

# **Summary of the Annual 2018 and 2019 Sablefish (*Anoplopoma fimbria*) Trap Survey, October 9 - November 19, 2018 and October 9 - November 19, 2019**

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2020

## **Canadian Technical Report of Fisheries and Aquatic Sciences nnn**



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by

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## **ABSTRACT**

Lacko, L.C. and Acheson, S.M. and Connors, B.M. 2020. Summary of the Annual 2018 and 2019 Sablefish (*Anoplopoma fimbria*) Trap Survey, October 9 - November 19, 2018 and October 9 - November 19, 2019. Can. Tech. Rep. Fish. Aquat. Sci. nnn: vi + 66 p.

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## RÉSUMÉ

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## 1 Introduction

Sablefish (*Anoplopoma fimbria*) are a commercially valuable species currently managed in British Columbia (BC) as part of the Integrated Fisheries Management Plan (IFMP) and harvested using trap, longline and trawl gear. For the past ten years (2010 to 2019), BC British Columbia fishermen have landed an average of approximately 2122 metric tons of sablefish annually. The majority of sablefish in 2018 were captured by longline hook gear (51%) and longline trap gear (39%). The majority of sablefish in 2019 were captured by longline trap gear (51%) and longline hook gear (43%). Fisher-log records plotted in a GIS (Geographic Information Systems) show that the commercial harvest of sablefish typically occurs at depths up to 985 fathoms, along the steep-walled slopes off the west coast of Haida Gwaii (formerly Queen Charlotte Islands), in the complex troughs of Queen Charlotte Sound, and in the steep canyons and ridges off the west coast of Vancouver Island.

Fishery-independent research and assessment surveys for sablefish have been conducted in BC coastal waters since 1988. Survey procedures have evolved over time, but each year, the surveys consisted of fishing sets using trap gear at randomly selected and/or index sites. These surveys are used to obtain catch rate data for assessing stock abundance, gather biological sample records, monitor oceanographic data, and collect tag release and recapture data. Since 2011, the survey design has remained relatively the same; combining a stratified random sampling (StRS) design for sites along BC's continental shelf and the continuation of standardized index sites at 5 mainland inlets localities which have been fished since 2002. For details about past survey designs, see the historic overview provided by (Wyeth and Kronlund 2003) and (Wyeth et al. 2004a). For details on specific surveys conducted from 1988 through 1993 see (Smith et al. 1996); for surveys in 1994 and 1995 see (Downes et al. 1997); for surveys from 1996 to 2000 see (Wyeth and Kronlund 2003). For the 2001 through 2006 surveys see (Wyeth and Kronlund 2003), (Wyeth et al. 2004b), (Wyeth et al. 2004a) and (Wyeth et al. 2006), respectively.

This technical report describes survey operations and summarizes the data collected on the 2018 chartered survey aboard the F/V Ocean Pearl and the 2019 chartered survey aboard the F/V Pacific Viking. Tables and figures referred to in the main text are numbered sequentially. Tables and figures in the appendices are labelled with the letter code of the appendix and a sequential number, e.g. Table A.1 for first table in Appendix A.

## 2 Methods

### 2.1 SURVEY DESIGN

The methodology for 2018 and 2019 Sablefish research and assessment survey included a stratified random sampling design component, a traditional inlet component, a Rough-eye/Blackspotted Rockfish research project and a benthic impacts study.

Under the stratified random sampling design component, StRS fishing sets were conducted in randomly chosen 2 km x 2 km grid cells, nested within five spatial strata and three depth strata (

Figure 1). The random design began on the 2003 survey, with the purpose of distributing tag releases at random, collecting biological samples and developing a catch-rate based index of abundance (Wyeth and Kronlund 2003). It provided an alternative design to the historic traditional component (1990 to 2010) of the surveys.

Standardized fishing sets under the traditional component of the surveys had specific gear and sampling protocols. The purpose of the standardized sets were to collect catch rate data in order to index trends in abundance, tag fish and obtain biological samples. Standardized fishing sets occurred within mainland inlet localities during the 2018 and 2019 survey. The geographic boundaries of these localities are shown in Figure 1.

In order to evaluate the impact of fishing gear to the benthic habitat, camera sets were deployed during the 2012 through to 2017 Sablefish research and assessment surveys. Nuytco autonomous camera systems were attached to traps to capture video and still imaging. In addition, accelerometers were also deployed on many sets to gather orientation and movement data. During the 2018 and 2019 survey, only accelerometers were attached to traps.

### **2.1.1 STRATIFIED RANDOM SAMPLING SURVEY COMPONENT**

The main component of the 2018 and 2019 survey employed a stratified random sampling design (StRS). Grid cells measuring 2 by 2 square kilometers were nested in each of five spatial strata ( $S_1$  to  $S_5$ ) and three depth strata ( $RD_1$  to  $RD_3$ ). The three depth ranges included 100-250 fathoms, 250-450 fathoms and 450-750 fathoms. The start locations of the 2018 survey are shown in (Figure 2) and listed in detail in Appendix B. The start locations of the 2019 survey are shown in (Figure 2) and listed in detail in Appendix C.

Historically, from 2003 through 2005, five grid cells were randomly selected in each spatial-depth stratum. Then from 2006 through 2010, the number of grid cells randomly selected in each spatial-depth stratum was increased to six. After 2011, the grid cells were randomly chosen based on area and catch numbers (Table 1).

### **2.1.2 TRADITIONAL SURVEY COMPONENTS**

The traditional survey component in 2018 and 2019 included conducting standardized sets with specific bait and gear requirements at four mainland inlet localities. Trap gear was deployed near the center of each of the five localities in order to avoid the steep slopes characteristic of these channels/fjords.

A list of historic offshore indexing and tagging localities and a timeline marking the notable changes in these traditional components over the survey years is presented in Appendix A. Sets were conducted in offshore indexing localities from 1988 through to 2010 and offshore tagging localities were conducted at these sites from 1996 through to 2007.

### **2.1.3 Portland Inlet Mainland Inlet Locality**

Portland Inlet was the most northerly mainland inlet locality. It is located just north of Prince Rupert and is approximately 40 kilometers long. As with previous years, five standardized sets were conducted at this site during the 2018 and 2019 surveys. The geo-referenced set polylines in Portland Inlet from 2003 to 2019 are plotted in Figure 3.

### **2.1.4 Gil Island Mainland Inlet Locality**

The Gil Island locality is located south west of Kitimat and is situated in the entrance to Douglas Channel. As with previous years, five standardized sets were conducted at the Gil Island locality during the 2018 and 2019 surveys. The geo-referenced set polylines in Gil Island from 2003 to 2019 are shown in Figure 3.

### **2.1.5 Finlayson Channel Mainland Inlet Locality**

The Finlayson Channel locality extends north of Milbanke Sound and west of Roderick Island. As with previous years, five standardized sets were conducted at the Finlayson Channel locality during the 2018 and 2019 surveys. The geo-referenced set polylines in Finlayson Channel from 2003 to 2019 are plotted in Figure 3.

### **2.1.6 Dean/Burke Channel Mainland Inlet Locality**

Dean Channel extends north east from Fisher Channel on the north side of King Island and west of Bella Coola. Burke Channel is on the south side of King Island and south west of Bella Coola. As with previous years, five standardized sets were conducted at the Dean/Burke Channel locality during the 2018 and 2019 surveys. The geo-referenced set polylines in Dean/Burke Channel from 2003 to 2019 are shown in Figure 3.

## **2.2 CHARTERED VESSEL**

The F/V Ocean Pearl , skippered by Darcy Nichols and Mike Derry, completed a total of 111 sets between Oct 9 - Nov 19 , 2018. The F/V Pacific Viking , skippered by Albert (Deacon) Melnychuk, completed a total of 109 sets between Oct 8 - Nov 25 , 2019. Table 2 lists all the Sablefish research and assessment surveys conducted from 1988 to 2019. This table includes a unique identifier (GFBIO Trip) required to reference the data stored in the Fisheries and Oceans Pacific Groundfish database, GFBIO.

## **2.3 FISHING GEAR**

The longline trap gear consisted of a groundline resting on the ocean floor with 25 baited traps attached to beackets at 150 foot intervals along its length and 90 pound anchors at each end. The traps had a bottom hoop diameter of 54 inches and no escape rings. The trap web was a braided poly with an inner stretched mesh diameter of 2.5 inches. Inside, the tunnels were made of 2 inch green, braidless, knotless, rashell mesh. The main gear elements are shown in Figure 4.

Standard bait bags (6 by 12 inches) made of 1/8 inch web with a nylon drawstring and #7 stainless trolling snaps were included with the traps. The bait methods for each survey component are listed in Table 3.

## **2.4 DATA COLLECTION DURING GEAR DEPLOYMENT**

Gear was deployed on alternate days within the set target depth stratum and soaked between 22 and 26 hours. A set log paper form was filled out on the deck stern by the science staff recorder who had maximum visibility of the crew setting the 25 traps over the stern rail. The set log included the time and identity of the first and last buoys. The beackets and traps were tallied using checked boxes (trap on becket) or Xed boxes (no trap on becket). The TDR and CTD serial numbers were recorded with the associated trap number.

At the same time, a second science recorder in the wheelhouse completed the required fields in the EDAS (Electronic Data Acquisition Systems) bridge log tabular form series with the titles: header, fishing, spatial, gear specs, depths, environment, comments, usability and finish. The header tabular form included the details of the deployment set date, set number, gear and personnel. The fishing tabular form was used to record the start and end positions of each set at the time when the first and last traps were deployed over the stern. The geo-referenced positions were obtained from the Nobeltec Navigation software running on the bridge computer, delivered electronically through a NMEA data string. Next, the spatial tab fields were populated automatically with the details of the statistical fishing grounds of the set. The gear specifications tabular form included static fields applicable to trap gear and bait, and manual entry of the number of traps set. The depth tabular form recorded depths from the vessels depth sounder at one-minute intervals between the first and last traps being set. At the end of the set, the average of these depths would be used to calculate the mean setting bottom depth. The environment tabular form was completed with the manual entry of the water temperature, wind, sea and sky metrics during deployment. The remaining forms provided entry of comments, documentation of set usability and accounting of the total catch at the finish of the set. Details on electronic entry of the bridge log form is available in the GFBio Field User Guide 2018 and (Olsen 2010).

## **2.5 CATCH PROCESSING**

The charter EDAS Sablefish Trap Catch form was completed during hauling by the science staff recorder positioned at the Marel platform scale and haul computer. Each becket number, trap number, basket weight, count and basket use code (D = Discarded after weighing (processed as commercial catch), A = Sampled for LSMWO, T = Tagged and released, SD = Sublegal

discarded, F= Frames, NA = No Sablefish catch/Trap missing) were recorded. Crew members would alert the recorder about any damage to a trap (i.e. holes) to enter in the EDAS Trap Usability form. The use of the Sablefish catch in the 2018 and 2019 survey for each basket from a trap by fishing set is listed in Appendix D and Appendix E, respectively. Details on electronic entry of the trap catch form is available in the GFBio Field User Guide 2018 and (Olsen 2010).

## **2.6 BIOLOGICAL SAMPLING**

Biological sampling were completed for Sablefish, Yelloweye Rockfish and Rough-eye/Blackspotted specimens on the EDAS Fish Recording form. Measurements were electronically recorded for fork length (L), body weight (W), sex (S) and maturity level (M). Sagittal otoliths (O) were collected and stored for later age lab determination. In addition, tissue for DNA was collected for Rougheye and Blackspotted Rockfish complex. Since this complex have similar appearances with slight variations in colour markings and dorsal fin spine lengths, the sampler visually identified each specimen as either a Rougheye, Blackspotted or a Hybrid species. All legal-sized Sablefish (fork length > 55 cm) that were sacrificed for biological samples were dressed, frozen, and landed as commercial catch.

## **2.7 SABLEFISH TAGGING**

Fish destined to be tagged were transferred from the sorting area to the tagging tank. Fork length (mm) measurements taken by the science sampler were transported electronically to the EDAS Fish Recording form by the Scantrol measuring board. Next, the sampler inserted a tag with a unique identifier (UID) on the left side of each fish, 1 cm below and 2-3 cm behind the anterior insertion of the first dorsal fin. A Mark II Long Tagging gun loaded with Floy FD-94 T-bar anchor tags was used to tag the Sablefish specimens. Before release, any sampling errors, injuries or damage to the fish were documented on the Fish Recording form. Tag checks were performed systematically to ensure tag numbers on the data form matched those on the fish specimen.

## **2.8 SABLEFISH TAG RECOVERY**

Any previously tagged fish that was brought aboard may have been treated in one of several ways. First, the tagged fish may have been re-released with a new tag, with the previous tag removed and stored in a vial. Second, the tagged fish may have been retained for biological sampling if it had a tag from another country, or if it had sustained numerous injuries. For these specimens, both the tag and otoliths were stored in a vial. The Department later returns those tags released by foreign agencies. The vial numbers are scanned into the EDAS Tag Recovery Entry form and the tag numbers are entered later during the tag processing step.

## **2.9 OCEANOGRAPHIC SENSOR DATA COLLECTION**

A Sea-bird Bird SBE 39 temperature and pressure logger was placed in a protective plastic pipe and was attached to the inside of the middle or end traps on 107 sets in 2018 (Appendix B) and 105 sets in 2019 (Appendix C) during gear deployment. HOBO Pendant G Loggers, model UA-004-64, were also attached inside the same middle or end traps on 109 sets (2018) and 66 sets (2019). A single accelerometer was also placed just forward of the hauler post. These loggers use an internal three-axis accelerometer to measure acceleration in units of g-force ( $\text{m/s}^2$ ).

A Concerto CTD (conductivity, temperature and depth) sensor was placed inside the middle or end traps on 15 sets in 2018 and 13 sets in 2019. Data from the accelerometers, CTD sensors, SBE temperature and pressure loggers were processed after the set was complete using EDAS Upload Sensor Data form.

## **2.10 ELECTRONIC MONITORING (EM) VIDEO DATA COLLECTION**

At the time of hauling gear, the vessel's electronic monitoring (EM) system cameras were activated by the hydraulic sensor. Three standard analog cameras were positioned at optimal viewing angles to record the survey activities. Two analog cameras were positioned along the mast to record the catch as it was processed at the hopper. A third analog camera was positioned on the side of the wheelhouse to record the traps as they were brought over the rail. The video data from each set was reviewed by the catch recorder and an assistant shortly after the set to provide quality control.

### **3 Results and Discussion**

#### **3.1 CATCH RATES**

The annual catch rates (number of Sablefish/number of traps) for StRS sets are summarized with boxplots in Figure 5 for each depth stratum ( $RD_1$ - $RD_3$ ) since the stratified random sampling program began in 2003.

##### **3.1.1 Shallow depth stratum ( $RD_1$ )**

Catch rates in the shallow depth stratum have shown a gradual decline from 2003 to 2009 (~11 to 5 fish per trap). The catch rates rose again to an average of 8 fish per trap in 2010 and gradually declined from 2011 to 2014 (~7 to 4 fish per trap). An increase occurred in 2015 and 2016 (~8 and 6 fish per trap, respectively). The catch rates surged in 2017, 2018 and 2019 (~14, 13 and 19 fish per trap, respectively). In the shallow depth stratum the uncertainty was lowest in 2003 with a  $cv=0.73$ .

##### **3.1.2 Middle depth stratum ( $RD_2$ )**

Within all years, the highest catch rates were achieved in the middle depth stratum. Catch rates in the middle depth stratum have shown a gradual decline from 2003 to 2010 (~18 to 10 fish per trap) but an increase in 2011 (~14 fish per trap). Over 2012, 2013 and 2014 the catch rate fluctuated (~10, 12 and 10 fish per trap, respectively). In 2015, a significant rise to ~19 fish per trap occurred, followed by a drop in 2016 (~14 fish per trap). In the past three years, 2017, 2018 and 2019 a large significant increase was seen (~26, 37 and 47 fish per trap, respectively). In the middle depth stratum ( $RD_2$ ) the uncertainty was lowest in 2007,  $cv=0.39$

##### **3.1.3 Deep depth stratum ( $RD_3$ )**

Catch rates in the deep depth stratum ( $RD_3$ ) increased from 2003 to 2006 (~6 to 12 fish per trap) but declined in 2007 (~7 fish per trap). They rose again in 2008 (~9 fish per trap) but showed a significant drop in 2009 (~5 fish per trap). In 2010, 2011 and 2013, the catch rates averaged ~6 fish per trap, similar to those levels seen in the first two years of the survey. In 2012 and 2014, the catch rate dropped again to ~4 fish per trap. During 2015, 2016 and 2017, the catch rates remained low (~5, 3 and 6 fish per trap, respectively). Once again, the catch rates of ~9 fish per trap (2008) were seen in 2018. In 2019, the catch rate was the highest at 12 fish per trap. In the deep depth stratum ( $RD_3$ ) the uncertainty was lowest in 2004 and 2006  $cv=0.59$ .

### **3.2 CATCH COMPOSITION**

Fifty-three taxonomic groups were represented in the catches during the StRS design (Type 3 tagging) sets in 2018 (Table 4). These included ten roundfish species, thirteen rockfish species, three flatfish species and twenty-seven invertebrate species. Other than Sablefish, the most common species in order of total weight captured were Spiny dogfish (*Squalus acanthias*), Pacific halibut (*Hippoglossus stenolepis*), Lingcod (*Ophiodon elongatus*), Yelloweye rockfish (*Sebastes ruberrimus*) and Arrowtooth flounder (*Atheresthes stomias*).

Taxonomic groups were represented in the catches from traditional standardized sets conducted at mainland inlet localities in 2018 (Table 5). These included Pacific halibut roundfish species, HIPPOGLOSSUS STENOLEPIS rockfish species, 247 flatfish species and invertebrate species. The most common species captured, in order of total weights, other than Sablefish were Spiny dogfish (*Squalus acanthias*) and Pacific halibut (*Hippoglossus stenolepis*).

Fifty taxonomic groups were represented in the catches during the StRS design (Type 3 tagging) sets in 2019 (Table 6). These included eleven roundfish species, thirteen rockfish species, four flatfish species and twenty invertebrate species. Other than Sablefish, the most common species in order of total weight captured were Lingcod (*Ophiodon elongatus*), Pacific halibut (*Hippoglossus stenolepis*), Spiny dogfish (*Squalus acanthias*), Rougheye rockfish (*Sebastes aleutianus*) and Redbanded rockfish (*Sebastes babcocki*).

Twelve taxonomic groups were represented in the catches from traditional standardized sets conducted at mainland inlet localities in 2019 (Table 7). These included three roundfish species, no rockfish species, three flatfish species and six invertebrate species. The most common species captured, in order of total weights, other than Sablefish were two (Four) and NA (NA).

### **3.3 SABLEFISH SAMPLING**

During the 2018 random design survey, a total of 46808 Sablefish were caught. Of that total, 8458 were tagged and released and 4663 were retained for biological sampling. Of the tagged fish, 126 were previously tagged fish that were re-released with a new tag. Last, 5 were previously tagged fish that were retained for sampling (Appendix F).

Out of the 11607 Sablefish captured during the 2018 traditional survey (inlet standardized sets), 2507 were tagged and released, 1078 were used for biological sampling and 82 were previously tagged fish re-released with a new tag.

Overall, the StRS design sets had a higher proportion of females to males over the spatial strata S1, S2, S3 and S4 (Table 8). More females than males were seen in the shallow depth stratum within the spatial strata S1, S2, S3, S4 and S5. In the mid depth stratum, there were more males than females in S1, S2, S3, S4 and S5. The deepest depth stratum saw more females in spatial strata S1, S2 and S3. More females than males were sampled in all traditional mainland inlet localities and ranged from 58 to 74 percent females (Table 8).

During the 2019 random design survey, a total of 60965 Sablefish were caught. Of that total, 9143 were tagged and released and 4591 were retained for biological sampling. Of the tagged

fish, 98 were previously tagged fish that were re-released with a new tag. Last, 2 were previously tagged fish that were retained for sampling (Appendix G)

Out of the 17871 Sablefish captured during the 2019 traditional survey (inlet standardized sets), 2899 were tagged and released, 1068 were used for biological sampling and 56 were previously tagged fish re-released with a new tag.

Overall, the StRS design sets had a higher proportion of females to males over the spatial strata S1, S2, S3 and S4 (Table 9). More females than males were seen in the shallow depth stratum within the spatial strata S1, S2, S3, S4 and S5. In the mid depth stratum, there were more males than females in S1, S2, S3, S4 and S5. The deepest depth stratum saw more females in spatial strata S1, S2 and S3. More females than males were sampled in all traditional mainland inlet localities and ranged from 68 to 71 percent females (Table 9).

Figure 6 (top) shows the length frequency histograms for the 38165 female (left) and 35328 male (right) Sablefish sampled for length and sex during the StRS portion of the 2003 - 2019 surveys. Out of the 73577 Sablefish sampled for length and sex, 84 were looked at but no sex could be determined. The mean fork length ( $\bar{x}$ ) for females was 65.3 cm and the mean fork length ( $\bar{x}$ ) for males was 58.5 cm. Figure 6 (bottom) graphs the average length of male and female Sablefish by year.

The length (cm) weight (kg) relationships for male and female Sablefish are shown by the 2018 survey year (Figure 7, left) and the 2019 survey year (Figure 7, right). Female Sablefish grow faster and reach far greater size and weight compared to males.

### 3.4 SABLEFISH SUB-LEGAL ENCOUNTERS

The percentage of sub-legal Sablefish (<55 cm fork length) sampled in the StRS survey strata ( $S_1, S_2, S_3, S_4, S_5$ ) and depth strata ( $RD_1, RD_2, RD_3$ ) since 2003 are shown in Figure 8. More than half of the specimens that were sublegal were found in the southern strata ( $S_1$ ) within the mid-depth strata ( $RD_2$ ) in 2010 and 2012 through 2014. In 2017 and 2018, the sublegal specimen count was above 50% in the northern strata ( $S_4$  and  $S_5$ ) and mid-depth strata ( $RD_2$ ). In 2019, sublegal specimens dominated all StRS survey strata in the mid-depth strata ( $RD_2$ ). Only in 2011 and 2015, more than half of the sublegal specimens were sampled in southern most survey strata  $S_1$  from the shallow waters ( $RD_1$ ).

### 3.5 OTHER FISH SAMPLING

The biological data collected during the 2018 and 2019 surveys from species other than Sablefish are listed in Appendix H and Appendix I, respectively. Length, sex, maturity, otoliths and DNA samples were taken for 147 (2018) and 195 (2019) specimens of the Rougheye/Blackspotted Rockfish complex. Length, sex, maturity, otoliths were taken for 25 (2018) and 11 (2019) Shortraker Rockfish. In addition, length, sex, maturity, otoliths were taken for 150 (2018) and 49 (2019) Yelloweye Rockfish.

For Pacific Halibut, only length samples were performed on 147 (2018) and 247 (2019)

specimens. Last, a length sample was taken for 1 (2019) Pacific Sleeper shark.

### **3.6 RECOVERED TAGGED SABLEFISH**

During the 2018 and 2019 sablefish surveys, a recovered Sablefish with a tag may have been treated in several ways. First, the tagged fish may have been re-released with a new tag, and the previous tag removed. Second, the tagged fish may have been retained if it was from another agency or if it had sustained numerous injuries. Re-releases of recovered tagged fish have occurred during the survey years 1992 through 1997 and 2004 through 2019.

Table 10 lists the counts of DFO tagged fish released and recovered from 1991 through 2019 up to the time of this report. The highest number of recovered tags has occurred one year after release. Table 11 lists the number of tagged fish released by Groundfish management unit (GMU) area and the counts of tags recovered for the past 11 years. For the locations of the GMU areas, see Figure 1: ,inset. In general, the highest recovery count of tagged fish has occurred in the same area of release with the exception of those released in area 5D, which saw the more recoveries in area 5E.

### **3.7 SABLEFISH AGES**

Figure 9 show bubble plots for Sablefish that have been aged by year from StRS sets and offshore standardized sets, respectively. The size of the circles in the bubble plots is proportional to the number of fish ages, with fish age 35 and older included in one bubble. The numbers of fish aged for each year are stated at the top of each figure panel. The age with the highest proportion has been posted to the right of the bubble symbols for each year.

The highest proportion of male Sablefish sampled from StRS sets for the years 2003 through to 2011 showed a steady increment at 3, 5, 5, 6, 8, 8, 8, 10 and 12 years of age, respectively. Then, another increment began in 2012 through to 2016 at 4, 5, 7, 7 and 8 years of age. Last, the year 2017 was dominated by 3 year olds and 2018 by 5 year olds. (Figure 9, left).

The highest proportion of female Sablefish sampled from StRS sets for the years 2003 through to 2010 showed a steady increment at 3, 4, 5, 6, 7, 8, 9 and 10 years of age, respectively. Between 2011 and 2015, another increment started at 3, 4, 5, 6 and 7 years of age. In 2016, 2017 and 2018, the highest proportion of female Sablefish were ages 3, 4 and 5 (Figure 9, right).

In 1990, 1991 and 1992, male Sablefish from offshore standardized sets ages 4, 6 and 7 had accounted for the highest proportion of ages. Then, from 1993 through to 1999, the highest proportion of ages showed a steady increase at 3, 4, 6, 6, 7, 8 and 9 years of age, respectively. In 2000, the age accounting for the highest proportion of male Sablefish were 5 year olds, and in 2001 and 2002 the highest proportion were 7 year olds. Another steady increment began in 2003 through to 2009 with ages of 5, 5, 6, 6, 7, 8 and 9, respectively. (Figure 10, left).

In 1990, 4 year old female Sablefish had accounted for the highest proportion of ages from offshore standardized sets. Then older female fish showed up in 1991 at age 11 and in 1992 at age 7. Between 1993 through to 1998, the highest proportion of ages showed a steady

increment at 3, 4, 5, 6, 7 and 8 years of age, respectively. Over the next five years, the highest proportion of female Sablefish ages remained 5 years old in 1999, 2000, 2002 and 2003 with the exception of 6 years old in 2001. From 2004 through to 2009, the ages showed another steady increment of 4, 5, 6, 6, 8 and 8, respectively (Figure 10, right).

Historic data from all samples lists the oldest female Sablefish at 92 years of age collected in 2003 where as the oldest male Sablefish with the age of 96 years old was documented for the year 2018.

### **3.8 OCEANOGRAPHIC TEMPERATURES AND DEPTHS**

Co-plots of average temperatures and average depths by 1-degree latitude intervals from southwest Vancouver Island to northwest Haida Gwaii are shown for 2018 and 2019 in Figure 11. Although the number of sets that deployed Sea-bird SBE 39 loggers varied in each 1-degree latitude zone, the general trend shows that the average temperatures decrease with increased depth.

Figure 12 displays the average temperatures as reported from the Sea-bird SBE 39 temperature and depth loggers since 2006, at three depth intervals: 100-250 fathoms (183 to 457 meters), 250-450 fathoms (458-823 meters) and 450-750 fathoms (824-1372 meters). In the shallow waters, the lowest average temperature was 4.9 °C (2010) within the 54°- 55° latitude band. The highest average temperature was 7.3 °C (2015) in the southern 50° - 51° latitude band.

Moving into the mid-depth waters, from 458-823 meters, the lowest average temperature was 4 °C (2007) within the 52°-53 ° latitude band. The highest average temperature was 5.2 °C (2006) in the southern 48°- 49° latitude band. In the deepest waters, the lowest average temperature of 2.6 °C (2016) was found in the 54°- 55° latitude band and the highest average temperature was 3.9°C (2013) in the southern 49°-50° latitude band.

### **3.9 ACKNOWLEDGEMENTS**

The stock assessment survey and data report is the result of the collaborative efforts of many individuals. The Canadian Sablefish Management has provided coordination and support of the annual Sablefish survey since 1994. The scientific staff that conducted the 2018 Sablefish research charter included Kevin Baker, Guy Boxall and Talyn Ridgway of Archipelago Marine Research Ltd (AMR); and Schon Acheson, Brendan Connors, Grant Garner, Kathryn Temple, Daniel Williams, and Malcolm Wyeth of Fisheries and Oceans, Canada. The scientific staff that conducted the 2019 Sablefish research charter included Guy Boxall and Olivia Schaefer of Archipelago Marine Research Ltd (AMR); and Schon Acheson, Travis Bell, Brendan Connors, Lindsay Dealy, Kathryn Temple, Daniel Williams, and Malcolm Wyeth of Fisheries and Oceans, Canada.

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the 2019 survey successful. In 2019, the crew consisted of Deacon Melnychuk (skipper), Cody Melnychuk, Dave Holomego, Rick Schneider, Mike Zbojovsky and Rory Johnson.

#### **4 Tables and Figures**

Table 1. Count of random set locations selected from the set of 2x2km grid cells, within the five spatial strata ( $S_1$ - $S_5$ ) and three depth strata ( $RD_1$ - $RD_3$ ) for all years the random survey component has been conducted. The five spatial strata can be seen in Figure 1, and the depth strata include  $RD_1$  (100-250 fathoms),  $RD_2$  (250-450 fathoms) and  $RD_3$  (450-750 fathoms).

Year	Strata	RD1	RD2	RD3	Total	Year	Strata	RD1	RD2	RD3	Total	
2003	$S_1$	5	5	5	15	2011	$S_1$	7	8	8	23	
	$S_2$	5	5	5	15		$S_2$	7	7	8	22	
	$S_3$	5	5	5	15		$S_3$	14	6	6	26	
	$S_4$	5	5	5	15		$S_4$	6	6	6	18	
	$S_5$	5	5	5	15		$S_5$	7	7	7	21	
	<b>Total</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>75</b>		<b>Total</b>	<b>41</b>	<b>34</b>	<b>35</b>	<b>110</b>	
2004	$S_1$	5	5	5	15	2012	$S_1$	7	8	8	23	
	$S_2$	4	5	6	15		$S_2$	7	7	8	22	
	$S_3$	5	5	5	15		$S_3$	14	6	6	26	
	$S_4$	5	5	5	15		$S_4$	6	6	6	18	
	$S_5$	5	5	5	15		$S_5$	7	7	7	21	
	<b>Total</b>	<b>24</b>	<b>25</b>	<b>26</b>	<b>75</b>		<b>Total</b>	<b>41</b>	<b>34</b>	<b>35</b>	<b>110</b>	
2005	$S_1$	5	5	5	15	2013	$S_1$	6	8	5	19	
	$S_2$	5	5	5	15		$S_2$	5	8	5	18	
	$S_3$	5	5	5	15		$S_3$	8	6	5	19	
	$S_4$	5	5	5	15		$S_4$	6	6	5	17	
	$S_5$	4	5	5	14		$S_5$	6	7	5	18	
	<b>Total</b>	<b>24</b>	<b>25</b>	<b>25</b>	<b>74</b>		<b>Total</b>	<b>31</b>	<b>35</b>	<b>25</b>	<b>91</b>	
2006	$S_1$	6	6	6	18	2014	$S_1$	6	8	5	19	
	$S_2$	6	6	6	18		$S_2$	6	7	5	18	
	$S_3$	6	6	6	18		$S_3$	8	6	5	19	
	$S_4$	6	6	6	18		$S_4$	6	6	5	17	
	$S_5$	6	6	6	18		$S_5$	6	7	5	18	
	<b>Total</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>90</b>		<b>Total</b>	<b>32</b>	<b>34</b>	<b>25</b>	<b>91</b>	
2007	$S_1$	6	6	6	18	2015	$S_1$	6	8	5	19	
	$S_2$	6	6	6	18		$S_2$	6	7	5	18	
	$S_3$	6	6	6	18		$S_3$	8	6	5	19	
	$S_4$	6	6	6	18		$S_4$	6	6	5	17	
	$S_5$	6	6	6	18		$S_5$	6	7	5	18	
	<b>Total</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>90</b>		<b>Total</b>	<b>32</b>	<b>34</b>	<b>25</b>	<b>91</b>	
2008	$S_1$	6	6	6	18	2016	$S_1$	6	8	5	19	
	$S_2$	6	6	6	18		$S_2$	6	7	5	18	
	$S_3$	6	6	6	18		$S_3$	8	6	5	19	
	$S_4$	6	6	6	18		$S_4$	6	6	5	17	
	$S_5$	6	6	6	18		$S_5$	6	7	5	18	
	<b>Total</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>90</b>		<b>Total</b>	<b>32</b>	<b>34</b>	<b>25</b>	<b>91</b>	
2009	$S_1$	6	6	6	18	2017	$S_1$	6	8	5	19	
	$S_2$	6	6	6	18		$S_2$	6	7	5	18	
	$S_3$	6	6	6	18		$S_3$	8	6	5	19	
	$S_4$	6	6	6	18		$S_4$	6	6	3	15	
	$S_5$	6	6	6	18		$S_5$	6	7	5	18	
	<b>Total</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>90</b>		<b>Total</b>	<b>32</b>	<b>34</b>	<b>23</b>	<b>89</b>	
2010	$S_1$	6	6	6	18	2018	$S_1$	6	8	5	19	
	$S_2$	6	6	6	18		$S_2$	6	7	5	18	
	$S_3$	6	6	6	18		$S_3$	8	6	5	19	
	$S_4$	6	6	6	18		$S_4$	6	6	5	17	
	$S_5$	4	6	6	16		$S_5$	6	7	5	18	
	<b>Total</b>	<b>28</b>	<b>30</b>	<b>30</b>	<b>88</b>		<b>Total</b>	<b>32</b>	<b>34</b>	<b>25</b>	<b>91</b>	
2019												
$S_1$												
6												
$S_2$												
6												
$S_3$												
8												
$S_4$												
6												
$S_5$												
5												
<b>Total</b>												
<b>31</b>												
<b>35</b>												
<b>23</b>												
<b>89</b>												

Table 2. British Columbia Sablefish research and assessment surveys, 1988 to 2019.

Year	Dates	Vessel	Captain	Set.Count	GFBIO.Trip
1988	Oct 28 - Nov 24	VICIOUS FISHER	VANCE FLETCHER	16	43990
1989	Oct 19 - Nov 18	LA PORSCHE	SIGURD BRYNJOLFSON	29	43910
1990	Nov 8 - Nov 18	VIKING STAR	DOUG FARRINGTON	24	43750
1991	Oct 9 - Oct 29	W. E. RICKER	ALAN FARRINGTON	32	43673
1992	Oct 13 - Nov 4	W. E. RICKER	RON ROBERTS	38	43670
1993	Oct 19 - Nov 11	W. E. RICKER	ALAN FARRINGTON	42	43650
1994	Oct 13 - Oct 31	LA PORSCHE	RICHARD BEAUVAIS	39	43630
1994	Oct 18 - Nov 13	WESTERN VIKING	RICK JONES	27	43390
1995	Oct 8 - Oct 20	OCEAN PEARL	ROBERT FRAUMENI	29	43270
1995	Oct 11 - Oct 28	VICTOR F	MICHAEL DERRY	34	43330
1995	Oct 1 - Oct 31	VIKING SUNRISE	JASON OLSEN	40	43350
1996	Sep 26 - Oct 10	OCEAN PEARL	MICHAEL DERRY	32	43039
1996	Sep 30 - Oct 22	VIKING STAR	OTTO ELVAN	49	43210
1996	May 10 - May 30	VIKING SUNRISE	ALBERT (DEACON) MELNYCHUK	42	43024
1997	Sep 26 - Oct 21	OCEAN PEARL	MICHAEL DERRY	74	42699
1997	May 20 - Jun 10	VIKING SUNRISE	ALBERT (DEACON) MELNYCHUK	42	42760
1998	Sep 22 - Oct 17	OCEAN PEARL	MICHAEL DERRY	89	41122
1999	Sep 29 - Oct 30	OCEAN PEARL	MICHAEL DERRY	109	40589
2000	Oct 8 - Nov 14	PACIFIC VIKING	ALBERT (DEACON) MELNYCHUK	131	40517
2001	Oct 6 - Nov 6	OCEAN PEARL	MICHAEL DERRY	134	43233
2002	Oct 4 - Nov 7	PACIFIC VIKING	ALBERT (DEACON) MELNYCHUK	125	48120
2002	Oct 5 - Nov 13	VIKING SUNRISE	JASON OLSEN	90	48110
2003	Oct 15 - Nov 13	OCEAN PEARL	MICHAEL DERRY	94	52100
2003	Oct 7 - Nov 10	VIKING STAR	JIM FARRINGTON	84	52120
2004	Oct 5 - Nov 15	MILBANKE SOUND	DON QUAST	95	58145
2004	Oct 5 - Nov 3	OCEAN MARAUDER	ALBERT (DEACON) MELNYCHUK	84	57360
2005	Oct 4 - Nov 2	PACIFIC VIKING	ALBERT (DEACON) MELNYCHUK	84	60529
2005	Oct 7 - Nov 17	VIKING SUNRISE	RORY JOHNSON	88	60503
2006	Oct 1 - Nov 1	PACIFIC VIKING	ALBERT (DEACON) MELNYCHUK	98	62966
2006	Oct 2 - Nov 15	SENA II	TIM JOYS	98	62666
2007	Oct 7 - Nov 12	PACIFIC VIKING	ALBERT (DEACON) MELNYCHUK	99	65106
2007	Oct 8 - Nov 12	VIKING TIDE	JASON OLSEN	91	65107
2008	Sep 29 - Nov 16	OCEAN PEARL	ROBERT FRAUMENI	157	67007
2009	Oct 8 - Nov 25	OCEAN PEARL	ROBERT FRAUMENI	155	69067
2010	Oct 9 - Nov 30	OCEAN PEARL	ROBERT FRAUMENI	153	70787
2011	Oct 9 - Nov 21	OCEAN PEARL	DARCY NICHOLS	132	72067
2012	Oct 9 - Nov 17	OCEAN PEARL	DARCY NICHOLS	135	73190
2013	Oct 11 - Nov 17	PACIFIC VIKING	ALBERT (DEACON) MELNYCHUK	111	74872
2014	Oct 9 - Nov 17	OCEAN PEARL	DARCY NICHOLS	111	76150
2015	Oct 9 - Nov 20	PACIFIC VIKING	ALBERT (DEACON) MELNYCHUK	111	77830
2016	Oct 7 - Nov 22	OCEAN PEARL	DARCY NICHOLS	111	80471
2017	Oct 6 - Nov 21	PACIFIC VIKING	ALBERT (DEACON) MELNYCHUK	109	82790
2018	Oct 9 - Nov 19	OCEAN PEARL	DARCY NICHOLS	111	84250
2019	Oct 8 - Nov 25	PACIFIC VIKING	ALBERT (DEACON) MELNYCHUK	109	85230

Table 3. Components of the 2018 and 2019 Sablefish research and assessment surveys.

Component	Bait	Locations	Sampling Protocol
Stratified random sampling, (StRS) Type 3 (Random tagging)	2 lbs frozen squid (bagged) 10 lbs Hake (loose)	Five spatial strata (S1-S5)	1/3 of traps used for tagging (<125 pieces), 1/3 of traps used for biosamples, (50 piece LSWMO) 1/3 of traps discarded
Traditional Inlet Standardized	2 lbs frozen squid (bagged)	Dean/Burke Channel Finlayson Channel Gil Island Portland Inlet	1/2 of traps used for tagging, 1/2 of traps used for biosample (50 piece LSWMO)

Table 4. Summary of species captured during the 2018 survey Type 3 tagging sets (StRS design) conducted by the Ocean Pearl. No value in the weight column indicates that the catch was not weighed. No value in both weight and count indicates a trace weight recorded from a trap of less than 1 kg.

Category	Common Name	Scientific Name	Count	Weight(kg)
Roundfish Species	Sablefish	ANOPLOPOMA FIMBRIA	99246	
	Spiny dogfish	SQUALUS ACANTHIAS	2973	
	Lingcod	OPHIODON ELONGATUS	1912	
	Pectoral rattail	ALBATROSSIA PECTORALIS	377	
	Pacific grenadier	CORYPHAENOIDES ACROLEPIS	332	
	Pacific cod	GADUS MACROCEPHALUS	11	
	Pink snailfish	PARALIPARIS ROSACEUS	10	
	Pacific flatnose	ANTIMORA MICROLEPIS	8	
	Black hagfish	EPTATRETUS DEANI	1	
	Spotted ratfish	HYDROLAGUS COLLIEI	1	
Rockfish Species	Yelloweye rockfish	SEBASTES RUBERRIMUS	1158	
	Redbanded rockfish	SEBASTES BABCOCKI	389	
	Rougheye rockfish	SEBASTES ALEUTIANUS	342	
	Shortraker rockfish	SEBASTES BOREALIS	80	
	Shortspine thornyhead	SEBASTOLOBUS ALASCANUS	58	
	Canary rockfish	SEBASTES PINNIGER	17	
	Rosethorn rockfish	SEBASTES HELVOMACULATUS	2	
	Silvergray rockfish	SEBASTES BREVISPINIS	2	
	Pacific ocean perch	SEBASTES ALUTUS	1	
	Sharpchin rockfish	SEBASTES ZACENTRUS	1	
		SEBASTES	1	
	Aurora rockfish	SEBASTES AURORA	1	
Flatfish Species	Longspine thornyhead	SEBASTOLOBUS ALTIVELIS	2	
	Pacific halibut	HIPPOGLOSSUS STENOLEPIS	2492	
Invertebrate Species	Arrowtooth flounder	ATHERESTHES STOMIAS	678	
	Dover sole	MICROSTOMUS PACIFICUS	8	
	Grooved Tanner Crab	CHIONOECETES TANNERI	119	
Invertebrate Species	Red Queen Crab	LITHODES COUESI	14	
	Brown box crab	PARALOMIS MULTISPINA	10	
	Oregon triton	ALLOCENTROTUS FRAGILIS	8	
	Anemone	LOPHOLITHODES FORAMINATUS	4	
	Fish-eating star	FUSITRITON OREGONENSIS	3	
	Golden king crab	NEPTUNEIDAE	2	
		NEPTUNEA	1	
		ACTINIARIA	1	
		STYLASTERIAS FORRERI	1	
		LITHODES AEQUISPINA	1	
		RATHBUNASTER CALIFORNICUS	4	
	Ophiuroidae	PORANIIDAE	1	
	Prawn	OPHIUROIDEA	1	
	Sea cucumber	PANDALUS PLATYCEROS	1	
	Soft sea cucumber	HOLOTHUROIDEA	1	
	Sweet potato sea cucumber	PSEUDOSTICHOPUS MOLLIS	1	
	Sea lilies and feather stars	MOLPADIA INTERMEDIA		
	Rose starfish	CRINODEA		
	Hermit crabs	CROSSASTER PAPPOSUS		
	Metridium	PAGURIDAE		
		METRIDIUM		
		TRITONIA		
		OPHIOSCOLEX		
		AMPHIOPHIURA PONDEROSA		
		HETEROZONIAS ALTERNATUS		
		LOPHASTER FURCILLIGER VEXATOR		

Table 5. Summary of species captured by the Ocean Pearl during the 2018 survey standardized sets conducted at mainland inlet localities. Null values indicate the catch was not counted or weighed. No value in both weight and count indicates a trace weight recorded from a trap of less than 1 kg.

Category	Common Name	Scientific Name	Count	Weight(kg)
Roundfish Species	Sablefish	ANOPLOPOMA FIMBRIA	1	19908
	Codfishes	GADIDAE		
Rockfish Species	Shortraker rockfish	SEBASTES BOREALIS	6	5
	Shortspine thornyhead	SEBASTOLOBUS ALASCANUS		
	Rougheye rockfish	SEBASTES ALEUTIANUS		
	Aurora rockfish	SEBASTES AURORA		
Flatfish Species	Pacific halibut	HIPPOGLOSSUS STENOLEPIS	495	33
	Arrowtooth flounder	ATHERESTHES STOMIAS		
Invertebrate Species	Mud star	CTENODISCUS CRISPATUS	15	1
	Oregon triton	FUSITRITON OREGONENSIS		
	Redclaw crab	CHORILIA LONGIPES		
	Sea cucumber	HOLOTHUROIDEA		
	Vermillion starfish	MEDIASTER AEQUALIS		
		MAIIDAE		
		NEPTUNEA		
	Anemone	ACTINIARIA		
	Cookie star	CERAMASTER PATAGONICUS		
	Heart urchins	ATELOSTOMATA		

Table 6. Summary of species captured during the 2019 survey Type 3 tagging sets (StRS design) conducted by the Pacific Viking. No value in the weight column indicates that the catch was not weighed. No value in both weight and count indicates a trace weight recorded from a trap of less than 1 kg.

Category	Common Name	Scientific Name	Count	Weight(kg)
Roundfish Species	Sablefish	ANOPLOPOMA FIMBRIA	111296	
	Lingcod	OPHIODON ELONGATUS	1888	
	Spiny dogfish	SQUALUS ACANTHIAS	1318	
	Pacific grenadier	CORYphaenoides ACROLEPIS	172	
	Pectoral rattail	ALBATROSSIA PECTORALIS	150	
	Pacific sleeper shark	SOMNIOSUS PACIFICUS	12	
	Pacific cod	GADUS MACROCEPHALUS	10	
	Pacific flatnose	ANTIMORA MICROLEPIS	7	
	Pink snailfish	PARALIPARIS ROSACEUS	7	
	Darkfin sculpin	MALACOCOTTUS ZONURUS	1	
	Threadfin sculpin	ICELINUS FILAMENTOSUS		
Rockfish Species	Rougheye rockfish	SEBASTES ALEUTIANUS	502	
	Redbanded rockfish	SEBASTES BABCOCKI	386	
	Yelloweye rockfish	SEBASTES RUBERRIMUS	168	
	Shortraker rockfish	SEBASTES BOREALIS	45	
	Shortspine thornyhead	SEBASTOLOBUS ALASCANUS	31	
	Yellowmouth rockfish	SEBASTES REEDI	5	
	Silvergray rockfish	SEBASTES BREVISPINIS	3	
	Rosethorn rockfish	SEBASTES HELVOMACULATUS	3	
		SEBASTES	3	
	Canary rockfish	SEBASTES PINNiger	2	
	Aurora rockfish	SEBASTES AURORA	1	
	Longspine thornyhead	SEBASTOLOBUS ALTIVELIS	4	
	Sharpchin rockfish	SEBASTES ZACENTRUS	2	
Flatfish Species	Pacific halibut	HIPPOGLOSSUS STENOLEPIS	1884	
	Arrowtooth flounder	ATHERESTHES STOMIAS	229	
	Dover sole	MICROSTOMUS PACIFICUS	8	
	Petrale sole	EOPSETTA JORDANI	7	
Invertebrate Species	Grooved Tanner Crab	CHIONOECETES TANNERI	143	
	Oregontriton	FUSITRITON OREGONENSIS	9	
	Red Queen Crab	LITHODES COUESI	9	
	Giant pacific octopus	ENTEROCTOPUS DOFLEINI	3	
	Brown box crab	LOPHOLITHODES FORAMINATUS	1	
		ALLOCENTROTUS FRAGILIS	1	
		PARALOMIS MULTISPINA	1	
	Starfish	NEPTUNEA	6	
	Jellyfish	RATHBUNASTER CALIFORNICUS	1	
	Ophiuroidea	SOLASTER	1	
	Rose starfish	ZOROASTERIDAE	1	
	Sea lilies and feather stars	ASTERIODEA	1	
		SCYPHOZOA		
		OPHIUROIDEA		
		CROSSASTER PAPPOSUS		
		CRINODEA		
		SOLASTERIDAE		
		TARASTER ALASCANUS		
		AMPHIOPHIURA PONDEROSA		
		BUCCINIDAE		

Table 7. Summary of species captured by the Pacific Viking during the 2019 survey standardized sets conducted at mainland inlet localities. Null values indicate the catch was not counted or weighed. No value in both weight and count indicates a trace weight recorded from a trap of less than 1 kg.

Category	Common Name	Scientific Name	Count	Weight(kg)
Roundfish Species	Sablefish	ANOPLOPOMA FIMBRIA	30270	7
	Spiny dogfish	SQUALUS ACANTHIAS		
Flatfish Species	Pacific sleeper shark	SOMNIOSUS PACIFICUS	1	247
	Pacific halibut	HIPPOGLOSSUS STENOLEPIS		
	Arrowtooth flounder	ATHERESTHES STOMIAS		
	Dover sole	MICROSTOMUS PACIFICUS		
Invertebrate Species		NEPTUNEA		
	Heart urchins	ATELOSTOMATA		
	Inshore Tanner Crab	CHIONOECETES BAIRDII		
	Mud star	CTENODISCUS CRISPATUS		
	Oregon triton	FUSITRITON OREGONENSIS		
	Vermillion starfish	MEDIASTER AEQUALIS		

Table 8. Summary of Sablefish biological data collected during the 2018 stratified random sets by spatial and depth stratum.

Spatial	Depth	Proportion		Mean Fork Length (mm)		
		Males	Females	Males	Females	Tagged
S1	RD1	0.43	0.57	580	635	611
	RD2	0.71	0.29	570	600	565
	RD3	0.33	0.67	558	621	585
		<b>0.49</b>	<b>0.51</b>	<b>569</b>	<b>619</b>	<b>587</b>
S2	RD1	0.26	0.74	591	636	607
	RD2	0.56	0.44	557	624	574
	RD3	0.22	0.78	569	653	625
		<b>0.35</b>	<b>0.65</b>	<b>572</b>	<b>638</b>	<b>602</b>
S3	RD1	0.19	0.81	557	628	610
	RD2	0.68	0.32	564	628	576
	RD3	0.31	0.69	568	655	603
		<b>0.39</b>	<b>0.61</b>	<b>563</b>	<b>637</b>	<b>596</b>
S4	RD1	0.21	0.79	618	649	658
	RD2	0.59	0.41	545	561	548
	RD3	0.65	0.35	613	676	640
		<b>0.48</b>	<b>0.52</b>	<b>592</b>	<b>629</b>	<b>615</b>
S5	RD1	0.28	0.72	585	633	590
	RD2	0.60	0.40	551	543	526
	RD3	0.62	0.38	592	634	602
		<b>0.50</b>	<b>0.50</b>	<b>576</b>	<b>603</b>	<b>573</b>
Dean/Burke Channel		0.34	0.66	487	539	521
Finlayson Channel		0.42	0.58	516	560	541
Gil Island		0.26	0.74	511	565	540
Portland Inlet		0.29	0.71	528	567	546
		<b>0.33</b>	<b>0.67</b>	<b>510</b>	<b>558</b>	<b>537</b>

Table 9. Summary of Sablefish biological data collected during the 2019 stratified random sets by spatial and depth stratum.

Depth Strata/Locality		Proportion		Mean Fork Length (mm)		
Spatial	Depth	Males	Females	Males	Females	Tagged
S1	RD1	0.43	0.57	580	635	611
	RD2	0.71	0.29	570	600	565
	RD3	0.33	0.67	558	621	585
		<b>0.49</b>	<b>0.51</b>	<b>569</b>	<b>619</b>	<b>587</b>
S2	RD1	0.26	0.74	591	636	607
	RD2	0.56	0.44	557	624	574
	RD3	0.22	0.78	569	653	625
		<b>0.35</b>	<b>0.65</b>	<b>572</b>	<b>638</b>	<b>602</b>
S3	RD1	0.19	0.81	557	628	610
	RD2	0.68	0.32	564	628	576
	RD3	0.31	0.69	568	655	603
		<b>0.39</b>	<b>0.61</b>	<b>563</b>	<b>637</b>	<b>596</b>
S4	RD1	0.21	0.79	618	649	658
	RD2	0.59	0.41	545	561	548
	RD3	0.65	0.35	613	676	640
		<b>0.48</b>	<b>0.52</b>	<b>592</b>	<b>629</b>	<b>615</b>
S5	RD1	0.28	0.72	585	633	590
	RD2	0.60	0.40	551	543	526
	RD3	0.62	0.38	592	634	602
		<b>0.50</b>	<b>0.50</b>	<b>576</b>	<b>603</b>	<b>573</b>
Dean/Burke Channel		0.32	0.68	513	553	534
Finlayson Channel		0.32	0.68	504	554	532
Gil Island		0.29	0.71	520	558	536
Portland Inlet		0.31	0.69	521	549	538
		<b>0.31</b>	<b>0.69</b>	<b>514</b>	<b>554</b>	<b>535</b>

Table 10. Count of tagged fish released since 1991 (including re-released) and counts of verified tag recoveries by year including any recoveries that had no reported year. The total count of tag recoveries represent the sum of all verified recoveries.

Year	Release	X91	X92	X93	X94	X95	X96	X97	X98	X99	X00	X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	
1991	2447	16	112	49	40	30	24	18	16	8	9	11	5	5	3	1	1	3	1	3	3	3	3	0	0	1	0	0	0	0		
1992	3586	0	15	131	99	66	51	33	45	31	9	20	15	6	3	4	3	4	3	4	7	0	4	2	2	0	1	0	0	0		
1993	7019	0	0	7	432	228	89	94	98	72	44	42	30	8	10	13	9	9	9	4	9	3	8	6	1	3	0	1	0	0		
1994	7044	0	0	0	13	421	253	238	229	127	77	61	46	14	17	21	10	5	8	2	6	6	5	4	0	2	0	1	0	0		
1995	15907	0	0	0	0	84	1573	957	606	372	247	164	90	50	57	26	43	22	15	13	12	16	15	3	7	6	6	3	3	1		
1996	28379	0	0	0	0	0	494	2326	1363	674	458	373	239	88	87	88	85	64	56	51	25	33	23	20	14	12	11	4	4	0		
1997	19782	0	0	0	0	0	0	1244	2326	913	496	369	244	94	72	93	100	62	60	34	20	18	29	21	8	6	5	5	3	0		
1998	21966	0	0	0	0	0	0	0	321	1746	1107	752	489	185	170	203	213	112	85	57	38	35	39	17	14	18	6	10	9	0		
1999	27412	0	0	0	0	0	0	0	0	234	2280	1434	938	354	397	334	280	164	122	61	56	58	43	42	23	18	16	19	21	3		
2000	22913	0	0	0	0	0	0	0	0	0	149	2044	931	320	313	288	233	139	108	66	80	39	49	15	16	24	8	14	10	5		
2001	18272	0	0	0	0	0	0	0	0	0	0	137	1565	418	468	383	396	187	155	69	60	33	45	42	15	23	23	10	11	10	0	
2002	19857	0	0	0	0	0	0	0	0	0	0	0	95	907	712	483	400	203	159	126	131	44	48	35	28	32	18	9	13	1		
2003	24658	0	0	0	0	0	0	0	0	0	0	0	0	0	0	166	1278	1037	635	356	271	183	119	89	82	46	30	36	23	16	13	0
2004	19328	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	1376	880	470	300	184	151	86	86	56	32	37	13	18	12	0	
2005	16511	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	1175	572	327	184	142	76	67	50	35	19	16	11	10	3	
2006	19335	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	288	1333	678	366	271	133	129	80	48	44	24	19	27	5	
2007	16598	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	203	1003	548	367	193	145	115	50	64	36	22	16	3	
2008	8300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71	378	278	132	82	54	30	30	22	14	10	0	
2009	7474	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	487	261	175	100	42	54	18	21	16	5		
2010	9921	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	402	349	179	71	86	55	35	26	5	0		
2011	12541	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	610	396	230	216	104	52	54	18	1	
2012	8725	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	462	243	230	113	68	62	13	0	
2013	7978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2014	6425	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	392	173	101	
2015	9788	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	35	325	208	155	31			
2016	8586	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	369	240	50	
2017	15693	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	532
2018	10965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	11
2019	12042	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 11. Counts of tagged fish recoveries by Groundfish management unit area (GMU).

Year	Area	Count	X3C	X3D	X4B	X5A	X5B	X5C	X5D	X5E	UN	USA	Total
2009	3C: S.W. VANCOUVER ISLAND	1380	112	24	0	2	0	0	0	1	7	12	158
2010		887	56	21	0	2	1	0	0	2	2	7	91
2011		1785	131	36	0	4	2	0	0	7	9	13	202
2012		1102	63	16	0	1	1	0	0	1	3	4	89
2013		1131	61	9	0	1	0	0	0	0	4	8	83
2014		636	13	1	0	0	0	0	0	0	1	2	17
2015		1786	75	28	0	0	2	0	0	3	4	17	129
2016		1719	90	15	0	3	0	0	0	2	2	8	120
2017		2038	78	20	0	0	0	0	0	3	2	1	104
2018		2119	25	8	0	0	1	0	0	0	1	0	35
2019		1530											0
2009	3D: N.W. VANCOUVER ISLAND	746	8	63	0	5	1	0	0	2	0	3	82
2010		1929	39	147	0	12	2	0	0	7	10	14	231
2011		1684	9	117	0	9	1	1	0	5	3	7	152
2012		1011	8	70	0	9	3	0	0	1	2	3	96
2013		1039	6	101	0	6	2	0	0	1	0	5	121
2014		1403	11	106	0	7	0	0	0	5	3	1	133
2015		1721	13	70	0	1	4	0	0	3	4	7	102
2016		1189	16	68	0	11	1	0	0	7	0	8	111
2017		3137	20	127	0	17	1	0	0	13	1	7	186
2018		1668	0	14	0	0	0	0	0	1	0	0	15
2019		1968											0
2009	5A: SOUTHERN Q.C. SOUND	978	1	7	0	63	10	0	0	10	3	3	97
2010		844	0	2	0	66	16	1	0	3	6	9	103
2011		964	3	27	0	60	13	0	1	8	5	4	121
2012		473	4	12	0	45	8	1	0	3	2	2	77
2013		614	0	18	0	60	7	0	0	3	1	5	94
2014		860	2	6	0	51	13	0	0	6	2	2	82
2015		852	1	18	0	35	4	0	0	2	3	2	65
2016		853	1	21	0	32	6	0	0	9	2	1	72
2017		638	1	7	0	24	4	0	0	4	1	2	43
2018		1011	0	2	0	7	0	0	0	5	0	0	14
2019		1238											0
2009	5B: NORTHERN Q.C. SOUND	900	1	2	0	9	90	0	0	28	6	6	142
2010		1219	4	12	1	14	34	1	0	8	5	10	89
2011		1731	7	20	0	36	85	0	0	21	3	18	190
2012		1571	9	16	0	25	105	0	0	31	2	16	204
2013		1451	2	5	0	10	59	1	0	16	2	10	105
2014		663	0	7	0	4	49	0	0	16	0	4	80
2015		1741	1	12	0	6	51	1	0	23	0	2	96
2016		1531	0	7	0	14	51	0	0	8	2	7	89
2017		2182	2	5	0	6	47	1	0	14	2	7	84
2018		1666	0	0	0	2	11	0	0	3	0	0	16
2019		2091											0
2009	5C: SOUTHERN HECATE STRAIT	1142	4	19	0	30	86	24	0	56	22	18	259
2010		2591	9	43	0	31	60	128	1	53	31	33	389
2011		2885	21	77	0	95	74	105	2	58	19	46	497
2012		1874	4	74	0	44	51	51	0	25	11	21	281
2013		799	3	17	0	15	26	9	0	11	2	10	93
2014		824	0	10	0	11	37	20	0	25	0	14	117
2015		799	0	8	0	7	21	16	0	13	1	6	72
2016		1035	1	7	0	3	11	33	0	18	1	11	85
2017		1862	0	1	0	6	5	64	0	11	4	6	97
2018		1384	0	0	0	0	0	28	0	3	0	0	31
2019		1460											0
2009	5D: NORTHERN HECATE STRAIT	984	0	5	0	4	5	0	18	117	20	40	209
2010		895	3	10	0	7	20	1	9	91	16	47	204
2011		1483	5	35	0	25	35	0	10	87	9	18	224
2012		771	6	24	0	18	10	0	8	51	4	22	143
2013		715	1	1	0	2	8	0	4	66	3	55	140

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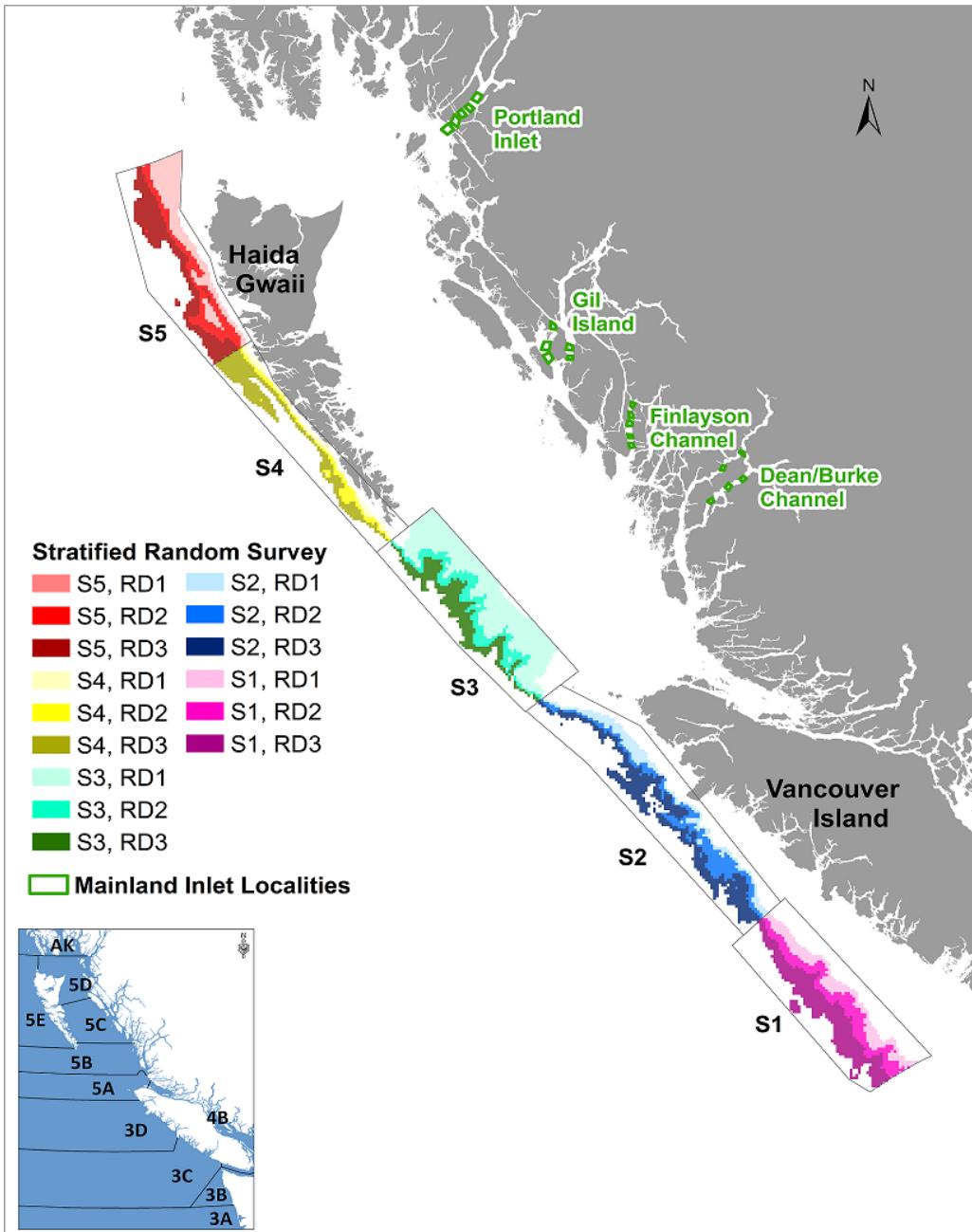


Figure 1. Location of the boundaries of the mainland inlet localities, and the five spatial areas ( $S_1-S_5$ ) of the stratified random survey design. The three depths strata ( $RD_1-RD_3$ ) are colour-coded, nested within each of the five spatial strata.

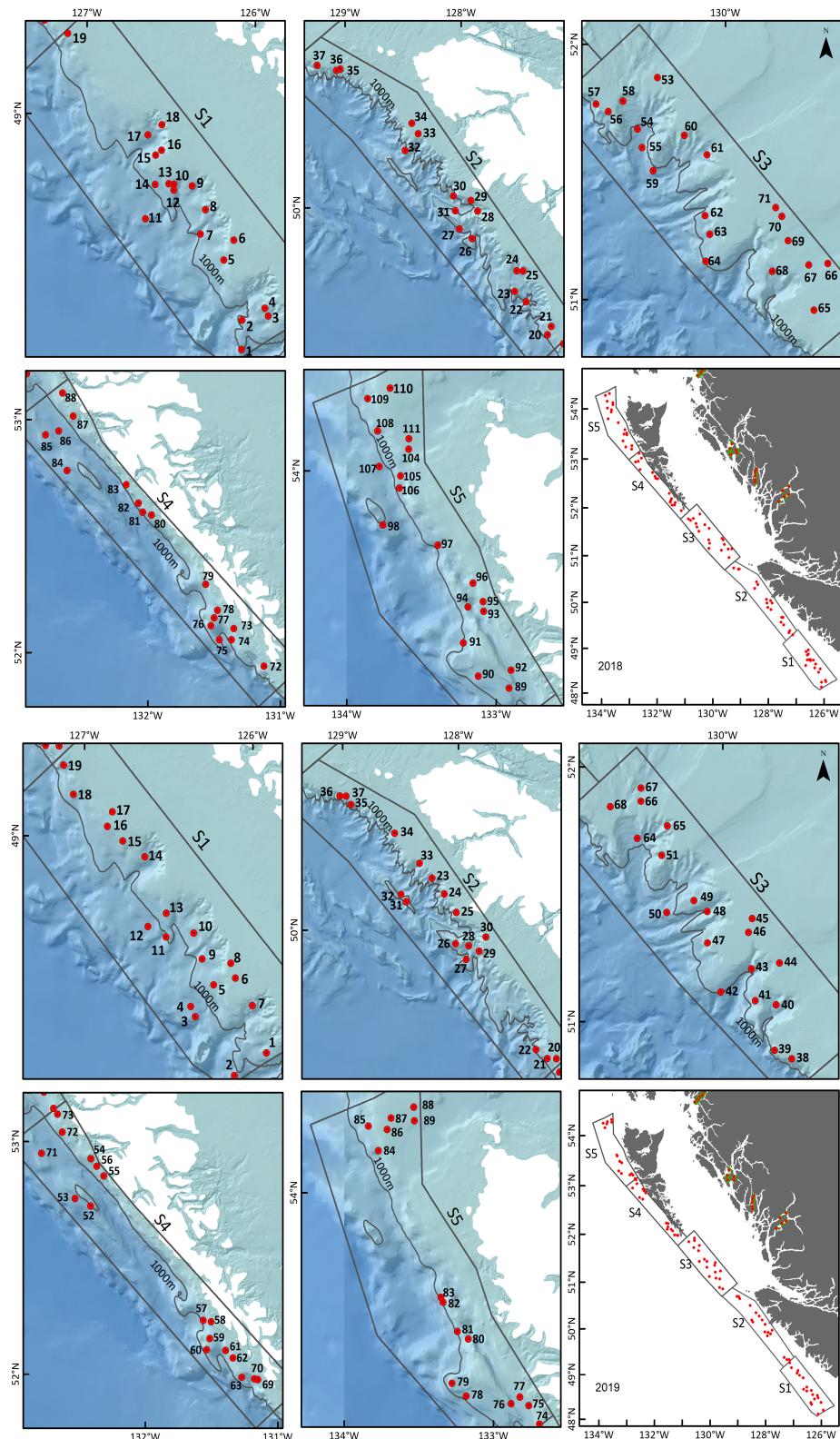


Figure 2. Start locations of survey sets (red markers) conducted in 2018 (top) and 2019 (bottom) for the stratified random survey areas  $S_1$  through  $S_5$ .

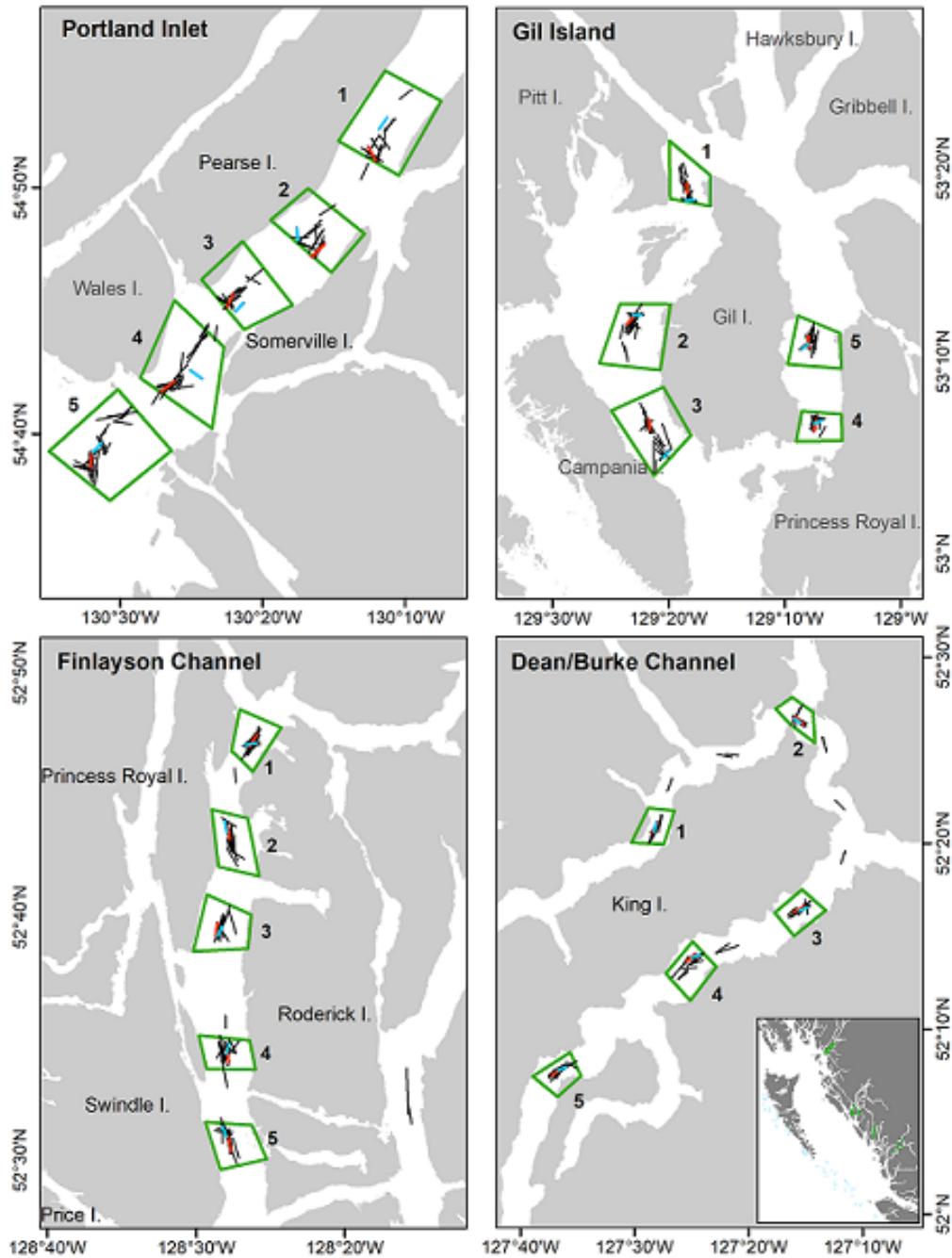


Figure 3. Location of the traditional survey sets within the mainland inlet localities since 1994. The setlines for 2018 are shown in blue and setlines for 2019 are shown in red.

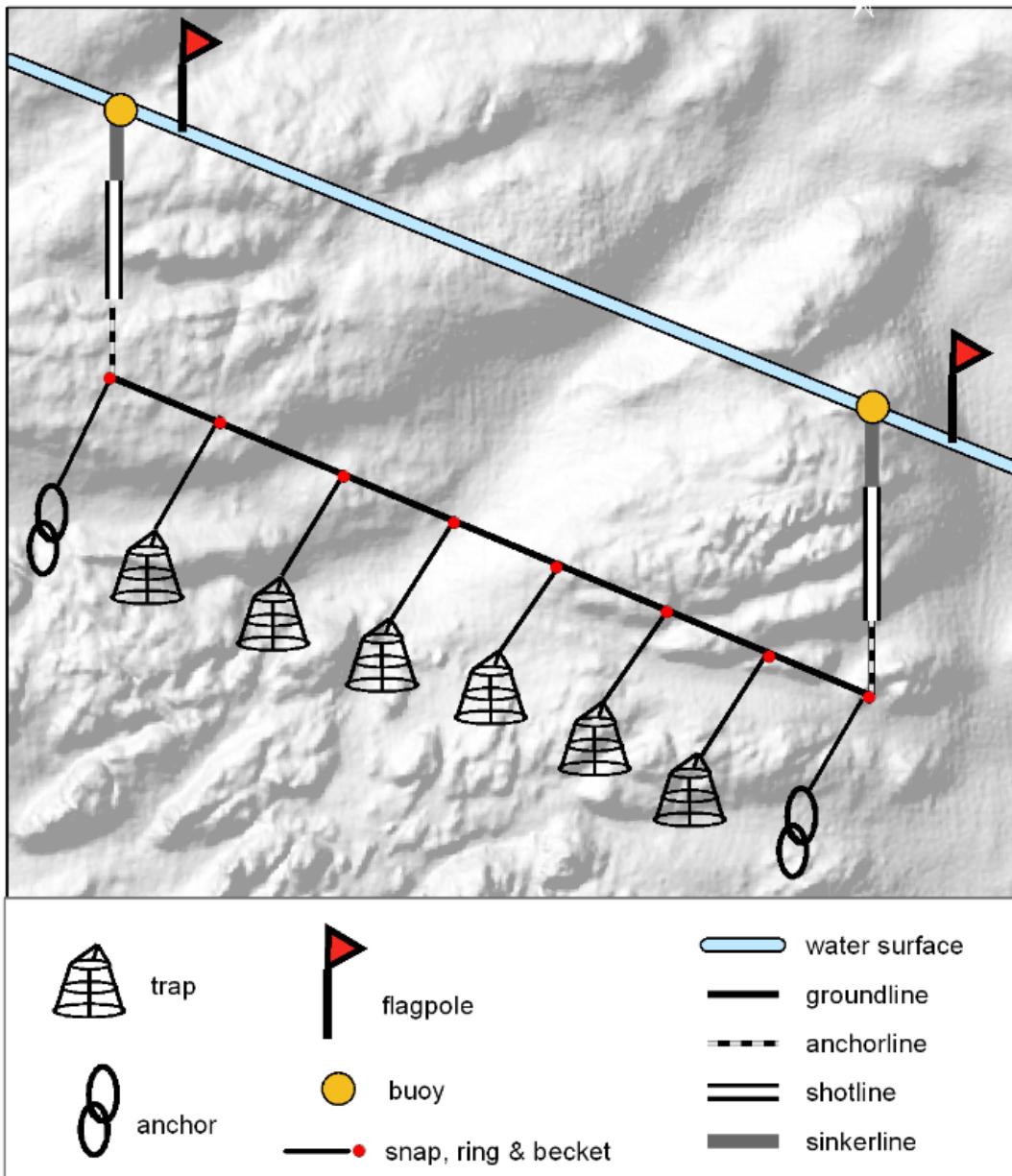


Figure 4. Trap gear elements consisting of 25 baited traps snapper to beackets along a groundline.

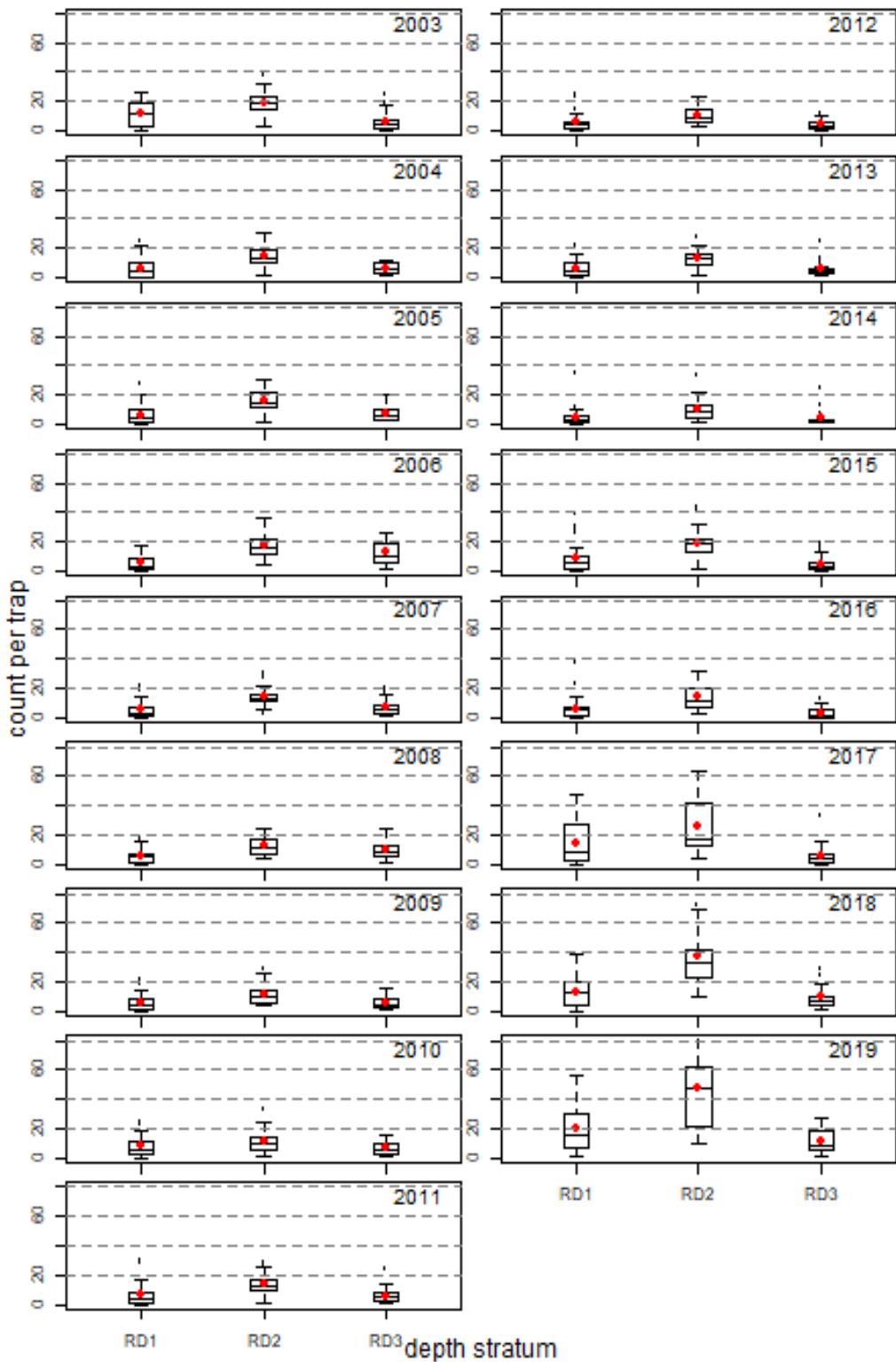


Figure 5. Distribution of yearly catch rates for Type 3 tagging sets summarised by a boxplot. Each panel shows catch rates grouped by depth strata from shallow to deep (RD<sub>1</sub>-RD<sub>3</sub>) for each year the past 10 years of the StRS survey. The filled circles show the mean catch rates for each depth stratum.

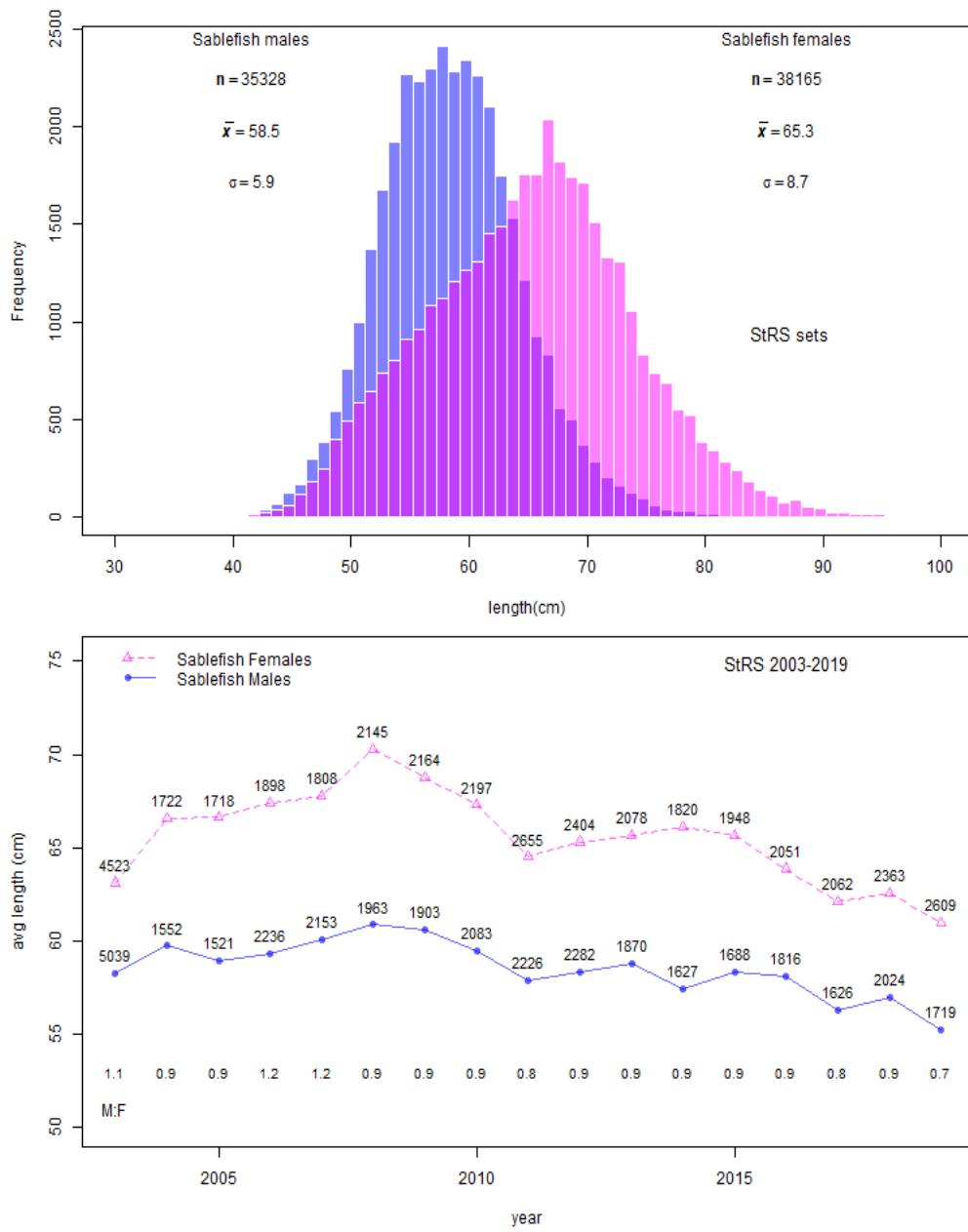


Figure 6. Top: Length frequencies for male Sablefish (blue-violet) and female Sablefish(fuchsia) up to 2019 for all StRS sets. The number of specimens is denoted by the letter n, the mean indicated by the xbar and the standard deviation is represented by the symbol sigma. Bottom: Average length of male and female Sablefish by year.

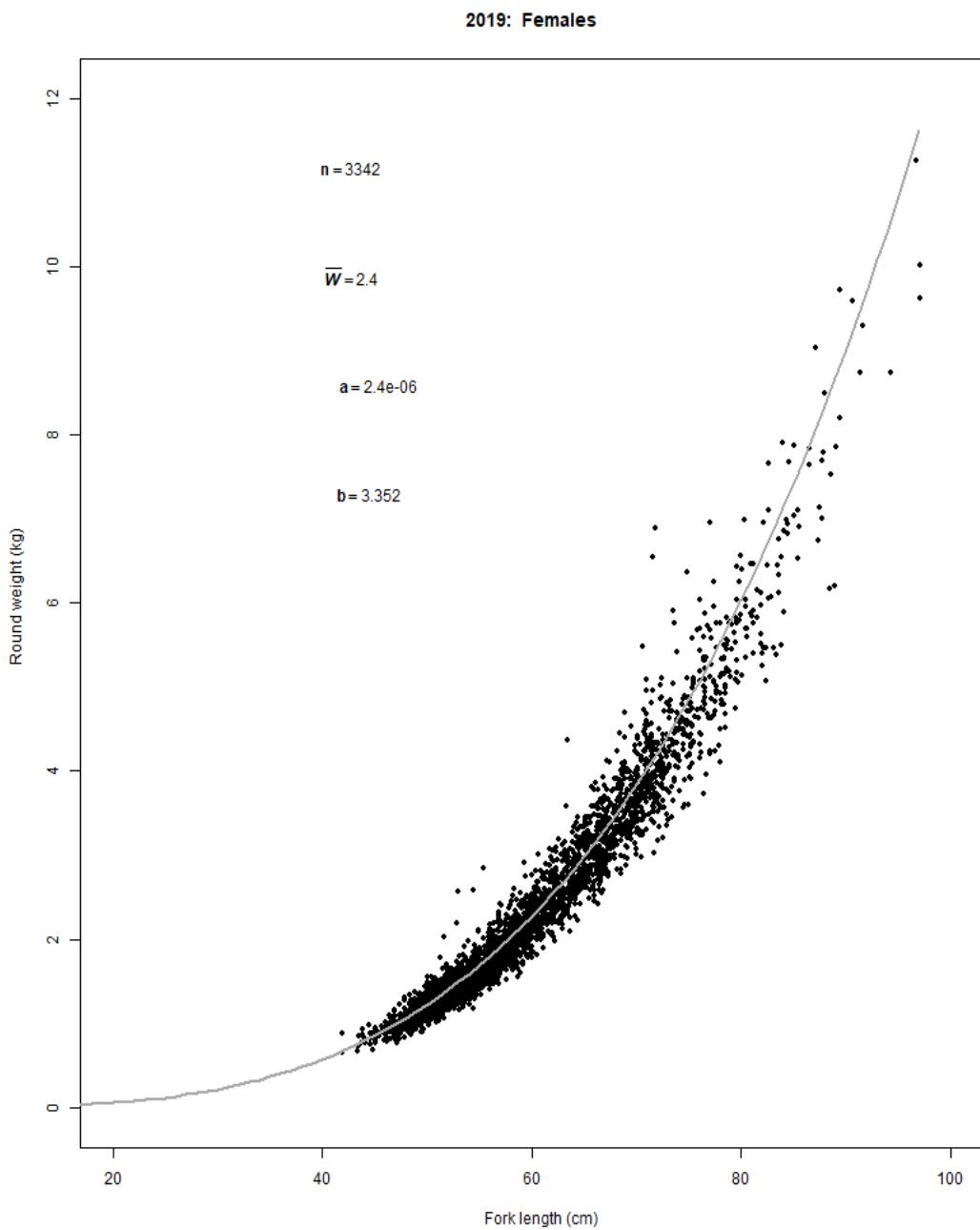


Figure 7. Sablefish fork length (L in cm) vs weight (W in kg) for males and females for the 2018 and 2019 surveys.

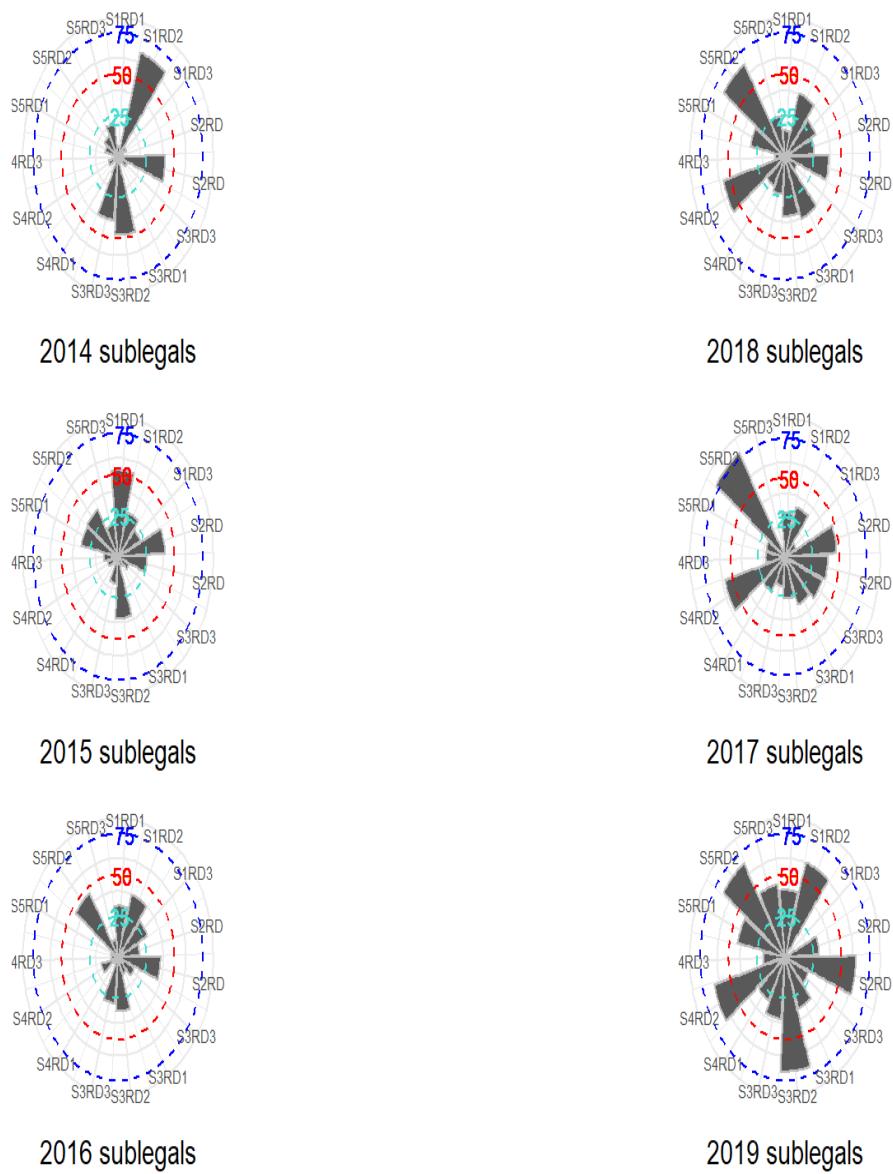


Figure 8. The percentage of sub-legal Sablefish (<55 cm fork length) sampled in the StRS survey strata and depth strata since 2014.

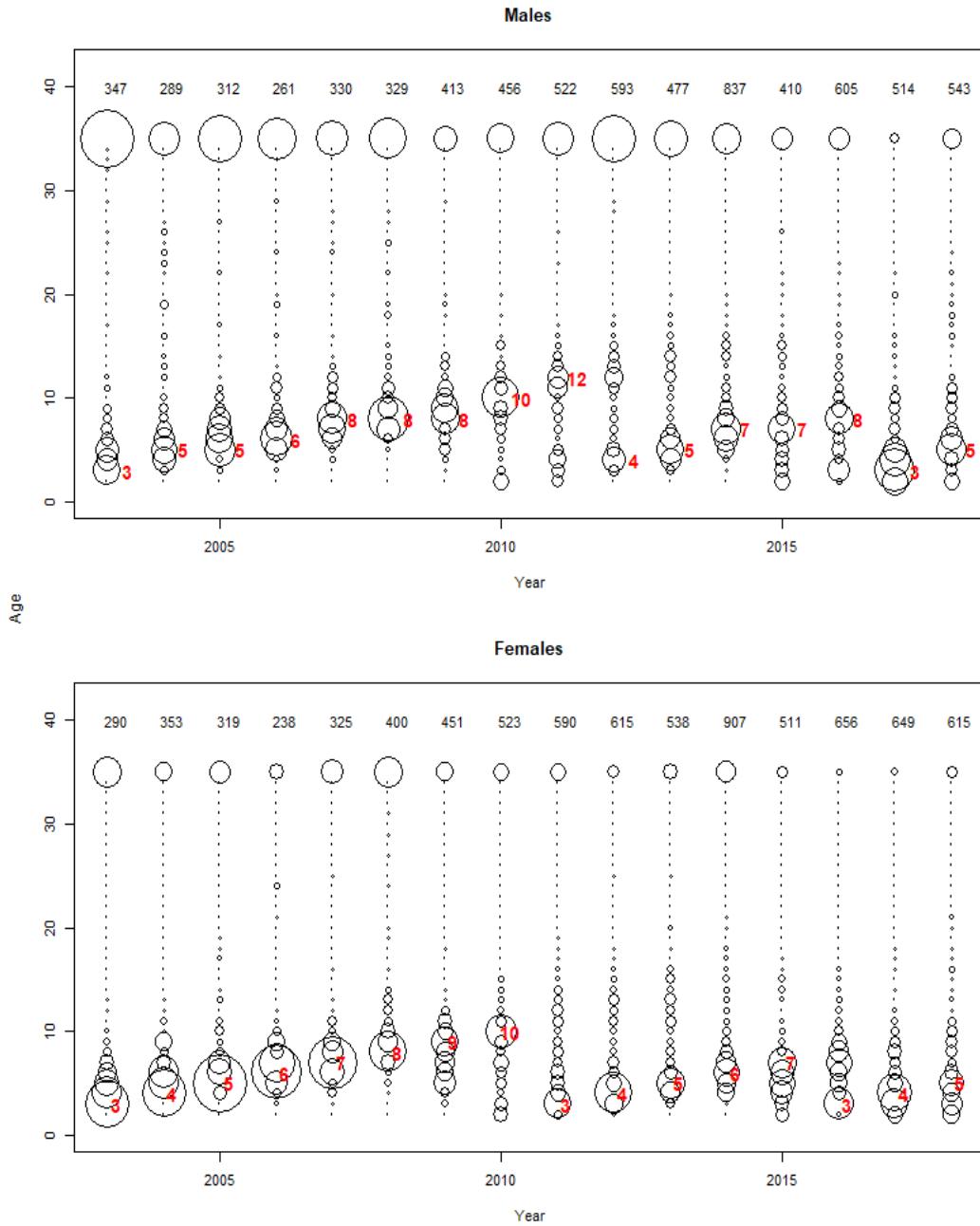


Figure 9. Bubble plot for male and female Sablefish ages by survey year from StRS sets that have been aged. The sizes of the circles are proportional to the number of fish with given ages. Fish age 35 and older are included in one bubble. The total number(n) of fish aged are listed across the top of each panel. The ages with the highest ratios are posted to the right of each bubble.

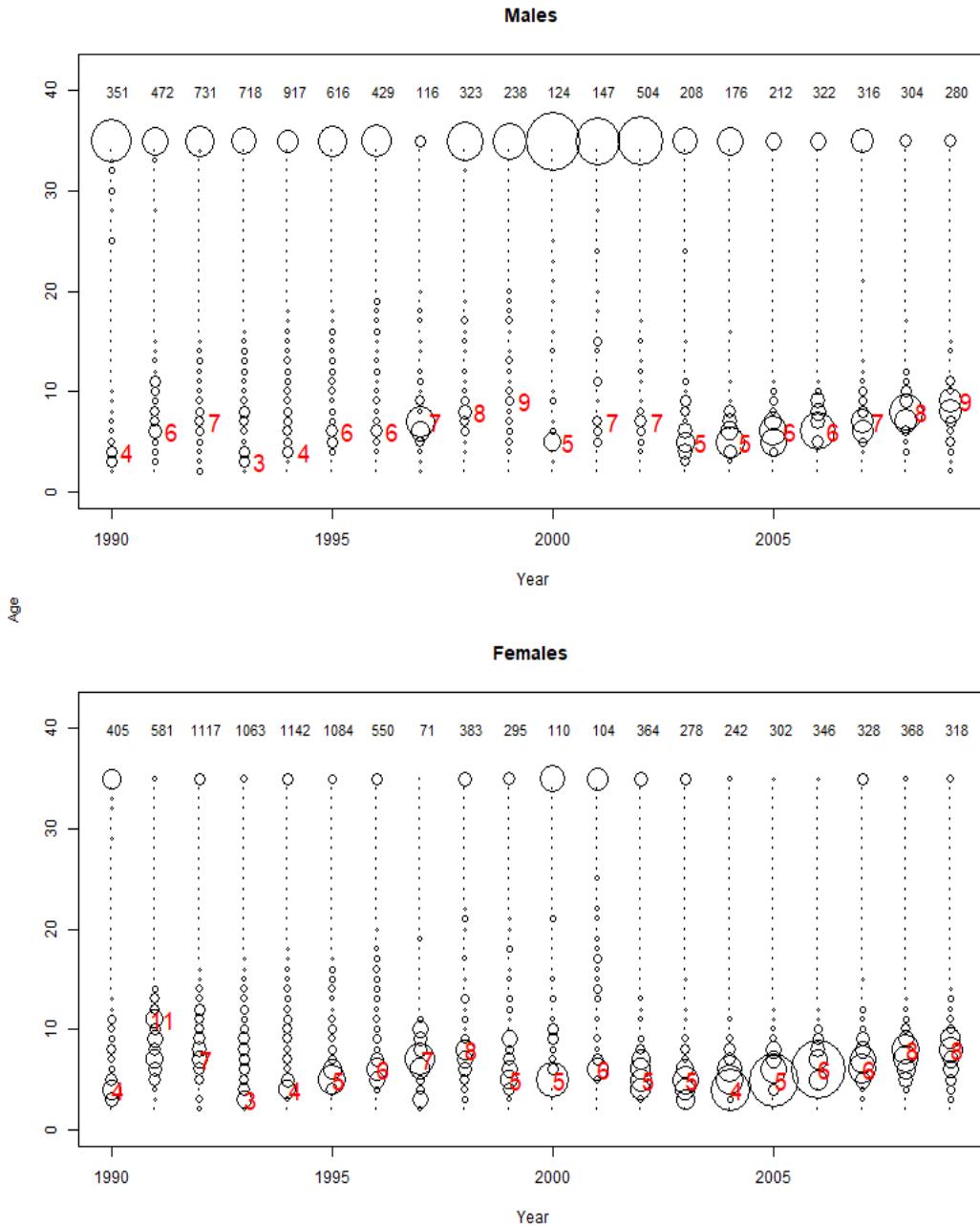


Figure 10. Bubble plot for male Sablefish ages by survey year from offshore standardized sets, to the time of this report. The sizes of the circles are proportional to the number of fish with given ages. Fish age 35 and older are included in one bubble. The total number (n) of fish aged are listed across the top of each panel. The ages with the highest ratios are posted to the right of each bubble.

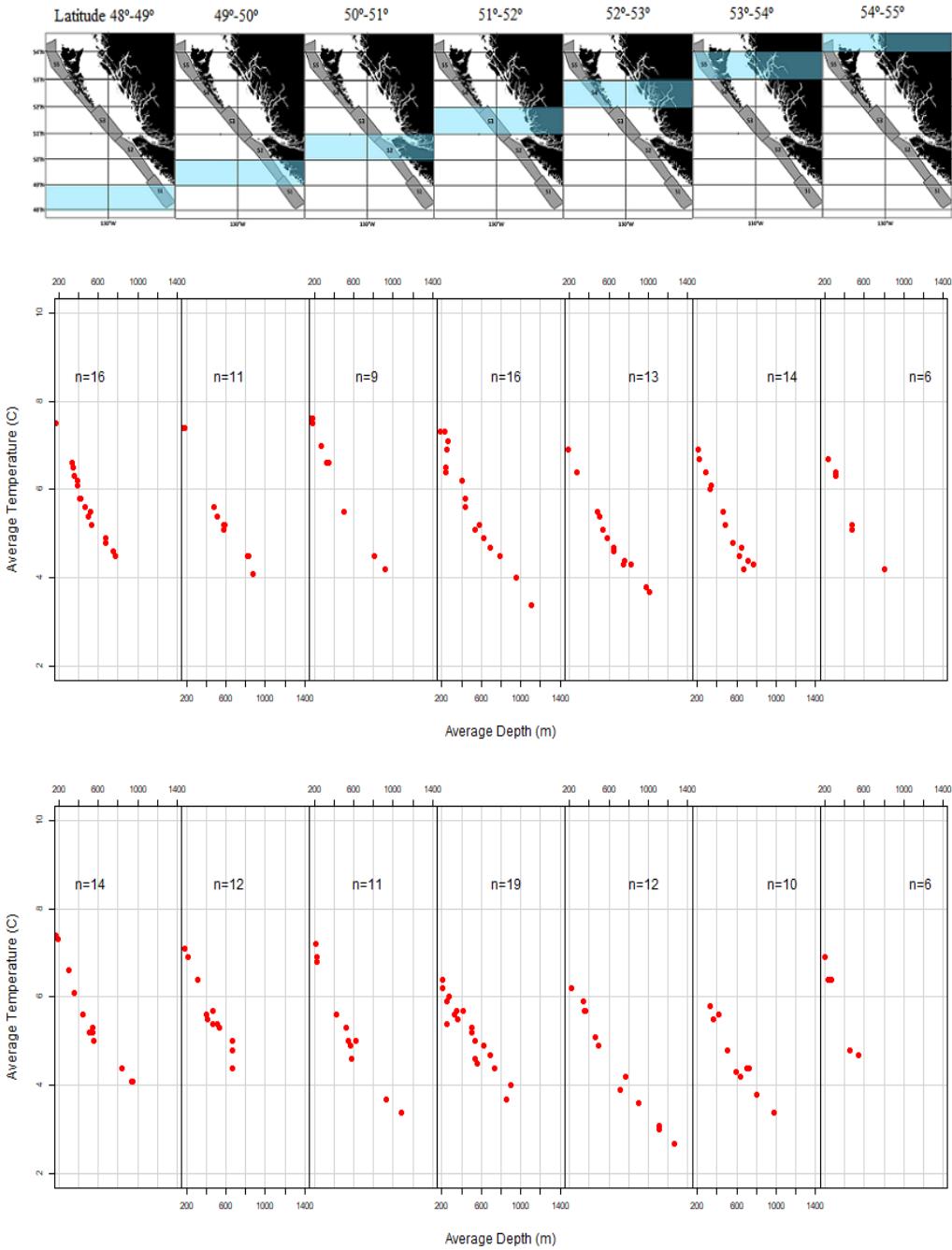


Figure 11. Coplot of average depth(m) vs average temperature ( $^{\circ}\text{C}$ ) for a given 1-degree latitude range (blue bands) for 2018 (top) and 2019 (bottom). The number of fishing sets deployed with a SBE 39 recorder are represented by n.

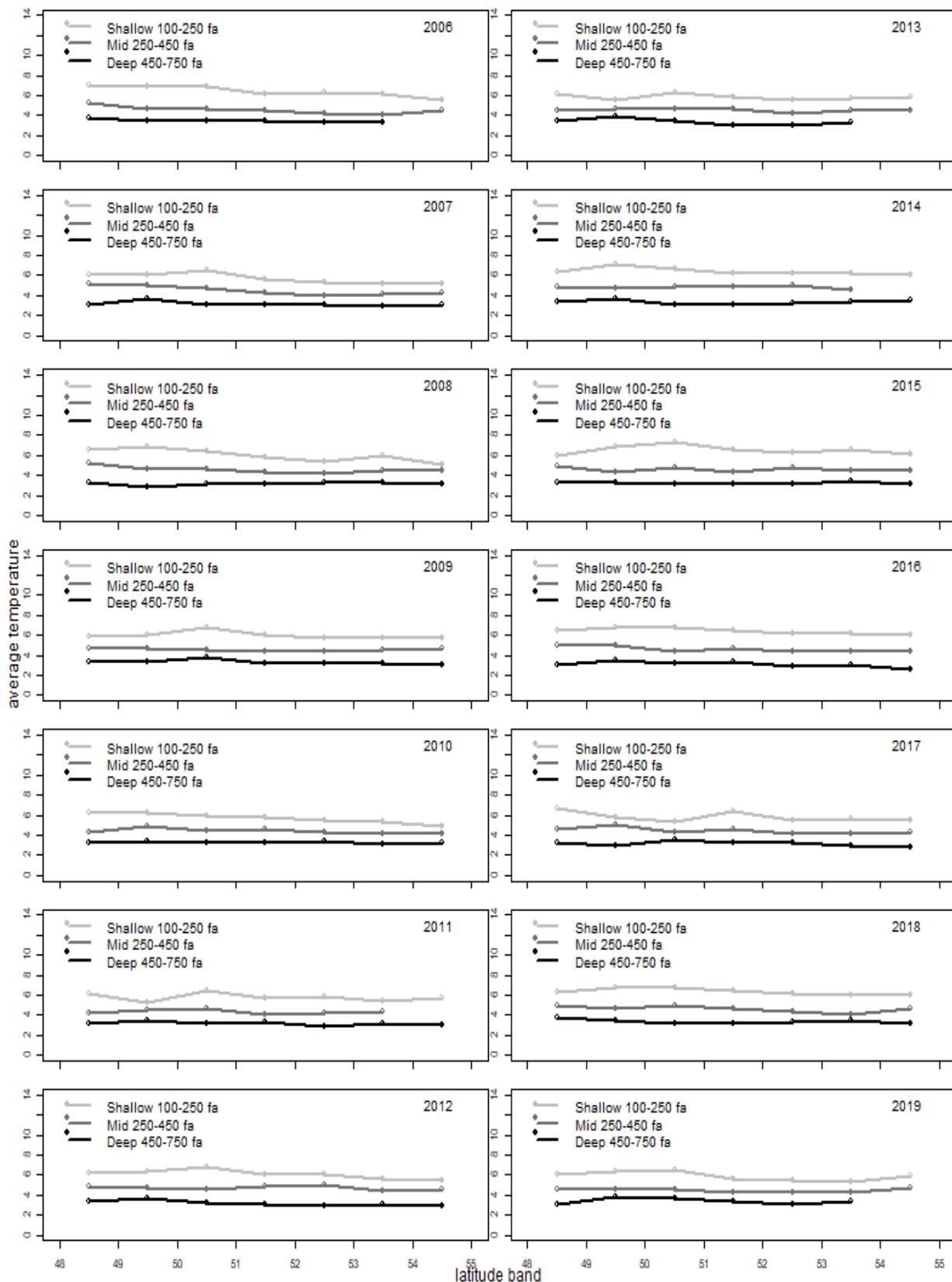


Figure 12. Average temperatures as reported from the Sea-bird SBE 39 loggers at 1-degree latitude intervals and three depth intervals: 100-250 fathoms (183 to 457 meters), 250-450 fathoms (458-823 meters) and 450-750 fathoms (824-1372 meters).

## **APPENDIX A LIST OF TRADITIONAL LOCALITIES.**

List of localities visited in the traditional component of the Sablefish research and assessment surveys from 1988 through 2019. Standardized sets (light blue boxes and half boxes) were conducted in offshore indexing localities from 1988 to 2010. Sablefish were tagged and released (dark blue half boxes) from standardized sets at offshore indexing localities beginning in 1991 and ending in 2007. In 1995, offshore tagging localities where only traditional tagging sets (red boxes) occurred were added in 1995 and discontinued in 2008. Mainland Inlet localities where standardized sets (green boxes) were conducted began in 1994 and continued through to 2019. Starting in 2002 (dark green), five standard fishing areas were chosen to ensure the consistency with the positions of sets conducted in previous years.

<b>Offshore Indexing</b>	<b>Year</b>	88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10
Langara Island-North Frederick		
Louis Point-Frederick Island		
Kunakun Point		
Hippa Island		
Buck Point		
Tasu Sound-Marble Island		
Gowgaia Bay		
Flamingo Inlet		
Cape St. James		
Triangle Island		
Quatsino Sound		
Solander Island		
Esperanza Inlet		
Barkley Canyon		

<b>Offshore Tagging</b>	<b>Year</b>	88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07
Langara Island		
Frederick Island		
Inside Hogback		
Outside Hogback		
Rennell Sound		
Chads Point		
Tasu Sound		
Anthony Island		
Mitchell's Gully-Middle Ground		
Pisces Canyon		
Kyuquot Sound-Ouokinish Inlet		
Estevan Point		
Father Charles Canyon		

<b>Mainland Inlet</b>	<b>Year</b>	88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11-present
Portland Inlet		
Gil Island		
Finlayson Channel		
Mathieson Channel		
Dean Burke Channel		

## **APPENDIX B SET DETAILS 2018.**

Details of sets completed during the 2018 survey program (F/V Ocean Pearl). Sets are listed by stratum/inlet name, set type, depth stratum, start date, end of gear deployment time and duration in minutes. The depth strata for type 3 tagging sets include RD<sub>1</sub> (100-250 fathoms), RD<sub>2</sub> (250-450 fathoms) and RD<sub>3</sub> (450-750 fathoms). The position data includes the major area along with the start and end latitude and longitude in degrees decimal minutes. The bottom depths (in meters) of the fishing set are shown with the mean bottom depth calculated from recordings at one minute intervals between the start and end of the set. The number of traps fished for each set excludes open traps, while holed or fouled traps have been included. Sets that successfully deployed a Seabird SBE temperature and pressure recorder, a Hobo accelerometer or a Concerto CTD are indicated with an 'x'.

Spatial Stratum	Set	Type	Depth	Date	Time	Duration	Area	Latitude	Longitude	Latitude	Longitude	Start	End	Mean	Traps Fished			SBE	Hobo	CTD	
															39				x	x	x
S1	1	StRS	RD3	Oct 10	12:03	1351	3C	48° 0.9'N	126° 4.9'W	48° 0.9'N	126° 4.1'W	1035	1100	1056	25				x		
S1	2	StRS	RD3	Oct 10	14:11	1350	3C	48° 4.4'N	126° 4.7'W	48° 4.4'N	126° 5.6'W	857	949	890	25				x		
S1	3	StRS	RD2	Oct 10	16:04	1361	3C	48° 5.3'N	125° 55.4'W	48° 4.7'N	125° 55.5'W	584	707	639	25	x			x	x	
S1	4	StRS	RD1	Oct 10	18:05	1336	3C	48° 7.1'N	125° 56.6'W	48° 6.7'N	125° 57.2'W	377	430	404	25	x			x	x	
S1	5	StRS	RD2	Oct 10	20:13	1396	3C	48° 7.7'N	126° 11.2'W	48° 8.1'N	126° 11.7'W	466	458	467	25	x			x	x	
S1	6	StRS	RD1	Oct 12	07:59	1325	3C	48° 2.1'N	126° 7.6'W	48° 1.9'N	126° 8.4'W	185	189	187	25	x			x	x	
S1	7	StRS	RD3	Oct 12	10:03	1434	3C	48° 3.4'N	126° 19.5'W	48° 3.5'N	126° 18.5'W	1077	820	899	25	x			x	x	
S1	8	StRS	RD2	Oct 12	12:02	1433	3C	48° 8.8'N	126° 17.7'W	48° 8.6'N	126° 17'W	530	466	476	25	x			x	x	
S1	9	StRS	RD2	Oct 12	14:13	1436	3C	48° 4.1'N	126° 22.5'W	48° 3.4'N	126° 22.5'W	553	725	635	25	x			x	x	
S1	10	StRS	RD2	Oct 12	16:02	1448	3C	48° 4.4'N	126° 28.9'W	48° 4.3'N	126° 28.1'W	474	539	500	25	x			x	x	
S1	11	StRS	RD3	Oct 12	18:23	1502	3C	48° 6.8'N	126° 39.2'W	48° 6.7'N	126° 38.3'W	1337	1338	1339	25	x			x	x	
S1	12	StRS	RD2	Oct 14	08:01	1335	3C	48° 3.1'N	126° 29'W	48° 2.5'N	126° 29.1'W	565	603	589	25	x			x	x	
S1	13	StRS	RD2	Oct 14	10:02	1349	3C	48° 4.5'N	126° 30.8'W	48° 4.4'N	126° 31.6'W	461	497	481	25	x			x	x	
S1	14	StRS	RD3	Oct 14	12:02	1377	3C	48° 4.4'N	126° 35.7'W	48° 4.4'N	126° 36.6'W	866	924	859	25	x			x	x	
S1	15	StRS	RD1	Oct 14	14:03	1389	3C	48° 0.8'N	126° 35.5'W	48° 0.8'N	126° 36.3'W	382	434	408	25	x			x	x	
S1	16	StRS	RD1	Oct 14	16:00	1396	3C	48° 1.9'N	126° 33.4'W	48° 1.7'N	126° 32.5'W	442	256	375	25	x			x	x	
S1	17	StRS	RD2	Oct 14	18:03	1404	3C	48° 5.3'N	126° 38.3'W	48° 5.3'N	126° 37.4'W	533	659	589	25	x			x	x	x
S1	18	StRS	RD1	Oct 14	20:04	1381	3C	48° 7.5'N	126° 33.2'W	48° 7.4'N	126° 32.3'W	430	207	322	25	x			x	x	
S1	19	StRS	RD1	Oct 16	08:04	1328	3D	49° 7.4'N	127° 6.9'W	49° 7.7'N	127° 6.1'W	206	193	199	25	x			x	x	
S2	20	StRS	RD2	Oct 16	09:54	1355	3D	49° 0.3'N	127° 15.1'W	49° 0.7'N	127° 15.4'W	643	627	608	25	x			x	x	
S2	21	StRS	RD1	Oct 16	11:56	1358	3D	49° 2.9'N	127° 13.3'W	49° 3.5'N	127° 13.3'W	209	200	205	25	x			x	x	
S2	22	StRS	RD3	Oct 16	14:09	1398	3D	49° 0.6'N	127° 26.3'W	49° 0.6'N	127° 25.5'W	921	948	925	25	x			x	x	
S2	23	StRS	RD2	Oct 16	16:00	1412	3D	49° 3.9'N	127° 32.2'W	49° 3.7'N	127° 32.8'W	637	711	655	25	x			x	x	
S2	24	StRS	RD2	Oct 16	18:04	1413	3D	49° 0.3'N	127° 31.1'W	49° 9.8'N	127° 31.1'W	685	637	651	25	x			x	x	
S2	25	StRS	RD2	Oct 16	19:32	1426	3D	49° 0.3'N	127° 27.8'W	49° 0.3'N	127° 28.7'W	552	579	559	25	x			x	x	
S2	26	StRS	RD2	Oct 18	08:08	1332	3D	49° 0.4'N	127° 54.1'W	49° 1'N	127° 54.1'W	718	751	739	25	x			x	x	
S2	27	StRS	RD3	Oct 18	10:08	1352	3D	49° 3.5'N	128° 0.7'W	49° 2.9'N	128° 0.7'W	1120	1032	1046	25	x			x	x	
S2	28	StRS	RD2	Oct 18	12:12	1367	3D	49° 9'N	127° 51.4'W	49° 9.4'N	127° 52'W	738	736	660	25	x			x	x	
S2	29	StRS	RD1	Oct 18	14:04	1396	3D	50° 0.3'N	127° 54.7'W	50° 0.7'N	127° 55.5'W	194	406	334	25	x			x	x	
S2	30	StRS	RD3	Oct 18	16:14	1404	3D	50° 0.7'N	128° 3.9'W	50° 0.4'N	128° 3.9'W	1174	1143	1167	25	x			x	x	
S2	31	StRS	RD3	Oct 18	18:11	1428	3D	49° 9.1'N	128° 2.9'W	49° 9.1'N	128° 3.9'W	1041	994	1035	25	x			x	x	
S2	32	StRS	RD3	Oct 20	08:11	1415	3D	50° 7.8'N	128° 28.9'W	50° 8.4'N	128° 28.9'W	1027	1029	1011	25	x			x	x	
S2	33	StRS	RD1	Oct 20	10:01	1413	3D	50° 3'N	128° 22.1'W	50° 3.6'N	128° 22.1'W	208	202	205	25	x			x	x	
S2	34	StRS	RD1	Oct 20	11:37	1402	3D	50° 6.3'N	128° 25.4'W	50° 6.9'N	128° 25.4'W	195	194	194	24	x			x	x	
S2	35	StRS	RD1	Oct 20	15:35	1430	5A	50° 2.9'N	129° 2.5'W	50° 2.5'N	129° 2.2'W	221	301	318	25	x			x	x	
S2	36	StRS	RD2	Oct 20	17:04	1449	5A	50° 2.4'N	129° 4.4'W	50° 2.4'N	129° 5.3'W	555	609	533	25	x			x	x	
S2	37	StRS	RD1	Oct 20	19:02	1440	5A	50° 4'N	129° 14.4'W	50° 3.6'N	129° 14.2'W	278	304	347	25	x			x	x	
Dean/Burke	38	Inlet		Oct 23	12:07	1078	5B	52° 0.7'N	127° 36.8'W	52° 0'N	127° 35.9'W	438	440	441	25	x			x	x	
Dean/Burke	39	Inlet		Oct 23	13:58	1130	5B	52° 3.8'N	127° 25'W	52° 4'N	127° 24.2'W	594	596	595	25	x			x	x	
Dean/Burke	40	Inlet		Oct 23	16:09	1107	5B	52° 6.3'N	127° 15.6'W	52° 6.6'N	127° 14.8'W	578	578	579	25	x			x	x	
Dean/Burke	41	Inlet		Oct 23	18:11	1132	5B	52° 6.4'N	127° 15.4'W	52° 6.7'N	127° 16'W	515	537	527	25	x			x	x	
Dean/Burke	42	Inlet		Oct 23	19:56	1187	5B	52° 1.2'N	127° 28.1'W	52° 0.6'N	127° 28.3'W	505	516	513	25	x			x	x	

continued.

Spatial Stratum	Set	Type	Depth	Date	Time	Duration	Area	Latitude	Longitude	Latitude	Longitude	Start	End	Mean	Traps Fished	SBE 39	Hobo	CTD
Finlayson	43	Inlet		Oct 25	11:57	1093	5C	52° 7.1'N	128° 25.9'W	52° 7'N	128° 26.7'W	572	576	576	25	x	x	
Finlayson	44	Inlet		Oct 25	14:04	1098	5C	52° 4'N	128° 28.1'W	52° 3.4'N	128° 27.9'W	710	634	665	25	x	x	x
Finlayson	45	Inlet		Oct 25	16:07	1107	5C	52° 9.6'N	128° 28.2'W	52° 9.2'N	128° 28.6'W	644	591	627	25	x	x	
Finlayson	46	Inlet		Oct 25	17:58	1117	5C	52° 4.8'N	128° 27.7'W	52° 4.3'N	128° 28'W	754	643	677	25	x	x	
Finlayson	47	Inlet		Oct 25	20:05	1115	5C	52° 1.4'N	128° 28.2'W	52° 0.9'N	128° 27.9'W	691	770	729	25	x	x	
Gil Island	48	Inlet		Oct 27	12:58	1054	5C	53° 8.4'N	129° 17.7'W	53° 8.3'N	129° 18.7'W	540	522	539	25	x	x	
Gil Island	49	Inlet		Oct 27	14:23	1092	5C	53° 2.4'N	129° 22.3'W	53° 2.4'N	129° 23.2'W	529	519	548	24	x	x	x
Gil Island	50	Inlet		Oct 27	15:55	1125	5C	53° 0.4'N	129° 19.9'W	53° 0'N	129° 20.6'W	683	683	687	25	x	x	
Gil Island	51	Inlet		Oct 27	18:17	1141	5C	53° 0.6'N	129° 8.6'W	53° 0.9'N	129° 7.9'W	552	569	562	25	x	x	
Gil Island	52	Inlet		Oct 27	20:02	1166	5C	53° 0.8'N	129° 7.6'W	53° 0'N	129° 6.7'W	567	533	545	25	x	x	
S3	53	StRS	RD1	Oct 29	08:08	1322	5B	51° 2.2'N	130° 27.6'W	51° 2.7'N	130° 26.9'W	285	270	275	25	x	x	
S3	54	StRS	RD3	Oct 29	11:03	1353	5B	51° 0.2'N	130° 35.6'W	51° 0.6'N	130° 35.1'W	1074	1077	1079	25	x	x	
S3	55	StRS	RD3	Oct 29	12:42	1421	5B	51° 5.9'N	130° 33.8'W	51° 6.3'N	130° 33.2'W	1339	1313	1321	25	x	x	
S3	56	StRS	RD1	Oct 29	14:56	1453	5B	51° 4.3'N	130° 47.5'W	51° 4.7'N	130° 48.2'W	270	265	267	25	x	x	
S3	57	StRS	RD2	Oct 29	16:57	1447	5B	51° 6.1'N	130° 52.4'W	51° 5.7'N	130° 53'W	473	723	648	25	x	x	
S3	58	StRS	RD2	Oct 29	19:00	1475	5B	51° 6.7'N	130° 41.5'W	51° 7.2'N	130° 41.6'W	562	506	535	24	x	x	
S3	59	StRS	RD3	Oct 31	08:24	1475	5B	51° 0.4'N	130° 29.3'W	51° 0'N	130° 29.9'W	1250	1322	1278	25	x	x	
S3	60	StRS	RD2	Oct 31	11:13	1462	5B	51° 8.8'N	130° 16.7'W	51° 8.3'N	130° 16.2'W	460	560	518	25	x	x	x
S3	61	StRS	RD2	Oct 31	12:47	1505	5B	51° 4.2'N	130° 7.5'W	51° 4'N	130° 6.8'W	678	636	660	25	x	x	
S3	62	StRS	RD2	Oct 31	15:29	1550	5B	51° 9.8'N	130° 8.3'W	51° 9.4'N	130° 8.2'W	770	767	801	25	x	x	
S3	63	StRS	RD3	Oct 31	17:37	1573	5B	51° 5.4'N	130° 6.4'W	51° 4.9'N	130° 6.5'W	882	865	891	25	x	x	
S3	64	StRS	RD3	Oct 31	19:44	1597	5A	51° 0'N	130° 8.1'W	51° 0.6'N	130° 8.3'W	892	969	928	25	x	x	
S3	65	StRS	RD1	Nov 2	08:04	1354	5A	50° 7.4'N	129° 24.2'W	50° 7'N	129° 23.7'W	192	189	190	25	x	x	
S3	66	StRS	RD1	Nov 2	10:08	1357	5A	51° 0.5'N	129° 18.7'W	51° 0'N	129° 19'W	247	260	254	25	x	x	
S3	67	StRS	RD1	Nov 2	12:01	1352	5A	51° 0.2'N	129° 26.4'W	51° 0.9'N	129° 25.5'W	286	283	284	25	x	x	x
S3	68	StRS	RD2	Nov 2	14:22	1365	5A	51° 0.7'N	129° 41.1'W	51° 0.9'N	129° 41.8'W	476	451	466	25	x	x	
S3	69	StRS	RD1	Nov 2	16:19	1383	5A	51° 3.9'N	129° 34.7'W	51° 4.5'N	129° 34.5'W	282	280	283	24	x	x	
S3	70	StRS	RD1	Nov 2	18:06	1385	5B	51° 9.7'N	129° 37.3'W	51° 9.1'N	129° 37.1'W	192	212	199	24	x	x	
S3	71	StRS	RD1	Nov 2	20:06	1369	5B	51° 1.7'N	129° 39.7'W	51° 2.2'N	129° 39'W	194	184	188	25	x	x	
S4	72	StRS	RD1	Nov 4	07:10	1325	5B	51° 6.4'N	131° 7.4'W	51° 5.9'N	131° 6.7'W	370	258	338	24	x	x	
S4	73	StRS	RD1	Nov 4	10:01	1354	5E	52° 0.3'N	131° 21'W	52° 0.7'N	131° 20.9'W	217	208	206	24	x	x	
S4	74	StRS	RD2	Nov 4	12:02	1361	5E	52° 0.4'N	131° 22'W	52° 0.7'N	131° 21.2'W	700	486	563	25	x	x	
S4	75	StRS	RD3	Nov 4	14:07	1417	5E	52° 0.4'N	131° 27.6'W	52° 0.2'N	131° 26.6'W	843	851	841	25	x	x	x
S4	76	StRS	RD2	Nov 4	16:00	1507	5E	52° 0'N	131° 31.4'W	52° 0.1'N	131° 30.3'W	513	740	604	25	x	x	
S4	77	StRS	RD2	Nov 4	18:07	1501	5E	52° 0.1'N	131° 29.9'W	52° 0.6'N	131° 29'W	674	791	717	25	x	x	
S4	78	StRS	RD2	Nov 4	20:09	1509	5E	52° 1'N	131° 28.4'W	52° 1.4'N	131° 28.9'W	804	804	813	24	x	x	
S4	79	StRS	RD1	Nov 4	22:02	1567	5E	52° 7.8'N	131° 33.7'W	52° 7.2'N	131° 33'W	202	185	199	25	x	x	
S4	80	StRS	RD1	Nov 7	08:05	1331	5E	52° 5.6'N	131° 58.2'W	52° 5.3'N	131° 59'W	217	502	307	25	x	x	
S4	81	StRS	RD3	Nov 7	10:01	1354	5E	52° 6.3'N	132° 2.2'W	52° 6.6'N	132° 3.1'W	866	977	935	25	x	x	
S4	82	StRS	RD2	Nov 7	12:00	1336	5E	52° 8.7'N	132° 4.1'W	52° 8.5'N	132° 5.2'W	519	676	589	25	x	x	
S4	83	StRS	RD2	Nov 7	14:01	1344	5E	52° 3.4'N	132° 9.7'W	52° 3.8'N	132° 10.5'W	439	659	544	26	x	x	x

continued.

Spatial Stratum	Set	Type	Depth	Date	Time	Duration	Area	Latitude	Longitude	Latitude	Longitude	Start	End	Mean	Traps Fished	SBE 39	Hobo	CTD
S4	84	StRS	RD3	Nov 7	16:46	1403	5E	52° 7'N	132° 36.4'W	52° 7.5'N	132° 36.3'W	1327	1300	1327	25	x	x	
S4	85	StRS	RD3	Nov 7	18:53	1453	5E	52° 6.1'N	132° 46.2'W	52° 6.7'N	132° 46.4'W	1093	1168	1126	25	x	x	
S4	86	StRS	RD3	Nov 9	08:04	1338	5E	52° 7.1'N	132° 40.2'W	52° 6.5'N	132° 40'W	1333	1325	1337	25	x	x	
S4	87	StRS	RD1	Nov 9	09:59	1334	5E	53° 0.9'N	132° 33.7'W	53° 0.6'N	132° 33.2'W	220	214	222	24	x	x	
S4	88	StRS	RD1	Nov 9	12:06	1321	5E	53° 0.7'N	132° 38.5'W	53° 0.7'N	132° 39.5'W	270	441	359	25	x	x	
S5	89	StRS	RD2	Nov 9	14:34	1339	5E	53° 1.7'N	132° 54.8'W	53° 1.1'N	132° 54.9'W	771	758	775	25	x	x	
S5	90	StRS	RD2	Nov 9	16:32	1356	5E	53° 4.3'N	133° 7.2'W	53° 4.2'N	133° 6.2'W	734	741	737	25	x	x	
S5	91	StRS	RD3	Nov 9	18:33	1379	5E	53° 1.8'N	133° 13.2'W	53° 1.5'N	133° 12.4'W	1049	974	1029	25	x	x	
S5	92	StRS	RD2	Nov 9	20:32	1432	5E	53° 5.7'N	132° 54'W	53° 5.4'N	132° 53.1'W	706	695	701	25	x	x	
S5	93	StRS	RD1	Nov 11	08:03	1339	5E	53° 8.9'N	133° 5'W	53° 9.4'N	133° 5.1'W	360	327	341	25	x	x	
S5	94	StRS	RD2	Nov 11	10:01	1354	5E	53° 9.9'N	133° 11.3'W	53° 0.5'N	133° 11.4'W	541	602	576	25	x	x	
S5	95	StRS	RD1	Nov 11	12:02	1348	5E	53° 1'N	133° 5.3'W	53° 1.7'N	133° 5.3'W	243	201	221	25	x	x	
S5	96	StRS	RD1	Nov 11	14:00	1330	5E	53° 5.2'N	133° 9.3'W	53° 5.8'N	133° 9.1'W	440	431	415	25	x	x	
S5	97	StRS	RD3	Nov 11	16:03	1390	5E	53° 3.6'N	133° 23.4'W	53° 4'N	133° 24.1'W	819	856	837	24	x	x	
S5	98	StRS	RD3	Nov 11	18:39	1448	5E	53° 8.1'N	133° 45.5'W	53° 8.6'N	133° 45.9'W	950	933	921	25	x	x	
Portland	99	Inlet		Nov 13	14:55	1023	5D	54° 9.2'N	130° 32'W	54° 9.6'N	130° 31.3'W	640	640	644	25	x	x	
Portland	100	Inlet		Nov 13	16:34	1075	5D	54° 7.8'N	130° 17.5'W	54° 8.4'N	130° 17.6'W	484	466	473	25	x	x	
Portland	101	Inlet		Nov 13	18:01	1104	5D	54° 2.9'N	130° 11.3'W	54° 2.4'N	130° 11.9'W	424	428	427	25	x	x	
Portland	102	Inlet		Nov 13	19:34	1126	5D	54° 5.3'N	130° 21.3'W	54° 5'N	130° 21.9'W	501	418	451	24	x	x	
Portland	103	Inlet		Nov 13	21:00	1126	5D	54° 2.6'N	130° 25.1'W	54° 2.2'N	130° 24.2'W	507	478	490	25	x	x	
S5	104	StRS	RD1	Nov 15	08:41	1331	5E	54° 0.8'N	133° 35.1'W	54° 0.4'N	133° 35.9'W	364	359	362	24	x	x	
S5	105	StRS	RD2	Nov 15	10:01	1353	5E	53° 8.9'N	133° 38.3'W	53° 9.3'N	133° 39.1'W	607	575	585	25	x	x	
S5	106	StRS	RD3	Nov 15	12:03	1333	5E	53° 6.2'N	133° 38.8'W	53° 5.8'N	133° 38.3'W	846	842	844	25	x	x	
S5	107	StRS	RD3	Nov 15	14:04	1389	5E	54° 0'N	133° 46.9'W	54° 0.6'N	133° 47.3'W	1096	1081	1087	25	x	x	
S5	108	StRS	RD2	Nov 15	15:55	1398	5E	54° 0.8'N	133° 47.6'W	54° 0.1'N	133° 46.8'W	549	505	517	25	x	x	
S5	109	StRS	RD2	Nov 15	18:06	1413	5E	54° 5.9'N	133° 51.6'W	54° 5.8'N	133° 50.6'W	584	511	548	25	x	x	
S5	110	StRS	RD1	Nov 15	19:54	1434	5E	54° 8.2'N	133° 42.6'W	54° 8.3'N	133° 41.5'W	250	256	254	25	x	x	
S5	111	StRS	RD1	Nov 15	21:57	1462	5E	54° 0.1'N	133° 35'W	54° 0.6'N	133° 34.7'W	363	365	362	25	x	x	

## **APPENDIX C SET DETAILS 2019.**

Details of sets completed during the 2019 survey program (F/V Pacific Viking). Sets are listed by stratum/inlet name, set type, depth stratum, start date, end of gear deployment time and duration in minutes. The depth strata for type 3 tagging sets include RD<sub>1</sub> (100-250 fathoms), RD<sub>2</sub> (250-450 fathoms) and RD<sub>3</sub> (450-750 fathoms). The position data includes the major area along with the start and end latitude and longitude in degrees decimal minutes. The bottom depths (in meters) of the fishing set are shown with the mean bottom depth calculated from recordings at one minute intervals between the start and end of the set. The number of traps fished for each set excludes open traps, while holed or fouled traps have been included. Sets that successfully deployed a Seabird SBE temperature and pressure recorder, a Hobo accelerometer or a Concerto CTD are indicated with an 'x'.

Spatial Stratum	Set	Type	Depth	Date	Time	Duration	Area	Latitude	Longitude	Latitude	Longitude	Start	End	Mean	Traps	SBE	Hobo	CTD
															39			
S1	1	StRS	RD2	Oct 9	07:35	1355	3C	48° 2'N	125° 55.1'W	48° 2'N	125° 56.1'W	679	722	703	25	x		
S1	2	StRS	RD3	Oct 9	09:46	1365	3C	48° 0'N	126° 6.5'W	48° 0'N	126° 7.6'W	1188	1385	1318	25	x		
S1	3	StRS	RD3	Oct 9	13:16	1336	3C	48° 0.1'N	126° 20.5'W	48° 0.1'N	126° 21.5'W	1203	1140	1171	25	x		
S1	4	StRS	RD3	Oct 9	14:30	1354	3C	48° 2.3'N	126° 22.1'W	48° 2.4'N	126° 23'W	1174	1195	1165	25	x	x	
S1	5	StRS	RD2	Oct 9	16:28	1346	3C	48° 7.1'N	126° 13.9'W	48° 7.1'N	126° 14.9'W	642	690	666	25	x	x	
S1	6	StRS	RD1	Oct 9	18:02	1361	3C	48° 8.6'N	126° 6.2'W	48° 8.6'N	126° 7.1'W	203	212	207	25	x	x	
S1	7	StRS	RD1	Oct 9	19:27	1393	3C	48° 2.5'N	126° 0.1'W	48° 1.7'N	126° 0.3'W	362	470	405	25	x	x	x
S1	8	StRS	RD1	Oct 11	07:56	1333	3C	48° 1.9'N	126° 7.8'W	48° 2'N	126° 8.8'W	187	192	190	25	x		
S1	9	StRS	RD2	Oct 11	09:34	1357	3C	48° 2.8'N	126° 18.1'W	48° 3'N	126° 19'W	670	730	698	25	x		
S1	10	StRS	RD2	Oct 11	11:08	1366	3C	48° 8.6'N	126° 21.1'W	48° 8.6'N	126° 22.2'W	629	708	661	25	x		
S1	11	StRS	RD3	Oct 11	12:49	1397	3C	48° 7.7'N	126° 30.9'W	48° 7.8'N	126° 31.9'W	1113	1282	1194	25	x	x	
S1	12	StRS	RD3	Oct 11	14:16	1430	3C	48° 0'N	126° 37.4'W	48° 0.1'N	126° 38.4'W	1305	1314	1310	25	x	x	
S1	13	StRS	RD2	Oct 11	16:01	1427	3C	48° 3'N	126° 30.8'W	48° 2.6'N	126° 31.6'W	555	619	585	25	x	x	
S1	14	StRS	RD2	Oct 11	18:25	1446	3C	48° 5.4'N	126° 38.5'W	48° 4.7'N	126° 38.9'W	516	580	543	25	x	x	
S1	15	StRS	RD1	Oct 11	19:51	1466	3C	48° 8.8'N	126° 46.3'W	48° 8.9'N	126° 47.4'W	414	457	432	25	x	x	x
S1	16	StRS	RD1	Oct 13	06:16	1316	3D	49° 0'N	126° 51.8'W	49° 0'N	126° 52.7'W	382	423	403	25	x		
S1	17	StRS	RD1	Oct 13	07:36	1361	3D	49° 0.2'N	126° 50'W	49° 0.2'N	126° 51'W	204	214	208	25	x		
S1	18	StRS	RD2	Oct 13	09:34	1384	3D	49° 0.1'N	127° 4'W	49° 0.1'N	127° 5'W	655	723	691	25	x		
S1	19	StRS	RD2	Oct 13	11:19	1384	3D	49° 5.4'N	127° 7.4'W	49° 5.2'N	127° 8.5'W	498	677	588	25	x	x	
S2	20	StRS	RD1	Oct 13	13:33	1385	3D	49° 9.6'N	127° 9.1'W	49° 9.6'N	127° 10.1'W	192	209	202	25	x	x	
S2	21	StRS	RD2	Oct 13	14:50	1400	3D	49° 9.7'N	127° 13.9'W	49° 9.7'N	127° 14.8'W	603	742	672	25	x	x	
S2	22	StRS	RD3	Oct 13	16:23	1447	3D	49° 2.6'N	127° 19.7'W	49° 2.6'N	127° 20.7'W	924	1132	1022	25	x	x	x
S2	23	StRS	RD2	Oct 18	08:14	1320	3D	50° 6.2'N	128° 13.6'W	50° 5.8'N	128° 14.3'W	449	629	569	25	x		
S2	24	StRS	RD1	Oct 18	10:05	1332	3D	50° 1.3'N	128° 7.2'W	50° 1'N	128° 8.2'W	323	488	380	25	x		
S2	26	StRS	RD2	Oct 18	13:54	1349	3D	49° 5.8'N	128° 1.3'W	49° 6.2'N	128° 2.3'W	519	492	494	25	x	x	
S2	27	StRS	RD3	Oct 18	15:30	1399	3D	49° 0.9'N	127° 55.8'W	49° 0.9'N	127° 56.9'W	815	867	839	25	x	x	
S2	28	StRS	RD2	Oct 18	16:52	1416	3D	49° 5.1'N	127° 54.5'W	49° 4.6'N	127° 54.8'W	613	760	686	25	x	x	x
S2	29	StRS	RD2	Oct 18	18:02	1463	3D	49° 3.5'N	127° 49.1'W	49° 3.5'N	127° 50.4'W	649	750	678	25	x	x	
S2	30	StRS	RD1	Oct 18	19:35	1463	3D	49° 7.9'N	127° 45.6'W	49° 7.9'N	127° 46.9'W	235	467	337	25	x	x	
S2	31	StRS	RD3	Oct 20	15:05	1366	3D	50° 0.9'N	128° 27'W	50° 0.9'N	128° 28'W	937	1126	991	25	x		
S2	32	StRS	RD3	Oct 20	16:13	1408	3D	50° 1.1'N	128° 29.7'W	50° 1.1'N	128° 30.8'W	1144	1024	1082	25	x		
S2	33	StRS	RD2	Oct 20	18:43	1400	3D	50° 0.7'N	128° 20.2'W	50° 0.2'N	128° 19.9'W	527	748	628	25	x		
S2	34	StRS	RD1	Oct 20	21:33	1389	5A	50° 0'N	128° 33'W	50° 9.7'N	128° 33.8'W	215	307	264	25	x	x	
S2	35	StRS	RD3	Oct 21	01:02	1395	5A	50° 8.8'N	128° 55.7'W	50° 8.7'N	128° 56.8'W	847	864	909	25	x	x	x
S2	36	StRS	RD2	Oct 21	02:23	1417	5A	50° 1.5'N	129° 1.4'W	50° 1'N	129° 2.1'W	544	716	669	25	x	x	
S2	37	StRS	RD1	Oct 21	03:28	1474	5A	50° 1.5'N	128° 58.1'W	50° 1.5'N	128° 59.3'W	230	357	267	25	x	x	
S3	38	StRS	RD1	Oct 25	07:58	1333	5A	50° 1.1'N	129° 32.1'W	50° 1'N	129° 33.2'W	226	244	228	25	x		
S3	39	StRS	RD2	Oct 25	09:36	1348	5A	50° 3.1'N	129° 39.1'W	50° 2.5'N	129° 38.7'W	460	796	616	25	x		
S3	40	StRS	RD2	Oct 25	12:14	1459	5A	51° 0.9'N	129° 38.4'W	51° 0.9'N	129° 39.6'W	360	400	350	25	x		
S3	41	StRS	RD2	Oct 25	13:40	1475	5A	51° 0.9'N	129° 46.9'W	51° 0.9'N	129° 47.9'W	633	722	674	25	x	x	
S3	42	StRS	RD3	Oct 25	16:03	1475	5A	51° 0'N	130° 0.8'W	51° 0.8'N	130° 1.8'W	990	1018	998	25	x	x	x
S3	43	StRS	RD3	Oct 25	18:27	1471	5A	51° 2.5'N	129° 48.4'W	51° 1.8'N	129° 48.5'W	855	828	876	25	x	x	

continued.

Spatial Stratum	Set	Type	Depth	Date	Time	Duration	Area	Latitude	Longitude	Latitude	Longitude	Start	End	Mean	Traps Fished	SBE 39	Hobo	CTD
				Stratum														
S3	44	StRS	RD1	Oct 25	19:59	1502	5A	51° 3.9'N	129° 37.1'W	51° 3.8'N	129° 38.1'W	274	280	276	25	x		
S3	45	StRS	RD1	Oct 27	08:03	1324	5B	51° 4.4'N	129° 48.2'W	51° 4.4'N	129° 49.2'W	203	204	206	25	x		
S3	46	StRS	RD1	Oct 27	09:22	1361	5B	51° 1.2'N	129° 49.7'W	51° 1.2'N	129° 50.6'W	237	236	236	25	x		
S3	47	StRS	RD2	Oct 27	11:42	1380	5B	51° 8.6'N	130° 6.2'W	51° 8.7'N	130° 7.1'W	545	611	579	25	x		
S3	48	StRS	RD3	Oct 27	13:42	1417	5B	51° 6.1'N	130° 6.3'W	51° 5.9'N	130° 7.3'W	993	1021	1011	25	x	x	
S3	49	StRS	RD2	Oct 27	15:03	1454	5B	51° 8.7'N	130° 11.7'W	51° 8.6'N	130° 12.8'W	546	585	560	25	x	x	
S3	50	StRS	RD3	Oct 27	16:59	1502	5B	51° 5.9'N	130° 22.8'W	51° 5.8'N	130° 23.9'W	1197	1320	1259	25	x	x	
S3	51	StRS	RD2	Oct 27	19:46	1531	5B	51° 9.3'N	130° 24.7'W	51° 9.2'N	130° 26'W	471	470	508	25	x		
S4	52	StRS	RD3	Oct 29	11:41	1338	5E	52° 3.5'N	132° 24.7'W	52° 3.5'N	132° 26'W	1099	1215	1156	25	x		
S4	53	StRS	RD3	Oct 29	13:05	1370	5E	52° 5.4'N	132° 31.8'W	52° 5.4'N	132° 33'W	1333	1324	1328	25	x		
S4	54	StRS	RD1	Oct 29	15:18	1377	5E	52° 5.6'N	132° 24.6'W	52° 5.5'N	132° 25.9'W	380	400	424	25	x	x	
S4	55	StRS	RD1	Oct 29	17:08	1387	5E	52° 1.2'N	132° 18.7'W	52° 0.6'N	132° 18.6'W	310	493	404	25	x	x	
S4	56	StRS	RD1	Oct 29	20:05	1327	5E	52° 3.7'N	132° 21.9'W	52° 3.8'N	132° 23'W	418	440	402	25	x	x	
S4	57	StRS	RD3	Oct 31	08:05	1321	5E	52° 4'N	131° 33.8'W	52° 3.9'N	131° 34.8'W	867	975	919	25	x		
S4	58	StRS	RD2	Oct 31	09:24	1347	5E	52° 3.6'N	131° 30.1'W	52° 3.6'N	131° 31.4'W	686	787	746	25	x		
S4	59	StRS	RD2	Oct 31	10:55	1373	5E	52° 0.3'N	131° 30.8'W	52° 0.8'N	131° 31.6'W	522	612	595	25	x	x	
S4	60	StRS	RD2	Oct 31	12:31	1404	5E	52° 0.4'N	131° 32.2'W	52° 0.4'N	131° 33.2'W	914	946	985	25	x	x	
S4	61	StRS	RD2	Oct 31	14:19	1399	5E	52° 0.2'N	131° 23.6'W	52° 0.4'N	131° 24.8'W	534	642	623	25	x	x	
S4	62	StRS	RD1	Oct 31	15:58	1415	5E	52° 0.3'N	131° 20.3'W	52° 0.1'N	131° 21.4'W	222	295	249	25	x	x	
S4	63	StRS	RD2	Oct 31	17:22	1434	5B	51° 9.2'N	131° 16.3'W	51° 9.2'N	131° 17.3'W	556	641	605	25	x	x	
S3	64	StRS	RD3	Nov 2	08:05	1324	5B	51° 3.3'N	130° 34.6'W	51° 3.1'N	130° 35.6'W	890	870	882	25	x		
S3	65	StRS	RD1	Nov 2	10:03	1335	5B	51° 6.2'N	130° 22.5'W	51° 6.2'N	130° 23.5'W	267	414	350	25	x		
S3	66	StRS	RD1	Nov 2	11:53	1359	5B	51° 2'N	130° 33.2'W	51° 1.5'N	130° 32.6'W	272	258	262	25	x	x	
S3	67	StRS	RD1	Nov 2	12:54	1395	5B	51° 5.1'N	130° 33.2'W	51° 4.6'N	130° 32.5'W	411	412	399	25	x	x	
S3	68	StRS	RD1	Nov 2	14:59	1407	5B	51° 0.7'N	130° 45.6'W	51° 1.1'N	130° 45.5'W	269	272	266	25	x	x	
S4	69	StRS	RD1	Nov 2	18:14	1406	5B	51° 8.6'N	131° 9'W	51° 7.9'N	131° 9.5'W	196	418	318	25	x	x	
S4	70	StRS	RD2	Nov 2	19:05	1440	5B	51° 8.8'N	131° 10.6'W	51° 8.4'N	131° 11.5'W	597	694	663	25	x	x	
S4	71	StRS	RD3	Nov 4	08:24	1315	5E	52° 7'N	132° 47'W	52° 7'N	132° 48'W	1168	1137	1151	25	x		
S4	72	StRS	RD2	Nov 4	10:14	1318	5E	53° 0.4'N	132° 37.5'W	53° 0.4'N	132° 38.6'W	528	681	611	25	x		
S4	73	StRS	RD1	Nov 4	11:38	1350	5E	53° 0.9'N	132° 39.7'W	53° 0.2'N	132° 39.6'W	327	352	402	25	x	x	
S5	74	StRS	RD1	Nov 4	12:54	1379	5E	53° 0.4'N	132° 41.5'W	53° 0.7'N	132° 42.5'W	423	463	429	25	x	x	
S5	75	StRS	RD2	Nov 4	14:03	1456	5E	53° 2.5'N	132° 45.7'W	53° 2.5'N	132° 46.9'W	485	551	529	25	x	x	
S5	76	StRS	RD2	Nov 4	15:11	1506	5E	53° 3'N	132° 52.9'W	53° 2.5'N	132° 52.1'W	602	729	686	25	x	x	
S5	77	StRS	RD2	Nov 4	16:17	1519	5E	53° 4.4'N	132° 49.4'W	53° 4.4'N	132° 50.6'W	566	649	608	25	x	x	
S5	78	StRS	RD3	Nov 9	08:05	1327	5E	53° 4.7'N	133° 10.9'W	53° 4.8'N	133° 11.8'W	835	874	856	25	x		
S5	79	StRS	RD2	Nov 9	09:36	1352	5E	53° 7.6'N	133° 16.6'W	53° 7.5'N	133° 17.7'W	614	729	668	25	x		
S5	80	StRS	RD2	Nov 9	12:02	1345	5E	53° 7.5'N	133° 10.1'W	53° 7.5'N	133° 11.3'W	540	704	601	25	x	x	
S5	81	StRS	RD3	Nov 9	13:25	1355	5E	53° 9.2'N	133° 14.5'W	53° 9.3'N	133° 15.7'W	794	1005	944	25	x	x	
S5	82	StRS	RD3	Nov 9	15:21	1370	5E	53° 5.7'N	133° 20.1'W	53° 5.7'N	133° 21.3'W	836	1181	1030	25	x	x	
S5	83	StRS	RD3	Nov 9	16:36	1394	5E	53° 6.9'N	133° 21.1'W	53° 6.9'N	133° 22.2'W	834	1090	1006	25	x	x	
S5	84	StRS	RD2	Nov 11	12:53	1328	5E	54° 0.3'N	133° 46.3'W	54° 0.2'N	133° 47.5'W	498	491	491	25	x		

continued.

Spatial Stratum	Set	Type	Depth	Date	Time	Duration	Area	Latitude	Longitude	Latitude	Longitude	Start	End	Mean	Traps Fished	SBE 39	Hobo	CTD
S5	85	StRS	RD2	Nov 11	14:17	1360	5E	54° 4.7'N	133° 50.3'W	54° 4.7'N	133° 51.7'W	490	576	535	25	x		
S5	86	StRS	RD1	Nov 11	16:14	1354	5E	54° 3.9'N	133° 42.7'W	54° 3.9'N	133° 44'W	257	249	253	24		x	x
S5	87	StRS	RD1	Nov 11	17:42	1363	5E	54° 6.4'N	133° 41.2'W	54° 6.4'N	133° 42.4'W	262	258	259	25	x	x	
S5	88	StRS	RD1	Nov 11	19:18	1357	5E	54° 8.8'N	133° 32.1'W	54° 8.9'N	133° 33.2'W	268	266	267	25	x	x	
S5	89	StRS	RD1	Nov 11	20:35	1362	5E	54° 5.8'N	133° 31.8'W	54° 5.7'N	133° 32.8'W	322	313	318	25	x	x	
Portland	90	Inlet		Nov 13	11:19	1072	5D	54° 1.7'N	130° 12.6'W	54° 1.1'N	130° 12'W	439	440	440	25	x		
Portland	91	Inlet		Nov 13	12:10	1122	5D	54° 7.8'N	130° 15.6'W	54° 7.2'N	130° 16.6'W	496	494	496	25	x		
Portland	92	Inlet		Nov 13	13:04	1192	5D	54° 5.8'N	130° 22.1'W	54° 5.1'N	130° 22.5'W	523	560	542	25	x	x	
Portland	93	Inlet		Nov 13	14:23	1225	5D	54° 2.2'N	130° 26.2'W	54° 1.7'N	130° 27.2'W	583	616	604	25	x	x	
Portland	94	Inlet		Nov 13	16:02	1253	5D	54° 9.3'N	130° 32'W	54° 8.6'N	130° 32.1'W	640	636	639	25	x	x	
Gil Island	95	Inlet		Nov 15	12:31	1052	5C	53° 9.3'N	129° 18.5'W	53° 8.7'N	129° 18.3'W	537	541	540	25	x		
Gil Island	96	Inlet		Nov 15	14:06	1084	5C	53° 2.4'N	129° 22.9'W	53° 1.9'N	129° 23.6'W	541	528	531	25	x		
Gil Island	97	Inlet		Nov 15	15:26	1145	5C	53° 0'N	129° 21.7'W	53° 0.4'N	129° 21.6'W	657	667	664	25	x	x	
Gil Island	98	Inlet		Nov 15	17:15	1178	5C	53° 0.3'N	129° 7.5'W	53° 0'N	129° 7.3'W	567	555	564	25	x	x	
Gil Island	99	Inlet		Nov 15	18:21	1223	5C	53° 0.7'N	129° 7.9'W	53° 1.4'N	129° 8'W	567	565	567	25	x	x	
Finlayson	100	Inlet		Nov 17	13:03	1019	5C	52° 7.5'N	128° 25.8'W	52° 7'N	128° 26.4'W	564	589	575	25	x		
Finlayson	101	Inlet		Nov 17	14:16	1043	5C	52° 3.8'N	128° 27.9'W	52° 3.1'N	128° 27.7'W	617	608	602	25	x		
Finlayson	102	Inlet		Nov 17	15:27	1068	5C	52° 9.8'N	128° 28.5'W	52° 9.2'N	128° 28.7'W	560	583	579	25	x	x	
Finlayson	103	Inlet		Nov 17	16:45	1093	5C	52° 4.7'N	128° 27.9'W	52° 4'N	128° 27.8'W	671	648	655	25	x	x	
Finlayson	104	Inlet		Nov 17	17:35	1136	5C	52° 1.1'N	128° 27.9'W	52° 0.3'N	128° 27.6'W	769	821	806	25	x	x	
Dean/Burke	105	Inlet		Nov 19	12:01	969	5B	52° 0.5'N	127° 28.5'W	52° 1.2'N	127° 27.9'W	519	504	515	24	x		
Dean/Burke	106	Inlet		Nov 19	14:01	985	5B	52° 6.8'N	127° 16'W	52° 6.3'N	127° 15.2'W	531	515	533	25	x		
Dean/Burke	107	Inlet		Nov 19	15:41	1037	5B	52° 6.6'N	127° 15'W	52° 6.3'N	127° 16.1'W	580	580	581	25	x	x	
Dean/Burke	108	Inlet		Nov 19	16:47	1068	5B	52° 4.1'N	127° 24.6'W	52° 3.6'N	127° 25.5'W	595	593	594	25	x	x	
Dean/Burke	109	Inlet		Nov 19	18:05	1124	5B	52° 0.9'N	127° 36.2'W	52° 0.5'N	127° 37.3'W	444	430	440	25	x	x	

## **APPENDIX D SUMMARY OF BASKET USE BY TRAP 2018.**

Summary of the basket use by trap number for sets during the 2018 Sablefish survey. Sets that did not retain Sablefish are not listed. The set numbers highlighted in green indicate standardized sets at mainland inlet localities. All other sets are of the StRS type. The fate of the Sablefish catch for each set and trap is indicated using the following abbreviations: D = Discarded after weighing (processed as commercial catch), A = Sampled for LSMWO, T = Tagged and released, SD = Sublegal discarded, F= Frames, NA = No Sablefish catch/Trap missing.

Total	Weight	Length	Recovered	Received	Despatched	Number	Type	8.5%	9.5%	10.5%	11.5%	12.5%	13.5%	14.5%	15.5%	16.5%	17.5%	18.5%	19.5%	20.5%	21.5%	22.5%	23.5%	24.5%	25.5%	26.5%	27.5%	28.5%	29.5%	30.5%	31.5%	32.5%	33.5%	34.5%	35.5%	36.5%	37.5%	38.5%	39.5%	40.5%	41.5%	42.5%	43.5%	44.5%	45.5%	46.5%	47.5%	48.5%	49.5%	50.5%	51.5%	52.5%	53.5%	54.5%	55.5%	56.5%	57.5%	58.5%	59.5%	60.5%	61.5%	62.5%	63.5%	64.5%	65.5%	66.5%	67.5%	68.5%	69.5%	70.5%	71.5%	72.5%	73.5%	74.5%	75.5%	76.5%	77.5%	78.5%	79.5%	80.5%	81.5%	82.5%	83.5%	84.5%	85.5%	86.5%	87.5%	88.5%	89.5%	90.5%	91.5%	92.5%	93.5%	94.5%	95.5%	96.5%	97.5%	98.5%	99.5%	100.5%
286	90	1	0	27	28	629	48	48	48	46	48	48	0.06	562	642																																																																																					
477	222	0	0	70	70	568	52	52	51	48	52	52	0.35	558	582																																																																																					
581	243	2	0	103	105	589	47	47	47	47	47	47	0.60	585</td																																																																																						

continued.

continued.

Total	Weight.Kg	Recovered	Recovery%	Sample Number	Sample Description	Group	Sample Size	Sample Proportion	Mean	Fork Length mm.
11915858415	208	5	10757	10947	5734	5471	5465	5371	5471	5741

## **APPENDIX E SUMMARY OF BASKET USE BY TRAP 2019.**

Summary of the basket use by trap number for sets during the 2019 Sablefish survey. Sets that did not retain Sablefish are not listed. The set numbers highlighted in green indicate standardized sets at mainland inlet localities. All other sets are of the StRS type. The fate of the Sablefish catch for each set and trap is indicated using the following abbreviations: D = Discarded after weighing (processed as commercial catch), A = Sampled for LSMWO, T = Tagged and released, SD = Sublegal discarded, F= Frames, NA = No Sablefish catch/Trap missing.



continued.

**APPENDIX F SUMMARY OF SABLEFISH BIOLOGICAL DATA 2018 BY SET.**

Set	Total Catch			Tagged Fish Counts			Tagged Fork Lengths(mm)			Specimen Count					Mean Fork Length(mm)		
	kg	Count	Recover-Rerelease	Deceased	Released	Count	Mean	Fork Length	Sex	Maturity	Otoliths	Weight	Count	Proportion Males	Males	Females	
1	286	90	1	0	27	28	629	48	48	48	46	48	48	0.06	562	642	
2	477	222	0	0	70	70	568	52	52	51	48	52	52	0.35	558	582	
3	581	243	2	0	103	105	589	47	47	47	47	47	47	0.60	585	629	
4	1776	659	1	0	130	131	620	63	63	63	63	63	63	0.71	585	633	
5	1371	575	2	0	129	131	573	63	63	63	62	63	63	0.76	588	597	
6	2917	981	2	0	120	122	634	45	45	45	45	45	45	0.44	594	660	
7	1135	439	0	0	140	138	601	68	68	68	68	68	68	0.35	566	636	
8	1348	528	0	1	137	138	594	54	54	54	54	54	54	0.70	603	648	
9	1734	791	3	0	144	147	588	69	67	66	67	67	69	0.67	583	604	
10	2292	1201	3	0	117	120	563	62	62	62	62	62	62	0.69	550	538	
11	75	18	0	0	10	10	693	8	8	8	8	8	8	0.00	0	691	
12	1947	1151	3	0	137	140	524	54	54	54	54	54	54	0.74	547	607	
13	2566	1514	1	0	183	184	544	51	50	50	50	50	51	0.74	548	578	
14	1182	588	4	0	171	175	567	62	62	62	62	62	62	0.55	553	595	
15	1648	725	1	0	136	137	582	57	56	56	56	56	57	0.57	562	589	
16	2446	874	1	0	118	119	623	47	47	47	47	47	47	0.15	589	658	
17	1483	674	6	0	125	131	566	58	58	58	58	58	58	0.78	564	610	
18	839	318	4	0	88	92	610	53	50	50	50	50	53	0.38	596	627	
19	1252	473	1	0	130	131	606	50	50	50	49	50	50	0.20	560	635	
20	1842	848	3	0	136	139	570	50	48	48	48	48	50	0.58	560	640	
21	893	445	0	0	125	125	562	55	53	53	53	53	55	0.25	549	599	
22	715	249	1	0	87	88	622	60	60	60	60	60	60	0.12	549	638	
23	1525	840	1	1	117	119	541	80	72	71	71	71	81	0.57	517	579	
24	1852	1013	0	0	158	158	547	61	57	57	57	57	61	0.65	538	567	
25	2650	1173	3	0	132	135	577	55	55	55	52	55	56	0.69	577	613	
26	889	383	2	0	102	104	569	61	61	61	61	61	61	0.46	542	623	
27	950	309	1	0	94	95	628	57	57	57	57	57	57	0.09	563	676	
28	1731	556	2	0	114	116	608	55	53	53	53	53	55	0.47	594	690	
29	788	236	1	0	82	83	652	55	50	50	50	50	55	0.40	627	703	
30	523	145	0	0	55	55	661	53	50	50	50	50	53	0.18	618	686	
31	704	245	0	0	102	102	625	54	52	52	52	52	54	0.27	578	649	
32	425	181	1	0	41	42	581	47	47	47	47	47	47	0.49	552	592	
33	293	111	1	0	27	28	561	39	38	38	38	38	39	0.18	569	598	
34	1316	473	2	0	147	149	596	47	46	46	45	46	47	0.22	501	595	
35	986	271	2	0	84	86	640	58	58	58	58	58	58	0.26	637	672	
36	1349	484	1	0	125	126	622	66	66	66	66	66	66	0.53	592	645	
37	1268	406	3	0	121	124	631	47	45	45	45	45	47	0.24	615	656	
38	357	213	2	0	81	83	529	45	45	45	45	45	45	0.27	472	534	
39	286	182	8	0	48	56	537	56	56	56	56	56	56	0.32	484	534	
40	341	215	3	0	80	83	511	57	57	57	57	57	57	0.33	464	543	
41	677	398	1	0	100	101	537	54	54	54	53	54	54	0.31	504	544	

continued.

Set	Total Catch		Tagged Fish Counts			Tagged Fork Lengths(mm)		Specimen Count					Mean Fork Length(mm)			
	kg	Count	Recover-Rerelease	Deceased	Released	Count	Mean	Fork Length	Sex	Maturity	Otoliths	Weight	Count	Proportion Males	Males	Females
42	824	576	0	0	148	148	507	53	53	53	53	53	53	0.43	503	543
43	1118	530	8	0	128	135	581	52	52	52	52	52	52	0.23	512	565
44	1412	835	8	0	143	150	530	60	60	60	16	60	60	0.37	519	558
45	1220	679	21	0	108	129	558	51	51	51	41	51	51	0.31	514	571
46	1314	818	11	0	144	155	547	57	56	57	57	57	57	0.64	522	540
47	1364	903	7	0	163	170	502	53	53	53	53	53	53	0.53	511	560
48	1270	681	0	0	137	137	553	56	56	56	56	56	56	0.18	527	575
49	651	398	2	0	127	129	537	53	53	53	53	53	53	0.15	512	561
50	974	453	1	0	122	122	582	55	55	55	55	55	55	0.22	528	599
51	882	581	3	0	128	131	519	55	55	55	55	55	55	0.44	501	548
52	770	529	1	0	122	123	513	50	50	50	50	50	50	0.30	504	535
53	943	556	0	0	97	96	539	61	61	61	61	61	61	0.23	520	541
54	797	240	1	0	58	59	654	59	59	59	59	59	59	0.29	623	690
55	197	49	0	0	29	29	709	15	15	15	15	15	15	0.00	0	737
56	736	163	1	0	60	61	694	52	51	51	51	51	52	0.18	572	724
57	1514	569	0	0	125	125	604	55	51	51	51	51	55	0.49	589	653
58	1527	654	0	0	135	135	598	52	52	52	52	52	52	0.63	584	618
59	379	111	1	0	38	32	648	46	46	45	46	46	46	0.02	570	676
60	2057	824	2	0	126	126	614	54	54	54	54	54	54	0.61	585	637
61	2042	1014	1	0	149	150	562	55	55	55	55	55	55	0.80	555	620
62	1729	1054	5	0	153	158	528	66	55	55	55	55	69	0.85	521	556
63	1529	725	5	0	116	121	571	66	58	58	58	58	66	0.53	553	574
64	1561	725	10	0	142	151	584	55	53	53	53	53	55	0.43	550	612
65	8	6	0	0	2	2	423	2	2	2	2	2	2	1.00	530	0
66	1327	421	1	0	118	119	638	53	53	53	53	53	53	0.32	597	623
67	1093	394	2	0	122	123	619	55	55	55	55	55	55	0.22	598	614
68	1717	754	1	0	146	147	577	57	56	55	56	56	57	0.68	579	631
69	921	485	1	0	130	131	560	60	60	60	60	60	60	0.17	501	566
70	324	79	0	0	33	33	680	34	34	34	34	34	34	0.00	0	708
71	248	60	1	0	22	23	707	37	37	37	37	37	37	0.08	505	669
72	352	82	0	0	37	37	712	45	45	45	43	45	45	0.31	637	709
73	103	21	0	0	7	7	754	15	15	15	14	15	15	0.33	612	752
74	1771	866	4	0	119	123	530	53	53	53	53	53	53	0.43	519	550
75	294	115	1	0	41	42	618	46	45	45	44	45	46	0.76	612	691
76	878	464	5	0	129	133	559	57	57	56	53	57	57	0.75	557	545
77	681	338	1	1	94	96	579	55	54	54	54	54	55	0.85	553	628
78	1183	681	2	0	113	115	554	64	57	57	56	57	64	0.77	528	537
80	743	243	0	0	67	67	662	54	54	54	54	54	54	0.20	626	638
81	447	166	0	0	58	58	639	56	56	56	56	56	56	0.79	599	665
82	2410	1727	0	1	121	122	520	61	46	46	46	46	61	0.57	564	530

continued.

Set	Total Catch		Tagged Fish Counts			Tagged Fork Lengths(mm)		Specimen Count					Mean Fork Length(mm)			
	kg	Count	Recover-Rerelease	Deceased	Released	Count	Mean	Fork Length	Sex	Maturity	Otoliths	Weight	Count	Proportion Males	Males	Females
83	1669	888	0	0	130	130	566	56	56	56	56	56	56	0.18	549	584
84	21	6	0	0	1	1	645	5	5	5	5	5	5	0.00	0	717
85	301	105	1	0	49	50	658	31	31	31	31	31	31	0.58	633	656
86	60	18	0	0	1	1	690	17	17	17	17	17	17	0.24	688	677
87	108	30	0	0	9	9	682	20	21	21	21	21	21	0.05	640	659
88	562	187	0	0	59	59	607	50	49	49	49	49	50	0.14	570	587
89	874	445	4	0	122	126	556	53	53	53	53	53	53	0.74	555	603
90	1057	578	6	0	120	126	540	50	50	50	50	50	50	0.76	546	579
91	208	77	0	0	23	23	637	36	36	36	36	36	36	0.64	589	624
92	750	399	1	0	132	128	555	57	57	57	57	57	57	0.77	559	569
93	379	130	0	0	46	46	599	52	52	52	52	52	52	0.19	584	625
94	2189	1859	0	0	44	44	504	222	50	50	50	50	222	0.30	467	475
95	29	8	0	0	3	3	670	5	5	5	5	5	5	0.00	0	656
96	1209	438	0	0	134	134	605	49	49	49	49	49	49	0.31	598	603
97	478	214	1	0	70	71	591	36	36	36	36	36	36	0.69	597	608
98	304	110	1	0	26	27	658	51	51	51	51	51	51	0.57	614	656
99	1629	607	3	0	137	140	607	55	55	55	55	55	55	0.15	560	624
100	1578	1019	3	0	148	151	527	56	56	56	56	56	56	0.36	528	536
101	454	329	0	0	87	87	500	53	53	53	53	53	53	0.38	516	545
102	982	569	0	0	139	139	545	52	52	52	52	52	52	0.33	526	549
103	1806	1092	0	0	135	135	536	55	55	55	55	55	55	0.25	530	563
104	520	125	0	0	31	31	684	51	51	51	51	51	51	0.35	642	697
105	1859	943	1	0	141	142	509	53	53	53	53	53	53	0.38	575	569
106	894	449	0	0	115	115	567	59	59	59	59	59	59	0.69	555	592
107	401	124	1	0	43	44	659	38	38	38	38	38	38	0.50	643	674
108	2798	2103	2	1	117	120	539	58	58	57	57	58	59	0.67	584	555
109	3470	2810	3	0	127	130	548	52	52	52	52	52	52	0.56	528	531
110	276	81	1	0	16	17	638	50	50	45	50	50	50	0.06	605	666
111	1268	663	0	0	122	122	540	54	54	54	54	54	54	0.50	539	549
Total	119158	58415	208	5	10757	10947		5734	5471	5465	5371	5471	5741			

**APPENDIX G SUMMARY OF SABLEFISH BIOLOGICAL DATA 2019 BY SET.**

Set	Total Catch		Tagged Fish Counts			Tagged Fork Lengths(mm)			Specimen Count						Mean Fork Length(mm)		
	kg	Count	Recover-Rerelease	Deceased	Released	Count	Mean	Fork Length	Sex	Maturity	Otoliths	Weight	Count	Proportion Males	Males	Females	
1	675	418	0	0	123	123	531	55	55	55	55	55	55	0.55	504	568	
2	327	75	0	0	26	26	722	42	42	42	42	42	42	0.02	695	732	
3	470	139	0	0	56	56	675	51	51	51	51	51	51	0.06	658	662	
4	495	150	0	0	56	56	652	50	50	50	50	50	50	0.10	622	686	
5	1322	650	1	0	120	121	583	56	56	56	56	56	56	0.70	557	658	
6	724	281	0	0	127	127	596	46	45	45	43	45	47	0.13	529	626	
7	2502	1409	0	0	153	150	577	149	56	56	56	56	149	0.27	529	582	
8	1092	395	0	0	135	135	625	45	45	45	45	45	45	0.07	585	626	
9	680	353	1	0	115	115	553	50	48	48	49	49	50	0.58	544	594	
10	682	365	0	0	126	126	549	56	56	56	56	56	56	0.77	543	594	
11	613	199	2	0	62	64	643	54	54	54	54	54	54	0.07	609	666	
12	300	80	1	0	29	30	684	44	44	44	44	44	44	0.05	598	688	
13	1828	1258	2	0	144	146	510	56	53	53	53	53	56	0.77	520	548	
14	723	396	1	0	108	109	536	57	57	57	57	57	57	0.75	558	569	
15	1864	976	5	0	137	142	552	51	50	51	51	51	51	0.52	558	573	
16	2524	1386	4	0	156	160	547	57	57	57	57	57	57	0.61	536	547	
17	1893	754	1	0	167	168	618	54	52	52	53	53	54	0.23	558	643	
18	1162	780	3	0	121	124	515	53	53	53	53	53	53	0.85	503	617	
19	2730	1439	3	0	152	155	562	61	55	55	55	55	61	0.55	558	574	
20	422	131	0	0	24	24	659	47	45	45	45	45	47	0.09	614	656	
21	2475	1467	1	0	118	119	548	69	53	53	53	53	69	0.58	570	627	
22	1333	558	2	0	120	122	615	54	54	54	54	54	54	0.41	557	630	
23	1798	1288	0	0	141	141	529	67	52	52	52	52	67	0.15	541	560	
24	1272	486	1	0	126	126	615	51	51	51	51	51	51	0.31	590	626	
25	281	132	0	0	32	32	620	29	23	23	23	23	29	0.26	628	623	
26	2508	1418	1	0	119	120	542	53	53	53	53	53	53	0.70	526	569	
27	991	0	1	0	136	137	605	49	49	49	49	49	50	0.37	544	635	
28	2012	1163	3	0	121	124	567	53	53	53	53	53	53	0.60	547	578	
29	723	488	0	0	138	137	559	47	47	46	47	47	47	0.49	563	628	
30	841	465	0	0	109	109	572	51	41	41	40	41	51	0.37	563	589	
31	333	133	3	0	36	39	591	50	50	50	50	50	50	0.48	555	624	
32	332	100	1	0	14	15	659	49	49	49	49	49	49	0.22	579	674	
33	2191	1328	0	0	114	114	536	73	52	52	52	52	73	0.27	545	538	
34	2328	1182	0	0	120	120	560	50	50	50	50	50	50	0.26	553	586	
35	781	370	0	0	124	124	587	52	52	52	52	52	52	0.52	570	600	
36	2133	1319	0	0	141	141	572	61	48	47	48	48	61	0.48	523	528	
37	520	200	0	0	50	50	605	26	26	26	26	26	26	0.19	597	605	
38	124	21	0	0	7	7	721	13	13	13	13	13	13	0.15	738	800	
39	2277	1178	1	0	143	143	598	58	56	56	56	56	58	0.36	552	561	
40	1334	919	3	0	132	134	527	49	49	49	49	49	49	0.71	519	570	
41	2025	1439	1	0	133	134	525	51	51	51	51	51	51	0.59	541	538	

continued.

Set	Total Catch		Tagged Fish Counts			Tagged Fork Lengths(mm)		Specimen Count						Mean Fork Length(mm)		
	kg	Count	Recover-Rerelease	Deceased	Released	Count	Mean	Fork Length	Sex	Maturity	Otoliths	Weight	Count	Proportion Males	Males	Females
42	1118	514	7	0	121	128	578	56	56	56	56	56	56	0.55	563	619
43	942	617	0	0	118	118	528	58	58	57	58	58	58	0.66	508	535
44	1201	424	2	0	135	137	621	54	54	54	54	54	54	0.30	553	593
45	647	185	0	0	58	58	675	51	51	51	51	51	51	0.14	604	665
46	665	178	2	0	52	54	649	45	45	45	45	45	45	0.00	0	704
47	1823	1092	1	0	129	130	523	49	48	49	49	49	49	0.60	517	531
48	1376	664	1	0	139	140	569	62	62	62	62	62	62	0.35	559	581
49	2902	2334	0	0	148	147	511	59	58	58	58	58	59	0.47	522	535
50	499	187	1	0	18	19	647	51	51	51	51	51	51	0.16	574	639
51	1287	740	0	0	121	121	548	45	45	45	45	45	45	0.47	559	553
52	242	88	1	0	25	26	615	53	53	53	53	53	53	0.51	609	681
53	21	6	0	0	4	4	703	2	2	2	2	2	2	0.00	0	715
54	1649	654	3	0	130	133	588	45	45	45	44	45	45	0.16	641	597
55	752	229	0	0	92	92	640	42	42	42	42	42	42	0.38	643	670
56	991	389	1	0	97	98	608	47	47	47	47	47	47	0.30	584	601
57	698	279	0	0	96	96	616	40	40	40	40	40	40	0.70	618	658
58	2401	1651	2	0	129	131	523	56	49	49	49	49	56	0.49	528	514
59	976	461	8	0	121	129	558	51	51	51	51	51	51	0.55	547	601
60	683	226	2	0	77	79	648	52	52	52	52	52	52	0.50	633	659
61	2773	1874	1	0	149	150	530	57	54	54	54	54	57	0.31	529	517
62	142	62	0	0	11	11	554	22	19	19	19	19	22	0.21	651	595
63	3030	2071	0	0	108	108	538	56	48	48	48	48	56	0.40	514	530
64	1569	610	2	0	127	129	608	56	56	56	56	56	56	0.63	589	649
65	738	240	0	0	62	62	646	51	51	51	51	51	51	0.29	605	668
66	426	168	0	0	49	49	576	54	54	54	54	54	54	0.17	521	602
67	1671	863	0	0	146	146	548	50	50	50	50	50	50	0.36	543	606
68	326	124	0	0	35	35	644	52	48	48	48	48	52	0.19	468	629
69	659	281	0	0	74	74	575	43	42	42	42	42	43	0.12	588	611
70	2465	1607	1	0	148	149	530	60	54	54	54	54	60	0.44	554	576
71	74	27	1	0	8	9	629	18	18	18	18	18	18	0.33	613	651
72	2958	2071	0	0	153	153	515	58	57	57	57	57	58	0.47	538	553
73	1212	430	0	0	130	130	637	46	46	46	46	46	46	0.22	567	606
74	2208	933	1	2	137	140	586	60	60	60	58	60	60	0.27	606	619
75	2945	1818	1	0	104	105	545	57	56	56	56	56	57	0.21	525	561
76	839	508	2	0	129	131	537	53	53	53	53	53	53	0.55	524	553
77	3428	2904	1	0	147	146	516	53	51	51	51	51	53	0.37	526	555
78	1066	617	9	0	143	152	557	56	56	56	56	56	56	0.66	557	576
79	1417	1120	1	0	169	170	486	50	50	50	50	50	50	0.58	494	532
80	594	284	0	0	116	116	558	51	51	51	51	51	51	0.47	537	555
81	435	178	0	0	68	68	604	51	51	51	51	51	51	0.49	596	648

continued.

Set	Total Catch		Tagged Fish Counts			Tagged Fork Lengths(mm)		Specimen Count					Mean Fork Length(mm)			
	kg	Count	Recover-Rerelease	Deceased	Released	Count	Mean	Fork Length	Sex	Maturity	Otoliths	Weight	Count	Proportion Males	Males	Females
82	703	344	2	0	111	113	560	57	57	57	57	57	57	0.46	533	630
83	623	314	1	0	88	89	565	53	53	53	53	53	53	0.66	548	661
84	1553	582	1	0	136	137	603	53	53	53	53	53	53	0.45	593	609
85	3100	1994	1	0	193	194	520	80	56	56	56	56	80	0.18	525	546
86	367	87	0	0	17	17	704	46	46	46	46	46	46	0.13	604	688
87	297	103	0	0	25	25	586	52	52	52	52	52	52	0.08	668	639
88	169	59	0	0	18	18	590	30	28	28	28	28	30	0.18	490	622
89	999	486	0	0	123	123	537	57	57	57	57	57	57	0.42	564	545
90	1153	779	0	0	183	183	537	51	51	51	51	51	51	0.33	509	546
91	1475	1020	0	0	165	165	513	52	52	52	52	52	52	0.31	500	520
92	2471	1434	1	0	127	128	535	51	51	51	51	51	51	0.37	537	550
93	2376	1289	0	0	141	141	551	55	55	55	55	55	55	0.31	535	565
94	1897	923	1	0	152	153	558	52	52	52	52	52	52	0.23	523	561
95	1420	819	0	0	137	137	549	49	49	49	48	49	49	0.31	517	569
96	2204	1379	8	0	155	163	537	55	55	55	55	55	55	0.16	512	551
97	1531	832	0	0	149	149	540	56	56	56	56	56	56	0.27	537	558
98	1843	1096	3	0	135	138	530	58	58	58	58	58	58	0.31	526	553
99	2276	1427	6	0	164	169	529	54	54	54	54	54	54	0.39	511	564
100	1015	598	4	0	140	144	529	56	55	55	55	55	57	0.27	507	549
101	1499	923	5	0	154	159	519	50	50	50	50	50	50	0.34	503	533
102	1520	956	7	0	118	125	534	48	48	48	48	48	48	0.38	494	547
103	988	565	7	0	128	135	542	52	52	52	52	52	52	0.44	501	555
104	1342	669	5	0	135	140	541	54	52	52	52	52	54	0.19	533	583
105	771	474	2	0	132	134	534	58	58	58	58	58	58	0.28	525	550
106	1185	691	2	0	132	134	535	55	54	54	51	54	55	0.24	503	566
107	889	530	0	0	119	118	542	59	59	59	59	59	59	0.47	515	544
108	1456	814	4	0	151	155	548	52	52	52	52	52	52	0.29	517	567
109	960	653	1	0	126	127	509	50	50	50	50	50	50	0.32	502	537
Total	141570	78836	154	2	11888	12031	5656	5395	5394	5389	5399	5399	5659			

**APPENDIX H SUMMARY OF BIOLOGICAL DATA 2018 BY SET FOR OTHER FISH.**

Species Name	Set	Specimen Count					Mean Fork Length(mm)			Sampler Visual id Count				
		Fork Length	Sex	Maturity	Otolith	DNA	Total Count	Proportion Males	Males	Females	No sex	Rougheye	Blackspotted	
ROUGHEYE/BLACKSPOTTED ROCKFISH COMPLEX	4	1	1	1	1	1	1	0.00	0	515	0	1	0	0
	13	3	3	3	3	3	3	0.33	490	498	0	1	1	1
	15	12	12	12	12	12	12	0.42	472	489	0	11	1	0
	29	1	1	1	1	1	1	0.00	0	615	0	0	1	0
	35	3	3	3	3	3	3	0.67	450	375	0	1	2	0
	37	11	11	11	11	11	11	0.64	465	493	0	6	5	0
	68	16	16	16	16	16	16	0.63	433	459	0	2	13	1
	72	4	4	4	4	4	4	0.50	503	440	0	1	3	0
	74	5	5	5	5	5	5	1.00	449	0	0	0	5	0
	79	1	1	1	1	1	1	1.00	630	0	0			
	80	14	14	14	14	14	14	0.71	469	516	0	0	14	0
	88	15	15	15	15	15	15	0.40	520	551	0	2	13	0
	93	5	5	5	5	5	5	0.40	448	487	0	0	5	0
	96	23	23	22	23	23	23	0.61	484	506	0	4	18	0
	102	3	3	3	3	3	3	0.33	545	418	0	0	3	0
	104	26	26	26	26	26	26	0.23	503	498	0	5	20	1
	108	2	2	2	2	2	2	0.00	0	480	0	0	2	0
	109	1	1	1	1	1	1	0.00	0	510	0	1	0	0
	111	1	1	1	1	1	1	0.00	0	530	0	1	0	0
SHORTRAKER ROCKFISH	8	1	1	1	1	0	1	1.00	615	0	0			
	29	7	7	7	7	0	7	0.43	628	506	0			
	35	3	3	3	3	0	3	0.67	748	645	0			
	36	4	4	4	4	0	4	0.25	460	557	0			
	46	1	1	1	1	0	1	1.00	760	0	0			
	57	3	3	0	3	0	3	1.00	570	0	555			
	58	1	1	1	1	0	1	1.00	420	0	0			
	60	1	1	1	1	0	1	0.00	0	535	0			
	68	1	1	1	1	0	1	1.00	595	0	0			
	74	1	1	1	1	0	1	0.00	0	535	0			
	83	1	1	1	1	0	1	0.00	0	530	0			
	93	1	1	1	1	0	1	0.00	0	660	0			
YELLOWEYE ROCKFISH	6	3	3	3	3	0	3	0.67	430	560	0			
	34	3	3	3	3	0	3	0.33	390	523	0			
	35	9	9	9	9	0	9	0.67	565	548	0			
	65	18	18	18	18	0	18	0.50	522	487	0			
	70	24	24	24	24	0	24	0.25	613	579	0			
	71	29	29	29	29	0	29	0.55	591	568	0			
	72	2	2	2	2	0	2	0.50	595	555	0			
	73	27	26	26	27	0	27	0.46	609	551	675			
	79	30	30	30	30	0	30	0.23	604	567	0			

continued.

Species Name	Set	Specimen Count					Mean Fork Length(mm)			Sampler Visual id Count				
		Fork Length	Sex	Maturity	Otolith	DNA	Total Count	Proportion Males	Males	Females	No sex	Rougheye	Blackspotted	Hybrid
	80	1	1	1	1	0	1	1.00	405	0	0			
	87	2	2	2	2	0	2	0.00	0	463	0			
	95	2	2	2	2	0	2	1.00	605	0	0			
PACIFIC HALIBUT	4	4	0	0	0	0	4	0.00	0	0	0	830		
	5	1	0	0	0	0	1	0.00	0	0	0	770		
	6	3	0	0	0	0	3	0.00	0	0	0	863		
	13	1	0	0	0	0	1	0.00	0	0	0	890		
	15	5	0	0	0	0	5	0.00	0	0	0	836		
	16	5	0	0	0	0	5	0.00	0	0	0	912		
	19	4	0	0	0	0	4	0.00	0	0	0	820		
	29	9	0	0	0	0	9	0.00	0	0	0	819		
	33	44	0	0	0	0	45	0.00	0	0	0	879		
	34	5	0	0	0	0	5	0.00	0	0	0	870		
	35	6	0	0	0	0	6	0.00	0	0	0	820		
	37	15	0	0	0	0	15	0.00	0	0	0	822		
	38	1	0	0	0	0	1	0.00	0	0	0	1280		
	40	2	0	0	0	0	2	0.00	0	0	0	1185		
	41	2	0	0	0	0	2	0.00	0	0	0	1000		
	43	2	0	0	0	0	2	0.00	0	0	0	785		
	48	1	0	0	0	0	1	0.00	0	0	0	730		
	49	4	0	0	0	0	4	0.00	0	0	0	863		
	50	1	0	0	0	0	1	0.00	0	0	0	1010		
	51	2	0	0	0	0	2	0.00	0	0	0	940		
	52	4	0	0	0	0	4	0.00	0	0	0	903		
	53	12	0	0	0	0	12	0.00	0	0	0	863		
	56	6	0	0	0	0	6	0.00	0	0	0	890		
	65	4	0	0	0	0	4	0.00	0	0	0	855		
	66	3	0	0	0	0	3	0.00	0	0	0	910		
	67	3	0	0	0	0	3	0.00	0	0	0	853		
	68	3	0	0	0	0	3	0.00	0	0	0	997		
	69	10	0	0	0	0	10	0.00	0	0	0	920		
	70	1	0	0	0	0	1	0.00	0	0	0	880		
	71	2	0	0	0	0	2	0.00	0	0	0	810		
	72	5	0	0	0	0	5	0.00	0	0	0	844		
	73	7	0	0	0	0	7	0.00	0	0	0	964		
	80	5	0	0	0	0	5	0.00	0	0	0	912		
	87	2	0	0	0	0	2	0.00	0	0	0	855		
	88	17	0	0	0	0	17	0.00	0	0	0	894		
	93	28	0	0	0	0	28	0.00	0	0	0	873		
	95	2	0	0	0	0	2	0.00	0	0	0	1085		

continued.

Species Name	Set	Specimen Count					Mean Fork Length(mm)				Sampler Visual id Count			
		Fork Length	Sex	Maturity	Otolith	DNA	Total Count	Proportion Males	Males	Females	No sex	Rougheye	Blackspotted	Hybrid
	96	18	0	0	0	0	18	0.00	0	0	844			
	99	2	0	0	0	0	2	0.00	0	0	750			
	100	20	0	0	0	0	20	0.00	0	0	834			
	101	15	0	0	0	0	15	0.00	0	0	771			
	102	5	0	0	0	0	5	0.00	0	0	818			
	103	2	0	0	0	0	2	0.00	0	0	880			
	104	8	0	0	0	0	8	0.00	0	0	875			
	110	11	0	0	0	0	11	0.00	0	0	869			
	111	12	0	0	0	0	12	0.00	0	0	814			

**APPENDIX I SUMMARY OF BIOLOGICAL DATA 2019 BY SET FOR OTHER FISH.**

Species Name	Set	Specimen Count					Mean Fork Length(mm)			Sampler Visual id Count				
		Fork Length	Sex	Maturity	Otolith	DNA	Total Count	Proportion Males	Males	Females	No sex	Rougheye	Blackspotted	Hybrid
PACIFIC SLEEPER SHARK	100	1	0	0	0	0	1	0.00	0	0	1690			
ROUGHEYE/BLACKSPOTTED ROCKFISH COMPLEX	7	5	5	4	5	5	5	0.80	483	510	0	4	1	0
	15	12	11	12	12	12	12	0.18	485	478	430	12	0	0
	16	2	2	2	2	2	2	0.50	455	460	0	2	0	0
	24	4	4	4	4	4	4	0.50	478	453	0	4	0	0
	30	1	1	1	1	1	1	0.00	0	520	0	1	0	0
	37	5	5	5	5	5	5	0.20	510	519	0	2	3	0
	54	19	19	19	19	19	19	0.58	477	467	0	1	16	2
	55	29	29	28	29	29	29	0.45	487	473	0	7	22	0
	56	18	18	18	18	17	18	0.78	482	486	0	0	18	0
	62	1	1	1	1	1	1	1.00	545	0	0	0	1	0
	65	9	9	9	9	9	9	0.56	453	371	0	2	7	0
	69	10	10	10	10	10	10	0.60	477	428	0	1	9	0
	73	25	25	25	25	25	25	0.56	490	493	0	1	24	0
	74	26	26	26	26	25	26	0.46	462	455	0	2	23	1
	84	29	29	29	29	29	29	0.24	449	482	0	9	20	0
SHORTRAKER ROCKFISH	54	1	1	1	1	0	1	0.00	0	600	0			
	55	1	1	1	1	0	1	0.00	0	590	0			
	56	2	2	2	2	0	2	1.00	650	0	0			
	59	2	2	2	2	0	2	0.50	625	600	0			
	69	3	3	3	3	0	3	0.33	620	620	0			
	73	1	1	1	1	0	1	0.00	0	565	0			
	84	1	1	1	1	0	1	0.00	0	695	0			
YELLOWEYE ROCKFISH	20	2	2	2	2	0	2	0.00	0	433	0			
	37	1	1	1	1	0	1	0.00	0	455	0			
	38	7	7	7	7	0	7	0.57	579	498	0			
	45	18	18	18	18	0	18	0.50	583	592	0			
	46	1	1	1	1	0	1	1.00	415	0	0			
	62	19	19	19	19	0	19	0.47	587	510	0			
	66	1	1	1	1	0	1	1.00	410	0	0			
PACIFIC HALIBUT	6	2	0	0	0	0	2	0.00	0	0	880			
	7	2	0	0	0	0	2	0.00	0	0	845			
	8	10	0	0	0	0	10	0.00	0	0	883			
	15	5	0	0	0	0	5	0.00	0	0	954			
	16	9	0	0	0	0	9	0.00	0	0	839			
	20	12	0	0	0	0	12	0.00	0	0	853			
	24	9	0	0	0	0	9	0.00	0	0	826			
	34	1	0	0	0	0	1	0.00	0	0	910			
	37	1	0	0	0	0	1	0.00	0	0	720			
	38	7	0	0	0	0	7	0.00	0	0	893			

continued.

Species Name	Set	Specimen Count					Mean Fork Length(mm)				Sampler Visual id Count			
		Fork Length	Sex	Maturity	Otolith	DNA	Total Count	Proportion Males	Males	Females	No sex	Rougheye	Blackspotted	Hybrid
	44	9	0	0	0	0	9	0.00	0	0	0	881		
	45	5	0	0	0	0	5	0.00	0	0	0	852		
	46	11	0	0	0	0	11	0.00	0	0	0	918		
	54	3	0	0	0	0	3	0.00	0	0	0	857		
	55	10	0	0	0	0	10	0.00	0	0	0	862		
	56	9	0	0	0	0	9	0.00	0	0	0	847		
	62	4	0	0	0	0	4	0.00	0	0	0	883		
	65	7	0	0	0	0	7	0.00	0	0	0	886		
	66	28	0	0	0	0	28	0.00	0	0	0	844		
	67	14	0	0	0	0	14	0.00	0	0	0	946		
	68	10	0	0	0	0	10	0.00	0	0	0	835		
	69	6	0	0	0	0	6	0.00	0	0	0	833		
	73	4	0	0	0	0	4	0.00	0	0	0	903		
	84	1	0	0	0	0	1	0.00	0	0	0	820		
	86	14	0	0	0	0	14	0.00	0	0	0	852		
	87	18	0	0	0	0	18	0.00	0	0	0	875		
	88	3	0	0	0	0	3	0.00	0	0	0	817		
	89	2	0	0	0	0	2	0.00	0	0	0	1010		
	90	10	0	0	0	0	10	0.00	0	0	0	751		
	91	10	0	0	0	0	10	0.00	0	0	0	790		
	92	1	0	0	0	0	1	0.00	0	0	0	690		
	93	1	0	0	0	0	1	0.00	0	0	0	840		
	94	1	0	0	0	0	1	0.00	0	0	0	890		
	95	3	0	0	0	0	3	0.00	0	0	0	963		
	96	1	0	0	0	0	1	0.00	0	0	0	1030		
	100	2	0	0	0	0	2	0.00	0	0	0	945		
	103	2	0	0	0	0	2	0.00	0	0	0	1055		

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