

Summary of the Annual 2018 and 2019 Sablefish (*Anoplopoma fimbria*) Trap Surveys, October 9 - November 19, 2018 and October 8 - November 25, 2019

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2020

Canadian Technical Report of Fisheries and Aquatic Sciences nnn



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SUMMARY OF THE ANNUAL 2018 AND 2019 SABLEFISH (*ANOPLOPOMA FIMBRIA*) TRAP SURVEYS, OCTOBER 9 - NOVEMBER 19, 2018 AND OCTOBER 8 - NOVEMBER 25, 2019

by

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Cat. No. Fs97-6/nnn E-PDF ISBN ISSN 1488-5379

Correct citation for this publication:

Lacko, L.C. and Acheson, S.M. and Connors, B.M. 2020. Summary of the Annual 2018 and 2019 Sablefish (*Anoplopoma fimbria*) Trap Surveys, October 9 - November 19, 2018 and October 8 - November 25, 2019. Can. Tech. Rep. Fish. Aquat. Sci. nnn: viii + 65 p.

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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 Surveys, October 9 - November 19, 2018 and October 8 - November 25, 2019. Can. Tech. Rep. Fish. Aquat. Sci. nnn: viii + 65 p.

This document describes sampling activities and summarizes results from the 2018 and 2019 British Columbia Sablefish research and assessment surveys. It is also intended to provide a historical reference for researchers. The two surveys utilized the same sampling strategies at stratified random (StRS) sites and all traditional inlet sites. The random component was comprised of StRS sets at five depth-stratified areas and the traditional component employed standardized sets at four inlet localities on the mainland.

As in previous surveys, biological sampling for sablefish included collection of length, weight, sex, maturity and age structures. Sablefish were randomly sampled from every third trap on all sets, up to a maximum sample size of 60 sablefish. Biological samples (length, weight, sex, maturity and otoliths) were taken for yelloweye rockfish, shortraker rockfish and rougheye/blackspotted rockfish species from catch in all traps. In addition, genetic samples were taken for the rough-eye/blackspotted rockfish complex and yelloweye rockfish. Length and weight measurements were collected from all Pacific halibut while only lengths were obtained from Pacific sleeper sharks.

A sablefish tag and release study has been conducted annually since 1991 and was continued in 2018 and 2019. Sablefish were selected randomly for tag and release from every third trap up to a maximum of 125 fish.

In total, 58,415 sablefish were caught in 2018, of which 5,741 were used for biological samples and 11,965 were tagged and released. Of those released, 208 were recaptured tagged fish. Five recaptured fish were retained for samples and the remaining 203 were fitted with a new tag and released back into the water. In 2019, a total of 78,836 sablefish were caught, of which 5,659 were used for biological samples and 12,042 were tagged and released. Of those released, 154 were recaptured tagged fish. Two recaptured fish were retained for samples and the remaining 152 were fitted with a new tag and released back into the water.

Other than sablefish, 53 and 18 taxonomic groups were represented in the 2018 catches from StRS sets and mainland inlet localities, respectively. In 2019, 50 and 12 taxonomic groups other than sablefish were captured from StRS sets and mainland inlet localities, respectively.

** to be updated **

Catch per unit effort (CPUE) is an important product from this survey. They can be used to infer population trends which are critical data elements used in stock assessment. CPUE from stratified random sets in the shallow depth stratum have shown a gradual decline in kilograms per trap from 2004 to 2007. CPUE rose again 2008 through 2010 and gradually declined from 2011 through 2014 to levels seen in 2007. An increase occurred again in 2015 through 2017, similar to those in 2008 and 2010. Last, CPUE surged in 2018, and 2019 to historic levels.

Within all years, the highest CPUE was achieved in the middle depth stratum. CPUE showed a

gradual decline from 2003 to 2010, then an increase in 2011 to those levels seen in 2004. CPUE dropped once again and fluctuated during 2012, 2013 and 2014. In 2015, a significant rise in numbers of fish per trap occurred, followed by a drop in 2016 to levels seen in 2004. Finally, a significant steady increase was seen in 2017, 2018 and 2019.

CPUE in the deep depth stratum (RD3) increased from 2003 to 2006 but declined in 2007. From 2008 through 2016, CPUE declined and remained low. A slight increase appeared in 2017, followed by another in 2018. In 2019, CPUE returned to those seen in 2006.

RÉSUMÉ

Lacko, L.C. and Acheson, S.M. and Connors, B.M. 2020. Summary of the Annual 2018 and 2019 Sablefish (*Anoplopoma fimbria*) Trap Surveys, October 9 - November 19, 2018 and October 8 - November 25, 2019. Can. Tech. Rep. Fish. Aquat. Sci. nnn: viii + 65 p.

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1 Introduction

Sablefish (*Anoplopoma fimbria*) are a commercially valuable species that are harvested in British Columbia (BC) using trap, longline and trawl gear as part of the integrated groundfish fishery. For the past ten years (2010 to 2019), BC fishermen have landed an average of 2,122 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%). 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 they have consisted of fishing sets using trap gear at randomly selected and/or index sites. These surveys are used to obtain catch rate data, gather biological samples, capture oceanographic measurements and collect tag release and recapture data. In turn, this information is used as the key contemporary index of abundance for assessing the biological status of the sablefish stock, and to condition an operating model that serves as the biological basis of the coastal Management Strategy Evaluation (DFO 2020).

The design of the sablefish survey has remained relatively consistent since 2011, and has been comprised of stratified random sampling (StRS) for sites along BC's continental shelf and the continuation of sampling at standardized index sites at four mainland inlets. 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.

In this technical report we describe survey operations and summarize 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 a letter code.

2 Methods

2.1 SURVEY DESIGN

Methodology for the 2018 and 2019 Sablefish research and assessment surveys employed a stratified random sampling (StRS) design component and a traditional standardized inlet component. The standard survey protocol requires the StRS component to be completed first, fishing from South to North. Next, the traditional inlet component must be conducted, also fishing from North to South. If weather impacts the survey plan, the inlet sites are fished before

completing the northern StRS sites in order to reduce the total number of fishing days.

2.1.1 STRATIFIED RANDOM SAMPLING SURVEY DESIGN COMPONENT

Since 2011, the StRS design has been conducted in all offshore survey areas. The StRS design began in 2003 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 also provided an alternative design to the historic traditional offshore component of the survey (1990 to 2010) which occurred at fixed locations.

Under the StRS design the offshore survey area is partitioned into five spatial strata (S_1 to S_5) and three depth strata (RD_1 to RD_3) for a total of 15 (Figure 1). The five spatial strata are S_1 (South West Coast Vancouver Island or SWCVI), S_2 (North West Coast Vancouver Island or NWCVI), S_3 (Queen Charlotte Sound or QCS), S_4 (South West Coast of Haida Gwaii or SWCHG), and S_5 (North West Coast of Haida Gwaii or NWCHG). The three targeted depth ranges are 100-250 fathoms (RD_1), 250-450 fathoms (RD_2), and 450-750 fathoms(RD_3). The area within each of the 15 strata are sectioned into 2 km x 2 km grid cells or ‘fishing blocks’ from which set locations are randomly chosen.

From 2003 through 2005, five grid cells were randomly selected in each spatial-depth stratum. From 2006 through 2010, the number was increased to six. An analysis was completed for the 2011 survey to optimize the allocation of the blocks to strata for the 2011 and 2012 survey. However, in order to lower survey costs, the number of blocks were further reduced for the 2013 survey, from a total of 110 to 91 offshore blocks while maintaining the same relative allocation of blocks to strata. This total number of blocks has been in place on all subsequent surveys (Table 1), including 2018 and 2019 (Figure 2a,b).

2.1.2 TRADITIONAL STANDARD SURVEY COMPONENTS

Standardized fishing sets under the traditional component of the survey have specific gear, bait, and sampling protocols. The original intent of the standardized sets was to collect catch rate data in order to index trends in abundance, tag fish and obtain biological samples. In 2010 the offshore portion of the traditional standardized survey was terminated as it was shown that the continued use of the standardized survey, in combination with the StRS, resulted in greater frequency for stock assessment errors (Cox et al. 2011). Since then only standardized fishing sets within four mainland inlet localities have continued (Appendix A). A string of twenty-five (25) traps were set at five specific localities in each of the following four (4) areas: Portland Inlet, Gil Island, Finlayson Channel, and Dean/Burke Channel. Trap gear was deployed near the center of each of the five locality boundaries in order to avoid the steep slopes characteristic of these channels/fjords Figure 3.

2.2 VESSELS

The 2018 survey of 111 sets was chartered aboard the 35.66 meter F/V Ocean Pearl, skippered by Darcy Nichols and Mike Derry between Oct 9 - Nov 19 , 2018. The 2019 survey of 109 sets was chartered aboard the 25.34 meter F/V Pacific Viking, skippered by Albert (Deacon) Melnychuk between Oct 8 - Nov 25 , 2019 Appendix B. Images and information about the vessels can be found at <http://marinetrack.com>.

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 (Figure 4, b). A flagpole was required for at least one end of the set to improve visibility for retrieval. The traps were steel frame with a bottom hoop diameter of 54 inches and covered with an North American #84 black braided nylon web of 2.75 inch mesh (Figure 4, a). The tunnels were made of green braided, knotless, 1.25 inch mesh. The traps did not include escape rings; but instead a 'rot panel' of # 21 cotton located above the middle ring.

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 2.

2.4 FISHING OPERATIONS

During normal survey fishing operations gear was deployed on alternate days. Prior to deployment, the Fishing Master inspected the block to determine fishability and if it was within the targeted depth range. The goal was to have as much gear as possible within the block boundaries. If unfishable, the survey protocol dictates that an alternate block is to be chosen to the east, west, north, and south, respectively. If none of those blocks meet the criteria, an alternate block of the same area and depth strata was randomly chosen.

Two science staff recorded information associated with the deployment of the gear. One science member was positioned in the wheelhouse and entered data in the GFBioField bridge log form within the Electronic Data Acquisition System (EDAS). The global positioning system (GPS) and bottom sounder data were logged continuously for the duration of the survey and designated fields on the bridge log were auto-populated. Details on electronic entry of the all GFBioField forms mentioned in this document is available in the GFBio Field User Guide 2018 (Olsen 2010). A set log was filled out on the deck by the science recorder who had maximum visibility of the crew setting the traps over the stern rail. The set log included the time and identity of the first and last buoys, anchor time, a tally of beackets and traps, as well as the unique identifying numbers of sensors deployed.

2.4.1 Stratified Random Component (StRS)

Sets in StRS blocks had a targeted soak time of 24 hours. Fishing sets were designated useable if hauled between 22 and 26 hours. Traps were baited with 10 pounds of loose offshore Pacific Hake (*Merluccius productus*) and 2 pounds of bagged squid (Table 2).

2.4.2 Traditional Standardized Inlet Component

Fishing sets in inlet localities had a targeted soak time of 18 hours. These sets were designated useable if hauled between 16 and 20 hours, compatible with the historic inlet survey protocols. Traps were baited with 2 pounds of bagged squid (Table 2).

2.5 CATCH PROCESSING

Haulback speed allowed the science crew to accurately record catch. Two science staff were positioned on deck at the haul card station; one recorded the catch and the other managed the movement of baskets. In addition, the catch recorder entered the haul start and end times into the GFBioField Bridge Log. As the groundline was hauled, each becket and trap were entered in the GFBioField Trap Catch form. Crew members alerted the recorder about any damage to a trap (i.e. holes) which was then recorded in the GFBioField Trap Usability form (Olsen 2010).

Catch by species from each trap was sorted into baskets by the crew. Baskets were then weighed to the nearest 0.2 kg on a motion compensating scale and given a basket use code of D, A, T, L, SD or F. Code D designated fish species as discards or commercial catch; code A allocated sablefish for age samples; code T allocated sablefish to be tagged and released; code L allocated fish for length samples; code SD identified sublegal sablefish discards; code F represented fish frames with amphipod or hagfish damage.

2.5.1 Sablefish Allocation Details

Prior to 2018, sablefish were tagged from 1/3 of the traps on StRS sets and 1/2 of the traps on the inlet sets. Due to high catch numbers, the survey protocol was revised in 2018 to designate ~125 sablefish to be tagged (T) from 1/3 of the traps on all sets. When catches were high, traps targeted for tagging were spread throughout the string to avoid tagging the first 125 fish. A biological sample was collected from the coded “A” traps with the goal of selecting 50 to 60 fish. If CPUE was high, the new survey protocol of 2018 designated a minimal of two traps to be used for samples. If both traps contained more than 60 sablefish, a random process was used to select ~60 specimens.

The remaining traps were allocated to the discard category and sorted by size into either legal (D) or sublegal (SD) discards. The SD (sublegal discards) code was added during the 2017 survey to account for the large numbers of juvenile sablefish and facilitate their quick return to

the ocean. Legal discards (D) of sablefish were kept by the vessel and processed as commercial catch.

2.6 BIOLOGICAL SAMPLING (LWSMO)

Biological samples were collected from sablefish, yelloweye rockfish (*Sebastodes ruberrimus*), shortraker rockfish (*Sebastodes borealis*) and rougheye/blackspotted rockfish (*Sebastodes aleutianus/Sebastodes melanostictus*) specimens on the GFBioField 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 potential ageing by the sclerochronology laboratory. In addition, tissue for DNA was collected from the rougheye/blackspotted rockfish complex for later species determination. Since this complex of two distinct species (Orr and Hawkins 2008) have similar appearances with slight variations in colour markings and dorsal fin lengths, the sampler visually identified each specimen as either a rougheye, a blackspotted or a hybrid species. All rockfish and legal-sized sablefish (fork length > 55 cm) that were sacrificed for biological samples were dressed, frozen, and landed as commercial catch.

Length (L) and weight (W) measurements were collected from all Pacific halibut (*Hippoglossus stenolepis*) before they were released at sea. Only the length (L) was recorded for Pacific sleeper sharks (*Somniosus pacificus*) before release. No biological samples were collected from other species.

2.7 SABLEFISH TAGGING

Fish destined to be tagged were transferred from the sorting area to a tagging tank. A vessel crew member was positioned to retrieve sablefish from the tank and provide assistance with fish handling. A scientist stood at the sample station and tagged fish with a Mark II Long Tagging gun loaded with Floy FD-94 T-bar anchor tags. The tag was inserted on the left side of the fish, 1 cm below and 2-3 cm behind the anterior insertion of the first dorsal fin. Fork length (mm to the nearest ½ cm) measurements taken on the Scantrol measuring board were electronically transferred to the GFBioField Fish Recording form (Olsen 2010). Before release, any sampling errors, injuries or damage to the fish were documented on the Fish Recording form by a second scientist who was stationed at the sample computer. 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 brought aboard may have been treated in one of two ways. First, sablefish with Canadian tags were re-released with a new tag and the previous tag was removed. In addition, any wounds from the old tag were recorded. Second, sablefish with a foreign agency tag or sablefish that had sustained numerous injuries were retained for biological sampling. For these specimens, the tag and otoliths were stored in a bar-coded vial to be scanned into the

GFBioField Tag Recovery Entry form (Olsen 2010). Foreign tags were returned to their country of origin.

During survey years 1992 through 1997 and 2004, previously tagged sablefish were re-released with the same tag. New tagging protocols of replacing the tag began in 2005.

2.9 OCEANOGRAPHIC SENSOR DATA COLLECTION

A Sea-bird Bird SBE 39 temperature and pressure logger was placed in a protective plastic pipe and attached to the inside of the middle or end traps. Data was successfully collected from 107 sets in 2018 (Appendix C) and 105 sets in 2019 (Appendix D). A SBE 39 was also placed in the tagging tank on hauling days to record water temperature.

In order to evaluate the impact of fishing gear on benthic habitat, Nuytco autonomous camera systems and HOBO Pendant G accelerometers were attached to traps to capture images and movement (2012 through 2017). During the 2018 and 2019 surveys, only accelerometers were deployed. Data was successfully collected from 109 sets in 2018 (Appendix C) and 66 sets in 2019 (Appendix D). In addition, a single accelerometer was stationed just forward of the hauler post.

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 tools on the GFBioField Upload Sensor Data form.

2.10 ELECTRONIC MONITORING VIDEO DATA COLLECTION

During haulback, the electronic monitoring (EM) system cameras were activated by the hydraulic sensor. Three standard analog cameras were positioned at optimal viewing angles to record survey activities. Two cameras were stationed along the mast to record the catch as it was processed at the hopper. A third camera was stationed 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 science staff the following day to provide quality control on catch data.

3 Results and Discussion

3.1 FISHING

3.1.1 2018 Survey

The 2018 survey was 42 days long and divided into three legs of 14, 16 and 14 days for a total of 34 fishing days. Inclement weather during the second leg required fishing to commence in Dean/Burke Channel, Finlayson Inlet and Gill Island prior to fishing the StRS sites in Queen Charlotte Sound. This ensured that no fishing days were lost.

Of the 91 original blocks for the StRS portion of the survey, five were replaced at-sea. One block was rejected after on-ground inspection and four were rejected based on absence of target depth requirements.

3.1.2 2019 Survey

The 2019 survey was 46 days long and divided into three legs of 17, 14 and 17 days for a total of 34 fishing days. Inclement weather during the survey caused a loss of seven fishing days, five during the first leg and two during the third leg. Two blocks were left unfished in strata five as the vessel moved to the inshore inlets.

Of the 91 original blocks for the StRS portion of the survey, one was attempted but not successfully fished, one was replaced due to on-ground inspection, three were replaced due to skipper knowledge (unfishable habitat) and two more were replaced based on absence of target depth requirements.

3.2 CATCH PER UNIT EFFORT (CPUE)

3.2.1 Stratified Random Set CPUE

Across all years, the highest annual CPUE (kg/trap) typically occurred in the middle depths (450-850 m). In recent years, an increase in CPUE started in 2015 and a consistent rise in CPUE began in 2017 (Figure 5). This increase was observed in nearly all depth strata (RD_1 to RD_2) and area strata (SD_1 to SD_5) (Figure 6). The observed catch by weight pattern was accompanied by an increase in the number of fish per trap. However, the large estimated numbers of fish were highly variable (+-95% CI) (Figure 7). The observed mean weights indicated a three year declining trend beginning in 2017 in half of the area-depth strata. Little or no trend was seen in the remaining strata (Figure 8).

3.2.2 Mainland Inlet CPUE

CPUE (kg/trap and #fish/trap) in the mainland inlets have varied in a predictable manner over time with peak CPUE occurring every 5-8 years (Figure 9a,b). In 2018 and 2019, the trend has increased to record levels. In contrast, the average weight of sablefish in 2018 and 2019 have showed record mean lows (Figure 9c).

3.3 CATCH COMPOSITION

3.3.1 2018 Survey

A total of fifty-three taxonomic groups were represented in the catches in StRS sets in 2018 (Table 3). These included ten roundfish species, thirteen rockfish species, three flatfish species and twenty-seven invertebrate species. Other than sablefish, the most common species, by weight, were spiny dogfish (*Squalus acanthias*), Pacific halibut (*Hippoglossus stenolepis*), lingcod (*Ophiodon elongatus*), yelloweye rockfish (*Sebastodes ruberrimus*) and arrowtooth flounder (*Atheresthes stomias*).

A total of eighteen taxonomic groups were represented in the catches from traditional standardized sets conducted in mainland inlet localities in 2018 (Table 4). These included two roundfish species, four rockfish species, two flatfish species and ten 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*).

3.3.2 2019 Survey

A total of fifty taxonomic groups were represented in StRS sets in 2019 (Table 5). These included eleven roundfish species, thirteen rockfish species, four flatfish species and twenty-two invertebrate species. Other than sablefish, the most common species, by weight, were lingcod (*Ophiodon elongatus*), Pacific halibut (*Hippoglossus stenolepis*), spiny dogfish (*Squalus acanthias*), rougheye/blackspotted rockfish complex (*Sebastodes aleutianus/Sebastodes melanostictus*) and redbanded rockfish (*Sebastodes babcocki*).

A total of twelve taxonomic groups were represented in the catches from traditional standardized sets conducted in mainland inlet localities in 2019 (Table 6). These included three roundfish species, no rockfish species, three flatfish species and six invertebrate species. The most common species, by weight, other than sablefish were Pacific halibut (*Hippoglossus stenolepis*) and spiny dogfish (*Squalus acanthias*).

3.4 SABLEFISH SAMPLING

A detailed breakdown of the fate of the catch in each trap for the 2018 and 2019 survey is listed in Appendix E and Appendix F, respectively.

During the 2018 StRS, a total of 46,808 sablefish were caught. Of that total, 8,458 were tagged and released and 4,663 were retained for biological sampling. Of the tagged fish, 126 were previously tagged fish that were re-released with a new tag. Another 5 previously tagged fish were retained for sampling (Appendix G).

Out of the 11,607 sablefish captured during the 2018 traditional survey (inlet standardized sets), 2,507 were tagged and released, 1,078 were used for biological sampling and 82 were previously tagged fish re-released with a new tag (Appendix G).

Overall, the StRS sets had a higher proportion of females than males over the spatial strata S₁, S₂, S₃ and S₄ with the exception of S~5 where the sex ratio was equal (Table 7). 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 samples ranged from 58 to 74 percent females (Table 7).

During the 2019 StRS, a total of 60,965 sablefish were caught. Of that total, 9,143 were tagged and released and 4,591 were retained for biological sampling. Of the tagged fish, 98 were previously tagged fish that were re-released with a new tag. Another 2 previously tagged fish were retained for sampling (Appendix H).

Out of the 17,871 sablefish captured during the 2019 traditional survey (inlet standardized sets), 2,899 were tagged and released, 1,068 were used for biological sampling and 56 were previously tagged fish re-released with a new tag (Appendix H).

Overall, the StRS design sets had a higher proportion of females to males over the spatial strata S₁, S₂, S₃, S₄ and S₅ (Table 8). The sex ratio was females biased 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 and S₃. 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 samples ranged from 68 to 71 percent females (Table 8).

Significant differences in length distributions between female and male sablefish are exhibited in the data collected from the StRS portion of the 2003 - 2019 surveys. 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 10a).

In 2018, the average mean fork length for the 2,363 females was 62 cm and the average mean fork length for the 2,024 males was 57 cm. In 2019, the average mean fork length for the 2,609 females was 61 cm and the average mean fork length for the 1,719 males was 55 cm. The mean length of both females and males reached their lowest mean size since 2003 (Figure 10b).

On average, female sablefish grow faster and reach far greater size (Figure 11a,b) compared to males (Figure 11c,d).

3.5 SABLEFISH SUB-LEGAL ENCOUNTERS

There have been distinct distribution patterns across strata of sub-legal sablefish (<55 cm fork length), following the highly anomalous warm ocean conditions of the “The Blob” (Bond et al. 2015). More than half of the sub-legal specimens were captured in the southern strata (S_1) mid-depth waters (RD_2) in 2014 and shallow waters (RD_1) in 2015. The sub-legal specimen count was above 50% in both 2017 and 2018 in the northern strata of S_4 and S_5 mid-depth waters (RD_2). In 2019, the sub-legal specimens dominated in all StRS survey strata (S_1 to S_5) mid-depth waters (RD_2) (Figure 12).

3.6 OTHER FISH SAMPLING

Length, sex, maturity, otoliths and DNA samples were collected for the Rougheye/Blackspotted Rockfish complex. Length, sex, maturity and otoliths were collected for Shortraker Rockfish. In addition, length, sex, maturity, otoliths and DNA were collected for Yelloweye Rockfish. For Pacific Halibut and Pacific Sleeper sharks, only length samples were collected (Appendix I and Appendix J).

3.7 RECOVERED TAGGED SABLEFISH

During the 2018 and 2019 sablefish surveys, 208 and 154 previously tagged fish were re-released live with a new tag, respectively. DFO has been tagging, releasing and recovering sablefish since 1991. The highest recovery rate is within the first year of release (Table 9).

3.8 SABLEFISH AGES

The highest proportion of male ages in StRS sets for 2003 through to 2011 were 3, 5, 5, 6, 8, 8, 8, 10 and 12 years of age, respectively. Another cohort appeared in 2012 through to 2016 as 4, 5, 7, 7 and 8 year olds. A cohort appeared to arrive in 2017 which was dominated by 3 year olds and in 2018 by 5 year olds (Figure 13a).

The highest proportion of female ages in the StRS sets for 2003 through to 2010 were 3, 4, 5, 6, 7, 8, 9 and 10 years of age, respectively. Then, another cohort appeared in 2011 through to 2015, showing up as 3, 4, 5, 6 and 7 year olds. In 2016, 2017 and 2018, the highest proportion of female sablefish were ages 3, 4 and 5 (Figure 13b).

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.

3.9 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 can be found in Figure 14. The 2018 and 2019 survey data exhibit a general trend of decreasing temperature with depth.

SBE 39 recorders have been placed on survey fishing sets since 2006. 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 (Figure 15).

3.10 ACKNOWLEDGEMENTS

The stock assessment survey and data report is the result of the collaborative efforts of many individuals. Wild Canadian Sablefish 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 AMR; and Schon Acheson, Travis Bell, Brendan Connors, Lindsay Dealy, Kathryn Temple, Daniel Williams, and Malcolm Wyeth of Fisheries and Oceans, Canada.

A special thanks to the skipper and crew of the F/V Ocean Pearl, whose efforts made the 2018 survey successful. In 2018, the crew consisted of Mike Derry (skipper), D'Arcy Nichols (skipper), Travis Anderson, Alec Fraumeni, Dan Heslop, Dylan Holstein, Jason Johnston and Alex Pugh. Also, much appreciation to the skipper and crew of the F/V Pacific Viking, whose efforts made 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. Spatial strata allocation for the 2018 and 2019 sablefish research and assessment surveys.

Spatial Strata	Depth Strata			Total
	RD1 (100-250 fm)	RD2 (250-450 fm)	RD3 (450-750 fm)	
S1 (South West Coast Vancouver Island or SWCVI)	6	8	5	19
S2 (North West Coast Vancouver Island or NWCVI)	6	7	5	18
S3 (Queen Charlotte Sound or QCS)	8	6	5	19
S4 (South West Coast Haida Gwaii or SWCHG)	6	6	5	17
S5 (North West Coast Haida Gwaii or NWCHG)	6	7	5	18
Total	32	34	25	91

Table 2. Components of the 2018 and 2019 sablefish research and assessment surveys.

Component	Bait	Locations
Stratified random sampling (StRS)	2 lbs frozen squid (bagged) 10 lbs Hake (loose)	Five spatial strata (S1-S5)
Traditional Inlet Standardized	2 lbs frozen squid (bagged)	Dean/Burke Channel Finlayson Channel Gil Island Portland Inlet

Table 3. Summary of species captured during the 2018 survey StRS sets 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 trace weights of less than 1 kg recorded.

Category	Common Name	Scientific Name	Count	Weight(kg)
Roundfish Species	Sablefish	ANOPLOPOMA FIMBRIA	99246	
	Spiny dogfish	SQUALUS ACANTHIAS	2973	
	Lingcod	OPHIODON ELONGATUS	1912	
	Pectoral ratail	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	
	Aurora rockfish	SEBASTES	1	
	Longspine thornyhead	SEBASTES AURORA	1	
		SEBASTOLOBUS ALTIVELIS	2	
Flatfish Species	Pacific halibut	HIPPOGLOSSUS STENOLEPIS	2492	
	Arrowtooth flounder	ATHERESTHES STOMIAS	678	
	Dover sole	MICROSTOMUS PACIFICUS	8	
Invertebrate Species	Grooved Tanner Crab	CHIONOECETES TANNERI	119	
	Red Queen Crab	LITHODES COUESI	14	
		PARALOMIS MULTISPINA	10	
	Brown box crab	ALLOCENTROTUS FRAGILIS	8	
	Oregon triton	LOPHOLITHODES FORAMINATUS	4	
		FUSITRITON OREGONENSIS	3	
		NEPTUNEIDAE	2	
	Anemone	NEPTUNEA	1	
	Fish-eating star	ACTINIARIA	1	
	Golden king crab	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	CRINOIDEA		
	Hermit crabs	CROSSASTER PAPPOSUS		
	Metridium	PAGURIDAE		
		METRIDIUM		
		TRITONIA		
		OPHIOSCOLEX		
		AMPHIOPHIURA PONDEROSA		
		HETEROZONIAS ALTERNATUS		
		LOPHASTER FURCILLIGER VEXATOR		

Table 4. 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 trace weights of less than 1 kg recorded.

Category	Common Name	Scientific Name	Count	Weight(kg)
Roundfish Species	Sablefish	ANOPLOPOMA FIMBRIA	1	19908
	Codfishes	GADIDAE		
Rockfish Species	Shortraker rockfish	SEBASTES BOREALIS	6	
	Shortspine thornyhead	SEBASTOLOBUS ALASCANUS	5	
	Rougheye rockfish	SEBASTES ALEUTIANUS	5	
	Aurora rockfish	SEBASTES AURORA	1	
Flatfish Species	Pacific halibut	HIPPOGLOSSUS STENOLEPIS	495	
	Arrowtooth flounder	ATHERESTHES STOMIAS	33	
Invertebrate Species	Mud star	CTENODISCUS CRISPATUS	15	
	Oregontriton	FUSITRITON OREGONENSIS	2	
	Redclaw crab	CHORILIA LONGIPES	1	
	Sea cucumber	HOLOTHUROIDEA		
	Vermillion starfish	MEDIASTER AEQUALIS		
		MAIIDAE		
		NEPTUNEA		
	Anemone	ACTINIARIA		
	Cookie star	CERAMASTER PATAGONICUS		
	Heart urchins	ATELOSTOMATA		

Table 5. Summary of species captured during the 2019 survey StRS sets 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 trace weights of less than 1 kg recorded.

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	
	Redband 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	
	Oregon triton	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	
		NEPTUNEA	6	
		ZOROASTERIDAE	1	
	Starfish	ASTERIODEA	1	
Jellyfish		PTERASTER	1	
		RATHBUNASTER CALIFORNICUS	1	
		SOLASTER	1	
		HIPPASTERIA	1	
		SOLASTERIDAE		
		TARASTER ALASCANUS		
		AMPHIOPHIURA PONDEROSA		
		BUCCINIDAE		
	Jellyfish	SCYPHOZOA		
	Ophiuroidea	OPHIUROIDEA		
Rose starfish	Rose starfish	CROSSASTER PAPPOSUS		
	Sea lilies and feather stars	CRINODEA		

Table 6. 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 trace weights of less than 1 kg recorded.

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

Table 7. Summary of sablefish biological data collected during the 2018 stratified random sets by spatial and depth stratum.

Spatial	Depth Strata/Locality	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
		0.49	0.51	569	619	587
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
		0.35	0.65	572	638	602
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
		0.39	0.61	563	637	596
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
		0.48	0.52	592	629	615
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
		0.50	0.50	576	603	573
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
		0.33	0.67	510	558	537

Table 8. 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	0.32	0.68	544	606	578
	RD2	0.69	0.31	535	588	541
	RD3	0.06	0.94	627	685	667
		0.36	0.64	569	626	595
S2	RD1	0.25	0.75	581	616	590
	RD2	0.47	0.53	545	570	548
	RD3	0.40	0.60	560	635	603
		0.37	0.63	562	607	580
S3	RD1	0.21	0.79	556	645	610
	RD2	0.53	0.47	532	547	538
	RD3	0.48	0.52	554	607	574
		0.41	0.59	547	600	574
S4	RD1	0.23	0.77	609	612	609
	RD2	0.45	0.55	551	560	540
	RD3	0.54	0.46	613	669	619
		0.41	0.59	591	614	589
S5	RD1	0.23	0.77	581	626	572
	RD2	0.40	0.60	531	558	532
	RD3	0.57	0.43	557	630	567
		0.40	0.60	556	605	557
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
		0.31	0.69	514	554	535

Table 9. Count of tagged fish released since 1991 (including re-released fish) 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	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	Total	no year	
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	372	7		
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	574	16		
1993	7019	0	0	7	432	228	89	94	98	72	44	42	30	8	10	13	9	9	9	4	4	9	3	8	6	1	3	0	1	0	0	1256	27
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	1582	16	
1995	15907	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	4485	94		
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	11	6	4	6721	116	
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	6345	123	
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	11	0	5687	59	
1999	27411	0	0	0	0	0	0	0	0	234	2280	1433	938	354	397	334	280	164	122	61	56	58	43	42	23	18	16	19	24	3	6952	53	
2000	22915	0	0	0	0	0	0	0	0	0	149	2046	931	320	313	288	233	139	108	66	80	39	49	15	16	24	8	14	11	5	4893	39	
2001	18271	0	0	0	0	0	0	0	0	0	0	136	1565	418	468	383	396	187	155	69	60	33	45	42	15	23	10	11	10	0	4083	57	
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	3484	40	
2003	24659	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	16	3	4431	45
2004	19328	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	14	0	3889	42	
2005	16511	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	12	3	2855	38	
2006	19334	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	28	5	3483	37
2007	16598	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	32	22	17	3	2806	40
2008	8300	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	1115	14	
2009	7474	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	1253	12		
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	1249	21		
2011	12541	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	56	18	1749	19		
2012	8725	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	69	63	13	1289	15		
2013	7978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77	329	300	161	74	66	9	1033	17			
2014	6425	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	68	11	788	9		
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	168	31	779	11		
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	31	369	260	50	719	9		
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	70	573	109	759	7		
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	41	111	153	1		
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			

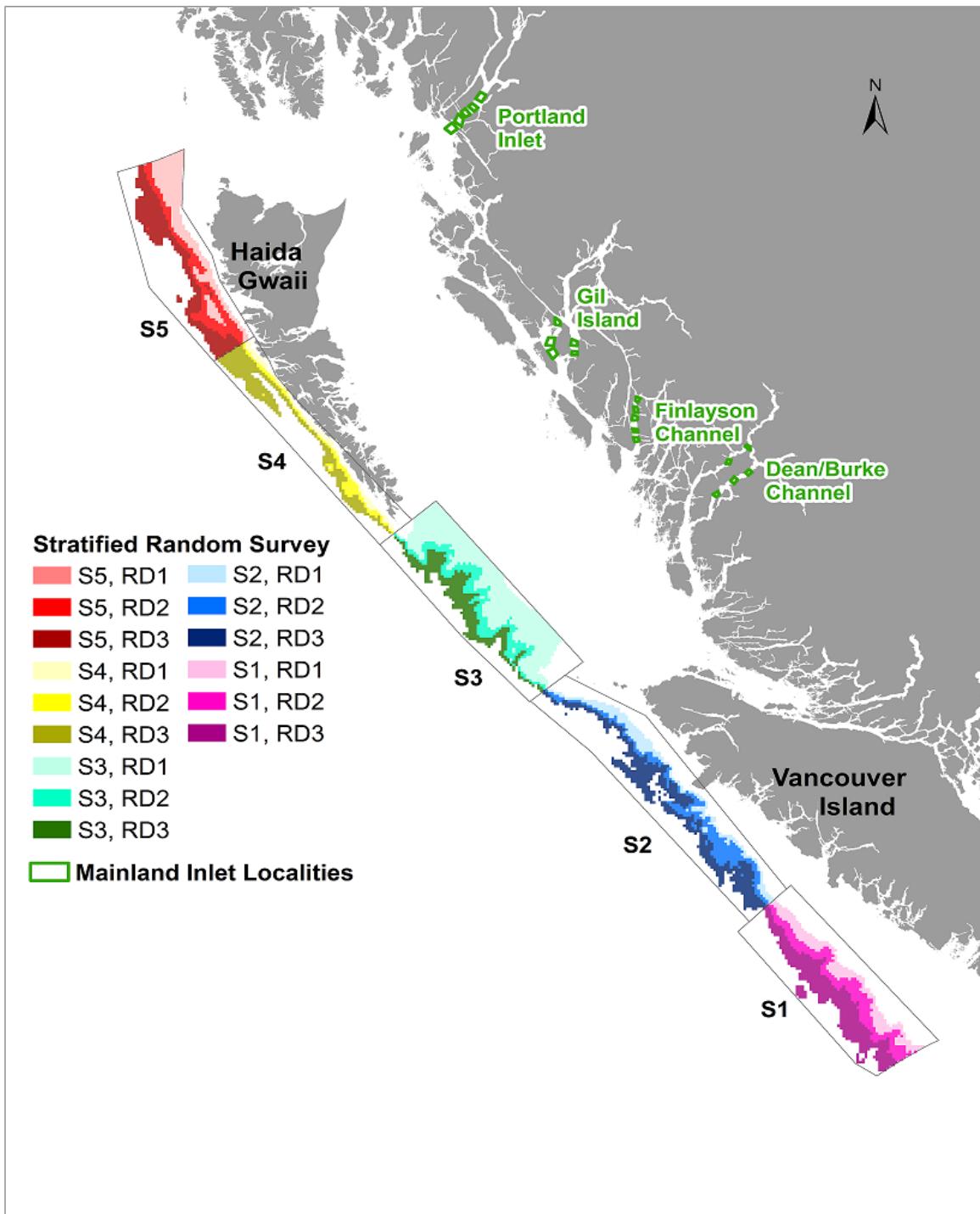


Figure 1. Location of the boundaries of the mainland inlet localities, and the five spatial areas (S_1 - S_5) of the stratified random survey design. The three depths strata (RD_1 - RD_3) are colour-coded and nested within each of the five spatial strata.

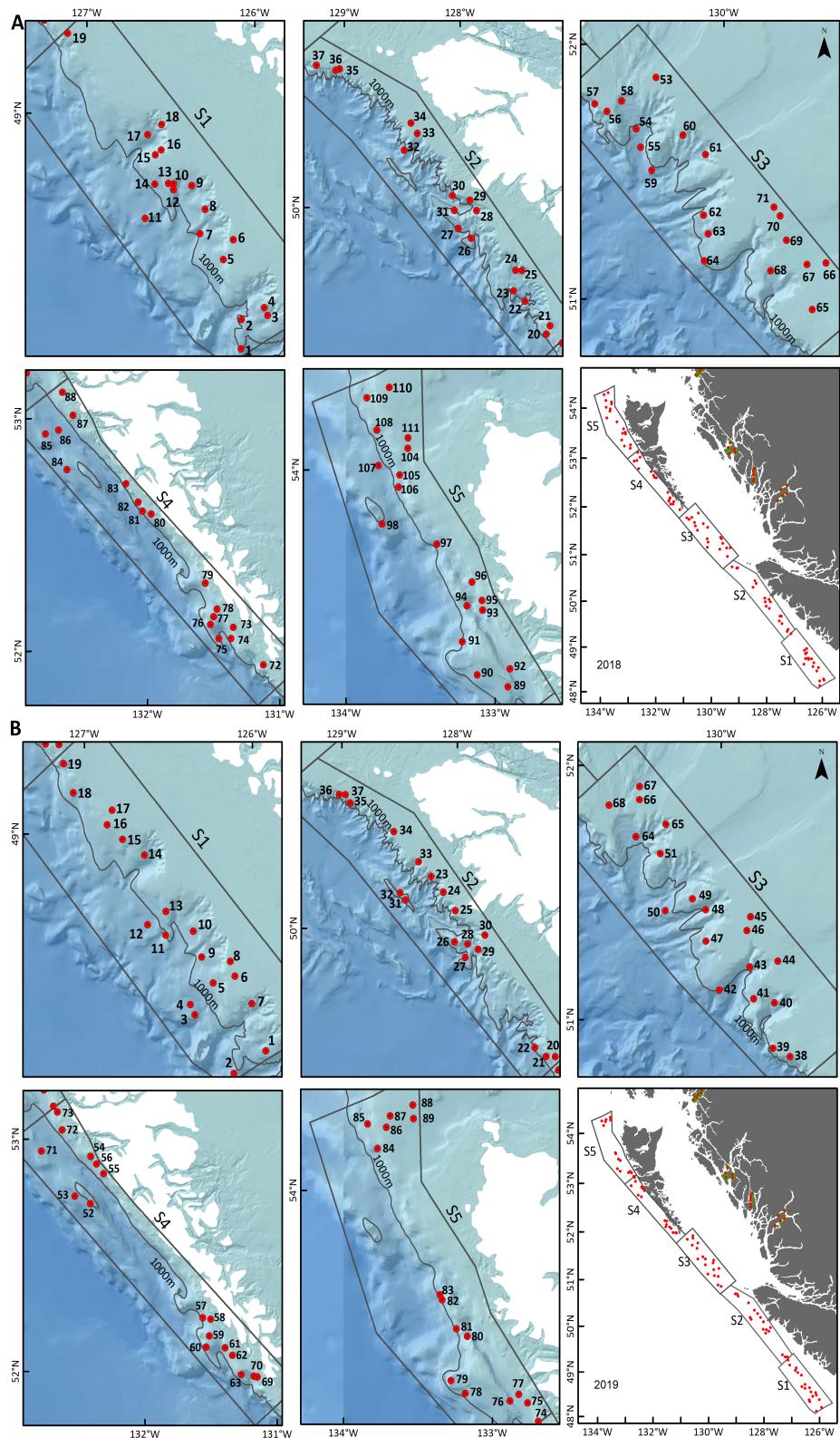


Figure 2. Start locations of survey sets (red markers) conducted in 2018 (A) and 2019 (B) for the stratified random survey areas S₁ through S₅.

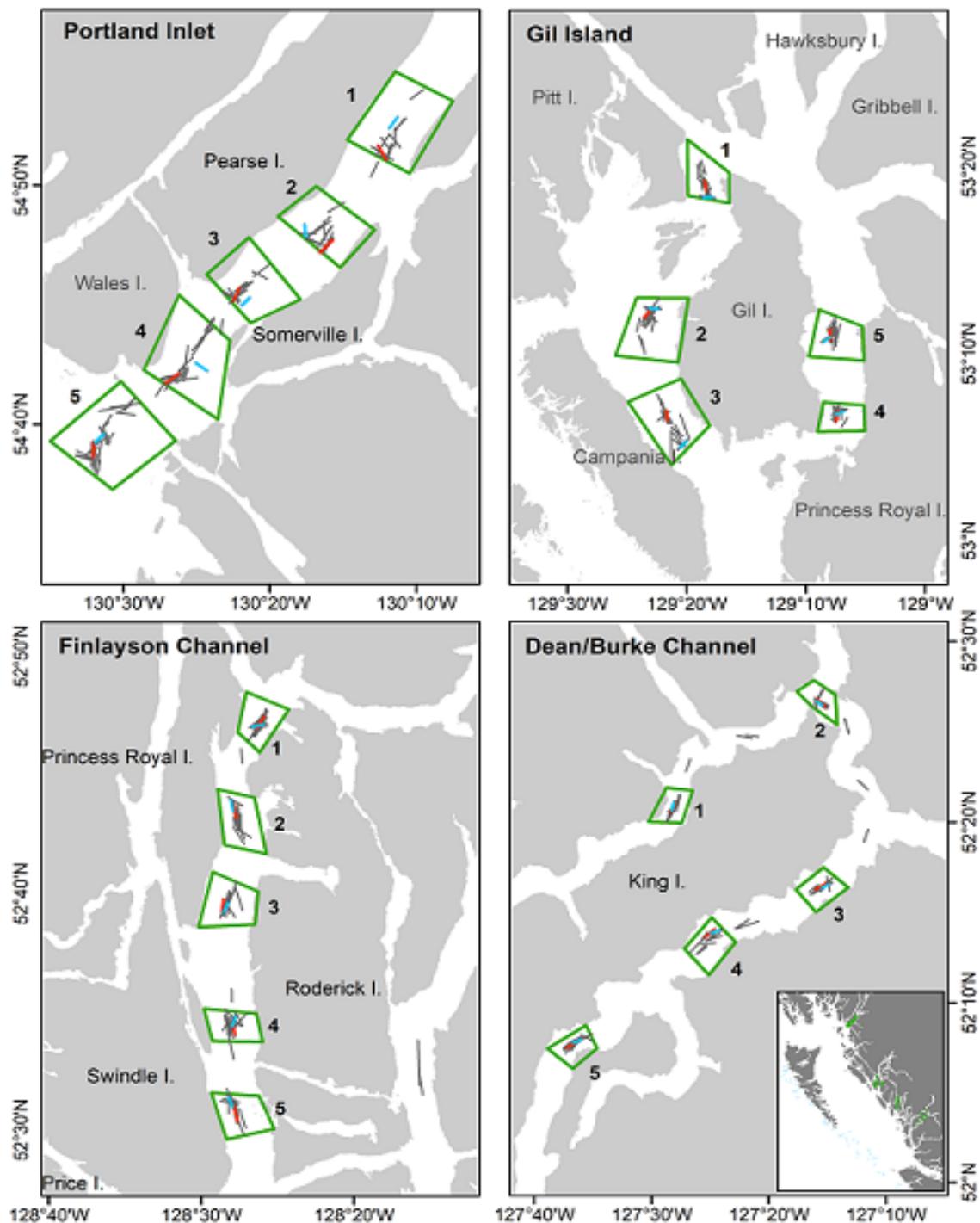


Figure 3. Location of the traditional survey sets within the mainland inlet localities since 1994. The setlines for 2018 are shown in blue and setlines for 2019 are shown in red.

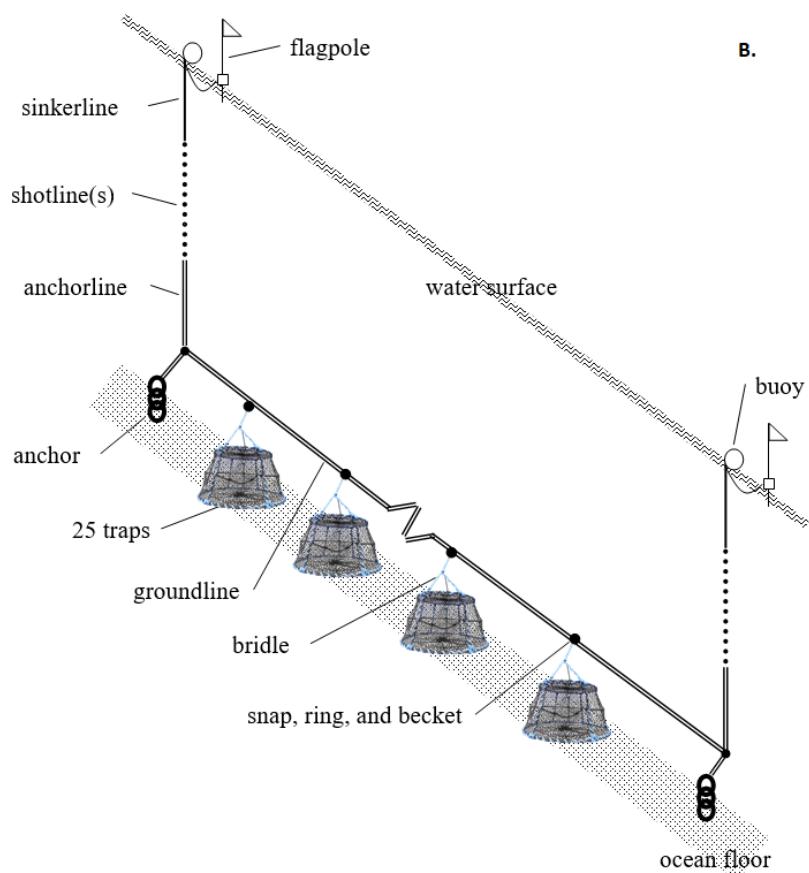
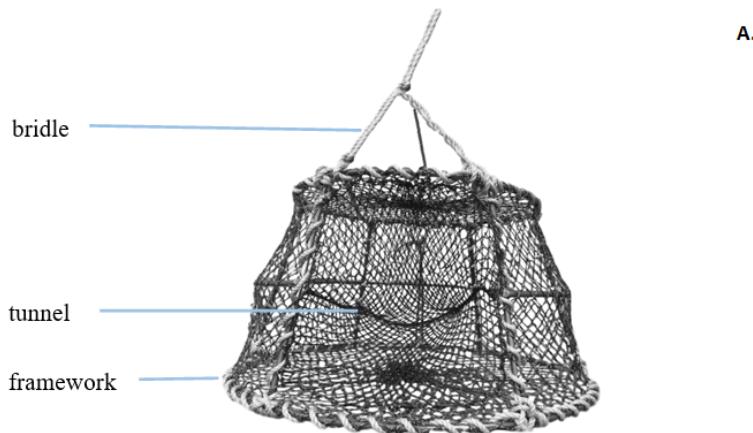


Figure 4. Trap elements (A). Trap gear elements consisting of 25 baited traps snapped to beackets along a groundline (B).

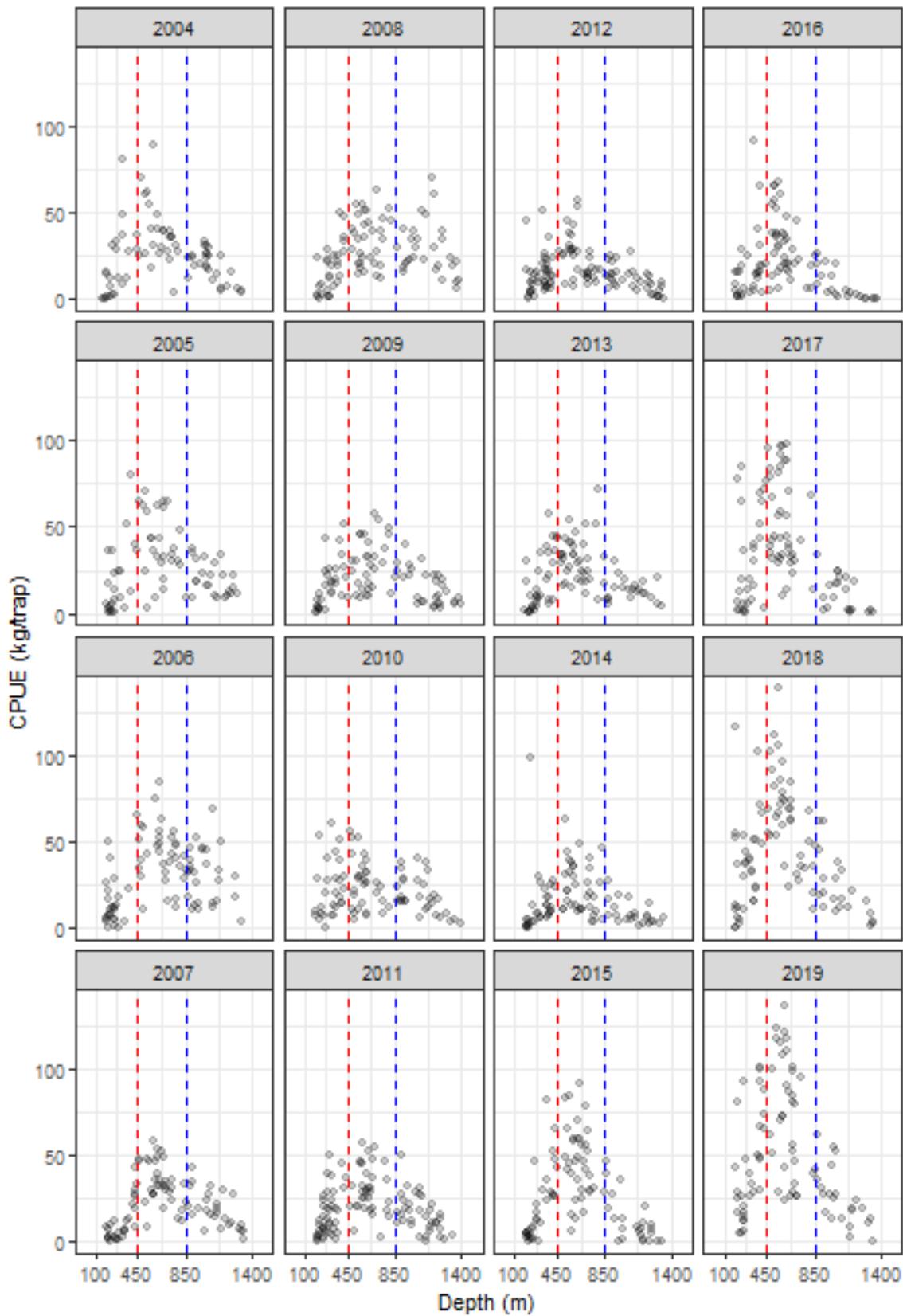


Figure 5. Sablefish catch per unit effort (CPUE) by depth and year for StRS sets.
 Dashed lines delineate depth strata (shallow(RD_1) = 100-450m, mid(RD_2) = 450-850m, deep(RD_3) = 850-1400m).

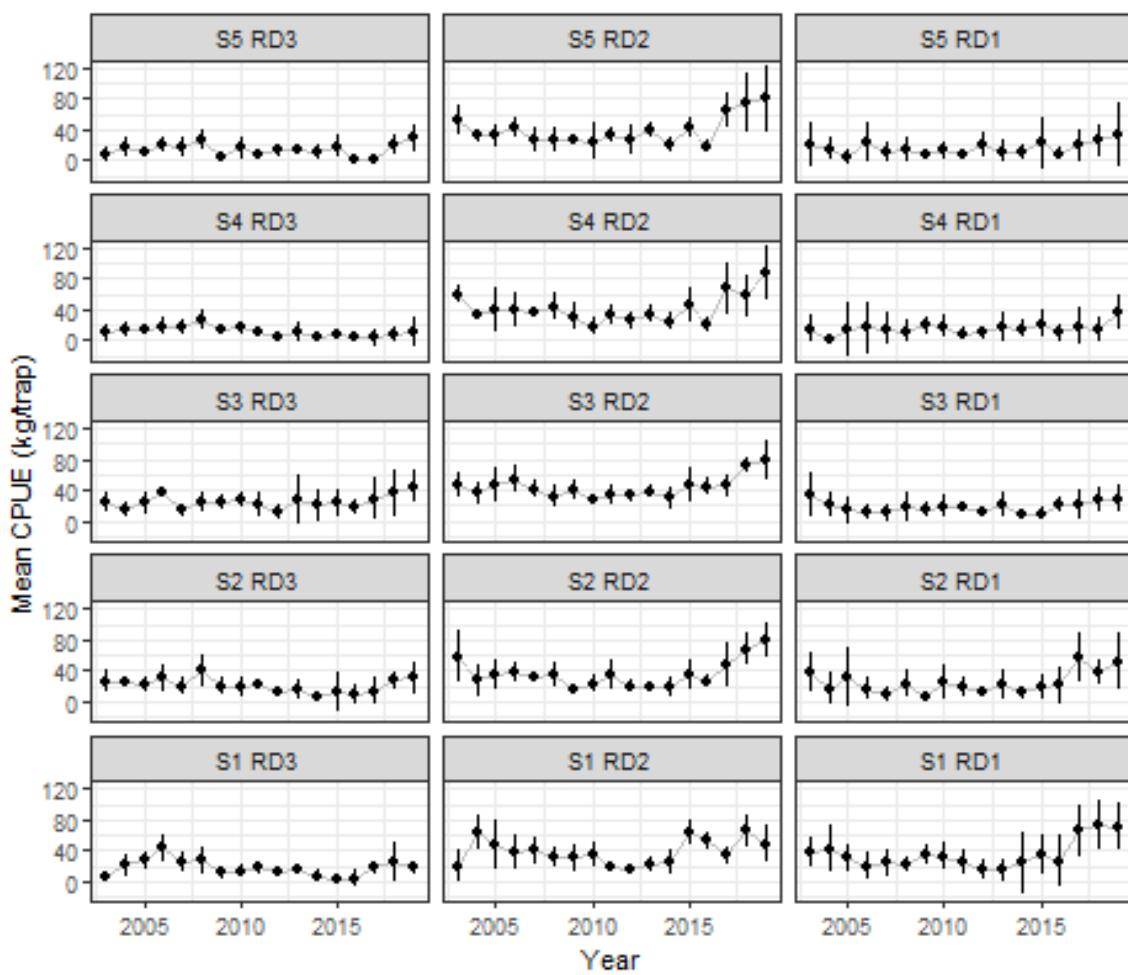


Figure 6. Average Sablefish catch per unit effort (CPUE; mean +/- 95% CIs) by survey strata over time. Panels run deep to shallow (left to right) and north to south (top to bottom).

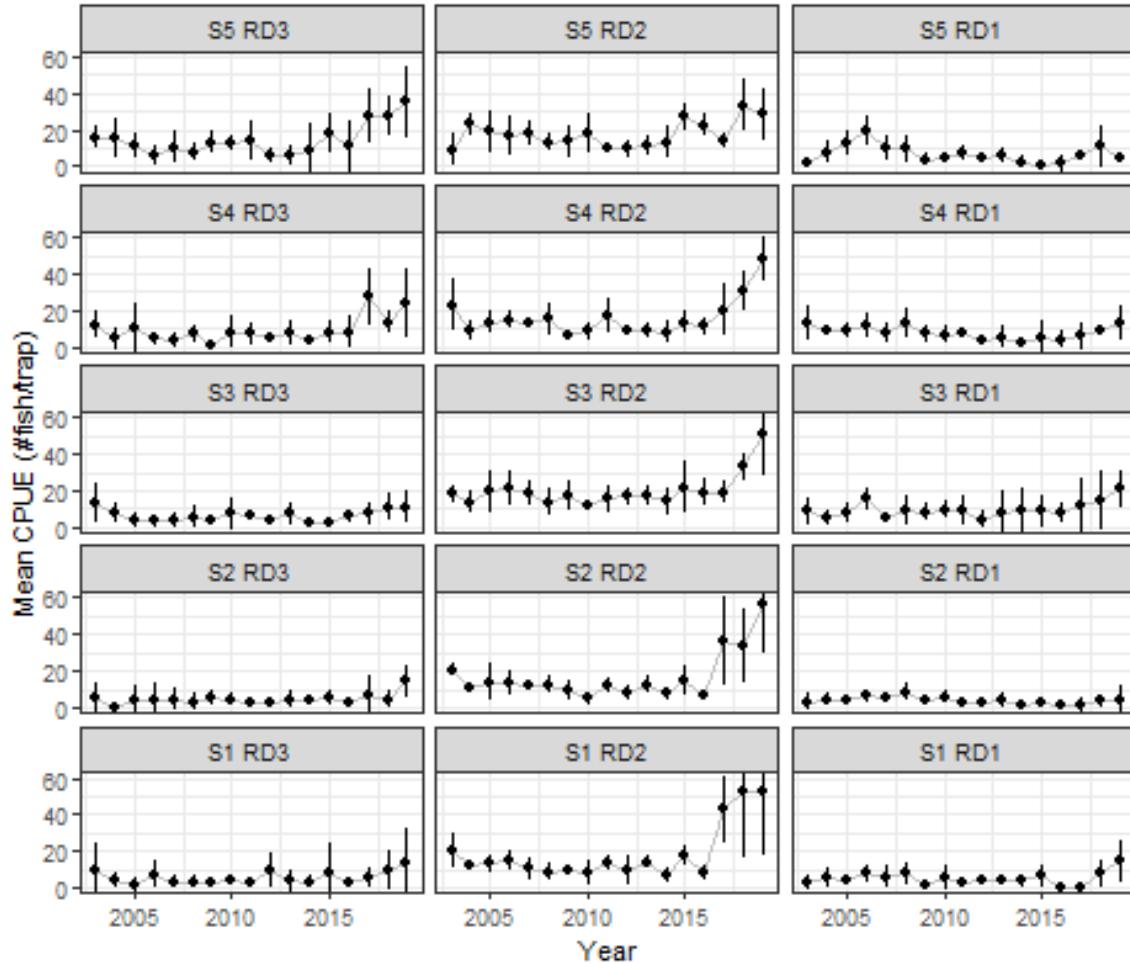


Figure 7. Average number of Sablefish per trap (mean +/- 95% CIs) by survey strata over time. Panels run shallow to deep (left to right) and south to north (top to bottom).

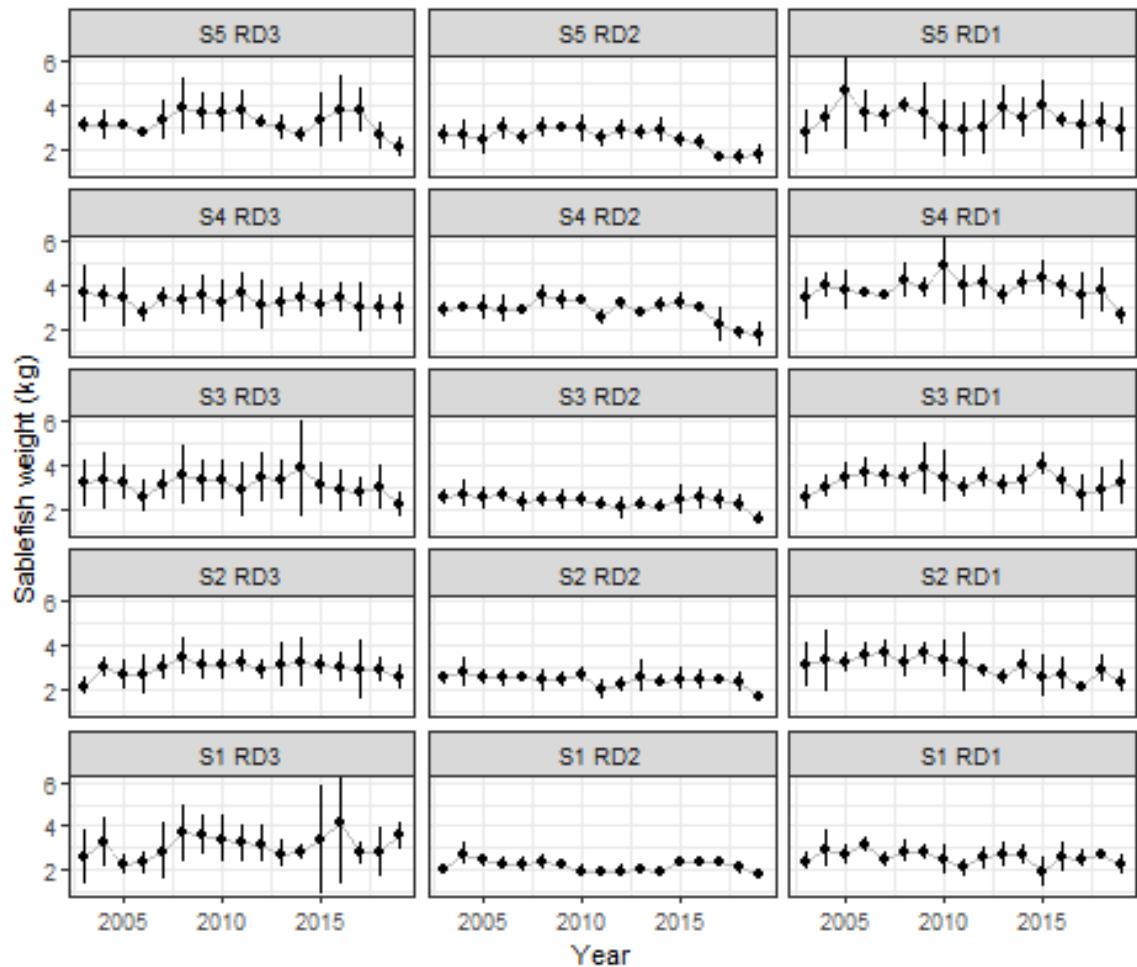


Figure 8. Average weight of Sablefish (mean +/- 95% CIs) by survey strata over time. Panels run shallow to deep (left to right) and south to north (top to bottom).

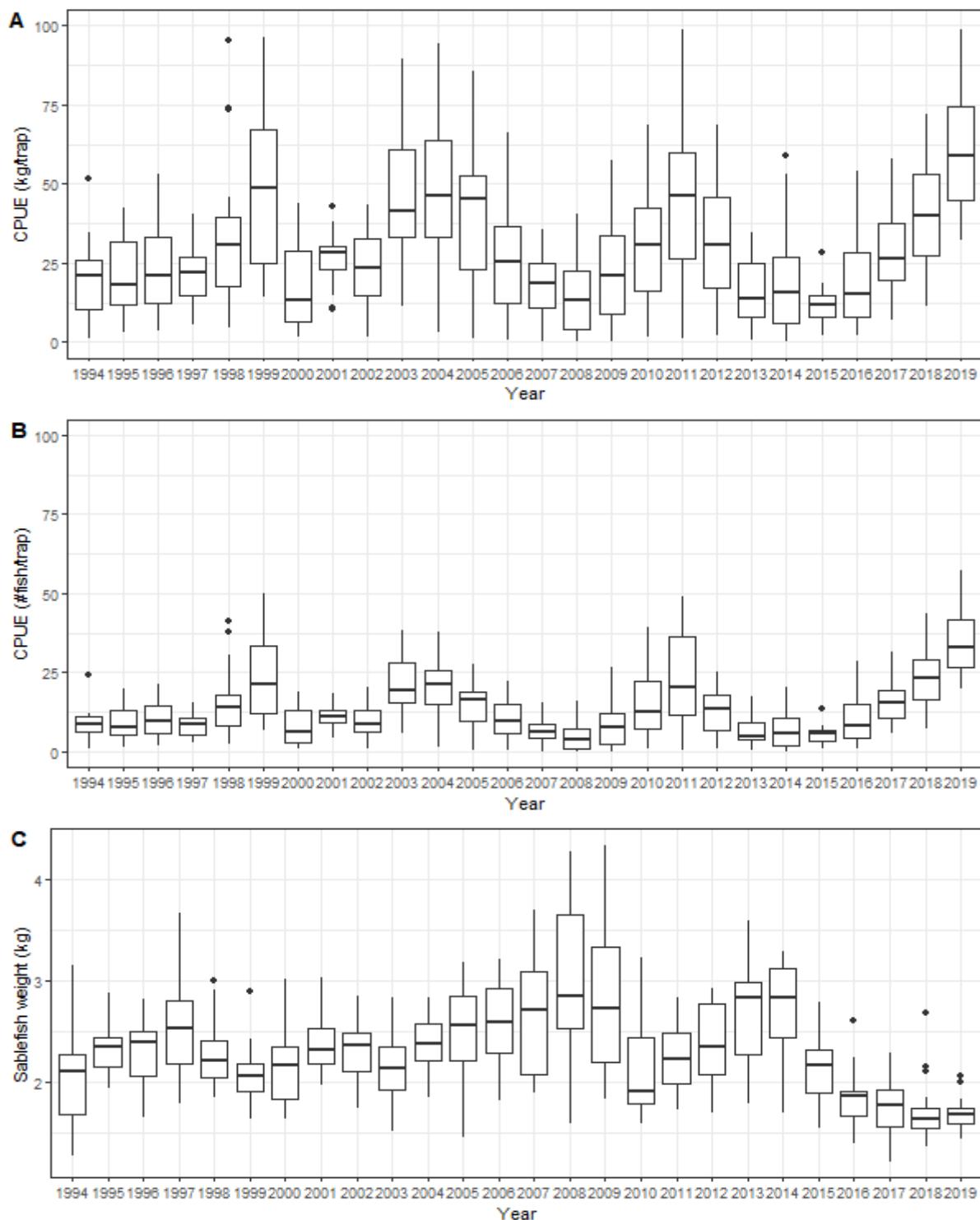


Figure 9. Average weight of Sablefish per trap (kg/trap) at mainland Inlet localities over time (A). Average number of sablefish per trap (#fish/trap) at mainland Inlet localities over time (B). Annual average weight of Sablefish (kg) at mainland Inlets (C).



Figure 10. Length frequencies for female (fuchsia) and male sablefish (blue-violet) and up to 2019 for all StRS sets. The number of specimens is denoted by the letter n , the mean indicated by the $x\bar{r}$ and the standard deviation is represented by the symbol sigma Σ (A). Average length and ratios of male and female sablefish by year. Counts by sex are shown across the top of the lines (B).

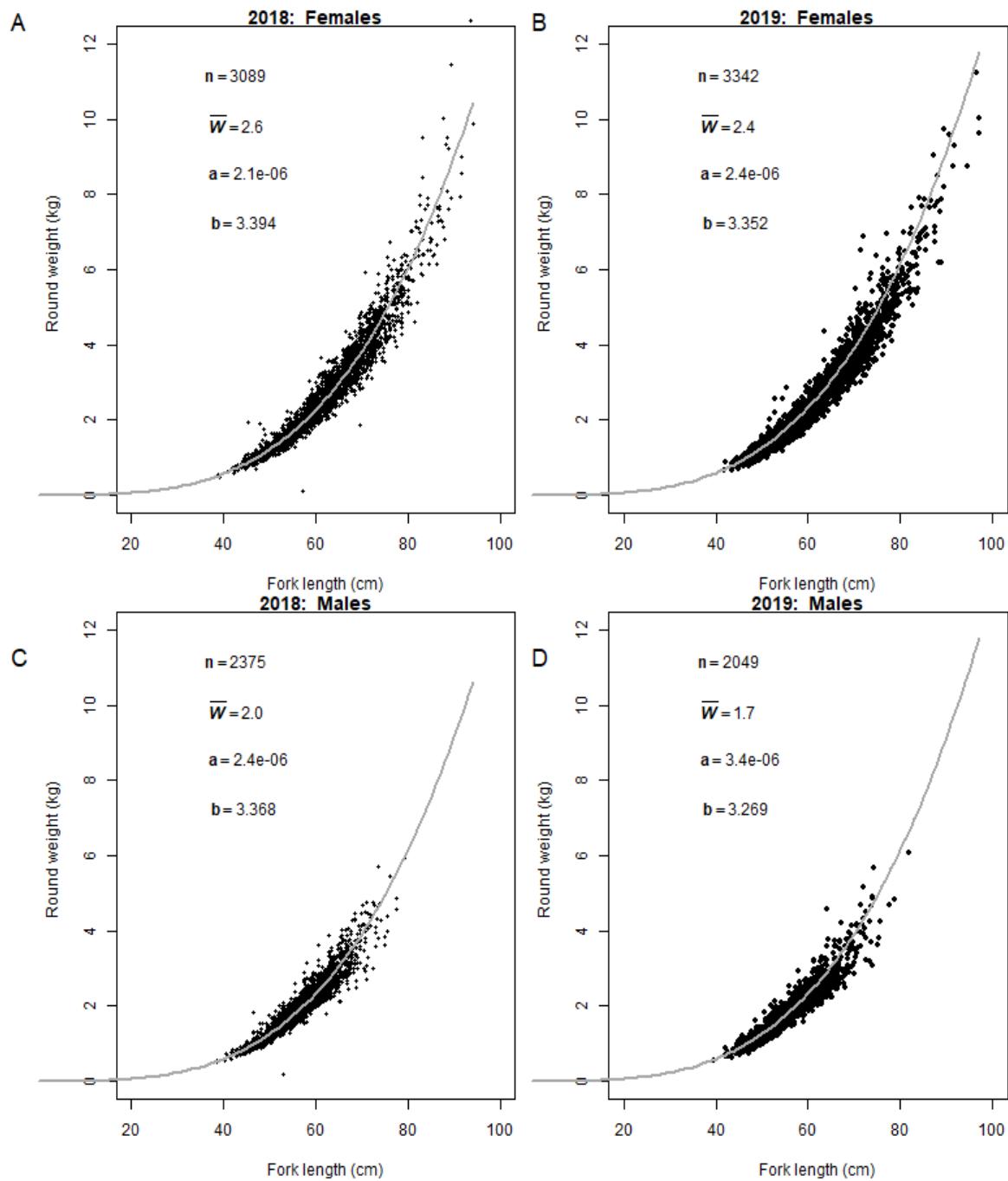


Figure 11. Sablefish fork length (L in cm) vs weight (W in kg) for females and males for the 2018 (A,C) and 2019 (B,D) surveys.



Figure 12. The percentage of sub-legal sablefish (<55 cm fork length) sampled by area and depth strata since the year 2014. Sub-legal specimen count above 50% sampled shown in blue.

A

Females



B

Males

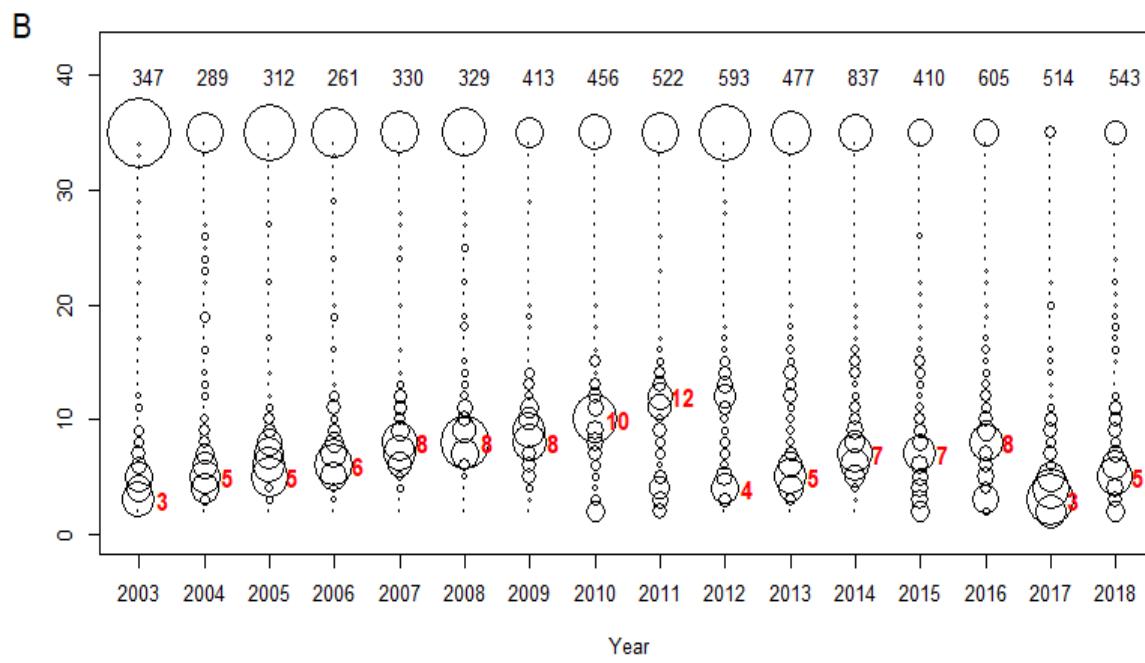


Figure 13. Bubble plot for female (A) and male (B) sablefish ages by survey year from StRS sets that have been aged. The sizes of the circles are proportional to the number of fish with given ages. Fish age 35 and older are included in one bubble. The total number(n) of fish aged are listed across the top of each panel. The ages with the highest ratios are posted to the right of each bubble.



Figure 14. Coplot of average depth (m) vs average temperature ($^{\circ}\text{C}$) for a given 1-degree latitude range (blue bands) for 2018 and 2019. The number of fishing sets deployed with a SBE 39 recorder are represented by n .

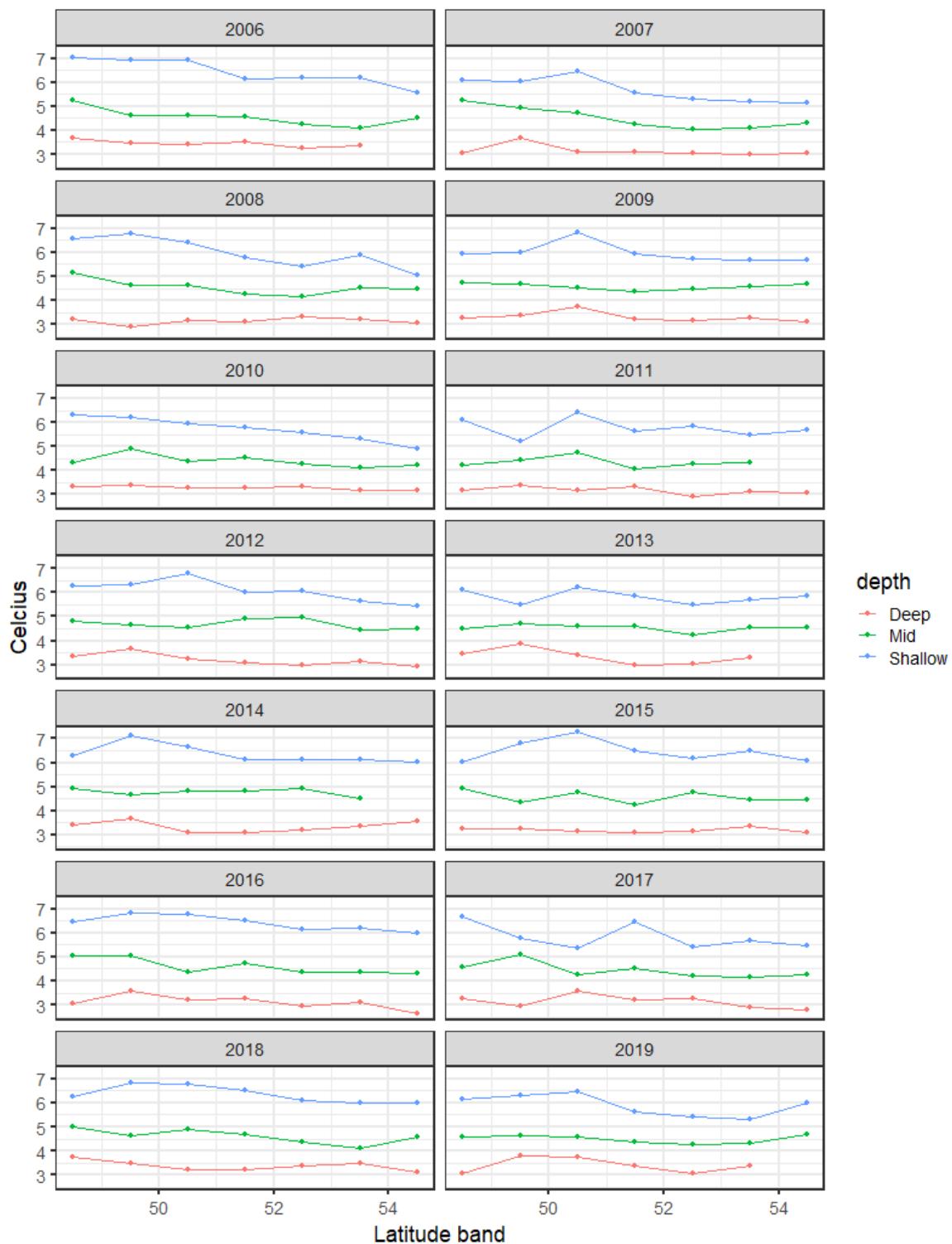


Figure 15. Average temperatures as reported from the Sea-bird SBE 39 loggers at 1-degree latitude intervals and three depth intervals: shallow: 100-250 fathoms (183 to 457 meters), medium: 250-450 fathoms (458-823 meters) and deep: 450-750 fathoms (824-1372 meters).

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.

Offshore Indexing	Year	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		

Offshore Tagging	Year	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		

Mainland Inlet	Year	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 LIST OF SABLEFISH RESEARCH AND ASSESSMENT SURVEYS.

Year	Dates	Vessel	Captain	Set.Count	GFBIO.Trip
1988	Oct 28 - Nov 24	VIOUS 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

APPENDIX C 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 RD₁ (100-250 fathoms), RD₂ (250-450 fathoms) and RD₃ (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		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		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		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		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 D 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 RD₁ (100-250 fathoms), RD₂ (250-450 fathoms) and RD₃ (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
															Fished	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 E 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. Lines in blue font represent 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.

Set	Trap.1	Trap.2	Trap.3	Trap.4	Trap.5	Trap.6	Trap.7	Trap.8	Trap.9	Trap.10	Trap.11	Trap.12	Trap.13	Trap.14	Trap.15	Trap.16	Trap.17	Trap.18	Trap.19	Trap.20	Trap.21	Trap.22	Trap.23	Trap.24	Trap.25	Trap.26
1	T	D	A	T	A	T	A	A	T	A	T	D,SD	A	T	T	A	T	T	A	D	T	A	A	T	T	
2	D,SD	A	T	D	A	T	D	D,SD	T	D	A	T	D,SD	A	T	D	A	T	D,SD	A	T	D,SD	A	T	D,SD	
3	A	T	D,SD	A	T	D,SD	A	T	D	D	T	D,SD	T,SD	T	D	A	T	D	D,SD	T	D,SD	A	T	D,SD	D	
4	T	D	A	T	D	D,SD	T	D	D	T	D,SD	T,SD	T	D	A	T	D	D	D,SD	D,SD	A	D,SD	D	D	D,SD	
5	D	D,SD	T	D	A	T	D	A	T	D	D	T	T,SD	D	T	D,SD	D,SD	D,SD	D,SD	A	D,SD	D	D,SD	T,SD	D	
6	D,SD	T	D	A	D	D	D	T	D,SD	A	T	D	D	D	D	T	D	D	D,SD	D	T	D,SD	D	D	D	
7	T	D,SD	A	T	D,SD	A	T	D,SD	D,SD	T	D,SD	D	D	D	T	D	T	D,SD	A	T	D	D	D	T	D,SD	
8	D	D,SD	T	D	A	T	D	D	T	D	D	T	D	D,SD	D	D,SD	A	T	D	D	T	D	D,SD	D	D	
9	D,SD	T	D,SD	A	T	D,F	D,SD	D	D,SD	D	T	D,F	D,F	D,SD	D,SD	A	T	D,SD	D,SD	T,SD	D,SD	D,SD	D,SD	D,SD	D,SD	
10	D,F	D,SD	T	D,SD	D,SD	D,SD	T	T,SD	A	D,SD	D,SD	D	D,SD	D,SD	T,SD	D,SD	D,SD	A	D,SD	T,SD	D,SD	D,SD	D,SD	D,SD	D,SD	D,F
11													A	A	T	A	T	A	T	T	A	T	A	T	A	
12	D,SD	T	D,SD	D,SD	D,SD	D,SD	A	T	D,SD	T,SD	D,SD	A	D,SD	D,SD	D,SD	D,SD	T,SD	D,SD								
13	T,SD	D,SD	D,SD	T	D,SD	A	D,SD	D,SD	T,SD	T	D,SD	D,SD	D,SD	D,SD	D,SD	T	D,SD	A	D,SD							
14	D,SD	A	T	D,SD	D,SD	D,SD	T	D,SD	D	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	A	D,SD	D,SD	D,SD	T,SD	D,SD
15	D	T	D,SD	D,SD	D,SD	D,SD	A	T	D,SD	A	D,SD	D,SD	D	T	D,SD	D,SD	T	D	D,SD	T	D	D,SD	T,SD	D,SD	D,SD	D
16	T	D,SD	D,SD	D,F	D,SD	A	T	D	T	D	D,SD	D,SD	D,F	D,F	D,SD	A	D,SD	D,F	D,SD	D,SD	T,SD	D,SD	D,SD	D,SD	D,SD	D,SD
17	D,SD	A	T	D,SD	T,SD	T	D,SD	T,SD	T	D,SD	D,SD	T	D,SD	A	T	T,SD	D,SD	T	D,SD	T,SD	T,SD	D,SD	A	D,SD	D,SD	
18	D,F	T	A	T,F	D,SD	A	T	T,SD	A	T	D,SD	T	T,SD	F	D	A	T	D,F	T,SD	T	D	D	T	D	D	D
19	T	D	A	T	A	D,SD	T	D,SD	A	T	D,SD	D,SD	T	D,SD	T	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	D,SD	D,SD	D,SD	
20	D,F	D,SD	T	D,SD	D,SD	T	D,SD	A	T	D,SD	T,SD	T	D,SD	T	D,SD	T,SD	D,SD	D,SD	D,SD							
21	D	D,SD	A	T	D,SD	D	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	A	T	D,SD	D	T	D,SD	D,SD	T	A
22	T	A	A	T	D	A	T	D	D	T	D	A	T	D,SD	D,SD	T	D	A	T	D,SD	A	T	D,SD	A	T	T
23	D,SD	D,SD	T	D,SD	A	T	D,SD	D,SD	D,SD	D,SD	D,SD	D,SD	D,SD	T	D,SD	T,SD	D,SD	D,SD	D,SD	D,SD						
24	D,F	T	D,SD	D,SD	D,SD	D,SD	T	D,SD	A	T	D,SD	D,SD	T	D,SD	A	D,SD										
25	T	D,SD	D,SD	T,SD	D,SD	A	T	D,SD	D,SD	D,SD	D,SD	D,SD	D,SD	T	D,SD	T,SD	T,SD									
26	D,SD	D,SD	T	D,SD	T	T	D,SD	A	T	D,SD	D,SD	T	D,SD	T,SD	T	D,SD	A	T	D	A	T	D,SD	D,SD	T,SD	T,SD	
27	A	T	T,SD	A	T	D	D	T	D	T	D	A	T	D	D	T	D	A	T	D	D	T	D,SD	D,SD	D,SD	
28	T	D,SD	D,SD	T	D,SD	A	T	D	D,SD	D,SD	T	D,SD	A	T	D	D,SD	T	D,SD	A	T,SD	D,SD	D,SD	T,SD	D,SD	D,F	
29													A	D	T,F	D,SD	A	T	D	D,SD	T	D,SD	A	T	D,F	T,F
30	T		A	T	A	A	T	A	A	T	D	A	T	D	A	T	D	A	A	A	A	A	T	T	D	
31			A	T	A	A	T	D	D,SD	T	D,SD	T	D,SD	D,SD	D,SD	D,SD	D,SD	A	T	D,SD	A	T	D,SD	D,SD	T	
32	A	T	D,SD	A	D,SD	A	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	D,SD	D,SD	A	T	A	T	A	T	D,SD	A	
33	A	A	A	A	T	A	D	T	D	D,SD	D,SD	D,SD	A	T	D	A	T	D,SD	A	A	A	A	A	A	A	
34	T	D,SD	D,F	T	D,SD	A	D,SD	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	T	T,SD	A	T	D,SD	D,F	T	D,SD	D,SD	D,SD	
35	D	D	T	D	A	T	D,SD	A	T	D	A	T	D,SD	A	T	T,SD	A	D	T	D	T	D	D	D	D	
36	D,SD	T	D,SD	A	T	D,SD	D,SD	T	T,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	A	T	D,SD	D,SD	D,SD	D,SD	D,SD	
37	T	D,SD	T,SD	T	A	T	D,SD	D,SD	T	D,SD	T	D,SD	T	T	D,SD	D,SD	T	D,SD	D	D,SD	D,SD	A	D,SD	D,SD	A	
38	D,SD	A	T	D,SD	T	D,SD	A	T	D,SD	T,SD	T	D,SD	A	T	T,SD	A	T	D,SD	A	D,SD	A	T	A	T	A	
39	A	T	T,SD	T,SD	D	T	T	T	T,SD	T	D,SD	T	D	T	D	T	T	T	T	T	T	T	T	T	T	
40	T	A	A	T	D,SD	T	T	D,SD	A	T	D	A	T	D,SD	A	T	D,SD	A	T	T,SD	D,SD	T	T	D,SD	T	
41	D,SD	A	T	T	D,SD	T	D,SD	D,SD	T	D,SD	T	D,SD	T	D,SD	D,SD	T	D,SD	T	D,SD	D,SD	T	D,SD	A	T	T	
42	A	T																								
43			A	T	D,SD	A	T	D,SD	D,SD	T	D,SD	T,SD	T	D,SD	T,SD	T	D,SD	T	T	D,SD	T,SD	T,SD	T,SD	T,SD	T,SD	
44	D,SD	A	T	D,SD	A	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	T,SD	D,SD	D,SD	D,SD	T,SD	D,SD	D,SD	D,SD	T,SD	
45	T	T	D,SD	D,SD	D,SD	T	T,SD	T,SD	T	D,SD	T,SD	T,SD	D,SD	T,SD	T,SD	D,SD	T,SD	D,SD	D,SD	D,SD	D,SD	D,SD	D,SD	T,SD	T,SD	
46	T	D,SD	T	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	T,SD	T,SD	T,SD	D,SD	T,SD							
47	D,SD	A	T	D,SD	D,SD	T	D,SD	D,SD	T	T,SD	D,SD	T	D,SD	T	D,SD	T,SD	T,SD	D,SD	D,SD	D,SD	T,SD	A	D,SD	D,SD	D,SD	T,SD
48	A	T	D,SD	A	T	D,SD	D,SD	T	A	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD									
49	T	D,SD	A	A	T	D,SD	A	T	D,SD	A	T	D,SD	A	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	T	T,SD	D,SD	
50	D,SD	T																								
51	A	T	T,SD	A	T	T,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	T	A	T	D	T,SD	T	D,SD	A	D,SD	D,SD	
52	T	T,SD	A	T	D,SD	A	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	D,SD	D,SD	
53	D,SD	A	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	D,SD	T	D,SD	T	D,SD	D,SD	T	D,SD	T	D,SD	A	T	D,SD	T,SD	D,SD	
54	A	T	D	A	T	D	A	T	D	A	T	D	A	T	D	A	T	D	D	T	T	D,SD	D	T	D	
55	T	D	T	D	T	D	A	T	D	A	T	D	A	T	D	A	A	A	A	A	A	A	T	A	A	

continued

APPENDIX F 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. Lines in blue font represent 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 G SUMMARY OF SABLEFISH BIOLOGICAL DATA 2018.

Biological data collected for sablefish by set, including catch weight in kilograms and numbers of fish. Details include a tally of specimens recovered, tagged and sampled. Mean fork lengths for tagged sablefish and sampled male and female sablefish are listed. Lines in blue font represent sets at mainland inlet localities.

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 H SUMMARY OF SABLEFISH BIOLOGICAL DATA 2019.

Biological data collected for sablefish by set, including catch weight in kilograms and numbers of fish. Details include a tally of specimens recovered, tagged and sampled. Mean fork lengths for tagged sablefish and sampled male and female sablefish are listed. Lines in blue font represent sets at mainland inlet localities.

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	5659			

APPENDIX I SUMMARY OF BIOLOGICAL DATA 2018 FOR OTHER FISH.

Biological data collected for fish other than sablefish. Each set is listed with counts of specimens sampled, calculations of mean fork lengths and number of species visually identified.

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

continued.

Species Name	Set	Specimen Count						Mean Fork Length(mm)			Sampler Visual id Count				
		Fork Length	Weight	Sex	Maturity	Otolith	DNA	Total Count	Proportion Males	Males	Females	No sex	Rougheye	Blackspotted	Hybrid
PACIFIC HALIBUT	80	1	1	1	1	1	0	1	1.00	405	0	0			
	87	2	2	2	2	2	0	2	0.00	0	463	0			
	95	2	2	2	2	2	0	2	1.00	605	0	0			
	4	4	0	0	0	0	0	4	0.00	0	0	830			
	5	1	1	0	0	0	0	1	0.00	0	0	770			
	6	3	0	0	0	0	0	3	0.00	0	0	863			
	13	1	1	0	0	0	0	1	0.00	0	0	890			
	15	5	0	0	0	0	0	5	0.00	0	0	836			
	16	5	0	0	0	0	0	5	0.00	0	0	912			
	19	4	0	0	0	0	0	4	0.00	0	0	820			
	29	9	1	0	0	0	0	9	0.00	0	0	819			
	33	44	45	0	0	0	0	45	0.00	0	0	879			
	34	5	5	0	0	0	0	5	0.00	0	0	870			
	35	6	6	0	0	0	0	6	0.00	0	0	820			
	37	15	14	0	0	0	0	15	0.00	0	0	822			
	38	1	1	0	0	0	0	1	0.00	0	0	1280			
	40	2	2	0	0	0	0	2	0.00	0	0	1185			
	41	2	2	0	0	0	0	2	0.00	0	0	1000			
	43	2	2	0	0	0	0	2	0.00	0	0	785			
	48	1	1	0	0	0	0	1	0.00	0	0	730			
	49	4	4	0	0	0	0	4	0.00	0	0	863			
	50	1	1	0	0	0	0	1	0.00	0	0	1010			
	51	2	2	0	0	0	0	2	0.00	0	0	940			
	52	4	4	0	0	0	0	4	0.00	0	0	903			
	53	12	12	0	0	0	0	12	0.00	0	0	863			
	56	6	6	0	0	0	0	6	0.00	0	0	890			
	65	4	4	0	0	0	0	4	0.00	0	0	855			
	66	3	3	0	0	0	0	3	0.00	0	0	910			
	67	3	3	0	0	0	0	3	0.00	0	0	853			
	68	3	3	0	0	0	0	3	0.00	0	0	997			
	69	10	10	0	0	0	0	10	0.00	0	0	920			
	70	1	1	0	0	0	0	1	0.00	0	0	880			
	71	2	2	0	0	0	0	2	0.00	0	0	810			
	72	5	5	0	0	0	0	5	0.00	0	0	844			
	73	7	7	0	0	0	0	7	0.00	0	0	964			
	80	5	5	0	0	0	0	5	0.00	0	0	912			
	87	2	2	0	0	0	0	2	0.00	0	0	855			
	88	17	17	0	0	0	0	17	0.00	0	0	894			
	93	28	28	0	0	0	0	28	0.00	0	0	873			
	95	2	2	0	0	0	0	2	0.00	0	0	1085			

continued.

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

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

Biological data collected for fish other than sablefish. Each set is listed with counts of specimens sampled, calculations of mean fork lengths and number of species visually identified.

Species Name	Set	Specimen Count							Mean Fork Length(mm)				Sampler Visual id Count		
		Fork Length	Weight	Sex	Maturity	Otolith	DNA	Total Count	Proportion Males	Males	Females	No sex	Rougheye	Blackspotted	Hybrid
PACIFIC SLEEPER SHARK	100	1	0	0	0	0	0	1	0.00	0	0	1690			
ROUGHEYE/BLACKSPOTTED ROCKFISH COMPLEX	7	5	5	5	4	5	5	5	0.80	483	510	0	4	1	0
	15	12	12	11	12	12	12	12	0.18	485	478	430	12	0	0
	16	2	2	2	2	2	2	2	0.50	455	460	0	2	0	0
	24	4	4	4	4	4	4	4	0.50	478	453	0	4	0	0
	30	1	1	1	1	1	1	1	0.00	0	520	0	1	0	0
	37	5	5	5	5	5	5	5	0.20	510	519	0	2	3	0
	54	19	19	19	19	19	19	19	0.58	477	467	0	1	16	2
	55	29	29	29	28	29	29	29	0.45	487	473	0	7	22	0
	56	18	18	18	18	18	17	18	0.78	482	486	0	0	18	0
	62	1	1	1	1	1	1	1	1.00	545	0	0	0	1	0
	65	9	9	9	9	9	9	9	0.56	453	371	0	2	7	0
	69	10	10	10	10	10	10	10	0.60	477	428	0	1	9	0
	73	25	25	25	25	25	25	25	0.56	490	493	0	1	24	0
	74	26	26	26	26	26	25	26	0.46	462	455	0	2	23	1
	84	29	29	29	29	29	29	29	0.24	449	482	0	9	20	0
SHORTRAKER ROCKFISH	54	1	1	1	1	1	0	1	0.00	0	600	0			
	55	1	1	1	1	1	0	1	0.00	0	590	0			
	56	2	2	2	2	2	0	2	1.00	650	0	0			
	59	2	2	2	2	2	0	2	0.50	625	600	0			
	69	3	3	3	3	3	0	3	0.33	620	620	0			
	73	1	1	1	1	1	0	1	0.00	0	565	0			
	84	1	1	1	1	1	0	1	0.00	0	695	0			
YELLOWEYE ROCKFISH	20	2	2	2	2	2	0	2	0.00	0	433	0			
	37	1	1	1	1	1	0	1	0.00	0	455	0			
	38	7	7	7	7	7	0	7	0.57	579	498	0			
	45	18	18	18	18	18	0	18	0.50	583	592	0			
	46	1	1	1	1	1	0	1	1.00	415	0	0			
	62	19	19	19	19	19	0	19	0.47	587	510	0			
	66	1	1	1	1	1	0	1	1.00	410	0	0			
PACIFIC HALIBUT	6	2	2	0	0	0	0	2	0.00	0	0	880			
	7	2	2	0	0	0	0	2	0.00	0	0	845			
	8	10	10	0	0	0	0	10	0.00	0	0	883			
	15	5	5	0	0	0	0	5	0.00	0	0	954			
	16	9	9	0	0	0	0	9	0.00	0	0	839			
	20	12	12	0	0	0	0	12	0.00	0	0	853			
	24	9	9	0	0	0	0	9	0.00	0	0	826			
	34	1	1	0	0	0	0	1	0.00	0	0	910			
	37	1	1	0	0	0	0	1	0.00	0	0	720			
	38	7	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	Weight	Sex	Maturity	Otolith	DNA	Total Count	Proportion Males	Males	Females	No sex	Rougheye	Blackspotted	Hybrid
	44	9	9	0	0	0	0	9	0.00	0	0	881			
	45	5	5	0	0	0	0	5	0.00	0	0	852			
	46	11	11	0	0	0	0	11	0.00	0	0	918			
	54	3	3	0	0	0	0	3	0.00	0	0	857			
	55	10	10	0	0	0	0	10	0.00	0	0	862			
	56	9	9	0	0	0	0	9	0.00	0	0	847			
	62	4	4	0	0	0	0	4	0.00	0	0	883			
	65	7	7	0	0	0	0	7	0.00	0	0	886			
	66	28	28	0	0	0	0	28	0.00	0	0	844			
	67	14	14	0	0	0	0	14	0.00	0	0	946			
	68	10	10	0	0	0	0	10	0.00	0	0	835			
	69	6	6	0	0	0	0	6	0.00	0	0	833			
	73	4	4	0	0	0	0	4	0.00	0	0	903			
	84	1	1	0	0	0	0	1	0.00	0	0	820			
	86	14	14	0	0	0	0	14	0.00	0	0	852			
	87	18	18	0	0	0	0	18	0.00	0	0	875			
	88	3	3	0	0	0	0	3	0.00	0	0	817			
	89	2	2	0	0	0	0	2	0.00	0	0	1010			
	90	10	10	0	0	0	0	10	0.00	0	0	751			
	91	10	10	0	0	0	0	10	0.00	0	0	790			
	92	1	1	0	0	0	0	1	0.00	0	0	690			
	93	1	1	0	0	0	0	1	0.00	0	0	840			
	94	1	1	0	0	0	0	1	0.00	0	0	890			
	95	3	3	0	0	0	0	3	0.00	0	0	963			
	96	1	1	0	0	0	0	1	0.00	0	0	1030			
	100	2	2	0	0	0	0	2	0.00	0	0	945			
	103	2	2	0	0	0	0	2	0.00	0	0	1055			

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