Pacific Spiny Dogfish (*Squalus suckleyi*) Longline Survey in the Strait of Georgia, October 2–13, 2019

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PACIFIC SPINY DOGFISH (*SQUALUS SUCKLEYI*) LONGLINE SURVEY IN THE STRAIT OF GEORGIA, OCTOBER 2–13, 2019

by

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A longline survey for Pacific Spiny Dogfish (*Squalus suckleyi*) was conducted in the Strait of Georgia aboard the CCGS *Neocaligus* from October 2-13, 2019. A total of 39 longline sets were completed at 10 index sites, within four depth strata where possible. A total of 5,606 Pacific Spiny Dogfish were caught, accounting for almost 97% of the total catch. A total of 5,514 Pacific Spiny Dogfish were biologically sampled. The Pacific Spiny Dogfish catch was predominately male (68%). Most male Pacific Spiny Dogfish were in the range of 58 to 88 cm in total length, with a minimum size of 48 cm and maximum size of 93 cm. Most female Pacific Spiny Dogfish were in the range of 58 to 98 cm, with a minimum size of 48 cm and maximum size of 114 cm. An additional 13 fish species were caught on the survey and measured for length.

RÉSUMÉ

Williams, D.C., Cornthwaite, A.M. 2024. Pacific Spiny Dogfish (*Squalus suckleyi*) Longline Survey in the Strait of Georgia, October 2-13, 2019. Can. Manuscr. Rep. Fish. Aquat. Sci. 3285: v + 19 p.

Un relevé à la palangre de l'aiguillat commun du Pacifique (*Squalus suckleyi*) a été effectué dans le détroit de Georgia à bord du NGCC *Neocaligus* du 2 au 13 octobre 2019. Au total, 39 poses de palangres ont été effectuées à 10 sites index, dans quatre strates de profondeur lorsque cela était possible. Au total, 5,606 aiguillats communs du Pacifique ont été capturés, représentant presque de 97% des prises totales. Au total, 5,514 aiguillats communs du Pacifique ont été échantillonnés biologiquement. Les prises d'aiguillat commun du Pacifique étaient dominées par les mâles (68 %). La plupart des aiguillats communs mâles mesuraient entre 58 et 88 cm de longueur totale, avec une taille minimale de 48 cm et une taille maximale de 93 cm. La plupart des femelles d'aiguillat commun mesuraient entre 58 et 98 cm, avec une taille minimale de 48 cm et une taille maximale de 114 cm. Treize autres espèces de poissons ont été capturées lors de l'enquête et leur longueur a été mesurée.

1 INTRODUCTION

Pacific Spiny Dogfish (*Squalus suckleyi*) are distributed throughout the North Pacific Ocean, from Baja California to the Bering Sea. Pacific Spiny Dogfish are present in all coastal waters of British Columbia, including the Strait of Georgia. Tagging studies have shown that Pacific Spiny Dogfish in the Strait of Georgia should be considered a discrete stock from offshore Pacific Spiny Dogfish (McFarlane and King 2002).

Pacific Spiny Dogfish were an important component of Canada's commercial fishery on the British Columbia coast from the late 1800s to the mid-1950s (King et al. 2017). In the late 1970's, a resurgence of interest in the fishery led to increases in catch, particularly in the Strait of Georgia, prompting the initiation of an assessment program for Pacific Spiny Dogfish. At the start of the program, two longline surveys were conducted in the Strait of Georgia in 1986 and 1989 (McFarlane et al. 2005a). These surveys were used to develop survey methodology and to provide baseline biological data and catch rates for fishing sites throughout the Strait of Georgia.

In the early 2000s, concerns regarding the exploitation of elasmobranch species highlighted the need to resume surveying Pacific Spiny Dogfish in the Strait of Georgia. During the mid-1990s, the standard gear used in the commercial longline fishery for Pacific Spiny Dogfish changed from J-hooks to Circle-hooks (King and McFarlane 2009). Therefore, a longline calibration survey was conducted in 2004 to assess potential changes in commercial catch rates and to calibrate catch rates from previous surveys (J-hooks) to future surveys (circle-hooks) (McFarlane et al. 2005b). Four longline assessment surveys for Pacific Spiny Dogfish in the Strait of Georgia subsequently occurred using circle hooks in 2005 (McFarlane et al. 2006), 2008 (King and McFarlane 2009), 2011 (King et al. 2012), and 2014 (Cornthwaite et al. 2022), using methodology and fishing sites consistent with previous surveys. This report documents the 2019 Strait of Georgia longline assessment survey for Pacific Spiny Dogfish.

2 METHODS

2.1 Vessel and fishing gear

The fishing vessel for the survey was the Canadian Coast Guard Ship (CCGS) *Neocaligus*, an 18.8 m fisheries research vessel.

Fishing was conducted using demersal snap-type longline gear. The groundline (Figure 1A) was 3/8 inch leaded polypropylene sectioned into 900 foot lengths (half-skates) joined with "C" links. Three or four groundline half-skates were used, depending on the depth stratum being fished. The groundline extended from a surface buoy to an anchor (approximately 75 lbs of chain), followed by an 1800 foot section on the substrate, having a target number of 300 hooks spaced approximately 6 feet apart, followed by a second anchor and a second surface buoy at the end. In addition, 5 lb lead sash weights were placed intermittently along the groundline section that was fishing.

Hook setup (Figure 1B) consisted of no. 72 stainless steel halibut snaps attached to gangions made from 18 inches of 250 lb test Perlon monofilament line crimped to approximately 15 inches length, attached with 4/0 swivels to size 14/0 Mustad circle hooks. Each hook was baited with a third of an approximately 6 inch herring with a target weight of 20 grams per hook.

2.2 Index sites and depth strata

The original (1986-1989) index sites were selected to be representative of commercial fishing in the Strait of Georgia. Subsequent longline surveys have fished a subset of the 14 original sites as vessel logistics and time has allowed. In 2019, fishing occurred at 10 of the original index sites: Active Pass, Cape Lazo, Cape Mudge, Epsom Point, French Creek, Grant Reef, Porlier Pass, Sinclair Bank, Sturgeon Bank, and Hornby Island (Figure 2). With the exception of Hornby Island (fished only in 2014), these sites were fished in all previous longline surveys.

At each site, gear was set within four depth strata (where available):

- 56 to 110 m;
- 111 to 165 m
- 166 to 220 m;
- Greater than 220 m.

2.3 Fishing operations

Longline sets were conducted at each index site in each available depth stratum. For each site, the depth strata were fished in random order to minimize a time of day bias. In order to minimize bias in catch rates due to differences in effective fishing time, all sets were fished for approximately two hours, based on the time between the last anchor entering the water during deployment and the first anchor exiting the water during retrieval.

2.4 Catch processing

For each set, catch was recorded at the rail as the line was retrieved. Fish that dropped off at the surface were recorded as lost at surface and partial fish were recorded as depredated. Individuals which had been depredated on the line (e.g., “head only” catches) were not weighed. Hooks without catch were recorded as empty, broken or baited.

Catch per unit effort (CPUE) for each set was calculated as the number in pieces (pcs) of Pacific Spiny Dogfish caught per 1000 hooks retrieved. The total CPUE was determined by depth stratum and index site for (1) all sets successfully fished, (2) sets successfully fished at index sites with all depth strata available, and (3) sets successfully fished in depth strata available at all index sites.

2.5 Biological sampling

Where possible, catch was released alive. Length and external sex were recorded from all captured Pacific Spiny Dogfish. Length was recorded for all other captured fishes, with internal or external sex recorded where possible. Body weights were recorded for Sablefish (*Anaplopoma fimbria*), Pacific Cod (*Gadus macrocephalus*), rockfishes (*Sebastes* sp.), flatfishes, skates, and Spotted Ratfish (*Hydrolagus colliei*) whenever possible. Reproductive maturity and age structures (otoliths) were also collected from rockfishes. Genetic samples in the form of fin clips were collected from Copper Rockfish (*S. caurinus*), Yelloweye Rockfish (*S. ruberrimus*), and Bluntnose Sixgill Shark (*Hexanchus griseus*) if possible.

Body lengths were measured in mm to the nearest ½ cm using Scantrol electronic measuring boards. Total Length (http://vocab.nerc.ac.uk/collection/P01/current/TL01XX01) was used for sharks (including Pacific Spiny Dogfish), skates, sculpins, and flatfishes. Fork Length (http://vocab.nerc.ac.uk/collection/P01/current/FL01XX01/) was used for rockfishes, Pacific Cod, and Sablefish.

Second Dorsal Length (http://vocab.nerc.ac.uk/collection/P01/current/SDL1XX01/) was measured for Spotted Ratfish (*Hydrolagus colliei*).

Body weights (http://vocab.nerc.ac.uk/collection/P01/current/SPWGXX01/) were measured in grams using a motion-compensating electronic benchtop scale (Marel Model M1100; capacity 6/15 kg; resolution 2/5g).

Sex was determined externally for chondrichthyans. Male chondrichthyans were identified by the presence of claspers associated with the pelvic fin. Sex was determined internally for rockfishes by examining their gonads.

3 RESULTS

3.1 Fishing

During the October 2–13, 2019 period, 11,700 hooks were fished on 39 longline sets at 10 index sites (Table 1, Appendix A). Four sets were completed at each site with one set per depth stratum, except for Hornby Island where only three sets were completed and Cape Mudge where two of four sets were completed in the same stratum. At Hornby Island there were no fishing grounds in the deepest stratum (>220 metres). At Cape Mudge two sets were mistakenly placed in the 166 to 220m stratum and none were placed in the greater than 220m stratum. The mean fishing time for each set (based on the time between the last anchor entering the water during deployment and the first anchor exiting the water during retrieval) was 120 minutes (Table 1, Appendix A).

3.2 Catch

A total of 5,606 Pacific Spiny Dogfish were caught, of which 12 were partially depredated ("head only") and 70 were lost/ dropped at the surface (Table 1). Pacific Spiny Dogfish were caught on all 39 sets and were the dominant species caught, accounting for 97% of the total catch (Table 2).

An additional 186 fishes representing 13 species (Table 2) and 4 invertebrate taxa (Table 1, Appendix B) were caught on the survey: the most numerous of these species were Yelloweye Rockfish (n=82), followed by Quillback Rockfish (n=37) and Spotted Ratfish (n=26).

Catch Per Unit Effort

Pacific Spiny Dogfish mean CPUE for the whole survey was 479 pieces/1000 hooks; male mean CPUE was 319 pieces /1000 hooks and female mean CPUE was 152 pieces/1000 hooks (Table 3).

Total CPUE by index site was greatest at Active Pass, Cape Lazo, and Grant Reefs and lowest at French Creek regardless of whether or not the deepest stratum (>220m) was included (Table 3). Male CPUE was highest at Cape Lazo and Active Pass; female CPUE was highest at Epson Point and Sinclair Bank (Table 3).

Pacific Spiny Dogfish CPUE by depth stratum showed the same trend regardless of whether or not sites without the deepest stratum (>220m) were excluded (Table 4): CPUE increased with increasing depth until the 166-220m stratum (666 pieces/1000 hooks) with a slight decrease in the deepest stratum (>220 m, 660 pieces/1000 hooks). Female CPUE was highest in the deepest stratum (> 220 m; 229 pieces/1000 hooks, Table 4), and male CPUE was highest in the 166–220 m depth stratum (450 pieces/1000 hooks, Table 4).

3.3 Biological Sampling

Length and sex were recorded for 5,514 Pacific Spiny Dogfish (Table 2). Detailed Pacific Spiny Dogfish length frequency data are presented in Table 5, Table 6, Figure 3, and Figure 4. Most male Pacific Spiny Dogfish were in the range of 58 to 88 cm; the shortest male was 48 cm and the longest was 93 cm (Table 5). Most female Pacific Spiny Dogfish were in the range of 58 to 98 cm; the shortest female was 48 cm and the longest was 114 cm (Table 5). Across fishing sites, the mean size for males was approximately 72 cm, with the highest mean for males observed at Active Pass, Cape Lazo, Hornby Island, and Sturgeon Bank Table 4, Figure 3). The mean size for females was approximately 74 cm, with the highest mean for females observed at Active Pass, French Creek, and Porlier Pass (Table 4, Figure 3). Larger males and females were encountered in the two shallowest depth strata (Table 6, Figure 4).

The catch of Pacific Spiny Dogfish was dominated by males (Table 1, Figure 5, Figure 6). This finding was consistent across depth strata (Figure 6) and fishing sites, with the exception of Epsom Point and Sinclair Bank where more females were caught (Table 1, Figure 5).

Biological data were recorded for 13 of the other fish species caught, including sex, lengths, weights, maturities and collection of age structures (otoliths) and/or genetic samples depending on species (Table 2).

4 DISCUSSION

The results presented in this report are from the seventh longline survey conducted in the Strait of Georgia designed to monitor the status, and collect biological samples of Pacific Spiny Dogfish. A total of 39 longline sets were completed at 10 index sites, within four depth strata where possible. While an additional 13 fish species were caught on the survey, Pacific Spiny Dogfish dominated the catch, accounting for almost 97% of the total catch by number. The Pacific Spiny Dogfish catch was dominated by males at all survey sites except Sinclair Bank and Epsom Point. The information from these surveys will provide the basis for examining current and future Pacific Spiny Dogfish dynamics and abundance trends in the Strait of Georgia.

In addition to the standard dogfish survey conducted in 2019, there were a number of sets conducted with the goal of comparing catch with standard survey dogfish longline gear to catch with standard survey hard bottom longline gear. It is intended that this comparative gear work will continue with the methodology and results discussed in a separate report.

5 ACKNOWLEDGEMENTS

We would like to thank Captain Dustin Flahr and the crew of the *CCGS Neocaligus*, as well as DFO staff Schon Hardy, Midoli Bresch and volunteer Dayv Lowry of the Washington Department of Fish and Wildlife, for their assistance in completing this survey. Also thanks to Jackie King for providing code for table/ figure generation, Malcolm Wyeth for providing a figure, Lindsay Davidson and Jon Faris for their review of this document prior to publication.

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Table 1. Number of sets fished, mean fishing time (duration in minutes), number of hooks, total catch of dogfish, number of dogfish lost at the surface and partially depredated, number of intact dogfish sampled, and proportion of females for each index site during the 2019 Pacific Spiny Dogfish longline survey.

Index Site	No. sets	Mean duration	No. Hooks	Total catch	Lost at surface	Depredated	Sampled	Prop. Female
Active Pass	4	120.0	1200	879	10	4	860	0.2
Cape Lazo	4	123.3	1200	796	9	0	784	0.0
Cape Mudge	4	120.0	1200	461	10	0	451	0.3
Epsom Point	4	117.5	1200	564	3	0	560	0.8
French Creek	4	119.5	1200	238	4	0	234	0.5
Grant Reefs	4	120.3	1200	706	8	1	696	0.4
Hornby Island	3	118.7	900	267	4	0	263	0.1
Porlier Pass	4	118.8	1200	597	9	1	588	0.2
Sinclair Bank	4	126.5	1200	506	9	2	494	0.9
Sturgeon Bank	4	118.8	1200	592	4	4	584	0.0
All Sites	39	120.4	11700	5606	70	12	5514	0.3

Table 2. Summary of species captured and sampled during the 2019 Pacific Spiny Dogfish longline survey including total catch (in pieces), number of lengths, sexes, weights, maturities, age structures, and genetic samples.

Species Captured	Number of sets	Total catch	Lengths	Sex	Weights	Maturities	Age structures	Genetic samples
North Pacific Spiny Dogfish	39	5606	5514	5514				
Bluntnose Sixgill Shark	1	1	1	1	1			1
Longnose Skate	10	19	19	19				
Spotted Ratfish	9	26	26	26				
Pacific Cod	1	1	1	1				
Sablefish	4	4	4	4				
Canary Rockfish	1	1	1	1	1			
Copper Rockfish	1	5	5	5	5	5	5	5
Greenstriped Rockfish	2	2	2	2	2			
Quillback Rockfish	7	37	37	37	37	37	37	
Yelloweye Rockfish	12	82	82	82	82	82	82	82
Pacific Sanddab	1	1	1	1				
Petrale Sole	2	2	2	2	1			
Pacific Staghorn Sculpin	1	2	2	2				
Total	39	5789	5697	5697	129	124	124	88

Table 3. Pacific Spiny Dogfish mean catch per unit effort (CPUE: fish pieces per 1000 hooks) in 2019 by index site for males and females for: (1) all sets and depth strata fished and; (2) excluding sets fished in the deepest stratum (> 220 m) which was not available at Hornby Island or Cape Mudge index sites.

Index Site	CPUE: All Depth Strata				CPUE: Excluding Deepest Stratum			
	No. Sets	Male	Female	Total	No. Sets	Male	Female	Total
Active Pass	4	557.5	159.2	732.5	3	573.3	177.8	763.3
Cape Lazo	4	634.2	19.2	663.3	3	625.6	14.4	650.0
Cape Mudge	4	281.7	94.2	384.2	3	233.3	47.8	288.9
Epsom Point	4	75.0	391.7	470.0	3	57.8	336.7	395.6
French Creek	4	105.8	89.2	198.3	3	47.8	86.7	136.7
Grant Reefs	4	334.2	245.8	588.3	3	302.2	234.4	543.3
Hornby Island	3	276.7	15.6	296.7	3	276.7	15.6	296.7
Porlier Pass	4	409.2	80.8	497.5	3	334.4	85.6	428.9
Sinclair Bank	4	43.3	368.3	421.7	3	42.2	284.4	334.4
Sturgeon Bank	4	464.2	22.5	493.3	3	400.0	6.7	411.1
All Sites	39	319.2	152.1	479.1	30	289.3	129	424.9

Table 4. Pacific Spiny Dogfish mean catch per unit effort (CPUE: fish pieces per 1000 hooks) in 2019 by depth stratum for males and females for: (1) all sets and index sites fished and (2) excluding sets at Cape Mudge and Hornby Island index sites where only three depth stratum were available.

Depth Stratum	CPUE: All Index Sites				CPUE: Exclude Cape Mudge/Hornby			
	No. Sets	Male	Female	Total	No. Sets	Male	Female	Total
56 – 110 m	10	133.7	67.3	205.7	8	161.3	83.8	250.8
111 – 165 m	11	299.1	123.0	427.3	8	305.4	151.3	460.4
166 – 220 m	9	450.4	204.8	665.6	8	427.1	225.0	662.5
> 220 m	9	418.9	228.9	660	8	417.9	228.3	658.8
All Sites	39	319.2	152.1	479.1	32	327.9	172.1	508.1

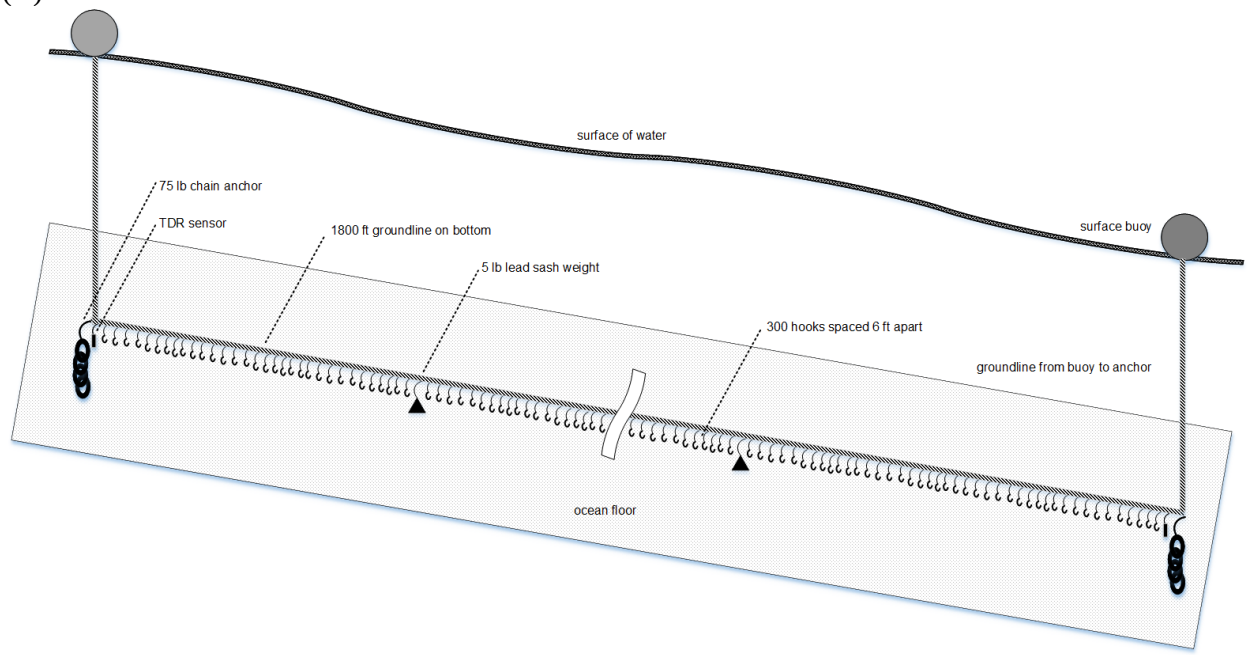
Table 5. Summary of male and female Pacific Spiny Dogfish total lengths (mm) by index site in 2019.

Index Site	Male lengths (mm)				Female lengths (mm)			
	N	Min	Max	Mean	N	Min	Max	Mean
Active Pass	669	480	890	730	191	525	1100	834
Cape Lazo	761	515	900	735	23	540	755	650
Cape Mudge	338	545	925	708	113	570	990	678
Epsom Point	90	555	860	703	470	480	1120	752
French Creek	127	510	820	698	107	555	1030	840
Grant Reefs	401	510	820	697	295	505	945	686
Hornby Island	249	540	865	735	14	550	695	638
Porlier Pass	491	510	855	718	97	540	1140	866
Sinclair Bank	52	530	820	666	442	560	940	699
Sturgeon Bank	557	535	885	734	27	480	785	620
All Sites	3735	480	925	722	1779	480	1140	739

Table 6. Summary of male and female Pacific Spiny Dogfish total lengths (mm) by depth stratum in 2019.

Depth Stratum	Male lengths (mm)				Female lengths (mm)			
	N	Min	Max	Mean	N	Min	Max	Mean
56 – 110 m	401	625	900	753	202	590	1140	885
111 – 165 m	987	545	925	728	406	565	1100	745
166 – 220 m	1216	485	890	715	553	525	1120	726
> 220 m	1131	480	885	714	618	480	1100	700
All Sites	3735	480	925	722	1779	480	1140	739

(A)



(B)

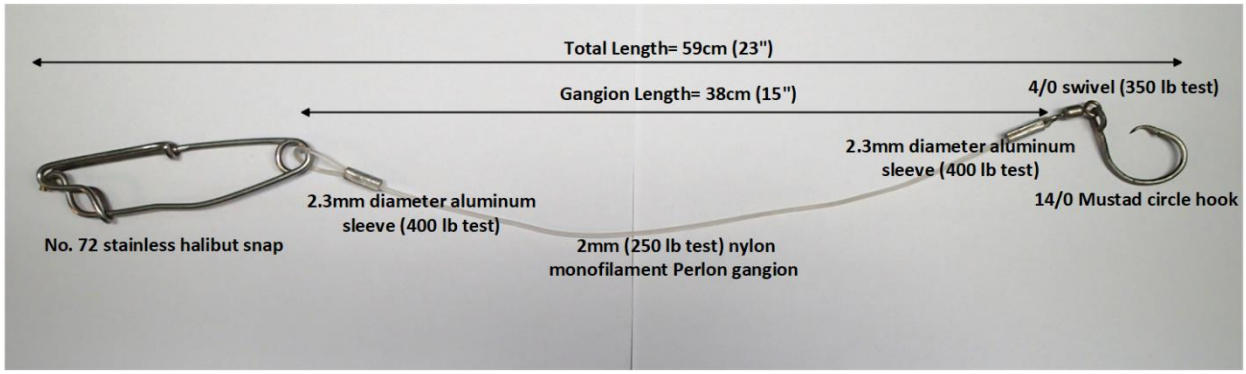


Figure 1. Gear schematic for the 2019 Pacific Spiny Dogfish longline survey in the Strait of Georgia illustrating the longline (A) and hook setup (B).

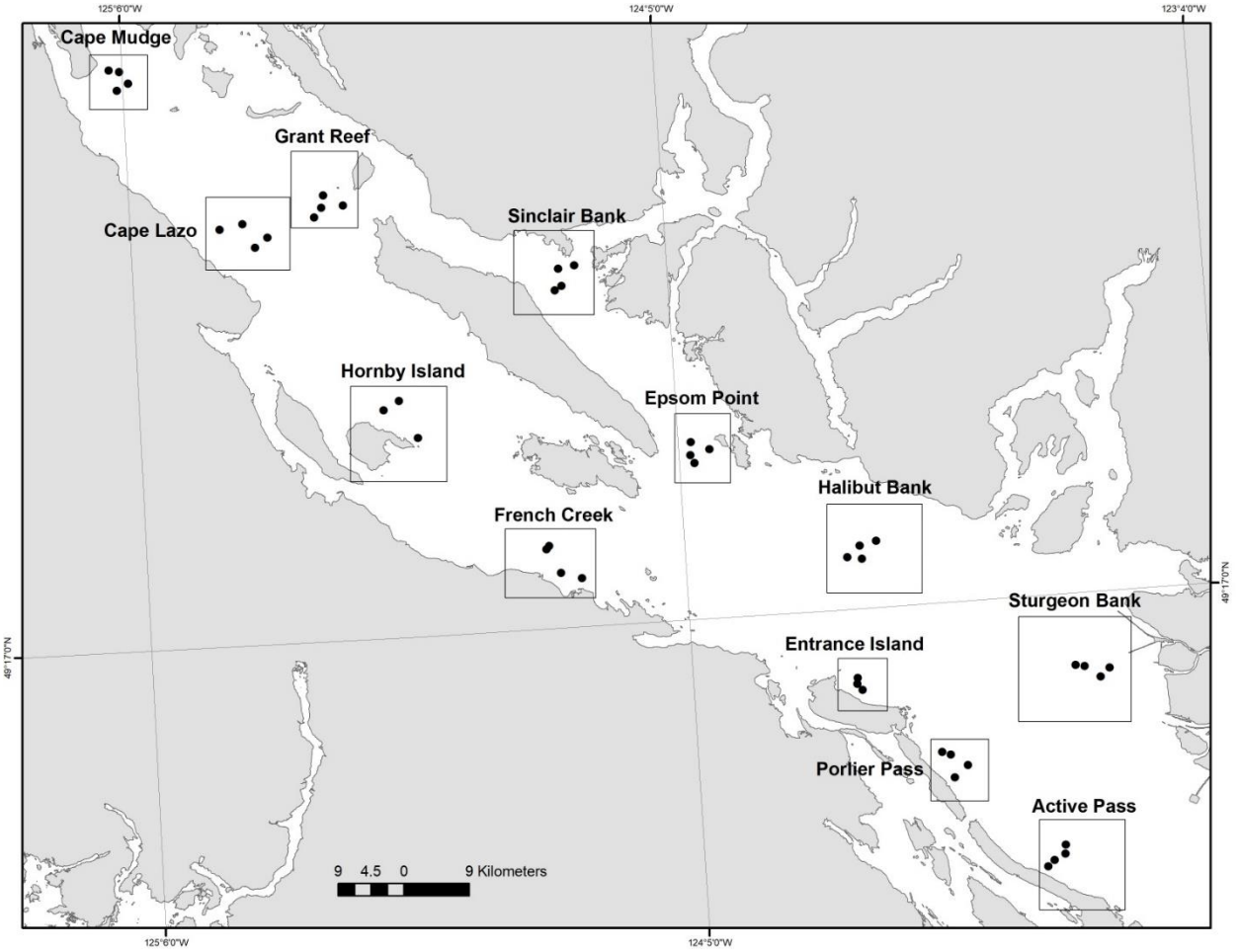


Figure 2. Fishing locations by survey index site for the 2019 Pacific Spiny Dogfish longline survey in the Strait of Georgia (note that Entrance Island and Halibut Bank sites were not fished in 2019). For detailed positional information see Appendix A.

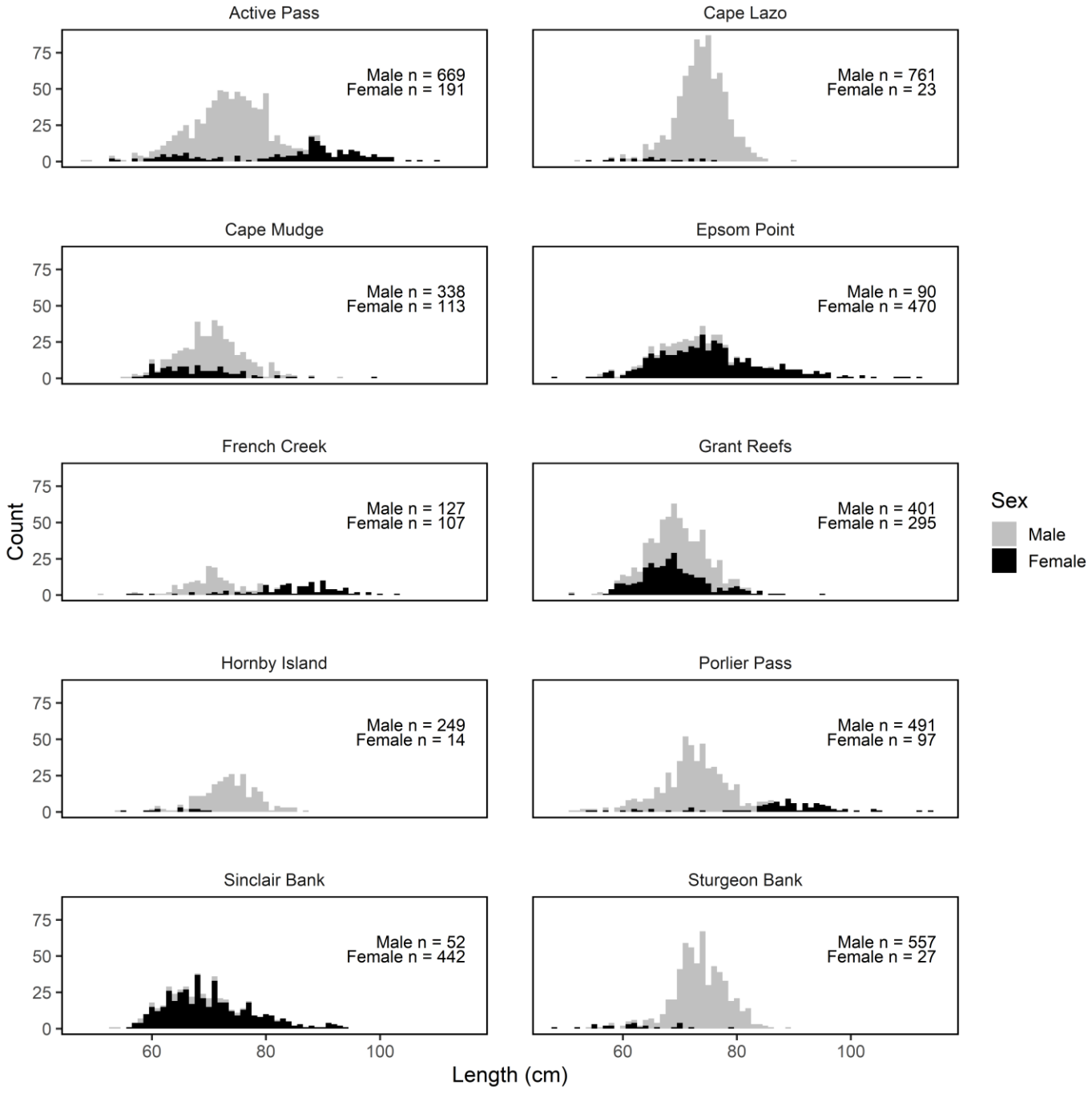


Figure 3. Pacific Spiny Dogfish male and female mean length frequency by index site in 2019.

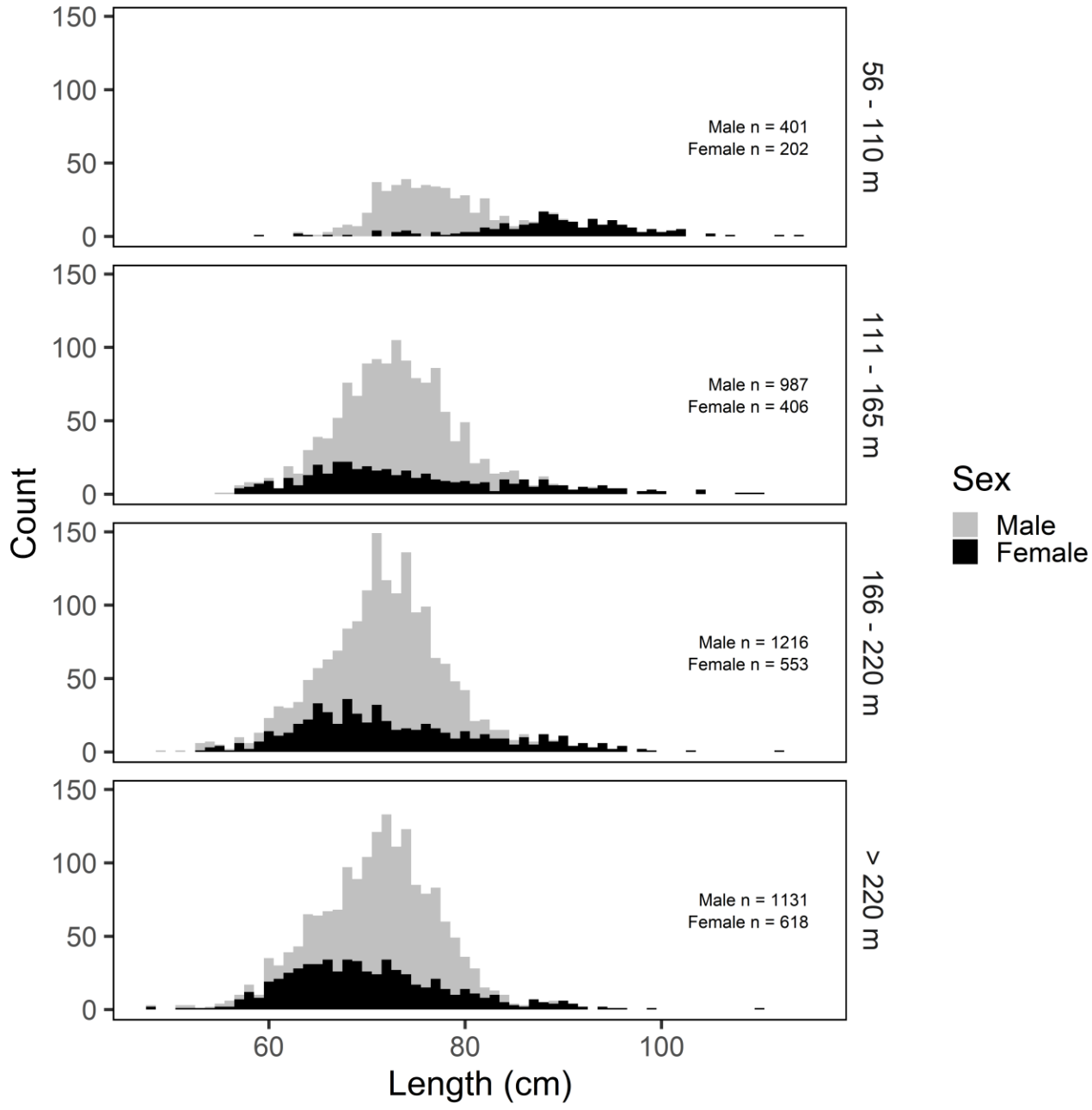


Figure 4. Pacific Spiny Dogfish mean length frequency by depth stratum in 2019.

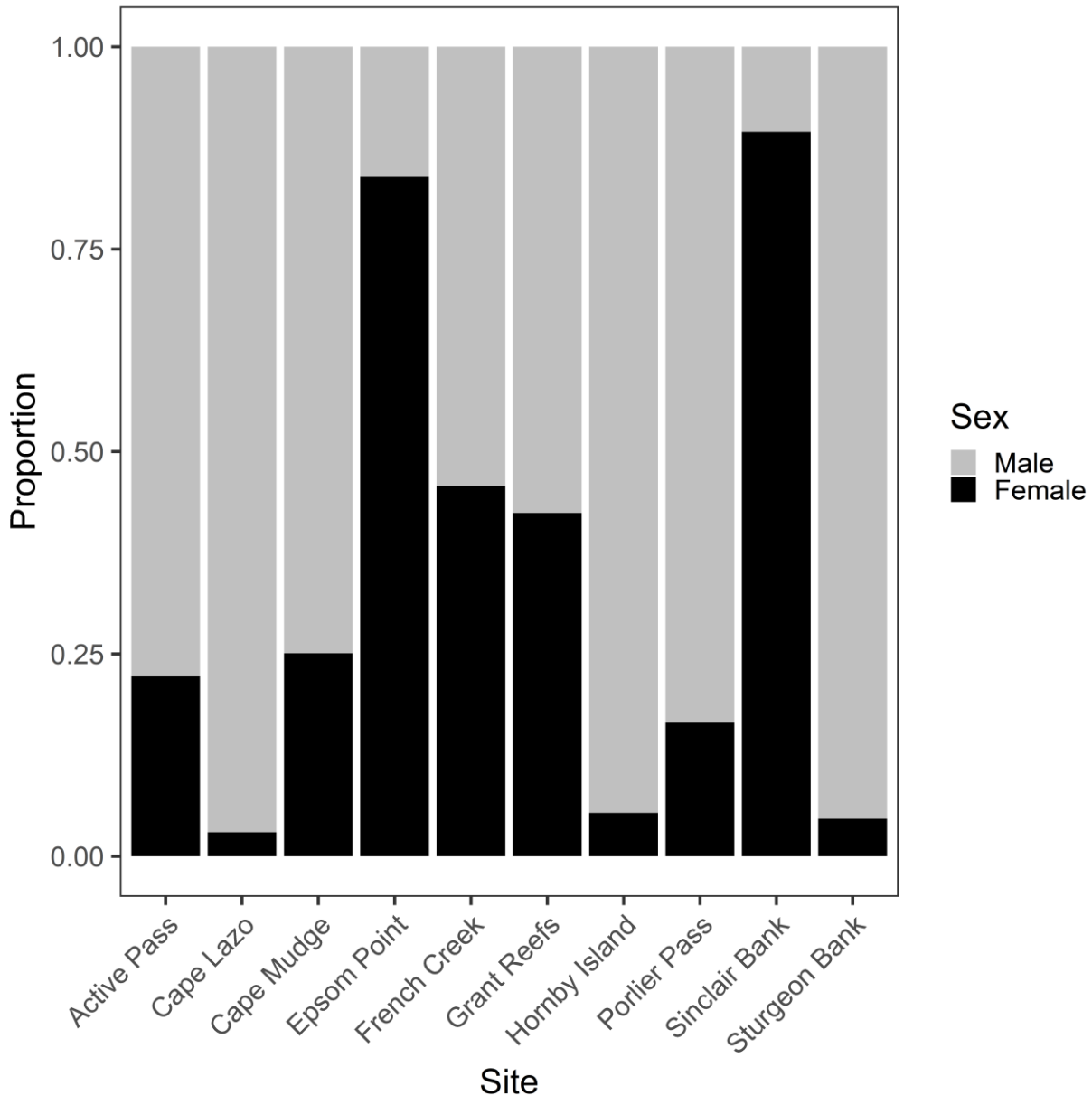


Figure 5. Sex ratio of Pacific Spiny Dogfish catch by index site in 2019.

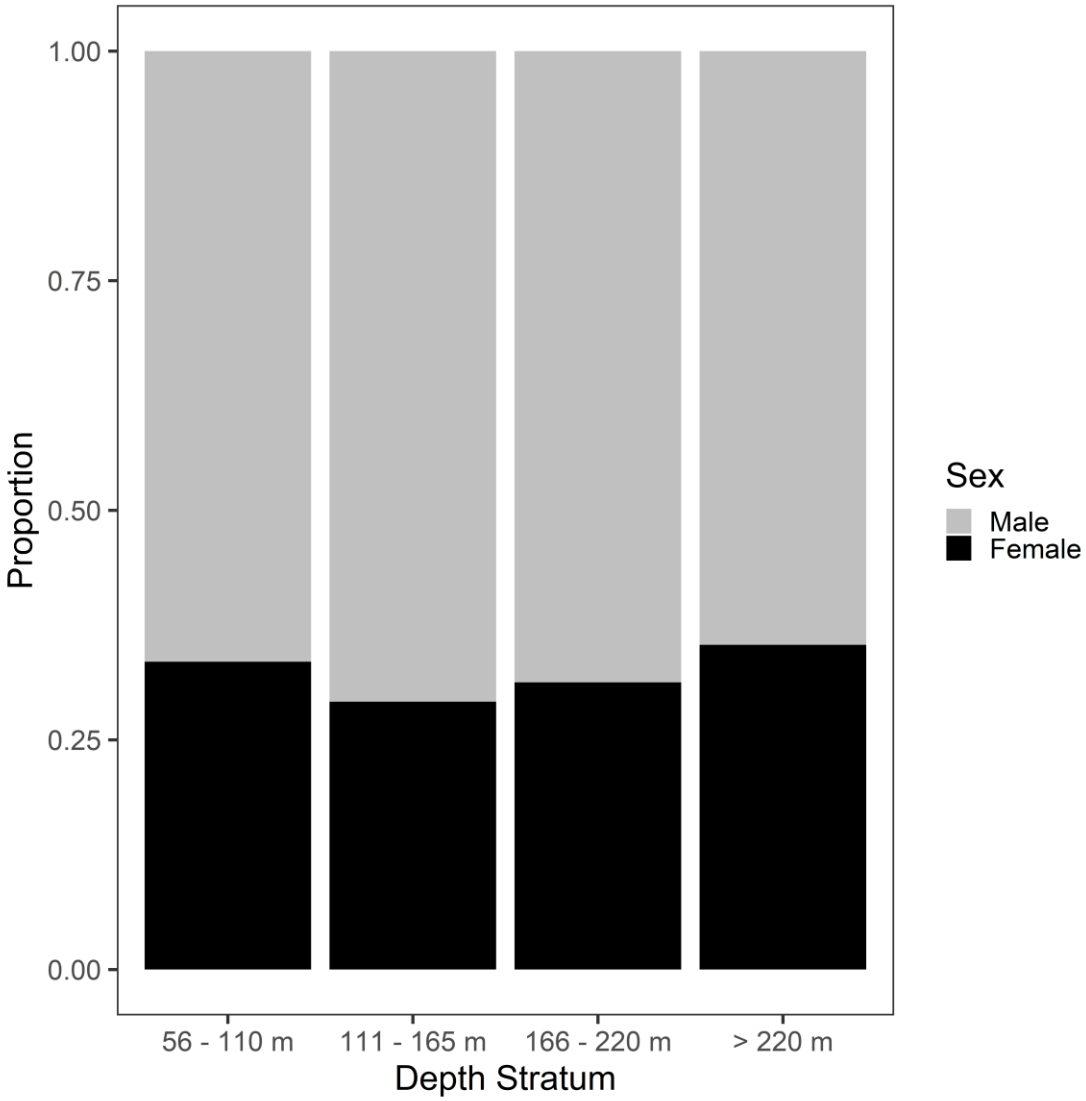


Figure 6. Sex ratio of Pacific Spiny Dogfish catch by depth stratum in 2019.

Appendix A: Bridge Log Data

Table A 1. Bridge log data from the October 2-13, 2019 Pacific Spiny Dogfish longline survey aboard the CCGS *Neocaligus*. Latitude and longitude in decimal degrees; effective fishing time (duration) in minutes; all depths in meters.

Set	Date	Start Time	Index Site	Depth Stratum	Hooks Retrieved	Start Latitude	Start Longitude	End Latitude	End Longitude	Start Depth	End Depth	Duration	Usable
1	2-Oct	7:50	Hornby Island	56 – 110	294	49.5295	124.5790	49.5363	124.5971	68	112	122	Yes
2	2-Oct	9:05	Hornby Island	111 – 165	299	49.5450	124.5918	49.5393	124.5825	136	155	119	Yes
3	2-Oct	12:29	Hornby Island	166 – 220	306	49.5811	124.6129	49.5737	124.6039	174	175	115	Yes
4	3-Oct	7:57	Sinclair Bank	56 – 110	298	49.6935	124.2793	49.7072	124.2846	70	84	118	Yes
5	3-Oct	9:10	Sinclair Bank	> 220	295	49.7034	124.3061	49.7170	124.3145	229	266	148	Yes
6	4-Oct	6:59	Sinclair Bank	166 – 220	305	49.6851	124.2959	49.6967	124.3009	222	205	120	Yes
7	4-Oct	7:53	Sinclair Bank	111 – 165	298	49.7114	124.2974	49.7224	124.3051	130	144	120	Yes
8	4-Oct	12:17	Grant Reefs	111 – 165	298	49.8442	124.7236	49.8558	124.7326	140	153	119	Yes
9	4-Oct	13:28	Grant Reefs	166 – 220	298	49.8296	124.7460	49.8204	124.7419	179	190	123	Yes
10	4-Oct	15:01	Grant Reefs	56 – 110	298	49.8591	124.7518	49.8602	124.7694	99	87	119	Yes
11	5-Oct	8:05	Cape Mudge	> 220	300	49.9963	125.0829	50.0079	125.0885	233	251	121	Yes
12	5-Oct	9:15	Cape Mudge	111 – 165	297	49.9887	125.1040	49.9810	125.0934	138	189	119	Yes
13	5-Oct	12:38	Cape Mudge	56 – 110	303	49.9798	125.1113	49.9758	125.1307	61	71	119	Yes
14	5-Oct	13:49	Cape Mudge	111 – 165	300	49.9856	125.0999	49.9959	125.1011	152	170	121	Yes
15	6-Oct	6:57	Grant Reefs	> 220	302	49.8111	124.7558	49.8013	124.7711	221	276	120	Yes
16	6-Oct	8:08	Cape Lazo	> 220	298	49.7831	124.8377	49.7948	124.8485	219	258	121	Yes
17	6-Oct	11:15	Cape Lazo	111 – 165	303	49.7817	124.8692	49.7733	124.8560	149	143	122	Yes
18	6-Oct	12:21	Cape Lazo	56 – 110	299	49.7676	124.8911	49.7789	124.8889	67	92	133	Yes
19	6-Oct	14:11	Cape Lazo	166 – 220	299	49.7884	124.8570	49.7981	124.8661	181	201	117	Yes
20	9-Oct	9:39	French Creek	111 – 165	297	49.3574	124.3086	49.3642	124.3184	116	148	118	Yes
21	9-Oct	10:57	French Creek	56 – 110	302	49.3552	124.3271	49.3584	124.3398	63	69	118	Yes
22	9-Oct	13:46	French Creek	166 – 220	302	49.3726	124.3295	49.3814	124.3367	163	200	123	Yes
23	9-Oct	14:52	French Creek	> 220	298	49.3837	124.3254	49.3899	124.3368	258	270	119	Yes
24	10-Oct	7:40	Epsom Point	56 – 110	295	49.4985	124.0473	49.4898	124.0384	78	75	120	Yes
25	10-Oct	8:36	Epsom Point	> 220	298	49.4780	124.0634	49.4717	124.0504	288	261	118	Yes
26	10-Oct	11:59	Epsom Point	111 – 165	300	49.4804	124.0327	49.4838	124.0485	141	160	118	Yes

Set	Date	Start Time	Index Site	Depth Stratum	Hooks Retrieved	Start Latitude	Start Longitude	End Latitude	End Longitude	Start Depth	End Depth	Duration	Usable
27	10-Oct	13:01	Epsom Point	166 – 220	296	49.4683	124.0336	49.4758	124.0455	185	181	114	Yes
28	11-Oct	7:22	Sturgeon Bank	56 – 110	297	49.1353	123.3081	49.1449	123.3050	83	86	119	Yes
29	11-Oct	8:30	Sturgeon Bank	> 220	301	49.1893	123.3811	49.1778	123.3825	249	248	118	Yes
30	11-Oct	12:20	Sturgeon Bank	166 – 220	295	49.1718	123.3494	49.1833	123.3504	191	190	120	Yes
31	11-Oct	13:24	Sturgeon Bank	111 – 165	299	49.1473	123.3264	49.1578	123.3233	136	134	118	Yes
32	12-Oct	7:36	Active Pass	56 – 110	298	48.9409	123.4228	48.9339	123.4109	102	80	119	Yes
33	12-Oct	8:30	Active Pass	111 – 165	294	48.9354	123.4006	48.9284	123.3857	133	162	120	Yes
34	12-Oct	12:16	Active Pass	> 220	293	48.9809	123.3888	48.9847	123.4011	252	265	122	Yes
35	12-Oct	13:26	Active Pass	166 – 220	301	48.9580	123.4008	48.9501	123.3882	192	189	119	Yes
36	13-Oct	7:38	Porlier Pass	56 – 110	297	48.9988	123.5428	48.9911	123.5312	56	82	118	Yes
37	13-Oct	8:42	Porlier Pass	166 – 220	297	49.0226	123.5324	49.0144	123.5182	186	190	119	Yes
38	13-Oct	12:15	Porlier Pass	111 – 165	299	49.0617	123.5984	49.0516	123.5894	125	133	118	Yes
39	13-Oct	13:15	Porlier Pass	> 220	300	49.0767	123.5693	49.0824	123.5812	230	222	120	Yes

Appendix B: Catch Data

Table B 1. Catch (pieces) data from the October 2-13, 2019 Pacific Spiny Dogfish longline survey aboard the CCGS *Neocaligus*.

Set	Bluntnose Sixgill Shark	Longnose Skate	Pacific Spiny Dogfish	Spotted Ratfish	Pacific Cod	Pacific Hake	Sablefish	Canary Rockfish	Copper Rockfish	Greenstriped Rockfish	Quillback Rockfish	Yelloweye Rockfish	Pacific Sanddab	Petrale Sole	Pacific Staghorn Sculpin	Oregontriton	Sponges	Starfish	Sunflower Starfish	Inanimate Objects	Total catch
1	0	0	3	3	0	0	0	1	0	0	3	18	0	0	0	0	0	0	0	0	28
2	0	4	57	5	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	81
3	0	0	207	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	207
4	0	0	15	0	0	0	0	0	0	0	5	1	0	1	0	0	0	0	0	0	22
5	0	0	205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	205
6	2	0	190	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	194
7	0	0	96	1	0	0	0	0	0	1	6	18	0	0	0	0	0	0	0	0	122
8	0	0	219	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	220
9	0	1	226	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	228
10	0	6	44	0	0	0	0	0	0	0	11	8	0	0	0	0	0	0	0	0	69
11	0	0	201	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	202
12	0	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	209
13	0	1	12	3	0	0	0	0	5	0	9	0	0	0	0	0	0	0	1	0	31
14	0	0	40	3	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	51
15	0	1	217	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	218
16	0	0	211	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	212
17	0	0	242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	242
18	0	0	108	1	0	0	0	0	0	1	2	7	0	0	0	0	0	0	0	0	119
19	0	0	235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	235
20	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
21	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
22	0	1	97	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	100

Set	Bluntnose Sixgill Shark	Longnose Skate	Pacific Spiny Dogfish	Spotted Ratfish	Pacific Cod	Pacific Hake	Sablefish	Canary Rockfish	Copper Rockfish	Greenstriped Rockfish	Quillback Rockfish	Yelloweye Rockfish	Pacific Sanddab	Petrale Sole	Pacific Staghorn Sculpin	Oregontriton	Sponges	Starfish	Sunflower Starfish	Inanimate Objects	Total catch
23	0	0	115	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	117
24	0	0	17	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	20
25	0	0	208	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	209
26	0	0	132	2	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	137
27	0	2	207	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	209
28	0	1	45	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	50
29	0	0	222	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	222
30	1	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	209
31	0	0	117	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118
32	0	0	231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	231
33	0	0	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	250
34	1	0	192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	193
35	2	0	206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208
36	0	0	131	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	133
37	0	1	221	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	222
38	0	0	34	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40
39	0	1	211	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	212