

Summary of the 2021 Hard Bottom Longline Inside Surveys in British Columbia

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ABSTRACT

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Hard bottom longline surveys in the inside waters of British Columbia were conducted on the Canadian Coast Guard Ship *Neocaligus* between August 6 to 25 and September 7 to 27, 2021. This survey series was started in 2003 and has alternated between a North and South geographical region annually. As the 2020 survey was cancelled due to COVID-19 pandemic impacts, both regions were surveyed in 2021. Survey objectives were to collect data for fishery-independent abundance indices of rockfish (*Sebastes* genus) species. Information on incidental species caught and oceanographic conditions were also collected.

In 2021, there were a total of 138 blocks successfully fished out of 143 blocks assessed (97%). In the Northern region, a total of 38 species (8 rockfish species) were caught in 67 sets. The most abundant fish species in the north by count was North Pacific Spiny Dogfish (*Squalus suckleyi*) followed by Quillback Rockfish (*Sebastes maliger*), Yelloweye Rockfish (*Sebastes ruberrimus*), and Spotted Ratfish (*Hydrolagus colliei*). In the Southern region, a total of 37 species (6 rockfish species) were caught in 71 sets. The most abundant fish species in the south by count was North Pacific Spiny Dogfish followed by Yelloweye Rockfish, Quillback Rockfish, and Lingcod (*Ophiodon elongatus*).

RÉSUMÉ

Williams, D.C., Haggarty, D. R. 2022. Summary of the 2021 Hard Bottom Longline Inside Surveys in British Columbia. Can. Manuscr. Rep. Fish. Aquat. Sci. 3245: vi + 31 p.

On a effectué des relevés à la palangre de fond dans les eaux intérieures de la Colombie-Britannique à bord du navire de la Garde côtière canadienne *Neocaligus* du 6 au 25 août et du 7 au 27 septembre 2021. Cette série de relevés a commencé en 2003 et on l'a fait alterner chaque année entre une région géographique du Nord et une région géographique du Sud. Le relevé de 2020 ayant été annulé en raison des répercussions de la pandémie de COVID-19, les deux régions ont fait l'objet d'un relevé en 2021. Les objectifs du relevé étaient de recueillir des données pour les indices d'abondance indépendants de la pêche pour les espèces de sébastes (genre *Sebastes*). On a également recueilli des renseignements sur les espèces capturées accidentellement et les conditions océanographiques.

En 2021, un total de 138 blocs ont été pêchés avec succès sur 143 blocs évalués (97 %). Dans la région du Nord, on a capturé un total de 38 espèces (8 espèces de sébastes) dans 67 blocs. L'espèce de poisson la plus abondante dans le Nord était l'aiguillat commun du Pacifique Nord (*Squalus suckleyi*), suivie du sébaste à dos épineux (*Sebastes maliger*), du sébaste aux yeux jaunes (*Sebastes ruberrimus*), et de la chimère d'Amérique (*Hydrolagus colliei*). Dans la région du Sud, on a capturé un total de 37 espèces (6 espèces de sébastes) dans 71 blocs. L'espèce de poisson la plus abondante dans le Sud était l'aiguillat commun du Pacifique Nord, suivie du sébaste aux yeux jaunes, du sébaste à dos épineux et de la morue-lingue (*Ophiodon elongatus*).

INTRODUCTION

In 2003, Fisheries and Oceans Canada (DFO) developed and executed an inaugural fishery-independent survey using longline gear in inside waters of British Columbia to collect data on inshore rockfish species. The first hard bottom longline (HBLL) survey was conducted in the northern inside waters of British Columbia that includes the lower portion of Queen Charlotte Strait, Broughton Archipelago, Johnstone Strait, and the Discovery Islands (Lohead and Yamanaka, 2004). The Inside survey alternates between this northern inside region and a southern inside region, which includes the Strait of Georgia/Salish Sea, Desolation Sound and the southern Gulf Islands (Lohead and Yamanaka, 2007) (Figure 1).

The HBLL Inside surveys target hard bottom habitat that is inaccessible to trawl fishing gear. Data collected on the survey is intended to provide fisheries independent relative abundance indices for Yelloweye Rockfish (*Sebastes ruberrimus*) and Quillback Rockfish (*Sebastes maliger*) in addition to other fish species commonly encountered and/or not well represented in other DFO surveys. The survey data are used to inform management decisions, enable stock monitoring and to conduct population assessments.

This document provides a brief summary of the methods and results from the 2021 surveys, which occurred between August 6 and 25 in the North survey and September 7 to 27 in the South survey. It is not intended as a comprehensive review of the survey, nor does it provide interpretive analysis of the survey results.

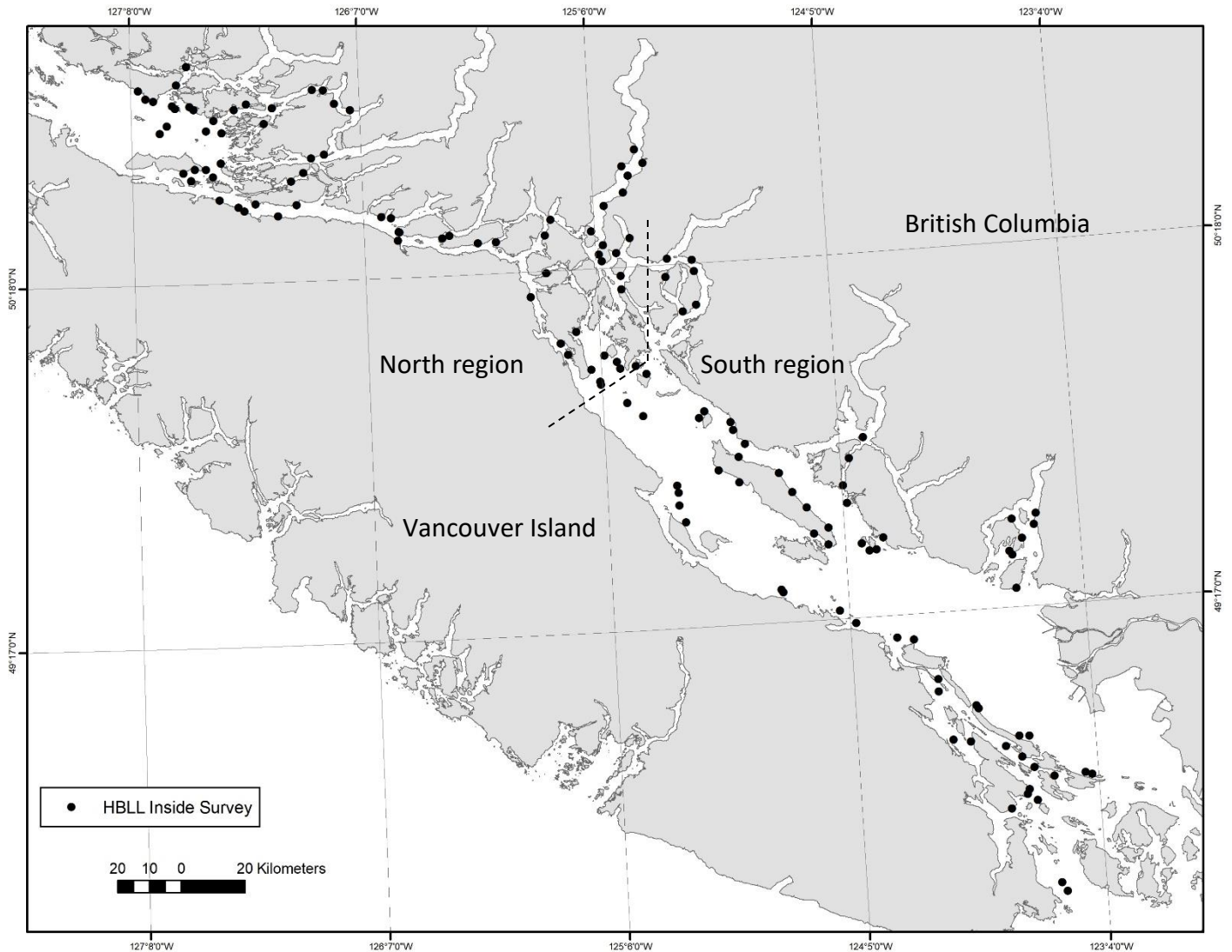


Figure 1. DFO Hard Bottom Longline survey sets for the North and South regions (divided by dashed line) on the inside waters of British Columbia in 2021.

METHODS

SURVEY DETAILS

The survey was conducted aboard the Canadian Coast Guard Ship (CCGS) *Neocaligus*, a 19 m nearshore fisheries research vessel stationed at the Pacific Biological Station in Nanaimo, BC (Figure 2). Each survey region (North and South) was split into two legs of 9 - 10 days in duration with two science staff on each leg due to Covid-19 restrictions on crewing size. Normally the survey would be staffed with three science staff per leg; therefore, there was a reduction in the overall biological sampling that staff could achieve for the 2021 survey year.



Figure 2. The Canadian Coast Guard Ship *Neocaligus* used for the 2021 HBLI Inside surveys (photo credit Fisheries and Oceans Canada).

The Inside HBLI surveys followed a random depth-stratified design. Each survey area was divided into 2 km² blocks where depths between 41- 100 metres existed (Lothead and Yamanaka, 2004). Each block was assigned one of two depth strata based on the average bottom depth in the block. The depth strata were divided into a shallow (41-70 m) and deep (71-100 m) stratum. Hard bottom substrate was targeted in each block within the selected depth stratum.

For each survey in the Inside HBLI series, blocks were randomly selected within each depth strata and assigned to the appropriate Pacific Fishery Management Area (PFMA). For 2021, 70 blocks in the North region (Figure 3 and Table 1) and 70 blocks in the South region (Figure 4 and Table 2) were selected.

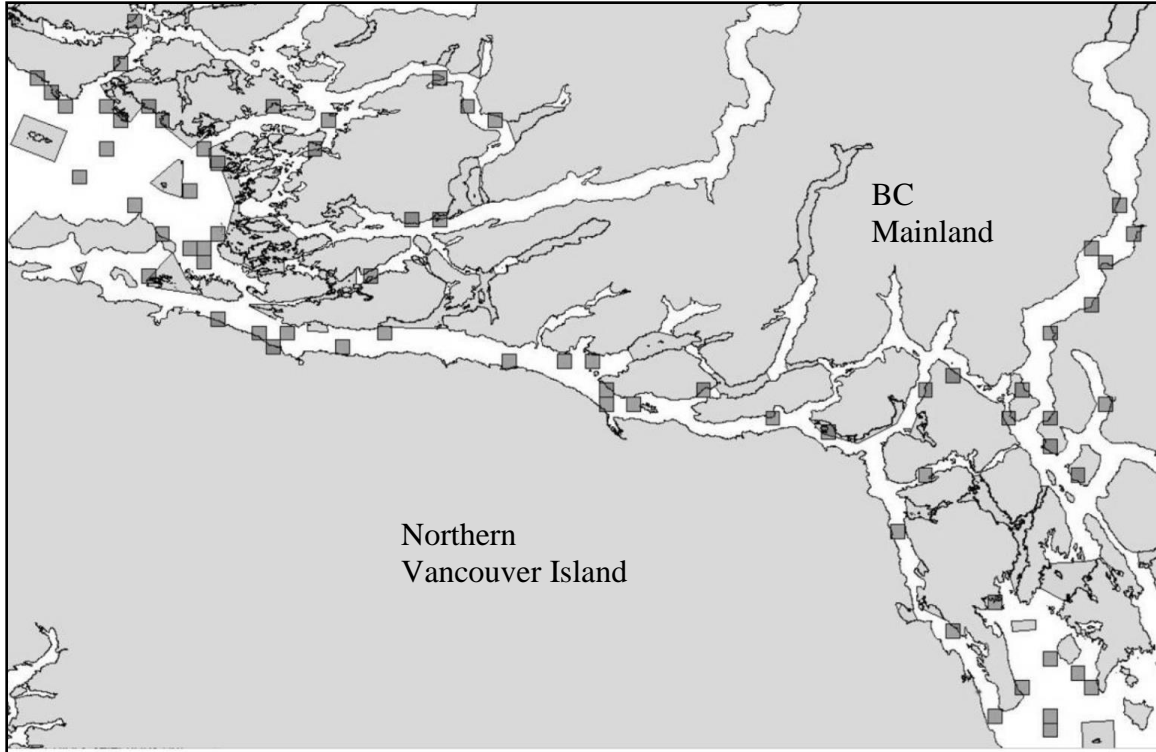


Figure 3. The 2021 HBLI Inside North survey area showing the 70 randomly selected blocks to be fished.

Table 1. Allocation of blocks amongst Pacific Fishery Management Area (PFMA) depth strata for the 2021 HBLI Inside North survey.

Stratum Description	Relative Allocation	2021 allocation
PFMA 12 40-70 m	36.92%	26
PFMA 12 71-100 m	16.92%	12
PFMA 13 40-70 m	29.23%	20
PFMA 13 71-100 m	16.92%	12
Total	100.00%	70

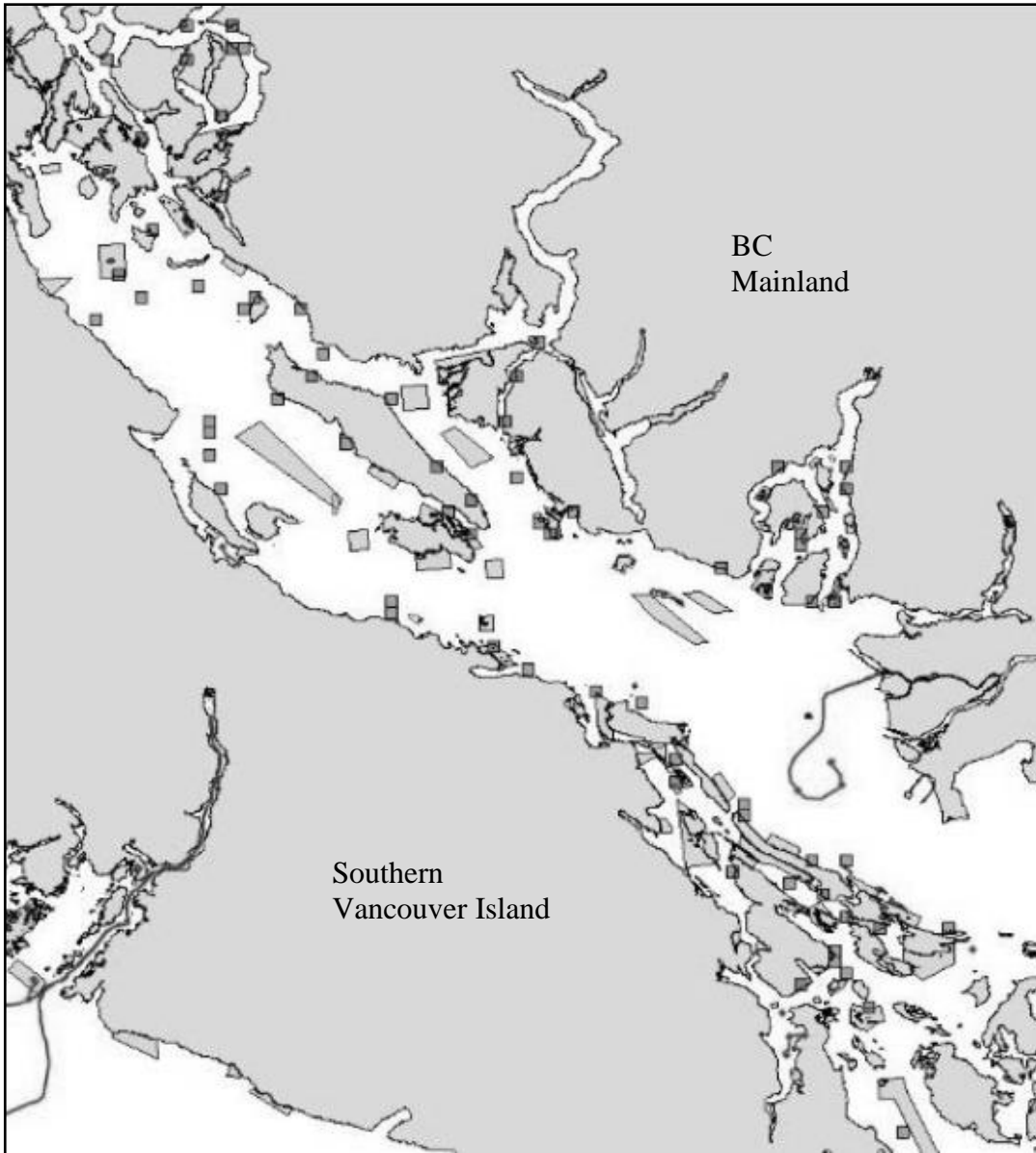


Figure 4. The 2021 HBLI Inside South survey area showing the 70 randomly selected blocks to be fished.

Table 2. Allocation of blocks amongst Pacific Fishery Management Area (PFMA) depth strata for the 2021 HBLI Inside South survey.

Stratum Description	Relative Allocation	2021 allocation
PFMA 14 40-70 m	7.14%	5
PFMA 14 71-100 m	7.14%	5
PFMA 15 40-70 m	11.43%	8
PFMA 15 71-100 m	11.43%	8
PFMA 16 40-70 m	10.00%	7

Table 2 cont.

Stratum Description	Relative Allocation	2021 allocation
PFMA 16 71-100 m	8.57%	6
PFMA 17 40-70 m	8.57%	6
PFMA 17 71-100 m	2.86%	2
PFMA 18 40-70 m	7.14%	5
PFMA 18 71-100 m	4.29%	3
PFMA 19 40-70 m	1.43%	1
PFMA 19 71-100 m	1.43%	1
PFMA 28 40-70 m	5.71%	4
PFMA 28 71-100 m	4.29%	3
PFMA 29 40-70 m	4.29%	3
PFMA 29 71-100 m	4.29%	3
Total	100.00%	70

FISHING DETAILS

Fishing Gear

HBLL gear was longline snap type with size 13/0 Mustad circle hooks and No. 72 stainless snaps on a 250 lb test perlon gangion. The gangions were made from 18 inch pieces of perlon with eyes crimped at each end resulting in approximately 15 inches (38 cm) eye to eye. Each hook was baited with a 30 gram piece of Argentinian squid.

The groundline for each set consisted of three “sections” of 3/8 inch leaded polypropylene (product name Manline). The sections were made from half an 1800 foot standard longline skate. Each section was 900 feet long and had C links at each end (Figure 5). Chain clump anchors weighing 20 kg were placed at each end of the “fishing” portion of the groundline and 2.5 kg lead pyramid sash weights were used periodically to ensure bottom contact was maintained throughout the string.

Star-Oddi Centi model temperature/depth recorders (TDRs) were deployed at the beginning, middle, and end of the fishing portion of the longline.

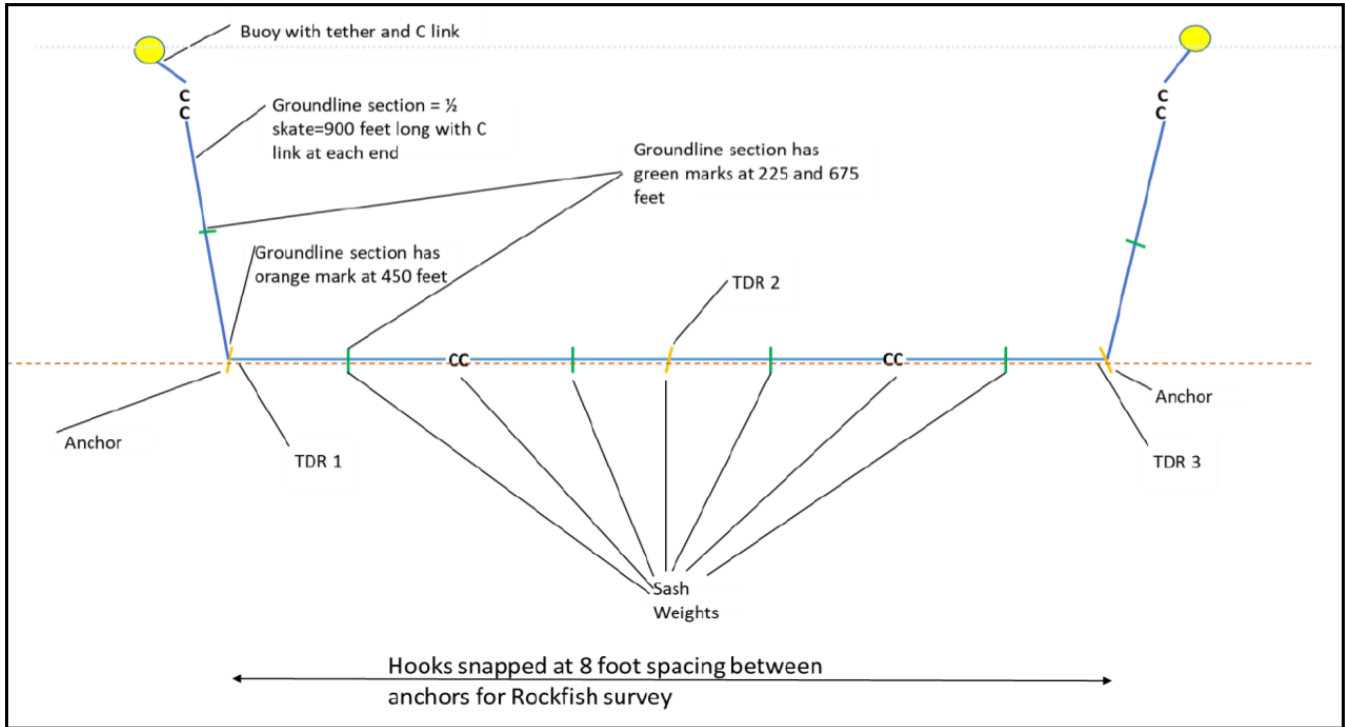


Figure 5. Fishing gear details from 2021 HBLL Inside surveys.

Fishing Protocol

Fishing operations were carried out during daylight hours with the goal of completing 4 sets per day. The gear was set entirely within the assigned depth stratum or changed to the other depth stratum if it was found during the block inspection that the assigned depth stratum was not feasible. If a block was considered completely unfishable due to temporary or permanent issues at that location then an alternate block was selected as close as possible to the original block and in the same depth stratum. Examples of unfishable blocks included presence of underwater hazards as identified by the Fishing Master, presence of other fishing gear in the block or strong currents during planned setting or hauling operations.

Setting the gear consisted of attaching the buoy to a C link on the first section of groundline and running out that section to the halfway point. An anchor was attached here and the gear was held until the start point of the set was reached. The anchor was released at the start point of the set, and then the hooks were snapped to the groundline by hand. The groundline ran through a setting table and one crew person stood on either side of the setting table, alternately snapping hooks on to the groundline spaced approximately 2.44 m (8 feet) apart. A total of 225 hooks were used on each set. The crew also attached sash weights after approximately every 68.58 meters (225 feet) to keep the groundline on the bottom. Once all the hooks were deployed, a second anchor was attached, and the remainder of the groundline was run out. Once the C link was reached, the vessel stopped to relieve tension on the groundline, and the crew attached a buoy to the C-link.

Gear was hauled in the same direction as it was set unless there was a reason to do otherwise such as soak time factors or direction of current during hauling. The target soak time (i.e. total time gear was deployed) was 120 minutes (defined as time between the last anchor deployed and first anchor retrieved). Anchor deployment or retrieval time was based on when it started to descend or ascend from the surface of the water.

The start and end positions, times, bottom depths, direction and speed of vessel, weather, tide, and environmental conditions were recorded for every set. In addition, global positioning system (GPS) coordinates and bottom sounder data were logged continuously from the vessel equipment for the duration of the survey.

Catch Processing

Once the set soaked for the target time of 120 minutes, hauling of the string was initiated in the direction it was set. Generally, retrieval of the first buoy occurred several minutes before the 120 minute soak time in order to ensure the first anchor of the haul came aboard 120 minutes from when the last anchor of the set was released. One member of the science staff recorded each hook condition and catch status as it came over the railing. Ship crew unsnapped hooks from the groundline and placed catch in baskets. Science staff recorded hooks as either empty, baited, or a species present. Biological samples were taken from all rockfish species, Lingcod, and Pacific Cod caught. Other species were sampled when time allowed.

Biological Sampling

Two types of biological sampling were collected. Length samples consisted of individual fish length and sex. Age samples consisted of length, sex, weight, maturity, and age. Generally, all rockfish species caught were treated as age samples.

Rockfish species were weighed to the nearest 0.02 kg using a motion-compensating Marel electronic balance, measured to the nearest 0.5 cm using an electronic Scantrol Fish Measuring Board, and otoliths were collected from each fish to determine age. A stomach content analysis was conducted and presence/ absence of *Sarcotases* parasites were also recorded for each specimen. DNA samples were collected from some species for further analysis. North Pacific Spiny Dogfish were measured and released, usually as they were unhooked from the line. Lingcod were measured, weighed and a fin sample consisting of rays 4-8 of the second dorsal fin were collected to determine age. Other species were recorded as present if encountered and measured/ weighed when time permitted. All age structures collected on this survey were submitted to the Sclerochronology Lab located at the Pacific Biological Station in Nanaimo, BC for storage and analysis.

Survey Sensors and Data Recorders

There were three Star-Oddi Centi temperature-depth recorders (TDRs) deployed with the fishing gear on as many sets as possible. One sensor was placed after the first anchor, the second at the mid-way point of the groundline, and the third before the second anchor.

A Seabird SBE19plus recorder (CTD) was used for a vertical cast at each fished block when time allowed. The SBE19plus recorded conductivity, temperature and pressure (depth) data. Each deployment consisted of a single vertical cast as close to the bottom as possible. The CTD was attached to a piece of groundline marked at 10 meter intervals and set from the groundline drum. The CTD was held at the surface for three minutes to allow the pump to flush the sensors, then lowered to near (<10 m) the bottom and retrieved.

Data Recording

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

All the data from the survey were archived in an enterprise database called “GFBio”, the Groundfish Biological Samples database maintained by the Groundfish Data Unit (Fisheries and Oceans Canada, Science Branch, Pacific Region) at the Pacific Biological Station in Nanaimo, BC.

Data generated from this survey were made available for download on Open Government and Ocean Biodiversity Information System (OBIS) at the following links:

<https://open.canada.ca/data/en/dataset/945e0f13-119b-451b-9038-50c6eb641aef>

<https://obis.org/dataset/d6dc7351-aae6-4ed1-8f75-5b81e356408a>

<https://obis.org/dataset/6a884ad0-9874-40bc-a6b6-f1e3eaf22e63>

RESULTS

FISHING

In the 2021 HBLL Inside North survey, a total of 67 blocks were successfully fished over the 18 days that fishing was conducted. A further 5 blocks were not fished or considered unusable. Complete information for each set in the north including date, soak time, start and end location, minimum, maximum and average depth, hooks fished, and usability is presented in Appendix A.

In the 2021 HBLL Inside South survey, a total of 71 blocks were successfully fished over the 19 days that fishing was conducted as presented in Appendix B.

During the 2021 HBLL Inside North survey, a total of 33 different species of fish and invertebrates were caught with the frequency of occurrence of each species by set shown in Appendix C.

During the 2021 HBLL Inside South survey, a total of 37 different species of fish and invertebrates were caught with the frequency of occurrence of each species by set shown in Appendix D.

BIOLOGICAL SAMPLES AND SPECIMENS

In the 2021 HBLL Inside North survey, there were a total of eight rockfish species and 14 other fish species caught as shown in Table 3 and Table 5. The most commonly encountered rockfish species were Quillback Rockfish (518 fish present in 58 sets) followed by Yelloweye Rockfish (214 fish in 34 sets). The most common other species encountered was North Pacific Spiny Dogfish (2,287 fish in 52 sets). Biological samples were collected from a total of 3,335 individual specimens of 22 fish species. The number of samples and recorded biological attributes per species is shown in Table 3. A summary of the biological data collected for each species is shown in Table 5.

In the 2021 HBLL Inside South survey, there were a total of six rockfish species and 21 other fish species caught as shown in Table 4 and Table 6. The most commonly encountered rockfish species were Yelloweye Rockfish (290 fish in 41 sets) followed by Quillback Rockfish (260 fish present in 48 sets). The other most commonly encountered species was North Pacific Spiny Dogfish (1,735 fish in 59 sets). Biological samples were collected from a total of 2,510 individual specimens of 21 fish species. The number of samples and recorded biological attributes per species is shown in Table 5. A summary of the biological data collected for each species is shown in Table 6.

Table 3. Number of biological samples and individuals examined by species collected on the 2021 HBLL Inside North survey.

Common Name	Scientific Name	Number of Samples	Length (mm)	Weight (g)	Sex	Age	Maturities
Quillback Rockfish	<i>Sebastes maliger</i>	58	516	516	517	432	487
North Pacific Spiny Dogfish	<i>Squalus suckleyi</i>	52	2287	0	2286	0	0
Yelloweye Rockfish	<i>Sebastes ruberrimus</i>	34	214	214	214	214	214
Spotted Ratfish	<i>Hydrolagus colliei</i>	28	60	59	61	0	0
Lingcod	<i>Ophiodon elongatus</i>	22	36	36	36	45	36
Longnose Skate	<i>Raja rhina</i>	18	31	31	31	0	0
Pacific Cod	<i>Gadus macrocephalus</i>	11	38	38	38	0	0
Sablefish	<i>Anoplopoma fimbria</i>	10	42	42	34	14	14
Copper Rockfish	<i>Sebastes caurinus</i>	8	19	19	19	19	19
Pacific Halibut	<i>Hippoglossus stenolepis</i>	7	16	5	1	0	0
Canary Rockfish	<i>Sebastes pinniger</i>	7	14	14	14	0	0
Greenstriped Rockfish	<i>Sebastes elongatus</i>	7	12	12	12	0	0
Yellowtail Rockfish	<i>Sebastes flavidus</i>	4	4	4	4	0	0
Red Irish Lord	<i>Hemilepidotus hemilepidotus</i>	2	27	27	0	0	0
Pacific Sanddab	<i>Citharichthys sordidus</i>	2	3	3	3	0	0
Big Skate	<i>Beringraja binoculata</i>	2	2	0	2	0	0
Kelp Greenling	<i>Hexagrammos decagrammus</i>	2	2	2	2	0	0
Silvergray Rockfish	<i>Sebastes brevispinis</i>	2	2	2	2	0	0
Cabezon	<i>Scorpaenichthys marmoratus</i>	1	2	2	0	0	0
Threadfin Sculpin	<i>Icelinus filamentosus</i>	1	1	1	0	0	0
Southern Rock Sole	<i>Lepidopsetta bilineata</i>	1	1	1	1	0	0
Tiger Rockfish	<i>Sebastes nigrocinctus</i>	1	1	1	1	1	1

Table 4. Number of biological samples and individuals examined by species collected on the 2021 HBLL Inside South survey.

Common Name	Scientific Name	Number of Samples	Length (mm)	Weight (g)	Sex	Age	Maturities
North Pacific Spiny Dogfish	<i>Squalus suckleyi</i>	59	1735	1735	0	0	0
Quillback Rockfish	<i>Sebastes maliger</i>	48	260	259	259	260	260
Yelloweye Rockfish	<i>Sebastes ruberrimus</i>	41	289	290	290	292	290
Lingcod	<i>Ophiodon elongatus</i>	21	39	39	39	44	39
Longnose Skate	<i>Raja rhina</i>	18	38	38	38	0	0
Pacific Sanddab	<i>Citharichthys sordidus</i>	15	32	32	32	0	0
Copper Rockfish	<i>Sebastes caurinus</i>	12	37	37	37	37	37
Greenstriped Rockfish	<i>Sebastes elongatus</i>	8	9	9	9	0	0
Spotted Ratfish	<i>Hydrolagus colliei</i>	7	16	16	15	0	0
Big Skate	<i>Beringraja binoculata</i>	6	7	7	6	0	0
Southern Rock Sole	<i>Lepidopsetta bilineata</i>	6	7	7	7	0	0
Canary Rockfish	<i>Sebastes pinniger</i>	5	7	7	7	0	0
Pacific Cod	<i>Gadus macrocephalus</i>	3	17	17	17	0	0
Cabezon	<i>Scorpaenichthys marmoratus</i>	2	0	4	4	0	0
Red Irish Lord	<i>Hemilepidotus hemilepidotus</i>	1	0	1	1	0	0
Kelp Greenling	<i>Hexagrammos decagrammus</i>	1	2	2	2	0	0
Flathead Sole	<i>Hippoglossoides elassodon</i>	1	1	1	1	0	0
Pacific Halibut	<i>Hippoglossus stenolepis</i>	1	1	1	0	0	0
Pacific Staghorn Sculpin	<i>Leptocottus armatus</i>	1	0	1	1	0	0
Great Sculpin	<i>Myoxocephalus polyacanthocephalus</i>	1	0	2	2	0	0
Tiger Rockfish	<i>Sebastes nigrocinctus</i>	1	1	1	1	1	1

Table 5. Number of specimens by species collected on the 2021 HBLI Inside North survey and associated attributes. (–) indicates no data collected.

Common Name	Number of Specimens	Min (mm)	Length Max (mm)	Ave. (mm)	Min (g)	Weight Max (g)	Ave (g)	Female Ratio
N. Pacific Spiny Dogfish	2287	415	1065	752	-	-	-	0.56
Quillback Rockfish	518	240	435	350	268	1704	833	0.46
Yelloweye Rockfish	214	285	730	460	382	6940	1933	0.50
Spotted Ratfish	63	315	555	441	322	1490	959	0.90
Sablefish	42	355	480	421	360	1008	647	0.56
Pacific Cod	38	330	605	450	368	2252	943	0.55
Lingcod	36	545	1030	780	1328	12860	5059	0.83
Longnose Skate	31	545	990	774	870	6235	2927	0.39
Red Irish Lord	27	240	380	322	210	958	528	-
Copper Rockfish	19	345	490	427	742	2045	1476	0.47
Pacific Halibut	16	640	900	773	4228	9175	6130	1.00
Canary Rockfish	14	310	555	492	535	2856	1989	0.57
Greenstriped Rockfish	12	270	360	310	244	618	402	0.83
Yellowtail Rockfish	4	275	450	338	284	1272	604	0.50
Pacific Sanddab	3	265	320	298	192	386	311	1.00
Big Skate	2	1200	1450	1325	-	-	-	0.50
Kelp Greenling	2	390	425	408	770	1120	945	0.50
Cabezon	2	505	575	540	2010	3380	2695	-
Silvergray Rockfish	2	350	525	438	576	1814	1195	0.00
Threadfin Sculpin	1	280	280	280	262	262	262	-
Southern Rock Sole	1	375	375	375	662	662	662	1.00
Tiger Rockfish	1	350	350	350	762	762	762	0.00

Table 6. Number of specimens by species collected on the 2021 HBLI Inside South survey and associated attributes. (–) indicates no data collected.

Common Name	Number of Specimens	Min (mm)	Length Max (mm)	Ave. (mm)	Min (g)	Weight Max (g)	Ave (g)	Female Ratio
N. Pacific Spiny Dogfish	1735	555	1190	854	-	-	-	0.66
Yelloweye Rockfish	292	250	640	432	274	5122	1655	0.49
Quillback Rockfish	260	250	410	352	290	1504	878	0.43
Lingcod	39	435	950	706	628	9390	3814	0.87
Longnose Skate	38	525	905	755	734	4854	2641	0.55
Copper Rockfish	37	280	500	441	400	2430	1718	0.35
Pacific Sanddab	32	235	365	307	130	588	343	0.97
Pacific Cod	17	420	670	586	790	3085	2011	0.94
Spotted Ratfish	16	325	455	396	348	916	679	0.69
Greenstriped Rockfish	10	195	325	280	186	496	346	1.00
Big Skate	7	670	1430	936	2300	10900	4888	0.57
Canary Rockfish	7	355	410	381	740	1290	943	0.57
Southern Rock Sole	7	350	405	379	564	888	708	1.00
Cabezon	4	540	650	598	3030	5204	4064	-
Kelp Greenling	2	405	445	425	852	1260	1056	1.00
Great Sculpin	2	315	340	328	432	536	484	-
Tiger Rockfish	1	320	320	320	666	666	666	0.00
Red Irish Lord	1	265	265	265	270	270	270	-
Pacific Staghorn Sculpin	1	350	350	350	626	626	626	-
Flathead Sole	1	315	315	315	282	282	282	1.00
Pacific Halibut	1	890	890	890	-	-	-	-

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APPENDIX A: 2021 HBLI INSIDE NORTH SURVEY BRIDGE LOG

Set	Date	Soak Time (min)	Start (°)		End (°)		Depth (m)			Hooks Fished	Useable Set
			Lat (N)	Long (W)	Lat (N)	Long (W)	Start	End	Ave		
1	8/7/2021	120	50.128	125.206	50.126	125.195	59	71	58	223	Yes
2	8/7/2021	120	50.035	125.031	50.041	125.028	66	60	66	226	Yes
3	8/7/2021	119	50.015	125.017	50.022	125.016	49	47	46	226	Yes
4	8/8/2021	120	50.342	125.004	50.341	125.012	85	85	85	227	Yes
5	8/8/2021	120	50.377	124.943	50.383	124.946	66	61	62	228	Yes
6	8/8/2021	121	50.318	125.069	50.322	125.075	84	96	61	227	Yes
7	8/8/2021	120	50.338	125.082	50.342	125.087	60	68	55	226	Yes
8	8/9/2021	121	50.362	125.068	50.367	125.061	67	58	92	227	Yes
9	8/9/2021	120	50.408	125.113	50.402	125.113	78	56	58	225	Yes
10	8/9/2021	121	50.472	125.051	50.476	125.053	60	54	61	226	Yes
11	8/9/2021	122	50.511	124.961	50.507	124.967	58	51	59	224	Yes
12	8/10/2021	120	50.555	124.942	50.555	124.934	45	76	53	228	Yes
13	8/10/2021	120	50.583	124.961	50.580	124.967	61	93	79	229	Yes
14	8/10/2021	119	50.585	124.871	50.591	124.869	29	72	48	226	Yes
15	8/10/2021	120	50.624	124.906	50.629	124.903	45	48	54	223	Yes
16	8/11/2021	120	50.441	125.294	50.444	125.287	66	95	83	221	Yes
17	8/11/2021	119	50.398	125.321	50.403	125.316	68	54	52	224	Yes
18	8/12/2021	22	50.426	125.959	50.431	125.964	92	76	89	0	No
19	8/12/2021	119	50.467	125.989	50.469	125.998	74	83	85	225	Yes
20	8/12/2021	120	50.472	126.030	50.472	126.041	65	63	59	227	Yes
21	8/12/2021	118	50.425	125.956	50.429	125.962	68	70	74	223	Yes
22	8/12/2021	1020	50.402	125.963	50.407	125.971	64	78	66	225	No
23	8/13/2021	123	50.516	126.405	50.513	126.415	44	73	59	228	Yes
24	8/13/2021	121	50.483	126.488	50.485	126.497	94	79	77	225	Yes
25	8/13/2021	118	50.519	126.588	50.522	126.595	70	39	67	223	Yes
26	8/13/2021	118	50.502	126.644	50.500	126.637	41	45	53	218	Yes
27	8/14/2021	120	50.533	126.745	50.535	126.754	53	49	57	226	Yes
28	8/14/2021	119	50.511	126.662	50.513	126.671	58	52	56	225	Yes
29	8/14/2021	120	50.600	126.780	50.598	126.772	84	95	76	223	Yes
30	8/14/2021	122	50.635	126.736	50.639	126.741	48	49	47	227	Yes
31	8/14/2021	103	50.618	126.804	50.624	126.806	68	95	88	220	Yes
32	8/15/2021	120	50.722	126.727	50.722	126.737	46	78	74	223	Yes
33	8/15/2021	119	50.725	126.802	50.731	126.801	69	86	86	217	Yes
34	8/15/2021	120	50.757	126.761	50.756	126.771	91	61	53	224	Yes
35	8/15/2021	120	50.787	126.852	50.791	126.855	52	79	53	225	Yes
36	8/15/2021	120	50.796	126.868	50.799	126.875	77	43	56	225	Yes
37	8/16/2021	119	50.619	126.852	50.624	126.857	58	57	57	224	Yes
38	8/16/2021	120	50.615	126.907	50.608	126.904	46	61	59	224	Yes
39	8/16/2021	119	50.591	126.877	50.592	126.868	79	54	55	228	Yes
40	8/17/2021	119	50.580	126.434	50.581	126.424	48	49	55	220	Yes

Set	Date	Soak Time (min)	Start (°)		End (°)		Depth (m)			Hooks Fished	Useable Set
			Lat (N)	Long (W)	Lat (N)	Long (W)	Start	End	Ave		
41	8/17/2021	123	50.605	126.370	50.602	126.378	73	95	86	224	Yes
42	8/17/2021	119	50.644	126.333	50.644	126.341	80	88	84	227	Yes
43	8/17/2021	122	50.654	126.277	50.650	126.282	76	61	74	225	No
44	8/18/2021	119	50.773	126.153	50.775	126.160	105	73	87	225	Yes
45	8/18/2021	119	50.797	126.227	50.790	126.228	63	67	59	225	Yes
46	8/18/2021	119	50.833	126.278	50.830	126.269	39	73	50	225	Yes
47	8/18/2021	119	50.833	126.319	50.835	126.329	65	113	58	225	Yes
48	8/19/2021	119	50.743	126.547	50.744	126.539	72	49	52	224	Yes
49	8/19/2021	119	50.785	126.507	50.789	126.502	62	63	60	225	Yes
50	8/19/2021	120	50.802	126.616	50.798	126.622	57	54	62	227	Yes
51	8/19/2021	138	50.784	126.670	50.786	126.679	124	73	74	224	Yes
52	8/20/2021	120	50.912	126.881	50.907	126.882	67	58	50	227	Yes
53	8/20/2021	120	50.861	126.926	50.857	126.932	48	89	54	225	Yes
54	8/20/2021	119	50.813	127.029	50.816	127.037	52	49	58	225	Yes
55	8/20/2021	119	50.844	127.095	50.846	127.102	89	96	100	223	Yes
56	8/20/2021	118	50.820	127.064	50.824	127.071	57	54	58	225	Yes
57	8/21/2021	119	50.724	127.003	50.727	127.011	80	88	83	225	Yes
58	8/21/2021	120	50.747	126.975	50.742	126.974	125	129	107	225	Yes
59	8/21/2021	120	50.794	126.940	50.792	126.933	52	55	61	225	Yes
60	8/21/2021	120	50.803	126.952	50.799	126.947	98	89	88	224	Yes
61	8/22/2021	119	50.412	125.736	50.412	125.743	90	85	85	225	Yes
62	8/22/2021	120	50.406	125.766	50.405	125.774	83	89	89	225	Yes
63	8/22/2021	120	50.384	125.615	50.389	125.616	64	47	51	224	Yes
64	8/22/2021	119	50.388	125.539	50.388	125.529	68	49	57	224	Yes
65	8/23/2021	120	50.297	125.316	50.292	125.323	69	86	81	225	Yes
66	8/23/2021	120	50.227	125.391	50.233	125.395	71	75	67	225	Yes
67	8/23/2021	117	50.094	125.270	50.100	125.273	50	47	50	0	No
68	8/23/2021	2	50.067	125.243	50.062	125.240	71	78	79	0	No
69	8/24/2021	121	49.976	125.100	49.976	125.109	95	92	90	226	Yes
70	8/24/2021	119	49.988	125.107	49.982	125.105	60	64	63	224	Yes
71	8/24/2021	119	50.022	125.145	50.017	125.141	87	49	56	222	Yes
72	8/24/2021	125	50.055	125.083	50.060	125.083	82	88	79	223	Yes

APPENDIX B: 2021 HBLI INSIDE SOUTH SURVEY BRIDGE LOG

Set	Date	Soak Time (min)	Start (°)		End (°)		Depth (m)			Hooks Fished	Useable Set
			Lat (N)	Long (W)	Lat (N)	Long (W)	Start	End	Ave		
1	9/8/2021	119	49.339	123.355	49.335	123.362	80	74	66	225	Yes
2	9/8/2021	117	49.438	123.377	49.443	123.374	99	91	93	229	Yes
3	9/8/2021	118	49.430	123.361	49.429	123.369	64	45	61	227	Yes
4	9/9/2021	118	49.532	123.359	49.527	123.354	81	70	83	225	Yes
5	9/9/2021	118	49.477	123.319	49.472	123.316	52	83	59	226	Yes
6	9/9/2021	118	49.543	123.248	49.539	123.252	80	50	56	225	Yes
7	9/9/2021	117	49.512	123.264	49.508	123.262	101	101	91	225	Yes
8	9/10/2021	119	49.506	123.917	49.500	123.916	61	53	60	225	Yes
9	9/10/2021	120	49.473	123.950	49.469	123.946	50	79	56	225	Yes
10	9/10/2021	121	49.471	123.983	49.468	123.975	64	50	59	225	Yes
11	9/10/2021	120	49.492	124.014	49.490	124.007	74	46	60	226	Yes
12	9/11/2021	121	49.603	124.061	49.608	124.065	81	92	80	225	Yes
13	9/11/2021	119	49.653	124.076	49.658	124.076	72	61	59	225	Yes
14	9/11/2021	120	49.728	124.044	49.733	124.042	71	81	93	224	Yes
15	9/11/2021	121	49.789	123.979	49.785	123.974	96	40	60	225	Yes
16	9/12/2021	120	49.539	124.148	49.542	124.153	84	46	57	225	Yes
17	9/12/2021	120	49.603	124.242	49.598	124.237	90	77	85	225	Yes
18	9/12/2021	120	49.648	124.300	49.644	124.295	69	45	52	227	Yes
19	9/12/2021	119	49.704	124.353	49.699	124.349	103	84	87	225	Yes
20	9/13/2021	121	49.788	124.487	49.790	124.494	93	61	84	223	Yes
21	9/13/2021	120	49.754	124.525	49.752	124.518	64	70	53	224	Yes
22	9/13/2021	121	49.826	124.538	49.831	124.539	94	87	89	225	Yes
23	9/13/2021	121	49.850	124.545	49.853	124.552	48	66	56	225	Yes
24	9/14/2021	120	50.167	124.731	50.170	124.726	89	72	90	224	Yes
25	9/14/2021	121	50.187	124.666	50.183	124.671	63	51	50	227	Yes
26	9/14/2021	121	50.280	124.673	50.278	124.667	99	72	82	226	Yes
27	9/14/2021	120	50.310	124.672	50.311	124.680	91	76	63	225	Yes
28	9/15/2021	121	50.240	124.997	50.237	124.990	85	53	83	226	Yes
29	9/15/2021	121	50.279	124.991	50.274	124.995	59	104	72	224	Yes
30	9/15/2021	120	50.315	124.787	50.320	124.786	82	89	88	225	Yes
31	9/15/2021	120	50.269	124.796	50.265	124.799	73	42	53	227	Yes
32	9/16/2021	120	50.002	124.905	49.997	124.900	75	59	56	225	Yes
33	9/16/2021	120	50.025	124.950	50.022	124.947	76	100	88	225	Yes
34	9/16/2021	121	49.924	124.996	49.919	124.991	68	44	55	224	Yes
35	9/16/2021	121	49.881	124.930	49.883	124.923	98	81	82	226	Yes
36	9/18/2021	120	49.630	124.793	49.625	124.789	63	60	64	231	Yes
37	9/18/2021	119	49.582	124.769	49.578	124.762	47	53	51	227	Yes
38	9/18/2021	120	49.660	124.789	49.665	124.794	86	77	81	224	Yes
39	9/18/2021	119	49.680	124.795	49.685	124.797	82	84	83	225	Yes
40	9/19/2021	120	49.888	124.658	49.884	124.662	70	65	61	223	Yes

Set	Date	Soak Time (min)	Start (°)		End (°)		Depth (m)			Hooks Fished	Useable Set
			Lat (N)	Long (W)	Lat (N)	Long (W)	Start	End	Ave		
41	9/19/2021	120	49.866	124.687	49.870	124.682	88	67	82	224	Yes
42	9/19/2021	119	49.718	124.608	49.719	124.617	76	94	87	226	Yes
43	9/19/2021	119	49.680	124.523	49.684	124.526	88	80	83	225	Yes
44	9/20/2021	120	49.528	124.219	49.527	124.211	93	67	84	225	Yes
45	9/20/2021	118	49.495	124.159	49.493	124.152	64	53	60	224	Yes
46	9/20/2021	119	49.376	124.367	49.377	124.375	64	59	62	225	Yes
47	9/20/2021	120	49.367	124.358	49.369	124.366	58	64	60	225	Yes
48	9/21/2021	123	49.019	123.569	49.016	123.563	65	70	63	223	Yes
49	9/21/2021	121	49.006	123.555	49.011	123.559	46	65	56	224	Yes
50	9/21/2021	120	48.923	123.389	48.927	123.396	42	65	57	225	Yes
51	9/21/2021	119	48.921	123.346	48.924	123.353	86	82	85	223	Yes
52	9/22/2021	121	48.777	123.365	48.771	123.364	53	52	49	224	Yes
53	9/22/2021	120	48.762	123.372	48.758	123.377	53	62	57	226	Yes
54	9/22/2021	117	48.864	123.382	48.867	123.389	47	50	42	226	Yes
55	9/22/2021	119	48.897	123.448	48.899	123.455	61	52	60	227	Yes
56	9/23/2021	120	48.837	123.339	48.832	123.335	97	94	98	225	Yes
57	9/23/2021	120	48.808	123.256	48.804	123.254	54	76	59	224	Yes
58	9/23/2021	120	48.811	123.125	48.808	123.117	102	76	86	225	Yes
59	9/23/2021	120	48.804	123.098	48.803	123.090	96	84	87	226	Yes
60	9/24/2021	120	48.505	123.255	48.510	123.258	55	54	57	225	Yes
61	9/24/2021	119	48.486	123.234	48.480	123.235	92	79	85	226	Yes
62	9/24/2021	121	48.744	123.336	48.739	123.331	61	49	56	224	Yes
63	9/24/2021	119	48.725	123.442	48.723	123.450	65	96	88	224	Yes
64	9/25/2021	118	49.213	123.818	49.214	123.810	70	53	64	225	Yes
65	9/25/2021	122	49.219	123.885	49.224	123.886	47	85	64	226	Yes
66	9/25/2021	120	49.270	124.061	49.270	124.053	63	63	51	227	Yes
67	9/25/2021	119	49.309	124.126	49.306	124.122	48	69	50	224	Yes
68	9/26/2021	120	49.100	123.724	49.096	123.719	47	50	46	224	Yes
69	9/26/2021	119	49.066	123.720	49.063	123.726	61	64	61	225	Yes
70	9/26/2021	119	48.920	123.603	48.916	123.598	70	44	46	226	Yes
71	9/26/2021	119	48.929	123.678	48.925	123.672	43	34	42	224	Yes

APPENDIX C: 2021 HBLL INSIDE NORTH CATCH NUMBERS BY SET

Common Name	Scientific Name	1	2	3	4	5	6	7	8
Silvergray Rockfish	<i>Sebastes brevispinis</i>								
Copper Rockfish	<i>Sebastes caurinus</i>		3	3					
Greenstriped Rockfish	<i>Sebastes elongatus</i>								1
Yellowtail Rockfish	<i>Sebastes flavidus</i>								
Quillback Rockfish	<i>Sebastes maliger</i>	4	3	12	1			5	7
Tiger Rockfish	<i>Sebastes nigrocinctus</i>								
Canary Rockfish	<i>Sebastes pinniger</i>					2			
Yelloweye Rockfish	<i>Sebastes ruberrimus</i>	10	3	4	3		10	19	43
North Pacific Spiny Dogfish	<i>Squalus suckleyi</i>	143	163	20	144	5			14
Sablefish	<i>Anoplopoma fimbria</i>								
Starfish	<i>Asteroidea spp.</i>								
Sea Whip	<i>Balticina septentrionalis</i>	4							
Big Skate	<i>Beringraja binoculata</i>								
Red Rock Crab	<i>Cancer productus</i>					2			
Inshore Tanner Crab	<i>Chionoecetes bairdi</i>								
Pacific Sanddab	<i>Citharichthys sordidus</i>								
-	<i>Crossaster spp.</i>								
Leather Star	<i>Dermasterias imbricata</i>								
Giant Pacific Octopus	<i>Enteroctopus dofleini</i>								
Mottled Star	<i>Evasterias troschelii</i>								
Pacific Cod	<i>Gadus macrocephalus</i>								
Red Irish Lord	<i>Hemilepidotus hemilepidotus</i>								
Kelp Greenling	<i>Hexagrammos decagrammus</i>								
Pacific Halibut	<i>Hippoglossus stenolepis</i>								
Spotted Ratfish	<i>Hydrolagus colliei</i>				1				
Threadfin Sculpin	<i>Icelinus filamentosus</i>								
Southern Rock Sole	<i>Lepidopsetta bilineata</i>	1							
-	<i>Metridium spp.</i>								
Great Sculpin	<i>Myoxocephalus polyacanthocephalus</i>								
Lingcod	<i>Ophiodon elongatus</i>					1		3	
-	<i>Phyllochaetopterus spp.</i>								
Sponges	<i>Porifera spp.</i>						1		2
-	<i>Pycnopodia spp.</i>								
Sunflower Starfish	<i>Pycnopodia helianthoides</i>		1						
Longnose Skate	<i>Raja rhina</i>	1	1	3		1	1		
Cabezon	<i>Scorpaenichthys marmoratus</i>			2					
-	<i>Solaster spp.</i>								
Fish-Eating Star	<i>Stylasterias forreri</i>								1

Appendix C cont.

Common Name	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Silvergray Rockfish															
Copper Rockfish									1						
Greenstriped Rockfish					1										
Yellowtail Rockfish															
Quillback Rockfish	12	5	8	5	8	3	1	28	3		1	1	3	17	
Tiger Rockfish															
Canary Rockfish					3		2	3							
Yelloweye Rockfish	4	5	9	5	12	1	3	9							
N. P. Spiny Dogfish	1	49		14		6	10	18	2		74	2	1	38	1
Sablefish															
Starfish															
Sea Whip															
Big Skate											1				
Red Rock Crab															
Inshore Tanner Crab															
Pacific Sanddab															
<i>Crossaster</i> spp.															
Leather Star															
Giant Pacific Octopus															
Mottled Star															
Pacific Cod															1
Red Irish Lord															2
Kelp Greenling															
Pacific Halibut												1			
Spotted Ratfish								1				2	4	7	5
Threadfin Sculpin															
Southern Rock Sole															
<i>Metridium</i> spp.															
Great Sculpin															
Lingcod	1	1	2	2			5					1	1	9	
<i>Phyllochaetopterus</i> spp.	3														
Sponges	2	2	3	1	2	2		2	1						
<i>Pycnopodia</i> spp.															
Sunflower Starfish	1	1													
Longnose Skate			1		1						1	2			
Cabezon															
<i>Solaster</i> spp.															
Fish-Eating Star		1		3											

Appendix C cont.

Common Name	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Silvergray Rockfish	1														
Copper Rockfish				1											
Greenstriped Rockfish		2			3										
Yellowtail Rockfish						1							1		
Quillback Rockfish	8	13	2	8	5	23	1		5	34	8	24	20	3	
Tiger Rockfish															
Canary Rockfish					1										
Yelloweye Rockfish	1	6			1					3			3		
N. P. Spiny Dogfish	48		152	22	23	14	3		25	9		4	5	29	58
Sablefish						1		14	2	1			1	2	3
Starfish												1			
Sea Whip															
Big Skate									1				1		
Red Rock Crab														1	1
Inshore Tanner Crab															
Pacific Sanddab															
<i>Crossaster</i> spp.														1	
Leather Star															
Giant Pacific Octopus															
Mottled Star															
Pacific Cod		1				3	1	8	9	1		1		3	9
Red Irish Lord							1	26							
Kelp Greenling											1			1	
Pacific Halibut							6		3			2	2	3	1
Spotted Ratfish	1	1		2	14	1	1	1	2	1	1			5	
Threadfin Sculpin															
Southern Rock Sole															
<i>Metridium</i> spp.												2			
Great Sculpin															
Lingcod	2	2			4		1							3	
<i>Phyllochaetopterus</i> spp.															
Sponges	1			1										1	
<i>Pycnopodia</i> spp.															
Sunflower Starfish				1											
Longnose Skate									2	2			1	2	1
Cabezon															
<i>Solaster</i> spp.						1							1		
Fish-Eating Star															

Appendix C cont.

Common Name	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
Silvergray Rockfish															
Copper Rockfish															
Greenstriped Rockfish															
Yellowtail Rockfish										1					1
Quillback Rockfish	2			13	10	18	26	5	2	9	5	1	3	8	1
Tiger Rockfish															
Canary Rockfish						2									
Yelloweye Rockfish					8	3	3			3	7	3		9	1
N. P. Spiny Dogfish	3		90		9							2		42	2
Sablefish															
Starfish															
Sea Whip							1								
Big Skate															
Red Rock Crab		1									1		2		
Inshore Tanner Crab		1													
Pacific Sanddab												2			1
<i>Crossaster</i> spp.															
Leather Star															
Giant Pacific Octopus															
Mottled Star								1					1		1
Pacific Cod															
Red Irish Lord		1	1												
Kelp Greenling															
Pacific Halibut															
Spotted Ratfish	1				1		1			1		1	2		
Threadfin Sculpin															
Southern Rock Sole										1					
<i>Metridium</i> spp.								2							1
Great Sculpin		1													
Lingcod	1	1					2	2	1		2				
<i>Phyllochaetopterus</i> spp.															
Sponges									2		1				
<i>Pycnopodia</i> spp.															
Sunflower Starfish															
Longnose Skate	1														
Cabezon															
<i>Solaster</i> spp.															
Fish-Eating Star															

Appendix C cont.

Common Name	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
Silvergray Rockfish			1												
Copper Rockfish									1		2				
Greenstriped Rockfish				3		1								1	
Yellowtail Rockfish							1								
Quillback Rockfish	8		14	24	4	30	42		14		7			10	
Tiger Rockfish															
Canary Rockfish				1											
Yelloweye Rockfish				1	1	1			3						
N. P. Spiny Dogfish	33	40	1	24	28	2	24	59	71	55	148	164	72		
Sablefish	3	12					3								
Starfish															
Sea Whip															
Big Skate		1													
Red Rock Crab															
Inshore Tanner Crab															
Pacific Sanddab															
<i>Crossaster</i> spp.															
Leather Star														1	
Giant Pacific Octopus										1					
Mottled Star															
Pacific Cod		1					5								
Red Irish Lord															
Kelp Greenling															
Pacific Halibut	1	3		1											
Spotted Ratfish			2	3				1	5	6				3	
Threadfin Sculpin				1											
Southern Rock Sole															
<i>Metridium</i> spp.					2										
Great Sculpin															
Lingcod							2			1				2	
<i>Phyllochaetopterus</i> spp.															
Sponges														1	
<i>Pycnopodia</i> spp.			1												
Sunflower Starfish															
Longnose Skate		3		1	1		1						1		
Cabezon															
<i>Solaster</i> spp.															
Fish-Eating Star															

Appendix C cont.

Common Name	69	70	71	72
Silvergray Rockfish				
Copper Rockfish		7	1	
Greenstriped Rockfish				
Yellowtail Rockfish				
Quillback Rockfish		1	4	4
Tiger Rockfish			1	
Canary Rockfish				
Yelloweye Rockfish			7	10
N. P. Spiny Dogfish	156	134	1	134
Sablefish				
Starfish				
Sea Whip				
Big Skate	1			
Red Rock Crab				
Inshore Tanner Crab				
Pacific Sanddab				
<i>Crossaster</i> spp.				
Leather Star				
Giant Pacific Octopus				
Mottled Star				
Pacific Cod				
Red Irish Lord				
Kelp Greenling				
Pacific Halibut				
Spotted Ratfish		1	1	
Threadfin Sculpin				
Southern Rock Sole				
<i>Metridium</i> spp.				
Great Sculpin				
Lingcod			1	
<i>Phyllochaetopterus</i> spp.				
Sponges		1		
<i>Pycnopodia</i> spp.		1		
Sunflower Starfish				
Longnose Skate		2	6	
Cabezon				
<i>Solaster</i> spp.				
Fish-Eating Star			1	

APPENDIX D: 2021 HBLL INSIDE SOUTH CATCH NUMBERS BY SET

Common Name	Scientific Name	1	2	3	4	5	6	7	8
Copper Rockfish	<i>Sebastes caurinus</i>								
Greenstriped Rockfish	<i>Sebastes elongatus</i>								
Quillback Rockfish	<i>Sebastes maliger</i>	2	1	2	6	2	4	14	
Tiger Rockfish	<i>Sebastes nigrocinctus</i>								
Canary Rockfish	<i>Sebastes pinniger</i>		1			1			
Yelloweye Rockfish	<i>Sebastes ruberrimus</i>	3			1			7	
N. P. Spiny Dogfish	<i>Squalus suckleyi</i>	27	38	75	10	19	13	12	20
Bristly Crab	<i>Acantholithodes hispidus</i>								
Anemone	Order Actiniaria							1	
Starfish	Class Asteroidea								
Sea Whip	<i>Balticina septentrionalis</i>								
Big Skate	<i>Beringraja binoculata</i>								
Red Rock Crab	<i>Cancer productus</i>								
Barnacles	Subclass Cirripedia								
Pacific Sanddab	<i>Citharichthys sordidus</i>	1							4
Giant Pacific Octopus	<i>Enteroctopus dofleini</i>								
Mottled Star	<i>Evasterias troschelii</i>								
Pacific Cod	<i>Gadus macrocephalus</i>								
Basket Star	<i>Gorgonocephalus eucnemis</i>								
Red Irish Lord	<i>Hemilepidotus hemilepidotus</i>								
Kelp Greenling	<i>Hexagrammos decagrammus</i>								
Bluntnose Sixgill Shark	<i>Hexanchus griseus</i>			1					
Flathead Sole	<i>Hippoglossoides elassodon</i>								
Pacific Halibut	<i>Hippoglossus stenolepis</i>								
Spotted Ratfish	<i>Hydrolagus colliei</i>								
Southern Rock Sole	<i>Lepidopsetta bilineata</i>								2
Pacific Staghorn Sculpin	<i>Leptocottus armatus</i>								
Sand Star	<i>Luidia foliolata</i>								1
Dungeness Crab	<i>Metacarcinus magister</i>								1
-	<i>Metridium</i>								
Great Sculpin	<i>Myoxocephalus polyacanthocephalus</i>								
Lingcod	<i>Ophiodon elongatus</i>				1	2			
Pink Short-Spined Star	<i>Pisaster brevispinus</i>								
Sponges	Phylum Porifera	1							
Sunflower Starfish	<i>Pycnopodia helianthoides</i>			1	1				
Longnose Skate	<i>Raja rhina</i>								
Cabezon	<i>Scorpaenichthys marmoratus</i>								
Fish-Eating Star	<i>Stylasterias forreri</i>								

Appendix D cont.

Common Name	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Copper Rockfish	1														
Greenstriped Rockfish				1							1				
Quillback Rockfish	3	6		19	11	6	1	3	5		6	9	10	1	1
Tiger Rockfish															
Canary Rockfish	2														
Yelloweye Rockfish	7	4		16	1	9	5	5	5	1	18	2	3	4	
N.P. Spiny Dogfish	5	30	44	2	5	18		10	32	11		9		21	7
Bristly Crab															
Anemone										1					
Starfish															
Sea Whip															
Big Skate															
Red Rock Crab															
Barnacles															
Pacific Sanddab		1	5		1										
Giant Pacific Octopus															
Mottled Star															
Pacific Cod															
Basket Star															
Red Irish Lord															
Kelp Greenling															
Bluntnose Sixgill Shark															
Flathead Sole															
Pacific Halibut															
Spotted Ratfish															
Southern Rock Sole			1											1	1
Pacific Staghorn Sculpin															
Sand Star															
Dungeness Crab															
Metridium spp.															
Great Sculpin															
Lingcod	1	1						3	4						
Pink Short-Spined Star															
Sponges	1	1		1				1			3	1	4		
Sunflower Starfish															1
Longnose Skate					1					1					1
Cabezon															
Fish-Eating Star															

Appendix D cont.

Common Name	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Copper Rockfish		4							1		10		2	1	
Greenstriped Rockfish					1						1	1			
Quillback Rockfish	6	1		3	1		4	1	2	5		6	12		2
Tiger Rockfish															
Canary Rockfish															
Yelloweye Rockfish	12	3	2	11	19	11	12	3	4	8	2	18	4		5
N.P. Spiny Dogfish	13		34	4						6	1	1	23	14	48
Bristly Crab						1									
Anemone															
Starfish															
Sea Whip															
Big Skate															
Red Rock Crab									2						
Barnacles															
Pacific Sanddab														4	
Giant Pacific Octopus									1						
Mottled Star															
Pacific Cod															
Basket Star															
Red Irish Lord															
Kelp Greenling															
Bluntnose Sixgill Shark															
Flathead Sole															
Pacific Halibut															
Spotted Ratfish											6	1			
Southern Rock Sole									1						
Pacific Staghorn Sculpin															
Sand Star															
Dungeness Crab															
Metridium spp.		1													
Great Sculpin															
Lingcod		2			2						1	3			
Pink Short-Spined Star															
Sponges	6	1	5			3	6					1			
Sunflower Starfish															
Longnose Skate								1			1		1		
Cabezon											2				
Fish-Eating Star	1								13						

Appendix D cont.

Common Name	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Copper Rockfish		5												
Greenstriped Rockfish													2	
Quillback Rockfish		20	12	16	1	6		1		1	2	1	3	
Tiger Rockfish														
Canary Rockfish													1	
Yelloweye Rockfish			7	2	24		9			1	4		8	
N.P. Spiny Dogfish	131	5	21		51	7	2	197	87	183	170	134	40	5
Bristly Crab						1								
Anemone														
Starfish														
Sea Whip		1	1						3					
Big Skate			2		2				1					
Red Rock Crab														8
Barnacles														
Pacific Sanddab					2				2					
Giant Pacific Octopus				1										
Mottled Star														
Pacific Cod	1		4		12									
Basket Star									1					
Red Irish Lord														
Kelp Greenling							2							
Bluntnose Sixgill Shark													1	
Flathead Sole														
Pacific Halibut														
Spotted Ratfish		1		1										
Southern Rock Sole														
Pacific Staghorn Sculpin														
Sand Star														
Dungeness Crab														
Metridium spp.														
Great Sculpin														
Lingcod		1				2	2						1	
Pink Short-Spined Star														
Sponges				1		1	3	1					2	
Sunflower Starfish									2					
Longnose Skate	3	1	2	1	5	2			5				2	
Cabezon														
Fish-Eating Star														

Appendix D cont.

Common Name	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
Copper Rockfish						3	1						5		3
Greenstriped Rockfish						2						1			
Quillback Rockfish		1				23	10					3	1	4	2
Tiger Rockfish														1	
Canary Rockfish						2									
Yelloweye Rockfish						5							12	5	10
N.P. Spiny Dogfish	3	12	5	52	6	2	6	17	46	14	12	3			1
Bristly Crab															
Anemone															
Starfish			1												
Sea Whip	1														
Big Skate			2	3	1			1	1	1					
Red Rock Crab	3	14	6	2						2	1				
Barnacles								1	1						
Pacific Sanddab	6	1	3				1		1	11	1				
Giant Pacific Octopus															
Mottled Star		1									1				
Pacific Cod															
Basket Star															
Red Irish Lord					1										
Kelp Greenling															
Bluntnose Sixgill Shark															
Flathead Sole		1													
Pacific Halibut										1					
Spotted Ratfish				2					5				1		
Southern Rock Sole															
Pacific Staghorn Sculpin			1												
Sand Star		2								2					
Dungeness Crab									1						
Metridium spp.															
Great Sculpin					2										
Lingcod					6	2	1	1					1	3	
Pink Short-Spined Star															
Sponges						1						2		3	1
Sunflower Starfish															
Longnose Skate	1										2	7			1
Cabezon					2										
Fish-Eating Star	1														

Appendix D cont.

Common Name	68	69	70	71
Copper Rockfish				1
Greenstriped Rockfish				
Quillback Rockfish				1
Tiger Rockfish				
Canary Rockfish				
Yelloweye Rockfish				
N.P. Spiny Dogfish	8	6	3	2
Bristly Crab				
Anemone			1	
Starfish				
Sea Whip				
Big Skate		2		
Red Rock Crab	5		4	
Barnacles				
Pacific Sanddab		1		
Giant Pacific Octopus				
Mottled Star	1			
Pacific Cod				
Basket Star				
Red Irish Lord				
Kelp Greenling				
Bluntnose Sixgill Shark				
Flathead Sole				
Pacific Halibut				
Spotted Ratfish				
Southern Rock Sole	1			
Pacific Staghorn Sculpin				
Sand Star				
Dungeness Crab				
Metridium spp.				
Great Sculpin				
Lingcod				2
Pink Short-Spined Star	1			
Sponges				
Sunflower Starfish				
Longnose Skate				
Cabezon				
Fish-Eating Star				