

Hecate Strait Groundfish Bottom Trawl Survey, May 22nd to June 19th, 2007

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MAY 22ND TO JUNE 19TH, 2007

by

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ABSTRACT

Olsen, N., Rutherford, K.L., Stanley, R.D., and Wyeth, M.R. 2009. Hecate Strait groundfish bottom trawl survey, May 22nd to June 19th, 2007. Can. Manuscr. Rep. Fish. Aquat. Sci. 2900: vi + 48 p.

A bottom trawl survey of Hecate Strait was conducted on the Canadian Coastguard Ship W. E. Ricker between May 22nd and June 19th, 2007. This was the second survey in what is intended to be a long-term survey series, coordinated with other area-specific surveys that together cover the continental shelf and upper slope of most of the British Columbia coast. The objective of these surveys is to provide fishery-independent abundance indices of all demersal fish species available to bottom trawling, as well as to collect biological samples of selected species.

The survey conducted 143 successful tows from a total of 156. The mean catch per successful tow was 292 kg, averaging about 19 different species of fish and invertebrates in each. The most abundant fish species encountered was arrowtooth flounder (*Atheresthes stomias*) followed by spotted ratfish (*Hydrolagus coliei*), rex sole (*Glyptocephalus zachirus*), and Dover sole (*Microstomus pacificus*). Biological data, including individual length, weight, sex, maturity, and age structure were collected from 56 different species of fish. Oceanographic data and net geometry were also recorded for most tows, including water temperature, depth, headrope height, and doorspread.

RÉSUMÉ

Olsen, N., Rutherford, K.L., Stanley, R.D., and Wyeth, M.R. 2009. Hecate Strait groundfish bottom trawl survey, May 22nd to June 19th, 2007. Can. Manuscr. Rep. Fish. Aquat. Sci. 2900: vi + 48 p.

Un relevé au chalut de fond a été réalisé, du 22 mai au 19 juin 2007, dans le détroit d'Hécaté par le navire W.E. Ricker de la Garde côtière canadienne. Il s'agit du deuxième relevé d'une série d'échantillonnages qui se veulent à long terme et qui sont coordonnés avec d'autres échantillonnages par secteur couvrant, ensemble, la plate-forme continentale et la partie supérieure du talus de la majeure partie de la côte de la Colombie-Britannique. L'objectif de ces échantillonnages est d'établir des indices d'abondance, indépendants de la pêche, de toutes les espèces de poissons démersaux capturables au chalut de fond et de recueillir des données biologiques sur les espèces sélectionnées.

Des 156 traits de chalut réalisés, 143 ont été fructueux. La prise moyenne par trait réussi pesait 292 kg. Quelque 19 espèces différentes de poissons et d'invertébrés ont été prises en moyenne à chaque trait. La plie à grande bouche (*Atheresthes stomias*) a été l'espèce la plus abondante; venaient ensuite la chimère d'Amérique (*Hydrolagus colliei*), la sole royale (*Glyptocephalus zachirus*) et la sole à petite bouche (*Microstomus pacificus*). Des données biologiques (longueur, poids, sexe, stade de maturité et structure d'âge) ont été recueillies pour 56 espèces différentes de poisson. Des données océanographiques et des données sur la géométrie du chalut (température de l'eau, profondeur, hauteur de la ralingue supérieure et écartement des panneaux) ont également été recueillies pour la plupart des traits.

INTRODUCTION

In 2003 a report by the Pacific Scientific Advice Review Committee (PSARC) recommended development of fishery-independent relative abundance indices using bottom trawl surveys in British Columbia waters (Sinclair et al., 2003). As an initial step, it recommended that a pilot survey be conducted in PMFC major areas 5A and 5B (Queen Charlotte Sound). This region was recommended in part because it is not covered by other bottom trawl surveys and it represents a significant portion of the commercial bottom trawl fishery.

The first Queen Charlotte Sound survey was successfully completed in the summer of 2003 (Olsen et al., 2007). Following that, additional surveys were planned for the west coast of Vancouver Island beginning in 2004, Hecate Strait beginning in 2005, and the west coast of the Queen Charlotte Islands beginning in 2006. These surveys are to be conducted on a rotating biennial schedule with the Queen Charlotte Sound and Hecate Strait surveys conducted in odd-numbered years and the west coast Vancouver Island and west coast Queen Charlotte Islands surveys conducted in even-numbered years. Together they provide comprehensive coverage of the continental shelf and upper slope of the British Columbia Coast (Figure 1).

This document provides a brief synopsis of the 2007 Hecate Strait groundfish bottom trawl survey, including the methods used and data collected. It is not intended as a comprehensive review of the survey, nor does it provide interpretive analysis of the survey results. Results of the first Hecate Strait survey are given in Workman et al., 2008.

METHODS

VESSEL AND FISHING GEAR

The survey was conducted aboard the Canadian Coast Guard Ship CCGS W. E. Ricker (Figure 2). The trawl net used was an Atlantic Western IIA box trawl (Table 1; Figure 3) connected to 1,100 kg U.S.A Jet doors.

STAFF SUMMARY

A total of 14 personnel were involved in the survey, which was split into 3 legs of 9 to 11 days in duration with 6 to 8 staff in each (Table 2).

SURVEY DESIGN

The study area consists of Hecate Strait, from approximately latitude 52° 40' N to latitude 54° 40' N and westward into Dixon Entrance to approximately longitude 133° 00' W, covering depths from 10 to 500 meters (Figure 4), and categorized into four distinct strata (Table 3; Figure 4). The southern region of this survey is nearly contiguous with the most northerly extent of the Queen Charlotte Sound survey.

We divided the survey area into a contiguous grid of 4 km² blocks and from these blocks we randomly selected 188 fishing locations. The number of locations and the allocation of locations across strata were based on an analysis by Sinclair et al. (2003) and were intended to minimize observational error for the most important commercial groundfish species (Figure 5).

OPERATIONS

Fishing

Fishing commenced at approximately 7 AM and ended at approximately 7 PM each day, to coincide with the ship's 12 hour crew rotation schedule.

Prior to fishing, the fishing master and chief scientist reviewed the selected fishing locations to determine a candidate set of locations to visit throughout the day. During this review process the fishing master would sometimes determine, based on his experience and knowledge of an area, that one or more locations were not fishable. In such cases we would mark the locations as "rejected based on prior knowledge".

We frequently began fishing immediately on arrival at a fishing location. However, if the fishing master was not familiar with an area we would "sound" the region (traverse the location and examine the depth sounder trace) to determine if it was suitable for trawling. If it was not, we marked the location and "rejected based on inspection".

When trawling, the fishing master would attempt to tow through the center of the 4 km² fishing block, usually following a depth contour. However, where the bottom topography made this difficult or impossible, the fishing master would trawl wherever he felt he could obtain a successful result, with the stipulation that at least half of the total

trawl track had to be within the 4 km² block (Figure 6). The scope used in 2009 is shown in Table 4 and Figure 7.

To determine the start of each 20 minute tow, we monitored the real-time net sensor data to establish when the net reached the sea floor, at which point we considered the net to be actively fishing. Nineteen minutes after the start of the tow, we retrieved the net. Retrieval was done one minute early because slack in the warps creates a lag of about one minute before the net leaves the bottom. Although our target on-bottom time was 20 minutes, we accepted tows that were at least 15 minutes in length. This was a pragmatic decision that allowed us to retain many tows that would otherwise have been failures due to hang-ups or early haul-backs.

The result of trawling was either a successful tow, or a hang-up or tear-up of the trawl net. In the event of a hang-up or tear-up, we would either mark the location as “rejected after one or more attempts to fish” or make additional attempts to fish. Thus, we kept records of the three scenarios that resulted in a location being removed from the sampling frame:

- Rejection based on prior knowledge
- Rejection based on on-ground inspection
- Rejection based on one or more failed fishing attempts

Rejected locations were removed from the sampling frame for the current and all future surveys. Thus, every year of the survey results in the removal of some unfishable area, which over time, will lead to increasing efficiency (i.e. we will spend less time surveying areas that cannot be fished).

Gear and Oceanographic Sensors

The trawl net was equipped with a Simrad ITI Trawl System that provided real-time net depth, doorspread and wingspread values. These data allowed us to continually monitor the net during fishing. In addition to these real-time sensors, we also attached data-logging probes to collect water temperature and pressure/depth (Seabird SBE 39), dissolved oxygen, pH, salinity, temperature, and depth (Seabird SBE 19plus), and contact of the trawl net with the sea floor (NMFS Bottom Contact Sensor). Data from these logging probes were downloaded at the end of each day.

Catch Processing

At the end of each tow, the net was retrieved and the catch dumped into a hopper in the fish processing lab. Catch was sorted by species into separate baskets as it moved along a conveyor system. Baskets were weighed to the nearest 0.1 kg using a large capacity, motion-compensating electronic balance (Marel Model M1100/M2000, 60 kg capacity). For small catches the number of individuals was often recorded as well as the weight. Catch was sorted to the lowest taxonomic group possible. For most fishes this was to the level of species; invertebrates, however, were often only keyed to phylum or order.

Biological Sampling

While the primary purpose of this survey was to generate fishery independent indices of relative abundance, our second goal was to collect associated biological information on the size, sex, and age composition of selected species. In particular, our biological sampling priorities were to collect length and sex frequencies on all species in the catch of each tow (subject to a minimum number of specimens criteria), to collect representative samples of specimen length and weight, and to collect age samples for select species.

We selected age samples from the dominant (by weight) catch in each tow, as well as certain species deemed high priority due to concerns over stock status (for example, Bocaccio, lingcod, and Pacific cod). Otoliths (calcareous accretions of the inner ear) were collected from rockfish and flatfish species while fin clips were taken from lingcod and Pacific cod. Both of these structures grow in a series of annular rings that can be counted to determine age.

RESULTS

FISHING

We divided the survey into 3 legs of 9 to 11 days each. The overall pattern of vessel movement during each leg is shown in Figure 8.

From a total of 29 survey days, 5 days were required for travel at the start and end of the survey, 2 days were required for crew changes, and 2 days were required for repairs to the vessel after the net became entangled in the propeller on May 31st. Thus, we ended with a total of about 20 full fishing days, in which time we conducted 156 tows, of which 143 were successful and 13 were unsuccessful due to hang-ups or tear-ups, for an average of about 7 successful tows per fishing day (Table 5).

The final status of the 2007 sampling frame includes 143 successfully fished locations, 13 locations rejected prior to fishing, based on the fishing master's knowledge, 24 locations rejected based on on-ground inspection, and 7 locations rejected after one or more failed fishing attempts (Figure 9). One location was left un-inspected and un-fished due to time constraints at the end of the survey.

CATCH

Catch weight per tow was typically less than 1,000 kg and on average, we observed about 10 to 25 species per tow (Figure 10 and Figure 11). We caught a total of 42,137 kg of fish and invertebrates. Most of this (40,568 kg) consisted of 96 different taxonomic groups of fish, including 24 rockfish taxa and 16 flatfish taxa. The remainder (1,569 kg) consisted of 96 invertebrate groups (Table 6). Of the fish species, arrowtooth flounder (*Atheresthes stomias*) was the dominant by weight, followed by spotted ratfish (*Hydrolagus coliei*), rex sole (*Glyptocephalus zachirus*), and Dover sole (*Microstomus pacificus*) (Table 7). Biomass indices over the history of the survey (2005 and 2007) are shown in Figure 12.

SAMPLES AND SPECIMENS

We sampled 56 species of fish for attributes such as length, weight, sex, maturity, and age (Table 8, Table 9, and Table 10).

GEAR AND OCEANOGRAPHIC SENSORS

We collected Seabird 39 data (water temperature and depth) from 139 tows and Seabird 19plus data (water temperature, depth, pH, salinity, and dissolved oxygen from 146 tows (Table 11, Figure 13). Although we have not yet analyzed these data in detail, they may prove useful for explaining, or at least correlate to, short term anomalies in abundance trends. In addition, they provide a base reference for detecting future climate change.

We collected bottom contact data from the NMFS Bottom Contact Sensor from 153 tows (Table 11). These data provide a record of the trawl net contact with the sea floor and thus are useful not only for determining the quality and quantity of the sea floor contact, but also indicate the relative rugosity of the sea floor. We use these data to determine the exact times that the trawl net first and last contacts the sea floor, thus providing an accurate measure of total bottom contact time (Figure 14).

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Table 1. Net specifications.

Part	Standard Length	Material	Metric Length	Units	Material
Rigging					
Sweep Line	90	7/8 cable	27.4	m	22 mm cable
Upper bridle	90	3/4 cable	27.4	m	19 mm cable
Lower bridle	90	7/8 cable	27.4	m	22 mm cable
Door Legs	36	7/8 cable	11	m	22 mm cable
Pickups	42	7/8 cable	12.8	m	22 mm cable
Hook ups	8.8 t	BMMDV80	8 mt	mt	BMMDV80
Net frame					
Headline	74.5	5/8 cable	22.7	m	16 mm cable
Headline floats	90	8" plastic Spheres			200 mm plastic spheres
Riblines		1" Polysteel rope			25 mm polysteel rope
Bolsch Line	68.33	9/8" poly steel rope	20.8	m	29 mm polysteel rope
Fishing Line	107.33	14 mm long link chain	32.7	m	14 mm long link chain
Foot Rope					
Foot Rope	107.33	5/8 Chain	32.7	m	16 mm chain
Foot rope bosom	14	16 in Tire gear with 2 in Spacing	4.3	m	400 mm tire gear with 50 mm spacing
Root rope wing1	18.33	18" rock hopper, 18 " disks spaced 18 " apart	5.6	m	450 mm rock hopper 450 mm spacing
Root rope wing2	8.83	18" rock hopper, 18 " disks spaced 18 " apart	2.7	m	450 mm rock hopper 450 mm spacing
Web					
Belly	5"	3.5 mm Euroline	127	mm	3.5 mm Euroline
Square	5"	3.5 mm Euroline	127	mm	3.5 mm Euroline
Side Panel	5"	3.5 mm Euroline	127	mm	3.5 mm Euroline
Taper	4.5"	3.5 mm Euroline	114	mm	3.5 mm Euroline
Intermediate	4.5"	3.5 mm Euroline	114	mm	3.5 mm Euroline
Codend	4.5"	3.5 mm Euroline	114	mm	3.5 mm Euroline
Guard Mesh	4.5 or 5 "	Double 4.5 mm Euroline	114 or 127	mm	Double 4.5 mm Euroline
Liner	3/4"	Notless Nylon	19	mm	Notless Nylon

Table 2. Science staff on each leg of the survey.

Leg	Dates	Staff
1	May 22nd to June 1st	Ed Choromanski Matt Drake Alex Gray Rob Kronlund Alan Sinclair * Matt Thompson Greg Workman Malcolm Wyeth
3	June 2nd to June 11th	Schon Acheson Matt Drake Alex Gray Matt McKay Colin Peters Rick Stanley *
4	June 12th to June 19th	Matt Drake Jeff Fargo * Alex Gray Matt McKay Colin Peters Kate Rutherford Greg Workman

* Chief scientist

Table 3. Definition of survey strata with the target tow allocation and the total area in each.

Depth					Target Tow	Actual Tow	Usable	Area (km ²)	
Meters		Fathoms			Allocation	Allocation	Tows		
10	-	70	5	-	38	60	68	48	5,958
70	-	130	38	-	71	45	50	45	3,011
130	-	220	71	-	120	40	55	37	2,432
220	-	500	120	-	273	15	15	13	1,858
Totals						160	188	143	13,259

Table 4. Mean warp length and scope by depth interval.

Depth (m)	Mean Warp (m)	Mean Warp (fa)	Mean Scope	Mean Depth (fa)
10 - 50	117	64	3.6	18
50 - 100	205	112	2.7	41
100 - 150	304	166	2.6	65
150 - 200	419	229	2.4	96
200 - 250	478	261	2.2	118
250 - 300	583	319	2.1	154
300 - 350	650	355	2.0	181
350 - 400	683	374	1.9	201

Table 5. Summary of survey operations.

Date	Start Fishing	End Fishing	Hours Fishing	Successful Tows	Failed Tows	Total Tows	Travel Day	Vessel Repairs	Crew Change
5/22/2007	-	-	-	-	-	-	✓		
5/23/2007	-	-	-	-	-	-	✓		
5/24/2007	8:15	19:16	11	9	0	9			
5/25/2007	7:31	18:34	11	9	2	11			
5/26/2007	7:38	18:18	11	7	2	9			
5/27/2007	7:40	19:21	12	10	0	10			
5/28/2007	7:27	18:29	11	9	1	10			
5/29/2007	7:14	19:10	12	9	0	9			
5/30/2007	7:36	11:56	4	3	1	4			
5/31/2007	-	-	-	-	-	-		✓	
6/1/2007	-	-	-	-	-	-		✓	
6/2/2007	-	-	-	-	-	-			✓
6/3/2007	7:28	17:55	10	6	0	6			
6/4/2007	7:20	18:48	11	8	2	10			
6/5/2007	7:03	18:46	11	8	1	9			
6/6/2007	7:31	19:03	12	10	0	10			
6/7/2007	7:17	18:25	11	9	1	10			
6/8/2007	7:51	18:14	11	6	2	8			
6/9/2007	7:06	18:13	11	8	0	8			
6/10/2007	7:13	14:35	7	4	0	4			
6/11/2007	-	-	-	-	-	-			✓
6/12/2007	7:21	18:06	11	7	0	7			
6/13/2007	7:06	19:08	12	6	0	6			
6/14/2007	7:08	18:59	11	7	1	8			
6/15/2007	7:08	13:08	6	5	0	5			
6/16/2007	7:22	11:46	4	3	0	3			
6/17/2007	-	-	-	-	-	-	✓		
6/18/2007	-	-	-	-	-	-	✓		
6/19/2007	-	-	-	-	-	-	✓		
Total			200	143	13	156	5	2	2
Average Per Day			10.0	7.2	0.7	7.8			

Table 6. Catch broken down by species groups.

Species Category	Number of Taxa	Weight (kg)
All fish	96	40,568
Rockfish	24	6,095
Flatfish	16	23,054
Roundfish	8	3,260
Cartilaginous fish	6	7,951
Other fish	42	209
Invertebrates	96	1,569

Table 7. All captured species showing number of tows in which the species occurred, total catch weight, maximum and mean per-tow catch weight, and relative abundance and relative error from bootstrapped area expanded estimates.

Species	Number of Tows	Catch Weight (kg)			Biomass (tonnes)	Relative Error
		Total	Maximum	Mean		
Arrowtooth flounder	117	8,772.8	1,425.7	75.0	6,678.5	0.19
Spotted ratfish	141	5,483.2	469.1	38.9	6,045.3	0.15
Rex sole	102	3,460.0	330.9	33.9	2,384.7	0.15
Dover sole	96	3,301.1	345.7	34.4	2,698.0	0.15
English sole	86	2,746.5	257.3	31.9	2,946.8	0.19
Yellowtail rockfish	40	2,212.5	1,796.2	55.3	2,087.3	0.84
Spiny dogfish	116	1,572.6	95.3	13.6	1,288.7	0.14
Walleye pollock	80	1,434.4	287.6	17.9	1,392.5	0.39
Southern rock sole	70	1,430.2	121.4	20.4	1,961.5	0.15
Pacific sanddab	42	1,116.2	340.2	26.6	1,171.7	0.45
Pacific halibut	73	924.8	131.8	12.7	1,041.9	0.20
Copper rockfish	13	800.1	535.2	61.5	1,009.2	0.68
Primnoa	9	664.6	277.0	73.8		
Pacific ocean perch	46	658.4	163.1	14.3	462.1	0.33
Big skate	30	645.0	140.0	21.5	800.2	0.26
Pacific cod	77	620.0	71.5	8.1	580.5	0.21
Redbanded rockfish	43	454.5	83.2	10.6	346.9	0.25
Flathead sole	54	434.8	62.1	8.1	311.5	0.24
Shortspine thornyhead	31	431.9	76.1	13.9	346.7	0.34
Sablefish	56	430.6	58.8	7.7	561.6	0.29
Quillback rockfish	36	403.2	113.1	11.2	412.1	0.44
Silvergray rockfish	47	369.1	49.6	7.9	261.6	0.21
Widow rockfish	5	343.5	341.8	68.7	342.1	0.97
Pacific tomcod	39	326.6	122.7	8.4	418.8	0.42
Dungeness crab	19	314.2	126.5	16.5		
Petrale sole	58	283.4	39.9	4.9	271.5	0.27
Sand sole	33	266.6	32.3	8.1	365.7	0.18
Lingcod	50	262.1	24.4	5.2	240.3	0.18
Longnose skate	34	226.0	24.0	6.6	212.4	0.20
Butter sole	24	154.7	65.0	6.4	210.6	0.45
Pacific hake	30	130.9	24.2	4.4	124.2	0.25
Rougheye rockfish	14	129.8	31.9	9.3	135.3	0.60
Metridium	25	93.1	29.4	3.7		
Curlfin sole	32	90.5	47.5	2.8	107.5	0.54
Pacific herring	47	76.8	15.6	1.7	92.2	0.27
Shortraker rockfish	4	69.6	33.1	17.4	64.4	0.61
Mitridae	1	59.7	59.7	59.7		
Fragile urchin	41	58.0	10.3	1.5		
Bocaccio	8	57.0	11.8	7.1	48.6	0.37
Sunflower starfish	26	47.7	20.8	1.8		
Slender sole	41	46.4	3.8	1.1	41.4	0.22
Squids	17	41.7	6.6	2.5		
Kelp greenling	12	41.4	15.6	3.5	53.5	0.48
Sharpchin rockfish	20	40.9	22.0	2.2	29.3	0.56

Table 7. Continued

Species	Number of Tows	Catch Weight (kg)			Biomass (tonnes)	Relative Error
		Total	Maximum	Mean		
Canary rockfish	15	40.9	9.0	2.7	33.2	0.36
Bigmouth sculpin	6	39.2	9.5	6.5	24.1	0.44
Yelloweye rockfish	7	37.0	9.6	5.3	25.0	0.43
Pink short-spined star	24	31.2	6.4	1.3		
Sea pen	9	30.5	28.9	3.4		
Bubble gum coral	1	29.2	29.2	29.2		
Sponges	26	27.4	4.1	1.1		
Acorn barnacle	8	25.9	14.7	3.2		
Starry flounder	3	25.0	12.2	8.3	46.2	0.65
Eulachon	47	23.9	4.2	0.5	20.1	0.21
Redstripe rockfish	10	23.6	18.9	2.4	17.1	0.77
Giant pacific octopus	1	20.6	20.6	20.6		
Opalescent inshore squid	26	19.5	13.8	0.8		
Sandpaper skate	12	18.4	6.0	1.5	15.4	0.40
Red urchin	4	13.8	10.5	3.4		
Heart urchins	11	13.7	5.6	1.2		
Wolf eel	3	13.6	5.5	4.5	15.0	0.62
Pacific sand lance	21	13.1	10.0	0.6	17.1	0.75
Cabezon	3	12.3	9.2	4.1	16.1	0.78
Shiner perch	19	10.1	6.8	0.6	12.4	0.70
Giant red sea cucumber	12	9.4	2.2	0.8		
China rockfish	2	7.9	4.9	3.9	10.5	0.71
Pink shrimp	37	7.4	1.9	0.2		
Greenstriped rockfish	7	7.4	2.0	1.1	4.5	0.46
Hippasteria	5	7.0	3.9	1.4		
Sidestripe shrimp	45	7.0	0.8	0.2		
Aleutian skate	1	5.7	5.7	5.7	4.0	1.00
Tube worms	2	5.6	3.9	2.8		
Pacific staghorn sculpin	4	5.2	3.0	1.3	7.2	0.62
Blackbelly eelpout	15	5.1	3.4	0.4	3.2	0.65
Prawn	16	4.8	1.0	0.3		
Sturgeon poacher	31	3.8	0.4	0.1	4.2	0.23
Red irish lord	2	3.6	3.2	1.8	4.4	0.86
Fish-eating star	12	3.6	0.7	0.3		
Black rockfish	2	3.4	2.5	1.7	4.3	0.74
Tritoniidae	5	3.4	1.9	0.9		
Buffalo sculpin	5	3.3	1.3	0.8	4.6	0.56
Threadfin sculpin	5	2.8	0.9	0.6	2.4	0.51
Pink shrimp (smooth)	13	2.7	1.3	0.2		
Blackfin sculpin	8	2.6	1.0	0.3	1.7	0.48
Chelyosoma productum	9	2.6	1.8	0.3		
Pink scallop, (aka reddish scallop)	17	2.2	1.0	0.1		
Fish eggs	3	1.9	0.8	0.6		
Mud star	12	1.8	1.1	0.2		

Table 7. Continued

Species	Number of Tows	Catch Weight (kg)			Biomass (tonnes)	Relative Error
		Total	Maximum	Mean		
Bath sponges	7	1.8	0.7	0.3		
Giant barnacle	1	1.5	1.5	1.5		
Pygmy rockfish	3	1.4	1.3	0.5	1.4	0.87
Bigfin eelpout	3	1.4	1.2	0.5	1.0	0.86
Glass sponges	2	1.4	1.2	0.7		
Leather star	4	1.4	0.4	0.3		
Basket stars	10	1.3	0.3	0.1		
Anemone	10	1.3	0.3	0.1		
Pacific krill	1	1.2	1.2	1.2		
Glass shrimp	6	1.1	0.4	0.2		
Harlequin rockfish	6	1.0	0.2	0.2	0.9	0.46
Cushion star	6	1.0	0.5	0.2		
Great sculpin	2	1.0	0.7	0.5	1.2	0.78
Sea urchins	1	0.9	0.9	0.9		
Jellyfish	10	0.9	0.2	0.1		
Splitnose rockfish	5	0.9	0.4	0.2	0.6	0.57
Solasteridae	5	0.9	0.3	0.2		
Bryozoa	8	0.8	0.4	0.1		
Black sea cucumber	1	0.7	0.7	0.7		
Snake prickleback	18	0.7	0.2	0.1	0.9	0.38
Smelts	1	0.7	0.7	0.7		
Roughback sculpin	12	0.6	0.1	0.1	0.8	0.34
Morning sun starfish	3	0.6	0.4	0.2		
Spiny red sea star	3	0.6	0.3	0.2		
American shad	1	0.5	0.5	0.5	0.4	0.99
Box crabs	1	0.5	0.5	0.5		
Speckled sanddab	4	0.5	0.2	0.1	0.7	0.63
Hagfishes	1	0.5	0.5	0.5		
Starfish	3	0.5	0.2	0.2		
Ophiuroidea	4	0.5	0.4	0.1		
Oregontriton	5	0.5	0.2	0.1		
Chinook salmon	1	0.4	0.4	0.4	0.5	0.98
Puget sound rockfish	2	0.4	0.3	0.2	0.5	0.81
True crabs	1	0.4	0.4	0.4		
Pacific sandfish	1	0.4	0.4	0.4	0.6	1.04
Arminidae	5	0.4	0.2	0.1		
Mottled star	2	0.4	0.3	0.2		
Diplopteraster multipes	1	0.3	0.3	0.3		
Black eelpout	4	0.3	0.3	0.1	0.8	0.74
C-o sole	1	0.3	0.3	0.3	0.4	1.06
Darkblotched rockfish	1	0.3	0.3	0.3	0.2	0.96
Pallid urchin	4	0.3	0.1	0.1		
Ophiuridae	3	0.3	0.2	0.1		
Rose starfish	6	0.3	0.2	0.0		
Thorny sculpin	2	0.3	0.2	0.1	0.2	0.80
Tunicata	5	0.2	0.1	0.0		

Table 7. Continued

Species	Number of Tows	Catch Weight (kg)			Biomass (tonnes)	Relative Error
		Total	Maximum	Mean		
Whitespotted sea cucumber	1	0.2	0.2	0.2		
Long-armed sea star	2	0.2	0.2	0.1		
Gastropods	2	0.2	0.2	0.2		
Rockfishes	2	0.2	0.1	0.1		
Neptunidae	1	0.2	0.2	0.2		
Pearly prickleback	1	0.2	0.2	0.2		
Cancer crabs	1	0.2	0.2	0.2		
Cheiraster dawsoni	5	0.2	0.1	0.0		
Lanternfish	4	0.1	0.1	0.0	0.4	0.76
Seaslugs	5	0.1	0.1	0.0		
Dipsacaster borealis	1	0.1	0.1	0.1		
Wattled eelpout	1	0.1	0.1	0.1	0.1	0.98
Cucumariidae	1	0.1	0.1	0.1		
Sea whip	2	0.1	0.1	0.1		
Green urchin	1	0.1	0.1	0.1		
Smalldisk snailfish	4	0.1	0.0	0.0	0.1	0.93
Furrowed rock crab	5	0.1	0.1	0.0		
Ribbed sculpin	2	0.1	0.1	0.0	0.0	0.88
Soft sea cucumber	2	0.1	0.1	0.0		
Nearchaster	2	0.1	0.0	0.0		
Whitebarred prickleback	1	0.1	0.1	0.1	0.0	0.99
Bat star	1	0.1	0.1	0.1		
Ctenophora	3	0.1	0.0	0.0		
Green false-jingle	1	0.1	0.1	0.1		
Pacific bobtail squid	5	0.1	0.0	0.0		
Amphiophiura ponderosa	3	0.0	0.0	0.0		
Astropectinidae	1	0.0	0.0	0.0		
Dorididae	2	0.0	0.0	0.0		
Goniasteridae	1	0.0	0.0	0.0		
Graceful decorator crab	5	0.0	0.0	0.0		
Spotfin sculpin	2	0.0	0.0	0.0	0.0	0.81
Bigeye poacher	4	0.0	0.0	0.0	0.0	0.71
Sand star	1	0.0	0.0	0.0		
Coonstripe shrimp	2	0.0	0.0	0.0		
Sea lilies and feather stars	2	0.0	0.0	0.0		
Segmented worms	2	0.0	0.0	0.0		
Shortfin eelpout	1	0.0	0.0	0.0	0.1	0.93
Viperfishes	3	0.0	0.0	0.0		
Branchiopods	1	0.0	0.0	0.0		
Bristly crab	1	0.0	0.0	0.0		
Flatworms	1	0.0	0.0	0.0		
Henricia	1	0.0	0.0	0.0		
Lampshells	1	0.0	0.0	0.0		
Lebbeus	2	0.0	0.0	0.0		
Northern lampfish	1	0.0	0.0	0.0		
Northern sculpin	1	0.0	0.0	0.0		

Table 7. Continued.

Species	Number of Tows	Catch Weight (kg)			Biomass (tonnes)	Relative Error
		Total	Maximum	Mean		
Pallid eelpout	3	0.0	0.0	0.0	0.0	0.94
Poachers	1	0.0	0.0	0.0		
Sea mouse	1	0.0	0.0	0.0		
Shrimp	2	0.0	0.0	0.0		
Squat lobster	1	0.0	0.0	0.0		
Tadpole sculpin	1	0.0	0.0	0.0	0.0	0.94
Vermillion starfish	1	0.0	0.0	0.0		
Yellowleg shrimp	7	0.0	0.0	0.0		
Crangonidae	2					
Crangons	2					
Longfin sculpin	1					
Peanutworms	1					
Pricklebacks	1					
Rosy tritonia	2					
Soft sculpin	3					
Topshells	1					

Table 8. Number of samples and number of recorded biological attributes per species sampled.

Species	Samples	Lengths	Weights	Sexes	Maturities	Ages
Aleutian skate	1	1	1	1	0	0
Arrowtooth flounder	43	1,970	889	1,970	888	685
Big skate	30	76	19	76	0	0
Black rockfish	2	5	5	5	3	3
Blackbelly eelpout	2	129	0	0	0	0
Bocaccio	8	12	12	12	12	12
Butter sole	8	354	59	354	59	59
C-o sole	1	1	1	1	0	0
Canary rockfish	15	38	12	37	0	0
China rockfish	2	12	12	12	12	12
Chinook salmon	1	1	1	1	0	0
Copper rockfish	14	226	162	226	162	162
Curlfin sole	31	122	21	122	0	0
Darkblotched rockfish	1	1	1	1	0	0
Dover sole	46	2,140	1,129	2,140	1,129	436
English sole	35	2,504	802	2,504	802	489
Eulachon	11	428	0	0	0	0
Flathead sole	17	614	225	614	224	154
Harlequin rockfish	5	5	5	4	0	0
Kelp greenling	7	74	3	74	0	0
Lingcod	49	121	66	120	37	13
Longnose skate	34	47	30	45	0	0
Pacific cod	76	1,236	1,236	1,236	1,235	289
Pacific hake	2	33	0	33	0	0
Pacific halibut	73	237	48	234	0	0
Pacific herring	13	667	0	24	0	0
Pacific ocean perch	18	671	351	671	351	301
Pacific sand lance	6	416	0	0	0	0
Pacific sanddab	21	1,069	263	1,069	263	184
Pacific tomcod	18	1,331	132	476	132	65
Petrale sole	55	368	297	368	266	254
Pygmy rockfish	2	14	1	14	0	0
Quillback rockfish	34	403	403	403	403	399
Redbanded rockfish	42	257	231	257	216	216
Redstripe rockfish	2	42	0	42	0	0
Rex sole	40	2,375	975	2,375	975	619
Rougheye rockfish	5	79	0	79	0	0
Sablefish	53	378	195	378	166	162
Sand sole	23	502	93	502	93	48
Sandpaper skate	12	13	10	13	0	0
Sharpchin rockfish	2	99	0	99	0	0
Shiner perch	3	233	0	0	0	0
Shortraker rockfish	4	7	7	7	7	7
Shortspine thornyhead	22	738	257	738	242	212
Silvergray rockfish	16	181	1	181	0	0
Slender sole	13	227	0	227	0	0
Smelts	1	116	0	0	0	0
Southern rock sole	54	1,822	1,105	1,822	1,103	1,102
Spiny dogfish	25	739	1	739	0	0
Spotted ratfish	35	2013	1	2013	0	0
Starry flounder	3	9	2	9	0	0
Walleye pollock	17	867	194	323	194	158
Widow rockfish	5	53	51	53	47	0
Wolf eel	2	2	1	0	0	0
Yelloweye rockfish	6	9	9	9	9	9
Yellowtail rockfish	37	404	166	404	149	149
Total	1,103	26,491	9,485	23,117	9,179	6,199

Table 9. Numbers of samples and specimens by sample type and species.

Species	Total		Len./Sex		Len./Sex/Wt.		Len./Sex/Wt./Age	
	N	n	N	n	N	n	N	n
Aleutian skate	1	1	0	0	1	1	0	0
Arrowtooth flounder	43	1,970	25	1,081	5	204	13	685
Big skate	30	76	13	53	17	23	0	0
Black rockfish	2	5	0	0	1	2	1	3
Blackbelly eelpout	2	129	2	129	0	0	0	0
Bocaccio	8	12	0	0	0	0	8	12
Butter sole	8	354	7	295	0	0	1	59
C-o sole	1	1	0	0	1	1	0	0
Canary rockfish	15	38	4	23	10	14	0	0
China rockfish	2	12	0	0	0	0	2	12
Chinook salmon	1	1	0	0	1	1	0	0
Copper rockfish	14	226	1	64	0	0	13	162
Curlfin sole	31	122	11	82	20	40	0	0
Darkblotched rockfish	1	1	0	0	1	1	0	0
Dover sole	46	2,140	24	1,011	12	693	10	436
English sole	35	2,504	22	1,702	4	312	9	489
Eulachon	11	428	11	428	0	0	0	0
Flathead sole	17	614	12	389	2	71	3	154
Harlequin rockfish	5	5	0	0	4	4	0	0
Kelp greenling	7	74	4	67	3	7	0	0
Lingcod	49	121	12	49	35	58	1	13
Longnose skate	34	47	7	17	25	28	0	0
Pacific cod	76	1,236	0	0	55	175	21	289
Pacific hake	2	33	2	33	0	0	0	0
Pacific halibut	73	237	33	175	37	59	0	0
Pacific herring	13	667	13	667	0	0	0	0
Pacific ocean perch	18	671	10	320	1	50	6	301
Pacific sand lance	6	416	6	416	0	0	0	0
Pacific sanddab	21	1,069	16	806	1	79	4	184
Pacific tomcod	18	1,331	16	1,199	1	31	1	65
Petrale sole	55	368	13	61	30	53	12	254
Pygmy rockfish	2	14	1	13	1	1	0	0
Quillback rockfish	34	403	0	0	4	4	30	399
Redbanded rockfish	42	257	8	22	13	19	21	216
Redstripe rockfish	2	42	2	42	0	0	0	0
Rex sole	40	2,375	24	1,400	5	356	11	619
Rougheye rockfish	5	79	5	79	0	0	0	0
Sablefish	53	378	22	156	27	60	4	162
Sand sole	23	502	20	409	1	45	2	48
Sandpaper skate	12	13	2	3	10	10	0	0
Sharpchin rockfish	2	99	2	99	0	0	0	0
Shiner perch	3	233	3	233	0	0	0	0
Shortraker rockfish	4	7	0	0	0	0	4	7
Shortspine thornyhead	22	738	16	478	2	48	4	212
Silvergray rockfish	16	181	15	171	1	10	0	0
Slender sole	13	227	13	227	0	0	0	0
Smelts	1	116	1	116	0	0	0	0
Southern rock sole	54	1,822	23	717	2	2	29	1,102
Spiny dogfish	25	739	24	722	1	17	0	0
Spotted ratfish	35	2,013	34	1,979	1	34	0	0
Starry flounder	3	9	1	4	2	5	0	0
Walleye pollock	17	867	13	673	1	36	3	158
Widow rockfish	5	53	0	0	5	53	0	0
Wolf eel	2	2	1	1	0	0	0	0
Yelloweye rockfish	6	9	0	0	0	0	6	9
Yellowtail rockfish	37	404	18	234	16	21	3	149
Total	1,103	26,491	512	16,845	359	2,628	222	6,199

Table 10. Statistics of individual length and weight, and sex proportion by species.

Species	Length (cm)			Weight (kg)			Sex Proportion	
	Min.	Max.	Mean	Min.	Max.	Mean	Male	Female
Aleutian skate	100	100	100	5.7	5.7	5.7	1.00	0.00
Arrowtooth flounder	10	80	43	0.0	5.0	0.9	0.37	0.63
Big skate	39	188	89	0.7	53.9	12.1	0.62	0.38
Black rockfish	29	39	34	0.4	1.0	0.7	0.40	0.60
Blackbelly eelpout	8	25	17				0.00	0.00
Bocaccio	45	80	71	1.1	6.5	4.6	0.75	0.25
Butter sole	20	40	30	0.1	0.7	0.5	0.34	0.66
C-o sole	27	27	27	0.4	0.4	0.4	0.00	1.00
Canary rockfish	19	58	37	0.5	3.1	1.7	0.55	0.42
China rockfish	25	37	32	0.3	0.9	0.6	0.50	0.50
Chinook salmon	30	30	30	0.4	0.4	0.4	1.00	0.00
Copper rockfish	22	48	38	0.1	2.1	1.2	0.35	0.65
Curlfin sole	12	42	30	0.1	1.0	0.4	0.54	0.46
Darkblotched rockfish	21	21	21	0.2	0.2	0.2	1.00	0.00
Dover sole	15	56	36	0.1	1.6	0.5	0.52	0.48
English sole	13	48	29	0.0	1.0	0.3	0.42	0.58
Eulachon	8	18	13				0.00	0.00
Flathead sole	10	48	31	0.0	1.1	0.3	0.47	0.53
Harlequin rockfish	19	26	23	0.1	0.3	0.2	0.40	0.40
Kelp greenling	19	42	33	0.1	0.5	0.3	0.54	0.46
Lingcod	24	104	55	0.1	10.9	2.7	0.36	0.63
Longnose skate	28	140	85	0.4	16.9	4.6	0.77	0.19
Pacific cod	6	89	30	0.0	6.7	0.4	0.50	0.50
Pacific hake	48	66	56				0.33	0.67
Pacific halibut	41	117	68	0.9	16.8	4.6	0.64	0.35
Pacific herring	10	27	19				0.02	0.01
Pacific ocean perch	8	50	32	0.1	1.4	0.4	0.56	0.44
Pacific sand lance	10	19	13				0.00	0.00
Pacific sanddab	13	36	26	0.0	0.5	0.2	0.47	0.53
Pacific tomcod	12	28	18	0.0	0.2	0.1	0.15	0.20
Petrale sole	19	62	38	0.1	2.7	0.8	0.35	0.65
Pygmy rockfish	15	24	20	0.2	0.2	0.2	0.29	0.71
Quillback rockfish	11	45	32	0.0	2.1	0.7	0.58	0.42
Redbanded rockfish	24	64	45	0.2	4.7	1.8	0.61	0.39
Redstripe rockfish	17	42	31				0.50	0.50
Rex sole	11	51	31	0.0	0.7	0.2	0.46	0.54
Rougheye rockfish	23	71	42				0.41	0.59
Sablefish	23	90	44	0.2	3.6	0.6	0.59	0.41
Sand sole	11	52	33	0.0	1.7	0.5	0.34	0.66
Sandpaper skate	16	103	56	0.0	6.0	1.6	0.62	0.38
Sharpchin rockfish	13	36	21				0.58	0.42
Shiner perch	7	14	10				0.00	0.00
Shortraker rockfish	65	97	83	3.4	14.8	9.9	0.71	0.29
Shortspine thornyhead	7	66	29	0.0	4.7	0.5	0.55	0.45
Silvergray rockfish	32	62	49	1.6	1.6	1.6	0.73	0.27
Slender sole	10	32	26				0.37	0.63
Smelts	7	11	9				0.00	0.00
Southern rock sole	10	51	30	0.0	1.7	0.4	0.37	0.63
Spiny dogfish	26	112	67	1.33	1.33	1.33	0.4	0.6
Spotted ratfish	8	60	31	0.6	0.6	0.6	0.51	0.49
Starry flounder	23	65	54	0.2	2.9	1.6	0.11	0.89
Walleye pollock	14	68	28	0.0	2.3	1.3	0.13	0.24
Widow rockfish	10	52	40	0.0	2.2	1.2	0.58	0.42
Wolf eel	51	157	104	3.2	3.2	3.2	0.00	0.00
Yelloweye rockfish	43	70	55	1.8	6.3	4.0	0.33	0.67
Yellowtail rockfish	21	57	42	0.1	2.6	1.1	0.54	0.46

Table 11. Data collected from net sensors, showing the number of tows from which each data type was collected.

Sensor	Attribute	Number of Tows	Number of Records
Global Positioning System (GPS)	Vessel Position - Latitude	148	2,957
	Vessel Position - Longitude	148	2,957
NMFS Bottom Contact Sensor	Bottom Contact Sensor Tilt Angle	153	37,420
Seabird SBE 19plus Seacat Profiler	Dissolved Oxygen	146	567,726
	Net Depth	146	283,863
	Salinity At Net Depth	146	283,863
	Water Temperature At Net Depth	146	283,863
Seabird SBE 39 Temperature and Depth Sensor	Net Depth	139	23,694
	Water Temperature At Net Depth	139	23,694
Simrad ITI Trawl System	Bottom Depth	111	11,953
	Trawl Net Doorspread	80	3,260
	Trawl Net Wingspread	100	3,741
	Vessel Direction - Compass Bearing True North	112	11,998
	Vessel Position - Latitude	112	11,997
	Vessel Position - Longitude	112	11,997
	Vessel Speed Over Ground	112	11,998

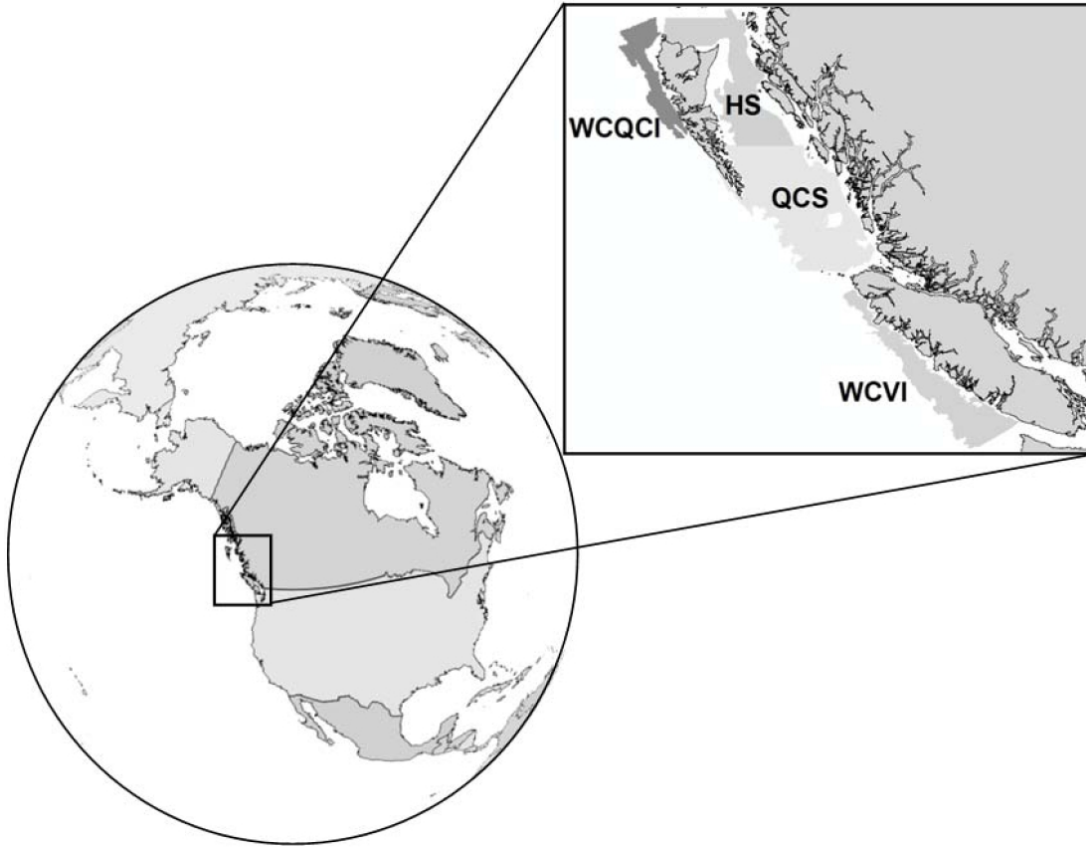


Figure 1. Locations of the modern groundfish trawl surveys on the coast of British Columbia, Canada. HS = Hecate Strait; WCQCI = west coast of Queen Charlotte Islands; QCS = Queen Charlotte Sound; WCVI = west coast of Vancouver Island.



Figure 2. The Canadian Coast Guard Ship W.E. Ricker.

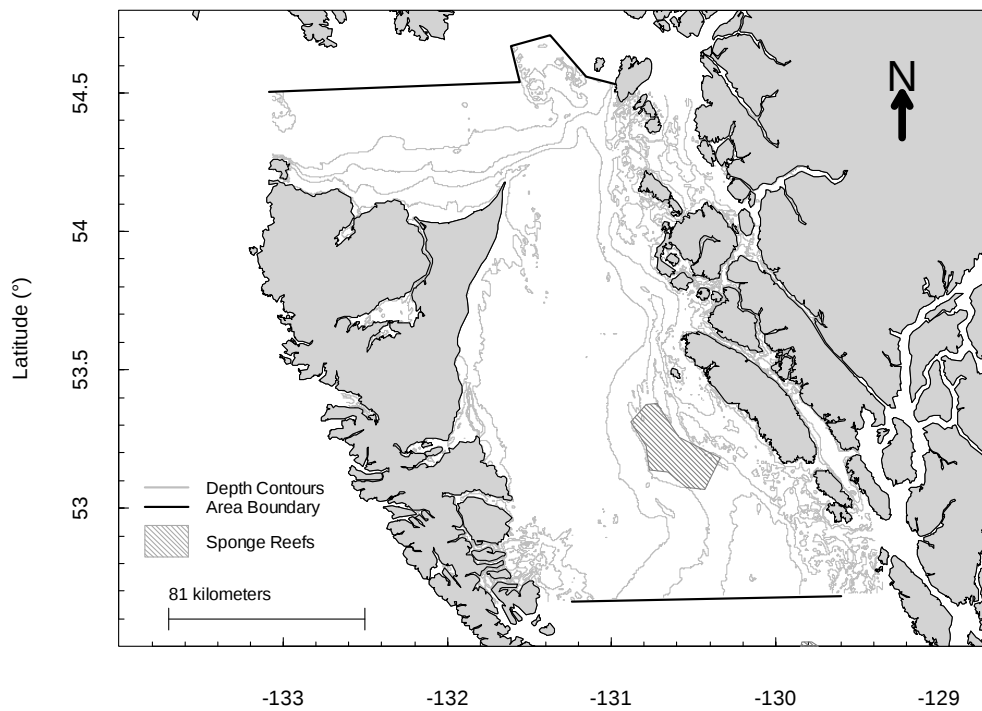


Figure 4. The Queen Charlotte Sound study area showing area boundary, sponge reef protected area, and depth contours.

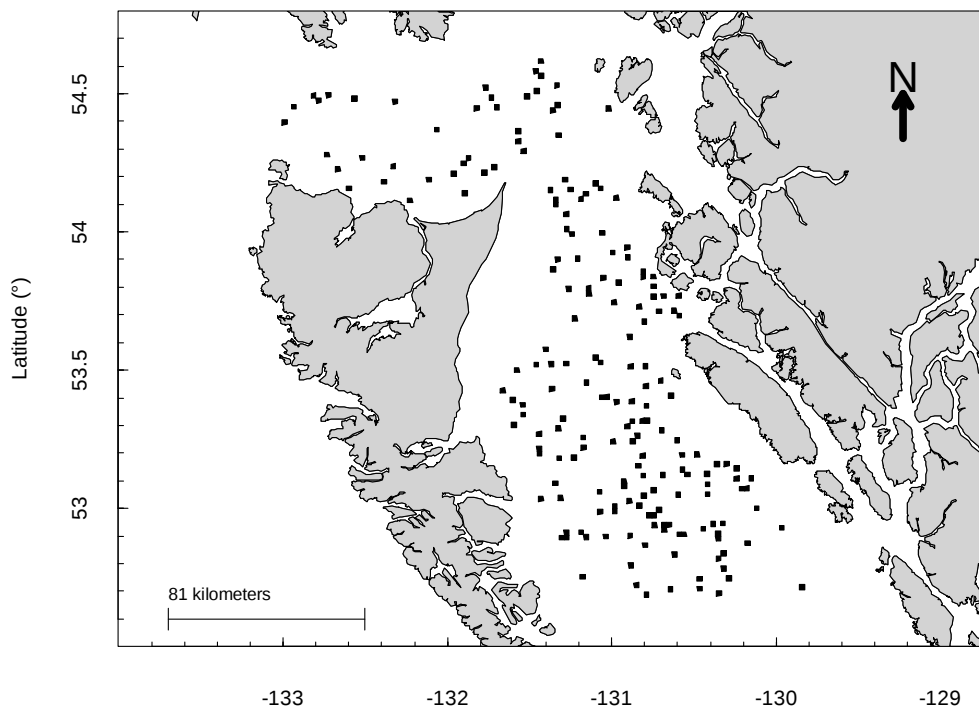


Figure 5. Initial status of the sampling frame showing the 188 selected fishing locations.

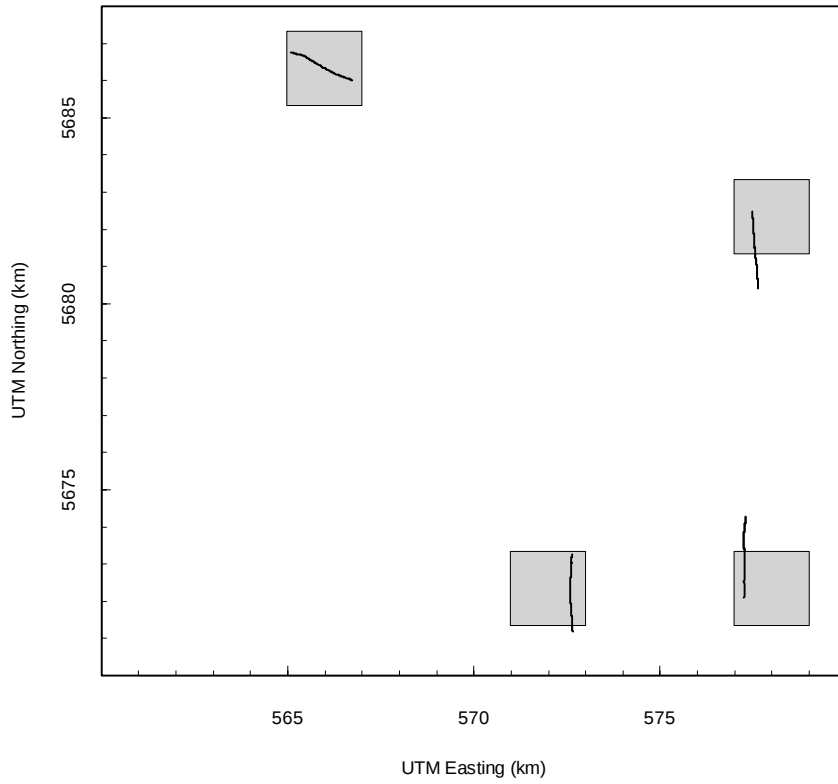


Figure 6. Example tow tracks demonstrating variations in track location within blocks.

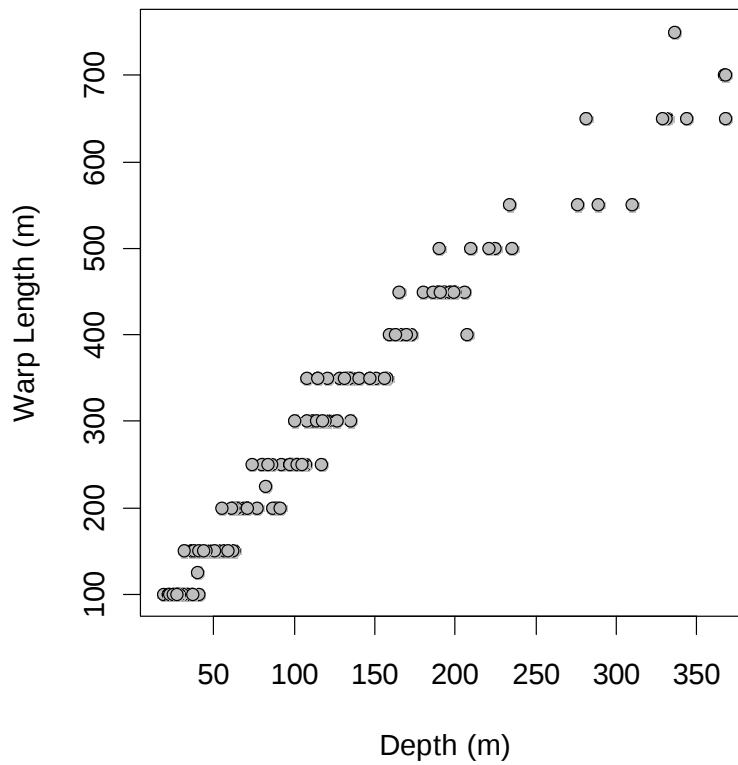


Figure 7. Warp length vs. starting depth.

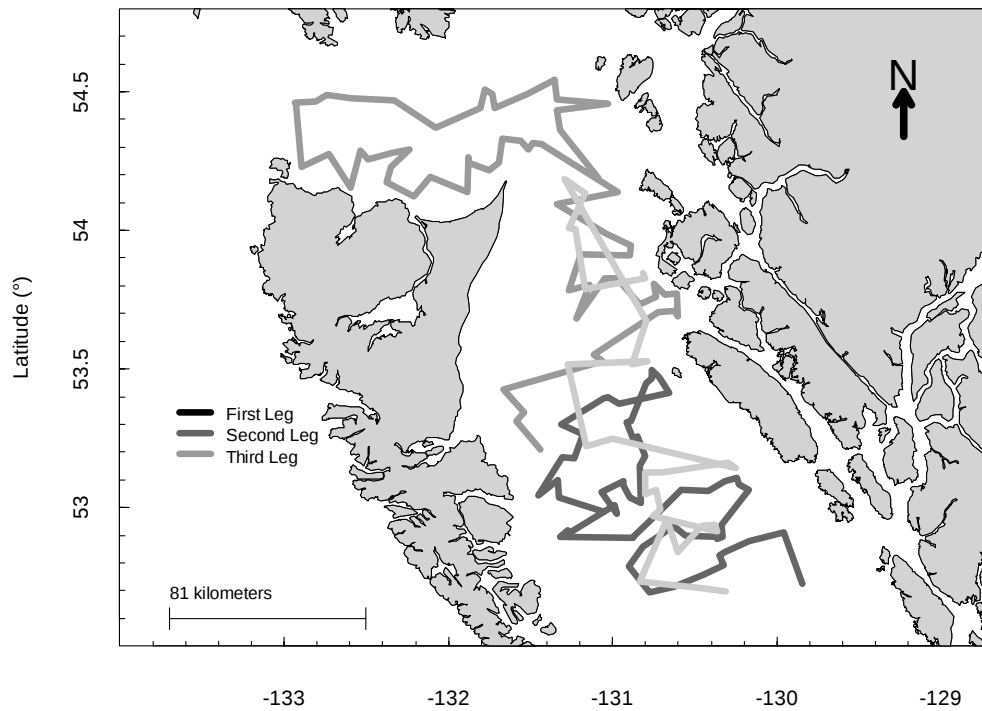


Figure 8. The paths followed on each leg of the survey.

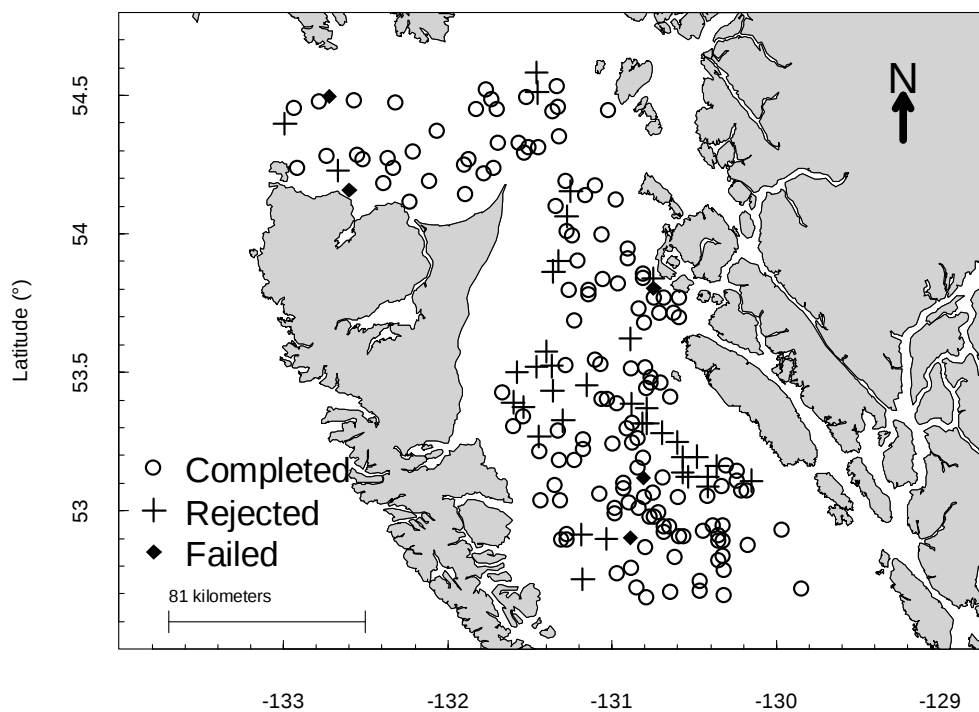


Figure 9. Final status of the sampling frame showing locations that were fished successfully (completed), rejected prior to fishing (rejected), or abandoned after one or more unsuccessful fishing attempts (failed).

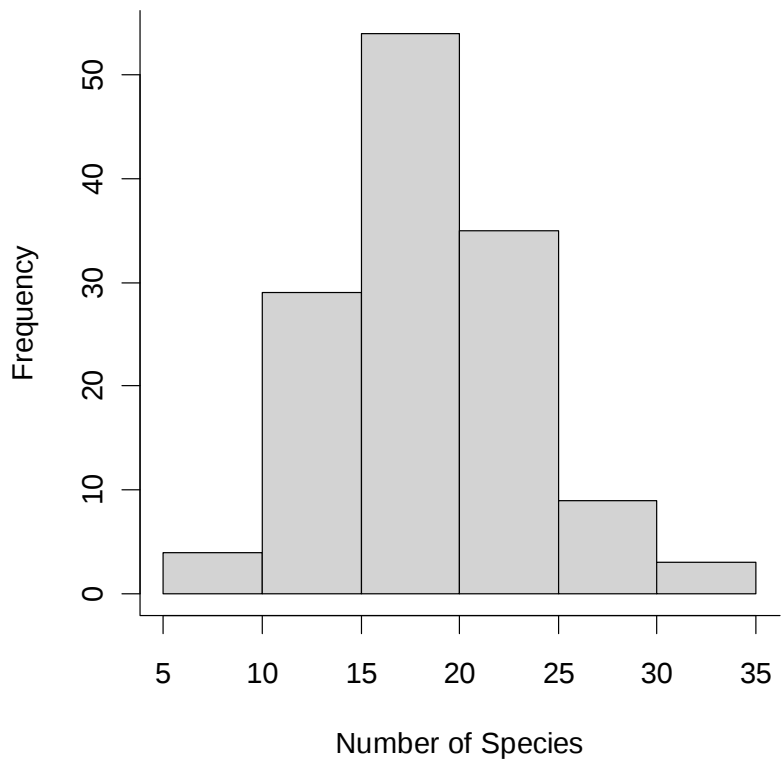


Figure 10. Histogram of number of species caught per tow.

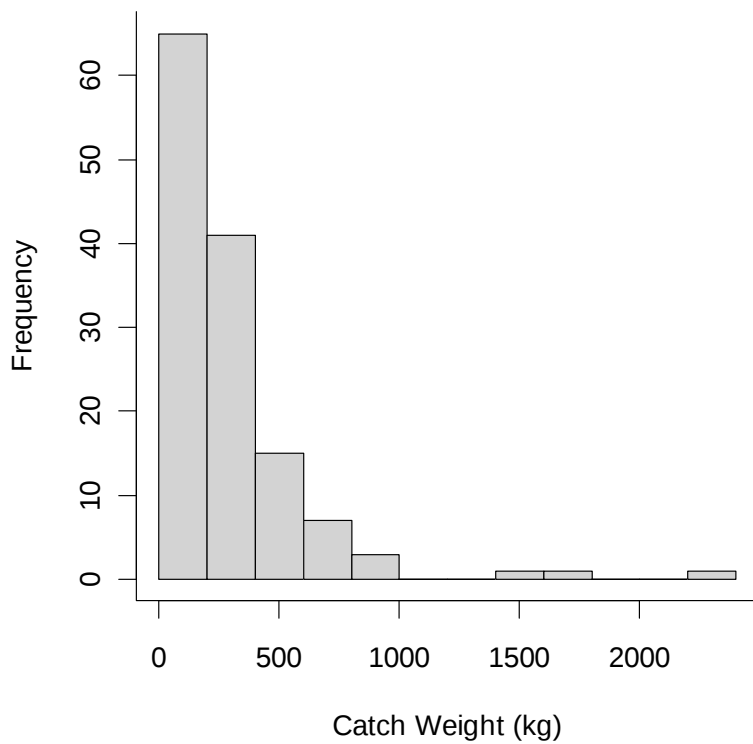


Figure 11. Histogram of catch weight per tow.

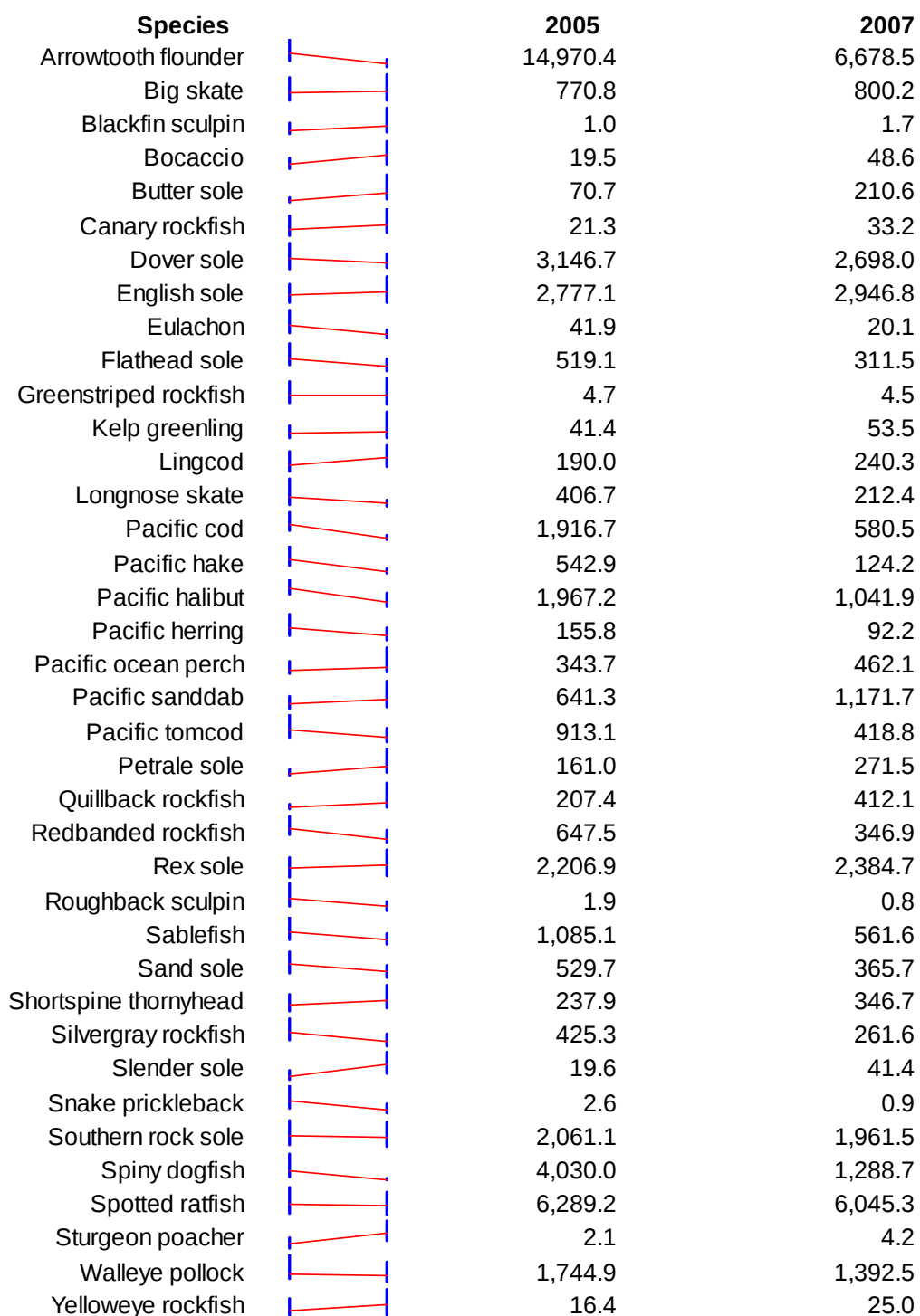


Figure 12. Biomass indices (tonnes) of selected species from all years of the Hecate Strait survey.

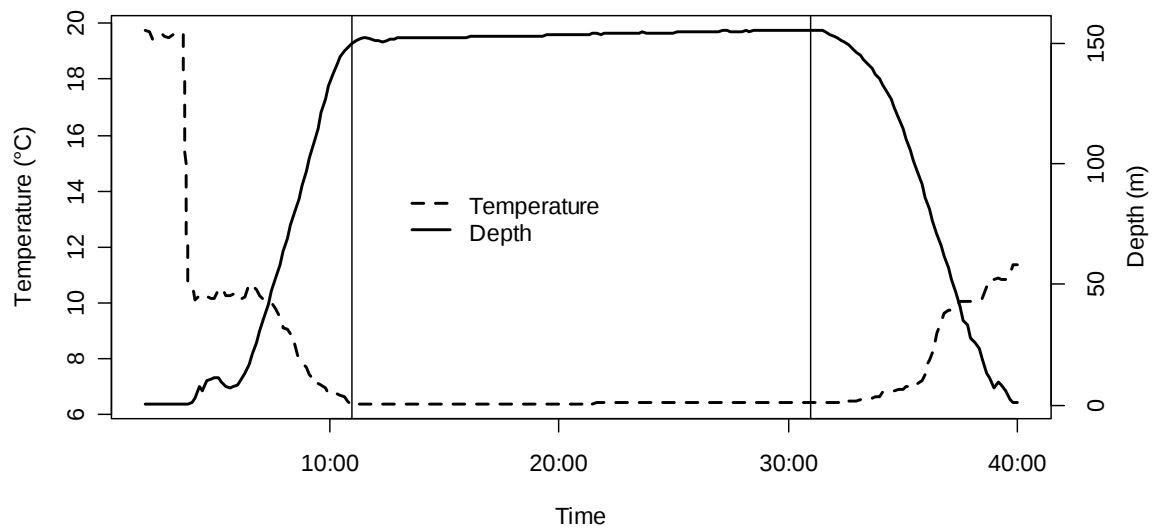


Figure 13. Example of a Seabird 39 temperature and depth profile. The vertical lines indicate the start and end of net contact with the sea floor.

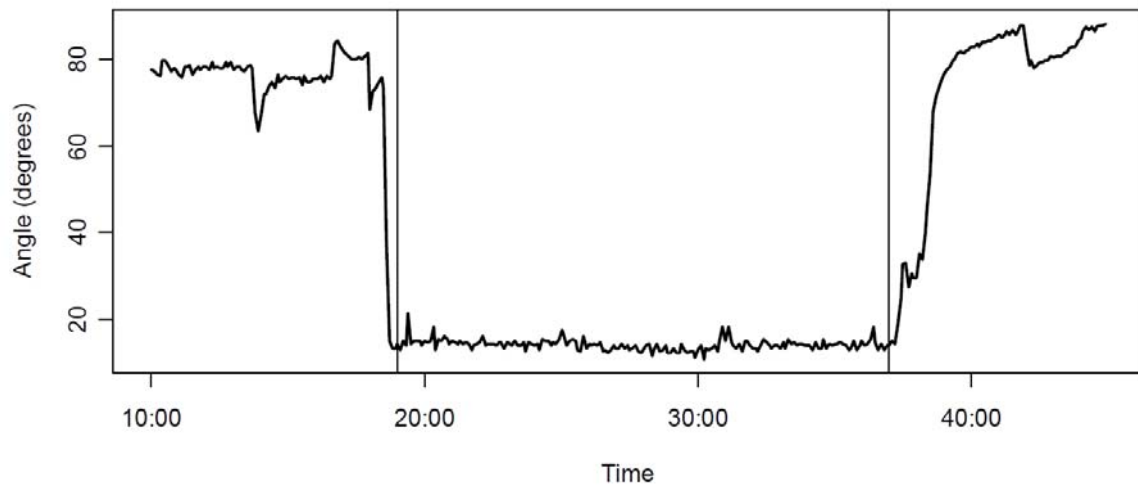


Figure 14. An example of an NMFS bottom contact sensor profile. The vertical lines indicate the start and end of net contact with the bottom.

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APPENDIX A: BRIDGE LOG

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
1	May 24	08:09	52.7250	129.8483	200	19	5.1	450	302.0	Yes
2	May 24	10:25	52.9122	129.9559	225	21	5.1	500	164.1	Yes
3	May 24	12:09	52.8774	130.1723	235	20	5.1	500	144.5	Yes
4	May 24	13:24	52.8412	130.3186	200	21	5.3	450	124.8	Yes
5	May 24	14:18	52.8269	130.3505	186	22	5.1	450	62.5	Yes
6	May 24	15:11	52.7941	130.3264	199	21	5.1	450	165.4	Yes
7	May 24	16:30	52.7552	130.4485	135	21	5.1	300	102.7	Yes
8	May 24	17:49	52.7133	130.6271	127	20	5.1	300	84.1	Yes
9	May 24	18:52	52.6932	130.7787	100	21	5.1	300	74.3	Yes
10	May 25	07:29	52.7869	130.9036	51	20	5.1	150	73.0	Yes
11	May 25	08:36	52.8591	130.8140	45	21	5.3	150	660.6	Yes
12	May 25	09:47	52.9142	130.6783	63	8	5.1	150	0.0	No
13	May 25	10:31	52.9369	130.6680	62	15	5.1	150	93.0	Yes
14	May 25	11:16	52.9376	130.6395	77	20	5.1	200	55.8	Yes
15	May 25	12:45	52.9169	130.5971	97	20	5.1	250	246.9	Yes
16	May 25	13:41	52.8998	130.5553	100	14	5.1	250	2,251.5	Yes
17	May 25	14:59	52.8964	130.3576	173	16	5.1	400	0.0	No
18	May 25	15:49	52.8874	130.3640	167	20	5.1	400	295.5	Yes
19	May 25	16:48	52.8936	130.3334	189	20	5.1	450	118.1	Yes
20	May 25	18:08	52.9392	130.3342	193	21	5.3	450	133.9	Yes
21	May 26	07:32	53.0658	130.1698	194	18	5.1	450	263.0	Yes
22	May 26	08:47	53.0829	130.2317	206	21	5.1	450	125.7	No
23	May 26	09:52	53.1053	130.2437	189	20	5.1	450	57.8	Yes
24	May 26	10:59	53.0952	130.3173	197	21	5.1	450	131.5	Yes
25	May 26	12:27	53.0594	130.4176	180	22	5.1	450	145.5	Yes
26	May 26	14:05	53.0629	130.5843	86	20	5.1	250	67.3	Yes
27	May 26	15:34	52.9760	130.7273	80	19	4.8	250	70.9	Yes
28	May 26	16:54	52.8955	130.8765	33	12	5.1	100	0.0	No
29	May 26	18:01	52.8889	130.8780	34	15	5.1	100	0.0	No
30	May 27	07:36	52.8933	131.3177	107	17	5.1	250	449.5	Yes
31	May 27	08:30	52.9172	131.2738	90	20	5	200	345.2	Yes
32	May 27	09:42	52.9021	131.2831	106	19	5.1	250	848.2	Yes
33	May 27	12:28	53.0077	130.9888	32	21	5.7	100	20.3	Yes
34	May 27	13:27	52.9764	130.9762	30	15	5.1	100	54.8	Yes
35	May 27	14:41	53.0555	131.0689	36	19	5.1	100	27.7	Yes
36	May 27	15:51	53.0965	130.9366	61	19	5.1	200	47.5	Yes
37	May 27	16:42	53.0805	130.9344	55	19	5.1	200	42.2	Yes
38	May 27	18:02	53.0351	130.8937	49	20	5.1	150	42.6	Yes
39	May 27	18:59	53.0152	130.8269	71	19	5.1	200	93.9	Yes
40	May 28	07:23	53.1511	130.8363	112	20	5.1	300	130.3	Yes
41	May 28	08:17	53.1862	130.8038	121	21	5.1	350	348.1	Yes
42	May 28	09:18	53.2581	130.8519	115	19	5.1	350	338.3	Yes
43	May 28	10:21	53.2367	130.8837	108	12	5.1	350	0.0	No

Appendix A continued.

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
44	May 28	11:08	53.2376	130.8678	115	20	5.1	350	247.2	Yes
45	May 28	12:40	53.3083	130.9145	102	21	5.1	250	146.0	Yes
46	May 28	13:42	53.3133	130.8887	126	19	5.1	300	624.3	No
47	May 28	15:37	53.4479	130.7982	134	19	5.1	350	425.8	Yes
48	May 28	16:46	53.4658	130.7635	158	20	5.1	350	372.0	Yes
49	May 28	18:05	53.4963	130.7640	159	20	5.1	400	577.6	Yes
50	May 29	07:10	53.4706	130.7165	108	20	5.5	300	43.4	Yes
51	May 29	08:06	53.4137	130.6534	114	20	5.1	300	53.0	Yes
52	May 29	10:00	53.3748	130.9642	99	19	5.1	250	327.3	Yes
53	May 29	10:58	53.3984	131.0286	71	19	5.1	200	279.0	Yes
54	May 29	12:22	53.3962	131.0546	57	20	5.3	150	507.3	Yes
55	May 29	14:54	53.3010	131.3106	27	15	5.1	100	151.3	Yes
56	May 29	16:00	53.2637	131.1784	38	19	5.1	150	545.9	Yes
57	May 29	17:37	53.1761	131.2365	25	19	5.1	100	123.9	Yes
58	May 29	18:48	53.1801	131.3061	27	20	5.1	100	165.5	Yes
59	May 30	07:34	53.0431	131.4503	19	19	5.3	100	43.9	Yes
60	May 30	08:38	53.0992	131.3345	22	19	5.1	100	54.0	Yes
61	May 30	09:43	53.0381	131.3252	38	20	5.1	150	139.7	Yes
62	May 30	11:53	52.9850	131.0563	32	1	5.1	150	0.0	No
63	Jun 3	07:27	53.2090	131.4383	26	19	5.1	100	70.9	Yes
64	Jun 3	09:01	53.3106	131.5852	28	20	5.3	100	145.6	Yes
65	Jun 3	10:03	53.3446	131.5403	34	20	5	100	496.7	Yes
66	Jun 3	12:10	53.4248	131.6679	22	15	5.3	100	99.4	Yes
67	Jun 3	16:17	53.5291	131.0616	41	16	4.6	150	198.9	Yes
68	Jun 3	17:35	53.5527	131.1119	47	19	5.1	150	88.9	Yes
69	Jun 4	07:15	53.7033	130.7217	131	20	5	350	285.9	Yes
70	Jun 4	08:29	53.7104	130.6262	92	19	5.1	250	127.0	Yes
71	Jun 4	09:33	53.6903	130.6002	59	19	5	150	651.2	Yes
72	Jun 4	10:39	53.7725	130.6085	66	19	5.1	200	431.6	Yes
73	Jun 4	12:12	53.7672	130.6849	121	19	5.1	300	341.2	Yes
74	Jun 4	13:25	53.8066	130.7514	97	6	5.1	250	41.9	No
75	Jun 4	14:18	53.7597	130.7370	133	15	5.1	350	330.0	Yes
76	Jun 4	15:36	53.7340	130.8323	69	19	5.1	200	127.4	Yes
77	Jun 4	17:27	53.8278	130.9738	58	19	5.1	150	189.5	Yes
78	Jun 4	18:27	53.8270	131.0489	53	19	4.4	150	196.7	No
79	Jun 5	07:01	53.6813	131.2213	40	20	5.1	150	770.8	Yes
80	Jun 5	08:34	53.8034	131.1407	43	20	5	150	405.5	Yes
81	Jun 5	09:44	53.7841	131.2692	39	19	5.1	150	909.0	Yes
82	Jun 5	11:52	53.9005	131.1979	34	5			0.0	No
83	Jun 5	12:23	53.9145	131.1988	37	18	5	100	373.1	Yes
84	Jun 5	14:08	53.9100	130.8957	64	19	5.1	200	411.4	Yes
85	Jun 5	15:10	53.9459	130.8891	63	19	4.8	150	223.7	Yes
86	Jun 5	16:16	53.9898	131.0441	81	20		250	988.5	Yes

Appendix A continued.

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
87	Jun 5	18:30	54.0955	131.3385	27	15	5.1	100	196.9	Yes
88	Jun 6	07:30	54.1359	130.9657	88	18	5.9	200	119.7	Yes
89	Jun 6	10:35	54.3095	131.4364	127	19	5.5	300	563.0	Yes
90	Jun 6	11:46	54.3132	131.4874	147	19	5	350	282.0	Yes
91	Jun 6	12:37	54.2929	131.5150	128	19	5.3	350	744.8	Yes
92	Jun 6	13:31	54.3237	131.5567	168	19	4.6	400	301.5	Yes
93	Jun 6	14:31	54.3317	131.6720	171	19	5.1	400	213.3	Yes
94	Jun 6	15:40	54.2427	131.6948	115	20	5.1	300	460.6	Yes
95	Jun 6	16:29	54.2153	131.7516	117	20	5.1	300	477.2	Yes
96	Jun 6	17:42	54.2440	131.8795	172	19	5.1	400	303.0	Yes
97	Jun 6	18:39	54.2623	131.8784	197	20	5.1	450	185.3	Yes
98	Jun 7	07:15	54.1396	131.8818	41	19	5	100	178.1	Yes
99	Jun 7	08:41	54.1922	132.1075	62	19	5.3	200	368.7	Yes
100	Jun 7	09:45	54.1204	132.2102	36	20	5.1	150	286.8	Yes
101	Jun 7	10:57	54.1741	132.3735	97	19	4.6	250	606.5	Yes
102	Jun 7	12:10	54.2291	132.3515	136	19	5.1	350	372.4	Yes
103	Jun 7	13:15	54.2901	132.2339	210	20	5.1	500	183.9	Yes
104	Jun 7	14:22	54.2780	132.3409	190	20	5	500	232.9	Yes
105	Jun 7	15:28	54.2572	132.4905	151	19	5.1	350	208.2	No
106	Jun 7	16:28	54.2891	132.5371	234	20	5.3	550	192.0	No
107	Jun 7	18:16	54.1549	132.5935	81	6	5.1		236.5	No
108	Jun 8	07:42	54.2751	132.7311	281	19	5.1	650	208.4	Yes
109	Jun 8	09:24	54.2279	132.8927	162	19	5.1	400	278.1	Yes
110	Jun 8	11:51	54.4513	132.9296	336	6	4.8	750	67.1	No
111	Jun 8	12:36	54.4586	132.9308	332	16	5.1	650	100.5	No
112	Jun 8	13:47	54.4656	132.8049	367	20	5.3	700	188.7	No
113	Jun 8	14:57	54.4862	132.7383	368	19	5.1	700	112.1	No
114	Jun 8	16:17	54.4762	132.5902	368	19	6.1	650	223.6	No
115	Jun 8	17:48	54.4700	132.3320	344	19	6.1	650	469.1	No
116	Jun 9	06:59	54.3690	132.0783	276	15	5.9	550	260.0	No
117	Jun 9	08:57	54.4390	131.8060	310	19	5.3	550	128.3	Yes
118	Jun 9	10:19	54.5087	131.7816	331	20	5.1	650	290.2	Yes
119	Jun 9	11:53	54.4934	131.7345	329	19	5.1	650	185.6	Yes
120	Jun 9	13:02	54.4403	131.7211	289	19	5.1	550	345.8	Yes
121	Jun 9	14:48	54.4918	131.5178	207	19	5.3	400	242.6	Yes
122	Jun 9	16:28	54.5421	131.3567	99	19	5.1	250	234.4	Yes
123	Jun 9	17:50	54.4722	131.3427	170	19	5.7	400	662.3	Yes
124	Jun 10	07:10	54.4551	131.0313	103	19	5.1	250	264.3	Yes
125	Jun 10	08:52	54.4339	131.3372	191	20	5.1	450	487.9	Yes
126	Jun 10	10:44	54.3625	131.3179	156	20	5.5	350	1,533.3	Yes
127	Jun 10	14:19	54.1899	131.0869	23	15	5.1	100	54.2	Yes
128	Jun 12	07:15	53.8472	130.8154	87	20	5	200	226.1	Yes
129	Jun 12	08:21	53.8261	130.8054	91	16	5	200	246.1	Yes
130	Jun 12	11:03	53.7861	131.1683	40	19	6.1	125	275.3	Yes

Appendix A continued.

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
131	Jun 12	13:45	54.0052	131.2303	31	20	5.3	100	191.0	Yes
132	Jun 12	14:40	54.0071	131.2699	29	19	5.3	100	421.7	Yes
133	Jun 12	16:14	54.1330	131.1665	29	15	5.5	100	442.6	Yes
134	Jun 12	17:49	54.1856	131.2964	25	14	4.6	100	222.5	Yes
135	Jun 13	07:04	53.6733	130.7966	44	19	5.3	150	362.3	Yes
136	Jun 13	09:07	53.5173	130.8807	84	19	4.2	250	190.0	Yes
137	Jun 13	10:21	53.5292	130.7865	101	19	5.5	250	100.0	Yes
138	Jun 13	14:06	53.5180	131.2739	27	20	5.3	100	200.3	Yes
139	Jun 13	17:38	53.2212	131.1600	37	19	5.1	100	39.4	Yes
140	Jun 13	18:45	53.2489	131.0047	74	20	5.1	250	270.8	Yes
141	Jun 14	07:02	53.1430	130.2522	165	20	5.1	450	122.3	Yes
142	Jun 14	08:23	53.1620	130.2966	166	14	5.3	400	49.7	Yes
143	Jun 14	10:24	53.1253	130.6942	140	20	5.5	350	747.3	Yes
144	Jun 14	11:44	53.1281	130.8026	119	2	5.3	300	0.0	No
145	Jun 14	15:11	53.0485	130.8025	97	20	5.1	250	223.0	Yes
146	Jun 14	16:14	53.0626	130.7342	118	20	5.1	300	1,724.7	Yes
147	Jun 14	17:34	52.9926	130.7099	102	20	5.3	250	319.0	Yes
148	Jun 14	18:37	52.9711	130.7554	71	19	5.3	200	255.2	Yes
149	Jun 15	07:03	52.9156	130.3626	170	20	5.3	400	182.6	Yes
150	Jun 15	08:08	52.9367	130.3776	163	20	5.1	400	179.0	Yes
151	Jun 15	09:20	52.9355	130.4557	117	21	5.1	250	35.5	Yes
152	Jun 15	11:04	52.8414	130.6011	105	18	5.5	250	192.8	Yes
153	Jun 15	12:46	52.9565	130.6722	59	20	5.5	150	58.4	Yes
154	Jun 16	07:18	52.7317	130.8353	82	19	5.1	225	55.6	Yes
155	Jun 16	09:49	52.7114	130.4637	147	20	5.5	350	41.3	Yes
156	Jun 16	11:20	52.6992	130.3113	221	20	4.2	500	193.4	Yes

APPENDIX B: CATCH BY TOW

Species	1	2	3	4	5	6	7	8	9	10
Aleutian skate										
Arrowtooth flounder	17.80	43.48	36.14	24.90	17.67	50.28	7.03	5.89	3.79	
Big skate										
Bigmouth sculpin										
Bocaccio	11.62	4.36								
Butter sole										
Cabezon										
Canary rockfish							8.99			
China rockfish										
Copper rockfish										
Curlfin sole										2.66
Dover sole	0.96	40.56	42.42	66.20	6.80	35.96		0.96		
English sole								5.21	27.00	1.78
Eulachon		0.64	0.52	0.04	0.20	0.01				
Flathead sole		5.98	1.34	0.68	1.73	0.23		4.88	1.65	
Greenstriped rockfish	1.34						2.00			
Kelp greenling										
Lingcod							24.39	2.00	4.11	
Longnose skate						18.63	0.55			
Pacific cod	12.88						0.79	1.93		5.48
Pacific hake		4.85	1.72							
Pacific halibut			4.20		3.72		6.06		0.89	
Pacific ocean perch	85.79	5.68	3.24	0.34	0.01		0.25			
Pacific sand lance										
Pacific sanddab									1.50	1.46
Pacific tomcod									0.98	0.46
Petrale sole		1.36				1.29	1.04		9.00	
Quillback rockfish										
Redbanded rockfish	13.12	24.70	16.05	5.94	6.99	14.60				
Redstripe rockfish	18.86									
Rex sole	7.62		7.18	5.04	6.18	3.82	3.27	30.54	5.70	
Rougheye rockfish			3.72							
Sablefish		4.24			0.42			0.43		
Sand sole										0.76
Sandpaper skate			1.42			6.00				
Sharpchin rockfish	22.02	0.20					0.31	0.01	0.01	
Shiner perch										6.80
Shortraker rockfish										
Shortspine thornyhead	10.04	0.98	2.30		1.36					
Silvergray rockfish	49.58	6.52		4.08	1.57	8.24	13.06	2.13	9.48	
Slender sole		1.82	2.52	0.34	1.02	0.03		0.32		
Southern rock sole									2.17	10.86
Spiny dogfish		7.50	12.84	9.04	10.70	21.04	19.37	23.09		10.34
Spotted ratfish	0.26		1.32	4.50		3.17	6.05	1.96	5.04	
Starry flounder										
Walleye pollock	3.28						0.77		0.32	0.50
Widow rockfish										
Wolf eel										
Yelloweye rockfish							7.97			
Yellowtail rockfish	3.20	3.34								
Other	43.66	7.87	7.57	3.72	4.14	2.13	0.77	4.75	2.70	31.94
Total	302.03	164.08	144.50	124.82	62.51	165.43	102.67	84.10	74.34	73.04

Appendix B continued.

Species	11	12	13	14	15	16	17	18	19	20
Aleutian skate										
Arrowtooth flounder				3.41	9.50			27.89	30.17	39.95
Big skate	8.90									
Bigmouth sculpin										
Bocaccio										
Butter sole										
Cabazon										
Canary rockfish						2.89				
China rockfish	2.97									
Copper rockfish	535.21		16.56	1.34						
Curlfin sole			0.64							
Dover sole					1.88			62.38	41.39	55.93
English sole			1.08	3.96	23.44	6.84				
Eulachon								0.06	0.03	0.04
Flathead sole								9.49	4.04	2.93
Greenstriped rockfish						0.34				
Kelp greenling	8.38		0.53							
Lingcod	19.42		2.38			6.21			6.22	1.94
Longnose skate								2.94		
Pacific cod			1.34		0.16			0.40	1.34	
Pacific hake										
Pacific halibut			16.80		9.52	12.19				
Pacific ocean perch								0.66	1.86	0.57
Pacific sand lance										
Pacific sanddab			1.22		1.12					
Pacific tomcod			0.06							
Petrale sole					16.52	1.24				
Quillback rockfish	20.57		6.36	2.84	1.46	38.05				
Redbanded rockfish								10.06	3.09	12.70
Redstripe rockfish						0.28		1.22		
Rex sole			0.12	1.04	86.26			126.86	10.39	5.04
Rougheye rockfish										
Sablefish										1.05
Sand sole										
Sandpaper skate										
Sharpchin rockfish			0.04			0.59		2.00		
Shiner perch										
Shortraker rockfish										
Shortspine thornyhead									0.31	
Silvergray rockfish						10.89		5.72		3.48
Slender sole								1.52	0.27	
Southern rock sole	0.60		7.42	4.54	0.42					
Spiny dogfish			4.00	19.93	72.64	19.74		14.68	13.31	2.10
Spotted ratfish	45.18		32.40	12.99	23.54	12.09		7.60	1.64	3.78
Starry flounder										
Walleye pollock				0.05	0.02	0.84		0.08		
Widow rockfish						341.82				
Wolf eel				5.00						
Yelloweye rockfish										
Yellowtail rockfish	8.94					1796.24		19.38	1.85	2.42
Other	10.43		2.02	0.65	0.42	1.26		2.54	2.23	1.98
Total	660.60		92.97	55.75	246.90	2251.51		295.48	118.14	133.91

Appendix B continued.

Species	21	22	23	24	25	26	27	28	29	30
Aleutian skate										
Arrowtooth flounder	45.50	42.14	13.20	57.54	54.16		2.73			0.65
Big skate										
Bigmouth sculpin							7.68			
Bocaccio										
Butter sole										
Cabazon										
Canary rockfish	2.52				3.14					
China rockfish										
Copper rockfish										
Curlfin sole						0.15				1.06
Dover sole	7.48	8.64	7.74	47.36	37.22					0.54
English sole						4.59	10.94			89.42
Eulachon		0.04	0.07	0.08						
Flathead sole			0.16	1.16	2.02					1.64
Greenstriped rockfish	0.52									
Kelp greenling										
Lingcod							4.45			1.43
Longnose skate			0.43	0.36						
Pacific cod	2.18	1.38	1.40							10.37
Pacific hake	5.80	2.50	1.28	1.64						
Pacific halibut						8.43	12.63			
Pacific ocean perch	37.76	9.14		4.94	1.77					
Pacific sand lance										
Pacific sanddab						0.14	7.31			212.93
Pacific tomcod							0.12			0.21
Petrale sole		1.04			2.98	2.06	0.59			9.79
Quillback rockfish										
Redbanded rockfish	10.70	34.86	2.50	5.32		2.70				
Redstripe rockfish										
Rex sole	3.16	0.50		0.46	0.26		0.31			3.75
Rougheye rockfish				0.26						
Sablefish										0.29
Sand sole										
Sandpaper skate			0.76							
Sharpchin rockfish	11.72									
Shiner perch							0.04			0.11
Shortraker rockfish										
Shortspine thornyhead	17.26	4.30								
Silvergray rockfish	44.52	3.12	5.34							
Slender sole		0.20		0.30	0.04					1.07
Southern rock sole						11.07	1.44			
Spiny dogfish	1.02	2.60	15.19	5.86	31.50	22.64	3.78			9.72
Spotted ratfish	4.56	5.64	1.12	3.42	5.86	14.95	18.48			104.13
Starry flounder										
Walleye pollock	0.48	0.94	0.83							1.89
Widow rockfish										
Wolf eel										
Yelloweye rockfish										
Yellowtail rockfish	9.00	6.04								
Other	58.86	2.65	7.77	2.78	6.54	0.53	0.39			0.46
Total	263.04	125.73	57.79	131.48	145.49	67.26	70.89			449.46

Appendix B continued.

Species	31	32	33	34	35	36	37	38	39	40
Aleutian skate										
Arrowtooth flounder		2.02				0.15	0.16	0.09	0.29	13.16
Big skate				2.77			9.54			
Bigmouth sculpin										
Bocaccio										
Butter sole							0.11		0.12	
Cabazon										
Canary rockfish										
China rockfish										
Copper rockfish										
Curlfin sole	4.18	1.66	1.76	0.39	1.65	1.04		2.45		
Dover sole		1.86								0.89
English sole	167.04	199.47	0.73		0.21	7.94	6.24	15.53	17.87	1.89
Eulachon										
Flathead sole										
Greenstriped rockfish										
Kelp greenling										
Lingcod	11.61	0.52							7.47	7.04
Longnose skate									2.05	
Pacific cod	0.22	0.56	0.41		0.50			0.75		4.83
Pacific hake										
Pacific halibut						9.15	9.52	3.09		9.66
Pacific ocean perch										
Pacific sand lance				0.23	0.14					
Pacific sanddab	78.79	340.21				0.60	0.67	0.44	4.05	
Pacific tomcod	2.39	11.02						0.62		
Petrale sole	1.48	5.74				1.53			0.16	
Quillback rockfish									0.91	5.92
Redbanded rockfish										
Redstripe rockfish										
Rex sole	0.32	1.42							0.69	9.80
Rougheye rockfish										
Sablefish	0.92	2.66								
Sand sole	7.58	0.70	5.33	9.44	7.49			0.31		
Sandpaper skate										
Sharpchin rockfish										
Shiner perch	0.51			0.02		0.01	0.08	0.69		
Shortraker rockfish										
Shortspine thornyhead										
Silvergray rockfish										0.84
Slender sole		0.50								0.10
Southern rock sole	5.62	1.52	11.12	40.76	10.02		2.08	10.85	0.70	0.23
Spiny dogfish	9.08	3.10			4.30	7.66	1.60	1.74	3.67	46.20
Spotted ratfish	52.22	25.50	0.53			19.16	9.01	0.27	26.91	23.35
Starry flounder										
Walleye pollock	0.04	246.74						0.05		3.76
Widow rockfish										
Wolf eel										
Yelloweye rockfish										
Yellowtail rockfish										
Other	3.24	2.99	0.40	1.23	3.28	0.30	3.17	5.74	29.00	2.61
Total	345.24	848.19	20.28	54.84	27.59	47.54	42.18	42.62	93.89	130.28

Appendix B continued.

Species	41	42	43	44	45	46	47	48	49	50
Aleutian skate										
Arrowtooth flounder	32.88	110.66		72.32	26.60	236.44	165.66	162.58	149.62	17.46
Big skate										
Bigmouth sculpin										
Bocaccio										
Butter sole										
Cabazon										
Canary rockfish										
China rockfish										
Copper rockfish										
Curlfin sole							0.40			
Dover sole	14.38	15.76		21.72	4.67	43.04	57.20	73.78	121.24	3.02
English sole	0.16	0.59			36.92	3.10		0.61		
Eulachon	0.14						0.03			
Flathead sole	24.84	60.48		18.76	1.08	29.86	3.70	1.34	0.82	
Greenstriped rockfish						0.86				
Kelp greenling										
Lingcod					9.90				1.50	
Longnose skate	2.60									
Pacific cod		1.24						7.58	5.74	1.48
Pacific hake									0.68	
Pacific halibut	5.06	8.25							3.72	
Pacific ocean perch		0.01		0.01				0.27	49.14	0.17
Pacific sand lance										
Pacific sanddab					0.34					
Pacific tomcod				0.18	0.04					
Petrale sole	5.50	0.96		1.00	2.12	0.58	2.10			
Quillback rockfish				1.42		0.64				0.08
Redbanded rockfish								0.77	2.86	0.92
Redstripe rockfish									0.46	
Rex sole	205.69	106.85		48.45	37.42	232.01	163.21	106.84	221.02	
Rougheye rockfish										
Sablefish		0.74		0.68	0.12	0.88	0.78		2.02	
Sand sole										
Sandpaper skate										
Sharpchin rockfish								0.44		0.07
Shiner perch										
Shortraker rockfish										
Shortspine thornyhead										
Silvergray rockfish						2.62		2.02	2.46	0.36
Slender sole	2.78	3.12		2.26		1.86	0.74	0.35	0.78	
Southern rock sole									0.16	
Spiny dogfish	25.68	13.11		23.76	13.02	49.82	3.28	3.88	2.36	
Spotted ratfish	19.14	14.02		13.02	13.20	18.62	13.62	8.60	10.06	13.88
Starry flounder										
Walleye pollock	1.56	1.30		0.28	0.04	1.94	0.03	1.38	1.28	0.96
Widow rockfish										
Wolf eel										
Yelloweye rockfish										
Yellowtail rockfish							0.76			
Other	7.73	1.16		1.31	0.52	2.00	14.30	1.57	1.70	5.00
Total	348.14	338.25		205.17	145.99	624.27	425.81	372.01	577.62	43.40

Appendix B continued.

Species	51	52	53	54	55	56	57	58	59	60
Aleutian skate										
Arrowtooth flounder	29.84	99.24	10.59							
Big skate					4.78	34.25				
Bigmouth sculpin										
Bocaccio		4.16								
Butter sole			0.56	0.16						
Cabazon							9.22	0.34		2.71
Canary rockfish				1.12						
China rockfish				4.88						
Copper rockfish				219.88	3.34		3.26	1.00		4.98
Curlfin sole			0.26	0.30		47.48	0.40			
Dover sole		28.24	6.06							
English sole		48.39	114.19	6.99	1.10	4.06	0.02	0.01		
Eulachon										
Flathead sole		26.88	2.68							
Greenstriped rockfish										
Kelp greenling				15.60						
Lingcod	1.04	1.96		9.20		0.36				
Longnose skate			0.92							
Pacific cod	8.08	12.14			5.13	0.74	47.71			0.11
Pacific hake										
Pacific halibut	1.70					24.20				
Pacific ocean perch										
Pacific sand lance					0.38	0.01	0.22	0.16	0.37	0.03
Pacific sanddab			110.70			0.30				
Pacific tomcod			1.98	0.39		0.96				
Petrable sole		8.41	6.56							
Quillback rockfish		0.84	1.41	113.05	2.60		4.14	3.00		1.24
Redbanded rockfish										
Redstripe rockfish										
Rex sole	0.50	42.50	3.37							
Rougheye rockfish										
Sablefish			0.48							
Sand sole				0.69	21.05	10.56	0.88	32.26		0.51
Sandpaper skate										
Sharpchin rockfish										
Shiner perch				0.07		0.25	0.98	0.03	0.06	
Shortraker rockfish										
Shortspine thornyhead										
Silvergray rockfish				1.11						
Slender sole		0.83								
Southern rock sole		0.10	2.65	2.84	36.48	121.36	15.06	96.80	4.51	8.86
Spiny dogfish		45.90	3.75	7.47	5.39	11.28		4.14		5.91
Spotted ratfish	7.78	5.42	4.90	29.20	39.18	289.14	38.24	5.07	19.29	21.78
Starry flounder										
Walleye pollock	1.62		0.28			0.18	0.01			
Widow rockfish		0.70		0.72						
Wolf eel										
Yelloweye rockfish										
Yellowtail rockfish	1.40	1.14	3.24	30.12						
Other	1.07	0.44	4.44	63.51	31.87	0.80	3.77	22.68	19.62	7.88
Total	53.03	327.29	279.02	507.30	151.30	545.93	123.91	165.49	43.85	54.01

Appendix B continued.

Species	61	62	63	64	65	66	67	68	69	70
Aleutian skate										
Arrowtooth flounder									171.91	85.42
Big skate				16.78	17.94	2.25	16.74	31.74		
Bigmouth sculpin										
Bocaccio										
Butter sole				11.32	64.98	25.23	1.16			
Cabazon										
Canary rockfish										
China rockfish										
Copper rockfish	4.68		0.74				5.06	2.36		
Curlfin sole	0.14							3.12		
Dover sole									51.89	11.10
English sole			0.04	24.75	220.17	9.29	0.34	1.31	0.40	2.96
Eulachon									0.11	0.34
Flathead sole										
Greenstriped rockfish										
Kelp greenling							1.28			
Lingcod							5.30			
Longnose skate										1.34
Pacific cod									9.56	
Pacific hake										
Pacific halibut			9.48	8.32			13.18	14.60		
Pacific ocean perch										
Pacific sand lance	0.72		0.04	0.03		0.20				
Pacific sanddab					0.72		0.30	0.29		
Pacific tomcod										0.04
Petrale sole										
Quillback rockfish							1.70			
Redbanded rockfish										
Redstripe rockfish										
Rex sole									18.81	17.28
Rougheye rockfish										
Sablefish										0.88
Sand sole	9.06		4.71	13.94	22.06	7.41				
Sandpaper skate										
Sharpchin rockfish										
Shiner perch	0.08		0.08			0.13				
Shortraker rockfish										
Shortspine thornyhead										
Silvergray rockfish										
Slender sole									3.03	0.48
Southern rock sole	34.54		50.62	30.40	59.22	19.72	110.26	14.51	1.76	
Spiny dogfish	3.56		4.25	1.40	75.70	11.49	1.08	5.38	2.81	
Spotted ratfish	82.72		0.70	0.63			40.14	14.52	5.32	4.94
Starry flounder										
Walleye pollock	0.05				0.06				1.84	
Widow rockfish										
Wolf eel										
Yelloweye rockfish										
Yellowtail rockfish									18.46	1.34
Other	4.16		0.19	38.21	35.88	24.02	2.38	1.10	0.01	2.08
Total	139.71		70.85	145.78	496.73	99.74	198.92	88.93	285.91	128.20

Appendix B continued.

Species	71	72	73	74	75	76	77	78	79	80
Aleutian skate										
Arrowtooth flounder	77.68	34.32	150.78	5.03	176.63	55.54	27.20	20.18	0.24	0.05
Big skate							1.22		57.67	61.89
Bigmouth sculpin										
Bocaccio										
Butter sole						0.34	7.89	0.30	0.38	
Cabazon										
Canary rockfish		1.86								
China rockfish										
Copper rockfish										
Curlfin sole						0.23		1.69	0.32	6.19
Dover sole	10.94	2.52	107.46	2.61	99.08	2.61		0.78		0.32
English sole	44.35	23.48	1.40			29.96	10.14	18.21	229.30	28.36
Eulachon			0.66		0.36					
Flathead sole	1.87	4.36	11.90			2.25				
Greenstriped rockfish										
Kelp greenling								1.21	1.52	
Lingcod	3.72	0.78				9.20		1.31	10.36	
Longnose skate			15.24						1.88	
Pacific cod	6.05	0.58		4.92		7.18	25.74		32.56	10.76
Pacific hake		0.04								
Pacific halibut	1.86				3.36		40.66	17.15	12.48	12.24
Pacific ocean perch										
Pacific sand lance										
Pacific sanddab	88.47	2.38					2.62	40.36	4.88	7.12
Pacific tomcod	48.05	18.46		0.31		1.44	12.25	0.05	3.90	0.10
Petrable sole	22.36	0.98		0.20		3.16	25.58	1.04		0.38
Quillback rockfish		8.44		8.30						
Redbanded rockfish					0.86					
Redstripe rockfish										
Rex sole	11.42	6.28	27.48		26.62	31.54	1.73			
Rougheye rockfish										
Sablefish	27.00	0.66	1.84		1.38	0.97		2.69	0.26	
Sand sole							8.99	0.38	5.14	
Sandpaper skate										
Sharpchin rockfish				0.10						
Shiner perch										
Shortraker rockfish										
Shortspine thornyhead										
Silvergray rockfish				4.48						
Slender sole	0.13		2.42		3.80					
Southern rock sole	0.27	1.54				0.24	4.47	10.42	61.58	45.30
Spiny dogfish		11.64	3.78	7.80	6.04			5.51	63.08	0.88
Spotted ratfish	18.70	279.43	17.80	5.34	6.64	5.21	17.34	63.83	269.84	221.00
Starry flounder										
Walleye pollock	287.60	24.18		0.95	3.42		0.74	4.30		0.04
Widow rockfish										
Wolf eel		5.45								
Yelloweye rockfish										
Yellowtail rockfish	0.45			1.05	1.62					
Other	0.31	4.20	0.48	0.78	0.22	0.20	2.90	7.33	15.43	10.83
Total	651.23	431.58	341.24	41.87	330.03	150.07	189.47	196.74	770.82	405.46

Appendix B continued.

Species	81	82	83	84	85	86	87	88	89	90
Aleutian skate										
Arrowtooth flounder	3.92		2.99	253.12	75.30	332.35	6.40	11.84	87.20	77.17
Big skate	140.00		10.19				3.92			2.63
Bigmouth sculpin										
Bocaccio										
Butter sole	0.20					6.70	22.80			
Cabazon										
Canary rockfish					6.32	0.66				
China rockfish										
Copper rockfish										
Curlfin sole			2.00							
Dover sole	0.26			0.30	0.60	16.66		0.51	130.67	91.12
English sole	58.32		5.17	2.78	0.08	257.28	88.49	21.22	39.97	0.17
Eulachon						0.32		0.49		0.09
Flathead sole						24.70		4.57	0.05	0.18
Greenstriped rockfish										
Kelp greenling			0.96	1.46	4.66					
Lingcod			1.38	1.75	1.60			3.68		
Longnose skate	6.06									
Pacific cod	19.80		13.20	22.39	16.92	15.81		4.86	5.45	
Pacific hake						0.74				
Pacific halibut	20.34		3.71	15.67	9.28	7.20	26.35		30.70	5.28
Pacific ocean perch										2.42
Pacific sand lance										
Pacific sanddab	1.26			9.88	5.60	0.60		1.42		
Pacific tomcod	56.04		1.34			0.22	20.77			
Petrals sole				0.64					1.37	
Quillback rockfish			1.96	10.00	23.58	1.12		13.29		
Redbanded rockfish										2.81
Redstripe rockfish					1.05					
Rex sole	0.14			0.37		28.24		2.68	18.74	16.83
Rougheye rockfish										
Sablefish	15.14		2.28	4.54	1.76			0.44		
Sand sole	9.06		11.92				8.00			
Sandpaper skate									0.96	0.29
Sharpchin rockfish										0.10
Shiner perch										
Shortraker rockfish										
Shortspine thornyhead										1.59
Silvergray rockfish					0.74	0.66		3.69		1.37
Slender sole						0.14				
Southern rock sole	85.52		61.60	6.48	3.40	5.20	7.64			
Spiny dogfish	11.62		1.58	2.56	2.00	7.90	3.04		22.90	7.56
Spotted ratfish	469.06		122.98	28.02	67.62	66.14	1.80	16.56	166.13	36.90
Starry flounder										
Walleye pollock	0.36			49.20		211.68		7.86	56.90	35.44
Widow rockfish										
Wolf eel										
Yelloweye rockfish								6.35		
Yellowtail rockfish						1.18		1.18	1.73	
Other	11.86		129.87	2.93	3.19	3.00	7.72	19.05	0.19	0.04
Total	908.96		373.13	412.09	223.70	988.50	196.93	119.69	562.96	281.99

Appendix B continued.

Species	91	92	93	94	95	96	97	98	99	100
Aleutian skate										
Arrowtooth flounder	218.40	96.18	76.12	118.02	332.38	84.71	98.19	67.39	31.00	5.46
Big skate	2.68					6.80		14.60		9.94
Bigmouth sculpin										
Bocaccio				4.64	10.08					
Butter sole								0.18	0.36	0.20
Cabazon										
Canary rockfish			1.88							
China rockfish										
Copper rockfish										
Curlfin sole								1.00		1.22
Dover sole	17.88	7.14	2.88	40.44	24.33	42.44	20.46			
English sole	45.54			52.92	2.21			23.38	1.40	8.44
Eulachon	0.06	0.48	0.04			0.50	2.00	0.01		
Flathead sole					0.43					
Greenstriped rockfish										
Kelp greenling										
Lingcod		1.64						0.44	12.30	1.81
Longnose skate										5.94
Pacific cod	8.88	4.62	1.87	0.90	5.03	15.80			1.37	2.46
Pacific hake		5.40	2.54			3.00				
Pacific halibut	14.82	3.34	9.38	4.60	6.57			13.02	11.40	131.81
Pacific ocean perch		103.98	18.18	2.42		10.24	6.40			
Pacific sand lance										
Pacific sanddab								1.28		3.72
Pacific tomcod								0.02	1.26	
Petrale sole				0.98	3.64			2.24		1.36
Quillback rockfish								0.02		2.14
Redbanded rockfish		7.42				17.84	4.38	2.36		
Redstripe rockfish				0.20						
Rex sole	33.62	5.98	20.60	27.32	31.72	74.77	8.46	0.02		
Rougheye rockfish		0.32					0.37			
Sablefish			0.42							
Sand sole										4.72
Sandpaper skate										
Sharpchin rockfish										
Shiner perch										
Shortraker rockfish										
Shortspine thornyhead		6.24					5.32			
Silvergray rockfish	6.64	6.82	4.46	7.90	5.74	2.84	1.59			
Slender sole						0.44				
Southern rock sole								2.50	19.92	24.42
Spiny dogfish	30.70	5.22	9.42	16.14	25.38	15.00	5.44		6.54	
Spotted ratfish	123.58	38.34	35.04	62.12	21.66	16.02	29.66	48.92	278.53	77.04
Starry flounder										
Walleye pollock	229.24	5.68	29.94	2.42		10.86	1.34		0.21	
Widow rockfish										
Wolf eel									3.15	
Yelloweye rockfish										
Yellowtail rockfish	12.50	2.54		119.56	7.54					
Other	0.22	0.14	0.50	0.01	0.49	1.73	1.68	0.67	1.29	6.12
Total	744.76	301.48	213.27	460.59	477.20	302.99	185.29	178.05	368.73	286.80

Appendix B continued.

Species	101	102	103	104	105	106	107	108	109	110
Aleutian skate										
Arrowtooth flounder	471.23	55.08	19.12	21.58	18.92	52.42	156.61	63.80	43.13	3.78
Big skate										
Bigmouth sculpin			9.48	5.72		3.32				
Bocaccio	6.52								11.82	
Butter sole										
Cabazon										
Canary rockfish				2.12	2.56				1.64	
China rockfish										
Copper rockfish										
Curlfin sole										
Dover sole	6.06	10.16	18.04	5.84	6.08	4.80		28.98	12.73	3.65
English sole	23.32	32.78								
Eulachon			0.58	0.62	0.02	2.02		0.20		
Flathead sole										
Greenstriped rockfish									1.99	
Kelp greenling							1.04			
Lingcod							1.50		1.50	
Longnose skate					15.78	8.90		15.78		
Pacific cod	1.20	7.22		5.71	45.93				71.51	
Pacific hake			0.86	3.18	3.20	9.48		11.44	1.95	
Pacific halibut			6.32	3.84	8.52	17.20		2.74		
Pacific ocean perch		163.12	18.80	18.29	23.28	3.70		2.52	20.74	2.50
Pacific sand lance										
Pacific sanddab										
Pacific tomcod										
Petrable sole	2.70	4.02			2.10				1.76	
Quillback rockfish							34.76			
Redbanded rockfish		1.82	17.06	83.19	9.02	25.70				
Redstripe rockfish		0.32								
Rex sole	15.12	13.22	16.46	7.74	13.90	9.54		20.86	17.93	17.78
Rougheye rockfish						29.43		17.04		
Sablefish			3.28			3.58				8.04
Sand sole										
Sandpaper skate				1.62				1.08		
Sharpchin rockfish		0.34		2.19					0.16	
Shiner perch										
Shortraker rockfish										
Shortspine thornyhead			7.58	9.89		4.64		25.48	2.39	16.73
Silvergray rockfish	12.34	16.06	13.88	20.95	11.90	1.38			25.40	
Slender sole				0.33						
Southern rock sole				0.65			0.64		0.58	
Spiny dogfish	6.94	5.92	2.06	2.48		7.08	1.20			
Spotted ratfish	15.66	10.30	44.66	14.83	15.38	2.46	34.92	15.92	19.14	10.69
Starry flounder										
Walleye pollock	43.80	46.61	1.16	2.99	5.76	1.00			14.10	
Widow rockfish										
Wolf eel										
Yelloweye rockfish					1.98		0.04			
Yellowtail rockfish	1.58	17.68	3.29	18.34	23.72	4.02	5.46		28.44	
Other		0.95	1.22	0.81	0.10	1.35	0.28	2.58	1.17	3.93
Total	606.47	385.60	183.85	232.91	208.15	192.02	236.45	208.42	278.08	67.10

Appendix B continued.

Species	111	112	113	114	115	116	117	118	119	120
Aleutian skate										
Arrowtooth flounder	2.38	3.96	3.16	0.62	3.94	2.76	5.60	28.62	7.90	13.14
Big skate										
Bigmouth sculpin										
Bocaccio										
Butter sole										
Cabazon										
Canary rockfish										
China rockfish										
Copper rockfish										
Curlfin sole										
Dover sole	23.71	34.56	27.80	55.40	32.90	10.87	16.14	96.28	61.49	11.74
English sole										
Eulachon						0.11	0.16	0.66	0.35	0.22
Flathead sole										
Greenstriped rockfish										
Kelp greenling										
Lingcod										
Longnose skate		6.00	21.86			1.01	7.69	8.24	3.08	9.90
Pacific cod										1.64
Pacific hake					4.24	0.80	0.90	1.02	6.08	1.08
Pacific halibut		4.69								
Pacific ocean perch					1.33	7.87	2.61	1.12		1.26
Pacific sand lance										
Pacific sanddab										
Pacific tomcod										
Petrale sole										
Quillback rockfish										
Redbanded rockfish	1.73		2.88		3.24	5.88	1.54			1.48
Redstripe rockfish										
Rex sole	9.01	21.30	16.84	24.91	11.80	3.10	9.04	29.22	26.16	1.12
Rougheye rockfish	4.00	3.40	3.71	8.18	12.47	14.56				31.92
Sablefish	22.46	10.06	11.10	17.62	45.98	20.06	25.14	53.22	31.82	58.76
Sand sole										
Sandpaper skate		1.46		1.42			0.02			
Sharpchin rockfish					0.10					
Shiner perch										
Shortraker rockfish		33.10		10.24			11.34	14.96		
Shortspine thornyhead	9.92	22.74	11.42	76.10	56.24	28.58	6.48	10.76	16.34	50.61
Silvergray rockfish										
Slender sole										
Southern rock sole										
Spiny dogfish				1.22	3.92	1.49	3.66			2.08
Spotted ratfish	21.83	8.96	6.48	3.62	6.66	5.19	31.50	38.12	24.80	29.00
Starry flounder										
Walleye pollock								0.36	0.67	2.88
Widow rockfish										
Wolf eel										
Yelloweye rockfish										
Yellowtail rockfish										
Other	5.46	38.46	6.85	17.88	286.28	157.68	6.46	7.88	6.93	128.98
Total	100.50	188.69	112.10	217.21	469.10	259.96	128.28	290.46	185.62	345.81

Appendix B continued.

Species	121	122	123	124	125	126	127	128	129	130
Aleutian skate			5.72							
Arrowtooth flounder	42.16	72.16	118.60	48.74	147.28	875.64		30.92	62.18	
Big skate						31.62	6.20			
Bigmouth sculpin				5.90						
Bocaccio										
Butter sole										
Cabazon										
Canary rockfish										
China rockfish										
Copper rockfish										
Curlfin sole										3.28
Dover sole	69.63	14.34	345.66	16.44	169.28	340.10		46.94	29.44	
English sole		0.56		2.20	0.34			11.56	12.54	5.42
Eulachon	0.40	4.16	0.74	3.48	0.66	0.90				
Flathead sole		6.90	1.76	0.42	25.44			5.64	39.00	
Greenstriped rockfish										
Kelp greenling										
Lingcod										3.14
Longnose skate	9.50		23.97	2.54		15.78				3.60
Pacific cod		1.96	2.08	10.56		2.64	0.80	15.72	3.00	3.18
Pacific hake	4.68	1.52	22.95	2.18	24.20					
Pacific halibut	8.16		7.13	5.80	4.68	10.00		2.62	3.54	13.12
Pacific ocean perch			0.47	0.18	0.22	24.54				
Pacific sand lance										0.07
Pacific sanddab										0.50
Pacific tomcod								0.30		
Petrale sole		3.80		1.12				0.52	0.64	
Quillback rockfish				7.48				3.30		
Redbanded rockfish	6.26		18.94		11.26	9.72				
Redstripe rockfish		0.08								
Rex sole	19.76	5.00	33.08	1.04	11.52	16.78		90.08	86.90	
Rougheye rockfish			0.39							
Sablefish	5.16	0.60	9.85	1.12	1.18	3.80		3.96	2.44	
Sand sole							4.35			1.28
Sandpaper skate	1.20				2.16					
Sharpchin rockfish										
Shiner perch										
Shortraker rockfish										
Shortspine thornyhead	17.16		1.70		4.74	2.20				
Silvergray rockfish								1.24		
Slender sole				0.28				0.90	1.92	
Southern rock sole		0.60	0.15				5.71	2.80	0.38	78.74
Spiny dogfish	8.24	5.64	1.87		6.10	60.56		1.28	2.66	0.30
Spotted ratfish	43.18	69.28	47.05	145.75	69.58	127.52	22.63	4.24	0.74	155.02
Starry flounder							9.82			
Walleye pollock		21.44	17.40	8.44	8.06	10.72		3.05	0.66	
Widow rockfish										
Wolf eel										
Yelloweye rockfish										
Yellowtail rockfish	4.00	23.68	2.05							
Other	3.15	2.65	0.74	0.61	1.20	0.79	4.69	1.02	0.04	7.69
Total	242.64	234.37	662.30	264.28	487.90	1533.31	54.20	226.09	246.08	275.34

Appendix B continued.

Species	131	132	133	134	135	136	137	138	139	140
Aleutian skate										
Arrowtooth flounder			2.68		16.99	33.26	33.02			11.84
Big skate	2.92		16.00	33.24	19.12			20.01	1.84	
Bigmouth sculpin										
Bocaccio										
Butter sole		2.56	0.46	6.62	1.02					
Cabazon										
Canary rockfish										1.40
China rockfish										
Copper rockfish			1.70							
Curlfin sole		0.18		0.60					2.19	0.32
Dover sole		0.17			0.08	6.26	4.68			0.34
English sole	0.26	107.08	99.14	81.69	48.20	16.50	22.86	11.63	0.15	45.54
Eulachon										
Flathead sole						0.66	2.37			0.50
Greenstriped rockfish										
Kelp greenling			4.70							0.10
Lingcod			0.80		4.58	5.04			1.50	7.14
Longnose skate		2.11			1.70					
Pacific cod			53.08	1.34	3.18					10.34
Pacific hake										
Pacific halibut	21.90	8.04	24.78	15.92	40.70			41.73		4.20
Pacific ocean perch										
Pacific sand lance	0.01		0.01		0.02			0.05	0.09	0.03
Pacific sanddab		0.33	0.54		26.41	0.88				8.50
Pacific tomcod	0.05	122.71	0.56	9.03	1.65	0.32	0.06			0.28
Petrale sole					39.86	6.02	1.12			4.00
Quillback rockfish			14.32						0.03	61.72
Redbanded rockfish										
Redstripe rockfish										
Rex sole					0.04	113.18	35.00			3.50
Rougheye rockfish										
Sablefish		9.96	0.72			0.54				
Sand sole	9.80	9.39	6.36	13.96				12.74	5.76	
Sandpaper skate										
Sharpchin rockfish										
Shiner perch		0.16							0.03	
Shortraker rockfish										
Shortspine thornyhead										
Silvergray rockfish										
Slender sole										
Southern rock sole	28.06	32.34	73.52	11.87	65.08		0.34	8.72	18.23	
Spiny dogfish				2.70	1.64	0.22		0.64	1.97	38.32
Spotted ratfish	108.90	74.64	131.18	13.68	90.06	5.68	0.33	71.77	7.12	25.46
Starry flounder				12.20				2.94		
Walleye pollock			0.36	0.19		0.01				3.58
Widow rockfish										0.27
Wolf eel										
Yelloweye rockfish										9.60
Yellowtail rockfish										1.36
Other	19.14	52.05	11.69	19.50	1.99	1.42	0.22	30.11	0.51	32.42
Total	191.04	421.72	442.60	222.54	362.32	189.99	100.00	200.34	39.42	270.76

Appendix B continued.

Species	141	142	143	144	145	146	147	148	149	150
Aleutian skate										
Arrowtooth flounder	65.50	27.64	173.99		6.50	1425.74	25.87	1.42	48.96	25.04
Big skate										
Bigmouth sculpin	7.06									
Bocaccio							3.75			
Butter sole								0.78		
Cabazon										
Canary rockfish	2.08									1.68
China rockfish										
Copper rockfish										
Curlfin sole							0.39			
Dover sole	6.48	2.67	59.79		4.52	39.06	31.25		22.04	37.30
English sole					25.54	45.95	21.41	55.65		
Eulachon	0.92	0.05	0.29						0.01	
Flathead sole	1.26	0.35	62.06		0.18	15.71	0.87		4.44	4.84
Greenstriped rockfish										
Kelp greenling										
Lingcod			19.35		1.96		5.19	12.78		
Longnose skate						0.65	3.01			
Pacific cod	0.36	0.51	0.51				0.38		0.54	
Pacific hake										
Pacific halibut					6.98		12.21	5.96	7.10	
Pacific ocean perch	0.20	0.45							7.49	10.52
Pacific sand lance										
Pacific sanddab								143.73		
Pacific tomcod					0.20			7.82		
Petrable sole		2.47	13.77		6.96	5.48	14.94	15.28		
Quillback rockfish					0.62					
Redbanded rockfish	2.04								17.79	9.20
Redstripe rockfish		0.26								0.90
Rex sole	2.86	3.04	330.90		95.69	80.38	173.41	1.80	50.91	53.25
Rougheye rockfish										
Sablefish	1.80		1.15				0.75			0.50
Sand sole										
Sandpaper skate										
Sharpchin rockfish	0.40								0.14	
Shiner perch										
Shortraker rockfish										
Shortspine thornyhead										
Silvergray rockfish	5.86				1.34				3.36	2.38
Slender sole	0.30	0.62	2.50			0.55	1.54		1.80	2.10
Southern rock sole										
Spiny dogfish	17.58	3.01	59.88		63.34	95.25	10.41		1.41	7.62
Spotted ratfish	5.68	6.25	18.02		8.76	15.03	13.08	7.58	1.22	2.62
Starry flounder										
Walleye pollock		0.20	0.36		0.24		0.36			2.86
Widow rockfish										
Wolf eel										
Yelloweye rockfish										6.16
Yellowtail rockfish									14.12	8.52
Other	1.87	2.17	4.77		0.21	0.93	0.19	2.40	1.29	3.54
Total	122.25	49.69	747.34		223.04	1724.73	319.01	255.20	182.62	179.03

Appendix B continued.

Species	151	152	153	154	155	156
Aleutian skate						
Arrowtooth flounder	6.98	3.94		0.01	3.69	37.62
Big skate						56.82
Bigmouth sculpin						
Bocaccio						
Butter sole			0.26			
Cabazon						
Canary rockfish						
China rockfish						
Copper rockfish						
Curlfin sole				1.17		
Dover sole					7.64	38.48
English sole		16.52		0.54		
Eulachon						0.01
Flathead sole	1.09	0.76			0.56	1.26
Greenstriped rockfish		0.32				
Kelp greenling						
Lingcod	1.21	1.10		10.33	6.52	
Longnose skate					3.12	2.88
Pacific cod	2.49	0.44		0.07		
Pacific hake					0.99	
Pacific halibut		2.60	11.30	23.11		4.32
Pacific ocean perch						1.92
Pacific sand lance			10.02	0.25		
Pacific sanddab		0.84	0.29	1.50		
Pacific tomcod						
Petrale sole	1.25	1.54		6.12	0.98	
Quillback rockfish	0.66	5.24				
Redbanded rockfish					0.01	22.22
Redstripe rockfish						
Rex sole	7.78	35.03		0.13	8.75	16.92
Rougheye rockfish						
Sablefish						
Sand sole						
Sandpaper skate						
Sharpchin rockfish						
Shiner perch						
Shortraker rockfish						
Shortspine thornyhead						0.50
Silvergray rockfish	6.94	15.34				6.66
Slender sole						0.37
Southern rock sole			28.08	1.94		
Spiny dogfish	2.46	91.32	7.78	7.00	7.93	1.28
Spotted ratfish	3.92	1.46	0.01	3.22	0.23	1.20
Starry flounder						
Walleye pollock	0.70				0.63	
Widow rockfish				0.01		
Wolf eel						
Yelloweye rockfish		4.88				
Yellowtail rockfish						
Other	0.09	11.49	0.65	0.20	0.27	0.98
Total	35.57	192.82	58.39	55.60	41.32	193.44