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**Midwater Trawl Tows and Catches Made on
C.G.S. G. B. Reed Cruise GBR81-1 Strait of
Georgia, January 12-23, 1981.**

L. W. Barner, F. H. C. Taylor, and P. B. McCarter

Department of Fisheries and Oceans
Resource Services Branch
Pacific Biological Station
Nanaimo, British Columbia V9R 5K6

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December 1981

MIDWATER TRAWL TOWS AND CATCHES MADE ON C.G.S. G. B. REED CRUISE GBR81-1
STRAIT OF GEORGIA, JANUARY 12-23, 1981.

by

L. W. Barner, F. H. C. Taylor, and P. B. McCarter

Department of Fisheries and Oceans
Resource Services Branch
Pacific Biological Station
Nanaimo, British Columbia V9R 5K6

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ABSTRACT

Barner, L. W., F. H. C. Taylor, and P. B. McCarter. 1981. Midwater trawl tows and catches made on U.S. G. B. REED cruise GBR81-1 Straits of Georgia, January 12-23, 1981. Can. Data Rep. Fish. Aquat. Sci. 310: iv + 40 p.

This report gives the midwater catches, fishing positions and biological sampling data obtained during G. B. REED cruise GBR81-1 January 12-23, 1981 Straits of Georgia. The distribution and abundance of Pacific hake (Merluccius productus) and Walleye pollock (Tmeragra chalcogramma), and other fish stocks present using a digital echo integration technique. The tows were made to identify the species responsible for the major fish concentrations encountered and to obtain samples.

Sex and length data were obtained for hake, pollock and dogfish.

Key words: Marine fish, catch composition, Pacific hake, walleye pollock, distribution and abundance, Straits of Georgia.

RÉSUMÉ

Barner, L. W., F. H. C. Taylor, and P. B. McCarter. 1981. Midwater trawl tows and catches made on C.G.S. G. B. REED cruise GBR81-1 Straits of Georgia, January 12-23, 1981. Can. Data Rep. Fish. Aquat. Sci. 310: iv + 40 p.

Ce rapport présente les prises entre deux eaux, les positions de pêche et les données biologiques prélevées au cours de la croisière GBR81-1 du G. B. REED dans le détroit de Georgie, du 12 au 23 janvier 1981. La distribution et l'abondance du merlu du Pacifique (Merluccius productus) et de la morue du Pacifique occidental (Theragra chalcogramma), ainsi que des autres stocks de poisson présents ont été déterminés à l'aide d'un intégrateur d'échos numérique. Des passages de chalut ont été faits afin d'identifier les espèces comprenant les concentrations majeures de poissons et de prélever des échantillons.

Des données sur le sexe et la longueur du merlu, de la morue et de l'aiguillat commun furent aussi prélevées.

Mots-clés: poissons marins, composition des captures, merlu du Pacifique, morue du Pacifique occidental, distribution et abondance, détroit de Georgie.

INTRODUCTION

From January to May 1981 an intensive investigation of the hake and pollock stocks in the Strait of Georgia was undertaken. This investigation included hydroacoustic surveys of the Strait in January, February and April, to determine the distribution and abundance of these species. During the hydroacoustic surveys midwater trawl tows were made to identify the major species in the main sound scattering layers (Fig. 1).

This report deals with the fishing activities carried out on the C.G.S. G. B. REED as part of the January hydroacoustic survey.

EQUIPMENT

Net and fishing gear

An Engel midwater trawl was the only net used during this cruise. This net was fished with 40-fm 5/8-in birdles. The forepart of the net was 434 16-in meshes in circumference the net tapered to a codend of double 1 1/2-in web. The codend also had a 3/4-in liner.

The depth of the net was determined by a headline transducer connected by a cable to an Elac netsounder operating at 30 KHz.

Sampling Method

The catch from each tow was brought aboard and sorted by species into galvanized tubs, with perforated bottoms to release water. For small catches of less than 6 tubs per species, all tubs were weighed. For large catches, in excess of 6 tubs per species. The tubs of each species were selected at random, two each from the beginning, middle and end of the catch, were possible, and weighed on a beam balance (to the nearest 0.5 kg). The remainder of the tubs were counted.

Any partially filled tub was weighed, for each species the average weight of the six tubs weighed was raised by the total number of tubs to obtain a total estimated weight for that species. The six weighed tubs formed the basis of subsequent sampling for length, sex, age and maturity.

The main sampling effort was devoted to hake pollock and dogfish.

Twenty-three hundred and fifty two hake were measured sexed and maturities examined, 922 pollock were measured, sexed and 100 fins taken for ageing; 213 dogfish were measured and sexed. Stomachs were examined on 29 dogfish. Table 1 presents a complete summary of species sampled, type and sample taken, and numbers of specimens examined.

This report contains length sex data for the following species:

Pacific hake	Appendix Table 1
Walleye pollock	Appendix Table 2
Dogfish	Appendix Table 3

In hake and pollock fork length was measured to the nearest centimeter. While for dogfish total length was measured to the nearest centimeter.

CATCH COMPOSITION

Table 2 contains a list of scientific and common names of species captured in 21 midwater tows made on this cruise.

Pacific hake dominated the catches accounting for 3733.0 kg or 59.5% by weight of the total midwater catch (Table 3). They appeared in 19 of the 21 tows. Walleye pollock ranked second, accounting for 1,796.5 kg or 28.7% of catch and were present in all 21 tows. Spiny dogfish was third with 637.5 kg or 10.2% and were present in 16 tows. These three species made up 98.4% of the total catch by weight.

In the Strait of Georgia fish appeared on the echosounder as a blotchy layer, which began as a 5-7 m "fringe" along the bottom in depths of about 110 m. As water depths increased the layer generally extended to the bottom, while the upper edge deepened slightly (to 145-160 m). It was often most intense from 180 to 275 m. In some places a scattering of small more discrete schools was found at depths of 55 to 90 m, above the main layer.

Midwater trawl tows were made in the upper 55-90 m layer and at various depths in the main layer (Table 4). The 3 tows in the upper layer consisted almost entirely of pollock. The average catch rate was 328 kg/hr. Few hake were taken and a relatively small number of dogfish (from a trace to 43 kg/hr). In tows made in the main layer at depths above 150 m, hake formed 63% of the average catch (in kg/hr) and pollock 32%. The average catch rates were 552 and 276 kg/hr, respectively. Dogfish formed 5% of the average catch and yielded 53 kg/hr. Included in the depth stratum are two hauls made in a very dense layer encountered in northern Malaspina Strait. These hauls had catch rates of hake of 2151 and 1043 kg/hr and of pollock of 697 and 1278 kg/hr. If these two hauls are omitted catch rates for the remainder of the Strait of Georgia reduce to 253 kg/hr (77%), 40 kg/hr (12%) for pollock and 37 kg/hr for dogfish. In tows made below 150 m hake formed 71%, pollock 8%, and dogfish 21% of the average catch/hr. The catch rates were 259, 30, and 75 kg/hr, respectively. The catch rates for hake and pollock were generally similar to those above 150 m, while that for dogfish increased somewhat.

Detailed tables (Tables 6, 7) show the time location and catches (kg) of midwater trawl tows made in the Strait of Georgia on cruise GBR81-1, January 12-23, 1981.

ACKNOWLEDGMENTS

The cooperation and assistance of Captain Jim Liston and the crew of the C.G.S. G. B. REED are most gratefully acknowledged.

Table 1. Summary of species sampled, type of sample, and number of specimens examined during G. B. Reed cruise GBR81-1, January 12-23, 1981.

	Tow no.	Type of net	No. measured length	Sex			Average weight	Maturity samples	Stomach	Age	Sampling remarks
				M	F	U					
Pollock	1	midwater	52	28	24	-	0.72	52	-	-	Total sampled. No tumours or Lamprey scars
Pollock	4	midwater	72	50	22	-	0.59	72	-	-	Total sampled. No tumours, 1 Lamprey scar
Pollock	7	midwater	119	64	53	-	0.56	119	-	-	Total sampled. No tumours, 11 Lamprey scars
Pollock	12	midwater	15	5	10	-	0.67	15	-	-	Total sampled. No tumours or Lamprey scars
Pollock	13	midwater	18	8	10	-	0.53	18	-	-	Total sampled. No tumours or Lamprey scars
Pollock	14	midwater	76	41	35	-	0.74	76	-	-	Random sub-sample, 100 fins. No tumours or Lamprey scars
Pollock	15	midwater	333	186	147	-	-	333	-	100	Total sampled. No tumours or Lamprey scars
Pollock	16	midwater	56	34	22	-	0.54	56	-	-	Random sub-sample. No tumours or Lamprey scars
Pollock	17	midwater	166	100	66	-	0.57	166	-	-	Random sub-sample. No tumours or Lamprey scars
Pollock	19	midwater	67	51	16	-	-	67	-	-	Random sub-sample. No tumours or Lamprey scars
Total	10		972	567	405	-	-	972	-	100	
Hake	1	midwater	183	27	156	-	0.74	-	-	-	Random sub-sample
Hake	3	midwater	179	75	95	9	0.77	-	-	-	Random sub-sample
Hake	6	midwater	322	169	153	-	0.37	-	-	-	Random sub-sample
Hake	8	midwater	270	113	102	55	0.51	-	-	-	Total sampled

Table 1 (cont'd)

	Tow no.	Type of net	No. measured length	Sex			Average weight	Maturity samples	Stomach	Age	Sampling remarks
				M	F	U					
Hake	12	midwater	91	46	45	-	-	-	-	-	Random sub-sample
Hake	13	midwater	320	191	129	-	0.51	-	-	-	Total sampled
Hake	14	midwater	225	64	87	74	0.36	-	-	-	Random sub-sample
Hake	15	midwater	191	114	77	-	-	-	-	-	Random sub-sample
Hake	17	midwater	202	109	93	-	0.46	-	-	-	Random sub-sample
Hake	18	midwater	103	56	47	-	-	-	-	-	Random sub-sample
Hake	19	midwater	92	52	40	-	-	-	-	-	Random sub-sample
Hake	20	midwater	68	40	28	-	0.47	-	-	-	Total sampled
Hake	21	midwater	106	38	68	-	-	-	-	-	Random sub-sample
Total	13	midwater	2,352	1,094	1,120	138	-	-	-	-	
Dogfish	14	midwater	29	17	12	-	2.43	-	29	-	Total sampled
Dogfish	20	midwater	146	80	66	-	0.23	-	-	-	Juveniles only sampled
Dogfish	21	midwater	38	22	16	-	0.57	-	-	-	Total sampled
Total	3		213	119	94	-	-	-	29	-	

Table 2. Scientific and common names^a of species captured.

Common name	Scientific Name
Pacific lamprey	<u>Lampetra tridentatus</u>
Brown cat shark	<u>Apristurus brunneus</u>
Spiny dogfish	<u>Squalus acanthias</u>
Ratfish	<u>Hydrolagus colliei</u>
Pacific herring	<u>Clupea harengus pallasii</u>
Chinook salmon	<u>Oncorhynchus tshawytscha</u>
Northern smoothtongue	<u>Leuroglossus stilbius schmidt</u>
Lanternfish	Myctophidae sp.
Plainfin midshipman	<u>Porichthys notatus</u>
Pacific cod	<u>Gadus macrocephalus</u>
Pacific hake	<u>Merluccius productus</u>
Walleye pollock	<u>Theragra chalcogramma</u>
Splitnose rockfish	<u>Sebastes diploproa</u>
yellowtail rockfish	<u>S. flavidus</u>
Quillback rockfish	<u>S. maliger</u>
Redstripe rockfish	<u>S. proriger</u>
Blackfin sculpin	<u>Malacocottus kincaidi</u>
Rex sole	<u>Glyptocephalus zachirus</u>
Flathead sole	<u>Hippoglossoides elassodon</u>
Slender sole	<u>Lyopsetta exilis</u>
Dover sole	<u>Microstomus pacificus</u>
English sole	<u>Parophrys vetulus</u>

^aAfter Hart (1973)

Table 3. Total catch by principal species, G. B. REED cruise
GBR81-1, January 12-23, 1981.

Species	Kilograms	% of total catch
Hake	3,733.0	59.54
Pollock	1,796.5	28.66
Spiny dogfish	637.5	10.17
Ratfish	54.5	0.87
Chinook salmon	18.5	0.30
Brown cat shark	18.0	0.29
Flathead sole	2.0	
Rex sole	2.0	
yellowtail rockfish	2.0	
Splitnose rockfish	2.0	
Pacific cod	1.5	
English sole	1.0	
Plainfin midshipman	1.0	
Dover sole	Tr.	0.17
Slender sole	Tr.	
Quillback rockfish	Tr.	
Redstripe rockfish	Tr.	
Northern smoothtongue	Tr.	
Myctophidae sp.	Tr.	
Pacific herring	Tr.	
Blackfin sculpin	Tr.	
<u>Invertebrates</u>		
Squid	Tr.	
Glass shrimp	Tr.	
Euphausiids	Tr.	
Prawns	Tr.	
Total	6,269.5	100.00%

Table 4. Catch (kg) and catch rates (kg/hr) in the upper layer and in the main fish layer above and below 150 m for hake, pollock and dogfish.

Tow no.	Headline depth	Hake		Pollock		Dogfish	
		kg	kg/hr	kg	kg/hr	kg	kg/hr
Upper Layer							
4	73	+	+	42	57	18	25
7	76	0	0	66	133	+	+
9	94	0	0	397	794	22	43
Main Layer, above 150 m							
1	102	330	495	38	56	3	4
2	148	8	16	+	+	22	44
12	77	52	111	10	21	0	0
13	92	162	324	10	19	29	58
14	135	140	195	56	79	70	98
15	73	1183	2151	384	697	39	71
16	128	40	82	30	62	9	19
17	132	504	1043	618	1278	38	80
Main Layer, below 150 m							
5	174	100	213	18	40	38	80
6	300	200	399	14	29	49	98
8	183	137	274	5	10	0	0
10	183	50	100	12	24	50	100
11	344	126	228	4	6	56	101
18	256	353	756	2	4	33	71
19	187	102	211	75	155	36	74
20	227	32	69	1	2	61	131
21	275	78	78	2	2	22	22

Table 5. Occurrence of food items in the stomachs of dogfish (Squalus acanthias), by 5-cm length groups on cruise GBR81-1, January 12-23, 1981.

Length interval group (cm)	Stomachs examined	Euphausiids	Hake fragments	Pollock fragments	Plainfin midshipman fragments
50- 54	1	-	-	-	-
55- 59	0	-	-	-	-
60- 64	1	-	-	-	-
65- 69	5	1	2	1	-
70- 74	2	1	-	-	-
75- 79	7	-	1	1	1
80- 84	3	-	1	1	-
85- 89	3	-	-	-	-
90- 94	2	-	1	-	-
95- 99	2	-	1	-	-
100-104	1	-	-	1	-
105-110	2	-	1	-	-
Total	29	2	7	4	1
Percent ^a	-	11.8	41.2	23.5	5.9

^aThe percentage each food item formed of the number of stomachs containing food.

Table 5 (cont'd)

Length interval group (cm)	Digested fish frag.	Unidentifiable digested material	Other	Total food occurrence	Empty stomachs	Stomachs with food
50- 54	-	-	-	0	1	0
55- 59	-	-	-	-	-	-
60- 64	-	-	-	0	1	0
			"spare ribs"			
65- 69	-	1	1	6	1	4
70- 74	-	-	-	1	1	1
75- 79	2	-	-	5	3	4
80- 84	1	1	-	4	0	3
85- 89	1	-	-	1	2	1
90- 94	-	-	-	1	1	1
95- 99	-	-	-	1	1	1
100-104	-	-	-	1	0	1
105-110	-	-	-	1	1	1
Total	4	2	1	21	12	17
Percent ^a	23.5	11.8	5.9	-	41.4	58.6

^aThe percentage each food item formed of the number of stomachs containing food.

Table 6. Species composition of G. B. REED, trawl catches, January 12-23, 1981.

Midwater or bottom net	Midwater		Midwater		Midwater		Midwater		Midwater		Midwater	
Tow number	1		2		3		4		5		6	
Total catch (kg)	382.5		31.0		229.0		78.0		161.0		263.0	
Duration (min)	40		30		30		45		28		30	
	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.
Dover sole	-	-	-	-	Tr.	1	-	-	-	-	-	-
English sole	1.0	2	-	-	-	-	-	-	-	-	-	-
Flathead sole	2.0	4	Tr.	1	-	-	-	-	-	-	-	-
Rex sole	2.0	4	Tr.	1	-	-	-	-	-	-	-	-
Slender sole	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sebastes diploproa</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sebastes flavidus</u>	-	-	1.0	1	-	-	1.0	1	-	-	-	-
<u>Sebastes maliger</u>	-	-	-	-	-	-	-	-	-	-	Tr.	1
<u>Sebastes proriger</u>	-	-	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	-	-	-	-	-	-	-	Tr.	1	-	-
Chinook salmon	-	-	Tr.	2	-	-	11.5	8	-	-	-	-
Myctophidae sp.	-	-	-	-	Tr.	-	-	-	-	-	-	-
Northern smoothtongue	-	-	-	-	Tr.	-	Tr.	-	Tr.	-	-	-
Pacific cod	1.5	1	-	-	-	-	-	-	-	-	-	-
Pacific hake (adult)	330.0	-	8.0	-	138.0	179	Tr.	-	99.5	-	199.5	-
Pacific hake (juv)	-	-	-	-	Tr.	-	Tr.	-	Tr.	-	Tr.	-
Pacific herring	-	-	Tr.	-	-	-	-	-	-	-	-	-
Plainfin midshipman	-	-	-	-	-	-	-	-	-	-	-	-
Walleye pollock	37.5	52	Tr.	1	12.5	22	42.5	72	18.5	27	14.5	-
Brown cat shark	Tr.	2	-	-	Tr.	-	-	-	5.5	-	Tr.	-
Pacific lamprey	Tr.	1	-	-	Tr.	1	-	-	-	-	-	-
Ratfish	5.5	-	Tr.	2	35.5	-	4.5	-	-	-	-	-
Spiny dogfish (adult)	3.0	1	11.0	-	34.5	-	-	-	37.5	-	49.0	-
Spiny dogfish (juv)	-	-	11.0	-	8.5	-	18.5	-	-	-	-	-
Squid	Tr.	4	Tr.	4	Tr.	Tr.	-	-	Tr.	2	Tr.	3
Shrimp	Tr.	-	Tr.	-	Tr.	Tr.	-	-	-	-	-	-

Table 6 (cont'd)

Midwater or bottom net	Midwater		Midwater		Midwater		Midwater		Midwater		Midwater	
Tow number	7		8		9		10		11		12	
Total catch (kg)	68.0		146.0		425.0		112.0		196.5		62.0	
Duration (min)	30		30		60		30		33		28	
	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.
Dover sole	-	-	-	-	-	-	-	-	-	-	-	-
English sole	-	-	-	-	-	-	-	-	-	-	-	-
Flathead sole	-	-	-	-	-	-	-	-	-	-	-	-
Rex sole	-	-	-	-	-	-	-	-	-	-	-	-
Slender sole	-	-	-	-	-	-	Tr.	1	-	-	-	-
<u>Sebastes diploproa</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sebastes flavidus</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sebastes maliger</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sebastes proriger</u>	-	-	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	-	Tr.	1	-	-	Tr.	2	-	-	-	-
Chinook salmon	1.5	1	-	-	5.5	4	-	-	-	-	-	-
Myctophidae sp.	-	-	-	-	-	-	-	-	-	-	-	-
Northern smoothtongue	-	-	Tr.	-	-	-	-	-	Tr.	-	-	-
Pacific cod	-	-	-	-	1.0	1	-	-	-	-	-	-
Pacific hake (adult)	-	-	137.0	270	-	-	50.0	-	125.5	-	52.0	-
Pacific hake (juv)	-	-	Tr.	-	-	-	Tr.	-	Tr.	-	-	-
Pacific herring	-	-	-	-	-	-	-	-	-	-	-	-
Plainfin midshipman	-	-	-	-	-	-	-	-	-	-	-	-
Walleye pollock	66.5	119	5.0	11	397.0	-	12.0	-	3.5	-	10.0	15
Brown cat shark	-	-	4.0	10	-	-	-	-	3.0	-	-	-
Pacific lamprey	-	-	-	-	-	-	-	-	-	-	-	-
Ratfish	-	-	-	-	-	-	-	-	9.0	-	-	-
Spiny dogfish (adult)	-	-	-	-	-	-	50.0	-	55.5	-	-	-
Spiny dogfish (juv)	Tr.	2	-	-	21.5	-	-	-	-	-	-	-
Squid	-	-	-	-	-	-	Tr.	2	-	-	-	-
Shrimp	-	-	Tr.	-	-	-	-	-	Tr.	-	-	-

Table 6 (cont'd)

Midwater or bottom net	Midwater		Midwater		Midwater		Midwater		Midwater		Midwater	
Tow number	13		14		15		16		17		18	
Total catch (kg)	200.5		267.0		1,605.5		78.5		1,161.0		392.0	
Duration (min)	30		43		33		29		29		28	
	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.
Dover sole	-	-	-	-	-	-	-	-	-	-	-	-
English sole	-	-	Tr.	1	-	-	-	-	-	-	-	-
Flathead sole	-	-	-	-	-	-	-	-	-	-	-	-
Rex sole	-	-	-	-	-	-	-	-	-	-	-	-
Slender sole	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sebastes diploproa</u>	-	-	-	-	-	-	-	-	1.0	2	-	-
<u>Sebastes flavidus</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sebastes maliger</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sebastes proriger</u>	-	-	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	-	-	-	-	-	-	-	-	-	-	-
Chinook salmon	-	-	-	-	-	-	-	-	-	-	-	-
Myctophidae sp.	-	-	-	-	-	-	-	-	-	-	-	-
Northern smoothtongue	-	-	-	-	-	-	-	-	-	-	Tr.	-
Pacific cod	-	-	-	-	-	-	-	-	-	-	-	-
Pacific hake (adult)	162.0	320	140.0	227	1,183.0	-	39.5	-	504.0	-	353.0	-
Pacific hake (juv)	-	-	-	-	Tr.	-	-	-	Tr.	-	Tr.	-
Pacific herring	-	-	-	-	-	-	-	-	-	-	-	-
Plainfin midshipman	-	-	Tr.	6	-	-	-	-	-	-	-	-
Walleye pollock	9.5	18	56.5	76	383.5	-	30.0	56	617.5	-	2.0	5
Brown cat shark	-	-	-	-	-	-	-	-	-	-	4.0	10
Pacific lamprey	-	-	-	-	Tr.	1	-	-	Tr.	2	-	-
Ratfish	-	-	-	-	-	-	-	-	-	-	-	-
Spiny dogfish (adult)	29.0	-	75.0	29	39.0	6	9.0	2	38.5	8	33.0	-
Spiny dogfish (juv)	-	-	-	-	-	-	-	-	-	-	-	-
Squid	-	-	Tr.	2	-	-	-	-	-	-	Tr.	1
Shrimp	-	-	-	-	-	-	-	-	Tr.	-	Tr.	-

Table 6 (cont'd)

Midwater or bottom net	Midwater		Midwater		Midwater	
Tow number	19		20		21	
Total catch (kg)	213.0		95.0		103.0	
Duration (min)	29		28		60	
	Wt.	No.	Wt.	No.	Wt.	No.
Dover sole	-	-	-	-	-	-
English sole	-	-	-	-	-	-
Flathead sole	-	-	-	-	-	-
Rex sole	-	-	-	-	-	-
Slender sole	-	-	-	-	-	-
<u>Sebastes diploproa</u>	-	-	1.0	1	-	-
<u>Sebastes flavidus</u>	-	-	-	-	-	-
<u>Sebastes maliger</u>	-	-	-	-	-	-
<u>Sebastes proriger</u>	-	-	-	-	Tr.	1
Blackfin sculpin	-	-	-	-	-	-
Chinook salmon	-	-	-	-	-	-
Myctophidae sp.	-	-	Tr.	-	-	-
Northern smoothtongue	-	-	Tr.	-	-	-
Pacific cod	-	-	-	-	-	-
Pacific hake (adult)	102.0	-	32.0	68	78.0	-
Pacific hake (juv)	Tr.	-	Tr.	-	Tr.	-
Pacific herring	-	-	-	-	-	-
Plainfin midshipman	-	-	-	-	-	-
Walleye pollock	75.0	-	1.0	1	2.0	4
Brown cat shark	-	-	-	-	1.5	4
Pacific lamprey	Tr.	1	-	-	-	-
Ratfish	-	-	-	-	-	-
Spiny dogfish (adult)	36.0	7	28.0	-	21.5	40
Spiny dogfish (juv)	-	-	33.0	126	-	-
Squid	Tr.	1	-	-	Tr.	1
Shrimp	-	-	Tr.	-	Tr.	-

Table 7. Tow information.

Vessel: G. B. REED Date: 81 Jan. 15 Yr Mo Day Set/haul no: 1
Location: S. of Point Roberts Area: Strait of Georgia
Start: Lat. 48°56.5' Long. 123°03.8'
End: Lat. 48°55.5' Long. 123°00.5'
min.
Gear: MWT - 434 E Start time (1352): 1432 Duration: 40
Bottom depth m: Start: 121 End: 132 Est. av. depth: 126
Footrope
Net Depth Range m: 114 Est. av. depth: 114
mi.
Direction of set °true: 115 Speed kn: 35 Distance travelled: 2.4
Set on: _____ Water condition: calm Tide: _____
Wind direction: 150°T Wind speed: 10 kn Recorder: F. Taylor
ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____
Remarks: _____
Sounder summary: Light scatter 5-7 m off bottom. Headline depth 102 m.

Vessel: G. B. REED Date: 81 Jan. 15 Yr Mo Day Set/haul no: 2
Location: N. of Belle Chain Islets Area: Strait of Georgia
Start: Lat. 48°51.5' Long. 123°08.7'
End: Lat. 48°51.1' Long. 123°10.6'
min.
Gear: MWT - 434 E Start time (1550): 1620 Duration: 30
Bottom depth m: Start: 146 End: 183 Est. av. depth: 164.5
Footrope
Net Depth Range m: 141-178 Est. av. depth: 141-178
mi.
Direction of set °true: 265 Speed kn: 3.5-4.0 Distance travelled: 1.3
Set on: _____ Water condition: calm Tide: _____
Wind direction: 150°T Wind speed: 10 Recorder: F. Taylor
ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____
Remarks: _____
Sounder summary: Single fish scatter over bottom. Headline depth 130-167 m.

Table 7 (cont'd)

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 16 Set/haul no: 3

Location: Midway Galiano Is - Roberts Bk Area: Strait of Georgia

Start: Lat. 48°59.3' Long. 123°21.6'

End: Lat. 48°58.2' Long. 123°19.8'

min.

Gear: MWT - 434 E Start time (0915): 0945 Duration: 30

Bottom depth m: Start: 212 End: 198 Est. av. depth: 205

Footrope

Net Depth Range m: 191 Est. av. depth: 191

mi.

Direction of set °true: - Speed kn: 3-4 Distance travelled: 1.6

Set on: _____ Water condition: _____ Tide: _____

Wind direction: S - SE Wind speed: 5 Recorder: F. Taylor

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: _____

Sounder summary: Scatter from 73 m to bottom. Headline depth 179 m.

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 16 Set/haul no: 4

Location: Midway Galiano Is - Roberts Bk Area: Strait of Georgia

Start: Lat. 48°58.8' Long. 123°19.7'

End: Lat. 49°01.4' Long. 123°21.7'

min.

Gear: MWT - 434 E Start time (1232): 1317 Duration: 45

Bottom depth m: Start: 212 End: 238 Est. av. depth: 225

Footrope

Net Depth Range m: 70 - 77 Est. av. depth: 73

mi.

Direction of set °true: 330 Speed kn: 3 - 4 Distance travelled: 3.0

Set on: _____ Water condition: _____ Tide: _____

Wind direction: S - SW Wind speed: 5 Recorder: F. Taylor

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: Lots of small 4" Hake in web

Sounder summary: Widely scattered 155 m layer of small schools or single fish.
Headline depth 59 - 66 m.

Table 7 (cont'd)

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 16 Set/haul no: 5

Location: E. Porlier Pas Area: Strait of Georgia

Start: Lat. 49°01.7' Long. 123°26.5'

End: Lat. 49°03.2' Long. 123°28.0'

min.

Gear: MWT ~ 434 E Start time (1424): 1452 Duration: 28

Bottom depth m: Start: 337 End: ~ Est. av. depth: 337

Footrope

Net Depth Range m: 176~194 Est. av. depth: 183

mi.

Direction of set °true: 330 Speed kn: 3.5 Distance travelled: 1.8

Set on: _____ Water condition: calm Tide: _____

Wind direction: S ~ SW Wind speed: 5 Recorder: F. Taylor

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: _____

Sounder summary: Layer at 165 ~ 183 m. Headline Depth 165 ~ 183 m.

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. Set/haul no: 6

Location: E. of Porlier Pass Area: Strait of Georgia

Start: Lat. 49°01.2' Long. 123°26.9'

End: Lat. 49°00.25' Long. 123°25.3'

min.

Gear: MWT ~ 434 E Start time (1558): 1628 Duration: 30

Bottom depth m: Start: 344 End: 311 Est. av. depth: 328

Footrope

Net Depth Range m: 300~267 Est. av. depth: 300~267

mi.

Direction of set °true: 150 Speed kn: 3.5 Distance travelled: 1.4

Set on: _____ Water condition: calm Tide: _____

Wind direction: S Wind speed: 5 Recorder: F. Taylor

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: _____

Sounder summary: Set on deep 'layer' about 73 m to bottom.

Table 7 (cont'd)

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 17 Set/haul no: 7

Location: S. Side McCall Bank Area: Strait of Georgia

Start: Lat. 49°18.1' Long. 123°37.2'

End: Lat. 49°19.6' Long. 123°39.3'

min.

Gear: MWT - 434 E Start time (0840): 0910 Duration: 30

Bottom depth m: Start: 300 End: 249 Est. av. depth: 275

Footrope

Net Depth Range m: 76 Est. av. depth: 76

mi.

Direction of set °true: 310 Speed kn: 3.5 Distance travelled: 2.0

Set on: _____ Water condition: low chop Tide: _____

Wind direction: 330°T Wind speed: 10 Recorder: F. Taylor

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: _____

Sounder summary: 'Pollock' layer light at 55 - 170 m, Headline depth 55 - 64 m.

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. Set/haul no: 8

Location: S. Side McCall Bank Area: Strait of Georgia

Start: Lat. 49°19.8' Long. 123°39.0'

End: Lat. 49°19.0' Long. 123°36.5'

min.

Gear: MWT - 434 E Start time (0948): 1018 Duration: 30

Bottom depth m: Start: 249 End: 238 Est. av. depth: 243

Footrope

Net Depth Range m: 195 Est. av. depth: 195

mi.

Direction of set °true: 130 Speed kn: 3.5 Distance travelled: 1.8

Set on: _____ Water condition: Rippled Tide: _____

Wind direction: - Wind speed: - Recorder: F. Taylor

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: _____

Sounder summary: Set on top part of main layer, 183 m to bottom. Headline depth 183 m.

Table 7 (cont'd)

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 17 Set/haul no: 9

Location: Midway Gabriola ~ Bowen Is. Area: Strait of Georgia

Start: Lat. 49°16.0' Long. 123°33.8'

End: Lat. 49°17.75' Long. 123°36.1'

min.

Gear: MWT ~ 434 E Start time (1230): 1300 Duration: 30

Bottom depth m: Start: 355 End: 339 Est. av. depth: 347

Footrope

Net Depth Range m: 94 Est. av. depth: 94

mi.

Direction of set °true: 325 Speed kn: 3.5 Distance travelled: 2.3

Set on: _____ Water condition: small waves Tide: _____

Wind direction: SE Wind speed: 20 Recorder: F. Taylor

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: _____

Sounder summary: 'Pollock' layer at 155 ~ 92 m. Headline depth 73 ~ 82 m.

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 17 Set/haul no: 10

Location: Midway Gabriola ~ Bowen Is. Area: Strait of Georgia

Start: Lat. 49°14.7' Long. 123°33.1'

End: Lat. 49°14.3' Long. 123°30.5'

min.

Gear: MWT ~ 434 E Start time (1427): 1457 Duration: 30

Bottom depth m: Start: 373 End: 357 Est. av. depth: 365

Footrope

Net Depth Range m: 177 Est. av. depth: 177

mi.

Direction of set °true: 090 Speed kn: 3.5 Distance travelled: 1.8

Set on: _____ Water condition: light chop Tide: _____

Wind direction: S ~ SE Wind speed: 20 Recorder: F. Taylor

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: _____

Sounder summary: Light 'Hake' layer at 183 m. Headline depth 165 m.

Table 7 (cont'd)

Vessel: G. B. REED Date: 81 Jan. 17 Yr Mo Day Set/haul no: 11
Location: Midway Gabriola - Bowen Is. Area: Strait of Georgia
Start: Lat. 49°14.4' Long. 123°32.3'
End: Lat. 49°14.4' Long. 123°31.8'
Gear: MWT - 434 E Start time (1602): 1635 Duration: 33 min.
Bottom depth m: Start: 366 End: 377 Est. av. depth: 371
Footrope
Net Depth Range m: 356 Est. av. depth: 356 mi.
Direction of set °true: 280 Speed kn: 3.5 Distance travelled: 1.6
Set on: _____ Water condition: - Tide: _____
Wind direction: S - SE Wind speed: 15 Recorder: F. Taylor
ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____
Remarks: _____
Sounder summary: Headline depth 337 - 350 m.

Vessel: G. B. REED Date: 81 Jan. 21 Yr Mo Day Set/haul no: 12
Location: W. of Grant Reef Area: Strait of Georgia
Start: Lat. 49°53.3' Long. 124°53.5'
End: Lat. 49°54.7' Long. 124°52.1'
Gear: MWT - 434 E Start time (0835): 0903 Duration: 28 min.
Bottom depth m: Start: 267 End: 161 Est. av. depth: Edge of bank
Footrope
Net Depth Range m: 89 Est. av. depth: 89 mi.
Direction of set °true: 43 Speed kn: 3.8 Distance travelled: 1.8
Set on: _____ Water condition: light chop Tide: _____
Wind direction: 135°T Wind speed: 10 Recorder: W. Barner
ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____
Remarks: Euphausiids in net meshes
Sounder summary: Small darker spots 92 - 128 m lighter diffuse spots 128 m to bottom. Headline depth 77 m.

Table 7 (cont'd)

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 21 Set/haul no: 13
 Location: W. of Grant Reefs Area: Strait of Georgia
 Start: Lat. 49°55.5' Long. 124°54.4'
 End: Lat. 49°54.2' Long. 124°52.2'
min.
 Gear: MWT - 434 E Start time (1100): 1130 Duration: 30
 Bottom depth m: Start: 209 End: 183 Est. av. depth: Edge of Bank
 Footrope
 Net Depth Range m: 92 - 85 Est. av. depth: 88
mi.
 Direction of set °true: 120 Speed kn: 3.8 Distance travelled: 1.9
 Set on: _____ Water condition: _____ Tide: _____
 Wind direction: 135°T Wind speed: 5 Recorder: W. Barner
 ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____
 Remarks: _____
 Sounder summary: Heavy layer 110 - 128 m diffuse to bottom. Headline depth 92 m.

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 21 Set/haul no: 14
 Location: off Powell River Area: Strait of Georgia
 Start: Lat. 49°52.8' Long. 124°42.2'
 End: Lat. 49°54.0' Long. 124°39.2'
min.
 Gear: MWT - 434 E Start time (1325): 1408 Duration: 43
 Bottom depth m: Start: 139 End: 113 Est. av. depth: variable
 Footrope
 Net Depth Range m: 135-109 Est. av. depth: 135-109
mi.
 Direction of set °true: 45 Speed kn: _____ Distance travelled: _____
 Set on: _____ Water condition: Rippled Tide: _____
 Wind direction: 230°T Wind speed: 15 Recorder: W. Barner
 ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____
 Remarks: Poor Net Sounder recording
 Sounder summary: Layer 128 m to bottom; diffuse. Headline depth 135 m.

Table 7 (cont'd)

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 22 Set/haul no: 15

Location: off Powell River Area: Strait of Georgia

Start: Lat. 49°50.5' Long. 124°34.8'

End: Lat. 49°50.3' Long. 124°34.4'

min.

Gear: MWT - 434 E Start time (0827): 0900 Duration: 33

Bottom depth m: Start: 231 End: 326 Est. av. depth: variable

Footrope

Net Depth Range m: 85 Est. av. depth: 85

mi.

Direction of set °true: 155 Speed kn: 4.2 Distance travelled: 2.3

Set on: _____ Water condition: Rippled Tide: _____

Wind direction: 140°T Wind speed: 5 Recorder: W. Barner

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: _____

Sounder summary: Heavy schools 73 ~ 92 m diffuse to bottom. Headline modal depth 73 m, ranged to 126 m.

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 22 Set/haul no: 16

Location: Malaspina Strait Area: Strait of Georgia

Start: Lat. 49°44.8' Long. 124°22.9'

End: Lat. 49°43.7' Long. 124°21.0'

min.

Gear: MWT - 434 E Start time (1046): 1115 Duration: 29

Bottom depth m: Start: 234 End: 327 Est. av. depth: variable

Footrope

Net Depth Range m: 122-158 Est. av. depth: 140

mi.

Direction of set °true: 120 Speed kn: 3.5 Distance travelled: 1.7

Set on: _____ Water condition: - Tide: _____

Wind direction: - Wind speed: - Recorder: W. Barner

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: Euphausiids in net

Sounder summary: Mush-type layer; heavier at top; goes to bottom. Headline depth 110 ~ 146 m.

Table 7 (cont'd)

Vessel: G. B. REED Date: 81 Jan. 22 Yr Mo Day Set/haul no: 17
Location: Malaspina Strait Area: Strait of Georgia
Start: Lat. 49°44.7' Long. 124°21.5'
End: Lat. 49°44.0' Long. 124°19.0'
min.
Gear: MWT ~ 434 E Start time (1327): 1356 Duration: 29
Bottom depth m: Start: 209 End: 165 Est. av. depth: variable
Footrope
Net Depth Range m: 140 ~ 149 Est. av. depth: 145
mi.
Direction of set °true: 100 Speed kn: 3.9 Distance travelled: 1.8
Set on: _____ Water condition: Glass Tide: _____
Wind direction: Nil Wind speed: Nil Recorder: W. Barner
ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____
Remarks: _____
Sounder summary: Headline depth 128 ~ 139 m.

Vessel: G. B. REED Date: 81 Jan. 22 Yr Mo Day Set/haul no: 18
Location: Malaspina Strait Area: Strait of Georgia
Start: Lat. 49°43.1' Long. 124°19.7'
End: Lat. 49°41.5' Long. 124°18.5'
min.
Gear: MWT ~ 434 E Start time (1505): 1533 Duration: 28
Bottom depth m: Start: 322 End: 253 Est. av. depth: 288
Footrope
Net Depth Range m: 268 Est. av. depth: 268
mi.
Direction of set °true: 145 Speed kn: 3.9 Distance travelled: 1.8
Set on: _____ Water condition: ~ Tide: _____
Wind direction: Nil Wind speed: Nil Recorder: W. Barner
ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____
Remarks: _____
Sounder summary: Layer 128 ~ 165 m diffuse. Headline depth 256 m.

Table 7 (cont'd)

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 22 Set/haul no: 19

Location: Malaspina Strait Area: Strait of Georgia

Start: Lat. 49°32.4' Long. 124°06.5'

End: Lat. 49°34.0' Long. 124°07.5'

min.

Gear: MWT ~ 434 E Start time (1726): 1755 Duration: 29

Bottom depth m: Start: 401 End: 384 Est. av. depth: 393

Footrope

Net Depth Range m: 111 Est. av. depth: 111

mi.

Direction of set °true: 330 Speed kn: 3.9 Distance travelled: 1.8

Set on: _____ Water condition: ~ Tide: _____

Wind direction: ~ Wind speed: ~ Recorder: W. Barner

ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: Towed bottom of layer

Sounder summary: 154 ~ 220 m diffuse layer. Headline depth 99 m.

Yr Mo Day

Vessel: G. B. REED Date: 81 Jan. 23 Set/haul no: 20

Location: Sisters Is. Area: Strait of Georgia

Start: Lat. 49°26.0' Long. 124°28.5'

End: Lat. 49°27.2' Long. 124°30.8'

min.

Gear: MWT ~ 434 E Start time (0822): 0850 Duration: 28

Bottom depth m: Start: 329 End: 315 Est. av. depth: 322

Footrope

Net Depth Range m: 239 Est. av. depth: 239

mi.

Direction of set °true: 305 Speed kn: 3.9 Distance travelled: 1.9

Set on: _____ Water condition: Rippled Tide: _____

Wind direction: 305°T Wind speed: 10 Recorder: W. Barner

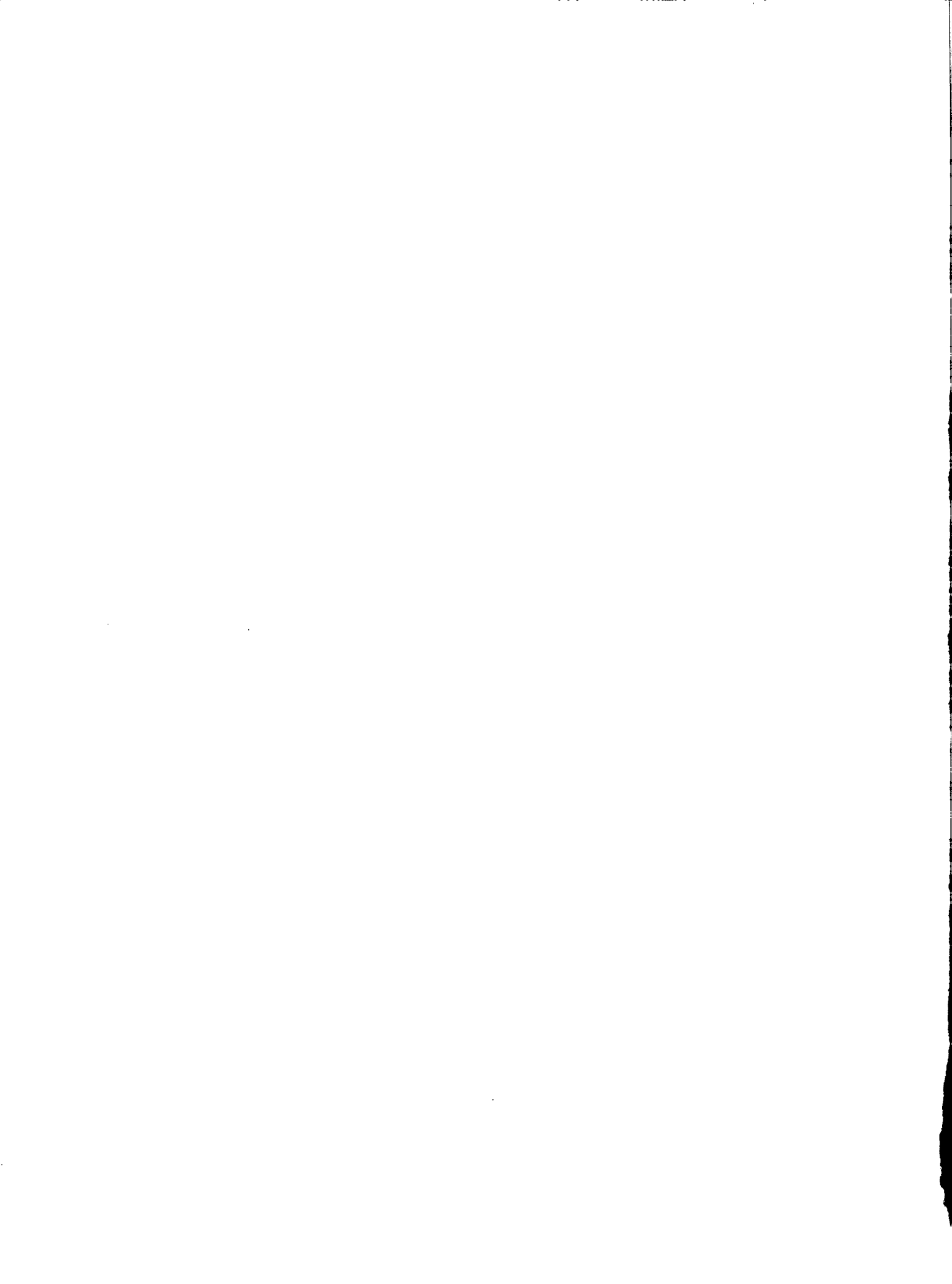
ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____

Remarks: _____

Sounder summary: Single fish layer 183 m to bottom. Headline depth 227 m.

Table 7 (cont'd)

Vessel: G. B. REED Date: 81 Jan. 21 Yr Mo Day Set/haul no: 21
Location: N. of Sabine Ch. Area: Strait of Georgia
Start: Lat. 49°38.0' Long. 124°29.2'
End: Lat. 49°35.1' Long. 124°25.5'
Gear: MWT - 434 E Start time (1057): 1157 Duration: 60 min.
Bottom depth m: Start: 344 End: 361 Est. av. depth: 352
Footrope
Net Depth Range m: 287 Est. av. depth: 287 mi.
Direction of set °true: 130 Speed kn: 3.7 Distance travelled: 3.7
Set on: _____ Water condition: light chop Tide: _____
Wind direction: 300°T Wind speed: 10 Recorder: W. Barner
ttm: _____ tdm: _____ bt: _____ Other oceanographic data: _____
Remarks: _____
Sounder summary: Single fish traces 220 m to bottom, sparse. Headline depth 275 m



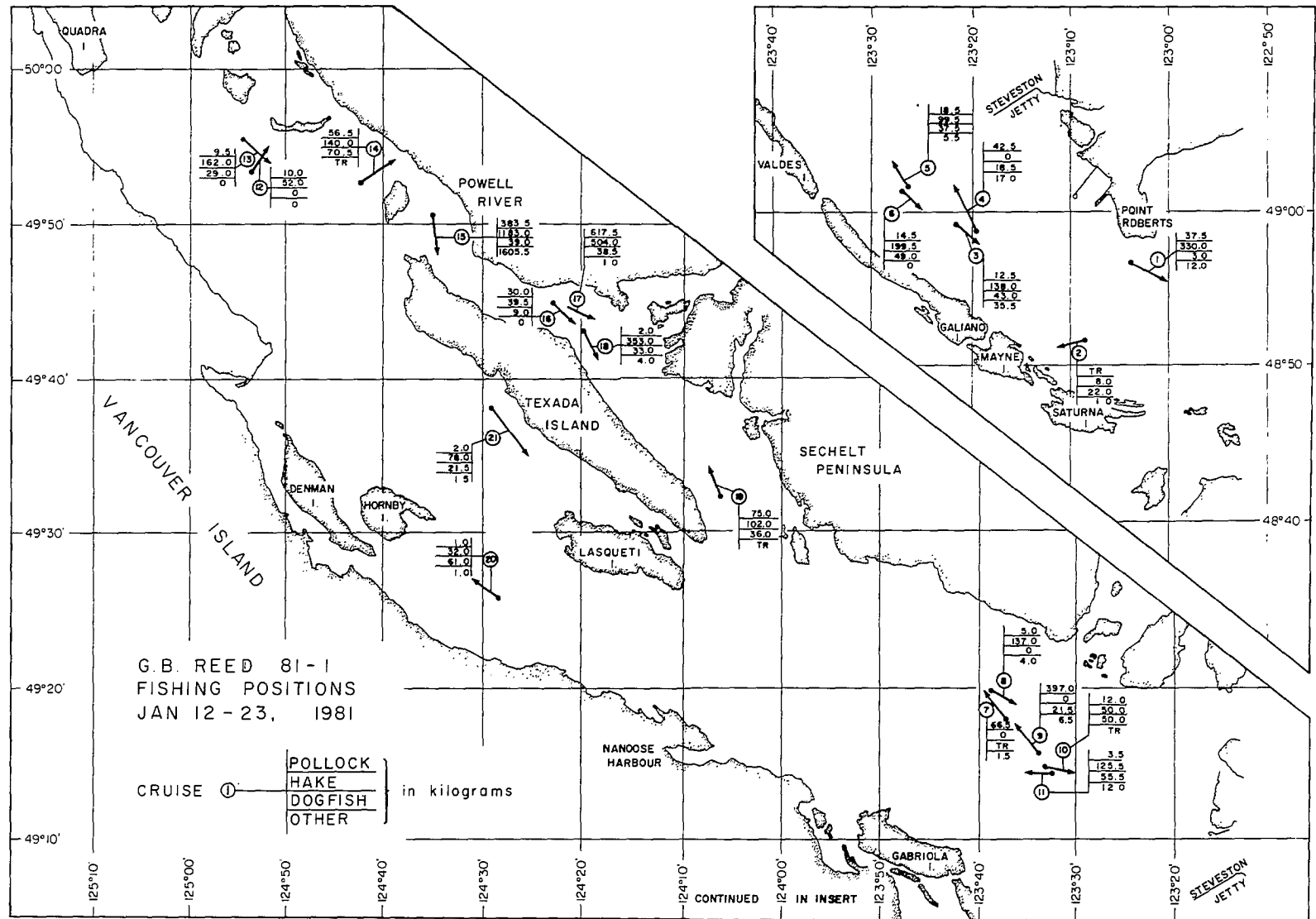


Fig. 1. Location of midwater trawl tows made in the Strait of Georgia by the G. B. REED Cruise, GBR81-1 January 12-23, 1981.



Appendix Table 1. Size composition of Walleye pollock (*Theragra chalcogramma*), numbers sampled, by haul and sex for G. B. REED cruise GBR81-1, January 12-23, 1981.

Fork length (cm)	Haul no.								
	1			4			7		
	M	F	T	M	F	T	M	F	T
26	-	2	2	-	-	-	-	-	-
7	-	0	0	-	-	-	-	-	-
8	-	2	2	-	-	-	-	-	-
9	-	3	3	-	-	-	-	-	-
30	-	0	0	-	-	-	-	-	-
1	-	0	0	-	-	-	-	-	-
2	1	0	1	-	-	-	-	-	-
3	0	0	0	-	-	-	-	-	-
4	0	0	0	-	-	-	-	1	1
5	1	0	1	-	-	-	1	0	1
6	0	0	0	2	-	2	2	0	2
7	0	0	0	2	-	2	4	3	7
8	3	2	5	8	-	8	9	3	12
9	2	1	3	11	1	12	14	3	17
40	0	0	0	16	6	22	13	10	23
1	2	2	4	0	4	4	4	5	9
2	3	2	5	6	3	9	12	7	19
3	3	0	3	1	4	5	1	1	2
4	2	1	3	3	3	6	2	5	7
5	2	0	2	1	1	2	1	10	11
6	2	0	2	-	-	-	1	5	6
7	3	0	3	-	-	-	-	-	-
8	2	1	3	-	-	-	-	-	-
9	2	2	4	-	-	-	-	-	-
50	-	0	0	-	-	-	-	-	-
1	-	3	3	-	-	-	-	-	-
2	-	1	1	-	-	-	-	-	-
3	-	0	0	-	-	-	-	-	-
4	-	1	1	-	-	-	-	-	-
5	-	0	0	-	-	-	-	-	-
6	-	0	0	-	-	-	-	-	-
7	-	0	0	-	-	-	-	-	-
8	-	0	0	-	-	-	-	-	-
9	-	0	0	-	-	-	-	-	-
60	-	1	1	-	-	-	-	-	-
Total	28	24	52	50	22	72	64	53	117

Appendix Table 1 (cont'd)

Fork length (cm)	Haul no.								
	12			13			14		
	M	F	T	M	F	T	M	F	T
26	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	1	1
2	-	-	-	-	1	1	1	0	1
3	-	-	-	-	0	0	0	0	0
4	-	-	-	-	0	0	0	0	0
5	-	-	-	-	0	0	0	0	0
6	-	-	-	-	0	0	0	0	0
7	1	-	1	-	0	0	0	0	0
8	1	1	2	-	1	1	0	0	0
9	0	0	0	1	0	1	2	1	3
40	0	0	0	1	0	1	7	1	8
1	1	1	2	4	1	5	6	5	11
2	1	3	4	1	2	3	10	4	14
3	1	0	1	1	1	2	6	5	11
4	-	2	2	-	2	2	7	1	8
5	-	1	1	-	2	2	1	4	5
6	-	1	1	-	-	-	0	4	4
7	-	0	0	-	-	-	1	2	3
8	-	1	1	-	-	-	-	3	3
9	-	-	-	-	-	-	-	1	1
50	-	-	-	-	-	-	-	3	3
1	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-
60	-	-	-	-	-	-	-	-	-
Total	5	10	15	8	10	18	41	35	76

Appendix Table 1 (cont'd)

Fork length (cm)	Haul no.								
	15			16			17		
	M	F	T	M	F	T	M	F	T
26	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	1	1
8	-	-	-	-	-	-	-	0	0
9	-	-	-	-	-	-	-	0	0
30	-	1	1	-	-	-	-	0	0
1	-	0	0	-	-	-	-	1	1
2	-	1	1	-	-	-	1	0	1
3	1	2	3	-	-	-	0	0	0
4	0	0	0	1	-	1	1	0	1
5	3	0	3	1	-	1	1	0	1
6	13	1	14	1	-	1	3	0	3
7	19	2	21	4	2	6	6	1	7
8	30	11	41	9	2	11	8	3	11
9	31	18	49	6	3	9	15	4	19
40	34	17	51	5	6	11	18	14	32
1	23	23	46	6	3	9	19	15	34
2	15	21	36	1	2	3	15	10	25
3	14	18	32	-	0	0	6	4	10
4	3	21	24	-	3	3	4	6	10
5	-	8	8	-	0	0	2	5	7
6	-	1	1	-	1	1	0	1	1
7	-	2	2	-	-	-	0	1	1
8	-	-	-	-	-	-	1	-	1
9	-	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-
60	-	-	-	-	-	-	-	-	-
Total	186	147	333	34	22	56	100	66	166

Appendix Table 1 (cont'd)

Fork length (cm)	Haul no. 19			Male total	Female total	Total
	M	F	T			
26	-	-	-	-	2	2
7	-	-	-	-	1	1
8	-	-	-	-	2	2
9	-	-	-	-	3	3
30	-	-	-	-	1	1
1	-	-	-	-	2	2
2	-	-	-	3	2	5
3	-	-	-	1	2	3
4	-	-	-	2	1	3
5	3	-	3	10	0	10
6	2	-	2	23	1	24
7	3	-	3	39	8	47
8	7	1	8	75	24	99
9	7	0	7	89	31	120
40	10	2	12	104	56	160
1	9	1	10	74	60	134
2	6	2	8	70	56	126
3	1	5	6	34	38	72
4	2	1	3	23	45	68
5	0	2	2	7	33	40
6	1	1	2	4	14	18
7	-	1	1	4	6	10
8	-	-	-	3	5	8
9	-	-	-	2	3	5
50	-	-	-	-	3	3
1	-	-	-	-	3	3
2	-	-	-	-	1	1
3	-	-	-	-	0	0
4	-	-	-	-	1	1
5	-	-	-	-	0	0
6	-	-	-	-	0	0
7	-	-	-	-	0	0
8	-	-	-	-	0	0
9	-	-	-	-	0	0
60	-	-	-	-	1	1
Total	51	16	67	567	405	972

Appendix Table 2. Size composition of hake (Merluccius productus), numbers sampled by haul and sex for G. B. REED cruise GBR81-1, January 12-23, 1981.

Fork length (cm)	Haul no.																	
	1			3				6			8				12			
	M	F	T	M	F	U	T	M	F	T	M	F	U	T	M	F	T	
20	-	-	-	-	-	-	-	-	-	-	-	-	4	4	-	-	-	
1	-	-	-	-	-	1	1	-	-	-	-	-	3	3	-	-	-	
2	-	-	-	-	-	1	1	-	-	-	-	-	9	9	-	-	-	
3	-	-	-	-	-	1	1	-	-	-	-	-	3	3	-	-	-	
4	-	-	-	-	-	1	1	-	-	-	-	-	3	3	-	-	-	
5	-	-	-	-	-	0	0	-	-	-	-	-	2	2	-	-	-	
6	-	-	-	-	-	0	0	-	-	-	-	-	4	4	-	-	-	
7	-	-	-	-	-	0	0	1	-	1	-	-	2	2	-	-	-	
8	-	-	-	-	-	1	1	0	-	0	-	-	4	4	-	-	-	
9	-	-	-	-	-	2	2	1	3	4	-	-	5	5	-	-	-	
30	-	-	-	-	-	0	0	4	6	10	-	-	3	3	-	-	-	
1	-	-	-	-	-	1	1	3	11	14	-	-	2	2	-	-	-	
2	-	-	-	-	-	0	0	4	18	22	-	-	2	2	-	-	-	
3	-	-	-	-	-	0	0	12	16	28	-	-	3	3	-	-	-	
4	-	-	-	-	-	0	0	22	16	38	-	-	2	2	-	-	-	
5	-	-	-	-	-	1	1	12	9	21	-	-	2	2	-	-	-	
6	-	-	-	-	1	-	1	15	3	18	-	-	2	2	1	1	2	
7	-	-	-	-	1	-	1	13	9	22	-	1	-	1	1	0	1	
8	-	-	-	-	0	-	0	12	4	16	1	3	-	4	1	0	1	
9	-	-	-	2	0	-	2	10	7	17	1	3	-	4	3	3	6	
40	-	-	-	0	1	-	1	7	3	10	3	4	-	7	1	4	5	
1	-	-	-	6	1	-	7	10	1	11	15	6	-	21	1	1	2	
2	3	-	3	6	2	-	8	17	3	20	16	9	-	25	6	2	8	
3	0	1	1	14	6	-	20	11	12	23	25	14	-	39	12	5	17	
4	3	2	5	20	8	-	28	9	11	20	23	23	-	46	9	3	12	
5	7	13	20	8	23	-	31	4	7	11	17	8	-	25	5	7	12	
6	6	17	23	5	12	-	17	2	9	11	8	17	-	25	2	8	10	
7	2	23	25	5	12	-	17	-	1	1	4	10	-	14	0	2	2	
8	3	20	23	6	11	-	17	-	2	2	-	2	-	2	3	3	6	
9	3	22	25	1	7	-	8	-	1	1	-	1	-	1	0	5	5	

Appendix Table 2 (cont'd)

Fork length (cm)	Haul no.																	
	1			3				6			8				12			
	M	F	T	M	F	U	T	M	F	T	M	F	U	T	M	F	T	
50	-	17	17	2	3	-	5	-	0	0	-	0	-	0	1	0	1	
1	-	17	17	-	3	-	3	-	1	1	-	0	-	0	-	0	0	
2	-	5	5	-	2	-	2	-	-	-	-	0	-	0	-	0	0	
3	-	5	5	-	0	-	0	-	-	-	-	0	-	0	-	0	0	
4	-	3	3	-	2	-	2	-	-	-	-	0	-	0	-	0	0	
5	-	2	2	-	-	-	-	-	-	-	-	0	-	0	-	1	1	
6	-	1	1	-	-	-	-	-	-	-	-	0	-	0	-	-	-	
7	-	1	1	-	-	-	-	-	-	-	-	0	-	0	-	-	-	
8	-	3	3	-	-	-	-	-	-	-	-	0	-	0	-	-	-	
9	-	1	1	-	-	-	-	-	-	-	-	0	-	0	-	-	-	
60	-	0	0	-	-	-	-	-	-	-	-	0	-	0	-	-	-	
1	-	0	0	-	-	-	-	-	-	-	-	1	-	1	-	-	-	
2	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
8	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
70	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total	27	156	183	75	95	9	179	169	153	322	113	102	55	270	46	45	91	

Appendix Table 2 (cont'd)

Fork length (cm)	13			14				Haul no. 15			17			18		
	M	F	T	M	F	U	T	M	F	T	M	F	T	M	F	T
20	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	4	4	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	3	3	-	-	-	-	-	-	-	1	1
5	-	-	-	-	-	10	10	-	-	-	-	-	-	-	1	1
6	-	-	-	-	-	6	6	-	-	-	-	-	-	-	0	0
7	-	-	-	-	-	4	4	-	-	-	-	-	-	-	2	2
8	-	-	-	-	-	7	7	-	-	-	-	-	-	-	1	1
9	-	-	-	-	-	4	4	-	-	-	-	-	-	-	0	0
30	-	-	-	-	-	5	5	-	-	-	-	1	1	-	1	1
1	-	1	1	-	-	11	11	-	-	-	-	2	2	-	0	0
2	-	0	0	-	-	7	7	-	2	2	-	1	1	-	2	2
3	-	0	0	-	-	6	6	-	0	0	-	5	5	3	1	4
4	2	1	3	1	1	-	2	3	3	6	1	2	3	0	0	0
5	1	4	5	1	3	-	4	4	0	4	1	2	3	3	2	5
6	0	1	1	0	3	-	3	4	4	8	2	6	8	2	2	4
7	2	4	6	6	5	-	11	6	5	11	3	11	14	2	5	7
8	7	6	13	3	3	-	6	9	7	16	10	3	13	2	4	6
9	3	4	7	5	3	-	8	7	4	11	8	10	18	2	2	4
40	6	0	6	1	5	-	6	17	11	28	14	6	20	2	2	4
1	9	12	21	5	4	-	9	17	11	28	7	11	18	1	3	4
2	24	7	31	7	5	-	12	14	6	20	13	8	21	7	0	7
3	23	9	32	8	9	-	17	15	5	20	16	9	25	14	5	19
4	34	8	42	9	5	-	14	7	8	15	20	8	28	10	3	13
5	29	15	44	7	10	-	17	5	4	9	9	3	12	4	5	9
6	18	14	32	4	7	-	11	5	4	9	1	2	3	3	4	7
7	14	9	23	5	10	-	15	1	1	2	2	1	3	1	1	2
8	8	10	18	2	8	-	10	-	1	1	1	1	2	-	-	-
9	2	11	13	-	3	-	3	-	0	0	1	0	1	-	-	-

Appendix Table 2 (cont'd)

Fork length (cm)	Haul no.																	
	13			14				15			17			18				
	M	F	T	M	F	U	T	M	F	T	M	F	T	M	F	T		
50	6	4	10	-	1	-	1	-	1	1	-	1	1	-	-	-		
1	3	5	8	-	0	-	0	-	-	-	-	-	-	-	-	-		
2	-	3	3	-	0	-	0	-	-	-	-	-	-	-	-	-		
3	-	0	0	-	0	-	0	-	-	-	-	-	-	-	-	-		
4	-	1	1	-	0	-	0	-	-	-	-	-	-	-	-	-		
5	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-		
6	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-		
7	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-		
8	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-		
9	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-		
60	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-		
1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-		
2	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-		
3	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-		
4	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-		
5	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-		
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Total	191	129	320	64	87	74	225	114	77	191	109	93	202	56	47	103		

Appendix Table 2 (cont'd)

Fork length (cm)	19			20			Haul no. 21			Male total	Female total	Unsexed total	Total
	M	F	T	M	F	T	M	F	T				
20	-	-	-	-	1	1	-	3	3	2	4	5	11
1	-	-	-	2	1	3	-	0	0	0	1	7	8
2	-	-	-	0	1	1	-	0	0	0	1	13	14
3	-	-	-	0	0	0	-	4	4	0	4	8	12
4	-	-	-	0	2	2	-	0	0	0	3	7	10
5	-	-	-	0	0	0	-	2	2	0	3	12	15
6	-	-	-	0	0	0	-	3	3	0	3	10	13
7	-	-	-	0	1	1	-	4	4	1	7	6	14
8	-	-	-	0	0	0	-	2	2	0	3	12	15
9	-	-	-	1	1	2	1	5	6	3	9	11	23
30	-	1	1	0	0	0	0	5	5	4	14	8	26
1	-	0	0	0	0	0	0	5	5	3	19	14	36
2	-	0	0	0	0	0	1	1	2	5	24	9	38
3	-	0	0	1	0	1	0	0	0	16	22	9	47
4	-	0	0	0	0	0	0	1	1	29	24	2	55
5	-	0	0	0	1	1	1	1	2	23	22	3	48
6	-	2	2	0	0	0	1	0	1	25	23	2	50
7	-	0	0	0	0	0	2	1	3	35	42	-	77
8	-	0	0	1	0	1	1	5	6	47	35	-	82
9	-	1	1	0	0	0	4	0	4	45	37	-	82
40	1	1	2	0	0	0	7	5	12	59	42	-	101
1	1	1	2	1	1	2	5	3	8	78	55	-	133
2	2	2	4	5	0	5	6	4	10	126	48	-	174
3	10	1	11	10	0	10	3	5	8	161	81	-	242
4	12	8	20	10	4	14	2	3	5	168	94	-	262
5	8	3	11	3	1	4	4	1	5	110	100	-	210
6	5	10	15	4	3	7	-	2	2	63	109	-	172
7	5	5	10	2	2	4	-	2	2	41	79	-	120
8	5	4	9	-	3	3	-	0	0	28	65	-	93
9	3	0	3	-	3	3	-	1	1	10	54	-	64

Appendix Table 2 (cont'd)

Fork length (cm)	19			20			Haul no. 21			Male total	Female total	Unsexed total	Total
	M	F	T	M	F	T	M	F	T				
50	-	1	1	-	2	2	-	-	-	9	30	-	39
1	-	-	-	-	0	0	-	-	-	3	26	-	29
2	-	-	-	-	0	0	-	-	-	-	10	-	10
3	-	-	-	-	0	0	-	-	-	-	5	-	5
4	-	-	-	-	1	1	-	-	-	-	7	-	7
5	-	-	-	-	-	-	-	-	-	-	3	-	3
6	-	-	-	-	-	-	-	-	-	-	1	-	1
7	-	-	-	-	-	-	-	-	-	-	1	-	1
8	-	-	-	-	-	-	-	-	-	-	3	-	3
9	-	-	-	-	-	-	-	-	-	-	1	-	1
60	-	-	-	-	-	-	-	-	-	-	0	-	0
1	-	-	-	-	-	-	-	-	-	-	2	-	2
2	-	-	-	-	-	-	-	-	-	-	0	-	0
3	-	-	-	-	-	-	-	-	-	-	0	-	0
4	-	-	-	-	-	-	-	-	-	-	0	-	0
5	-	-	-	-	-	-	-	-	-	-	1	-	1
6	-	-	-	-	-	-	-	-	-	-	1	-	1
7	-	-	-	-	-	-	-	-	-	-	1	-	1
8	-	-	-	-	-	-	-	-	-	-	0	-	0
9	-	-	-	-	-	-	-	-	-	-	0	-	0
70	-	-	-	-	-	-	-	-	-	-	1	-	1
Total	52	40	92	40	28	68	38	68	106	1,094	1,120	138	2,352

Appendix Table 3. Size composition of dogfish (*Squalus acanthias*), numbers sampled, by haul and by sex, for G. B. REED cruise GBR81-1, January 12-23, 1981.

Fork length (cm)	Haul no.									Total		
	14			20			21					
	M	F	T	M	F	T	M	F	T	M	F	T
30	-	-	-	3	1	4	-	-	-	3	1	-
1	-	-	-	2	2	4	-	-	-	2	2	4
2	-	-	-	2	2	4	-	2	2	2	4	6
3	-	-	-	4	1	5	-	0	0	4	1	5
4	-	-	-	4	5	9	-	0	0	4	5	9
5	-	-	-	7	1	8	-	0	0	7	1	8
6	-	-	-	11	11	22	-	0	0	11	11	22
7	-	-	-	13	11	24	-	1	1	13	12	25
8	-	-	-	10	9	19	-	0	0	10	9	19
9	-	-	-	7	6	13	-	2	2	7	8	15
40	-	-	-	4	5	9	-	2	2	4	7	11
1	-	-	-	4	3	7	1	0	1	5	3	8
2	-	-	-	8	4	12	0	0	0	8	4	12
3	-	-	-	0	1	1	0	0	0	0	1	1
4	-	-	-	0	1	1	0	1	1	0	2	2
5	-	-	-	1	1	2	1	0	1	2	1	3
6	-	-	-	-	0	0	1	1	2	1	1	2
7	-	-	-	-	0	0	2	0	2	1	0	1
8	-	-	-	-	2	2	1	0	1	2	2	4
9	-	-	-	-	-	-	1	0	1	1	0	1
50	1	-	1	-	-	-	1	0	1	2	0	2
1	0	-	0	-	-	-	2	0	2	2	0	2
2	0	-	0	-	-	-	2	0	2	2	0	2
3	0	-	0	-	-	-	2	1	3	2	1	3
4	0	-	0	-	-	-	1	1	2	1	1	2
5	0	-	0	-	-	-	0	0	0	0	0	0
6	0	-	0	-	-	-	3	0	3	3	0	3
7	0	-	0	-	-	-	0	1	1	0	1	1
8	0	-	0	-	-	-	0	0	0	0	0	0
9	0	-	0	-	-	-	2	0	2	2	0	2
60	0	-	0	-	-	-	1	2	3	1	2	3
1	0	-	0	-	-	-	0	0	0	0	0	0
2	0	1	1	-	-	-	0	0	0	0	1	1
3	0	0	0	-	-	-	0	0	0	0	0	0
4	0	0	0	-	-	-	0	0	0	0	0	0
5	0	1	1	-	-	-	0	1	1	0	2	2
6	0	0	0	-	-	-	0	0	0	0	0	0
7	1	1	2	-	-	-	1	0	1	2	1	3
8	1	0	1	-	-	-	-	0	0	1	0	1
9	0	1	1	-	-	-	-	0	0	0	1	1
70	0	0	0	-	-	-	-	0	0	0	0	0
1	0	0	0	-	-	-	-	0	0	0	0	0
2	1	0	1	-	-	-	-	0	0	1	0	1
3	1	0	1	-	-	-	-	0	0	1	0	1

Appendix Table 3 (cont'd)

Fork length (cm)	Haul no.									Total			
	14			20			21						
	M	F	T	M	F	T	M	F	T	M	F	T	
74	0	0	0	-	-	-	-	0	0	0	0	0	0
5	0	0	0	-	-	-	-	1	1	0	1	1	1
6	1	0	1	-	-	-	-	-	-	1	0	1	1
7	1	0	1	-	-	-	-	-	-	1	0	1	1
8	2	0	2	-	-	-	-	-	-	1	0	1	1
9	3	0	3	-	-	-	-	-	-	2	0	2	2
80	1	0	1	-	-	-	-	-	-	3	0	3	3
1	0	0	0	-	-	-	-	-	-	1	0	1	1
2	0	0	0	-	-	-	-	-	-	0	0	0	0
3	2	0	2	-	-	-	-	-	-	0	0	0	0
4	0	0	0	-	-	-	-	-	-	2	0	2	2
5	1	0	1	-	-	-	-	-	-	0	0	0	0
6	0	1	1	-	-	-	-	-	-	1	0	1	1
7	1	0	1	-	-	-	-	-	-	0	1	1	1
8	-	0	0	-	-	-	-	-	-	1	0	1	1
9	-	0	0	-	-	-	-	-	-	-	0	0	0
90	-	0	0	-	-	-	-	-	-	-	0	0	0
1	-	0	0	-	-	-	-	-	-	-	0	0	0
2	-	0	0	-	-	-	-	-	-	-	0	0	0
3	-	0	0	-	-	-	-	-	-	-	0	0	0
4	-	2	2	-	-	-	-	-	-	-	0	0	0
5	-	0	0	-	-	-	-	-	-	-	2	2	2
6	-	0	0	-	-	-	-	-	-	-	0	0	0
7	-	1	1	-	-	-	-	-	-	-	0	0	0
8	-	0	0	-	-	-	-	-	-	-	1	1	1
9	-	1	1	-	-	-	-	-	-	-	0	0	0
100	-	0	0	-	-	-	-	-	-	-	1	1	1
1	-	0	0	-	-	-	-	-	-	-	0	0	0
2	-	0	0	-	-	-	-	-	-	-	0	0	0
3	-	1	1	-	-	-	-	-	-	-	0	0	0
4	-	0	0	-	-	-	-	-	-	-	1	1	1
5	-	1	1	-	-	-	-	-	-	-	0	0	0
6	-	1	1	-	-	-	-	-	-	-	1	1	1
7	-	-	-	-	-	-	-	-	-	-	1	1	1
8	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-
110	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	17	12	29	80	66	146	22	16	38	119	94	213	213

LIBRARY
 FISHERIES AND OCEANS
 BIBLIOTHEQUE
 PÊCHES ET OCÉANS

