Exploratory Fishing by the Automated Longliner M/V *Viking Star* Off the West Coast of the Queen Charlotte Islands, September, 1979

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EXPLORATORY FISHING BY THE AUTOMATED LONGLINER M/V VIKING STAR OFF THE WEST COAST OF THE QUEEN CHARLOTTE ISLANDS, SEPTEMBER 1979

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ABSTRACT

McCarter, P. B. 1980. Exploratory fishing by the automated longliner M/V VIKING STAR off the west coast of the Queen Charlotte Islands, September, 1979. Can. Data Rep. Fish. Aquat. Sci. 193: 45 p.

The Industrial Development Program in cooperation with the Pacific Biological Station chartered the M/V VIKING STAR for the purpose of determining the viability of a rockfish longline fishery on the west coast of the Queen Charlotte Islands. A total of 46 sets were made and effort was concentrated in the following areas: 1) Gray Rock to Cape Henry; 2) Buck Point; 3) Kano Inlet; 4) Kindakun Point; and 5) Tian Head to Frederick Island. The yelloweye rockfish (Sebastes ruberrimus) comprised 36.9% of the total estimated round weight (14,117 kg) of the catch. Catch rates were highest at Gray Rock between 86 and 128 m. This Data Report presents the catches, fishing locations and biological data collected.

Key words: Automated longlining, rockfish, Queen Charlotte Islands.

RÉSUMÉ

McCarter, P. B. 1980. Exploratory fishing by the automated longliner M/V VIKING STAR off the west coast of the Queen Charlotte Islands, September, 1979. Can. Data Rep. Fish. Aquat. Sci. 193: 45 p.

Le programme de développement industriel, en collaboration avec la Station de biologie du Pacifique, a affrété le VIKING STAR afin de déterminer la viabilité de la pêche à la palangre des sébastes sur la côte ouest des îles Reine-Charlotte. Au total, on a réalisé 46 opérations, et l'effort s'est concentré dans les zones suivantes: 1) du rocher Gray au cap Henry, 2) à la pointe Buck; 3) à l'inlet Kano; 4) à la pointe Kindakun; et 5) du cap Tian à l'île Frederick. Le sébaste aux yeux jaunes (Sebastes rubberimus) composait 26,9 % du total estimé du poids brut (14 117 kg) des prises. Les taux de prise étaient les plus élevés au rocher Gray, entre 86 et 128 m. le présent rapport donne des données sur les prises, les lieux de pêche et les renseignements biologiques recueillis.

Mots clés: Pêche automatisée à la palangre, sébaste, îles Reine-Charlotte.

INTRODUCTION

Several bottom-trawl surveys were conducted by the Pacific Biological Station in 1978 and 1979 to estimate the biomass of rockfishes off the west coast of the Queen Charlotte Islands. During the course of these surveys large concentrations of fish were observed on the echo sounder where bottom topography was too rough to trawl. In Vancouver, during this same period, the first Autoline system of longlining on the Pacific coast was being fitted on the M/V VIKING STAR, owned and skippered by Egil Elvan. In September 1979, the Industrial Development Program in cooperation with the Pacific Biological Station took the opportunity to charter this vessel for the purpose of determining the viability of a rockfish longline fishery on the west coast of the Queen Charlotte Islands. This Data Report presents the results of 46 longline sets made on a variety of bottom types where bottom trawling is impossible. The study concentrated on continuous line monitoring and size-age composition samples of four dominant rockfish species in the catch.

VESSEL AND GEAR

The M/V VIKING STAR is a 24.75 m seiner/autoliner built in 1978. Detailed vessel specifications are contained in Appendix Table 1. The autoline unit (house) measures 6.7 m x 6.7 m x 3.0 m and occupies the same position on the stern as the replaced seine drum. The magazines (approximately 1400 hooks, gangions and groundline coils on each) are suspended on racks inside the house. The hooks (positioned side by side in a slot) and the hanging coils of groundline are drawn through an automatic cutting and baiting machine. Whole, frozen herring are thawed in a tank and fed into the machine by the baiter. One 140 lb box of frozen herring (approximately 200 pieces) usually baits 1400 hooks with a setting time of about 10 min. A second man assists the baiter and makes sure the hooks are being fed through properly. Occasionally a few hooks go out unbaited due to hooks being replaced on the magazine in the wrong order. The observer noted this only rarely during the cruise. The flags, buoys, buoy lines and anchors are dispatched from the roof of the house, by a third man.

Hauling a 1400-hook set usually takes one hour. As the fish are being hauled at the side, gaffed and dressed, the hooks are automatically cleaned and have old bait removed as they pass through a system of waterspray brushes. The groundline, gangions and hooks are then pulled through aluminum pipes back to the house at the stern. A hook separator and twist remover enclosed in the house allows the hooks to return to the racks in an orderly fashion under the constant supervision and aid of the engineer. An average of 50 gangions and hooks are replaced for every 1400 hooks set. Replacing gangions takes place during hauling so that setting can begin immediately after hauling. The groundline strands are opened and a single overhand knot is used to tie on the replaced gangion and

hook. The number of replaced hooks and gangions usually depends upon the jaw strength of the species being caught and the number of snarls per set; bent or straightened hooks are more frequent when dogfish are hooked. Gangions must be cut occasionally to untangle portions of snarled groundline. Gear characteristics are included in Appendix Table 2.

FISHING LOCATION

The survey objective involved setting short skates of gear along each 55 m (30 fm) depth interval from 55 m to 460 m so that the size and species composition of rockfishes and incidental species could be determined. The target areas were: 1) Gray Rock to Cape Henry; 2) Buck Point; 3) off Kano Inlet; 4) off Kindakun Point and 5) from Tian Head to Frederick Island. The survey was to start at Gray Rock, continue to Frederick Island and if time and weather permitted, an attempt was to be made at setting gear on the Bowie Seamount.

Strong tides and steep edges encountered in the Gray Rock to Cape Henry area made it difficult to accomplish the survey objective. Good weather and the persevering nature of the skipper and crew, however, enabled a 13,300 hook effort covering 13 setting locations, during the first three days. The strings were shortened after the second day from one full magazine (1400 hooks) to one half magazine (700 hooks) in order to reduce gear loss and keep skates within the 55-m depth stratum. Approximately 15 lines of gear (1 1/2 magazines) and two anchors were lost due to rough bottom and tides. Soak times were usually 2-3 hrs except for two 10-hr sets which could not be picked up until dusk because the marker buoys were forced underwater by strong tidal currents.

The Cape Henry to Kindakun and Kunakun Point areas were surveyed during the following four days. Nineteen sets or a total of 18,900 hooks were hauled. No gear was lost but groundlines occasionally broke. The decision was made not to go out to the Bowie Seamount when signs of the end of good weather appeared on the seventh day. Bad weather hampered fishing effort during the remaining seven days.

Fourteen sets or a total of 14,560 hooks were completed in the Port Louis to Langara Island areas. Several sets were made in or close to spots sheltered from southeasterly swells which were not designated in the survey objective. This was done only to make best use of available time under the prevailing conditions. It became necessary to lie in harbour for two full days and two half days.

An estimated total of 46,760 hooks were set with 44,660 hooks successfully hauled. LORAN C bearings of sets are shown in Appendix Table 3 and plotted on charts in Figures 1a-1c.

BIOLOGICAL SAMPLING AND FISH PROCESSING

Four 100 length/sex/maturity/double otolith rockfish samples were collected. Only the most abundant rockfish species in a specific location and characteristic depth interval were sampled. It was frequently difficult to obtain at least 100 fish of a single species in any one setting location. Representative samples of four different species from widely separated areas were obtained, however, so that growth, mortality and age composition of their respective populations could be estimated. Sebastes pinniger was the only rockfish species kept that could not be sampled because the species was never sufficiently concentrated in any group of sets (never more than 30/set). A tape recorder was used to record data and proved effective in most instances. Appendix Tables 4, 5 and 6 contain sampling data and Appendix Table 7 provides a list of common names of rockfishes.

Fish were gaffed and dressed by crewmen while the observer monitored the groundline. When it became apparent that one species could be sampled, dressing of that species was discontinued and all of these fish were put aside in a checker. The skipper and crew were very helpful in obtaining samples and frequently took turns participating in the sampling, in addition to their regular work loads. Rockfishes were either dressed head-on (S. ruberrimus, S. maliger, S. pinniger) or dressed head-off (S. aleutianus, S. babcocki). Lingcod (Ophiodon elongatus) and blackcod (Anoplopoma fimbria) were dressed head-off and Pacific cod (Gadus macrocephalus), head-on. All other fishes caught were discarded immediately. Fish kept on board were washed, scrubbed and placed in plate freezers for 3-4 hrs. Frozen fish were taken off the plates and placed in bins, usually on the following evening. When a sufficient number of fish accumulated in the bins, the fish were lifted out of the hold in a glazing bucket, glazed and returned to other bins. This process occupied a good part of the evenings. A summary of the total estimated round weight of catches based on pieces counted is shown in Table 1. The location of their capture by set number is contained in Appendix Table 3 and a summary of catch by pieces and haul is presented in Appendix Table 8.

INCIDENTAL SPECIES CAUGHT

A total of 329 halibut (Hippoglossus stenolepis) were caught, all of which were carefully returned to the sea alive. Most halibut were undersized or small to medium in size. A summary of the total estimated round weights of all discards is shown in Table 1. The location of their capture by set number is contained in Appendix Table 3 and their quantity by pieces and haul in Appendix Table 9.

RESULTS

Yelloweye rockfish (S. ruberrimus) comprised the largest percentage (63.4%) of the total estimated round weight of the catch. This species was caught in nearly every set between 55 m and 202 m in depth. Catch rates were highest in the 86-128 m stratum at Gray Rock, the 108-194 m stratum at Barber Point, the 64-92 m stratum at Gowgaia Bay, the 119-138 m stratum at Kunakun Point and the 110-194 m stratum at Langara Island. S. ruberrimus specimens were generally larger (50-70 cm) from deep sets than from shallow sets (40-60 cm). A sample was taken at Langara Island (183-194 m).

Canary rockfish (S. pinniger) was the second most abundant rockfish caught by weight (6.7%). This species was captured in the same depth strata as S. ruberrimus but formed a 30% or greater proportion of the catch in only three locations (west of Barber Point, south of Wells Cove and west of Langara Island). Small (30-40 cm) fish were caught in shallow sets (55-92 m) and large (40-60 cm) fish in deep sets (92-194 m).

Rougheye rockfish (S. aleutianus) was the third most abundant rockfish in the catch with the majority being caught in three sets which were all within a 367-550 m depth interval (Buck Point, Kindakun Point and Kunakun Point). A representative sample was taken at Buck Point (422-477 m).

Quillback rockfish (S. maliger) was fourth in abundance by estimated weight and was present only on shallow sets (55-110 m). This species was prevalent in every area where shallow sets were attempted but fish were sampled only in the area where fishing effort and catch rate was highest (south of Frederick Island, 55-77 m).

Silvergray rockfish (S. brevispinis) was fifth in abundance but none were brought aboard. These fish were caught in every area from 55-211 m and appeared most abundant where bottom depth was 147-183 m. Most fish were 40-60 cm in length and rarely comprised greater than 5% of any set.

Redbanded rockfish (S. babcocki) was sixth in abundance and was caught between 183 m and 367 m with the best catches coming at 202-238 m at Gray Rock and Kindakun Point. A representative sample was taken at Gray Rock.

Bocaccio (S. paucispinis) was seventh in abundance and appeared in most sets that were between 110 m and 202 m in depth. None of these fish were kept and rarely did they exceed 1% composition of any set. Most fish were between 60 cm and 70 cm in length.

Shortspine thornyhead (Sebastolobus alascanus) was eighth in abundance and 40-60 cm specimens were caught in four of the six sets that were made in depths exceeding 367 m. Seven other rockfish species were caught during the cruise but had a combined weight of less than 75 kg.

Female rockfish sampled were either in a resting or maturing stage while male rockfish were in a developing or developed maturity stage. Length frequency and maturity information collected from four species is contained in Appendix Tables 5 and 6.

The overall, average catch rate of all fish kept and dressed during the survey was calculated to be 0.156 kg/hook (0.347 lb/hook). Certain sets produced a much higher catch rate. The top five catch rates from individual sets are as follows: set no. 12 at Gowgaia Bay achieved 0.639 kg/hook (1.42 lb/hook); set no. 3 at Gray Rock 0.509 kg/hook (1.13 lb/hook); set no. 27 at Kunakun Point 0.396 kg/hook (0.880 lb/hook); set no. 43 at Langara Island 0.335 kg/hook (0.750 lb/hook); and set no. 4 at Barber Point 0.284 kg/hook (0.630 lb/hook). These catch rates do not reflect the order of best fishing, as time spent exploring each area was brief and varied, according to weather, tides, steepness of the edge, timing and other human factors. A "saw tooth" type bottom situated on the edge of a dropoff (as seen on the sounder) always appeared the most favourable habitat for rockfish catches. Sounder recordings of most sets are shown in Appendix Fig. 1a-1h.

A rockfish longline fishery on the west coast of the Queen Charlotte Islands might be most amenable to this type of vessel and operation. Labour-saving methods such as the Mustad Autoline System may be advantageous in setting and hauling in potentially productive areas. Since the bottom is extremely rough in most locations of rockfish abundance the additional time for exploration and gear repair afforded by such a system may be a strong determinant of the success of a line fishery in this area.

ACKNOWLEDGMENTS

I am grateful to Captain Egil Elvan and the crew of the M/V VIKING STAR for their eagerness, perseverance and welcome assistance in achieving the survey objective. Thanks are also extended to Mr. R. McIlwaine of the Industrial Development Program and Messrs. B. Leaman, D. Nagtegaal and N. Venables of the Pacific Biological Station for their help in drafting the report.

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Table 1. Summary of total catches and discards for M/V VIKING STAR rockfish cruise, September 18-October 2, 1979. (Common names in Appendix Table 7.)

Species	Catch			Discard		
	Number of pieces	Estimated round weight (kg)	% of total catch	Number of pieces	Estimated round weight (kg)	% of total discard
Sebastes ruberrimus	1,288	5,216	63.4	40	108[bc]	1.8
Anoplopoma fimbria	279	879	10.7	16	22[bc]	0.4
S. pinniger	246	554	6.7	20	36[bc]	0.6
Ophiodon elongatus	60	486	5.9	7	57[b]	1.0
S. aleutianus	256	403	4.9	100	146[bd]	2.5
S. maliger	278	375	4.6	20	27[bd]	0.5
S. babcocki	197	288	3.5	5	7[b]	0.1
Gadus macrocephalus	12	27	0.3	10	23[e]	0.4
Hippoglossus stenolepis	-	-	-	329	2,221[a]	37.5
Squalus acanthias	-	-	-	844	1,899[a]	32.3
Sebastes brevispinis	-	-	-	196	375[a]	6.4
Raja rhina	-	-	-	30	203[a]	3.5
S. paucispinis	-	-	-	53	191[a]	3.2
Hydrolagus colliei	-	-	-	140	158[a]	2.7
Raja binoculata	-	-	-	19	128[ad]	2.2
Seb. alascanus	-	-	-	56	76[a]	1.3
Atheresthes stomias	-	-	-	66	59[a]	1.0
Hippoglossoides elassodon	-	-	-	20	27[d]	0.5
Lepidopsetta bilineata	-	-	-	19	26[d]	0.4
S. helvomaculatus	-	-	-	110	25[a]	0.4
Prionace glauca	-	-	-	3	20[a]	0.3
S. flavidus	-	-	-	15	17[a]	0.3
S. ciliatus	-	-	-	8	14[a]	0.2
S. melanops	-	-	-	5	9[a]	0.2
S. nebulosus	-	-	-	8	7[a]	0.1
Microgadus proximus	-	-	-	2	3[a]	0.1
S. elongatus	-	-	-	4	2[a]	<0.1
S. nigrocinctus	-	-	-	1	1[a]	<0.1
Hexagrammos decagrammus	-	-	-	1	1[a]	<0.1
Microstomus pacificus	-	-	-	1	1[a]	<0.1
Total	2,616	8,228	100.0	2,148	5,889	100.0

Reasons for discarding: [a]not a retained species (little market value or prohibited); [b]unable to be gaffed; [c]undersized; [d]filleted; [e]bitten by other fish

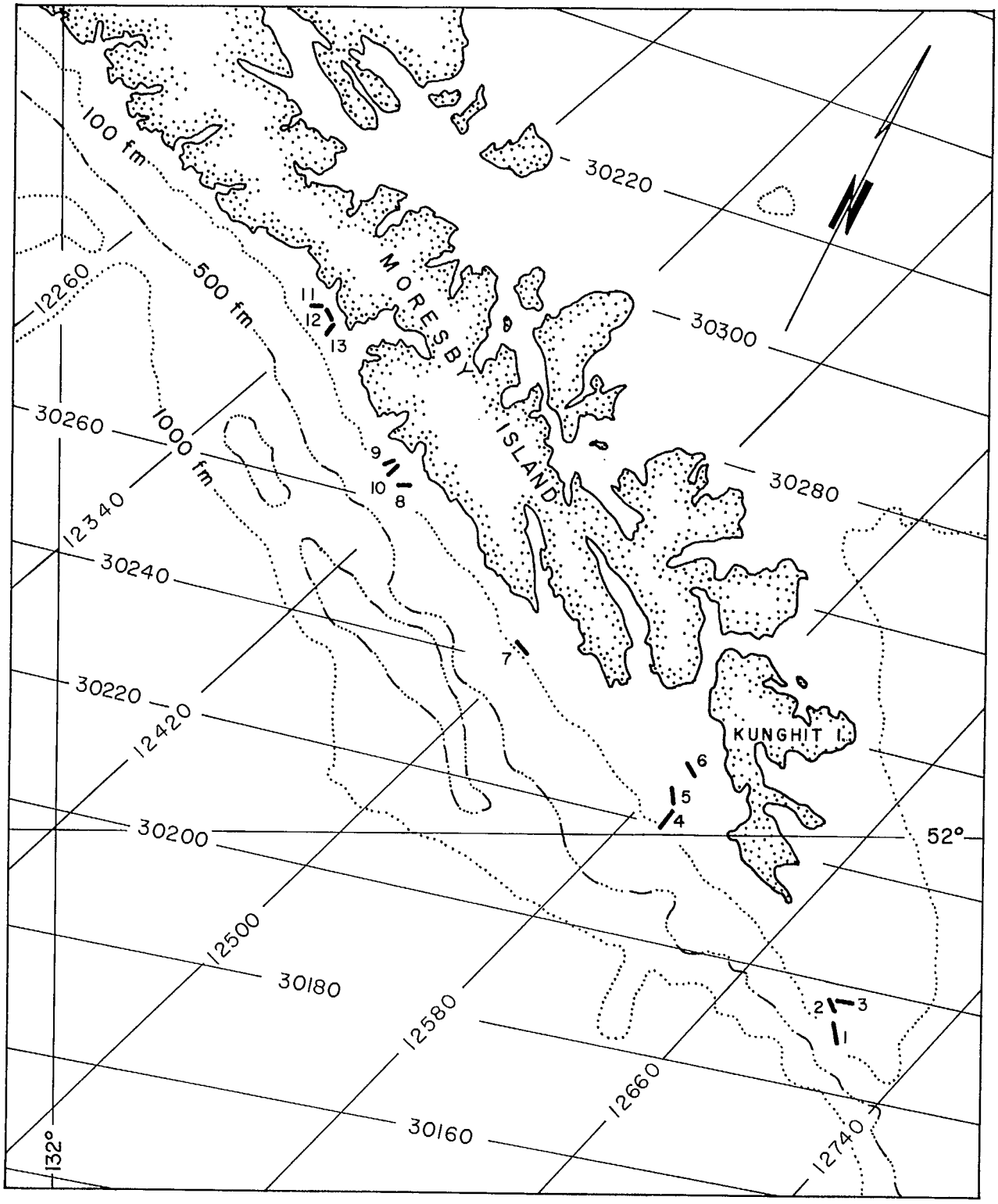


Fig. 1a. Locations of sets 1-13, M/V VIKING STAR rockfish cruise, September 18-October 3, 1979.

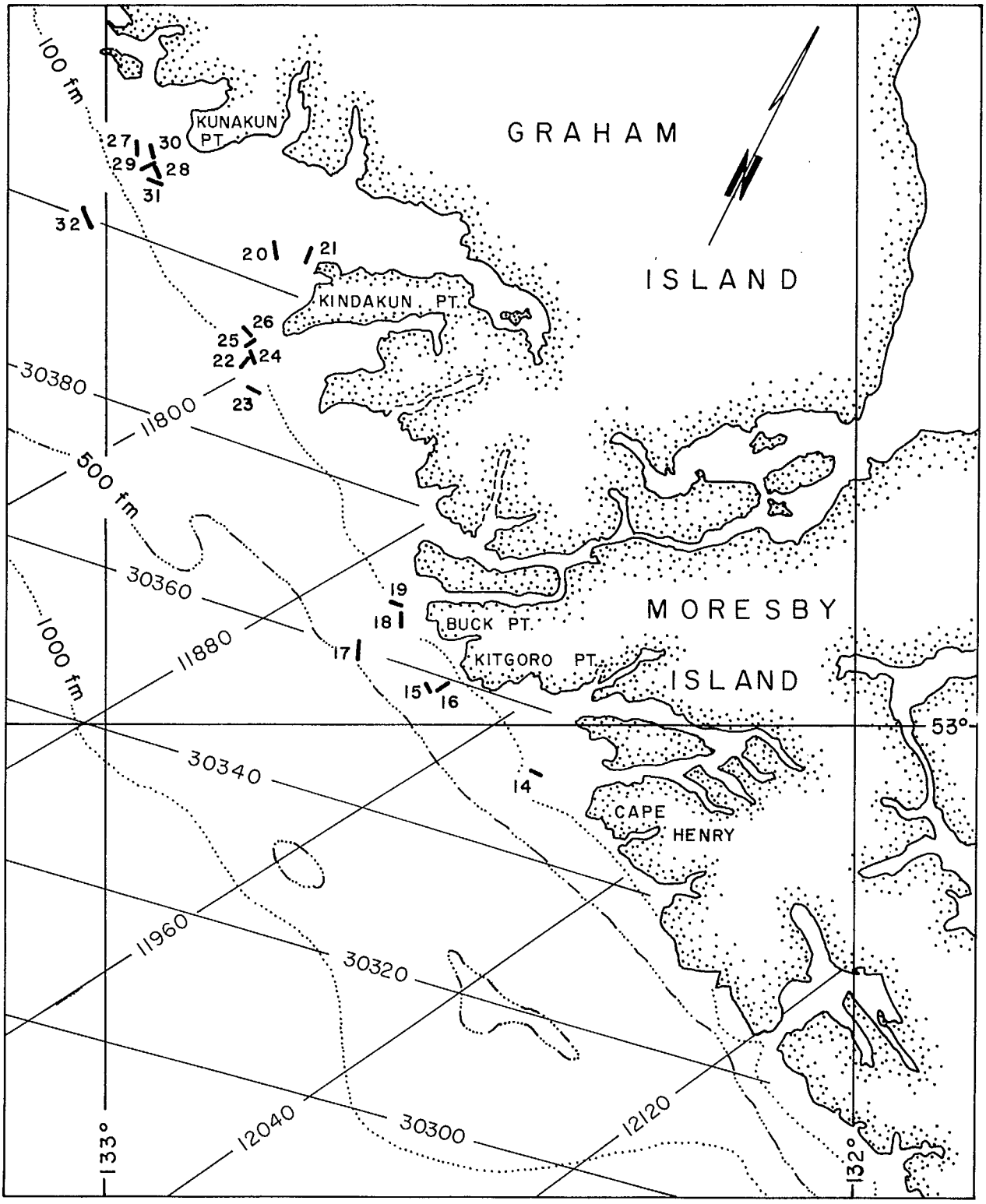


Fig. 1b. Locations of sets 14-32, M/V VIKING STAR rockfish cruise, September 18-October 3, 1979.

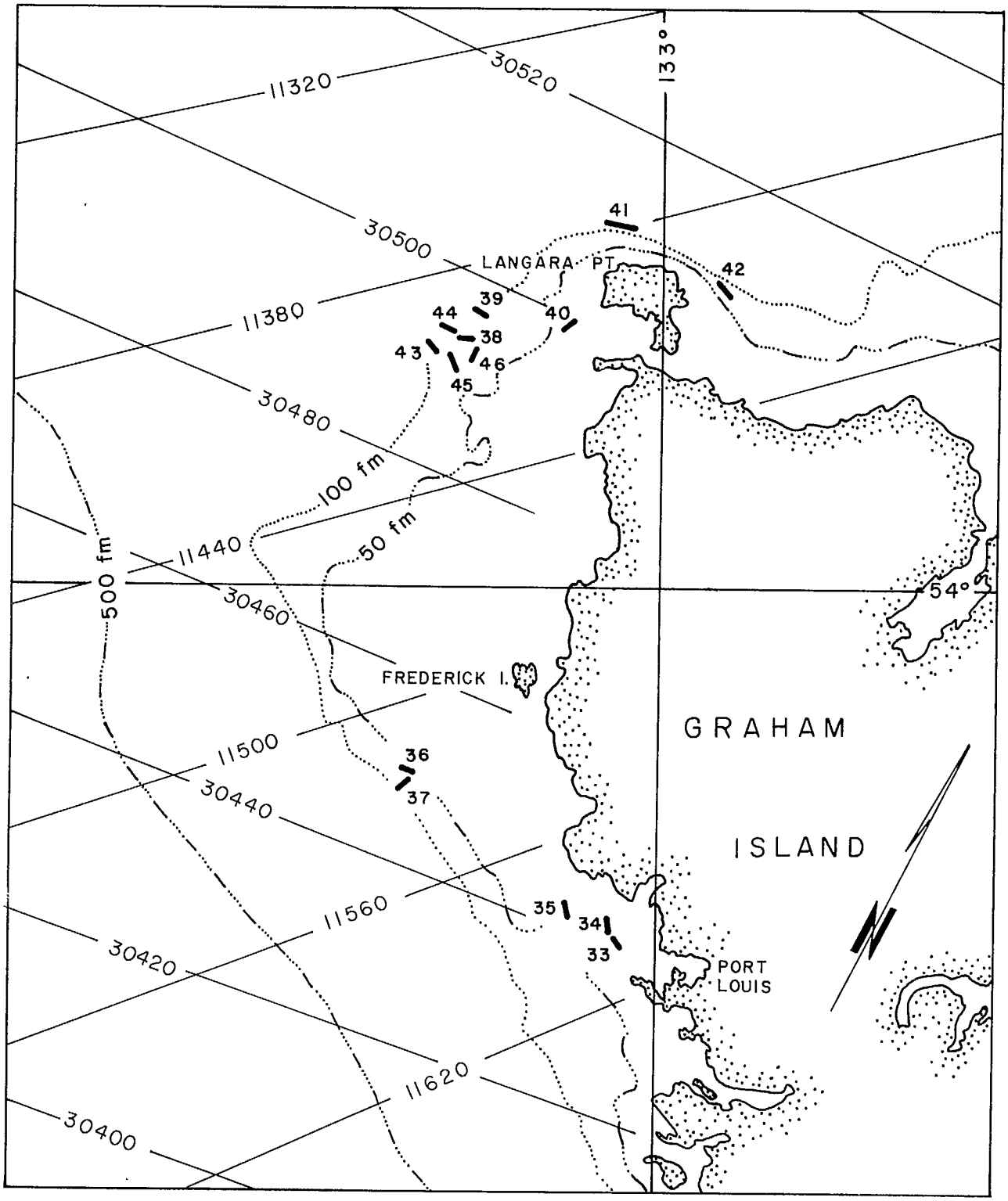


Fig. 1c. Locations of sets 33-46, M/V VIKING STAR rockfish cruise, September 18-October 3, 1979.

Appendix Table 1. Vessel specifications.

Name: VIKING STAR Gear: LONGLINE Length: 24.75 m Beam: 7 m Draft: 3 m

Gross Tonnage: 126.27 t Net Tonnage: 50.91 t

Engine Type: Diesel Engine Make: Caterpillar Horsepower: 520

Speed (Maximum): 11 kn Cruise: 10 kn

Navigational Devices:

Radar - Koden and Furuno

Loran C - Koden and Northstar

Fish Finding Devices:

Chromascope Fish Finder (Koden)

Ekolite Sounder

Wesmar Sonar

Fish Hold Capacity: 5,000 cu ft

Skipper: Egil Elvan

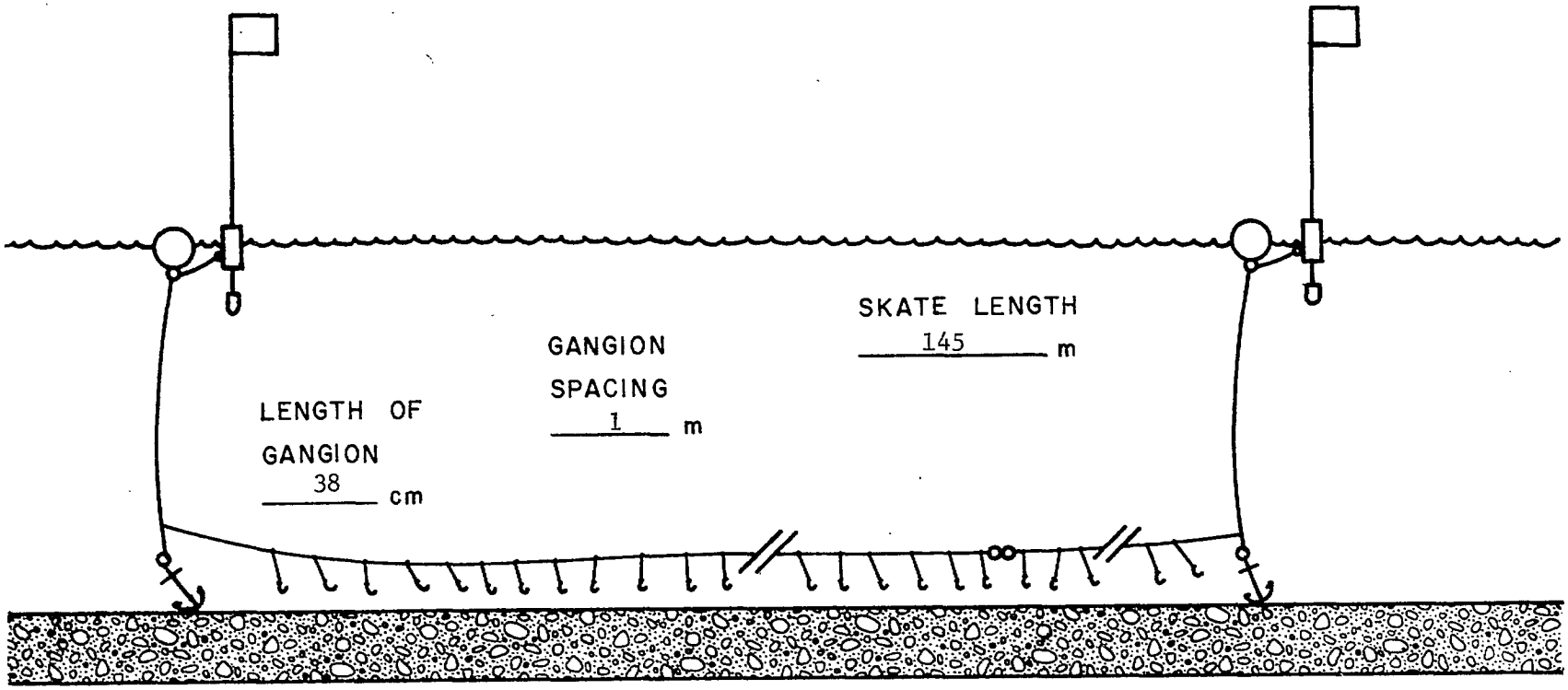
No. of Crew members: 6

Year Built: 1978

Appendix Table 2. Gear characteristics, M/V VIKING STAR, September 18-October 2, 1979.

Groundline - 3 strand terylene (tarred, split fibre for rigidity). Approximately 6-7 mm in diameter.
Gangion - 2 strand nylon. Approximately 2 mm in diameter.

LONGLINE DIMENSIONS



AVERAGE NUMBER OF LINES/SET 5 or 10

AVERAGE SET LENGTH .75 km or 1.5 km

BREAKING STRENGTH OF GROUNDLINE 800 kg

AVERAGE NUMBER OF HOOKS/LINE 140

HOOK SIZE No. 6 Mustad

Appendix Table 3. Bridge log data, M/V VIKING STAR, September 18-October 2, 1979.

Set no.	1979 date	Area	Set time		Depth (m)		Haul time		Loran C Start position		Loran C Finish position		No. of lines
			Start	Fin.	Start	Fin.	Start	Fin.	X	Y	X	Y	
	Sept												
1	19	Gray Rock	1000	1010	293	207	1215	1320	12706.2	30190.0	12702.4	30193.2	10
2	19	Gray Rock	1020	1032	183	128	2100	2200	12700.1	30196.3	12697.9	30196.5	10
3	19	Gray Rock	1045	1055	128	86	1930	2030	12697.9	30196.5	12704.5	30198.2	10
4	20	Barber Point	0850	0900	189	196	1130	1200	12592.7	30218.5	12592.3	30221.0	10
5	20	Barber Point	0910	0920	189	108	1245	1345	12592.3	30221.0	12590.0	30224.9	10
6	20	Barber Point	0935	0945	121	55	1400	1500	12585.7	30229.0	12587.0	30226.0	10
7	20	Nagas Point	1645	1650	134	165	1845	1915	12499.4	Y*	12501.0	Y*	5
8	21	S. Wells Cove	0853	0858	187	156	1115	1145	12412.2	30265.5	12411.9	30264.0	5
9	21	S. Wells Cove	0906	0911	180	147	1200	1240	12407.7	30267.2	12406.7	30265.6	5
10	21	S. Wells Cove	0923	0928	132	83	1250	1320	12409.0	30269.0	12407.0	30267.0	5
11	21	Gowgaia Bay	1445	1455	183	138	1700	1730	12337.4	30284.3	12340.0	30285.0	5
12	21	Gowgaia Bay	1450	1455	92	64	1800	1830	12340.0	30285.0	12343.9	30286.1	5
13	21	Gowgaia Bay	1510	1515	119	125	1830	1900	12340.0	30285.0	12347.0	30283.5	5
14	22	Cape Henry	0955	1000	174	156	1235	1305	11983.9	30352.7	11985.0	30351.4	5
15	22	Kitgoro Point	1135	1140	223	211	1400	1430	11938.5	30357.0	11939.6	30357.8	5

*Loran C was giving incorrect readings.

Appendix Table 3 (cont'd)

Set no.	1979 date	Area	Set time		Depth (m)		Haul time		Loran C Start position		Loran C Finish position		No. of lines
			Start	Fin.	Start	Fin.	Start	Fin.	X	Y	X	Y	
	Sept												
16	22	Kitgoro Point	1140	1145	211	202	1435	1505	11939.6	30357.8	11940.0	30358.9	5
17	22	Buck Point	1530	1540	477	422	1800	1900	11914.0	30359.7	11905.7	30361.3	10
18	23	Buck Point	0815	0820	183	161	1130	1200	11907.0	30366.7	11905.6	30367.9	5
19	23	Buck Point	0820	0830	156	138	1025	1120	11905.6	30367.9	11904.0	30369.5	5
20	23	Cone Head	1415	1420	156	183	1805	1900	11773.0	30405.0	11771.9	30407.0	5
21	23	Cone Head	1435	1440	138	156	1730	1800	11773.6	30407.9	11774.5	30408.2	5
22	24	Kindakun Pt.	0850	0855	165	220	1300	1330	11796.3	30390.9	11798.2	30389.5	5
23	24	Kindakun Pt.	0905	0915	367	550	1140	1245	11804.2	30386.5	11808.4	30384.5	10
24	24	Kindakun Pt.	1400	1405	229	202	1830	1900	11795.5	30389.4	11793.0	30390.0	5
25	24	Kindakun Pt.	1410	1415	202	182	1720	1800	11793.0	30390.0	11789.0	30391.0	5
26	24	Kindakun Pt.	1420	1425	174	163	1645	1715	11789.0	30391.0	11784.0	30392.8	5
27	25	Kunakun Pt.	0955	1000	138	119	1310	1340	11717.0	30408.9	11718.0	30409.4	5
28	25	Kunakun Pt.	1010	1015	114	101	1235	1305	11718.0	30409.4	11720.0	30409.0	5
29	25	Kunakun Pt.	1030	1035	180	141	1425	1505	11715.9	30408.0	11718.2	30408.5	5
30	25	Kunakun Pt.	1120	1125	770	367	1530	1700	11718.3	30402.9	11720.3	30405.0	15

Appendix Table 3 (cont'd)

Set no.	1979 date	Area	Set time		Depth (m)		Haul time		Loran C Start position		Loran C Finish position		No. of lines
			Start	Fin.	Start	Fin.	Start	Fin.	X	Y	X	Y	
	Sept												
31	25	Kunakun Pt.	1405	1410	138	134	1840	1910	11719.5	30408.1	11721.4	30408.0	5
32	25	Kunakun Pt.	1740	1805	570	238	1950	2200	11720.6	30401.9	11719.6	30397.4	25
33	26	Louis Point	1020	1025	160	64	1330	1400	11599.5	30442.0	11601.0	30442.5	5
34	26	Louis Point	1040	1045	81	64	1255	1325	11599.7	30443.9	11601.6	30443.9	5
35	26	Louis Point	1100	1105	55	59	1430	1500	11586.4	30443.5	11582.8	30445.4	5
36	28	S. Frederick Is.	0830	0840	55	73	0930	1005	11521.3	Y*	11524.4	Y*	10
37	28	S. Frederick Is.	0850	0900	72	77	1015	1100	11521.4	Y*	11522.0	Y*	10
38	28	W. Langara Is.	1445	1455	92	64	1655	1755	11400.6	Y*	11392.2	Y*	10
39	28	W. Langara Is.	1500	1505	101	92	1800	1830	11392.2	Y*	11391.5	Y*	5
40	29	W. Langara Is.	1120	1125	48	64	1530	1600	11407.7	Y*	11406.8	30500.6	5
	Oct												
41	1	NE. Langara Is.	1015	1030	367	376	1310	1445	11378.8	30511.3	11387.0	30511.0	15
42	1	E. Langara Is.	1545	1550	83	147	1745	1815	11412.0	Y*	11409.9	Y*	5
43	2	W. Langara Is.	0915	0925	194	183	1115	1215	11397.4	Y*	11399.5	Y*	10
44	2	W. Langara Is.	1030	1035	183	211	1230	1300	11399.5	Y*	11396.2	30495.3	5
45	2	W. Langara Is.	1345	1352	127	154	1530	1610	11403.5	Y*	11402.6	30495.5	7
46	2	W. Langara Is.	1400	1407	105	123	1615	1700	11406.4	30496.0	11405.6	30495.7	7

*Loran C was giving incorrect readings.

Appendix Table 4. Biological samples taken during the M/V VIKING STAR rockfish cruise, September 18-October 2, 1979. Numbers of fish sampled.

Species	Length only	Len-oto2	Len-sex-oto2-mat	Total sampled	Location depth (m)
Sebastes aleutianus	-	-	100	100	Buck Point 422-477
S. babcocki	-	-	100	100	Gray Rock 207-293
S. maliger	-	32[a]	68	100	S. Frederick Is. 55-77
S. ruberrimus	-	-	84	84	SW. Langara Is. 183-194
S. ruberrimus	50[a]	-	-	50	Gowgaia Bay 92-183
Total	50	32	352	434	

[a]Fish dressed head-on

Appendix Table 5. Summary of maturities collected during M/V VIKING STAR rockfish cruise, September 18-October 2, 1979.

Species: Redbanded rockfish (S. babcocki)
Locality: Gray Rock
Date: September 19, 1979
Set: No. 1
Depth: 207-293 m

	Male								Female						
Condition:[a]	1	9	8	A	B	C	D	E	1	2	3	4	5	6	7
Length (cm)															
30					-	-									-
31					-	-									-
32					-	-									-
33					-	-									1
34					-	1									0
35					-	0									1
36					-	0									0
37					-	0									0
38					-	1									1
39					1	2									0
40					0	0									1
41					0	3									0
42					1	4									1
43					-	6									5
44					-	10									3
45					-	7									3
46					-	9									3
47					-	5									4
48					-	8									4
49					-	2									7
50					-	0									1
51					-	1									2
52					-	0									1
53					-	0									-
54					-	1									-
55					-	-									-
56					-	-									-
57					-	-									-
58					-	-									-
59					-	-									-
60					-	-									-
Subtotal					2	60									38
% Maturity					3%	97%									100%
Total					62							38			
Sex ratio					62%							38%			

Appendix Table 5 (cont'd)

Species: Rougheye rockfish (S. aleutianus)
Locality: Buck Point
Date: September 22, 1979
Set: No. 22
Depth: 422-477 m

	Male								Female						
Condition:[a]	1	9	8	A	B	C	D	E	1	2	3	4	5	6	7
Length (cm)															
30				-	-	-				-					-
31				-	-	-				-					-
32				-	-	-				-					-
33				-	-	-				-					-
34				-	-	-				-					-
35				-	-	-				-					-
36				-	-	-				-					-
37				-	1	-				-					-
38				-	0	-				-					-
39				-	0	-				-					-
40				-	0	-				-					-
41				-	0	-				-					-
42				-	0	1				-					-
43				-	3	0				-					2
44				-	2	0				-					3
45				-	3	2				-					8
46				-	5	2				1					3
47				-	2	2				0					8
48				1	4	4				2					10
49				-	1	2				0					6
50				-	2	0				0					4
51				-	2	0				0					7
52				-	1	1				1					0
53				-	1	-				-					0
54				-	-	-				-					1
55				-	-	-				-					1
56				-	-	-				-					1
57				-	-	-				-					-
58				-	-	-				-					-
59				-	-	-				-					-
60				-	-	-				-					-
Subtotal				1	27	14				4					54
% Maturity				3%	64%	33%				7%					93%
Total					42							58			
Sex ratio					42%							58%			

Appendix Table 5 (cont'd)

Species: Quillback rockfish (*S. maliger*)
Locality: South Frederick Island
Date: September 28, 1979
Set: No. 36 & 37
Depth: 55-77 m

	Male								Female						
Condition:[a]	1	9	8	A	B	C	D	E	1	2	3	4	5	6	7
Length (cm)															
30					-	-				-					-
31					-	-				-					-
32					-	-				-					1
33					-	-				-					0
34					-	-				-					1
35					-	-				-					0
36					-	-				-					1
37					-	-				-					0
38					1	2				-					2
39					0	0				1					1
40					1	3				-					5
41					3	4				-					2
42					0	3				-					3
43					3	3				-					5
44					3	5				-					4
45					-	1				-					5
46					-	2				-					3
47					-	-				-					-
48					-	-				-					-
49					-	-				-					-
50					-	-				-					-
51					-	-				-					-
52					-	-				-					-
53					-	-				-					-
54					-	-				-					-
55					-	-				-					-
56					-	-				-					-
57					-	-				-					-
58					-	-				-					-
59					-	-				-					-
60					-	-				-					-
Subtotal					11	23				1					33
% Maturity					32%	68%				3%					97%
Total					34							34			
Sex ratio					50%							50%			

Appendix Table 5 (cont'd)

Species: Yelloweye rockfish (*S. ruberrimus*)
Locality: 7 miles SW Parry Passage, Langara Island
Date: October 2, 1979
Set: No. 43
Depth: 183-194 m

	Male								Female						
Condition:[a]	1	9	8	A	B	C	D	E	1	2	3	4	5	6	7
Length (cm)															
38	-			-	-	-			2	-					-
39	-			-	-	-			0	-					-
40	-			-	-	-			0	-					-
41	-			-	-	-			0	-					-
42	1			-	-	-			0	-					-
43	0			-	-	-			0	-					-
44	0			-	-	-			0	-					-
45	0			-	-	-			0	-					-
46	0			-	-	-			0	-					-
47	0			-	-	-			0	-					2
48	0			-	-	1			1	-					1
49	0			-	-	1			-	-					0
50	0			-	-	0			-	2					0
51	1			1	1	0			-	2					3
52	-			-	2	1			-	0					4
53	-			-	1	0			-	1					2
54	-			-	1	0			-	0					1
55	-			-	0	0			-	0					5
56	-			-	0	0			-	0					1
57	-			-	1	2			-	1					0
58	-			-	0	0			-	-					4
59	-			-	0	2			-	-					4
60	-			-	0	0			-	-					2
61	-			-	1	2			-	-					2
62	-			-	0	2			-	-					0
63	-			-	2	1			-	-					4
64	-			-	0	3			-	-					0
65	-			-	1	2			-	-					1
66	-			-	0	1			-	-					1
67	-			-	0	1			-	-					0
68	-			-	0	2			-	-					1
69	-			-	0	-			-	-					1
70	-			-	0	-			-	-					0
71	-			-	1	-			-	-					1
Subtotal	2			1	11	21			3	6					40
% Maturity	6%			3%	31%	60%			6%	12%					82%
Total			35									49			
Sex ratio			42%									58%			

Footnote to Appendix Table 5

[a]Rockfish maturity codes

	1	Immature (translucent; males, stringlike, females, small)
Females	2	Maturing (small; yellow eggs; translucent or opaque)
	3	Mature (large; yellow eggs; opaque)
	4	Fertilized (large, orange-yellow eggs; translucent)
	5	Embryos or larvae (includes eyed eggs)
	6	Spent (large, flaccid, red ovaries
	7	Resting (moderate size, firm, red-gray ovaries)
Males	8	Mature (small, brown to large white testes)
		A = resting (small, brown, ribbonlike testes)
		B = developing (swelling, brown-white testes)
		C = developed (large, white testes; easily broken)
		D = running sperm
		E = spent
	9	Maturing (stringlike, translucent-white testes)

Appendix Table 6. Size composition of species collected during M/V VIKING STAR cruise, September 18-October 2, 1979.

	Redbanded		Yelloweye	Rougheye		Quillback			Yelloweye	
Species:	S. babcocki		S. ruberrimus	S. aleutianus		S. maliger			S. ruberrimus	
Date:	Sept. 19		Sept. 21	Sept. 22		Sept. 28			Oct. 2	
Set no.	1		11, 12, 13	22		36, 37			43	
	M	F	U	M	F	M	U	F	M	F
Fork length (cm)										
30	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	1	-	-
33	-	1	-	-	-	-	-	0	-	-
34	1	0	-	-	-	-	1	1	-	-
35	0	1	-	-	-	-	2	0	-	-
36	0	0	-	-	-	-	1	1	-	-
37	0	0	-	1	-	-	1	0	-	-
38	1	1	-	0	-	3	2	2	-	2
39	3	0	-	0	-	0	4	2	-	0
40	0	1	-	0	-	4	6	5	-	0
41	3	0	-	0	-	7	6	2	-	0
42	5	1	-	1	-	3	4	3	1	0
43	6	5	-	3	2	6	5	5	0	0
44	10	3	-	2	3	8	-	4	0	0
45	7	3	-	5	8	1	-	5	0	0
46	9	3	-	7	4	2	-	3	0	0
47	5	4	-	4	8	-	-	-	0	2
48	8	4	-	9	12	-	-	-	1	2
49	2	7	1	3	6	-	-	-	1	0
50	0	1	2	2	4	-	-	-	0	2
51	1	2	6	2	7	-	-	-	3	5
52	0	1	4	2	1	-	-	-	3	4
53	0	-	2	1	0	-	-	-	1	3
54	1	-	1	-	1	-	-	-	1	1
55	-	-	3	-	1	-	-	-	0	5
56	-	-	1	-	1	-	-	-	0	1
57	-	-	2	-	-	-	-	-	3	1
58	-	-	1	-	-	-	-	-	0	4
59	-	-	2	-	-	-	-	-	2	4
60	-	-	2	-	-	-	-	-	0	2
61	-	-	2	-	-	-	-	-	3	2
62	-	-	5	-	-	-	-	-	2	0
63	-	-	6	-	-	-	-	-	3	4
64	-	-	3	-	-	-	-	-	3	0
65	-	-	2	-	-	-	-	-	3	1
66	-	-	2	-	-	-	-	-	1	1
67	-	-	1	-	-	-	-	-	1	0
68	-	-	0	-	-	-	-	-	2	1
69	-	-	1	-	-	-	-	-	0	1
70	-	-	1	-	-	-	-	-	0	0
71	-	-	-	-	-	-	-	-	1	1
Total	62	38	50	42	58	34	32	34	35	49

Appendix Table 7. Common and scientific names of species captured.

Common name	Scientific name
FLATFISH	
Dover sole	*Microstomus pacificus*
Flathead sole	*Hippoglossoides elassodon*
Halibut	*Hippoglossus stenolepis*
Rock sole	*Lepidopsetta bilineata*
Turbot	*Atheresthes stomias*
ROCKFISH	
Rougheye rockfish	*S. aleutianus*
Redbanded or convict rockfish	*S. babcocki*
Silvergray rockfish	*S. brevispinis*
Dusky rockfish	*S. ciliatus*
Greenstriped rockfish	*S. elongatus*
Yellowtail rockfish or greenies	*S. flavidus*
Rosethorn rockfish	*S. helvomaculatus*
Quillback rockfish or rock cod	*S. maliger*
Black rockfish	*S. melanops*
China rockfish	*S. nebulosus*
Tiger rockfish	*S. nigrocinctus*
Bocaccio rockfish or longjaw	*S. paucispinis*
Canary rockfish	*S. pinniger*
Yelloweye rockfish or red cod	*S. ruberrimus*
Idiot or shortspine thornyhead	*Seb. alascanus*
ROUNDFISH	
Blackcod	*Anoplopoma fimbria*
Lingcod	*Ophiodon elongatus*
Pacific cod	*Gadus macrocephalus*
Walleye pollock	*Theragra chalcogramma*
Kelp greenling	*Hexagrammos decagrammus*
CARTILAGINOUS FISH	
Ratfish	*Hydrolagus colliei*
Blue shark	*Prionace glauca*
Spiny dogfish	*Squalus acanthias*
Longnose skate	*Raja rhina*
Big skate	*Raja binoculata*

Appendix Table 8. Species catch (pieces) by set number, M/V VIKING STAR, September 18-October 2, 1979.

Set no.	No.hooks hauled	Yelloweye *S.ruberrimus*	Rougheye *S.aleutianus*	Quillback *S.maliger*	Black-cod	Canary *S.pinniger*	Redbanded *S.babcocki*	Ling-cod	Pacific cod	Total
1	1400	6	4	0	2	0	105	3	0	120
2	700	37	0	0	0	4	0	1	0	42
3	1400	185	0	11	0	3	0	7	0	206
4	140	0	0	0	0	0	7	0	0	7
5	1400	76	0	0	0	46	3	2	4	131
6	1400	33	0	0	0	30	0	1	0	64
7	700	28	0	0	0	0	0	0	0	28
8	700	3	0	0	0	0	0	0	0	3
9	700	27	0	0	0	6	0	2	0	35
10	700	27	0	8	0	30	0	3	0	68
11	700	40	0	0	0	0	0	2	0	42
12	700	112	0	30	0	8	0	0	0	150
13	560	49	0	0	0	4	0	0	0	53
14	700	56	0	0	0	0	1	0	0	57
15	700	1	0	0	6	0	5	0	0	12

Appendix Table 8 (cont'd)

Set no.	No.hooks hauled	Yelloweye *S.ruberrimus*	Rougheye *S.aleutianus*	Quillback *S.maliger*	Black-cod	Canary *S.pinniger*	Redbanded *S.babcocki*	Ling-cod	Pacific cod	Total
16	700	7	0	0	2	0	4	0	2	15
17	1400	0	153	0	37	0	0	0	0	190
18	700	18	0	0	0	0	4	1	1	24
19	700	20	0	0	0	0	0	0	0	20
20	700	16	0	0	0	0	0	0	3	19
21	700	0	0	0	0	0	0	0	0	0
22	700	26	0	0	0	1	4	0	0	31
23	1400	0	53	0	40	0	6	0	0	99
24	700	1	1	0	0	0	38	0	0	40
25	700	21	0	0	0	0	25	0	2	48
26	700	7	0	0	0	0	0	2	7	16
27	700	67	0	0	0	11	0	2	0	80
28	700	26	0	10	0	6	0	2	0	44
29	700	45	0	0	0	1	0	1	1	48
30	2100	0	115	0	70	0	0	0	0	185

Appendix Table 8 (cont'd)

Set no.	No.hooks hauled	Yelloweye *S.ruberrimus*	Rougheye *S.aleutianus*	Quillback *S.maliger*	Black-cod	Canary *S.pinniger*	Redbanded *S.babcocki*	Ling-cod	Pacific cod	Total
31	700	43	0	0	0	0	0	3	0	46
32	3500	0	26	0	48	0	0	0	0	74
33	700	13	0	6	1	6	0	4	0	30
34	700	19	0	9	0	4	0	4	0	36
35	700	9	0	4	0	0	0	2	0	15
36	1400	8	0	55	0	16	0	0	0	79
37	1400	43	0	75	0	13	0	0	0	131
38	1400	18	0	23	0	0	0	3	0	44
39	700	19	0	29	0	25	0	1	0	74
40	700	6	0	25	0	1	0	3	0	35
41	2100	0	4	0	89	0	0	0	0	93
42	700	3	0	0	0	0	0	0	0	3
43	1400	97	0	0	0	16	0	15	0	128
44	700	8	0	0	0	0	0	2	2	12
45	980	53	0	0	0	5	0	1	0	59
46	980	55	0	13	0	30	0	0	0	98
Total		1,328	356	298	295	266	202	67	22	2,834
%		46.9	12.6	10.5	10.4	9.4	7.1	2.4	0.8	100.1

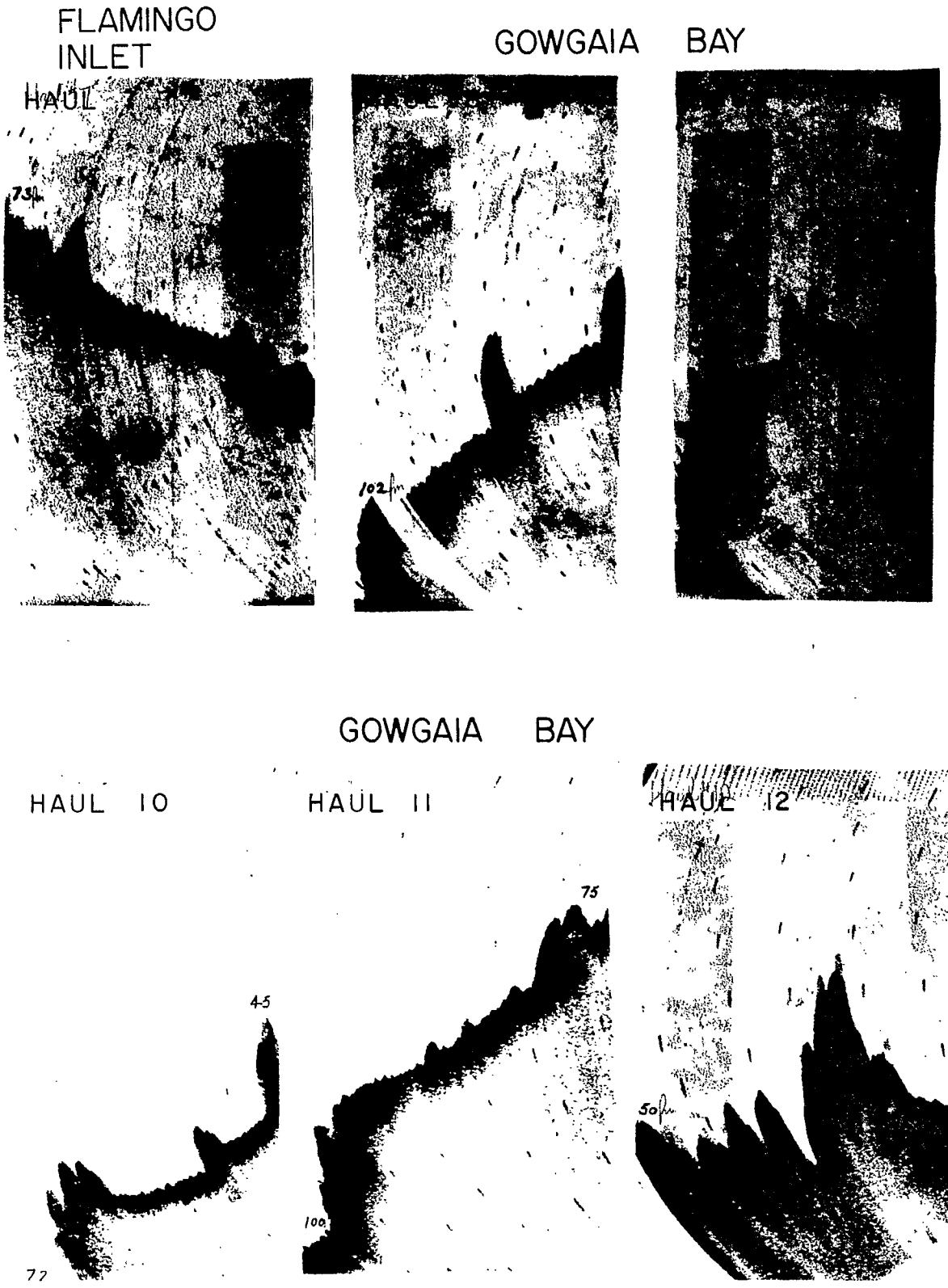
Appendix Table 9. Species discards (pieces) by set number, M/V VIKING STAR, September 18-October 2, 1979.

Set No.	No.hooks hauled	Dogfish	Halibut	*S.brevispinis*	Ratfish	*S.helvomaculatus*	Turbot	*Seb.alascanus*	*S.paucispinis*	Longnose skate	Flathead sole	Big skate	Rock sole	*S.flavidus*	*S.ciliatus*	*S.nebulosus*	*S.melanops*	*S.elongatus*	Blue shark	Pollock	*S.nigrocinctus*	Kelp greenling	Dover sole	Total
1	1,400	41	6	12	–	5	–	–	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	68
2	700	2	3	8	–	5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	18
3	1,400	–	–	9	–	–	–	–	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	15
4	140	2	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
5	1,400	25	7	11	1	5	1	–	4	1	–	–	2	2	–	–	–	–	–	–	–	–	–	59
6	1,400	19	3	12	4	7	–	–	–	–	3	–	3	4	–	–	–	–	–	–	–	–	–	55
7	700	12	8	7	–	6	–	–	–	1	–	1	3	–	–	–	–	–	–	–	–	–	–	38
8	700	24	15	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	40
9	700	33	18	5	7	7	–	–	2	–	–	–	1	–	–	–	–	–	–	–	–	–	–	73
10	700	25	12	1	2	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	44
11	700	15	8	3	1	2	–	–	1	–	–	–	1	–	–	–	–	1	–	–	–	–	–	32
12	700	–	2	4	2	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1	–	10
13	560	6	–	2	–	–	–	–	8	1	–	–	–	–	–	–	–	–	–	–	1	–	–	18
14	700	7	7	3	4	8	–	–	3	–	–	–	–	–	–	–	–	–	1	–	–	–	–	33
15	700	30	4	1	–	–	2	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	38
16	700	16	6	4	3	–	15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	44
17	1,400	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
18	700	31	4	2	3	4	2	–	1	1	–	–	–	–	–	–	–	1	–	–	–	–	–	49
19	700	9	6	–	3	1	–	–	–	1	4	–	2	–	–	–	–	–	–	–	–	–	–	26
20	700	12	8	20	10	–	–	–	4	1	–	–	–	–	–	–	–	–	–	–	–	–	–	55
21	700	15	4	–	–	–	–	–	–	2	7	–	–	–	–	–	–	–	–	–	–	–	–	28
22	700	22	5	–	2	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–	31
23	1,400	8	1	–	–	–	18	10	–	4	–	1	–	–	–	–	–	–	–	–	–	–	–	42
24	700	10	4	1	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	18
25	700	14	3	4	–	–	2	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	24

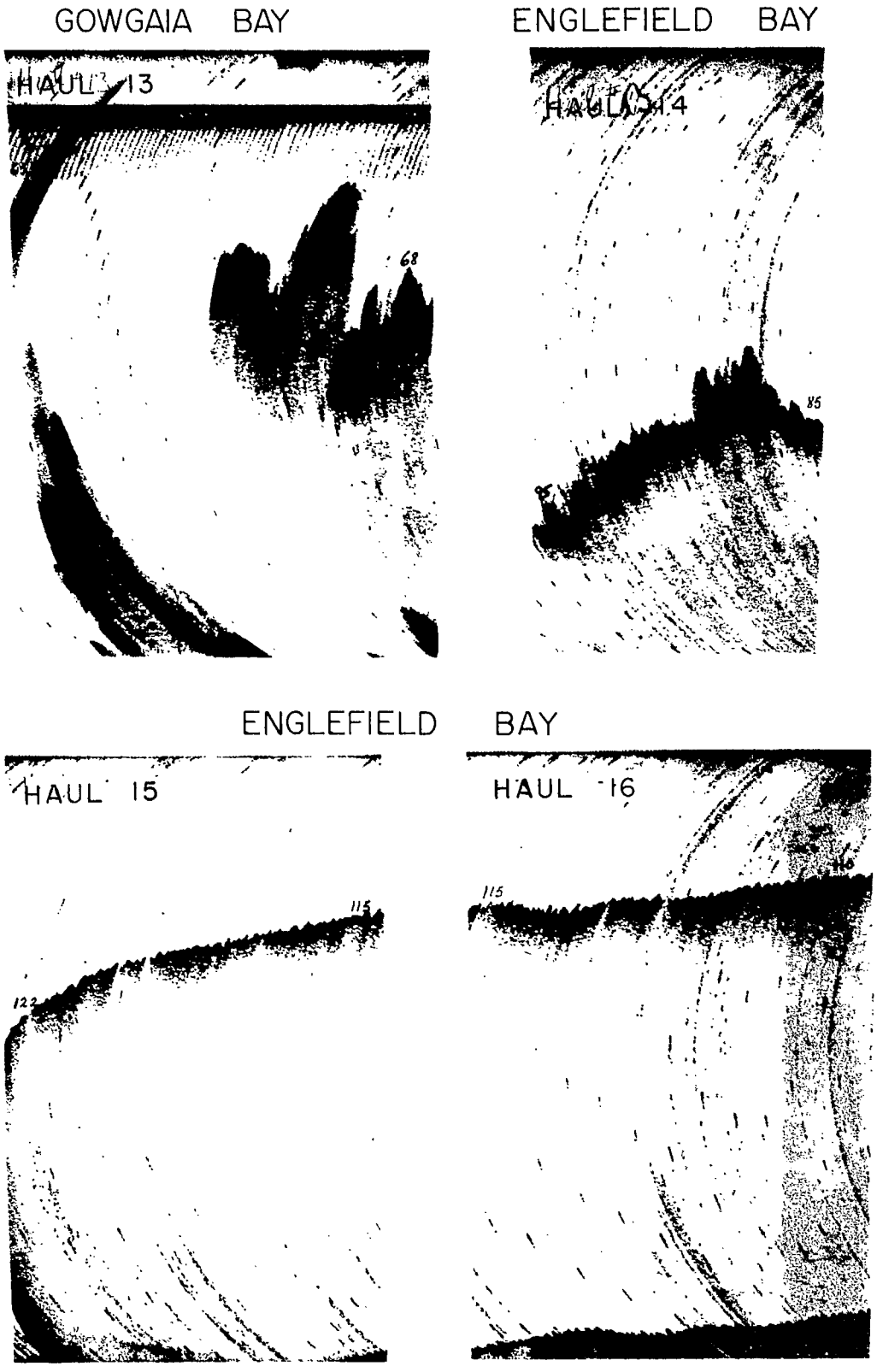
Appendix Table 9 (cont'd)

Set No.	No. hooks hauled	Dogfish	Halibut	S. brevispinis	Ratfish	S. helvomaculatus	Turbot	Seb. alascanus	S. paucispinis	Longnose skate	Flathead sole	Big skate	Rock sole	S. flavidus	S. ciliatus	S. nebulosus	S. melanops	S. elongatus	Blue shark	Pollock	S. nigrocinctus	Kelp greenling	Dover sole	Total
26	700	19	4	6	–	2	9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	40
27	700	7	21	6	–	3	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	39
28	700	1	15	–	17	3	–	–	–	–	–	–	6	–	–	–	–	–	–	–	–	–	–	42
29	700	10	22	4	2	7	2	–	1	1	1	1	–	–	–	–	–	–	–	–	–	–	–	51
30	2,100	–	–	–	–	–	4	7	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	13
31	700	20	13	1	5	3	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	44
32	3,500	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
33	700	14	6	2	11	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	35
34	700	3	–	1	12	–	–	–	–	–	–	–	–	–	–	5	3	–	–	–	–	–	–	24
35	700	62	5	–	6	–	–	–	–	–	–	4	–	–	–	–	1	–	–	–	–	–	–	78
36	1,400	8	8	2	7	8	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	36
37	1,400	7	9	8	1	4	–	–	–	–	–	1	–	–	–	–	–	–	1	–	–	–	–	31
38	1,400	8	48	3	–	8	–	–	–	–	–	2	4	–	–	–	–	–	–	–	–	–	–	73
39	700	1	–	–	10	4	–	–	–	–	–	1	3	–	1	–	–	–	–	–	–	–	–	20
40	700	3	3	–	15	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	24
41	2,100	42	22	–	2	–	11	35	–	8	–	3	–	–	–	–	–	–	–	2	–	–	1	126
42	700	180	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	181
43	1,400	29	2	27	8	3	–	–	19	–	2	–	–	1	–	–	1	1	–	–	–	–	–	93
44	700	20	3	4	2	1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	31
45	980	22	13	13	–	4	–	–	–	–	2	–	–	–	4	–	–	–	–	–	–	–	–	58
46	980	10	1	9	–	5	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	26
Total		844	329	196	140	110	66	56	53	30	20	19	19	15	8	8	5	4	3	2	1	1	1	1,930
%		43.7	17.1	10.2	7.3	5.7	3.4	2.9	2.8	1.6	1.0	1.0	1.0	.8	.4	.4	.3	.2	.2	.1	Tr	Tr	Tr	100.1

Tr = trace

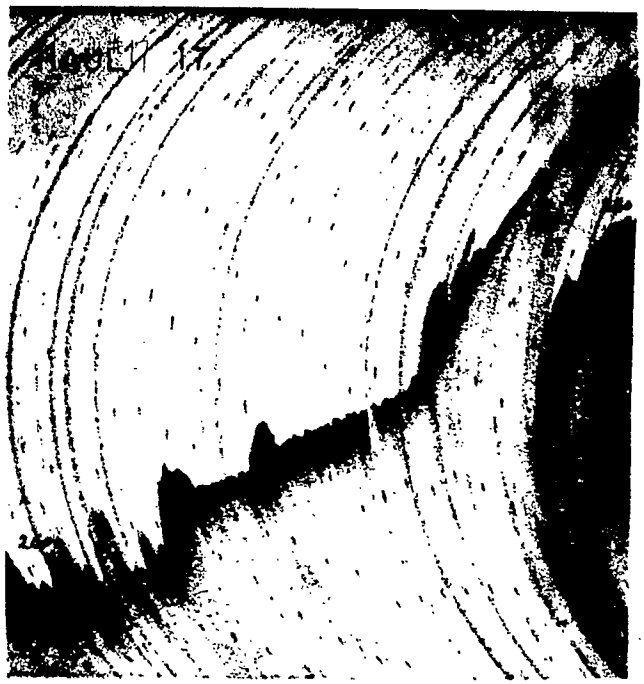


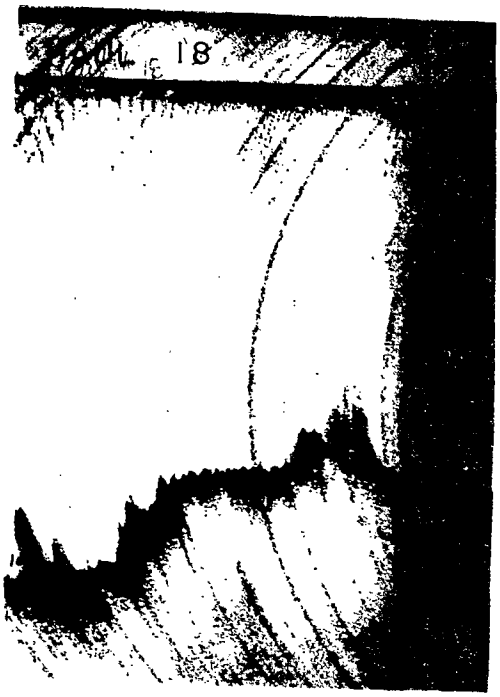
Appendix Fig. 1a. Sounder records of the M/V VIKING STAR, sets 7-12.



Appendix Fig. 1b. Sounder records of the M/V VIKING STAR, sets 13-16.

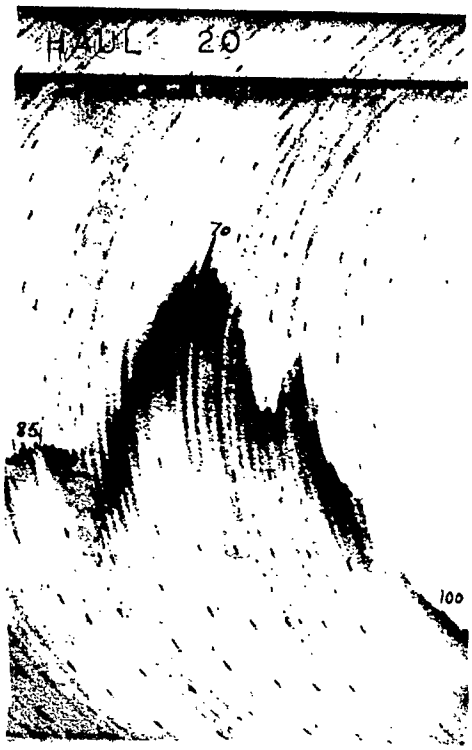
BUCK POINT



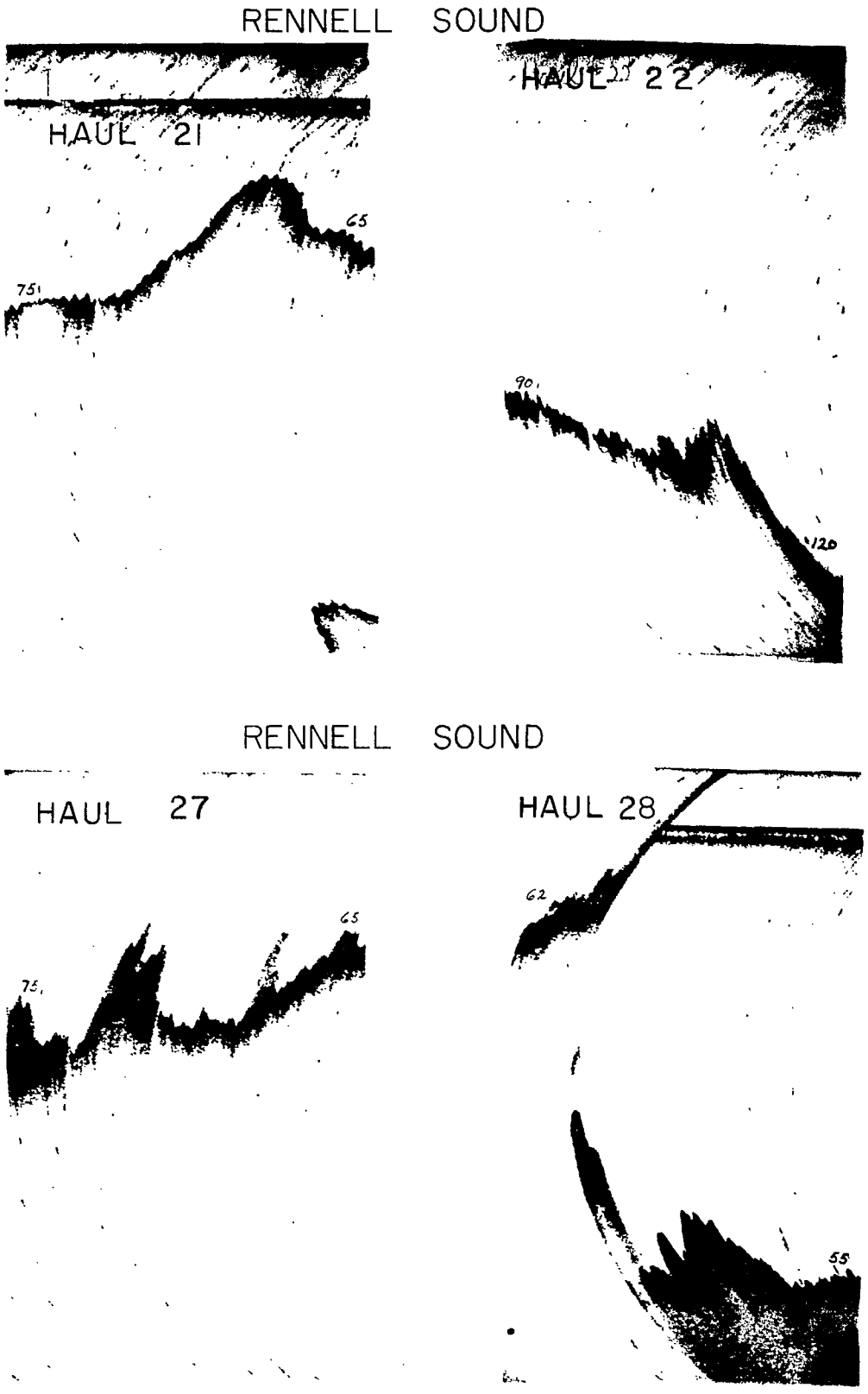


BUCK POINT

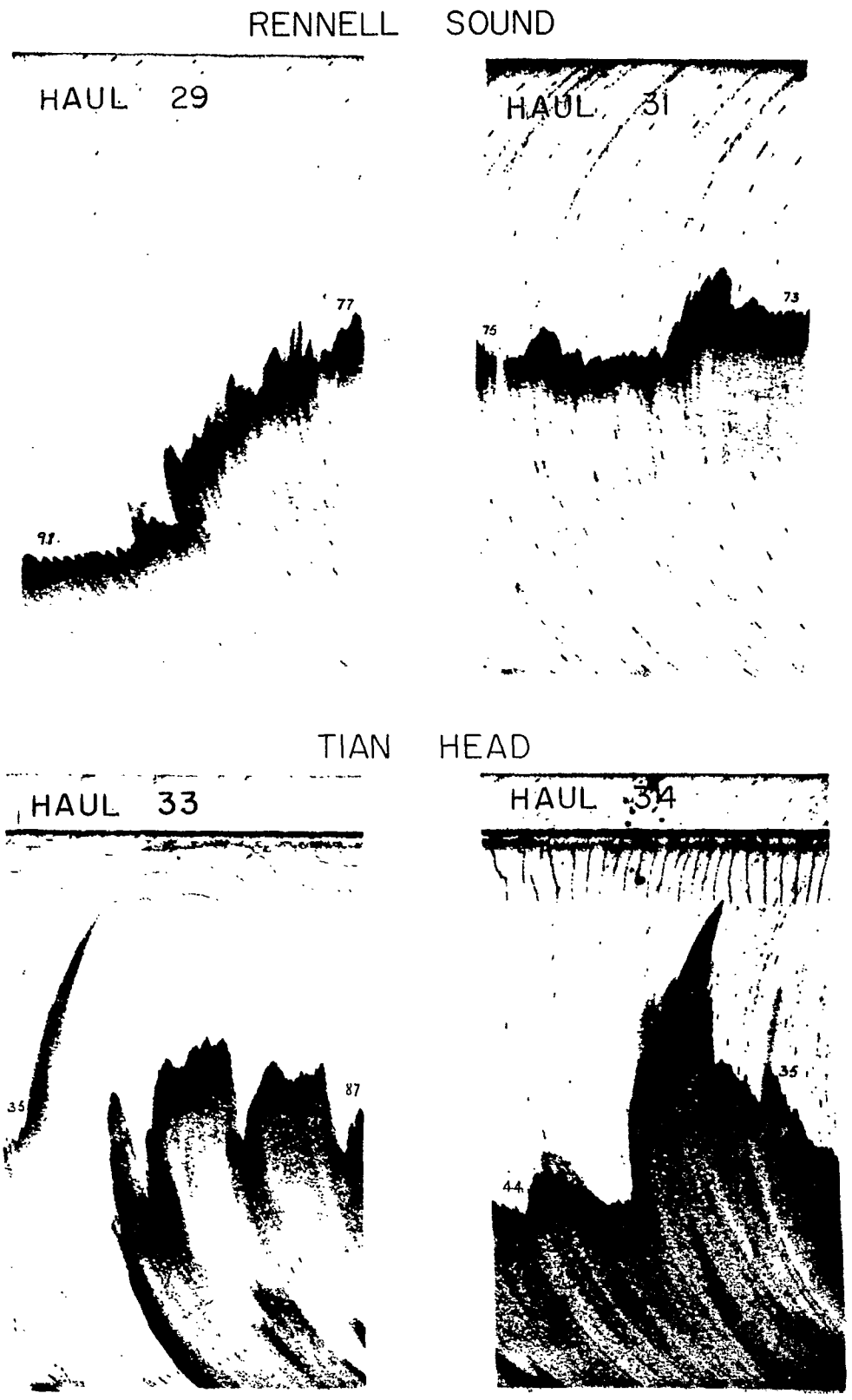
RENNELL SOUND



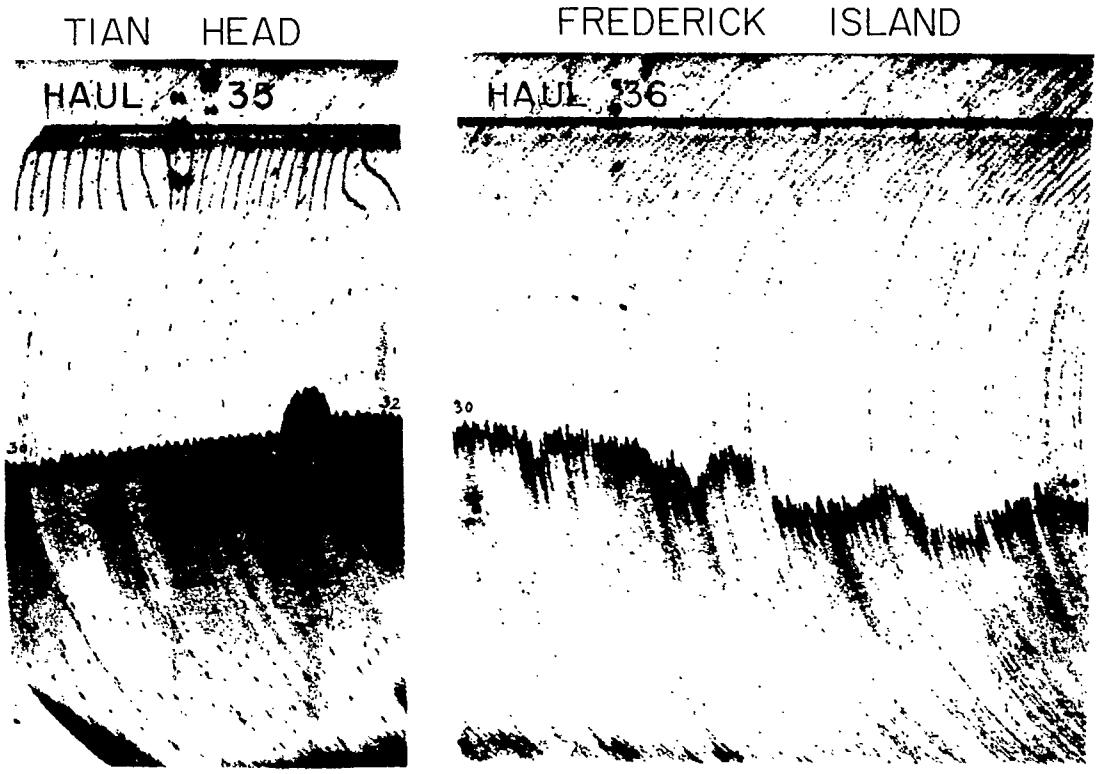
Appendix Fig. 1c. Sounder records of the M/V VIKING STAR, sets 17-20.

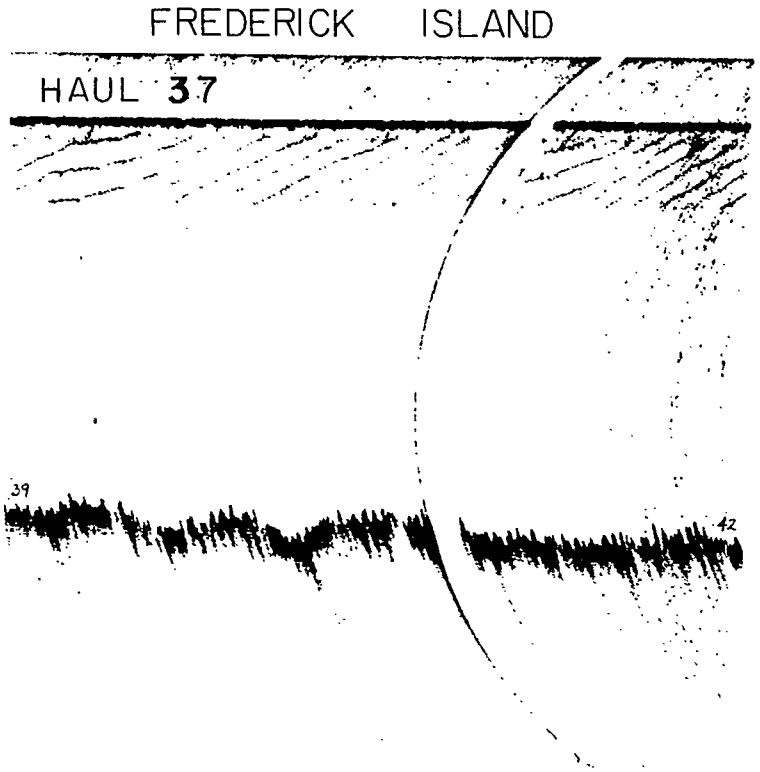


Appendix Fig. 1d. Sounder records of the M/V VIKING STAR, sets 21, 22, 27, 28.

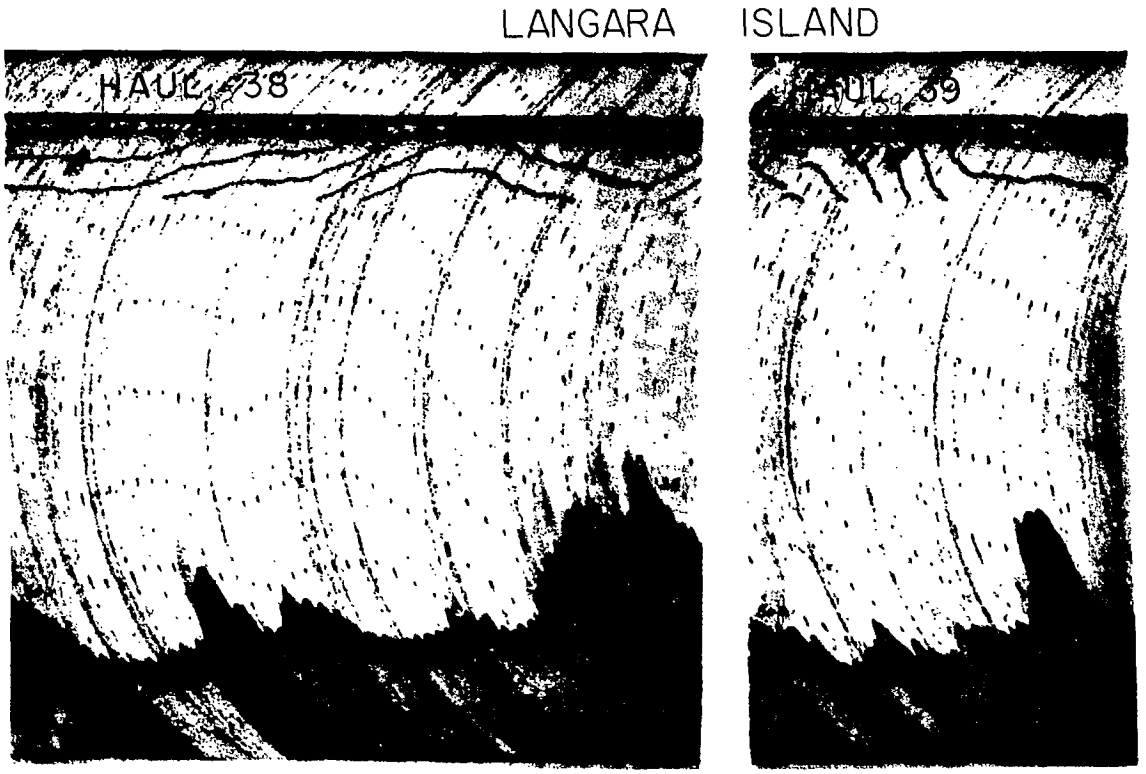


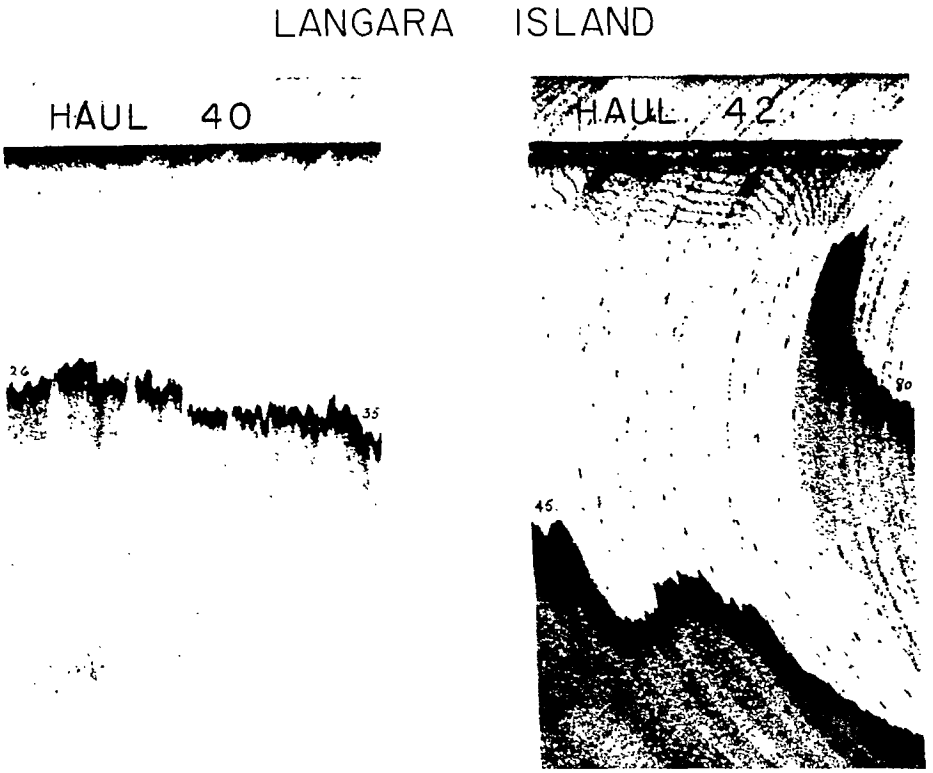
Appendix Fig. 1e. Sounder records of the M/V VIKING STAR, sets 29, 31, 33, 34.



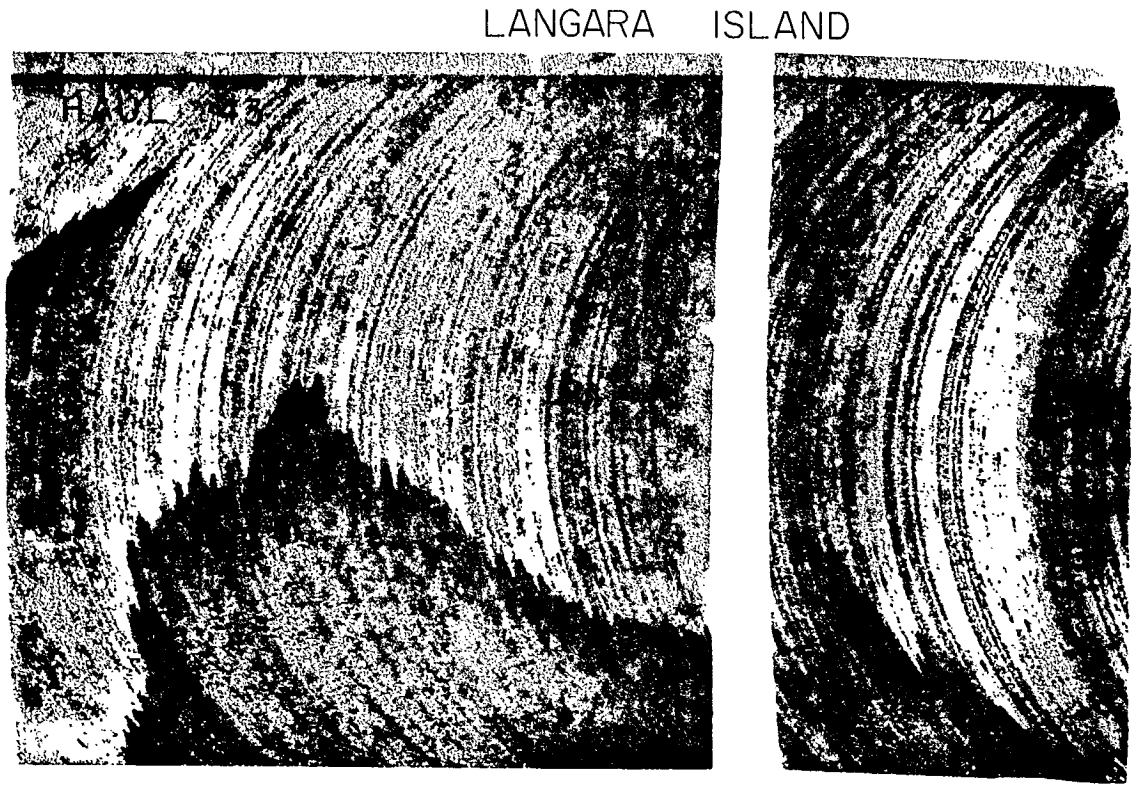


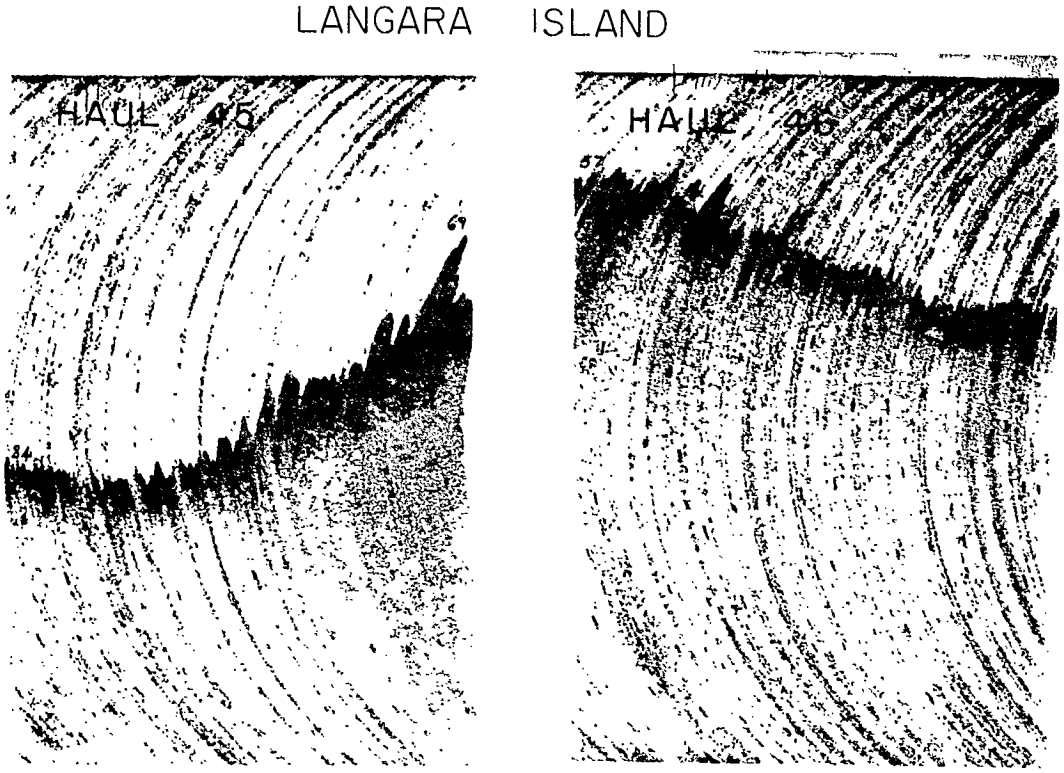
Appendix Fig. 1f. Sounder records of the M/V VIKING STAR, sets 35-37.





Appendix Fig. lg. Sounder records of the M/V VIKING STAR, sets 38-40, 42.





Appendix Fig. 1h. Sounder records of the M/V VIKING STAR, sets 43-46.