Catches and Trawl Locations of *M/V Arctic Harvester* during the Dover Sole Biomass Survey off the West Coast of Vancouver Island, February-March 1981

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and Aquatic Sciences No. 295

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CATCHES AND TRAWL LOCATIONS OF M/V ARCTIC HARVESTER DURING THE DOVER SOLE BIOMASS SURVEY OFF THE WEST COAST OF VANCOUVER ISLAND, FEBRUARY-MARCH 1981

by

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ABSTRACT

Carter, E. W., L. A. Lapi, and J. E. Richards. 1981. Catches and trawl locations of M/V ARCTIC HARVESTER during the Dover sole biomass survey off the west coast of Vancouver Island, February-March 1981. Can. Data. Rep. Fish. Aquat. Sci. 295: iv + 57 p.

A trawl survey of Dover sole (Microstomus pacificus) was conducted off the west coast of Vancouver Island during February and March 1981. The purpose of the survey was to determine the bathymetric distribution and estimate biomass of the species. The area surveyed extended from Cape Flattery north to Nootka Sound over a depth range of 180-500 fm (330-915 m).

This report deals with the bathymetric distribution of catches, and contains detailed records on haul locations, species caught, and biological information by species such as length-frequency and gonad condition.

Key words: bathymetric distribution, Dover sole, Microstomus pacificus, west coast Vancouver Island.

RÉSUMÉ

Carter, E. W., L. A. Lapi, and J. E. Richards. 1981. Catches and trawl locations of M/V ARCTIC HARVESTER during the Dover sole biomass survey off the west coast of Vancouver Island, February-March 1981. Can. Data. Rep. Fish. Aquat. Sci. 295: iv + 57 p.

Un levé par chalutage de la sole Pacifique (Microstomus pacificus) a été effectué au large de la côte ouest de l'île Vancouver en février et mars 1981. Le levé avait pour but de déterminer la distribution bathymétrique de l'espèce et d'en évaluer la biomasse. La région étudiée s'étendait du cap Flattery jusqu'au nord de la baie Nootka à une profondeur variant de 180 à 500 brasses (330 à 915 m).

Le présent rapport porte sur la distribution bathymétrique des prises et contient des renseignements détaillés sur les endroits de chalutage et les espèces capturées; des données biologiques, comme la fréquence des longueurs et l'état des gonades, y sont également incluses pour chaque espèce.

Mots-clés: distribution bathymétrique, sole du Pacifique, Microstomus pacificus, côte ouest de l'île Vancouver.

INTRODUCTION

During February and March 1981 the Pacific Biological Station conducted a bottom trawl survey off the west coast of Vancouver Island. The purpose of the survey was to estimate the biomass of Dover sole (Microstomus pacificus) and to determine bathymetric distribution of Dover sole during the winter months. Previously the species was found to reside in deep water in winter and shallow water in summer off the British Columbia coast (Harling et al. 1978). The survey was scheduled to be carried out in two 10-day trips, but an equipment break-down caused the first trip to be cut short after five days and the second trip to be extended by five days.

This report presents the results of the survey including bathymetric distributions, haul locations, catch information, and biological data collected. Further analysis of the biomass data will be presented in a subsequent report.

CRUISE PLAN

VESSEL AND GEAR

The M/V ARCTIC HARVESTER, a 141-ft (43-m) stern trawler, was awarded the charter. An Engel, high-lift bottom trawl rigged for hard bottom and with a codend liner was used for the survey. A sole footrope was used on one haul to test its efficiency. Complete vessel specifications are included in Appendix Table 1. Gear characteristics are illustrated in Appendix Table 2.

SURVEY AREA

The area surveyed was the west coast of Vancouver Island from Cape Flattery north to Nootka Sound. An attempt was made to sample all depths between 180 fm (330 m) and 500 fm (915 m). Some problems with uneven bottom were encountered but most areas were well covered.

METHODS

Catches were sampled by taking three or four tubs of fish at the beginning, middle, and end of each as the fish moved down a conveyor belt from

a hopper at the stern of the boat. This method of sampling should have eliminated any bias by the conveyor system selecting large or small fish first. Species were sorted into other tubs and weighed on a beam balance. The weight of each species in the sample was then extrapolated to the total haul weight (skipper's estimate) to establish the total weight of each species for that haul.

Marketable species were selected out and placed in chilled sea water in the fish holds by the crew. Fish were only retained during the latter part of the cruise to stay within the allowable number of days that fish may be held in brine prior to sale. Species which were kept include rockfish (Sebastes spp.), sablefish (Anoplopoma fimbria), petrale sole (Eopsetta jordani), and Dover sole (Microstomus pacificus).

Length/sex/maturity/double otolith samples and length/frequency samples were taken upon request by other investigations. Fish were measured to the nearest cm and otoliths were stored in plastic trays (Tray Biens--brand name) containing a 50% glycerine solution, with thymol crystals. Otoliths were transported to the Pacific Biological Station Ageing Unit for age determination. Species sampled included Dover sole, petrale sole, sablefish, and Pacific ocean perch (Sebastes alutus). A list of common and scientific names of species caught is found in Appendix Table 12.

In addition, several transects were made to determine vertical temperature profiles with expendable bathythermographs (XBTs). XBT stations are noted on Fig. 1 and 2. These results will be presented in an annual oceanographic report.

RESULTS

Forty-three hauls were completed and only one (No. 13) was deemed unusable, due to gear failure. Set locations and bridge log information are contained in Fig. 1 and 2, and Appendix Table 3, respectively. The total catch was 112,342 kg, of which five species comprised 86% (Table 1). These species were Dover sole (44%), sablefish (14%), arrowtooth flounder (12%), Sebastolobus alascanus (8%), and Sebastes alutus (8%).

Biological samples were collected from 2,785 specimens comprising four species: Dover sole (1,914), petrale sole (326), sablefish (295), and Pacific ocean perch (200). Table 2 summarizes the samples collected. Length/sex, maturity, and otolith samples were collected from all four species, and stomach content data from sablefish. These data are presented in Appendix Tables 4-11.

Ninety-eight percent (48,103 kg) of the Dover sole was taken in depths of 200-300 fm (366-549 m). These findings coincide with the discovery of Dover sole in depths of 250-300 fm (457-549 m) off Langara and Frederick Islands in February 1977 (Harling et al. 1977).

It is also interesting to note that 17% (1,461 kg) of Sebastes alutus was caught in 401-450 fm (733-823 m). Previous studies in the northeastern Pacific Ocean indicate a bathymetric variation between stocks (Westrheim 1973) and maturity states (Westrheim 1975) of S. alutus. However, these studies recorded a maximum depth of 280 fm (512 m). Hart (1973) reported a range from the surface to 350 fm (640 m) for the species, throughout its geographic range.

Quantitative depth distribution, based on catch rates (kg/h), is displayed for all species in Table 3. For the five principal species caught, the depth distributions are as follows:

Species	Depth (fm)	
	Range	Principal
Dover sole	151-450	201-300
Sablefish	151-500	351-450
Arrowtooth flounder	151-450	151-250
Sebastolobus alascanus	151-500	251-300/401-450
Sebastes alutus	151-450	201-250/401-450

ACKNOWLEDGMENTS

We would like to thank Captain Jim Trimm and the crew of the M/V ARCTIC HARVESTER for sharing their knowledge and supplying the assistance necessary in making this survey successful. The knowledge and fishing experience of Mr. Norm Sigmund proved invaluable and was greatly appreciated.

Personnel for this survey was provided, in part, by the British Columbia Ministry of the Environment.

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Westrheim, S. J. 1973. Age determination and growth of Pacific ocean perch (Sebastes alutus) in the northeast Pacific Ocean. J. Fish. Res. Board Can. 30: 235-247.

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Table 1. Weight (kg) of species and percent of total catch by 50-fm depth interval, ARCTIC HARVESTER, February-March 1981.

Species	Depth Interval (fm) 151-200	%	201-250	%	251-300	%	301-350	%
Dover sole	54	5	26,107	48	21,792	52	760	12
Sablefish	32	3	1,979	4	4,316	10	3,769	61
Turbot	567	50	8,607	16	3,771	9	521	8
Sebastolobus alascanus	76	7	2,458	4	4,638	11	758	12
Sebastes alutus	43	4	3,914	7	3,294	8	3	-
Petrale sole	178	15	4,787	9	285	1	22	0.5
Rex sole	81	7	3,197	6	695	2	7	-
S. aleutianus	-	-	1,991	4	1,109	3	-	-
S. borealis	-	-	543	1	1,136	3	18	0.5
Skate	-	-	609	1	361	1	96	2
Misc. species[a]	-	-	-	-	146	-	220	4
S. diploproa	-	-	32	3	303	-	-	-
Hake	-	-	15	-	68	-	-	-
S. babcocki	59	5	-	-	-	-	-	-
S. crameri	11	1	-	-	-	-	-	-
Total	1,134	100	54,510	100	41,611	100	6,174	100

Table 1 (cont'd)

Species	Depth Interval (fm) 351-400	%	401-450	%	451-500	%	Total weight	Percent of total catch
Dover sole	347	10	25	0.5	-	-	49,085	44
Sablefish	2,513	72	1,956	48	1,062	78	15,627	14
Turbot	27	1	20	0.5	-	-	13,513	12
Sebastolobus alascanus	508	15	294	7	252	19	8,983	8
Sebastes alutus	-	-	1,461	36	-	-	8,715	8
Petrale sole	-	-	-	-	-	-	5,272	5
Rex sole	-	-	-	-	-	-	3,980	3
S. aleutianus	-	-	218	5	-	-	3,319	3
S. borealis	-	-	-	-	-	-	1,697	1
Skate	12	-	-	-	-	-	1,079	1
Misc. species[a]	64	2	108	3	46	3	583	1
S. diploproa	-	-	-	-	-	-	336	T
Hake	-	-	-	-	-	-	83	T
S. babcocki	-	-	-	-	-	-	59	T
S. crameri	-	-	-	-	-	-	11	T
Total	3,470	100	4,083	100	1,361	100	112,342	100

[a]Includes Pacific dab, ratfish, squid, and crab.

Table 2. Biological sample taken on M/V ARCTIC HARVESTER, February-March 1981.

Species	No. of fish				
	Length/sex	Maturity	Stomach	Otolith[2]	Total
Dover sole	1,964	880	-	880	1,964
Petrale sole	326	190	-	100	326
Sablefish	295	295	295	295	295
Pacific ocean perch	200	200	-	200	200
Total	2,785	1,565	295	1,475	2,785

Table 3. Average catch per unit effort (kg/h) of species by 50-fm depth interval, ARCTIC HARVESTER, February-March 1981.

Species	Depth interval (fm)							
	151-200	201-250	251-300	301-350	351-400	401-450	451-500	Total average C.P.U.E.
Dover sole	24.6	789.7	813.7	54.2	57.8	9.5	-	517.0
Sablefish	14.7	69.1	159.2	261.7	418.8	534.7	178.2	180.1
Turbot	257.7	266.3	112.4	35.3	4.5	7.6	-	133.1
Sebastolobus alascanus	34.4	74.5	149.3	51.0	84.6	93.7	42.2	91.7
Sebastes alutus	19.6	103.7	77.6	0.2	-	548.0	-	83.2
Petrale sole	81.0	145.3	9.8	1.6	-	-	-	52.4
Rex sole	36.8	99.9	27.4	0.5	-	-	-	41.8
S. aleutianus	-	60.9	31.5	-	-	81.8	-	33.1
S. borealis	-	19.3	34.4	1.4	-	-	-	16.9
Skates	-	20.4	13.1	6.3	2.0	-	-	11.8
Misc. species[a]	-	2.4	5.4	14.2	10.6	28.8	7.7	7.3
S. diploproa	14.7	10.8	-	-	-	-	-	3.9
Hake	-	0.4	2.3	-	-	-	-	0.8
S. babcocki	27.0	-	-	-	-	-	-	0.6
S. crameri	4.9	-	-	-	-	-	-	0.1

[a]Includes Pacific dab, ratfish, squid, and crab.

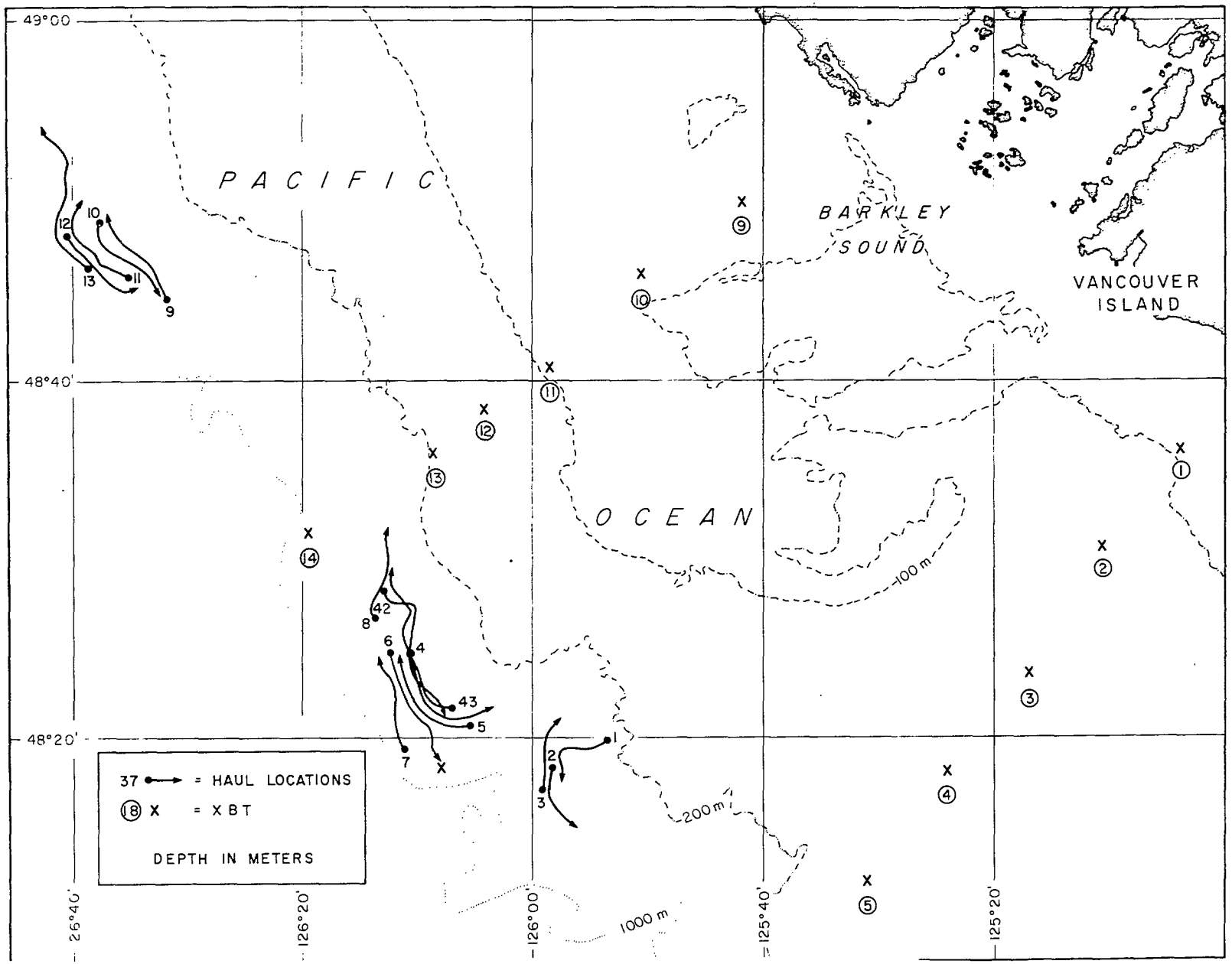


Fig. 1. Trawl locations and XBT stations, M/V ARCTIC HARVESTER Dover sole cruise, February-March, 1981.

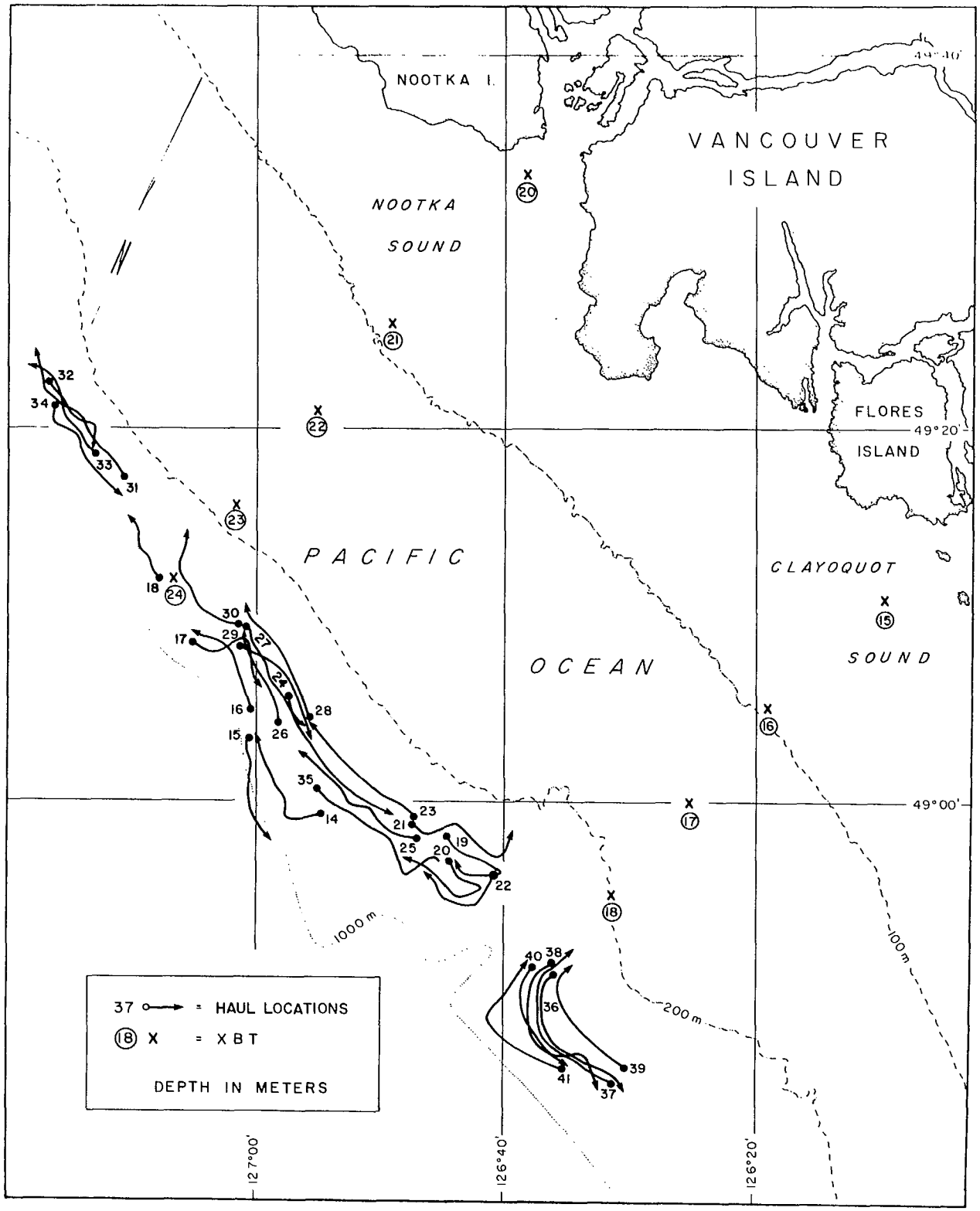


Fig. 2. Trawl locations and XBT stations, M/V ARCTIC HARVESTER Dover sole cruise, February-March, 1981.

APPENDIX TABLES

Appendix Table 1. Vessel specifications for the M/V ARCTIC HARVESTER.

Vessel: ARCTIC HARVESTER

Skipper: Jim Trimm

Landing port: Vancouver

Length (m): 43

Gross tons: 696

H.P.: 975

No. crew: 6

Electronic Aids

Depth sounder: Simrad

Radar: Furuno

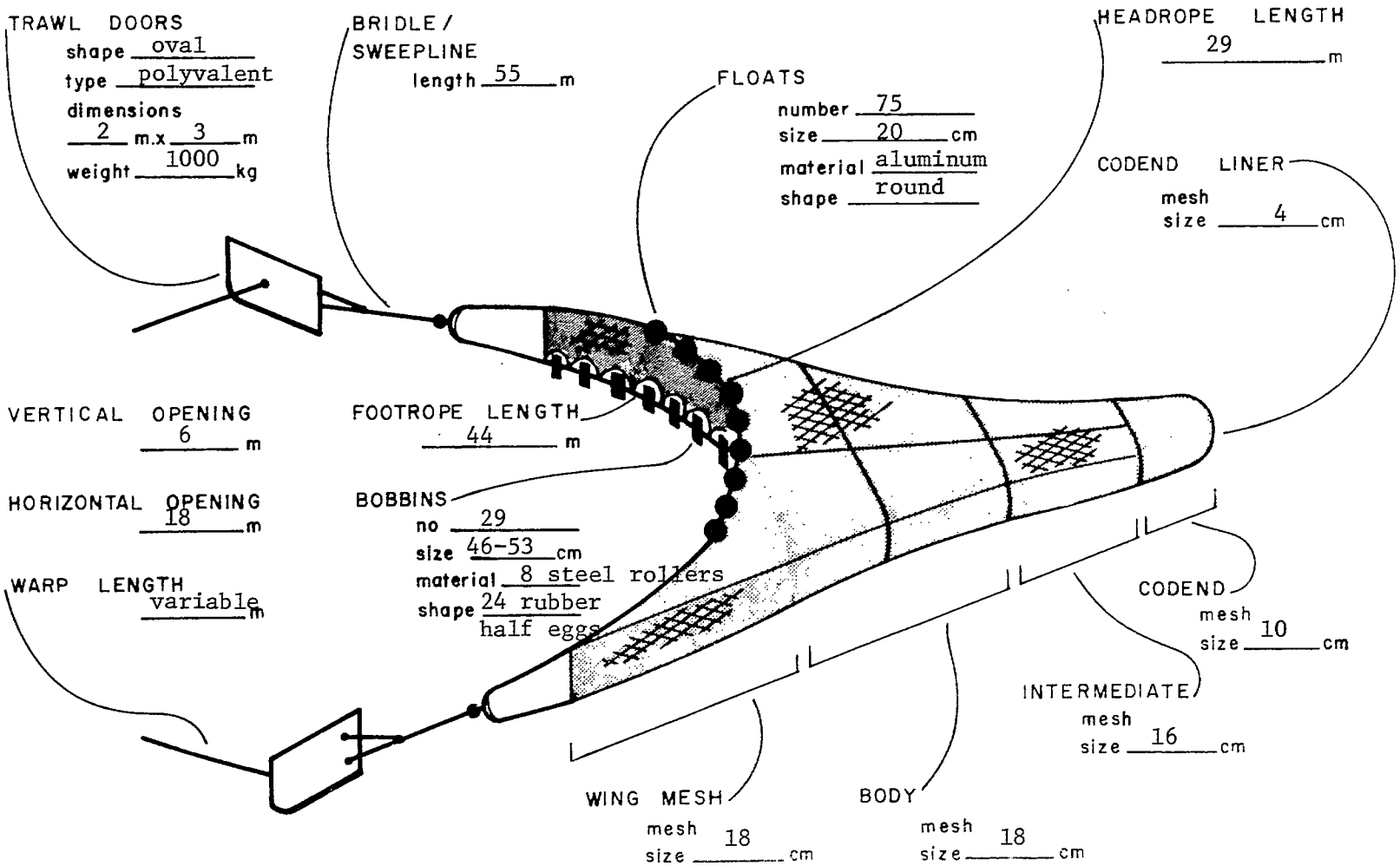
Autopilot: Sperry

Loran: Internav

Appendix Table 2. NET DIMENSIONS AND CHARACTERISTICS FOR BOTTOM TRAWL

VESSEL ARCTIC HARVESTER NET Engel High Lift

OBSERVATION PERIOD



APPENDIX TABLE 3. HAUL DATA FOR M/V ARCTIC HARVESTER

HAUL NO.	1		2	
MAJOR AREA	3C		3C	
MINOR AREA	23		23	
DATE	FEB 01		FEB 01	
DEPTH MODE F/(M)	250 /(457)		300 /(548)	
DURATION (H)	2.00		2.00	
	START	STOP	START	STOP
TIME	14:35	16:35	17:35	19:35
LAT.(DEG,MIN)	48°19'	48°17'	48°18'	48°15'
LONG.(DEG,MIN)	125°53'	125°56'	125°58'	125°56'
LC-5990-X	14669	14650	14648	14656
LC-5990-Y	28945	28939	28948	28924
DEPTH (F)	193	270	300	315
SPECIES CATCH(KG.)				
DAB (PACIFIC)	-		-	
DOVER SOLE	431		202	
PETRALE SOLE	TRACE		-	
REX SOLE	24		TRACE	
TURBOT	12		20	
S. ALEUTIANUS	-		-	
S. ALUTUS	83		-	
S. BABCOCKI	-		-	
S. BOREALIS	161		-	
S. CRAMERI	-		-	
S. DIPLOPROA	9		-	
SEB. ALASCANUS	-		94	
HAKE	-		-	
MISC. SPECIES	-		TRACE	
SABLEFISH	167		138	
RATFISH	21		-	
SKATES	TRACE		TRACE	
CRABS	TRACE		-	
SQUID	-		-	
TOTAL CATCH (KG.)	907		454	

3	4	5
3C	3C	3C
23	23	23
FEB 01	FEB 02	FEB 02
350 /(640)	250 /(457)	297 /(543)
1.58	2.00	2.00

START	STOP	START	STOP	START	STOP
20:25	22:00	6:25	8:25	9:20	11:20
48°17'	48°21'	48°28'	48°21'	48°20'	48°25'
125°59'	125°56'	126°10'	126°03'	126°05'	126°12'
14649	14650	14598	14625	14622	14595
28935	28964	29010	28981	29979	29014
350	350	250	250	300	294

-	-	-
7	1112	98
-	414	22
1	124	13
2	131	53
-	76	-
-	477	18
-	-	-
3	-	111
-	-	-
-	-	TRACE
26	145	396
-	TRACE	13
6	TRACE	TRACE
94	242	636
TRACE	-	-
2	-	-
-	-	-
-	TRACE	TRACE
145	2722	1361

APPENDIX TABLE 3. HAUL DATA FOR M/V ARCTIC HARVESTER

HAUL NO.	6		7	
MAJOR AREA	3C		3C	
MINOR AREA	23		23	
DATE	FEB 02		FEB 02	
DEPTH MODE F/(M)	375 /(685)		480 /(877)	
DURATION (H)	2.00		2.00	
	START	STOP	START	STOP
TIME	12:10	14:10	16:20	18:20
LAT.(DEG,MIN)	48°25'	48°18'	48°19'	48°24'
LONG.(DEG,MIN)	126°12'	126°08'	126°11'	126°13'
LC-5990-X	14592	14610	14608	14588
LC-5990-Y	29015	28967	28969	29013.7
DEPTH (F)	350	400	388	480
SPECIES CATCH(KG.)				
DAB (PACIFIC)	-		-	
DOVER SOLE	32		TRACE	
PETRALE SOLE	-		-	
REX SOLE	-		-	
TURBOT	-		-	
S. ALEUTIANUS	-		-	
S. ALUTUS	-		-	
S. BABCOCKI	-		-	
S. BOREALIS	-		-	
S. CRAMERI	-		-	
S. DIPLOPROA	-		-	
SEB. ALASCANUS	154		207	
HAKE	-		-	
MISC. SPECIES	12		34	
SABLEFISH	686		654	
RATFISH	-		-	
SKATES	TRACE		-	
CRABS	24		13	
SQUID	-		-	
TOTAL CATCH (KG.)	907		907	

8	9	10
3C	3C	3C
23	24	24
FEB 02	FEB 03	FEB 03
275 /(502)	250 /(457)	300 /(548)
2.00	2.00	2.00

START	STOP	START	STOP	START	STOP
19:50	21:50	7:10	9:10	9:55	11:55
48°27'	48°31'	48°44'	48°49'	48°48'	48°44'
126°14'	126°12'	126°31'	126°37'	126°37'	126°33'
14584	14588.1	14501.5	14477	14474	14497
29028	29061.6	29177.8	29216	29218	29185
250	335	250	254	300	300

-	TRACE	-
9	142	515
TRACE	TRACE	-
TRACE	236	9
23	412	279
TRACE	54	-
385	574	TRACE
-	-	-
18	290	-
-	TRACE	-
-	TRACE	-
156	250	192
14	-	-
TRACE	-	TRACE
302	310	1204
-	-	-
TRACE	-	70
TRACE	-	TRACE
-	-	TRACE
907	2268	2268

APPENDIX TABLE 3. HAUL DATA FOR M/V ARCTIC HARVESTER

HAUL NO.	11		12	
MAJOR AREA	3C		3C	
MINOR AREA	24		24	
DATE	FEB 03		FEB 03	
DEPTH MODE F/(M)	350 /(640)		400 /(731)	
DURATION (H)	2.00		2.00	
	START	STOP	START	STOP
TIME	12:55	14:55	15:50	17:50
LAT.(DEG,MIN)	48°46'	48°49'	48°48'	48°45'
LONG.(DEG,MIN)	126°35'	126°39'	126°40'	126°34'
LC-5990-X	14490	14466	14463	14490
LC-5990-Y	29185	29224	29222	29187
DEPTH (F)	350	350	400	400
SPECIES CATCH(KG.)				
DAB (PACIFIC)	-		-	
DOVER SOLE	69		9	
PETRALE SOLE	-		-	
REX SOLE	-		-	
TURBOT	59		17	
S. ALEUTIANUS	-		-	
S. ALUTUS	-		-	
S. BABCOCKI	-		-	
S. BOREALIS	-		-	
S. CRAMERI	-		-	
S. DIPLOPROA	-		-	
SEB. ALASCANUS	267		82	
HAKE	-		-	
MISC. SPECIES	69		23	
SABLEFISH	2256		146	
RATFISH	-		-	
SKATES	-		12	
CRABS	-		5	
SQUID	TRACE		-	
TOTAL CATCH (KG.)	2722		295	

13	14	15
3C	3C	3D
24	25	25
FEB 03	MAR 07	MAR 07
475 /(868)	425 /(777)	485 /(886)
2.25	2.00	1.97

START	STOP	START	STOP	START	STOP
19:05	21:20	11:15	13:15	14:50	16:48
48°46'	48°51'	48°58'	49°03'	49°02'	48°58'
126°38'	126°40'	126°53'	127°00'	127°00'	126°59'
14481	14458.4	14406	14364	14366	14383
29195	29238.5	29295	29340	29333	29303
410	360	420	450	480	490

-	-	-
-	TRACE	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	131	45
-	-	-
-	63	-
-	1591	408
-	-	-
-	TRACE	-
-	29	-
-	TRACE	-
0	1814	454

APPENDIX TABLE 3. HAUL DATA FOR M/V ARCTIC HARVESTER

HAUL NO.	16		17	
MAJOR AREA	3D		3D	
MINOR AREA	25		25	
DATE	MAR 08		MAR 08	
DEPTH MODE F/(M)	375 /(685)		325 /(594)	
DURATION (H)	2.00		2.00	
	START	STOP	START	STOP
TIME	6:50	8:50	10:20	12:20
LAT.(DEG,MIN)	49°04'	49°09'	49°07'	49°06'
LONG.(DEG,MIN)	127°00'	127°04'	127°05'	127°00'
LC-5990-X	14363	14337	14343	14363
LC-5990-Y	29350	29383	29377	29358
DEPTH (F)	378	360	400	300
SPECIES CATCH(KG.)				
DAB (PACIFIC)	-		-	
DOVER SOLE	306		10	
PETRALE SOLE	-		-	
REX SOLE	-		TRACE	
TURBOT	10		38	
S. ALEUTIANUS	-		-	
S. ALUTUS	-		-	
S. BABCOCKI	-		TRACE	
S. BOREALIS	-		TRACE	
S. CRAMERI	-		-	
S. DIPLOPROA	-		-	
SEB. ALASCANUS	272		61	
HAKE	-		TRACE	
MISC. SPECIES	TRACE		6	
SABLEFISH	1680		226	
RATFISH	-		-	
SKATES	-		22	
CRABS	TRACE		-	
SQUID	TRACE		TRACE	
TOTAL CATCH (KG.)	2268		363	

18	19	20
3D	3D	3D
25	25	25
MAR 09	MAR 10	MAR 10
425 /(777)	240 /(438)	275 /(502)
1.33	2.00	2.00
START	START	START
8:45	9:15	12:10
49°12'	48°58'	48°56'
127°07'	126°44'	126°44'
14321	14436.5	14440
29404	29285.7	29278
380	225	250
STOP	STOP	STOP
10:05	11:15	14:10
49°15'	48°57'	48°56'
127°10'	126°44'	126°47'
14305	14439.9	14436
29426	29279.6	29238
400	251	280
-	-	-
25	336	36
-	1216	204
-	87	TRACE
20	556	161
218	52	11
1461	156	36
-	-	-
-	-	TRACE
-	-	-
TRACE	-	-
162	64	204
TRACE	-	TRACE
15	TRACE	39
365	243	436
TRACE	TRACE	-
-	12	TRACE
-	TRACE	TRACE
-	TRACE	7
2268	2722	1134

APPENDIX TABLE 3. HAUL DATA FOR M/V ARCTIC HARVESTER

HAUL NO.	21		22	
MAJOR AREA	3D		3D	
MINOR AREA	25		25	
DATE	MAR 10		MAR 10	
DEPTH MODE F/(M)	210 /(384)		350 /(640)	
DURATION (H)	2.17		2.00	
	START	STOP	START	STOP
TIME	15:05	17:15	18:05	20:05
LAT.(DEG,MIN)	48°58'	48°58'	48°56'	48°56'
LONG.(DEG,MIN)	126°47'	126°39'	126°40'	126°46'
LC-5990-X	14425	14457.1	14455	14432.8
LC-5990-Y	29296	29283.3	29270	29280.5
DEPTH (F)	222	196	287	352

SPECIES CATCH(KG.)

DAB (PACIFIC)	-	-
DOVER SOLE	188	12
PETRALE SOLE	1199	22
REX SOLE	219	TRACE
TURBOT	1536	109
S. ALEUTIANUS	16	-
S. ALUTUS	212	3
S. BABCOCKI	-	-
S. BOREALIS	-	-
S. CRAMERI	-	-
S. DIPLOPROA	-	-
SEB. ALASCANUS	47	97
HAKE	-	-
MISC. SPECIES	TRACE	56
SABLEFISH	133	375
RATFISH	TRACE	-
SKATES	78	6
CRABS	TRACE	-
SQUID	TRACE	TRACE
TOTAL CATCH (KG.)	3629	680

23	24	25
3D	3D	3C
25	25	25
MAR 10	MAR 11	MAR 11
210 /(384)	240 /(438)	280 /(512)
3.08	3.08	2.50
START STOP	START STOP	START STOP
20:55 24:00	00:45 3:50	5:45 8:15
48°59' 49°05'	49°06' 48°59'	48°58' 49°02'
126°47' 126°55'	126°57' 126°49'	126°46' 126°56'
14426 14377.6	14375 14417	14427.3 14384.5
29297.5 29353.6	29353 29301	29290 29330.4
205 220	230 240	260 278
69	TRACE	-
236	1276	311
118	14	TRACE
659	99	TRACE
1449	397	218
187	184	16
111	43	TRACE
TRACE	-	-
-	-	60
-	TRACE	-
-	-	-
208	163	507
-	TRACE	TRACE
TRACE	TRACE	27
139	50	605
-	-	-
-	43	71
TRACE	TRACE	TRACE
TRACE	TRACE	TRACE
3175	2268	1814

APPENDIX TABLE 3. HAUL DATA FOR M/V ARCTIC HARVESTER

HAUL NO.	26		27	
MAJOR AREA	3D		3D	
MINOR AREA	25		25	
DATE	MAR 11		MAR 11	
DEPTH MODE F/(M)	280 /(512)		248 /(453)	
DURATION (H)	1.95		1.92	
	START	STOP	START	STOP
TIME	9:03	11:00	11:50	13:45
LAT.(DEG,MIN)	49°04'	49°09'	49°09'	49°04'
LONG.(DEG,MIN)	126°58'	127°01'	127°01'	126°56'
LC-5990-X	14372	14353	14353	14381
LC-5990-Y	29344	29382	29380	29340
DEPTH (F)	300	260	240	260
SPECIES CATCH(KG.)				
DAB (PACIFIC)	-		-	
DOVER SOLE	3429		6402	
PETRALE SOLE	-		-	
REX SOLE	225		423	
TURBOT	234		101	
S. ALEUTIANUS	-		262	
S. ALUTUS	-		TRACE	
S. BABCOCKI	-		-	
S. BOREALIS	81		-	
S. CRAMERI	-		-	
S. DIPLOPROA	-		-	
SEB. ALASCANUS	234		302	
HAKE	TRACE		-	
MISC. SPECIES	72		TRACE	
SABLEFISH	261		221	
RATFISH	-		-	
SKATES	-		TRACE	
CRABS	-		-	
SQUID	TRACE		TRACE	
TOTAL CATCH (KG.)	4536		7711	

28	29	30
3D	3D	3D
25	25	25
MAR 11	MAR 11	MAR 11
210 /(384)	263 /(480)	270 /(493)
2.00	2.08	2.37
START	START	START
STOP	STOP	STOP
14:40	17:40	21:05
16:40	19:45	23:27
49°04'	48°08'	49°09'
49°10'	49°03'	49°14'
126°55'	127°01'	127°01'
127°08'	126°55'	127°05'
14384.5	14354	14352
14353.1	14383	14326
29343	29374	29381
29385	29335	29416
229	260	240
200	265	220
-	-	-
1487	3002	608
114	-	-
212	286	62
1978	442	436
TRACE	-	90
262	TRACE	55
TRACE	-	-
TRACE	-	152
-	-	-
294	-	-
180	221	456
TRACE	TRACE	8
TRACE	TRACE	TRACE
687	390	360
TRACE	-	TRACE
229	195	TRACE
-	-	TRACE
TRACE	-	TRACE
5443	4536	2268

APPENDIX TABLE 3. HAUL DATA FOR M/V ARCTIC HARVESTER

HAUL NO.	31		32	
MAJOR AREA	3D		3D	
MINOR AREA	25		25	
DATE	MAR 12		MAR 12	
DEPTH MODE F/(M)	250 /(457)		240 /(438)	
DURATION (H)	2.92		1.50	
	START	STOP	START	STOP
TIME	00:50	3:45	8:50	10:20
LAT.(DEG,MIN)	49°17'	49°24'	49°22'	49°18'
LONG.(DEG,MIN)	127°10'	127°17'	127°16'	127°12'
LC-5990-X	14301	14256	14267	14287
LC-5990-Y	29441	29492	29479	29453
DEPTH (F)	240	260	220	240

SPECIES CATCH(KG.)

DAB (PACIFIC)	-	-
DOVER SOLE	2061	1353
PETRALE SOLE	-	-
REX SOLE	406	471
TURBOT	160	588
S. ALEUTIANUS	443	392
S. ALUTUS	TRACE	59
S. BABCOCKI	-	-
S. BOREALIS	196	177
S. CRAMERI	-	-
S. DIPLOPROA	-	TRACE
SEB. ALASCANUS	239	314
HAKE	15	-
MISC. SPECIES	TRACE	-
SABLEFISH	TRACE	177
RATFISH	-	TRACE
SKATES	109	98
CRABS	TRACE	TRACE
SQUID	TRACE	-
TOTAL CATCH (KG.)	3629	3629

33	34	35
3D	3D	3C
25	25	25
MAR 12	MAR 12	MAR 12
290 /(530)	325 /(594)	325 /(594)
0.88	2.00	3.05

START	STOP	START	STOP	START	STOP
11:15	12:08	14:45	16:45	19:15	22:18
49°18'	49°23'	49°21'	49°15'	49°07'	48°56'
127°13'	127°17'	127°16'	127°11'	126°55'	126°45'
14287	14258	14269	14298.4	14390	14437
29451	29484	29472	29436.1	29317	29282
280	300	300	352	330	350

-	-	-
2971	585	TRACE
-	-	-
50	6	-
50	197	76
40	-	-
-	-	-
-	-	-
-	12	-
-	-	-
-	-	-
179	125	144
TRACE	-	-
-	18	47
339	388	371
-	-	-
TRACE	30	25
-	-	18
TRACE	TRACE	TRACE
3629	1361	680

APPENDIX TABLE 3. HAUL DATA FOR M/V ARCTIC HARVESTER

HAUL NO.	36		37	
MAJOR AREA	3C		3C	
MINOR AREA	24		24	
DATE	MAR 12		MAR 13	
DEPTH MODE F/(M)	220 /(402)		239 /(437)	
DURATION (H)	2.57		2.83	
	START	STOP	START	STOP
TIME	23:56	2:30	3:25	6:15
LAT.(DEG,MIN)	48°51'	48°44'	48°44'	48°51'
LONG.(DEG,MIN)	126°36'	126°30'	126°31'	126°34'
LC-5990-X	14481	14509	14506	14484
LC-5990-Y	29226	29179	29180	29233
DEPTH (F)	220	227	238	240
SPECIES CATCH(KG.)				
DAB (PACIFIC)	-		-	
DOVER SOLE	3634		5463	
PETRALE SOLE	712		1194	
REX SOLE	237		203	
TURBOT	430		788	
S. ALEUTIANUS	-		-	
S. ALUTUS	148		1042	
S. BABCOCKI	-		-	
S. BOREALIS	-		TRACE	
S. CRAMERI	-		-	
S. DIPLOPROA	-		TRACE	
SEB. ALASCANUS	178		381	
HAKE	TRACE		TRACE	
MISC. SPECIES	TRACE		TRACE	
SABLEFISH	104		TRACE	
RATFISH	-		-	
SKATES	-		TRACE	
CRABS	-		-	
SQUID	TRACE		-	
TOTAL CATCH (KG.)	5443		9072	

38	39	40
3C	3C	3C
24	24	24
MAR 13	MAR 13	MAR 13
264 /(482)	185 /(338)	270 /(493)
4.05	2.20	2.00
START	START	START
7:10	11:13	14:13
48°51'	48°46'	48°51'
126°36'	126°30'	126°37'
14480	14509	14473
29230	29185	29231
260	185	260
STOP	STOP	STOP
11:13	13:25	16:13
48°44'	48°51'	48°44'
126°32'	126°34'	126°32'
14502	14485	14489.2
29180	29228	29196
268	184	280
-	-	-
3724	54	590
58	178	TRACE
58	81	TRACE
643	567	143
TRACE	-	-
1131	43	-
-	59	TRACE
136	-	186
TRACE	11	-
TRACE	32	TRACE
682	76	292
TRACE	TRACE	6
TRACE	TRACE	-
370	32	50
TRACE	TRACE	-
TRACE	TRACE	93
TRACE	TRACE	-
TRACE	TRACE	TRACE
6804	1134	1361

APPENDIX TABLE 3. HAUL DATA FOR M/V ARCTIC HARVESTER

HAUL NO.	41		42	
MAJOR AREA	3C		3C	
MINOR AREA	24		23	
DATE	MAR 13		MAR 13	
DEPTH MODE F/(M)	330 /(603)		230 /(420)	
DURATION (H)	2.07		3.08	
	START	STOP	START	STOP
TIME	17:23	19:27	5:55	9:00
LAT.(DEG,MIN)	48°45'	48°51'	48°28'	48°21'
LONG.(DEG,MIN)	126°39'	126°37'	126°12'	126°07'
LC-5990-X	14489	14471	14591	14612
LC-5990-Y	29191	29233	29038	28984
DEPTH (F)	320	340	220	240
SPECIES CATCH(KG.)				
DAB (PACIFIC)	-		-	
DOVER SOLE	76		3197	
PETRALE SOLE	TRACE		205	
REX SOLE	-		143	
TURBOT	40		594	
S. ALEUTIANUS	-		451	
S. ALUTUS	-		1762	
S. BABCOCKI	-		-	
S. BOREALIS	3		-	
S. CRAMERI	-		-	
S. DIPLOPROA	-		-	
SEB. ALASCANUS	37		369	
HAKE	-		TRACE	
MISC. SPECIES	TRACE		-	
SABLEFISH	59		41	
RATFISH	-		-	
SKATES	11		41	
CRABS	TRACE		-	
SQUID	TRACE		TRACE	
TOTAL CATCH (KG.)	227		6804	

Appendix Table 4. Size composition, by sex, and gonad maturity stages of Microstomus pacificus caught off the west coast Vancouver Island (ARCTIC HARVESTER, March 7-14 1981).

	Set 24												
Fork length (cm)	Male					Female							
	1	3	5	6	7	1	2	3	4	5	6	7
26	-	1	-	-	-							
27	-	0	-	-	-	1	-	-	-	-	-	-
28	-	0	-	-	-	-	-	-	-	-	-	-
29	-	1	-	-	-	-	-	-	-	-	-	-
30	-	3	-	-	-	-	-	-	-	-	-	-
31	1	3	-	-	-	-	-	-	-	-	-	-
32	-	3	-	-	-	-	-	-	-	-	-	-
33	-	6	1	-	-	-	-	-	-	-	-	2
34	-	4	0	-	-	-	-	-	-	-	-	1
35	-	4	1	-	-	-	-	-	-	-	-	2
36	-	2	0	-	-	-	-	-	-	-	-	3
37	-	2	2	-	-	-	-	2	-	-	-	3
38	-	1	1	-	-	-	-	0	-	-	-	2
39	-	3	1	-	-	-	-	0	-	-	1	1
40	-	2	3	-	-	-	-	0	-	-	1	1
41	-	2	0	-	-	-	-	1	-	-	0	1
42	-	1	4	-	-	-	-	5	-	-	1	-
43	-	1	1	-	-	-	-	1	2	-	0	-
44	-	-	0	-	-	-	-	1	0	-	0	-
45	-	-	0	-	-	-	-	3	2	-	0	-
46	-	-	0	-	-	-	-	0	1	-	0	-
47	-	-	0	-	-	-	-	0	0	-	1	-
48	-	-	0	-	-	-	-	0	0	-	-	-
49	-	-	0	-	-	-	-	0	1	-	-	-
50	-	-	1	-	-	-	-		1			-
51						-			1			-
52						-			0			-
53						-			0			-
54						-			1			-
55						-	-		0			-
56						-	-	-	1	-	-	-
Total	1	39	15	0	0	1	0	14	10	0	4	16
Percent	2	71	27	-	-	2	-	31	23	-	9	36
Percent males			52						43			

Appendix Table 4 (cont'd)

Fork length (cm)	Set 26												
	Male					Female							
	1	3	5	6	7	1	2	3	4	5	6	7
26												
27												
28	–	1	–	–	–							
29	–	0	–	–	–							
30	–	0	–	–	–							
31	–	0	–	–	–							
32	–	1	1	–	–	–	–	1	–	–	–	–
33	–	0	0	–	–	1	–	0	–	–	–	–
34	–	0	0	–	–	–	–	0	–	–	–	1
35	–	0	0	–	–	–	–	0	–	–	–	1
36	–	2	2	–	–	–	–	0	–	–	–	0
37	–	0	6	–	–	–	–	0	–	–	–	1
38	–	1	7	–	–	–	–	1	–	–	–	0
39	–	1	5	–	–	–	–	4	–	–	–	0
40	–	1	8	–	–	–	–	0	–	–	–	2
41	–	0	8	–	–	–	–	1	–	–	–	–
42	–	0	3	–	–	–	–	1	–	–	–	–
43	–	1	7	–	–	–	–	0	–	–	1	–
44	–	0	6	–	–	–	–	0	–	–	–	–
45	–	1	3	–	–	–	–	2	–	–	–	–
46	–	–	1	–	–	–	–	0	1	–	–	–
47	–	–	1	–	–	–	–	4	0	–	–	–
48						–	–	1	0	–	–	–
49						–	–	6	0	–	–	–
50						–	–	1	0	–	–	–
51						–	–	1	0	–	–	–
52						–	–	0	0	–	–	–
53						–	–	1	1	–	–	–
54												
55												
56												
Total	0	9	58	0	0	1	0	24	2	0	1	5
Percent	–	13	87	–	–	3	–	73	6	–	3	15
Percent males			62									

Appendix Table 4 (cont'd)

Fork length (cm)	Set 27												
	Male					Female							
	1	3	5	6	7	1	2	3	4	5	6	7
26												
27												
28												
29												
30												
31												
32						-	-	-	-	-	-	1
33	-	1	1	-	-	-	-	-	-	-	-	0
34	-	2	0	-	-	-	-	-	-	-	-	0
35	-	0	2	-	-	-	-	-	-	-	-	0
36	-	2	2	-	-	-	-	-	-	-	-	1
37	-	2	3	-	-	-	-	-	-	-	-	0
38	-	0	5	-	-	-	-	1	-	-	-	0
39	-	1	5	-	-	-	-	1	-	-	-	1
40	-	3	7	-	-	-	-	3	-	-	-	-
41	-	0	10	-	-	-	-	2	-	-	-	-
42	-	1	7	-	-	-	-	2	-	-	-	-
43	-	-	2	-	-	-	-	2	-	-	-	-
44	-	-	9	-	-	-	-	3	1	-	-	-
45	-	-	3	-	-	-	-	1	0	-	-	-
46	-	-	2	-	-	-	-	0	0	-	-	-
47	-	-	1	-	-	-	-	1	0	-	-	-
48	-	-	0	-	-	-	-	3	0	-	-	-
49	-	-	0	-	-	-	-	1	0	-	-	-
50	-	-	1	-	-	-	-	0	1	-	-	-
51						-	-	2	-	-	-	-
52						-	-	0	-	-	-	-
53						-	-	1	-	-	-	-
54												
55												
56												
Total	0	12	60	0	0	0	0	23	2	0	0	3
Percent	-	17	83	-	-	-	-	82	7	-	-	11
Percent males			72									

Appendix Table 4 (cont'd)

Fork length (cm)	Set 31												
	Male					Female							
	1	3	5	6	7	1	2	3	4	5	6	7
26												
27												
28	–	1	–	–	–							
29	–	0	–	–	–							
30	–	0	–	–	–	–	–	–	–	–	–	1
31	–	3	–	–	–	–	–	–	–	–	–	1
32	–	5	3	–	–	–	–	–	–	–	–	1
33	–	7	3	–	–	–	–	–	–	–	–	0
34	–	3	5	1	–	–	–	–	–	–	–	5
35	–	5	4	–	–	–	–	2	–	–	–	3
36	–	5	3	–	1	–	–	1	–	–	–	3
37	–	2	4	–	0	–	–	2	–	–	–	6
38	–	4	3	–	1	–	–	2	–	–	–	12
39	–	2	0	–	0	–	–	1	–	–	–	5
40	–	3	3	–	1	–	–	7	–	–	–	1
41	–	1	0	–	–	–	–	4	–	–	–	1
42	–	1	2	–	–	–	–	8	–	–	–	5
43	–	0	0	–	–	–	–	5	–	–	–	3
44	–	1	0	–	–	–	–	2	–	–	–	2
45	–	1	1	–	–	–	–	4	–	–	–	0
46						–	–	1	–	–	–	3
47						–	–	1	–	–	–	1
48						–	–	3	–	–	–	0
49						–	–	0	–	–	–	0
50						–	–	0	–	–	1	1
51						–	–	0	–	–	–	–
52						–	–	3	–	–	–	–
53												
54												
55												
56												
Total	0	44	31	1	3	0	0	46	0	0	1	54
Percent	–	56	39	1	4	–	–	46	–	–	1	53
Percent males			44									

Appendix Table 4 (cont'd)

Fork length (cm)	Set 36												
	Male					Female							
	1	3	5	6	7	1	2	3	4	5	6	7
26												
27												
28	–	1	–	–	–							
29	–	1	–	–	–							
30	–	0	–	–	–	–	–	–	–	–	–	1
31	–	0	–	–	–	–	–	–	–	–	–	0
32	–	2	–	–	–	–	–	–	–	–	–	0
33	–	1	–	–	–	–	–	–	–	–	–	0
34	–	3	1	–	–	–	–	–	–	–	–	0
35	–	2	0	–	–	–	–	–	–	–	–	0
36	–	4	0	–	–	–	–	–	–	–	–	1
37	–	4	2	–	–	–	–	1	–	–	–	0
38	–	5	1	–	–	–	–	0	–	–	–	1
39	–	6	3	–	–	–	–	4	–	–	–	1
40	–	2	3	–	–	–	–	2	–	–	–	0
41	–	1	1	–	–	–	–	4	–	–	–	0
42	–	0	1	–	–	–	–	6	1	–	–	1
43	–	2	2	–	–	–	–	7	0	–	–	0
44	–	1	–	–	–	–	–	3	0	–	–	0
45	–	1	–	–	–	–	–	2	0	–	–	1
46	–	0	–	–	–	–	–	3	0	–	–	1
47	–	1	–	–	–	–	–	2	0	–	–	1
48	–	0	–	–	–	–	–	1	1	–	–	–
49	–	1	–	–	–	–	–	1	–	–	–	–
50						–	–	1	–	–	–	–
51						–	–	0	–	–	–	–
52						–	–	0	–	–	–	–
53						–	–	1	–	–	–	–
54												
55												
56												
Total	0	38	14	0	0	0	0	38	2	0	0	8
Percent	–	73	27	–	–	–	–	79	4	–	–	17
Percent males			52									

Appendix Table 4 (cont'd)

Fork length (cm)	Set 37												
	Male					Female							
	1	3	5	6	7	1	2	3	4	5	6	7
26												
27												
28												
29	–	1	–	–	–							
30	–	0	–	–	–							
31	–	0	–	–	–							
32	–	0	–	–	–	–	–	–	–	–	–	1
33	–	2	–	–	–	–	–	–	–	–	–	–
34	–	1	–	–	–	–	–	–	–	–	–	–
35	–	1	1	–	–	–	–	–	–	–	–	–
36	–	2	1	–	–	–	–	–	–	–	–	–
37	–	5	5	–	–	–	–	–	–	–	–	–
38	–	8	3	–	–	–	–	–	–	–	–	–
39	–	6	4	–	–	–	–	–	–	–	–	–
40	–	9	6	–	–	–	–	1	–	–	–	–
41	–	3	6	–	–	–	–	1	–	–	–	–
42	–	5	2	–	–	–	–	1	–	–	–	–
43	–	5	0	–	–	–	–	2	–	–	–	–
44	–	3	3	–	–	–	–	3	–	–	–	–
45	–	0	–	–	–	–	–	2	–	–	–	–
46	–	0	–	–	–	–	–	1	–	–	–	–
47	–	1	–	–	–	–	–	1	–	–	–	–
48	–	2	–	–	–	–	–	0	1	–	–	–
49						–	–	0	–	–	–	–
50						–	–	0	–	–	–	–
51						–	–	0	–	–	–	–
52						–	–	0	–	–	–	–
53						–	–	0	–	–	–	–
54						–	–	0	–	–	–	–
55						–	–	0	–	–	–	–
56						–	–	1	–	–	–	–
Total	0	54	31	0	0	0	0	13	1	0	0	1
Percent	–	64	36	–	–	–	–	86.7	6.7	–	–	6.7
Percent males			80									

Appendix Table 4 (cont'd)

Fork length (cm)	Set 38												
	Male					Female							
	1	3	5	6	7	1	2	3	4	5	6	7
26												
27												
28	–	1	–	–	–							
29	–	0	–	–	–							
30	–	0	–	–	–							
31	–	0	–	–	–							
32	–	0	–	–	–							
33	–	0	–	–	–							
34	–	2	–	–	–							
35	–	1	–	–	–							
36	–	5	–	–	–							
37	–	5	1	–	–							
38	–	5	0	–	–							
39	–	10	0	–	–	–	–	–	–	–	–	1
40	–	10	1	–	–	–	–	–	–	–	–	–
41	–	12	2	–	–	–	–	1	–	–	–	–
42	–	10	1	–	–	–	–	2	–	–	–	–
43	–	10	0	–	–	–	–	0	–	–	–	–
44	–	4	0	–	–	–	–	0	–	–	–	–
45	–	0	1	–	–	–	–	2	–	–	–	–
46	–	2	–	–	–	–	–	2	–	–	–	–
47	–	0	–	–	–	–	–	2	1	–	–	–
48	–	1	–	–	–	–	–	2	–	–	–	–
49	–	1	–	–	–	–	–	1	–	–	–	–
50	–	1	–	–	–							
51												
52												
53												
54												
55												
56												
Total	0	80	6	0	0	0	0	12	1	0	0	1
Percent	–	93	7	–	–	–	–	86	7	–	–	7
Percent males			88									

Appendix Table 4 (cont'd)

Fork length (cm)	Set 42											
	Male					Female						
	1	3	5	6	7	1	2	3	4	5	6	7
26												
27												
28												
29												
30												
31												
32												
33												
34	-	4	-	-	-							
35	-	4	-	-	-							
36	-	5	-	-	-	-	-	1	-	-	-	-
37	-	7	-	-	-	-	-	0	-	-	-	2
38	-	14	-	-	-	-	-	0	-	-	-	0
39	-	9	-	-	-	-	-	0	-	-	-	0
40	-	15	-	-	-	-	-	0	-	-	-	0
41	-	9	-	-	-	-	-	1	-	-	-	0
42	-	7	-	-	-	-	-	0	1	-	-	0
43	-	5	1	-	-	-	-	1	0	-	-	0
44	-	2	-	-	-	-	-	0	0	-	-	0
45	-	4	-	-	-	-	-	1	1	-	-	0
46	-	2	-	-	-	-	-	0	-	-	-	0
47	-	2	-	-	-	-	-	0	-	-	-	1
48						-	-	1	-	-	-	-
49												
50												
51												
52												
53												
54												
55												
56												
Total	0	89	1	0	0	0	0	5	2	0	0	3
Percent	-	99	1	-	-	-	-	50	20	-	-	30
Percent males			91									

Footnote to Appendix Table 4. Flatfish maturity states.

Stage of maturity	Males	Females
Immature:		
1)	Testes very small, somewhat translucent, and pink-brown in colour.	Ovaries very small, pink coloured, and gelatinous.
2)	No stage in males.	Ovaries enlarging, pink coloured, and granular in texture.
Mature:		
3)	Testes enlarging, brown-white or white in colour, retaining sperm. (Developing)	Ovaries enlarging, yellow to orange in colour, granular, and partially containing opaque eggs. (Developing)
4)	No stage in males.	Ovaries yellow or orange and full of eggs. Eggs partly translucent. (Gravid)
5)	Testes enlarged, white and flowing sperm evident. (Spawning)	Ovaries full of entirely translucent mature ova. Eggs will run from oviduct under slight pressure. (Spawning)
6)	Testes flaccid, shrunken, and yellow white or olive white in colour. (Spent)	Ovaries flaccid, few translucent eggs left. Ovarian membrane very bloodshot and sac-like. (Spent)
7)	Testes firm and white or brownish-white in colour, not enlarged. (Resting)	Ovaries becoming firm. No eggs discernable by eye. Colour yellowish or orange, texture slightly granular. (Resting)

Appendix Table 5. Size composition, by sex, and gonad maturity stages of Eopsetta jordani caught off the west coast Vancouver Island (ARCTIC HARVESTER, March 7-14 1981).

	Set 19													
Fork length (cm)	Male						Female							
	1	2	3	5	6	7	1	2	3	4	5	6	7
36	-	-	1	3	-	-							
37	1	1	4	8	-	-							
38	3	0	12	9	-	-							
39	2	3	13	16	-	-							
40	3	1	13	20	-	-							
41	0	1	7	7	-	-							
42	1	2	5	7	-	-							
43	0	1	9	6	-	-							
44	0	0	5	7	-	-							
45	0	0	3	3	-	-							
46	1	1	1	2	-	-	-	-	-	1	-	-	-
47	-	-	-	0	-	-	-	-	-	1	-	-	-
48	-	-	-	1	-	-	-	-	-	1	-	-	-
49							-	-	-	1	-	-	-
50							-	-	-	1	-	-	-
51							-	-	-	0	-	-	-
52							-	-	-	0	-	-	-
53							-	-	-	1	-	-	-
54							-	-	-	0	-	-	-
55							-	-	-	0	-	-	-
56							-	-	-	1	-	-	-
Total	11	10	73	89	0	0	0	0	0	7	0	0	0
Percent	6	5	40	49	-	-	-	-	-	100	-	-	-
Percent males				99									

Footnote to Appendix Table 5. Flatfish maturity states.

Stage of maturity	Males	Females
Immature:		
1)	Testes very small, somewhat translucent, and pink-brown in colour.	Ovaries very small, pink coloured, and gelatinous.
2)	No stage in males.	Ovaries enlarging, pink coloured, and granular in texture.
Mature:		
3)	Testes enlarging, brown-white or white in colour, retaining sperm. (Developing)	Ovaries enlarging, yellow to orange in colour, granular, and partially containing opaque eggs. (Developing)
4)	No stage in males.	Ovaries yellow or orange and full of eggs. Eggs partly translucent. (Gravid)
5)	Testes enlarged, white and flowing sperm evident. (Spawning)	Ovaries full of entirely translucent mature ova. Eggs will run from oviduct under slight pressure. (Spawning)
6)	Testes flaccid, shrunken, and yellow white or olive white in colour. (Spent)	Ovaries flaccid, few translucent eggs left. Ovarian membrane very bloodshot and sac-like. (Spent)
7)	Testes firm and white or brownish-white in colour, not enlarged. (Resting)	Ovaries becoming firm. No eggs discernable by eye. Colour yellowish or orange, texture slightly granular. (Resting)

Appendix Table 6. Size composition by sex, and gonad maturity stages for Anoplopoma fimbria caught off the west coast of Vancouver Island, February-March, 1981.

Total Length (cm)	Maturity stages															
	Male							Female								
	I2	R1	R2	Ripe	Run	Spent	Rec	I2	R2	Ripe	1R	2R	Run	Spent	Rec	Rest
45	1	–	–	–	1	–	–									
46	1	–	–	–	0	–	–									
47	2	–	–	1	1	–	–	2	–	–	–	–	–	–	–	–
48	1	–	–	0	2	–	1	0	–	–	–	1	–	–	–	–
49	2	–	–	1	7	1	0	1	–	–	–	0	–	–	–	–
50	0	–	–	0	3	3	0	1	–	2	–	0	1	–	1	–
51	1	–	1	2	3	2	0	–	–	0	–	0	0	1	1	–
52	1	–	0	0	8	2	1	–	–	2	–	0	0	0	0	–
53	1	–	1	2	7	0	3	–	–	1	–	0	1	0	1	1
54	0	1	0	0	5	2	1	–	–	5	–	1	1	0	0	0
55	1	0	0	0	4	1	0	–	–	1	–	0	0	0	0	0
56	–	1	0	4	6	3	0	–	–	2	–	0	0	0	0	0
57	–	–	1	2	6	1	0	–	–	1	–	1	1	0	0	0
58	–	–	–	1	2	0	0	–	–	2	–	1	2	1	0	0
59	–	–	–	3	6	3	1	–	–	3	–	0	0	0	1	0
60	–	–	–	2	1	–	–	–	–	3	–	0	0	0	0	0
61	–	–	–	2	4	–	–	–	–	1	–	1	1	0	0	0
62	–	–	–	0	0	–	–	–	–	3	–	1	0	0	0	1
63	–	–	–	1	1	–	–	–	–	3	–	1	0	0	1	0
64	–	–	–	0	1	–	–	–	–	0	–	0	1	0	1	0
65	–	–	–	0	1	–	–	–	–	6	–	1	0	0	0	0
66	–	–	–	1	2	–	–	–	–	5	1	2	0	0	0	1
67	–	–	–	1	1	–	–	–	–	2	1	0	0	0	1	–
68	–	–	–	1	0	–	–	–	–	3	1	0	0	0	–	–
69	–	–	–	0	4	–	–	–	–	0	0	2	0	0	–	–
70	–	–	–	1	0	–	–	–	–	1	1	0	1	1	–	–
71	–	–	–	–	1	–	–	–	–	6	0	0	0	0	–	–
72	–	–	–	–	1	–	–	–	–	4	2	1	0	1	–	–
73	–	–	–	–	0	–	–	–	–	3	1	2	1	0	–	–

Appendix Table 6 (cont'd)

Total Length (cm)	Maturity stages															
	Male							Female								
	I2	R1	R2	Ripe	Run	Spent	Rec	I2	R2	Ripe	1R	2R	Run	Spent	Rec	Rest
74	-	-	-	-	1	-	-	-	-	1	1	1	0	0	-	-
75								-	-	3	0	3	0	0	-	-
76								-	-	0	0	2	0	0	-	-
77								-	-	3	0	1	1	2	-	-
78								-	-	3	0	0	0	0	-	-
79								-	1	1	0	0	0	3	-	-
80								-	-	1	0	0	0	0	-	-
81								-	-	0	0	1	1	1	-	-
82								-	-	0	1	1	0	0	-	-
83								-	-	0	0	0	1	0	-	-
84								-	-	0	1	1	0	1	-	-
85								-	-	0	-	1	0	0	-	-
86								-	-	0	-	0	0	1	-	-
87								-	-	1	-	0	1	-	-	-
88								-	-	-	-	1	-	-	-	-
Total	11	2	3	25	79	18	7	4	1	72	10	27	14	12	7	3
Percent	8	1	2	17	55	12	5	3	1	47	7	18	9	8	5	2
Percent males				49												

Footnote to Appendix Table 6. Blackcod maturity stages.

BLACKCOD MALES

I_1	Threadlike--difficult to distinguish males and females.
I_2	Some thickening--light brown to tan in colour. Usually full length.

MATURE

R_1	Early development stage, gonad thickening, whitish in colour approximately 15-20% of body cavity.
R_2	Same as above, usually some obvious blood vessel on exterior surface. 25% of body cavity.
Ripe	Obvious--convolutions full; gonad about 35-40% of body cavity.
Running	Sperm released when slight pressure put on exterior posterior body cavity. Lobes fully developed.
Spent	Bloodshot tipped lobes on convolution; will probably release sperm if moderate pressure applied to external posterior body cavity.
Recovering	Fairly flat but with obvious bloodshot appearance on ends of lobes.

IMMATURE BLACKCOD FEMALES

I_1	Threadlike--difficult to distinguish males and females.
I_2	Some thickening--darker than males. Gonad is rounded at each end.

MATURE

R_1	Early developing stage, eggs easily identifiable. Gonads fill about 25% of body cavity. Eggs white in colour.
R_2	Early developing stage, eggs more easily identifiable. Gonads fill about 35% of body cavity. Eggs white in colour.
Ripe	Gonad full size--at least 50% body cavity. Eggs white, opaque.
1R	Gonad same size as previous category but at least 25% of eggs translucent.

Footnote to Appendix Table 6 (cont'd)

2R	Gonad same size as previous two categories but more than 50% of eggs translucent.
Running	Slight to moderate pressure on external posterior of cavity will produce small stream of translucent eggs from vent.
Spent	Gonad red-purplish in colour, some residual eggs remaining; occasionally outer wall of gonad flaccid.
Recovering	Some red-purplish colour remaining. Gonad not flaccid, almost a wrinkled surface.
Rest	Smooth--elongated--roundish in shape--dark brown in colour, fleshy interior.

Appendix Table 7. Size composition, by sex, and gonad maturity stages of Sebastes alutus caught off the west coast of Vancouver Island (Set no. 18 ARCTIC HARVESTER, March 7-14 1981).

Fork length (cm)	Condition														
	Male								Female						
	1	9	8	8A	8B	8C	8D	8E	1	2	3	4	5	6	7
34	-	-	-	2	-	-	-	-							
35	-	-	-	8	-	-	-	4							
36	-	-	-	6	-	-	-	3	-	-	-	1	3	-	-
37	-	-	-	4	-	-	-	8	-	-	-	2	12	-	1
38	-	-	-	6	-	-	-	2	-	-	-	2	18	-	0
39	-	-	-	2	-	-	-	3	-	-	-	2	36	1	0
40	-	-	-	-	-	-	-	1	-	-	-	6	31	2	1
41									-	-	-	-	18	1	-
42									-	-	-	-	12	-	-
43									-	-	-	-	2	-	-
Subtotal	0	0	0	28	0	0	0	21	0	0	0	13	132	4	2
% Maturity	-	-	-	57	-	-	-	43	-	-	-	9	87	3	1
Total				49								151			
% Male				24											

Footnote to Appendix Table 7. Description of rockfish maturity stages.[1]

Maturity code		Gonad condition
FEMALES:	1	IMMATURE (translucent; males, stringlike; females small)
	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. A few larvae may be present).
	7	RESTING (moderate size, firm, red-grey ovaries)
MALES:	8	MATURE (ribbon-like; small brown to large white)
	8A	RESTING (ribbon-like; small, brown)
	8B	DEVELOPING (swelling, brown-white)
	8C	DEVELOPED (large, white; easily broken)
	8D	RUNNING (running sperm)
	8E	SPENT (flaccid, red)
	9	MATURING (stringlike, translucent, white)

[1]Slightly modified version of the stages described by Harling (1971). In Sebastes flavidus an intermediate stage, characterized by small white testes, exists between the resting (8A) and the developing (8B) stages. Some color variations also occur in the female maturing stage (2). S. reedi ovaries exhibit small orange eggs while S. aleutianus and S. brevispinis small eggs are pinkish in color.

Appendix Table 8. Length/frequency, by set, of Microstomus pacificus caught off the west coast Vancouver Island, ARCTIC HARVESTER, February-March 1981.

Total length (cm)	Set 4			Set 24			Set 26			Set 27		
	M	F	T	M	F	T	M	F	T	M	F	T
26	-	-	-	1	-	1	-	-	-	-	-	-
27	-	-	-	1	1	2	-	-	-	-	-	-
28	-	-	-	0	0	0	1	-	1	-	-	-
29	-	-	-	2	0	2	1	-	1	-	-	-
30	-	-	-	4	1	5	0	-	0	-	-	-
31	2	-	2	5	0	5	1	-	1	-	-	-
32	2	1	3	4	0	4	3	1	4	-	1	1
33	0	1	1	14	2	16	0	2	2	2	0	2
34	4	0	4	6	4	10	2	1	3	2	0	2
35	10	0	10	7	2	9	1	1	2	2	0	2
36	12	0	12	8	7	15	6	3	9	4	1	5
37	7	0	7	6	9	15	7	2	9	5	0	5
38	20	0	20	6	6	12	14	1	15	5	1	6
39	5	0	5	5	9	14	8	5	13	6	2	8
40	6	3	9	6	3	9	14	7	21	10	3	13
41	8	3	11	3	4	7	14	2	16	10	2	12
42	3	2	5	6	7	13	11	2	13	8	2	10
43	7	0	7	4	5	9	14	6	20	2	2	4
44	1	1	2	0	4	4	6	2	8	9	4	13
45	3	1	4	1	7	8	6	3	9	3	1	4
46	-	1	1	2	5	7	3	5	8	2	0	2
47	-	1	1	0	1	1	1	6	7	1	1	2
48	-	0	0	0	0	0	0	4	4	0	3	3
49	-	0	0	0	1	1	0	9	9	0	1	1
50	-	0	0	1	4	5	1	1	2	1	1	2
51	-	0	0	-	2	2	-	2	2	-	2	2
52	-	0	0	-	0	0	-	2	2	-	0	0
53	-	1	1	-	0	0	-	2	2	-	1	1
54	-	-	-	-	1	1	-	0	0	-	-	-
55	-	-	-	-	0	0	-	0	0	-	-	-
56	-	-	-	-	1	1	-	0	0	-	-	-
57	-	-	-	-	-	-	-	0	0	-	-	-
58	-	-	-	-	-	-	-	0	0	-	-	-
59	-	-	-	-	-	-	-	0	0	-	-	-
60	-	-	-	-	-	-	-	1	1	-	-	-
Total	90	15	105	92	86	178	114	70	184	72	28	100

Appendix Table 8 (Cont'd)

Total length (cm)	Set 29			Set 31			Set 33			Set 36		
	M	F	T	M	F	T	M	F	T	M	F	T
26	–	–	–	–	–	–	–	–		–	–	–
27	–	1	1	–	–	–	–	–	–	–	–	–
28	–	0	0	1	–	1	–	–	–	2	1	3
29	1	0	1	0	–	0	1	–	1	1	0	1
30	0	0	0	0	1	1	0	1	1	0	1	1
31	0	1	1	3	1	4	1	1	2	1	1	2
32	2	1	3	8	1	9	1	0	1	2	0	2
33	5	0	5	10	0	10	3	1	4	2	3	5
34	10	0	10	9	5	14	7	3	10	6	0	6
35	13	0	13	9	5	14	10	6	16	7	0	7
36	18	2	20	9	4	13	12	5	17	16	2	18
37	17	4	21	6	8	14	6	9	15	14	3	17
38	29	8	37	8	14	22	4	13	17	11	4	15
39	18	4	22	2	6	8	3	9	12	13	6	19
40	23	7	30	7	8	15	3	10	13	11	3	14
41	6	4	10	1	5	6	3	15	18	2	7	9
42	8	5	13	3	13	16	2	9	11	2	13	15
43	3	6	9	0	8	8	0	13	13	6	11	17
44	2	6	8	1	4	5	3	9	12	1	7	8
45	1	0	1	2	4	6	0	7	7	2	4	6
46	0	1	1	–	4	4	1	9	10	0	9	9
47	2	2	4	–	2	2	–	8	8	1	5	6
48	1	1	2	–	3	3	–	0	0	0	5	5
49	1	3	4	–	0	0	–	2	2	1	2	3
50	–	–	–	–	2	2	–	2	2	–	4	4
51	–	–	–	–	0	0	–	1	1	–	2	2
52	–	–	–	–	3	3	–	0	0	–	1	1
53	–	–	–	–	–	–	–	1	1	–	1	1
54	–	–	–	–	–	–	–	0	0	–	–	–
55	–	–	–	–	–	–	–	1	1	–	–	–
56	–	–	–	–	–	–	–	0	0	–	–	–
57	–	–	–	–	–	–	–	1	1	–	–	–
58	–	–	–	–	–	–	–	–	–	–	–	–
59	–	–	–	–	–	–	–	–	–	–	–	–
60	–	–	–	–	–	–	–	–	–	–	–	–
Total	160	56	216	79	101	180	60	136	196	101	95	196

Appendix Table 8 (Cont'd)

Total length (cm)	Set 37			Set 38			Set 42			Total		
	M	F	T	M	F	T	M	F	T	M	F	T
26	-	-	-	-	-	-	-	-	-	1	-	1
27	-	-	-	-	-	-	-	-	-	1	2	3
28	-	-	-	1	-	1	-	-	-	5	1	6
29	1	-	1	0	-	0	-	-	-	7	0	7
30	0	-	0	1	-	1	-	-	-	5	4	9
31	0	-	0	0	-	0	-	-	-	13	4	17
32	1	1	2	0	-	0	1	-	1	24	6	30
33	5	1	6	0	-	0	4	-	4	45	10	55
34	6	0	6	2	-	2	10	2	12	64	15	79
35	6	0	6	5	-	5	9	2	11	80	16	96
36	12	1	13	6	-	6	11	1	12	114	26	140
37	17	0	17	9	1	10	14	2	16	108	38	146
38	27	0	27	16	0	16	24	0	24	164	47	211
39	20	1	21	19	1	20	17	0	17	116	43	169
40	22	5	27	18	1	19	31	3	34	152	52	204
41	20	8	28	21	1	22	18	2	20	106	53	159
42	16	2	18	25	2	27	15	1	16	99	58	157
43	13	7	20	21	0	21	11	1	12	81	60	141
44	9	3	12	9	1	10	6	0	6	45	41	86
45	0	5	5	2	3	5	5	2	7	25	37	62
46	1	2	3	4	3	7	3	0	3	16	39	55
47	2	3	5	1	3	4	3	1	4	11	33	44
48	2	1	3	1	3	4	-	1	1	4	21	25
49	-	1	1	1	3	4	-	-	-	3	22	25
50	-	2	2	1	-	1	-	-	-	4	16	20
51	-	0	0	-	-	-	-	-	-	-	9	9
52	-	0	0	-	-	-	-	-	-	-	6	6
53	-	0	0	-	-	-	-	-	-	-	6	6
54	-	0	0	-	-	-	-	-	-	-	1	1
55	-	0	0	-	-	-	-	-	-	-	1	1
56	-	1	1	-	-	-	-	-	-	-	2	2
57	-	-	-	-	-	-	-	-	-	-	1	1
58	-	-	-	-	-	-	-	-	-	-	0	0
59	-	-	-	-	-	-	-	-	-	-	0	0
60	-	-	-	-	-	-	-	-	-	-	1	1
Total	180	44	224	163	22	185	182	18	200	1,293	671	1,964

Appendix Table 9. Length/frequency of Eopsetta jordani caught off the west coast of Vancouver Island, ARCTIC HARVESTER, February-March 1981.

Total length (cm)	Set 19			Set 21			Total		
	M	F	T	M	F	T	M	F	T
32	-	-	-	2	-	2	2	-	2
33	-	-	-	0	-	0	0	-	0
34	-	-	-	0	-	0	0	-	0
35	-	-	-	0	-	0	0	-	0
36	4	-	4	4	-	4	8	-	8
37	14	-	14	17	-	17	31	-	31
38	24	-	24	20	1	21	44	1	45
39	34	-	34	19	0	19	53	0	53
40	37	-	37	26	0	26	63	0	63
41	15	-	15	14	1	15	29	1	30
42	15	-	15	7	2	9	22	2	24
43	16	-	16	3	5	8	19	5	24
44	12	-	12	0	2	2	12	2	14
45	6	-	6	1	3	4	7	3	10
46	5	1	6	0	1	1	5	2	7
47	0	1	1	1	3	4	1	4	5
48	1	1	2	-	0	0	1	1	2
49	-	1	1	-	1	1	-	2	2
50	-	1	1	-	0	0	-	1	1
51	-	0	0	-	1	1	-	1	1
52	-	0	0	-	1	1	-	1	1
53	-	1	1	-	0	0	-	1	1
54	-	0	0	-	1	1	-	1	1
55	-	0	0	-	-	-	-	0	0
56	-	1	1	-	-	-	-	1	1
Total	183	7	190	114	22	136	297	29	326

Appendix Table 10. Length/frequency of Anoplopoma fimbria caught off the west coast Vancouver Island, ARCTIC HARVESTER, February-March 1981.

Total Length (cm)	Set 7			Set 10			Set 11			Total		
	M	F	T	M	F	T	M	F	T	M	F	T
45	1	-	1	-	-	-	1	-	1	2	-	2
46	0	-	0	1	-	1	0	-	0	1	-	1
47	1	-	1	1	1	2	2	1	3	4	2	6
48	2	1	3	0	0	0	2	0	2	4	1	5
49	6	0	6	3	1	4	2	0	2	11	1	12
50	6	4	10	0	1	1	0	0	0	6	5	11
51	7	1	8	1	1	2	1	0	1	9	2	11
52	7	2	9	3	0	3	2	0	2	12	2	14
53	8	2	10	2	2	4	4	0	4	14	4	18
54	7	5	12	1	0	1	1	2	3	9	7	16
55	5	1	6	0	0	0	1	0	1	6	1	7
56	6	0	6	1	0	1	7	2	9	14	2	16
57	4	2	6	0	0	0	6	1	7	10	3	13
58	1	3	4	1	1	2	1	2	3	3	6	9
59	1	1	2	5	2	7	7	1	8	13	4	17
60	0	0	0	1	0	1	2	3	5	3	3	7
61	1	2	3	2	1	3	3	0	3	6	3	9
62	-	0	0	0	4	4	0	1	1	0	5	5
63	-	1	1	1	2	3	1	2	3	2	5	7
64	-	0	0	1	1	2	0	1	1	1	2	3
65	-	1	1	0	3	3	1	3	4	1	7	8
66	-	1	1	0	3	3	3	5	8	3	9	12
67	-	0	0	0	1	1	2	3	5	2	4	6
68	-	2	2	0	0	0	1	2	3	1	4	5
69	-	0	0	2	2	4	2	0	2	4	2	6
70	-	0	0	0	2	2	1	2	3	1	4	5
71	-	0	0	1	3	4	-	3	3	1	6	7
72	-	1	1	1	6	7	-	1	1	1	8	9
73	-	1	1	0	4	4	-	2	2	0	7	7
74	-	0	0	1	3	4	-	0	0	1	3	4
75	-	0	0	-	4	4	-	2	2	-	6	6
76	-	0	0	-	1	1	-	1	1	-	2	2
77	-	0	0	-	4	4	-	3	3	-	7	7
78	-	0	0	-	2	2	-	1	1	-	3	3
79	-	0	0	-	4	4	-	1	1	-	5	5
80	-	0	0	-	1	1	-	0	0	-	1	1
81	-	0	0	-	2	2	-	1	1	-	3	3
82	-	0	0	-	2	2	-	0	0	-	2	2
83	-	0	0	-	1	1	-	0	0	-	1	1
84	-	0	0	-	3	3	-	0	0	-	3	3
85	-	1	1	-	0	0	-	0	0	-	1	1
86	-	-	-	-	1	1	-	0	0	-	1	1
87	-	-	-	-	1	1	-	1	1	-	2	2
88	-	-	-	-	1	1	-	-	-	-	1	1
Total	63	32	95	29	71	100	53	47	100	145	150	295

Appendix Table 11. Length/frequency of *Sebastes alutus* caught off the west coast of Vancouver Island (ARCTIC HARVESTER, March 7-14 1981).

Length (cm)	Set 18		
	M	F	T
34	2	-	2
35	12	-	12
36	9	4	13
37	12	15	27
38	8	20	28
39	5	39	44
40	1	40	41
41	-	19	19
42	-	12	12
43	-	2	2
Total	49	151	200

Appendix Table 12. Common and scientific names of species caught.

Common name	Scientific name
FLATFISH	
Pacific dab	Citharychthys sordidus
Halibut	Hippoglossus stenolepis
Dover sole	Microstomus pacificus
English sole	Parophrys vetulus
Flathead sole	Hippoglossoides elassodon
Petrale sole	Eopsetta jordani
Rex sole	Glypfocephalus zachirus
Turbot	Atheresthes stomias
ROUNDFISH	
Pacific cod	Gadus macrocephalus
Hake	Merluccius productus
Sablefish	Anoplopoma fimbria
Rougheye rockfish	Sebastes aleutianus
Pacific ocean perch	S. alutus
Redbanded rockfish	S. babcocki
Shortraker rockfish	S. borealis
Darkblotched rockfish	S. crameri
Splitlip rockfish	S. diploproa
Shortspine thornyhead or idiot	Sebastolobus alascanus
SELACHII	
Ratfish	Hydrolagus colliei
Skate	Rajidae
Spiny dogfish	Squalus acanthias