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M. N. Arai, G. A. McFarlane, M. W. Saunders, and G. M. Mapstone

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

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SPRING ABUNDANCE OF MEDUSAE, CTENOPHORES, AND SIPHONOPHORES OFF SOUTHWEST VANCOUVER ISLAND: POSSIBLE COMPETITION OR PREDATION ON SABLEFISH LARVAE

by

M. N. Arai[1], G. A. McFarlane, M. W. Saunders, and G. M. Mapstone[1]

Department of Fisheries and Oceans

Biological Sciences Branch

Pacific Biological Station

Nanaimo, B.C. V9R 5K6

[1]Department of Biological Sciences
The University of Calgary
2500 University Drive N. W.
Calgary, Alberta T2N 1N4

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ABSTRACT

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The most consistently abundant coelenterate March-April 1985-1989 in 300-700 m Tucker trawls and in night neuston samples outside the 500 m contour was the trachymedusa *Aglantha digitale*. *Velella velella* hydranths were also abundant on the surface at offshore stations in 1987 and 1988, and *Pleurobrachia pileus* var *bachei* was abundant in neuston tows from inshore stations 1986, 1987 and 1988.

Based on present knowledge of the diets of the three abundant coelenterates listed above, coelenterate predation on sablefish larvae in March and April is unlikely to be of importance to their survival rates. All three species are however predators of copepods, the main larval food.

RESUME

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Le coelentéré dont l'abondance était la plus constante en mars-avril, de 1985 à 1989, dans des traits de chalut Tucker effectués de 300 à 700 m et dans des échantillons de neuston prélevés la nuit au-delà de la courbe de 500 m, était la trachymédusa *Aglantha digitale*. Les hydranthes de *Velella velella* abondaient aussi à la surface aux stations océaniques en 1987 et 1988, et on trouvait en abondance *Pleurobrachia pileus* var. *bachei* dans les traits de neuston aux stations côtières en 1986, 1987 et 1988.

D'après les connaissances actuelles sur l'alimentation des trois importants coelentérés ci-dessus, il semble peu probable que leur prédation des larves de morue charbonnière en mars et avril ait une importance pour le taux de survie de ce poisson. Ces trois espèces sont toutefois prédatrices des copépodes, qui constituent la principale source de nourriture des larves de poisson.

INTRODUCTION

Sablefish has the highest landed value in the groundfish fisheries of the Canadian Pacific Coast. The La Perouse Project is a multidisciplinary, multispecies investigation intended to provide long-term physical and biological data for research on the major commercial fish stocks off the west coast of Vancouver Island, including sablefish. One of the goals of the program is to examine the factors affecting recruitment of a number of species, in order to make accurate forecasts of recruitment success. Strong year classes of sablefish can double the size of the stock in the coastal upwelling production zone which includes the La Perouse Bank. McFarlane and Beamish (1992) have examined evidence correlating strong year classes with climatic influences and copepod production. Many coelenterate species are either predators of fish larvae or competitors for copepod prey (Arai 1988). The present study was conducted in cooperation with the La Perouse project to examine the populations of coelenterates and their possible interrelations with the sablefish larvae.

Sablefish adults spawn along the continental shelf at depths generally exceeding 300 m during February (Mason et al. 1983). Laboratory measurements of buoyancy indicate that the newly hatched larvae may sink to more than 1000 m before moving to the surface (Alderdice et al. 1988: McFarlane and Beamish 1992). Researchers from the Pacific Biological Station used nonclosing bongo samplers in 1986 and closing Tucker trawls in 1987 and 1988 to search for early stage larvae to 700 m depths in the La Perouse Bank area and associated slope waters. These field observations have confirmed that sablefish larvae are present in March (also rarely February) at 300-700 m depth at stations outside the 500m contour line (McFarlane and Beamish 1992; Fig. 1). Surveys using neuston nets 1984-1989 (Shaw et al. 1985; Shaw et al. 1987; Shaw et al. 1988) have established that the larvae reach the surface in late March.

Larvae caught during February do not contain food because they are still in the early yolk utilization stage (McFarlane and Beamish 1992). Larvae caught during March at depth were feeding exclusively on copepod eggs and nauplii. Similarly larvae caught during April in the surface waters were feeding almost exclusively on calanoid copepods (nauplii and adults). Copepods were the dominant zooplankton present at all depths and months in which larvae were captured. Off the Washington and Oregon coast larvae caught in April and May are also primarily utilizing copepod nauplii (Grover and Olla 1986).

In the present study the abundances of medusae, ctenophores, *Velella* hydranths, and siphonophores have been determined in a number of tows from the above studies. 1986 bongo and 1987 and 1988 Tucker samples were selected to give maximum comparative data on season and depth along lines off Pachena Point and Barkley Sound from inshore to beyond the 1200-m contour line. Neuston samples taken along the same lines and off Clayoquot Sound and Kyoquot Sound 1985-1989 were also examined.

MATERIALS AND METHODS

The samples sorted for this survey were collected by the groundfish section of the Pacific Biological Station, Nanaimo B.C. Station locations and bottom depths are given in Table 1 and Figure 1.

Methods used in collecting with the bongo and neuston samplers 1985 and 1986 are described in Shaw et al. (1987 and 1988). The paired bongos used for oblique tows in 1986 were equipped with 230 μm and 350 μm Nitex nets. The neuston samples were collected with a modified Sameoto sampler equipped with a flowmeter (Mason and Phillips 1986). The sampler had a 500 μm mesh Nitex net and a codend with a 351 μm steel mesh window. Except as noted in Tables 5-9 neuston samples 1985-1989 were taken at night.

In 1987 and 1988 discrete depth samples were taken at 300, 500 and 700 m using a 1 m^2 Tucker trawl that opened and closed at depth (McFarlane and Beamish 1992). Each trawl unit consisted of three nets. When deploying this gear, the bottem net was open with the middle and top net closed. At the desired depth, the middle net was opened and the top and bottom net closed for a tow duration of approximately 15 min. During retrieval the top net was open. Each net of 335 μm black nitex mesh was equiped with a codend with a 335 μm screen and a flowmeter.

Samples preserved in 5 % buffered sea-water formaldehyde were sorted for all Velella, medusae, ctenophores and siphonophores at the Pacific Biological Station, Nanaimo, B.C. The coelenterates were then brought to the Department of Biological Sciences, University of Calgary, Calgary, Alta. for identification and counting. Velella, medusae, and ctenophores were identified and counted by M. N. Arai, siphonophores by G. Mapstone.

RESULTS

Abundances of Velella hydranths, medusae, siphonophores and ctenophores are presented by capture method in Tables 2-12.

Examination of the Tucker tows (Tables 3 and 4) shows that Aglantha digitale (O.F. Müller, 1776) was the most abundant medusae from 300-700 meters in the spring of both 1987 and 1988. Other trachymedusae present included Colobonema sericeum Vanhoffen, 1902, Crossota rufobrunnea (Kramp, 1913), and Pantachogon haeckeli Maas, 1893. Narcomedusae included Aegina citrea Eschscholtz, 1829, Cunina frugifera Kramp, 1948, Pegantha sp., Solmissus marshalli Agassiz and Mayer, 1902 and Solmaris quadrata Bouillon, Boero, and Seghers, 1991. Scyphomedusae, from the order Coronatae, were mostly Atolla vanhoeffeni Russell, 1957 and Periphylla periphylla (Péron and Lesueur, 1809). Anthomedusae, such as Bythotiara depressa Naumov, 1960, were rare. Relative abundances were similar in the two years, but fewer medusae were present in 1988 than in 1987.

Tucker tow samples from 1987 were also examined for siphonophores (Tables 10-12). From 300-700 metres the most abundant siphonophores were the calycophoran species Chuniphyes multidentata Lens & van Riemsdijk, 1908 and Lensia conoidea (Keferstein & Ehlers, 1860), and the physonect species Nanomia bijuga (Chiaje, 1841). Other Calycophorae include up to 25 species, the common ones being Vogtia serrata (Moser, 1925), Dimophyes arctica (Chun, 1897), Lensia multicristata (Moser, 1925), Lensia baryi Totton, 1965, Clausophyes moserae Margulis, 1988 and Praya reticulata (Bigelow, 1911). Other Physonectae include up to 6 species, the common ones being Frillagalma vityazi Daniel, 1966 and Bargmannia elongata Totton, 1954.

Aglantha digitale was also abundant in neuston samples (Tables 5-9) collected at night from stations outside the 500 m contour. It was rare in samples collected during the day. Velella velella (Linné, 1758) hydranths were also abundant on the surface in April at offshore stations in 1987 and 1988, but less abundant in 1985 and 1986 and rare in 1989. In 1986 they were abundant in May.

At inshore stations the cydippid ctenophore Pleurobrachia pileus (O.F. Muller, 1776) var. bachei Agassiz 1860 was abundant in neuston tows from

April of 1986, 1987 and 1988, but was less common in 1985 and 1989. The leptomedusa Eutonina indicans (Romanes, 1876), was uncommon in April of 1985, 1986 and 1987, and absent in 1988 and 1989, even at Kyoquot Sound where it had been abundant in 1980 (Fulton et al. 1982). Leptomedusae, including also Phialidium gregarium (A. Agassiz, 1862) and Mitrocoma cellularia (A. Agassiz, 1865), become abundant by May. Other inshore species include the anthomedusa Sarsia sp., and the calycophoran siphonophore Muggiaea atlantica Cunningham, 1892.

In addition to the species listed above a number of rarer species have been collected, particularly in the deeper Tucker samples. At least 30 species are previously unreported from Western Canadian waters, and taxonomic work is ongoing.

DISCUSSION

Based on the present knowledge of the diets of the common coelenterates, predation by these forms on sablefish larvae is not likely to be important.

As the larvae rise through the water column they will encounter Aglantha digitale and other trachymedusae, narcomedusae, coronate scyphomedusae and siphonophores. Aglantha digitale, which has been thoroughly investigated, primarily eats copepods, with some tintinnids, and euphausid eggs and larvae (Smedstad 1972, Williams and Conway 1981, Larson 1987, Purcell and Mills 1988, Purcell and Grover 1990). It is probable that other trachymedusae have similar diets (Purcell and Mills 1988). Narcomedusae have noncontractile tentacles specialized for predation on other gelatinous plankton such as salps (Larson et al. 1989).

Coronate scyphozoa such as Periphylla and Atolla are known to eat copepods and larger arthropods, chaetognaths and fish (Larson 1979, 1986). Stomach contents of forty of the larger Periphylla caught in this study were examined. The stomachs contained copepods (71% of number of prey items), ostracods (15%), gastropods (5%), chaetognaths (4%) and euphausids (2%), etc. but no fish. It is not known to what extent this reflects abundances of possible prey. Since populations of coronate medusae rarely exceeded 10 per 1000 m^3 in the present study, it is in any case unlikely that they are important predators on or competitors with sablefish larvae.

Siphonophores found March 1987 between 300 and 700 m included the calycophoran species Chuniphyes multidentata and Lensia conoidea, and the physonect species Nanomia bijuga. While calycophorans consume mainly smaller copepods, physonects are known to consume larger copepods and other larger hard and soft-bodied prey, sometimes including fish larvae (Mackie et al. 1987). No data is available on the diet of these particular two calycophoran species. Nanomia bijuga in the Gulf of California contained large copepods, shrimp and chaetognaths in the gastrozooids (Purcell 1981). Fish were not present in the gastrozooids of N. bijuga although they were present in other physonect and cystonect species at the same locality . Elsewhere other authors have observed capture of mysids and euphausids by this species (Biggs 1977; Alvarino 1985). Even if the species does consume some fish it was not abundant when the sablefish larvae were present in the water column. Assuming a ratio of 14-15 nectophores to an average-sized individual, they were most abundant in the January and February samples and by March are rarely present in concentrations of more than 5 individuals per 1000 m^3.

After the larvae reach the surface, in some years they will encounter Velella as well as Aglantha in the offshore stations. The diet of Velella hydranths consists of "passive food" such as fish and invertebrate eggs and small larval crustacea, but fish larvae are rarely caught (Bieri 1961, 1970; Wickham 1979; Purcell and Mills 1988). If swept inshore the larvae may encounter large numbers of Pleurobrachia. The diet of this wide ranging ctenophore has been studied by many workers. The diet consists largely of copepods and other small arthropods although fish larvae may be eaten occasionally (Fraser 1970; Hirota 1974; Yip 1984; van der Veer 1985; Frank 1986). The leptomedusa Eutonina indicans and the anthomedusa Sarsia sp. both include fish larvae in their diets (Sveshnikov 1963; Arai and Hay 1982) but were found in the present samples only in small numbers.

In summary as stated above it is not likely that extensive coelenterate predation occurs, at least during March and April. It is possible that later in the season larger populations of Eutonina and Sarsia may be present. However sablefish grow rapidly, reaching an average length of 5 cm by July (McFarlane and Beamish 1983) and are then not vulnerable to hydromedusan predation.

Since the diets of the abundant Aglantha and Pleurobrachia both consist largely of copepods it is interesting to speculate that they may be competing with the sablefish and other fish larvae for food. Both may be present in concentrations of more than 1000 individuals per 1000 m^3, Aglantha primarily offshore and Pleurobrachia in the surface layers inshore. However competition is difficult to prove. Proof requires not only measurement of the rates of predation by the fish, coelenterates, and other predators but also examination of the copepods to show that the copepod population is limited by predation rather than by other factors such as food or the environment. Large-scale climate patterns are correlated with copepod abundance (McFarlane and Beamish 1992) but the immediate factors limiting copepod production and survival are not known, particularly in this localized area.

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Table 1 Station locations and depths

Locality	Stn. No.	Latitude	Longitude	Bottom depth (m)
Pachena Point				
	LB2	48° 39.0' N	125° 2.4' W	55
	LB4	48° 35.7' N	125° 8.7' W	105
	LB6	48° 32.2' N	125° 15.5' W	110
	LB7	48° 28.7' N	125° 22.1' W	152
	LB8	48° 25.3' N	125° 28.7' W	145
	LB9	48° 22.0' N	125° 34.8' W	135
	LB10	48° 18.6' N	125° 41.4' W	150
	LB11	48° 15.2' N	125° 47.8' W	200
	LB12	48° 12.9' N	125° 51.9' W	510
	LB13	48° 10.6' N	125° 56.1' W	810
	LB14	48° 08.5' N	126° 00.0' W	1180
	LB15	48° 04.4' N	126° 08.4' W	1450
	LB16	48° 00.5' N	126° 17.0' W	1530
	LB17	47° 56.5' N	126° 26.1' W	> 1200
Barkley Sound				
	LC2	48° 48.7' N	125° 31.0' W	105
	LC4	48° 43.4' N	125° 40.8' W	162
	LC6	48° 36.5' N	125° 54.0' W	95
	LC8	48° 29.5' N	126° 07.1' W	197
	LC9	48° 25.9' N	126° 13.7' W	660
	LC10	48° 22.4' N	126° 20.2' W	1150
	LC11	48° 19.0' N	126° 26.7' W	1470
	A4 (LC12)	48° 15.0' N	126° 40.0' W	> 1200
Wickaninnish Bay				
	LD2	48° 58.4' N	125° 47.1' W	42
LD4	48° 53.2' N	125° 57.0' W	60	
	LD7	48° 42.7' N	126° 16.8' W	475
	LD10	48° 32.2' N	126° 36.6' W	1475
Clayoquot Sound				
	E5	49° 05.1' N	126° 04.5' W	35
	E10	49° 02.0' N	126° 10.4' W	73
	E20	48° 55.6' N	126° 22.9' W	154
	E30	48° 49.2' N	126° 34.9' W	362
	E40	48° 43.1' N	126° 46.5' W	1304
	E50	48° 37.6' N	126° 57.3' W	2012
	E60	48° 31.2' N	127° 09.3' W	2560

Table 1 (cont'd.)

Locality	Stn. No.	Latitude	Longitude	Bottom depth (m)
Clayoquot Sound (cont'd)				
	E80	48° 19.0' N	127° 32.0' W	2615
NootKa Sound				
	F6	49° 13.5' N	127° 05.0' W	433
Kyoquot Sound				
	G1	50° 03.6' N	127° 13.8' W	210
	G2	49° 59.1' N	127° 14.2' W	160
	G4	49° 51.5' N	127° 25.0' W	73
	G5	49° 47.2' N	127° 29.0' W	90
	G6	49° 40.1' N	127° 40.3' W	585
	G7	40° 30.5' N	127° 51.0' W	2012

Table 2 Medusae and Ctenophores in Bongo Samples 1986: Numbers per 1000 m³

Station	Date	Depth (m)	Mesh (µ)	Antho-medusae	Eutonina	Other Lepto-medusae	Limno-medusae	Aglantha	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
LB4	Feb. 25	0-80	230									47	
			350					3				164	20
LB9	Mar. 2	100-150	230										
			350										
	Mar. 4	0-150	230									13	
			350									7	7
LB10	Mar. 2	100-145	230					8					
			350										
	Mar. 4	0-158	230					7					
			350					7					
LB11	Mar. 2	100-200	230										
			350										
	Mar. 4	100-200	230					39					
			350					34					20
LB12	Mar. 2	100-200	230					21					
			350										
		200-500	230					53	37	11			
			350	3				110	23	3			3
	Mar. 4	100-200	230					63					7
			350					137					14
		200-500	230					80	3	13			23
			350					142	35	7			3
LB13	Mar. 2	100-200	230	6				1400	6				6
			350					1866					
		200-500	230					957	40	18			3
			350					1035	32	32			3
		500-700	230		2			387	16	16	4		4
			350	2				449	14	5	9		
	Mar. 4	100-200	230					1051	34	17			8
			350					1157					
		200-500	230					841	7	11			
			350					941	19	15			4
		500-700	230	2				671	29	19			7
			350					727	17	12			2
LB4	Apr. 3	0-105	230	7		7		95		7		307	
			350			7		99				296	
LB7	Apr. 3	0-155	230					6		6		86	
			350						6			198	11
LB9	Apr. 3	0-148	230									70	11
			350					5				158	38
LB11	Apr. 3	0-217	230		4			41		8		1228	17
			350					47		4		1158	17
LB12	Apr. 3	0-200	230					105		5		100	
			350					116		5		42	9
		200-500	230					542	13	79		53	

Table 2 (cont'd.)

Station	Date	Depth (m)	Mesh (µ)	Antho-medusae	*Eutonina*	Other Lepto-medusae	Limno-medusae	*Aglantha*	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
			350					611	16	135		62	3
LB13	Apr. 3	0-200	230					241		5			10
			350					316		11	5		11
		200-500	230				5	34	17	34			2
			350					50	20	10			12
		500-700	230					33	14	10			
			350					95	32	8	4		2
LC11	Apr. 4	0-200	230					144				5	
			350					149					16
		200-500	230	4	2			362	21	31	8	2	
			350					380	15	34			4
		500-700	230	2				133	10	18	4		
			350					163	22	10	4	2	2
F6	Apr. 11	0-200	230						15	5			5
			350										
		200-500	230					101	30	28	3		
			350					106	49	23	3		
		500-700	230					94	48	16	7		
			350					110	27	5			
G1	Apr. 10	0-150			5		55	27					
G2	Apr. 10	0-200					29	44					
LB4	May 15	0-107	230	17	70	1104		78				565	
			350	81	227	1845		264				1164	
LB9	May 11	0-148	230	24		244	15	63				2020	
			350	20		284	15	80				2293	
LB11	May 11	0-200	230	22	22	909	26	9				192	22
			350	23	28	2024	27	14				307	18
LB13	May 11	0-200	230		4	17	4	30		26		175	9
			350		9	26		26	4	13		147	4
		200-500	230	6	6			63	35	37	9	28	6
			350	4	2	4		67	45	45	7	20	4
		500-700	230	2	2			27	47	8	4	8	8
			350					36	27	13	2	17	4
E20	May 16		230		30	45		5				1030	
			350	11	74	80		5				925	
E40	May 16	0-200	230					4	26	17			
			350					45		12			
		200-500	230					70	19	17		2	2
			350	2				57	32	19		4	
		500-700	230					50	12	8	2		
			350	2				58	19	9	2	2	7

Table 3 Medusae and Ctenophores in Tucker Tow Samples 1987; Numbers per 1000 m^3

Station	Date	Depth (m)	Antho-medusae	Lepto-medusae	Limno-medusae	*Aglantha*	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
LB2	Jan.22	0-30		< 1	1	9				< 1	
		30		1	3	91	< 1	1		5	
LB4	Jan.22	0-95		2		50				2	
		95		1		18	< 1			2	< 1
LB6	Jan.22	0-90		< 1		1	< 1	< 1		1	
		90			1	6		1			1
		90-0		2	1	8		5		1	1
LB8	Jan.22	0-130			< 1	1					
		130				35		1			
		130-0			1	2					
LB10	Jan.22	0-125			< 1	1					
		125				18					< 1
		125-0						1		< 1	
LB12	Feb.3	0-300			< 1	21					< 1
		300				22		1		1	
		300-0				37	3				
LB13	Feb.3	0-300	1			119	2	2	1	2	1
		300				36	11	4	3		
		0-500	< 1		< 1	62	8	2	1		1
		500				29	15	3	3		2
		500-0	< 1			73	5	5	1	< 1	< 1
		700-0	< 1			54	2	2	< 1	< 1	
LB14	Jan.27	0-300				109	3	2			
		300				48	6	4			
		500	1			17	3	7	1		
		500-0	< 1			22	2	< 1	< 1	< 1	< 1
LB17	Jan.26	0-300				11	2	1	1		
		300	1			29	15	4	4	1	
		300-0			< 1	58	< 1	4	1		
		0-500	2			22	6	1	1		
		500	< 1			3	1	2	< 1	< 1	
LC2	Jan.23	90		2	1	72		7		3	5
		90-0		4		16					1
LC6	Jan.23	70			1	19		4		2	
		70-0		2		29		2		2	
LC9	Jan.23	300				79		3			
		300-0			1	92		2		< 1	
	Jan.24	0-500	1			36	6	5	2		
		500	2	< 1		39	10	8	4		
		500-0			< 1	53	1	1	< 1	< 1	< 1
LC10	Jan.24	0-300				40	7	3	1		1
		300				21	3	6	< 1		< 1
		0-500	1			52	10	12	4		
		500				32	12	22	5		1
		500-0			< 1	80	3	4	< 1		< 1

Table 3 (cont'd.)

Station	Date	Depth (m)	Antho-medusae	Lepto-medusae	Limno-medusae	Aglantha	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
		0-575	< 1			28	7	2	2		1
		575	1			34	7	2	2		2
		575-0	< 1			71	5	4	1		1
LC11	Jan.25	0-300				113	< 1	< 1			
		300				193		1			< 1
		0-500				32	3	1			< 1
		500	1			20	7	2			
		500-0				55	1	4			
A4	Jan.25	0-300				155	< 1	3			
		300				79		8			
		0-500	< 1			39	2	1			
		500	1			73	8	2	< 1	< 1	
		500-0	< 1	< 1		82	2	1			< 1
LB2	Feb.14	28		2		85				5	
		28-0		2		30				19	
LB4	Feb.14	85-88				12		1		1	
		88-0				36				6	
LB6	Feb.14	0-70				5				< 1	< 1
LB10	Feb.15	0-112									
		112-130			< 1						
LB12	Feb.21	300	1			40	1	8	5		
		400	2			38	7	9	3		
		400-0	1			61	9	15	3		< 1
LB13	Feb.18	300				113	1	1			
		300-0		< 1	< 1	6	< 1	< 1			
		500				22	12	7	1		1
		500-0				17	4	5	1	< 1	
		700				19	4	3	1	< 1	3
		700-0	< 1			20	4	4	< 1		< 1
LB14	Feb.21	0-300				67	1	4			
		0-500			< 1	102	5	14	2		1
		500	1		< 1	15	10	15	2		< 1
		0-700	< 1			91	4	2	< 1		< 1
		700				3	1	1	< 1		< 1
LB17	Feb.17	500	2			4	3	6	3		2
	Feb.21	0-300				52	1	2	2		
		300				46	1	< 1	1		
		0-500				11	4	3	1	< 1	
		500	< 1			11	6	11	1		< 1
LB17	Feb.21	0-700	< 1			15	7	1	1		
		700	< 1			9	2	1	1		< 1
LC2	Feb.15	0-60		< 1		10		< 1		< 1	
		60			1	26				4	1
LC6	Feb.23	0-80		1	1	53	1			23	

Table 3 (Cont'd.)

Station	Date	Depth (m)	Antho-medusae	Lepto-medusae	Limno-medusae	Aglantha	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
		80		9	1	1					
LC9	Feb.16	300				123	21	41	7		
		300-0	< 1		< 1	40	6	9	1	< 1	
		500		1		51	20	41	3		
		500-0	< 1			59	8	36	1	< 1	< 1
LC10	Feb.16	300				39		< 1			
		300-0				67	< 1	1			< 1
		500	2			29	12	24	5		
		500-0	1			47	7	3	3		1
	Feb.15	700				46	11	4	3		2
		700-0	< 1			47	4	3	< 1		1
	Feb.23	300				68		< 1			
LC11	Feb.16	300				30	6	3	4		
		300-0				34	< 1	1	1		
		500				9	15	3	2		
		500-0	< 1			20	3	4	1		1
		700				14	4	2			
		700-0	< 1			22	5	3	1		< 1
A4	Feb.17	300				52	12	6	6		
		300-0				23	3	5	1	< 1	
		500	1			28	6	5	1		
		500-0	< 1	< 1		21	5	5	1	< 1	< 1
		700	< 1			23	8	4	2		
		700-0	< 1			11	5	3	2		< 1
LB2	Mar.16	< 55		12	24	106			12	318	
		< 55		2	2	17		1		3	
LB4	Mar.17	< 105				2		1			
		< 105		1		10		1			
LB6	Mar.20	80				3					
		80-0			< 1	2					
LB10	Mar.20	< 150	< 1			< 1					
		< 150		3		8					
LB12	Mar.18	0-300				26	3	6			
		300				5	30	42			
		0-450	< 1			15	4	3	3		< 1
		450	< 1			4	7	4	4		
LB13	Mar.20	0-300				44	2	2	1		
		300				25	< 1	4	< 1		
		0-500	1			22	11	7	1		
		500				4	6	9	1		
		0-700				24	5	4			
		700				2	2	4			< 1
LB14	Mar.16	0-300		1		36	8	5	3		
		300				12	16	7	1		< 1

Table 3 (Cont'd.)

Station	Date	Depth (m)	Antho-medusae	Lepto-medusae	Limno-medusae	*Aglantha*	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
		0-500				9	2	1	1		< 1
		500				6	7	2	1		
		0-700				21	10	2	2		
		700				1	2	1	2		
LB17	Mar.21	0-300				63	52	35	10		7
		300				1	62	6			7
		0-500	1	< 1		13	13	3	2	1	
		500	1			2	9	4	< 1		
		0-700	< 1		< 1	11	9	< 1	2		< 1
		700				1	4	2	1		
LC2	Mar.14	< 105		2		15				1	
		< 105				35				30	
LC6	Mar.14	< 120		1		2					
		< 120		2		15					
LC9	Mar.21	0-300				39	4	26	4		
	Mar.22	300				6	7	14	1		3
		0-500	< 1			43	8	4	4		1
LC10	Mar.15	300-0				19	2	2			
		500				4	9	8	3		1
		500-0	< 1			23	3	3	< 1		< 1
		700				4	4	1			
		700-0	< 1	< 1		11	3	4	< 1		1
	Mar.21	300				6	3	4	1		< 1
		300-0				27	2	2	< 1		
		500				12	6	4	< 1		< 1
		500-0	< 1	< 1		6	3	3	1		< 1
		700	< 1			2	1	< 1	< 1		
		700-0	< 1			3	2	1	< 1		< 1
LC11	Mar.15	0-300		< 1		27	13	9	1		
		300				18	11	11	< 1		3
		0-500	< 1			36	7	8	1		
		500	< 1			2	6	4	1		
		0-700	< 1			9	8	4	1		
		700				6	5	2	1		
A4	Mar.16	0-300		< 1		32	4	8	< 1		
		300	< 1			9	15	10	4		1
		0-500	< 1			11	4	1	1	< 1	< 1
		500	1			2	14	3	< 1		
	Mar.15	0-700	1			14	8	4	2		
		700				3	3	4	2		
	Mar.21	300	1			2	13	5			< 1
		300-0	< 1			7	3	1			
		0-500	1		< 1	44	15	12	4		2
		500				2	8	3	1		
		0-700	< 1	< 1		5	6	2	1	< 1	

Table 3 (Cont'd.)

Station	Date	Depth (m)	Antho-medusae	Lepto-medusae	Limno-medusae	Aglantha	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
		700				3	2	1			
LB6	May2	80		4		3		< 1		1	
		80-0	14	226		51				111	
LB13	May2	0-300	1			25	13	32	1		
		300				3	21	50			
		0-500				31	8	4	2	1	
		500				12	16	11	9		
		0-700	1	< 1		34	4	5	2		
		700				4	3	4	1		
LB16	Apr.22	0-300	< 1			48	< 1	3			
		300				4	< 1	2			
		0-500	< 1			5	1	< 1	< 1		< 1
		500				6	4	2	1		
		0-700				11	6	1	1		
		700				9	3	1	< 1		
LC6	Apr.23	70	< 1	1		< 1				< 1	
		70-0		4		11				16	
LC10	Apr.24	300-0			1	52	4	12			
		500-0	< 1			28	5	3	2		< 1
		700-0	< 1			20	3	2	1		
A4	Apr.24	0-300				26	6	21			
		0-700	< 1			13	4	2	< 1	< 1	

Table 4 Medusae and Ctenophores in Tucker Tow Samples 1988: Numbers per 1000 m³

Station	Date	Depth (m)	Antho-medusae	Lepto-medusae	<u>Aglantha</u>	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
LB2	Feb.11	40			4		2		1	
		40-0			1					
LB6	Feb.11	95			31		1			
		95-0			3		1			
LB12	Feb.12	300	< 1		11	5				
		300-0			8					
		450			15	1				
		450-0			3	3	3			
LB13	Feb.13	0-350			24		1	< 1		
	Feb.12	350			18	4	1	1		
		0-500			27	4	3	1		
		500			15	6		1		
		0-700	< 1		5	2	1	< 1	< 1	< 1
		700			5	1	2			
LB14	Feb.13	500	< 1		10	12	< 1	2		
		700			5	4				
	Feb.18	0-300			37	5	3			
		300	1		46	32	20			
		500	1		6	10	1		1	1
		500-0	< 1		45	8	1	< 1	< 1	
		700			24	16	1	< 1		
		700-0	< 1		47	8	1	< 1		
LB17	Feb.14	300-0			18		8		< 1	
		500	1		6	3	1	< 1		
		500-0			12	2	3	1		
		700			6	3	1	1		
		700-0	< 1		16	3	4	< 1		< 1

Table 4 (cont'd.)

Station	Date	Depth (m)	Antho-medusae	Lepto-medusae	*Aglantha*	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
LC2	Feb.16	0-99			9					
LC6	Feb.16	0-60			10	1	2			
LC9	Feb.17	300			4	1	1			
		300-0	1		20	10	5	1		
		500			3	2	< 1	1		
		500-0			12	8	1			
LC10	Feb.16	300-0		< 1	7	< 1	3	1		
	Feb.15	500-0	< 1		10	2	2	< 1		
		700			3	2	< 1	< 1		
		700-0	< 1		7	3	1	< 1		
	Feb.17	500			5	6	2	2		
		700-0			23	16	5	1		1
LC11	Feb.15	500	1		11	10	3			
		700			5	4	1	1		< 1
		700-0	< 1		8	6	2	1	< 1	< 1
A4	Feb.14	0-300			21	1	1	2		
		0-500			25	3	1	< 1	< 1	
		500			10	8	< 1	2		
		0-700			9	2	< 1			
LB4	Mar.7	73			6					
		73-0			21					
LB10	Mar.2	0-140								
		140								
LB12	Mar.7	300			7	4	1			
		300-0			24	1	< 1			
LB13	Mar.2	0-300			3		1	1		
		300			3	3				

Table 4 (cont'd.)

Station	Date	Depth (m)	Antho-medusae	Lepto-medusae	Aglantha	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
		0-500	< 1		3	5	1	1		
		500				1	1			
		0-700			2	3	< 1	1		
		700			< 1	2		1		
	Mar.7	0-700	< 1	< 1	13	7	2	1		
		700			1	< 1				
LB14	Mar.3	300	1		18	10	1	1		
		300-0			8	2	1			
		500			11	20	1	2		
		500-0			8	2	1	1		
		700			7	6				
		700-0	1		7	3	2	1		
LB15	Mar.3	0-700			8	4	1	< 1		
		700	1		4	12	1	2		
LB17	Mar.3	300	2		1	47	8	1		
		300-0			19	4	9	1		
	Mar.3	500			1	1	1	< 1		
		500-0			5	3	2			< 1
		700-0	< 1		7	4	3	< 1		
	Mar.10	0-700			7	5	2	1		
		700			< 1	2	< 1	< 1		
LC4	Mar.6	< 160			14		1			
		< 160			42		< 1			
LC9	Mar.9	0-300			3	1	2	1		
		300	1		2	4	1	< 1		
		0-500	1		8	12	3	1		< 1
		500			2	1	2			

Table 4 (cont'd.)

Station	Date	Depth (m)	Antho-medusae	Lepto-medusae	Aglantha	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
LC10	Mar.5	0-300			9	8	3	1		1
		300	1		3	2	2	1		1
		0-500			5	7	< 1	1	< 1	< 1
		500			1	3	< 1	< 1		
		0-700	< 1		5	5	1	1		
		700			1	1				
	Mar.9	300-0			3	< 1	1			
		500			5	5	< 1	< 1		
		500-0			46	4	3	< 1		
		700			1	3	< 1	< 1		
		700-0	< 1		7	3	1	1		
LC11	Mar.4	500			1	4	1			
		500-0	< 1		6	7	2	< 1	< 1	
	Mar.4	700	< 1		1	< 1		1		
		700-0			4	5	2	1		
	Mar.9	0-700	< 1		4	4	< 1	1		
		700			4	3		< 1		
A4	Mar.4	0-300			12	8	2	< 1		
		300			3	19	4			
		0-500			22	6	1			< 1
		500			5	10	2			
		0-700	< 1		12	3	1	< 1		
		700			8	1	4			
	Mar.10	0-300	< 1		24	5	4			
		300			27	1	3			
		0-500	< 1		10	15	2	2		< 1
		500	1		88	9	3			

Table 4 (cont'd.)

Station	Date	Depth (m)	Antho-medusae	Lepto-medusae	*Aglantha*	Other Trachy-medusae	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
		0-700	< 1		7	4	< 1	< 1	< 1	
		700			20	2	1	1		< 1
LB6	Apr.6	< 110	< 1	< 1	< 1				3	
LB16		0-500	< 1		< 1	1	2	1		< 1
		500			1		1			
		700			< 1	< 1	< 1	1		< 1
		700-0			< 1	< 1	< 1			

Table 5 Velella Hydranths, Medusae and Ctenophores in Neuston Tows 1985: Numbers per 1000 m³

Station	Date (D=Day)	Velella (mm) size classes) 0-10	10-20	Antho-medusae	Eutoninia	Other Lepto-medusae	Limno-medusae	Aglantha	Narco-medusae	Cydippid	Other Ctenophora
LB2	Apr. 10			57	4			4		21	
	Apr. 10D			7	53	60				21	
LB4	Apr. 10			26		3				3	
	Apr. 10D				3						
LB6	Apr. 10	4		7						4	
	Apr. 10D	10		7	3	17				10	
LB8	Apr. 10						4				
LB10							8				
LB11	Apr. 11	3								7	
	Apr. 14	3									
	Apr. 21	11		4				7			
LB12	Apr. 14							68			
	Apr. 21		6					11			
LB13	Apr 14	6						295	9		3
	Apr 21	23	18					91	5		
LB14	Apr. 13							188	16		21
LB15	Apr. 13							10	13		3
LB16	Apr. 13							3	6	3	
LC8	Apr. 13							12			
LC10	Apr. 12							180			
	Apr. 16	9	9					371			
LC11	Apr. 12	4									

Table 6 Velella Hydranths, Medusae and Ctenophores in Neuston Tows 1986; Numbers per 1000 m³

Station	Date (D=Day)	Velella (mm size classes) 0-10	10-20	20-30	30-40	40-50	Antho-medusae	Eutonina	Other Lepto-medusae	Aglantha	Narco-medusae	Cydippid
LB2	Apr. 6							6				
LB4	Apr. 6						4	4				
LB8	Apr. 6											12
LB10	Apr. 5											50
LB11	Apr. 3D	4								8		4361
	Apr. 5											26
LB12	Apr. 3											362
	Apr. 5									12	18	
LB13	Apr. 3									277		
	Apr. 5									25	3	3
LB14	Apr. 3	9	9							251		
	Apr. 5									287		
LB15	Apr. 3	24	35							1685		
	Apr. 5									636		
LB16	Apr. 4	14	42	3						671		
	Apr. 5	41	47				3			3		
LC2	Apr. 7							9				
LC4	Apr. 7						7	53		7		1009
LC6	Apr. 6						17					340
LC8	Apr. 6											346
LC9	Apr. 6		14							7		
	Apr. 16									28	7	
LC10	Apr. 6	8	24							24		173
LC11	Apr. 4D	9	9									
	Apr. 6	5										2081
E10	Apr. 15						7		4			42

Table 6 (cont'd.)

Station	Date (D=Day)	Velella (mm size classes) 0-10	10-20	20-30	30-40	40-50	Antho-medusae	Eutonina	Other Lepto-medusae	Aglantha	Narco-medusae	Cydippid
E20	Apr. 15			3			12					135
E30	Apr. 15		4							28		
E40	Apr. 14									67		
E60	Apr. 14	10	38	14	3					101		
E80	Apr. 14	66	16	3			3			16		
G1	Apr. 10						53					
G2	Apr. 10		5									
G4	Apr. 11	12								18		
G5	Apr. 11									80		
G6	Apr. 10D											6
G7	Apr. 10D											19
LB2	May 11									14		7
LB4	May 11						48		153			832
LB6	May 11						114		5	5		130
LB8	May 11						8		4			2916
	May 11	9					4	9				4509
LB10	May 11						38					498
LB11	May 11	33	87				54		43			195
LB12	May 12	200	298	57	11		74	6		189		973
LB13	May 11D	65	92	27			23					154
	May 12	161	115	52	10		10			94		26
LB14	May 12	70	330	135	5	5	5			375	10	5
LB15	May 11D	396	718	165	17	4	4			4		
	May 12	94	162	162	54	7				175	20	
LB16	May 12	726	230	13	13		4			13	8	4
LC2	May 15	31	43				6	290	580	6		672
LC4	May 15	19	45				26					
LC6	May 15	162	234	68	5		338		9			667

Table 6 (cont'd.)

Station	Date (D=Day)	Velella (mm size classes) 0-10	10-20	20-30	30-40	40-50	Anthomedusae	Eutonina	Other Leptomedusae	Aglantha	Narcomedusae	Cydippid
LC8	May 16	545	1436	86	5				5	11		65
LC9	May 16	574	535	33			11		6			17
LC10	May 16	227	313	29			19			444	14	357
LC11	May 16	1980	692	20	10		10			100		

Table 7 Velella Hydranths, Medusae and Ctenophores in Neuston Tows 1987; Numbers per 1000 m^3

Station	Date (D=Day)	Velella (mm size classes) 0-10	10-20	20-30	30-40	40-50	Anthomedusae	Eutonina	Other Leptomedusae	Limnomedusae	Aglantha	Narcomedusae	Cydippid	Other Ctenophora
LB6	Feb. 18	71									6			
LB8	Feb. 18	115									30			
LB10	Feb. 18	38	12											
LB12	Feb. 18	17	23						3					
LB6	Mar. 18	10												
LB13	Mar. 18	10	2							2	406			
	Mar. 20	18	5											
LB17	Mar. 16D	18										3		3
	Mar. 20	6	3								279			
LC4	Mar. 14								2					
LC8	Mar. 15	51												
LC9	Mar. 15	111		3							131			
	Mar. 21							3			317			
LC10	Mar. 21	33	3								42			
A4	Mar. 15	82	12	3							281	6		
LB2	May 3						24		8				911	
LB4	Apr. 22D							3	53		6		6886	
	May 3						16						45	
LB6	May 2		5						9				774	
LB8	Apr. 23	11					30	22	137		300		207	
	May 2	4							121				1146	
LB10	Apr. 23	87	42	8										
	May 1	15												
LB11	Apr. 22D	102	143	23									4	
	Apr. 23	136	116	4										
	May 1	15	74	48									4	
LB12	Apr. 23	50	92										7	
	May 1	14	32	18							276	7	4	
LB13	Apr. 23	39	238	39										
	May 2	4	18	33							333	22		

Table 7 (Cont'd.)

Station	Date (D=Day)	Velella (mm size classes) 0-10	10-20	20-30	30-40	40-50	Anthomedusae	Eutonina	Other Leptomedusae	Limnomedusae	Aglantha	Narcomedusae	Cydippid	Other Ctenophora
	May 2D	31	12										4	
LB14	Apr. 22	119	639	83	7						123			
	May 2	69	124	22							737	15		
LB15	Apr. 22	311	95	7										
	May 2	14	7								10			
LB16	Apr. 22	55	207	69	9	5								
	Apr. 22D	474	382	239	15									
	May 2	531	271	37							29			
LC2	Apr. 23	2					30							
LC4	Apr. 23	8	4	8			4				4		41	
	Apr. 23D	32	16	4			4	16	2288		12		946	
LC6	Apr. 23D										8		4	
	Apr. 24						23					4	4	
LC8	Apr. 24	119	170	44	3	3			3				3	
LC9	Apr. 25	35	39				4		4		14	4		
LC10	Apr. 24	12	40				8				780	4	65	8
	Apr. 24D	134	116	7									4	
LC11	Apr. 24	10	14	19							100	5		
A4	Apr. 24	147	33	45	4									
	Apr. 24D	49	49	7										
LC10	Apr. 25	60	45								1823		8	
E5	Apr. 26	4												
E10	Apr. 26		46	21	12	8			17				232	
	Apr. 26D	4	12	4					272				3492	
E20	Apr. 26	16	21				4						62	
	Apr. 26D	7	3											
E30	Apr. 27	199	235	4			11				57		71	
E40	Apr. 26D	62	82	12			78						86	
	Apr. 27		14		4		25		4				49	
E50	Apr. 26D		7	3			44						616	
	Apr. 27		39	7	4		32		4		35		836	120
E60	Apr. 27	28	28		11		4		7		579		4	

Table 7 (Cont'd.)

Station	Date (D=Day)	*Velella* (mm size classes) 0-10	10-20	20-30	30-40	40-50	Anthomedusae	*Eutonina*	Other Leptomedusae	Limnomedusae	*Aglantha*	Narcomedusae	Cydippid	Other Ctenophora
G2	Apr. 28								3	3			234	
	Apr. 28D						22	4	58					
G4	Apr. 28	4	11	4			51						420	
	Apr. 28D	3					17	10	7	7			531	
G5	Apr. 28D	18	14	11									46	
	Apr. 29	59	40										4	
G6	Apr. 28D	77	15											
	Apr. 29		8								27			
G7	Apr. 28D		4				4							
	Apr. 29										281			

Table 8 Velella Hydranths, Medusae and Ctenophores in Neuston Tows 1988: Numbers per 1000 m^3

Station	Date (D=Day)	Velella (mm size classes) 0-10	10-20	20-30	Antho-medusae	Eutonina	Other Lepto-medusae	Limno-medusae	Aglantha	Narco-medusae	Cydippid	Other Ctenophores
LB10	Feb. 18	3								3		
LB11	Feb. 18		1							1	1	
LB12	Feb. 18	10							2			
LB13	Feb. 13	46	6					3	19			
LC9	Mar. 8	15	4						22	4		
LC10	Mar. 8	31	11									3
LC11	Mar. 8		3						67	3		
A4	Mar. 8	42	2						17	2		
LB2	Apr. 8	5			74						32	
LB4	Apr. 6D	87	4								42	
	Apr. 8	284	4		12						100	
	Apr. 17				13						1301	
LB6	Apr. 9	5			28						128	
	Apr. 17D				5						236	
LB8	Apr. 6D	33	4				11				18	
	Apr. 9				9						4	
	Apr. 17		4		13						157	
LB10	Apr. 6											
	Apr. 17											
LB11	Apr. 6		6						6			
	Apr. 9D						5	5				
	Apr. 17											
LB12	Apr. 6	16	11						5			
	Apr. 16									4		
LB13	Apr. 7	32	5		5				32	27		
	Apr. 7D	15	3									
	Apr. 16											
LB14	Apr. 7	7	7						7	7		
	Apr. 16											
LB15	Apr. 7	71	12						43			
	Apr. 16	8	4							4		
LB16	Apr. 7D	50	12									
	Apr. 7D								5			
	Apr. 16		7						3			
LC2	Apr. 9				7			13			33	
LC4	Apr. 9				5							
	Apr. 9D				6						374	
LC6	Apr. 9D	5										
	Apr. 10	52	24		4							
LC8	Apr. 9D	9										
	Apr. 10										4	
LC9	Apr. 10											8
LC10	Apr. 10D	7	17									

Table 8 (Cont'd.)

Station	Date (D=Day)	*Velella* (mm size classes) 0-10	10-20	20-30	Antho-medusae	*Eutonina*	Lepto-medusae	Limno-medusae	*Aglantha*	Other Narco-medusae	Cydippid	Other Ctenophores
	Apr. 16	16	19						6			
LC11	Apr. 16	4	4						130	11		7
A4	Apr. 10D	23										6
	Apr. 15								90	5		
LD10	Apr. 11	11	4									
E5	Apr. 11				4						137	
E10	Apr. 11		5		5							
	Apr. 11D	33			7						139	
E20	Apr. 11	21			17						4	
E30	Apr. 11D	18	3									
	Apr. 12	28	5								9	
E40	Apr. 11D	14										
	Apr. 12	28							28	4	8	
E50	Apr. 11D	15	8									
	Apr. 12	5	34	5					69			5
E60	Apr. 11D	24	16									
	Apr. 12	15	11	4					68			
G2	Apr. 13											
	Apr. 13D											
G4	Apr. 13D	4			8							
G5	Apr. 13											
	Apr. 13D											
G6	Apr. 13								9	6		
	Apr. 13D											
G7	Apr. 14								682			3

Table 9 Velella Hydranths, Medusae and Ctenophores in Neuston Tows 1989: Numbers per 1000 m^3

Station	Date (D=day)	Velella (mm size classes) 0-10	Velella (mm size classes) 10-20	Anthomedusae	Aglantha	Narcomedusae	Scyphomedusae	Cydippid	Other Ctenophora
LB2	Apr. 11			7				18	4
LB4	Apr. 11			4					
	Apr. 11D								
LB6	Apr. 11								
	Apr. 18			4					
LB8	Apr. 11								
	Apr. 11D								
	Apr. 18			3		3		7	
LB10	Apr. 9							10	10
	Apr. 19					3			
	Apr. 19D							8	
LB11	Apr. 9	3			3				
	Apr. 10D								
	Apr. 19			3	10				
	Apr. 19D								
LB12	Apr. 9				3	3			
	Apr. 19				169	29		4	
	Apr. 19D			4					
LB13	Apr. 9				160	7			
	Apr. 10D								
	Apr. 19				110				
	Apr. 19D			3					
LB14	Apr. 10				1113	3			41
	Apr. 19			3	461				14
	Apr. 19D			3				7	
LB15	Apr. 19				9				
LB16	Apr. 10				3			3	
	Apr. 10D								11
LC2	Apr. 7	7						4	
LC4	Apr. 7							4	
LC8	Apr. 8D							4	
	Apr. 9								
	Apr. 19				17				
	Apr. 19D								
LC9	Apr. 9				6	22			
	Apr. 19D			3					
LC10	Apr. 8				357	21			
	Apr. 19				107	4			
LC11	Apr. 8				763	47			140
	Apr. 19D			4					
LC12	Apr. 8								14
	Apr. 8D								
E10	Apr. 12D	4							
	Apr. 13						3		
E20	Apr. 12D							4	

Table 9 Velella Hydranths, Medusae and Ctenophores in Neuston Tows 1989: Numbers per 1000 m^3

Station	Date (D=day)	*Velella* (mm size classes) 0-10	10-20	Antho-medusae	*Aglantha*	Narco-medusae	Scypho-medusae	Cydippid	Other Ctenophora
	Apr. 13							3	
E30	Apr. 13				20	7			
E40	Apr. 12				317	4			
	Apr. 12D								
E50	Apr. 12				24			3	12
	Apr. 12D								
E60	Apr. 12				7				29
G2	Apr. 14			28					
	Apr. 14D			20				3	
G4	Apr. 16			3					
G5	Apr. 15D								
G7	Apr. 15D								

Table 10 Siphonophores in January and early February Tucker Tow Samples 1987; Numbers per $1000m^3$

Station	Date	Depth (m)	*Chuniphyes multidentata*	*Lensia conoidea*	*Muggiaea atlantica*	Other Calycophorae	*Nanomia bijuga*	Other Physonectae
LB2	Jan. 22	30			59	1	22	
LB4	Jan. 22	95			8	1	7	
LB6	Jan. 22	0-90			1	< 1	3	
		90			7		24	
		90-0			8	< 1	5	
LB8	Jan. 22	130		1	1	1	20	
LB10	Jan. 22	125-0					2	
LB12	Feb. 3	0-300	1	12		2	168	
		300		3		5	115	
LB13	Feb. 3	0-300	2	3		6	99	1
		300	22	1		7	149	
		0-500	14	10		3	71	10
		500	41	2		4	2	6
		500-0	9	6		2	38	4
		700-0	4	4	< 1	1	58	2
LB14	Jan. 27	0-300	8	3		3	62	
		500	54	1		14	49	
		500-0	1	2		1	64	1
LB17	Jan. 26	0-300	2	23		3	69	
		300	12	3		9	75	
		300-0	<1	12		1	119	1
		0-500	15	2		7	80	2
		500	1	7		1	23	<1
LC2	Jan. 22	90			38	1	99	
LC6	Jan. 22	70			12	33	3	
LC9	Jan. 23	300	2	15		2	88	
		300-0	1	12		13	32	
	Jan. 24	0-500	11	8		6	32	8
		500	38	<1		13	110	13
		500-0	3	9		2	27	<1

Table 10 (Con't)

Station	Date	Depth (m)	*Chuniphyes multidentata*	*Lensia conoidea*	*Muggiaea atlantica*	Other Calycophorae	*Nanomia bijuga*	Other Physonectae
LC10	Jan. 24	0-300	7	13		5	43	
		300	1	32		3	129	1
		0-500	76	15		18	70	14
		500	72	2		16	70	
		500-0	8	13		2	28	2
		0-575	60	4		8	25	12
		575	115	1		9	7	10
		575-0	7	7		9	18	3
LC11	Jan. 25	300	7	17		9	79	
		0-500	5	7		4	19	<1
		500	8	1		7	24	3
		500-0	2	9		1	20	
A4	Jan. 25	0-300	5	8		2	106	
		300	10	4		3	276	
		0-500	15	3		14	25	
		500	63	2		21	42	
		500-0	11	6		6	28	<1
LD2	Jan. 30	30			27		62	
LD10	Feb. 1	300	5	13		4	57	

Table 11 Siphonophores in February and March Tucker Tow Samples 1987; Numbers per $1000m^3$

Station	Date	Depth (m)	*Chuniphyes multidentata*	*Lensia conoidea*	*Muggiaea atlantica*	Other Calycophorae	*Nanomia bijuga*	Other Physonectae
LB2	Feb.	28			23		77	<1
	14	28-0			15		40	1
LB4	Feb.	85-88			2		12	
	14	88-0			21	< 1	39	3
LB6	Feb.	0-70			< 1	< 1	3	<1
	14	70-85			4			
LB12	Feb.	300	< 1	29		2	54	
	21	400-0	1	20		4	143	<1
LB13	Feb.	300	1	6		4	49	
	18	500	88	< 1		9	11	8
		500-0	9	1		3	68	2
		700	40			1	7	
		700-0	16	1		4	37	2
LB14	Feb.	0-300	10	21		3	133	
	21	0-500	38	5		14	92	6
		500	56	2		6	93	14
		0-700	28	6		5	49	2
LB17	Feb.	500	13	1		7	5	2
	17	0-300	3	6		3	107	
	Feb.	300	4	10		6	59	11
	21	0-500	11	2		2	36	3

Table 11 (Cont'd.)

Station	Date	Depth (m)	Chuniphyes multidentata	Lensia conoidea	Muggiaea atlantica	Other Calycophorae	Nanomia bijuga	Other Physonectae
A4	Mar.	0-300	14	14		5	97	4
	16	300	7	1		9	34	1
		0-500	13	11		7	63	3
		500	26	< 1		10	12	5
		0-700	58	10		21	47	4
	Mar.	700	16	1		5	9	
	15	300	15	< 1		4	14	4
		300-0	3	4		5	13	
	Mar.	0-500	63	15		13	45	20
	21	500	25	< 1		1	1	16
		0-700	41	4		15	24	2
		700	33	2		3	2	12

Numbers for Chuniphyes multidentata, Lensia conoidea and Muggiaea atlantica represent counts of anterior nectophores; for Nanomia bijuga they represent counts of nectophores with 14-15 nectophores making up an average-sized individual.

Table 12 Siphonophores in April and May Tucker Tow Samples 1987; Numbers per $1000m^3$

Station	Date	Depth (m)	Chuniphyes multidentata	Lensia conoidea	Muggiaea atlantica	Other Calycophorae	Nanomia bijuga	Other Physonectae
LB6	May 2	80			< 1		6	
		80-0			27		17	
LB13	May 2	0-300	1	6		11		
		300	5	5				
		0-500	4	4		13	2	7
		500	16			9		
		0-700	8	12		24	26	3
		700	10	3		10	7	
LB16	April	0-300	8	21		13	20	1
	22	300	16	13		5	78	7
		0-500	2	2	2	7	2	3
		500	15	2	1	5	1	18
		0-700	11	4	3	7	5	8
		700	12	2	1	4		12
LC6	April	70					7	
	23	70-0			15		2	
LC10	April	300-0	1	3		4	3	2
	24	500-0	4	7		4	1	2
		700-0	1	4		2	2	1
A4	April	300-0	3	11	3	6	11	6
	24	700-0	2	4	1	3	10	2

Numbers for Chuniphyes multidentata, Lensia conoidea and Muggiaea atlantica represent counts of anterior nectophores; for Nanomia bijuga they represent counts of nectophores with 14-15 nectophores making up an average-sized individual.

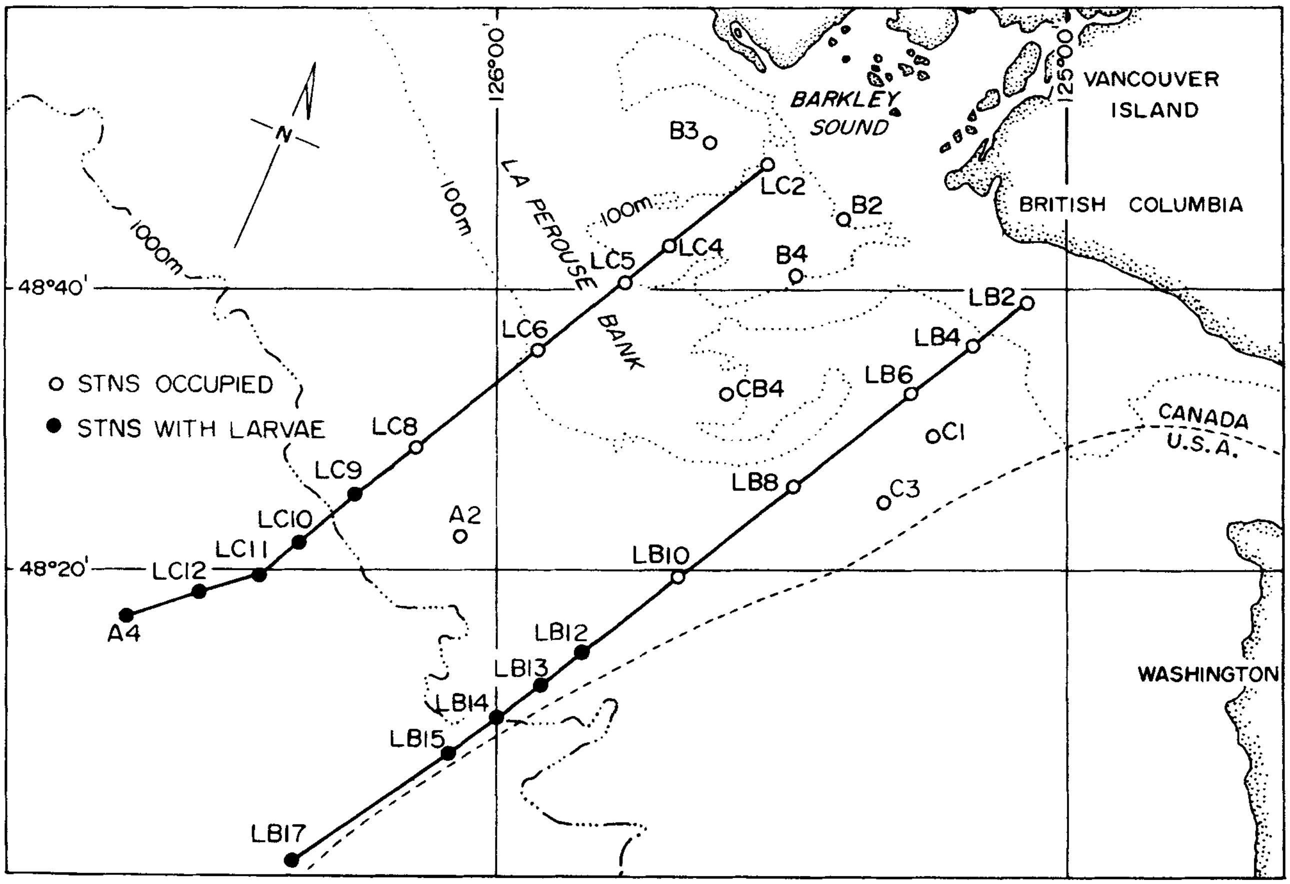

Figure 1. La Perouse Bank survey lines and Tucker trawl sampling stations occupied February and March 1987 and 1988. Sable fish larvae were collected at stations indicated by black dots.