RESULTS OF FISH LARVAE SAMPLING BY MEANS OF FINE-MESHED SAMPLERS ATTACHED TO A BOTTOM TRAWL

W. Ślósarczyk and I. Wójcik

Abstract

Fine-meshed samplers were attached to the top of a bottom trawl in order to provide information on the composition, distribution and abundance of Antarctic fish larvae in the near-bottom zone, which is usually not sampled using plankton nets. The efficiency of various sized meshes for sampling larvae in the bottom zone and the resistance of the samplers to damage during trawl operations were observed. Number of fish caught by samplers constructed using 0.505 mm net were similar to those taken by samplers made using 12 mm net with 0.505 mm insets. The 12 mm net was, however, more vulnerable to damage. The nets were more effective in sampling when attached to the top of the trawl belly, not to the codend. A total of 12 fish species were recorded. The most common fishes caught were postlarval *Nototheniidae*, and among them *Notothenіops larseni* (9.3-20.5 mm). The abundance of postlarval fish was highest in the shallow (108-166 m), nearshore waters of the northeastern shelf of South Georgia. Low values of the abundance index, including most of zero catches, were recorded on the western and southwestern part of the island shelf. Differences observed between the species composition of samples taken in this study and samples which have been collected in the midwater zone during the summer in the South Georgia area are discussed.

Résumé

Des échantillonneurs à mailles fines furent attachés en haut d'un chalut de fond afin d'obtenir des informations sur la composition, la répartition et l'abondance des larves de poissons antarctiques dans la zone proche du fond, où l'on ne procède pas d'ordinaire à des échantillonnages à l'aide de filets à plancton. L'efficacité de différentes tailles de mailles pour l'échantillonnage de larves dans la zone de fond ainsi que la résistance des échantillonneurs à l'endommagement au cours des opérations de chalutage ont été examinées. La quantité de poissons capturés par des échantillonneurs construits en utilisant un filet de 0,505 mm était semblable à celle capturé par des échantillonneurs construits en utilisant un filet de 12 mm avec des poches de 0,505 mm. Le filet de 12 mm était cependant plus susceptible à l'endommagement. Les filets étaient plus efficaces attachés au sommet du ventre du chalut, et non pas au cul de chalut. Un total de 12 espèces de poissons a été enregistré. Les plus communs dans la prise étaient des *Nototheniidae* à l'état post-larvaire, dont les *Notothenіops larseni* (9,3-20,5 mm). Les poissons à l'état post-larvaire étaient en plus grand nombre dans les eaux côtières peu profondes (108-166 m) du plateau nord-est de la Géorgie du Sud. Les valeurs faibles de l'indice d'abondance, y compris la plupart des prises nulles, ont été enregistrées sur la partie ouest et sud-ouest du plateau insulaire. L'on discute les différences

observées entre la composition par espèces des échantillons pris dans cette étude et des échantillons qui ont été pris pendant l'été dans la zone mésopélagique de la zone de la Géorgie du Sud.

Резюме

Чтобы получить информацию о составе, распределении и количестве личинок антарктических рыб в придонном слое, пробы которого с помощью планктонных сетей обычно не берутся, использовались мелкоячеистые пробоотборники, прикрепленные к верхней части донного трала. Велись наблюдения по эффективности ячеи различных размеров при взятии проб личинок в придонном слое и прочности пробоотборников, в условиях проведения траления. Количество рыбы, пойманной пробоотборниками, сделанными из сетного полотна с ячеей в 0,505 мм, и пробоотборниками, сделанными из сетного полотна с ячеей в 12 мм и со вставками из ячеи в 0,505 мм было примерно одинаковым. Однако, сеть с ячеей в 12мм оказалась в большей степени подверженной повреждениям. При взятии проб эффективность пробоотборников была выше тогда, когда они были прикреплены к самому верху нижней части трала, а не к кутку. Всего было зарегистрировано 12 видов рыб. Чаще всего встречались *Nototheniidae* на постларвальной стадии, а среди них - *Nototheniops larseni* (9,3-20,5 мм) Численность рыбы в постларвальной стадии была наивысшей в мелководье (108-66 мм), в прибрежных водах северо-восточной части шельфа Южной Георгии. Низкие величины показателя численности, включая большинство нулевых уловов, были зарегистрированы в западной и юго-западной части островного шельфа. Обсуждаются наблюдающиеся различия в видовом составе проб, взятых при проведении этих исследовательских работ, и проб, собранных в течении лета в среднем слое воды в районе Южной Георгии.

Resumen

Se fijaron muestreadores de malla fina en la parte superior de un arrastre de fondo con el fin de obtener información sobre la composición, distribución y abundancia de larvas de peces antárticos en la zona cercana al fondo, la cual no se muestrea normalmente con redes de plancton. Se observó la eficiencia de mallas de diversos tamaños en el muestreo de larvas en la zona del fondo, y la resistencia al daño de los muestreadores durante las operaciones de arrastre. El número de peces capturados por los muestreadores fabricados con red de 0,505 mm fue parecido a los que se capturaron con muestreadores fabricados con red de 12 mm con insertos de 0,505 mm. La red de 12 mm resultó ser, sin embargo, más vulnerable a sufrir daños. Las redes fueron más efectivas en el muestreo cuando estaban fijadas a la parte superior del vientre del arrastre, y no en el copo. Se registró un total de 12 especies diferentes. Los peces capturados más comunes fueron *Nototheniidae* post larvales, y entre ellos

1. INTRODUCTION

This study was undertaken around South Georgia during the 1987/88 summer season as part of the US Antarctic Marine Living Resources (AMLR) Program. A bottom trawl survey was conducted aboard the R/V *Professor Siedlecki* in cooperation with US scientists*. The sampling methods and gear were developed at the Sea Fisheries Institute (MIR) in Gdynia following the AMLR principal coordinator's advice. The objective of the study was to provide information on the composition distribution and abundance of Antarctic fish larvae in the near bottom zone. The layer just above the seabed must be sampled in order to obtain information about early life history stages of some species (North, 1987). The bottom zone is, however, usually not sampled due to the danger of damage to or loss of nets.

2. METHODS

The survey was conducted between 18 December, 1987 and 10 January, 1988. The survey included 118 standard trawl stations in a random stratified design and an additional fifteen hauls conducted within commercially exploited fishing grounds. One or two pairs of fine-meshed samplers, designed to collect larvae, were attached to the trawl in 49 of the 118 hauls (Figures 1 and 2). Each pair consisted of one sampler with 12 mm mesh and one sampler with 0.505 mm mesh. The sampler made of 12 mm mesh could be fitted with an inset made of 0.505 mm mesh. The samplers were attached to the top of the trawl in the following positions: A - 4 m from the headrope on the first segment of the trawl belly; C - 12 m from the headrope on the second segment; B - 16 m from the headrope on the third segment; D - 28 m from the headrope on the codend and X - 8 m from the headrope on the second segment of the trawl belly (Figure 2).

The whole catch from a sampler or a sample taken from it was sorted, fish larvae were counted and their standard lengths were recorded. Samples were preserved in 4% formaldehyde or 70% methanol buffered with potassium hydroxide (for subsequent ageing of larvae). Unfortunately the buffer caused fading of pigment patterns and made further identification of some larvae, especially nototheniids, difficult.

3. RESULTS AND DISCUSSION

The first objective of the study was to test the efficiency of various sizes of meshes (0.505 mm, 12 mm and 12 mm with 0.505 mm inset) for sampling larvae in the near-bottom zone and to test the resistance of the samplers to damage during trawl operations. A summary of the sampling results for three different mesh sizes is given in Table 1. At the beginning of the bottom survey (stations 19-226) the 12 mm mesh sampler was used without a fine-meshed inset. Few fish larvae were caught using the 12 mm mesh, whereas the 0.505 mm net produced large samples. From station 30 onwards, therefore, the 0.505 mm mesh inset was fixed in the end of the 12 mm samplers of larvae. After this change, with a few exceptions, numbers of larvae were comparable in both nets (Table 1). The volume of small plankton and benthos in samples collected by the 12 mm net with the inset tended to be approximately half the volume taken by the 0.505 mm sampler (Table 1). Better filtering efficiency of the 12 mm mesh facilitated the subsequent sorting of fish larvae.

Stations 21, 28, 29, 2P, 3P and 4P were excluded from the analysis of sampling efficiency because counts were available from the 0.505 mm sampler only. The 12 mm

---

* Dr Valerie Loeb, Moss Landing Laboratory, USA, idenitified half of the samples of fish larvae, but did not have an opportunity to review the draft of this paper and incorporate results of her contribution. She will, however, be included as a co-author in the completed paper.

sampler was damaged during gear operations and then replaced before station 30. The 12 mm net was torn up again when placed on the codend in position D (Figure 2). It appears that this net was more vulnerable to damage than the 0.505 mm net.

Complete analysis of the sampling efficiency of nets in various positions on the trawl was not possible because only two positions (A-B and C-D) were tested simultaneously (Table 2). Moreover, damage to the 12 mm net in position D reduced the scope of analysis to the 0.505 mm sampler for positions C and D.

Catches by 12 mm and 0.505 mm samplers in positions A and B were similar. The 12 mm sampler with the fine mesh inset was in single hauls (especially 36 and 46) more effective in sampling than the 0.505 mm net. For example, the total number of larvae caught at station 36 reached 1 768 specimens per hour. As regards net positions C and D, the 0.505 sampler was much more efficient when attached to the second segment of the belly (position C), rather than to a codend (position D). In position D, the 12 mm sample on stations 67, 68 and 74 (before damage), also caught only single larvae . This was most probably caused by the fine-mesh inset as well as by the low filtering efficiency of that part of the trawl (Ziebo 1976).

The data set from the 12 mm net is not complete, therefore the 0.505 mm sampler in positions X, B and C (the second and third segments of the trawl belly) was selected for subsequent analysis of the distribution and abundance of fish larvae. That net sampled very efficiently fish larvae, as well as juveniles, throughout the entire shelf of South Georgia.

Species composition in selected samples is shown in Table 3. Out of 33 hauls, no fish were recorded in eight. A total of twelve fish species were identified in the remaining 25 samples. The most common fishes caught were postlarval *Nototheniidae* (Figure 3) and among them postlarval *Notothenіops larseni* (9.3-20.5 mm) (Table 3). Single juvenile and adult states of: *N. larseni* (64-175 mm), *N. nudifrons* (102 mm), *Champsocephalus gunnari* (112-370 mm) and *Artedidraco airus* (62 mm) were also captured.

The abundance of postlarval fish was highest in hauls 20, 22 and 36, which were carried out in the shallow (108-166 m) nearshore waters of the northeastern shelf of South Georgia (Table 3 and Figure 3). The exception was haul 15P which was towed over a wide range of depths (122-228 m). The upper depth limit of haul 15P was, however, in shallow water. Generally low values of abundance were recorded on the western and southwestern part of the island shelf. There were no differences observed in results of day and night sampling.

A preliminary analysis suggested that the species composition of samples obtained during this study differed substantially from that of most ichthyoplankton samples collected during the summer in the South Georgia area. Postlarval *Champsocephalus gunnari* and *Chaenocephalus aceratus* are quite abundant in midwater samples in this area (Kompowski, 1980 a, b), in contrast to postlarval *Pseudochaenichthys georgianus* which is usually scarce (Slosarczyk, 1983; North, 1987). These species were more or less equally abundant in the bottom samples collected during this study, however, North (1987) observed dominance of postlarval *Notothenia gibberifrons* and *Notothenіops nudifrons* in samples taken during the period 4 February-5 March 1986. In the bottom samples collected during this study, these nototheniids were very rare. Analysis of diurnal vertical distribution of fish larvae in the Cumberland East Bay of South Georgia during 4-14 January 1987 suggested that most fish larvae in summer are in the upper 100 m layer of the nearshore waters (North, 1987). Between 100-220 m only larger larvae of *Pagothenia hansoni* were present (North, 1987). *P. hansoni* was also one of the most abundant larvae observed in samples collected near the bottom in this study.

When analyzing the species composition of samples and the effectiveness of the nets used in this study to sample the near bottom layer, one must not forget that the samplers could not be closed when passing through midwater layers. Some of the larvae in samples were probably taken in the water column above the bottom. For example, postlarval *Nototheniops larseni* was probably captured during deployment or retrieval of the trawl. According to North (1987), in summer, the early life forms of this species concentrate mainly in the upper 20 m layer and only few specimens are found deeper than 100 m.

REFERENCES

KOMPOWSKI, A. 1980 a. Studies on juvenile *Chaenocephalus aceratus* Lonnberg, 1906 (Pisces, Chaenichthyidae) from off South Georgia. Acta Ichthyol. Piscatoria 10(1): 45-53.

KOMPOWSKI, A. 1980 b. On feeding *Champsocephalus gunnari* Lonnberg, 1905 (Pisces, Chaenichthyidae) off South Georgia and Kerguelen Is. Acta Ichthyol Piscatoria 10 (1): 25-44.

NORTH, A.W. 1987. Distribution of fish larvae at South Georgia horizontal, vertical and temporal distribution and early life history relevant to monitoring year-class strength and recruitment. CCAMLR WG-FSA-87/16 .

SLOSARCZYK, W. 1983. Preliminary estimation of abundance of juvenile Nototheniidae and Channichthyidae within krill swarms east of South Georgia. Acta Ichthyol. Piscatoria 13 (1): 3-11.

ZIEBO, Z. 1976. Przeplyw wody we wlokach. Studia i Materialy Morsk Inst Ryp Gdynia C 30: 134 p.

Table 1: Abundance indices (numbers of larvae per hour fished) and total volume (ml) of samples (fish larvae, other zooplankton and benthos) collected using samplers with various mesh sizes (12 mm, 12/0.505 mm, 0.505 mm).

Station	Abundance Index			Total Volume of Samples		
	12 mm	12+0.505 mm	0.505 mm	12 mm	12+0.505 mm	0.505 mm
19	0		4	20		320
20	0		612	40		280
22	2		514	10		180
24	0		128	10		560
25	5		2	10		170
26	0		32	4		320
30		6	2		na	na
31		0	6		350	510
32		3	0		420	380
33		2	0		90	700
34		2	4		710	1390
35		312	106		590	na
36		2988	528		950	1800
37		12	4		na	670
38		8	10		430	150
45		50	138		90	720
46		298	120		960	1420
67		18	58		300	780
68		55	36		670	1490
74		8	18		440	800
89		12	8		90	600
94		10	10		340	760
95		4	6		110	490
97		10	10		na	490
109		4	2		250	470
116		2	0		100	230
14 P		0	2		100	900
15 P		304	364		110	330
122		10	12		340	790
123		0	16		190	290
124		4	2		50	640
127		4	6		50	760
130		4	8		20	60

na - data not available

Table 2: Abundance indices (numbers of larvae per hour fished) and total volume (ml) of samples (fish larvae, other zooplankton and benthos) for samples with various mesh sizes (12 mm, 12/0.505 mm, 0.505 mm) attached to the trawl in various positions (X, A, B, C, D).

Station	Abundance Index									
	12 mm	12+ 0.505 mm				0.505 mm				
	X	A	B	C	D	X	A	B	C	D
19	0					0				
20	0					612				
21	*					5				
22	2					514				
23	0					0				
24	0					128				
25	5					2				
26	0					32				
28	*					32				
29	*					76				
2P	*					7				
3P	*					2				
4P	*					10				
5P	0					0				
30		6	*				2	*		
31		0	0				2	6		
32		3	0				0	0		
33		0	2				0	0		
34		2	0				2	2		
35		50	66				60	38		
36		1768	1220				240	288		
37		12	0				4	0		
38		6	2				0	10		
45		38	20				74	58		
46		256	42				56	64		
67				16	2				58	0
68				55	0				31	5
74				6	2				16	2
89				12	*				6	2
94				10	*				10	0
95				4	*				4	2
97				10	*				8	2
109				4	*				2	0
116				2	*				0	0
14P				0	*				2	0
15P				304	*				364	0
122				10	*				12	0
123				0	*				10	6
124				4	*				2	0
127				4	*				6	0
130				4	*				10	*

* damaged sampler

Table 2 (continued)

Station	Total Volume of Samples									
	12 mm	12+ 0.505 mm	0.505 mm							
	X	A	B	C	D	X	A	B	C	D
19	20					320				
20	40					280				
21	*					190				
22	10					180				
23	20					20				
24	10					560				
25	10					170				
26	4					320				
28	*					400				
29	*					320				
2P	*					70				
3P	*					110				
4P	*					100				
5P	na					na				
30		na	*				na	*		
31		150	200				230	280		
32		250	170				170	210		
33		30	60				220	480		
34		130	580				420	970		
35		310	na				420	170		
36		470	480				600	1200		
37		420	na				170	500		
38		100	330				10	140		
45		20	70				420	300		
46		300	660				1000	420		
67				80	220				460	320
68				290	380				840	650
74				100	340				220	580
89				90	*				340	260
94				340	*				620	140
95				110	*				340	150
97				na	*				260	230
109				250	*				240	230
116				100	*				40	190
14P				100	*				640	260
15P				110	*				90	240
122				340	*				540	250
123				190	*				220	70
124				50	*				320	320
127				50	*				680	80
130				20	*				60	*

* damaged sampler

Table 3: Distribution and abundance of postlarval and juvenile fish on the continental shelf of South Georgia, 18 December 1987 to 10 January 1988 (R/V *Professor Siedlecki*, AMLR Cruise 8712, the bottom trawl 32/36, the fine-meshed sampler 0.505, sampler positions X,B,C).

Sta	Sampling time	Sampling depth range (m)	Volume sorted/ total (ml)	Abundance as numbers per hour fished						
				Nototheniidae	Notothenia larseni	Notothenia nudifrons	Notothenia gibberifrons	Pagothenia hansoni	Nototheniidae ind.	Channichthyidae
19	0620-0650	216-270	80/160							
20	0715-0745	136-166	70/140		440			156		
21	1035-1100	142-260	80		2					
22	1400-1430	139-153	5		370			128	16	
23	1620-1650	217-225	10/20							
24	2045-2115	118-149	140/280		98			26		
25	0245-0310	325-376	5							
26	0515-0545	219-227	80/160		24				8	
28	1240-1310	94-111	100/200		16	6	4			
29	1420-1450	124-174	80/160		28				8	
2P	2005-2055	168-205	30/60		7					
3P	2210-0030	266-300	130-260							
4P	0240-0340	129-164	50/100		10					
5P	0525-0825	124-244	na							
30	2245-2315	236-265	na		3					
34	1750-1820	187-216	485		1					
36	0545-0615	108-112	200/600		121			76		
38	1505-1535	230-290	70		2		5	2		
46	2025-2055	118-122	210		33		2	14		
68	1750-1815	137-150	350		15			2		
83	0045-0115	285-293	30							
87	0940-1000	157-160	na							
13P	1505-1540	302-319	75							
89	2235-2305	136-150	170		7					
95	1315-1345	217-220	170					1		
109	0135-0205	139-147	120		2					
110	0320-0340	169-198	120							
114	1820-1850	246-250	220							
115	2155-2225	201-227	245							
14P	2020-2150	244-267	320							
15P	0055-0230	122-228	25/140		353				4	
122	0905-0935	228-262	270						4	
124	1550-1620	262-265	160						2	

Table 3 (continued)

Abundance as numbers per hour fished															Total (number /hour)
Pseudochaenichthys georgianus	Chaenocephalus aceratus	Champsocephalus gunnari	Bathydraconidae	Psilodraco breviceps	Artedidraconidae	Artedidraco mirus	Myctophidae	Electrona antarctica	Paralepididae	Notolepis coatsi	Macrouridae	Macrourus whitsoni	Unidentified	
										4				4
										4			12	612
	2													4
														514
														0
								4						128
												2		2
														32
													8	34
4				28									8	76
														7
													2	2
														10
														0
		3												6
1													2	4
													91	288
													1	10
													15	64
	4			4		2							4	31
														0
														0
														0
1														8
2				1										4
		14												16
														0
														0
														0
	2													2
								7		4				368
2	4			2										12
														2

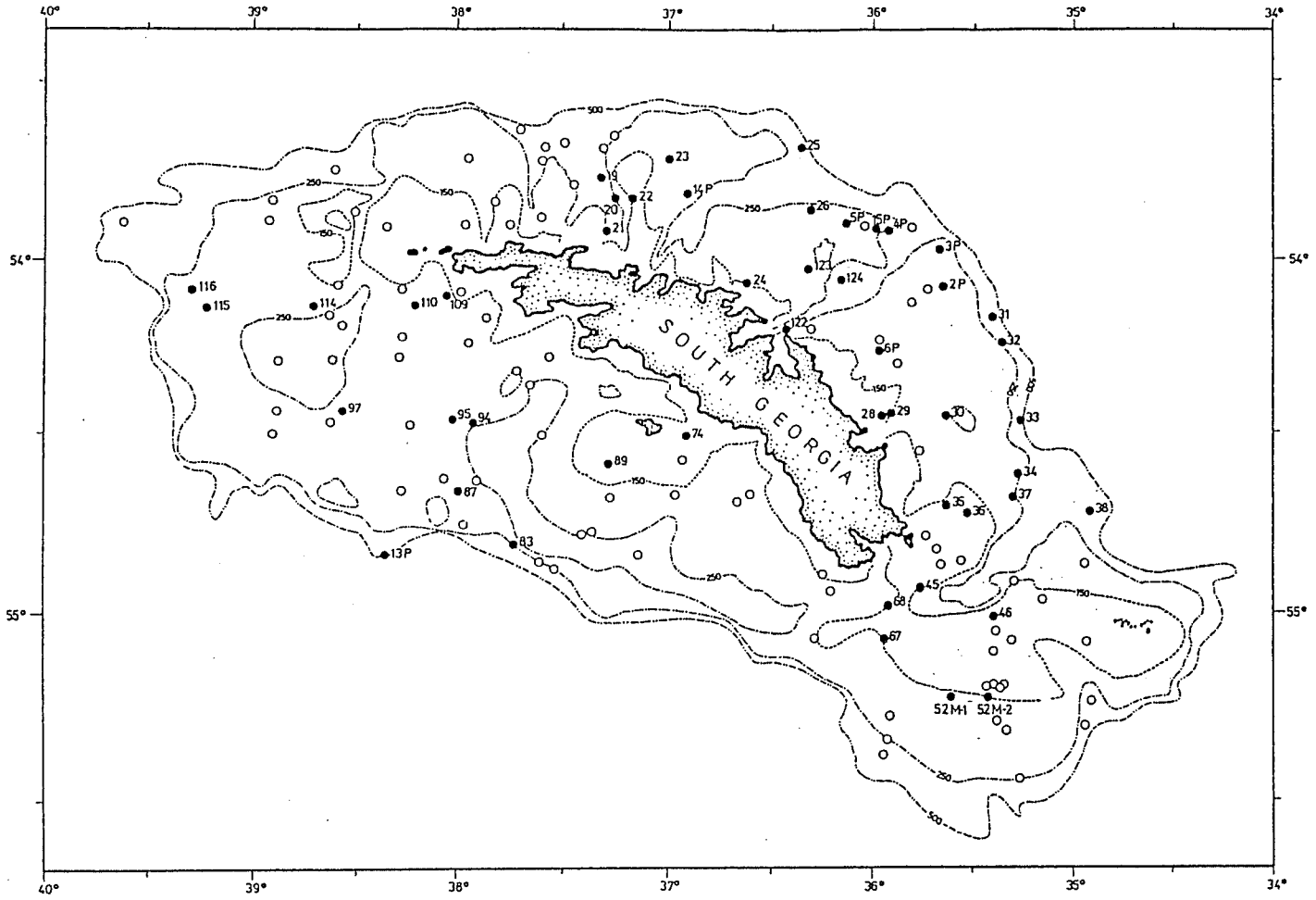

Figure 1: Trawling stations of RV *Professor Siedlecki* during US AMLR Program (18 December, 1987 to 10 January, 1988). Solid and numbered circles are hauls with fine-meshed samplers.

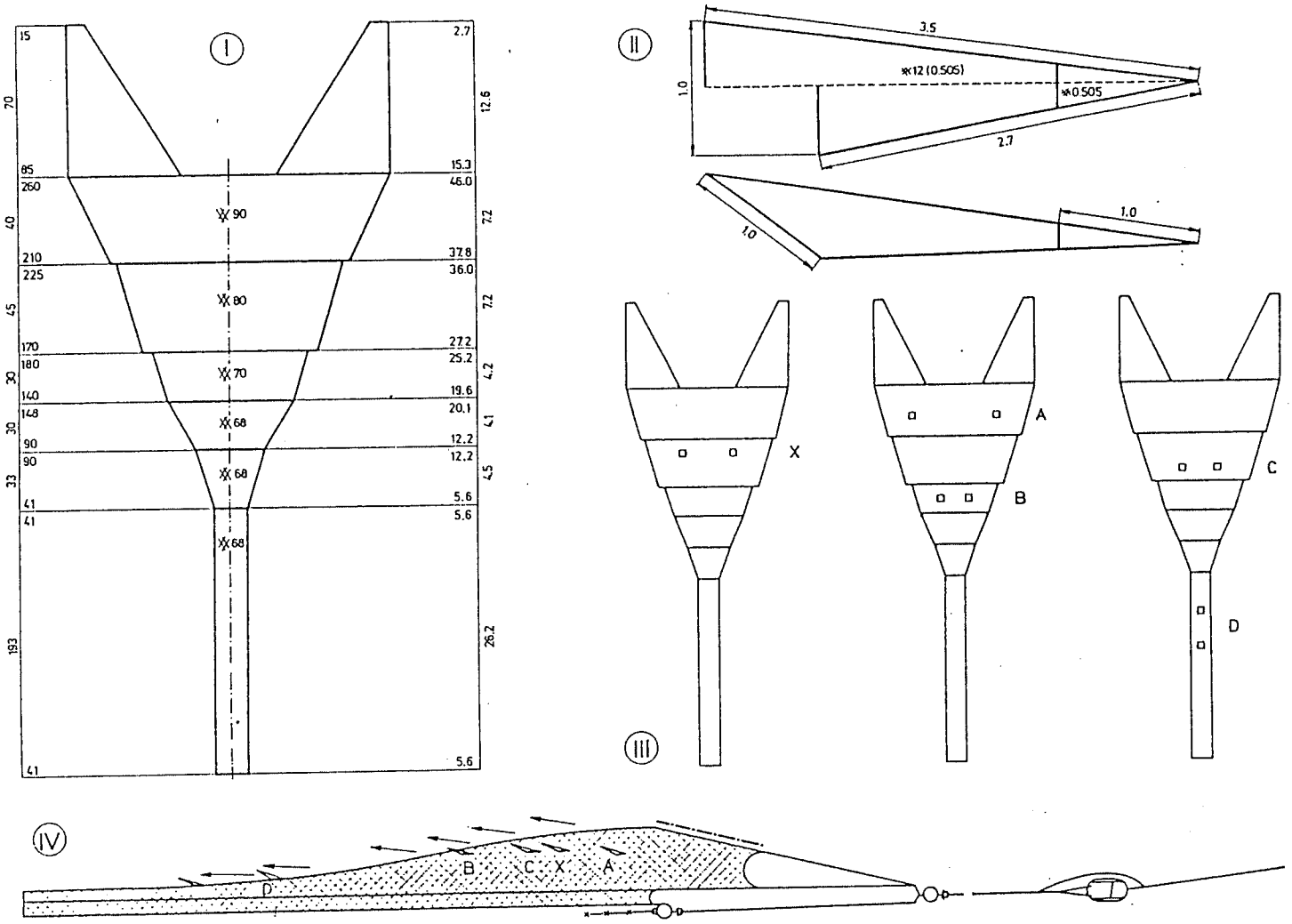

Figure 2: General layout of the bottom trawl 32/36 (I), the fine-meshed samplers (II) and their location on the topside of the trawl (III and IV).

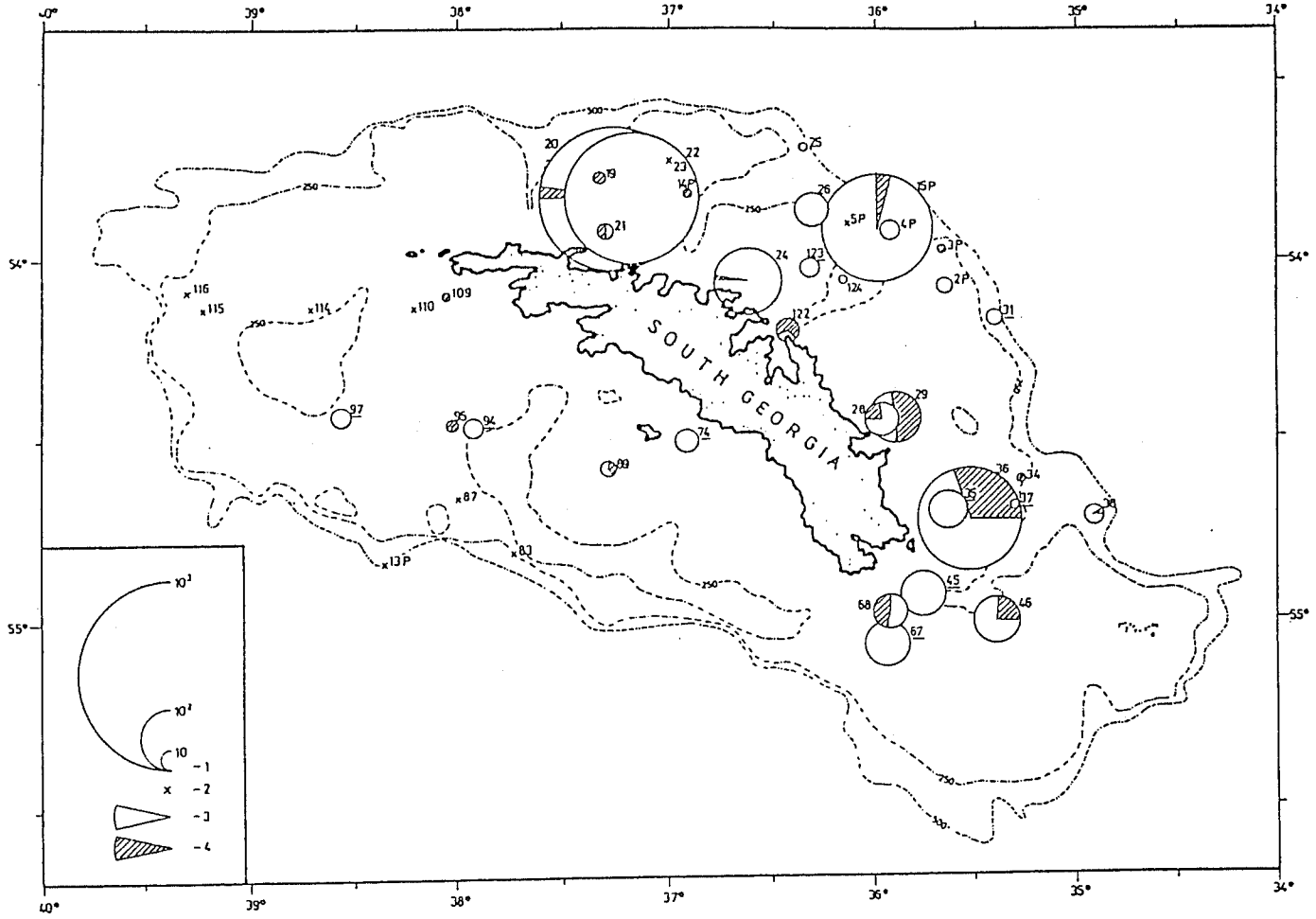

Figure 3: Distribution and abundance of postlarval Antarctic fish on the shelf of South Georgia (December-January 1987/88), 1 - number of fish captured per hour fished, 2 - hauls with no fish captured, 3 - *Nototheniidae*, 4 - other fish (see Table 3), station numbers underlined - samples sorted in USA

Légendes des tableaux

Tableau 1 — Indices d'abondance (nombres de larves par heure de pêche) et volume total (ml) des échantillons (larves de poissons, autre zooplancton et benthos) prélevés utilisant des échantillonneurs de divers maillages (12 mm, 12/0.505 mm, 0.505 mm).

Tableau 2 — Indices d'abondance (nombres de larves par heure de pêche) et volume total des échantillons (larves de poissons, autre zooplancton et benthos) pour des échantillonneurs de divers maillages (12 mm, 12/0.505 mm, 0.505 mm) attachés au chalut en divers positions (X, A, B, C, D).

Tableau 3 — Distribution et abondance de poissons à l'état post-larvaire et juvéniles sur le plateau continental de la Géorgie du Sud, du 18 décembre 1987 au 10 janvier 1988 (navire de recherche Professor Siedlecki, campagne d'étude AMLR 8712, chalut de fond 32/36, échantillonneur à maillage fin 0.505, positions d'échantillonneur X, B, C).

Légendes des figures

Figure 1 — Stations de chalutage du navire de recherche *Professor Siedlecki* au cours du Programme AMLR des Etats-Unis (du 18 décembre 1987 au 10 janvier 1988). Les cercles pleins et numérotés représentent les traits de chalut utilisant des échantillonneurs à maillage fin.

Figure 2 — Vue schématique générale du chalut de fond 32/36 (I), des échantillonneurs à maillage fin (II) et de leur emplacement au-dessus du chalut (III et IV).

Figure 3 — Distribution et abondance des poissons antarctiques à l'état post-larvaire sur le plateau de la Géorgie du Sud (décembre-janvier 1987/88). 1 - nombre de poissons capturés par heure de pêche, 2 - traits où aucun poisson n'a été capturé, 3 - *Nototheniidae*, 4 - autres poissons (voir le Tableau 3), numéros des stations soulignés - échantillons triés aux Etats-Unis.

Заголовки к таблицам

Таблица 1 — Индексы численности (количество личинок за час промысла) и общий объем (мл) проб (личинки рыбы, другой зоопланктон и бентос), собранных при использовании пробоотборников с разными размерами ячеи (12 мм, 12/0,505 мм, 0,505 мм).

Таблица 2 — Индексы численности (количество личинок за час промысла) и общий объем проб (личинки рыбы, другой зоопланктон и бентос), собранные при использовании пробоотборников с разными размерами ячеи (12 мм, 12/0,505 мм, 0,505 мм), прикрепленных к тралу в различных точках (X, A, B, C, D).

Таблица 3 — Распределение и численность рыбы на постличиночной стадии и молодей на материковом шельфе Южной Георгии, 18 декабря - 10 января 1988 г. (НИС "Профессор Седлецкий", рейс AMLR 8712, донный трал 32/36, мелкоячеистый пробоотборник с размером ячеи 0,505 мм, пробоотборники прикреплены в точках X, B, C).

Подписи к рисункам

Рисунок 1 Станции сбора проб тралом НИС "Профессор Седлецкий" в течение работы программы США по морским живым ресурсам Антарктики (US. AMLR) (18 декабря 1987 г. - 10 января 1988 г.). Заштрихованные и пронумерованные точки обозначают траления с использованием мелкоячеистых пробоотборников.

Рисунок 2 Общий чертеж донного трала 32/36 (I), мелкоячеистые пробоотборники (II) и их расположение в верхней части трала (III и V).

Рисунок 3 Распределение и численность ледяной рыбы на постличиночной стадии по шельфу у Южной Георгии (декабрь-январь 1987/1988 гг.). 1 - количество рыбы, пойманной за один час промысла, 2 - траления, за которые не поймано рыбы, 3 - *Nototheniidae*, 4 - другие виды рыбы (см. Таблицу 3), номера станций подчеркнуты - пробы были классифицированы в США.

Encabezamientos de las Tablas

Tabla 1 Indices de abundancia (número de larvas por hora de pesca) y volumen total (ml) de muestras (peces larvales, otros zooplancton y bentos) recolectados con muestreadores de distintos tamaños de malla (12 mm, 12/0.505 mm, 0.505 mm).

Tabla 2 Indices de abundancia (número de larvas por hora de pesca) y volumen total de muestras (peces larvales, otros zooplancton y bentos) para muestras con distintos tamaños de mallas (12 mm, 12/0.505 mm, 0.505 mm), fijados al arrastre en distintas posiciones (X, A, B, C, D).

Tabla 3 Distribución de peces postlarvales y juveniles en la plataforma continental de Georgia del Sur, 18 de diciembre de 1987 - 10 de enero de 1988 (B/I *Professor Siedlecki*. Crucero AMLR 8712, arrastre de fondo 32/36, muestreador de malla fina 0.505. posiciones del muestreador X, B, C).

Leyendas de las Figuras

Figura 1 Estaciones de arrastre del B/I *Professor Siedlecki* durante el Programa AMLR de los Estados Unidos (18 diciembre 1987 - 10 enero 1988). Los circulos sólidos numerados corresponden a los lances con muestreadores de malla fina.

Figura 2 Trazado completo del arrastre de fondo 32/36 (I), muestreadores de malla fina (II) y su posición en la parte superior del arrastre (III & IV).

Figura 3 Distribución y abundancia de los peces postlarvales antárticos en la plataforma de Georgia del Sur (diciembre-enero 1987/88). 1 - número de peces capturados por hora de pesca, 2 - lances sin captura, 3 - *Nototheniidae*, 4 - otros peces (véase tabla 3), se subraya los números de las estaciones - muestras clasificadas en los EE.UU.