PRELIMINARY RESULTS OF A BOTTOM TRAWL SURVEY AROUND ELEPHANT ISLAND IN OCTOBER AND DECEMBER 1987

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Abstract

A total of 40 bottom trawl hauls was carried out onboard RV *Polarstern* in October and December 1987. Preliminary results indicate rather stable stock compositions in *Chaenocephalus aceratus*, *Notothenia gibberifrons* and *N. neglecta* at least since February 1985. In *N. rossii* the proportion of larger (= older) fish in the catches increased. Composition of the catches of *C. gunnari* differed significantly from that in previous seasons which argues for an exchange with *C. gunnari* from other shelf areas of the Peninsula region.

Résumé

Un total de 40 traits de chalut de fond a été effectué à partir du navire de recherche *Polarstern* en octobre et décembre 1987. Les résultats préliminaires indiquent une composition plutôt stable des stocks de *Chaenocephalus aceratus*, *Notothenia gibberifrons* et *N. neglecta* au moins depuis février 1985. En ce qui concerne *N. rossii*, la proportion de poissons plus âgés dans les prises était en augmentation. La composition des prises de *C. gunnari* était nettement différente de celle des saisons précédentes, ce qui dénoterait un échange avec *C. gunnari* d'autres plateaux de la zone de la péninsule.

Резюме

В октябре и декабре 1987 г. НИС "Поларштерн" было произведено в общей сложности 40 тралений донным тралом. Предварительные данные показали довольно устойчивый, по крайней мере, с февраля 1985 г., состав запасов *Chaenocephalus aceratus, Notothenia gibberifrons* и *N. neglecta.* В уловах *N. rossii* увеличилась доля рыб большего размера (т.е. более старшей). Состав уловов *C. gunnari* сильно отличался от составов уловов в предыдущих сезонах, что является доводом в пользу той точки зрения, что имеет место обмен с запасами *C. gunnari* других участков шельфа в районе Антарктического полуострова.

Resumen

Se llevó a cabo un total de 40 lances de arrastre de fondo a bordo del B/I *Polarstern* en octubre y diciembre de 1987. Los resultados preliminares indican composiciones bastante estables en las poblaciones de *Chaenocephalus aceratus* , *Notothenia gibberifrons* y *Notothenia neglecta* por lo menos desde febrero de 1985. En *N. rossii* aumentó la proporción de peces de mayor tamaño (= de más edad). La

composición de las capturas de *C. gunnari* fue significativamente diferente a la de temporadas anteriores, lo cual indica un intercambio con *C. gunnari* de otras áreas de la plataforma de la región de la Península.

1. INTRODUCTION

Since 1975/76 the Federal Republic of Germany has been carrying out a long-term program to study the biology and dynamics of fishes around Elephant Island as well as their interactions with the environment and their trophic links with plankton and benthos. In the first years (1975/76, 1977/78, 1981) investigations focussed on the commercially exploitable species *Notothenia rossii, N. gibberifrons, Champsocephalus gunnari* and *Chaenocephalus aceratus*. During SIBEX in 1983 the program was extended to all fish species. Since then, surveys have been carried out in November 1983, February 1985, May/June 1986 and October and November 1987. Results of the surveys until 1986 have been described by Kock (1986) and Nast et al. (1988).

Results of the most recent survey in October and December 1987 are described as follows.

2. MATERIAL AND METHODS

Based on the stratification of the shelf by depth and fish abundance (Kock, 1986), 40 sampling stations were chosen randomly but restricted to areas where trawling conditions were moderate to good. Additionally 6 shallow water stations were carried out off the south coast of the island between Isla Rowett and Endurance Glacier.

From 28 October to 1 November and 13-16 December 1987, 21 and 19 hauls (Stat. Nos 67-89 and 218-236) were carried out by RV *Polarstern* using a 140' bottom trawl with a small meshed liner of 20 mm. Sampling depth varied from 65-458 m. Standard trawling time was 30 minutes. The location of fishing stations is set out in Figure 1.

The shallow water area southwest of Endurance Glacier was sampled by the launch *Polarfuchs* on 12 December 1987 using a 4 m beam trawl with a mesh size of 10 mm. Fishing depth varied from 10-60 m. Trawling time was 15 minutes.

Total length of the specimens sampled was measured to the nearest cm below. Age determinations in *Notothenia rossii* were carried out by means of scales following methods and results of Freytag (1980). Maturity stages were determined according to Everson's (1977) five-point-scale.

3. RESULTS

3.1 Catch Composition

A total of 40 species was present in the catches (Table 1). Except for *Akarotaxis nudiceps* (Bathydraconidae) and *Paraliparis sp.* (Liparididae) all had been reported on previous cruises (see Nast et al., 1988). The catch of a number of egg capsules of *Bathyraja sp.* (most probably *B. maccaini*) containing embryos close to hatching at 295-426 m depth (Stat. Nos. 234-236) is the first record of rajid egg capsules with developing embryos in the Peninsula region.

The 40 hauls yielded a total catch of 18.04 tonnes. The most abundant species in terms of biomass were *Notothenia gibberifrons* (57.7%), *Chaenocephalus aceratus* (17.1%), *Notothenia neglecta* (8.8% mainly in December), *Notothenia rossii* (5.4%, mainly in December) and *Champsocephalus gunnari* (5.2%).

The beam trawl catches in shallow waters were predominated by small *N. gibberifrons* (3-5 cm and 8-13 cm total length) which probably represent age classes

1+ and 2+. Other species present were *Harpagifer antarcticus*, 2 pelagic fingerlings of *N. neglecta* (62 and 70 mm total length) at 20 and 40 m depth, *Chaenocephalus aceratus, Trematomus* and *Parachaenichthys charcoti*.

3.2 Catches and Length (Age) Compositions of the Most Abundant Species

3.2.1 *Notothenia gibberifrons*

The species was present on all stations fished. Catches were mostly in the order of 50-250 kg. Catches of more than 1 000 kg were only obtained west of the island and northwest of Seal Rocks (Figure 2).

Catches consisted mostly of individuals of 22-45 cm length. Length compositions were very similar for both fishing campaigns (Figure 7). Gonads of adult fish were all in resting stage (stage 2).

3.2.2 *Chaenocephalus aceratus*

More than 70% of the catches contained less than 100 kg. Higher catches with a maximum of 407 kg were primarily taken northwest, north and northeast of Seal Rocks (Figure 3).

Fish of 10-70 cm were present in the catches. Individuals > 56 cm were exclusively females. The first 3 peaks in the length frequency composition (Figure 8) most probably represent age classes 1+, 2+ and 3+.

The shift in these peaks by about 2 cm within a 6 weeks period gives some indication on the growth performance in late spring/early summer. Gonads of sexually mature fish were all in stage 2.

3.2.3 *Notothenia neglecta*

Catches of *N. neglecta* exceeded 100 kg only twice, when 885 and 353 kg were taken northwest and east of Seal Rocks in December (Figure 4).

Length frequency composition was similar in October and December. The bulk of fish was 40-50 cm long (Figure 7).

More than 95% of the fish were sexually mature. Their gonads were all in resting stage.

3.2.4 *Notothenia rossii*

Notothenia rossii were only observed on 16 out of the 40 stations fished. Only single specimens were caught except in a haul off the north coast of the island where 858 kg were taken in December (Figure 5).

Fish of 43-59 cm predominated in the catches. They mostly belong to age classes 7 and 8 (Figure 8 and Table 2).

Females up to 50 cm were mostly juveniles. Larger females were mainly in stage 2. About 20% of the mature females had developing ovaries. Males were almost exclusively sexually mature. About 30% of them had developing testes.

3.2.5 *Champsocephalus gunnari*

Catches of *C. gunnari* rarely exceeded 50 kg. The maximum catch was 372 kg taken northwest of Seal Rocks in December (Figure 6), which consists almost exclusively of age class 1+ fish.

In October individuals of 26-32 cm predominated (Figure 7), which were also present in December. Then, however, the bulk of specimens was 11-14 cm long (Figure 7) and belonged to age class 1+.

Most of the fish were juveniles. Sexually mature fish were from 28 cm onwards. Nearly all gonads were in resting stage.

4. DISCUSSION

Elephant Island is an area where two ichthyofaunal groups mix: those with a lesser Antarctic or seasonal pack ice zone type of distribution and those with a greater Antarctic type of distribution. Species with a lesser Antarctic type of distribution which are represented by the genus *Notothenia* and the icefish *Chaenocephalus aceratus* and *Champsocephalus gunnari*, however, made up more than 98% of the catches (i.e. biomass).

Except for *Notothenia gibberifrons* catches of all species were in same order as during previous surveys, indicating little or no change in their biomass. Catches of *N. gibberifrons* were lower than during a previous survey in May/June 1986, when the species was found to form prespawning aggregations. This may have influenced the amount of catches.

Analysis of length frequency distributions indicate little or no changes in the stock compositions of *N. gibberifrons, Ch. aceratus* and *N. neglecta* since the previous survey in May/June 1986. Information on *N. rossii* which was the target species in the commercial fishery in 1979/80 (total catch: 18 753 tonnes) is based on only one haul and should thus be regarded with care. Since the previous surveys in 1985 and 1986 the proportion of individuals >50 cm has increased. Age classes 7+ and to a lesser extent 8+ predominated compared to 1985 and 1986 when age class 6+ was the most dominant in the catches. Length composition of *C. gunnari*, which was the target species in the fishery from 1978/79 to 1982/83, differed significantly from that in 1985 and 1986 arguing for an exchange with individuals from other shelf areas of the Peninsula region.

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FREYTAG, G. 1980. Length, age and growth of *Notothenia rossii marmorata* Fischer 1885 in the west Antarctic waters. Arch.FischWiss. 30(1): 39-66.

KOCK, K.-H. 1986. The state of exploited Antarctic fish stocks in the Scotia arc region during SIBEX (1983-1985). Arch.FischWiss. 37 (beih.1): 129-186.

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Table 1: List of fish species caught during *Polarstern* ANT VI/2 around Elephant Island

Nototheniidae

Dissostichus mawsoni
Pleuragramma antarcticum
Notothenia rossii marmorata
N. gibberifrons
N. neglecta
N. kempi
Nototheniops larseni
N. nudifrons
Trematomus eulepidotus
T. newnesi
Pagothenia bernacchii
P. hansoni

Harpagiferidae

Harpagifer antarctius

Muraenolepidae

Muraenolepis microps

Zoarcidae

Lycodichthys antarcticus
Ophthalmolycus amberensis (?)
Zoarcidae sp.

Trichiuridae

Paradiplospinus gracilis

Myctophidae

Electrona sp.
Gymnoscopelus nicholsi

Channichthyidae

Champsocephalus gunnari
Chaenocephalus aceratus
Chionodraco rastrospinosus
Cryodraco antarcticus
Chaenodraco wilsoni
Pseudochaenichthys georgianus
Neopagetopsis ionah
Pagetopsis macropterus

Bathydraconidae

Akarotaxis nudiceps
Parachaenichthys charcoti
Prionodraco evansii
Racovitzia glacialis
Gymnodraco acuticeps
Gerlachea australis

Rajidae

Bathraja eatonii
B. maccaini
B. species 2
Bathyraja sp. egg capsules

Liparididae

Paraliparis sp. 1
Paraliparis sp. 2

Paralepididae

Notolepis coatsi

Table 2: Age length of *Notothenia rossii marmorata* from Elephant Island in December 1987

length group (cm)	age class										
	5+	6+	7+	8+	9+	10+	11+	12+	13+	14+	15+
37	1										
38											
39	1										
40		2									
41			1								
42	1	1	4								
43		1	4								
44		3	9	1							
45		2	18	1							
46		3	22	3							
47		1	30								
48		2	35	1							
49		1	17	3							
50			15	6							
51			9	11	1						
52			4	11	1						
53			4	11	3						
54				2	4						
55				4	5	1					
56				1	4	1					
57				1	3	1					
58					3	2	1				
59					1	2					
60							2	1			
61											
62						1	2				
63											
64											
65											
66											
67											
68											
69											
70											
71											
72											1
n	3	16	172	56	25	8	5	1			1

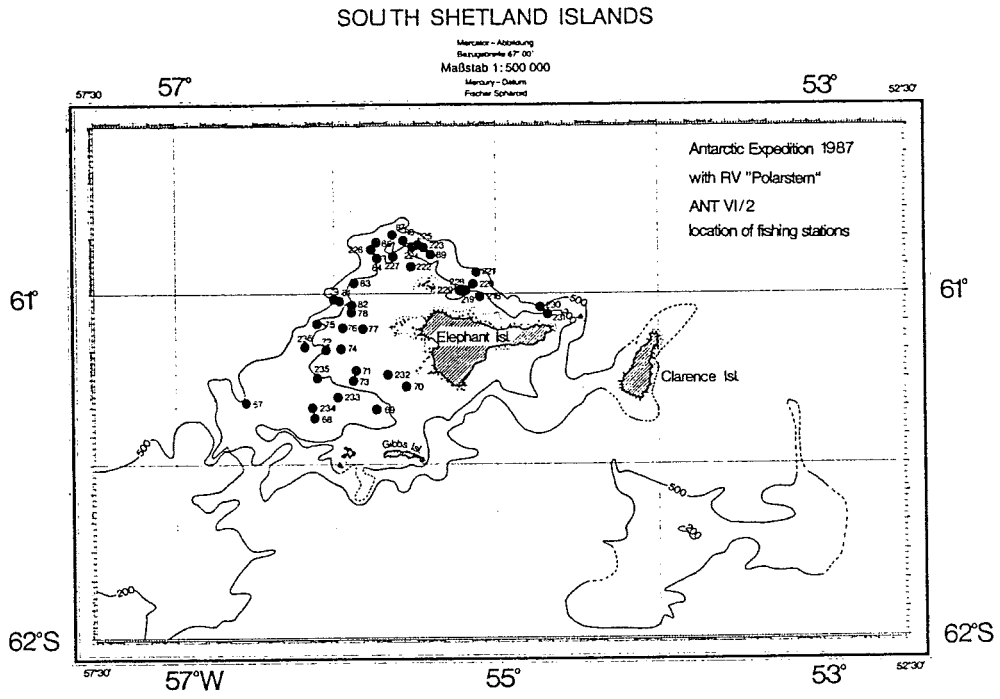

Figure 1: Location of fishing stations.

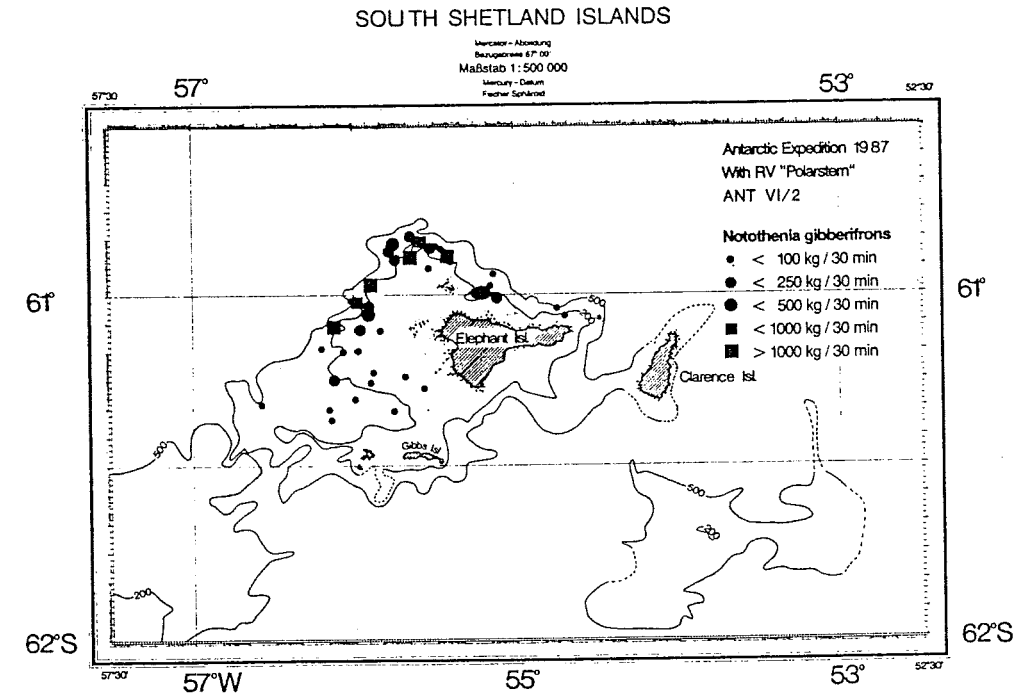

Figure 2: Catches of *Notothenia gibberifrons* around Elephant Island in October and December 1987.

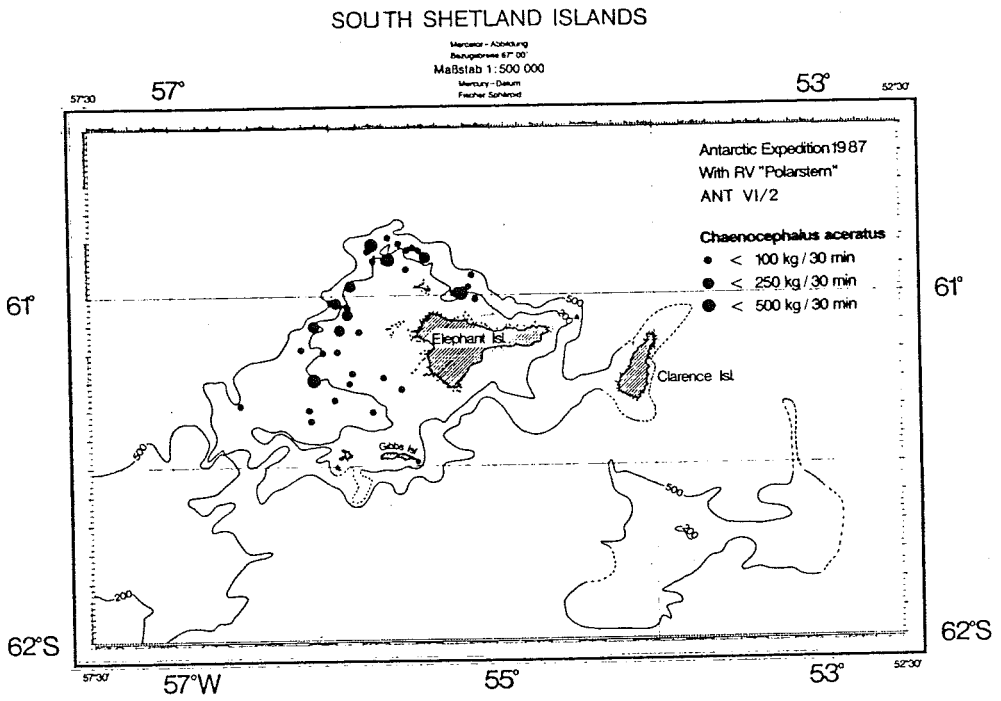

Figure 3: Catches of *Chaenocephalus aceratus* around Elephant Island in October and December 1987.

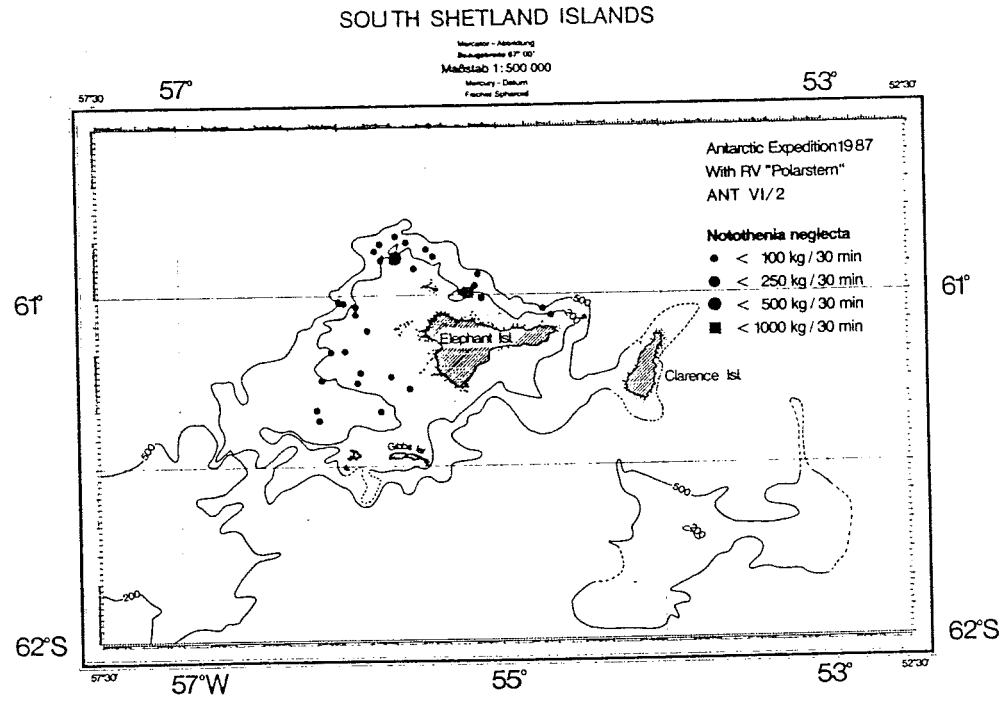

Figure 4: Catches of *Notothenia neglecta* around Elephant Island in October and December 1987.

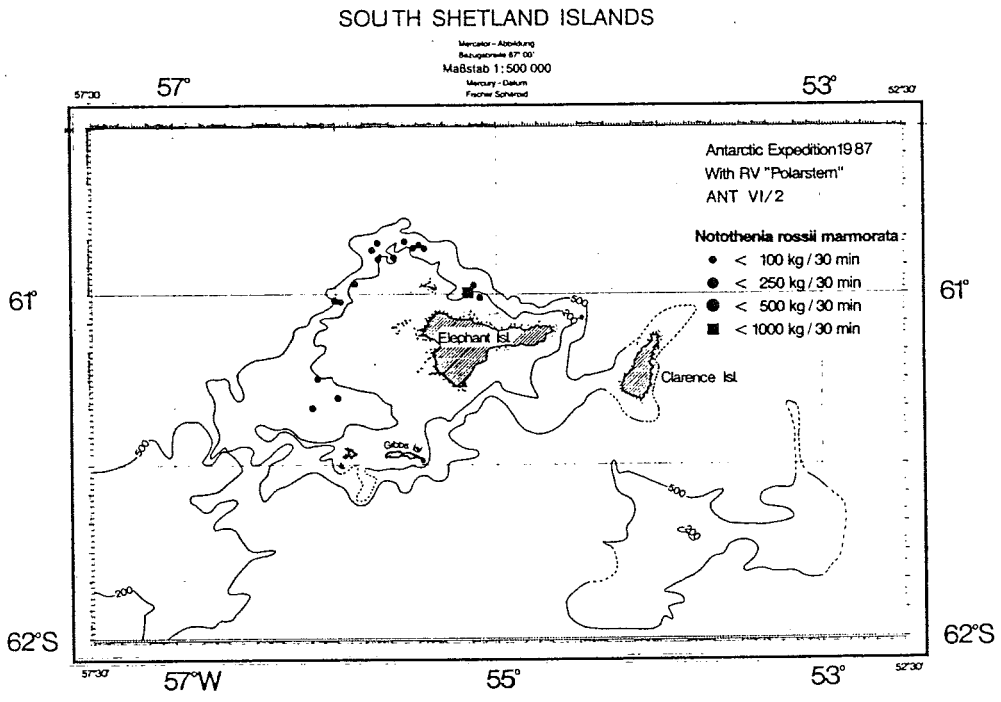

Figure 5: Catches of *Notothenia rossii* around Elephant Island in October and December 1987.

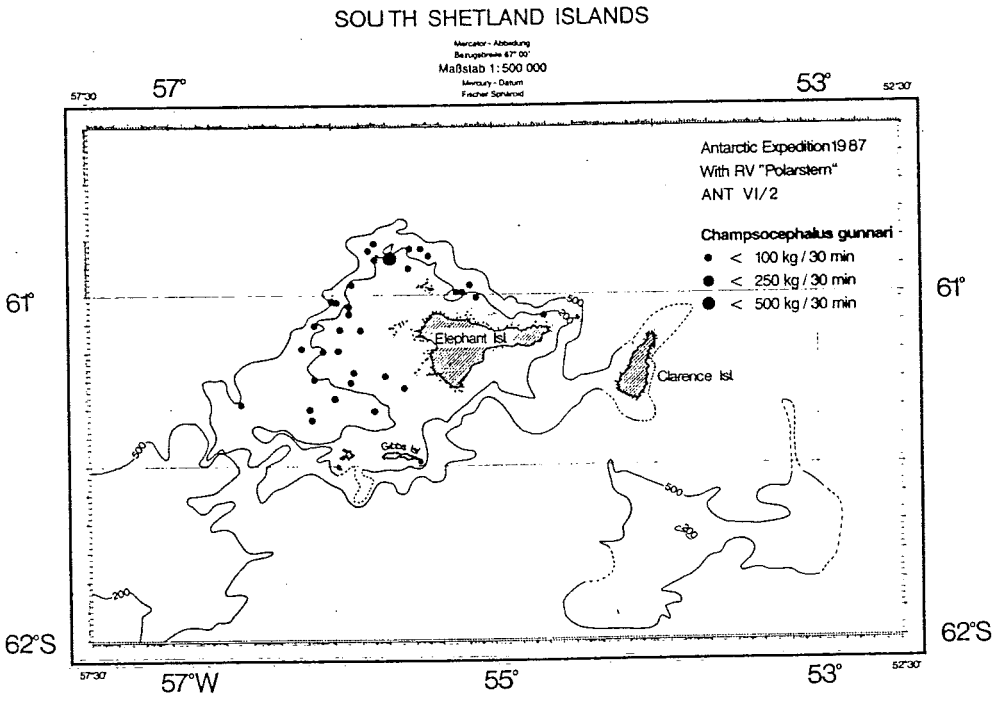

Figure 6: Catches of *Champsocephalus gunnari* around Elephant Island in October and December 1987.

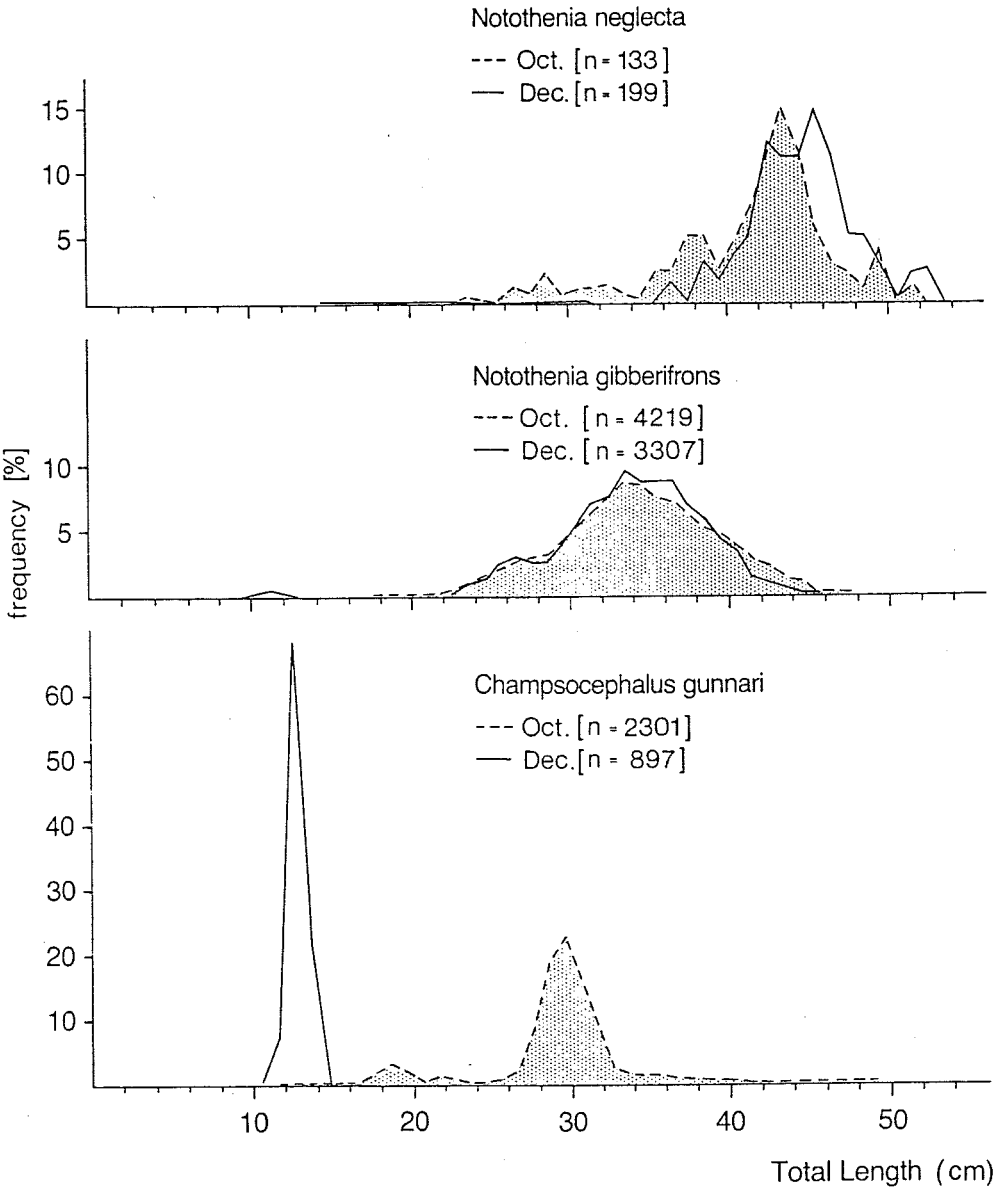

Figure 7: Length composition of *Champsocephalus gunnari, Notothenia gibberifrons* and *Notothenia neglecta* around Elephant Island in October and December 1987.

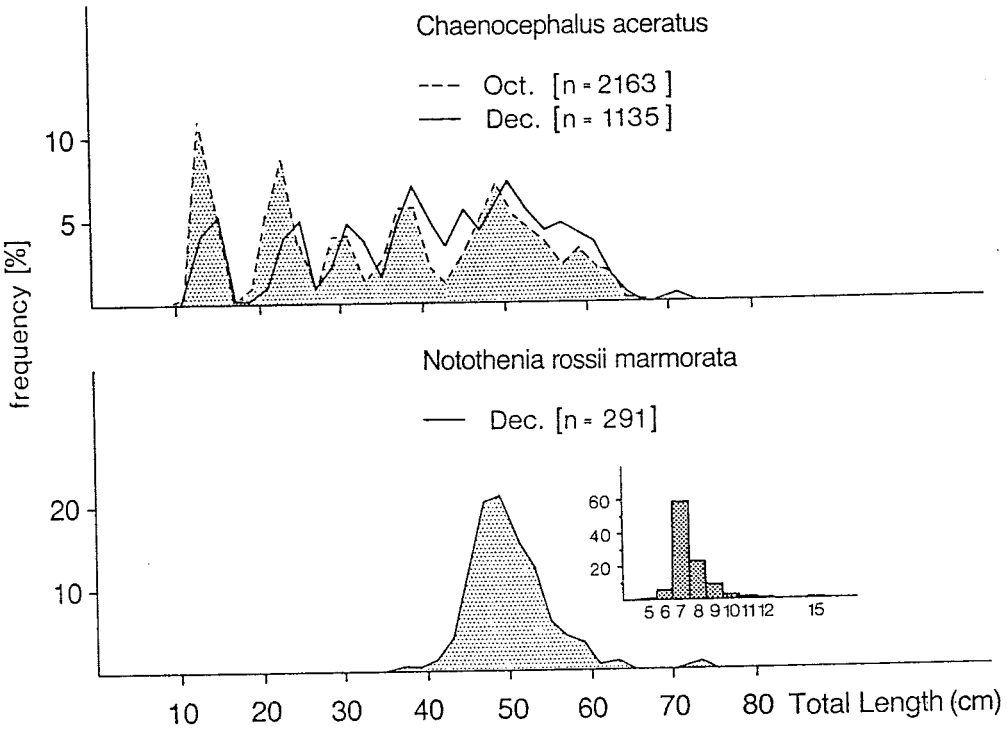

Figure 8: Length composition of *Notothenia rossii marmorata* and *Chaenocephalus aceratus* around Elephant Island in October and December 1987.

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Figure 6 — Prises de *Champsocephalus gunnari* autour de l'île de l'Eléphant aux mois d'octobre et décembre 1987.

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Figure 8 — Compositions en longueurs de *Notothenia rossii marmorata* et *Chaenocephalus aceratus* autour de l'île de l'Eléphant aux mois d'octobre et décembre 1987.

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