

POTENTIAL NURSERY AREAS FOR FISH IN THE PRYDZ BAY REGION

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Abstract

A survey with a fine-meshed midwater trawl in Prydz Bay in January/February 1991 indicated the potential for the shelf area of the Bay to be a nursery ground for nototheniid and channichthyid fish. Nearly all juvenile fish were caught in the top 50 m over the shelf, and more than 95% were *Pleuragramma antarcticum*. This species was abundant (up to 9 100 were caught in a 30 minute haul) especially near the shelf break. The dominant size class was of 45 mm standard length, which corresponds to an age of 1+. Nototheniids and channichthyid juveniles were much less common, and were found in the central and western parts of the shelf. Although no specific nursery grounds were identified, the whole of the Prydz Bay shelf area could be considered a nursery area.

Résumé

Une campagne d'évaluation effectuée dans la baie Prydz en janvier/février 1991 avec un chalut pélagique à maillage fin a indiqué la possibilité que la région du plateau de la baie soit une nurserie de poissons nototheniidés et channichthyidés. Presque tous les juvéniles de poissons, composés de plus de 95% de *Pleuragramma antarcticum*, ont été capturés dans les 50 m supérieurs, au-dessus du plateau. Cette espèce était abondante (un trait de 30 minutes a capturé jusqu'à 9 100 poissons), notamment à proximité de la bordure du plateau. La classe de taille dominante était celle de 45 mm de longueur standard, correspondant à un âge de 1+. Les juvéniles de nototheniidés et de channichthyidés étaient beaucoup moins souvent présents, sauf dans les secteurs central et occidental du plateau. Bien qu'aucune nurserie spécifique n'ait été identifiée, l'ensemble du plateau de la baie Prydz pourrait être considéré comme une zone de nurseries.

Резюме

Съемка мелкочейным разноглубинным тралом в заливе Прюдз в январе-феврале 1991 г. указала на то, что в шельфовом районе залива имеются условия для откорма семейств нототениевых и белокровных рыб. Почти все неполовозрелые особи были выловлены в верхних 50 метрах над шельфом, и более чем 95% являлись *Pleuragramma antarcticum*. Рыбы этого вида преобладали в особенности вблизи границы шельфа (около 9 100 было выловлено за 30 минутное траление). Доминирующий размерный класс составлял 45 мм. стандартной длины, что соответствует возрасту 1+. Неполовозрелые нототениевые и белокровные встречались гораздо реже, и были обнаружены в

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центральной и западной частях шельфа. Несмотря на то, что специфические участки откорма не были идентифицированы, вся шельфовая площадь залива Прудз может считаться участком откорма.

Resumen

De un estudio realizado con una red de arrastre pelágico con una luz de malla muy fina en la zona de la plataforma de la bahía de Prydz, en enero/febrero de 1991, se desprende el potencial de la bahía para constituirse en una zona de cría para nototénidos y caenictidos. Casi todos los juveniles fueron pescados en los 50 m superiores de la plataforma y más del 95% fue *Pleuragramma antarcticum*. Esta especie fue muy abundante (se pescaron hasta 9 100 ejemplares en un arrastre de 30 minutos), especialmente cerca del borde de la plataforma. La clase dominante fue de 45 mm de talla, lo que corresponde a la edad 1+. Mucho menos comunes resultaron los nototénidos y caenictidos juveniles en la zona central y occidental de la plataforma. Aunque no se identificaron zonas específicas de cría, toda la zona de la plataforma de la bahía de Prydz se podría considerar como una zona de cría.

1. INTRODUCTION

As a result of debate on the potential of a significant by-catch of juvenile fish in krill fishing operations, the Scientific Committee for the Conservation of Antarctic Marine Living Resources (SC-CAMLR, 1990) agreed that nursery grounds for fish should be identified as a matter of priority and the topic discussed by the Working Group on Fish Stock Assessment.

In the 1990/91 season, Australia conducted a survey of the pelagic fishes of the Prydz Bay region using equipment with sufficiently fine meshes to sample larval and juvenile fish. While not sufficient unequivocally to identify nursery areas as such, the results of this survey do indicate the areas of highest young fish abundance and thus those to be avoided by krill fishing operations if fish by-catch is to be minimised.

2. MATERIALS AND METHODS

The Prydz Bay region was surveyed in using an International Young Gadoid Pelagic Trawl (IYGPT). This has a headline length of 20 m, and a mesh size of 15 cm in the wings and mouth area and 2 mm in the codend. Behaviour of the net while fishing was monitored with a SIMRAD trawl surveillance sonar, allowing real time measurement of the effective mouth area, and hence volume filtered. Mouth opening averaged 11 to 12 m wide by 7 to 8 m high, and nets were towed at fishing depth for a standard haul duration of 30 minutes at 3 knots, giving a volume of water filtered per haul in the vicinity of 233 000 m³. Stations were planned at 30 mile intervals covering the entire shelf area of Prydz Bay, the banks to the west as far as Scullin Monolith, and along some transects offshore from the shelf break. Most stations were successfully sampled (Figure 1), with the exception of a few in the southeast and east side of the Bay, where ice prevented fishing, and a western transect had to be slightly displaced to avoid ice. At each station, hauls were made at three depths: at 30 to 50 m depth, approximately midway between surface and bottom, and at approximately 30 m above the bottom. Figure 1 shows the sampling sites.

3. RESULTS

Nearly all the juvenile fish were caught in the near surface trawls (30 to 50 m depth), so these trawls alone will be analysed. *Pleuragramma antarcticum* constituted the great majority of the catch, with various channichthyid and nototheniid species making up the rest. Because of some difficulties in identification of small larvae and the low numbers of Channichthyidae and Nototheniidae (excluding *P. antarcticum*), these families are treated as a whole and not subdivided into species.

Figure 2 shows the catches of *P. antarcticum* in the near surface hauls. Large numbers (up to 9100/30 min haul) occur in the central part of the bay, especially near the shelf break and some distance offshore from it, but the southern, eastern and western margins had low or zero catches. The length frequency distribution (Figure 3) shows a major mode at 45 mm, with subsidiary modes at 15 mm and 70 mm. These size modes correspond reasonably well with the 0+, 1+ and 2+ year groups established by Hubold and Ekau (1986) for *P. antarcticum* in the Weddell Sea.

Other Nototheniidae (mainly comprising *Trematomus* spp.) were widespread but not numerous, except in one station near the shelf edge at the eastern side of the bay (Figure 4). A wide range of lengths were caught, mostly between 35 mm and 100 mm SL (Figure 5).

Channichthyid juveniles were more abundant than nototheniids, but still far less numerous than *P. antarcticum* (Figure 6). They were mostly found in the central and western parts of the bay, but rarely near the edge of the continental shelf or beyond it. A wide range of sizes up to 120 mm SL were caught (Figure 7), and surprisingly for a mixed group of species there are two distinct size groups.

4. DISCUSSION

It is clear that nearly all juvenile fish caught in the Prydz Bay region are associated with the continental shelf zone. These fish belong to the typically shelf dwelling families Nototheniidae and Channichthyidae. Extremely few larvae or juveniles were caught of the typically oceanic families Myctophidae and Paralepididae, although adults and subadults were common, especially in the deeper hauls beyond the continental shelf edge.

Between the three major groups, the whole of the shelf zone is utilised, with *P. antarcticum* mostly in the region of the shelf break, which includes a zone to seaward of the continental slope, and channichthyids being more confined to the central part of the shelf, away from the shelf edge. The single significant occurrence of nototheniid larvae was in the region of the shelf break.

Although these data do not identify nursery areas in the strict sense of the word, i.e. a discrete where fish are spawned or where young fish congregate to feed, there is some justification for considering the whole shelf region in the area studied as a nursery area. Catches of *P. antarcticum* are high in the shelf break area, and while channichthyid catches are much lower, it should be remembered that channichthyids are larger, probably slower to mature and less fecund than *P. antarcticum*, and so a lower juvenile mortality could still have a significant effect on the population. The Prydz Bay shelf is much wider than in most Antarctic localities, and the concentration of channichthyid larvae further south than the coastline allows in most places may imply that this area is a breeding ground from which fish ultimately disperse to neighbouring shelf areas.

There are no fine-scale data for the krill fishery that took place in the Prydz Bay area in the early 1980s, but if it followed apparent normal practice elsewhere, it probably concentrated

on the region on both sides of the shelf break. Krill fisheries almost exclusively exploit the upper 100 m of the water column, so these fish data are relevant to the potential impact of a krill fishery.

Such a krill fishery would be likely to have a large by-catch of *P. antarcticum*, as it would almost exactly overlap the main area of this species' abundance. There is likely also to be a significant effect on the juvenile channichthyids, especially if the fishery extended further on to the shelf.

REFERENCES

- HUBOLD, G. and W. EKAU. 1986. On the midwater fish fauna of the Weddell Sea, Antarctica. *Proc. V Congr. Europ. Ichthyol. Stockholm*, 1985: 391-396.
- SC-CAMLR, 1990. *Report of the Ninth Meeting of the Scientific Committee (SC-CAMLR-IX)*. CCAMLR, Hobart, Australia: 345 pp.

IYGPT STATIONS

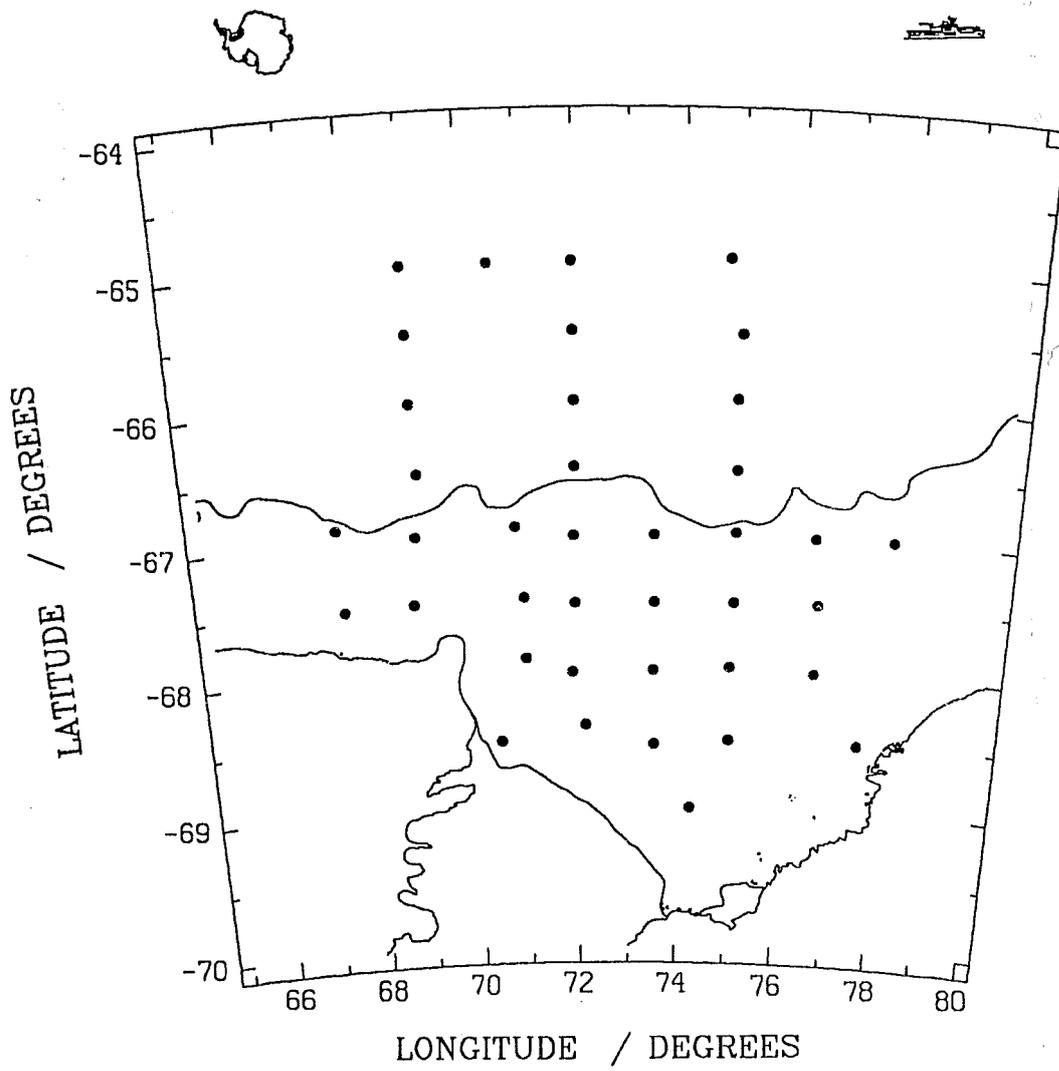


Figure 1: Map of sampling localities in Prydz Bay.

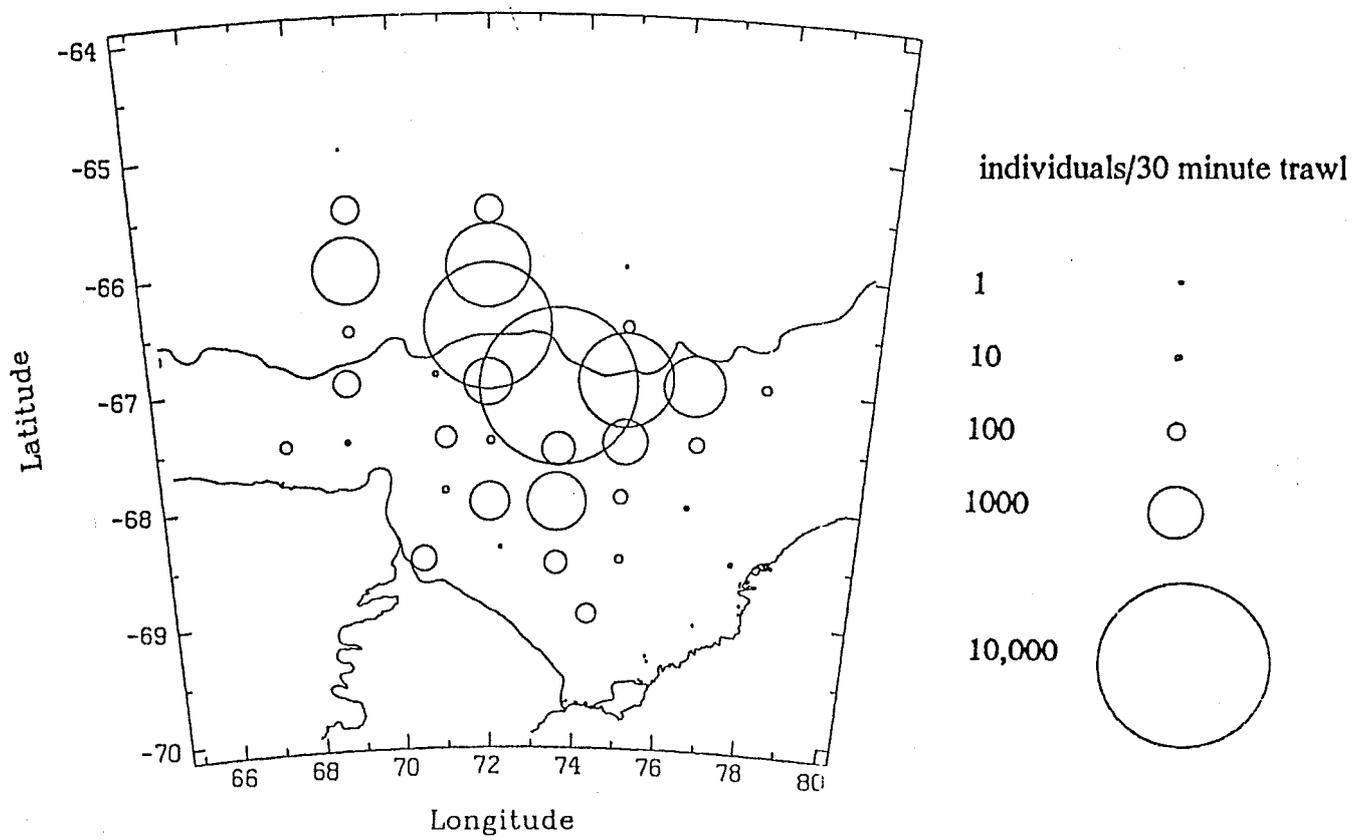


Figure 2: Catches of *P. antarcticum* juveniles.

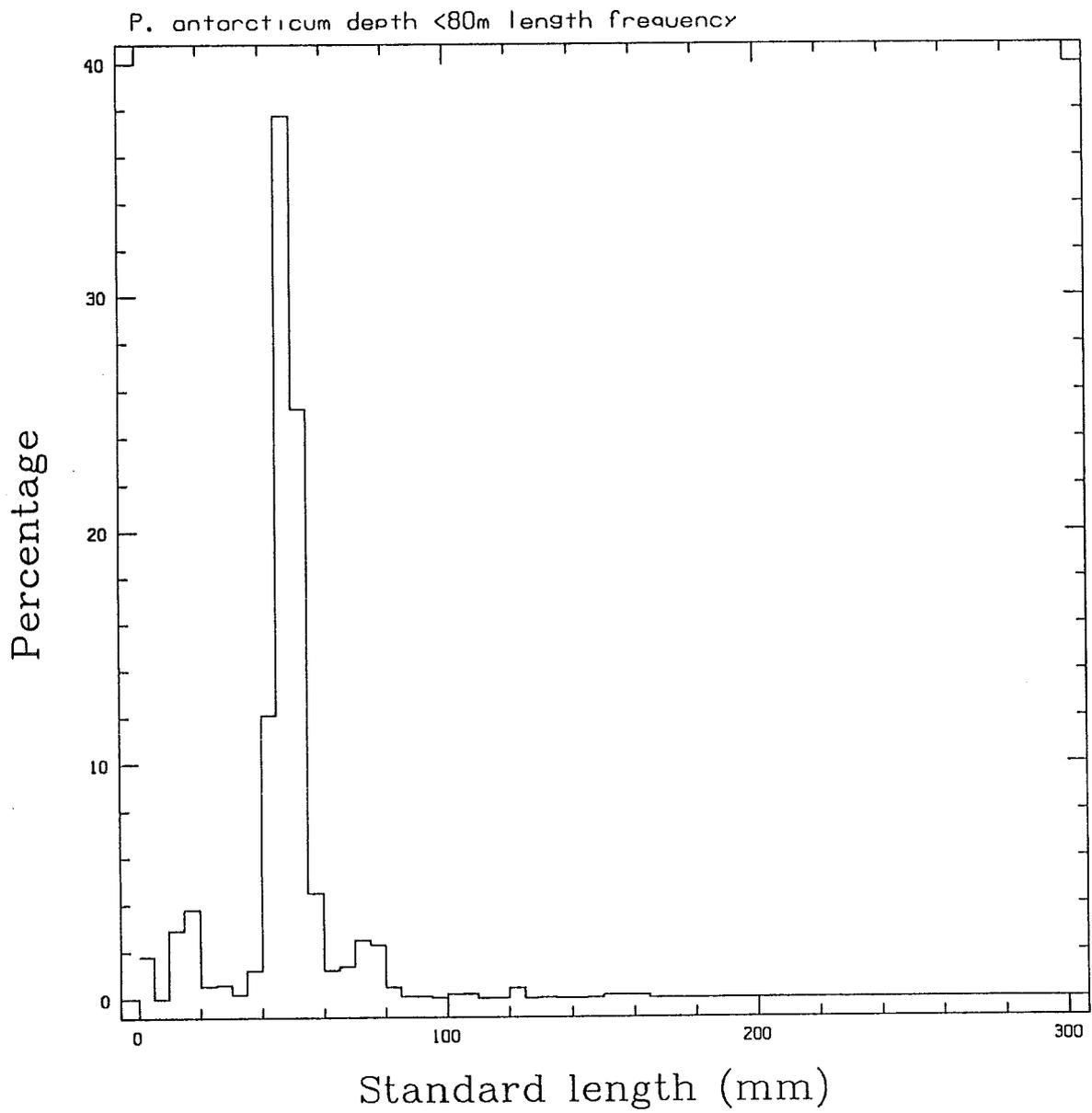


Figure 3: Length frequency of *P. antarcticum* catches.

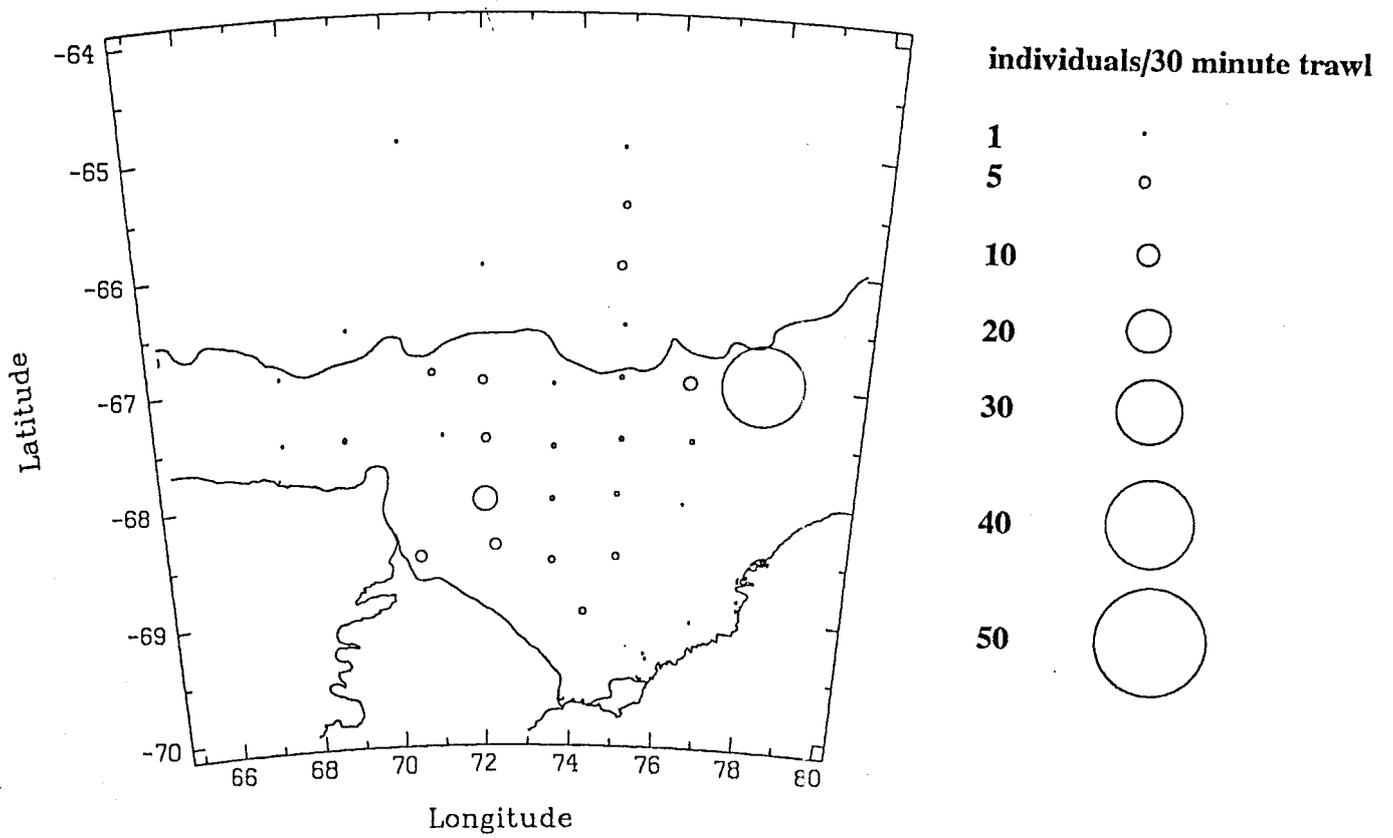


Figure 4: Catches of Nototheniidae (excluding *P. antarcticum*) juveniles.

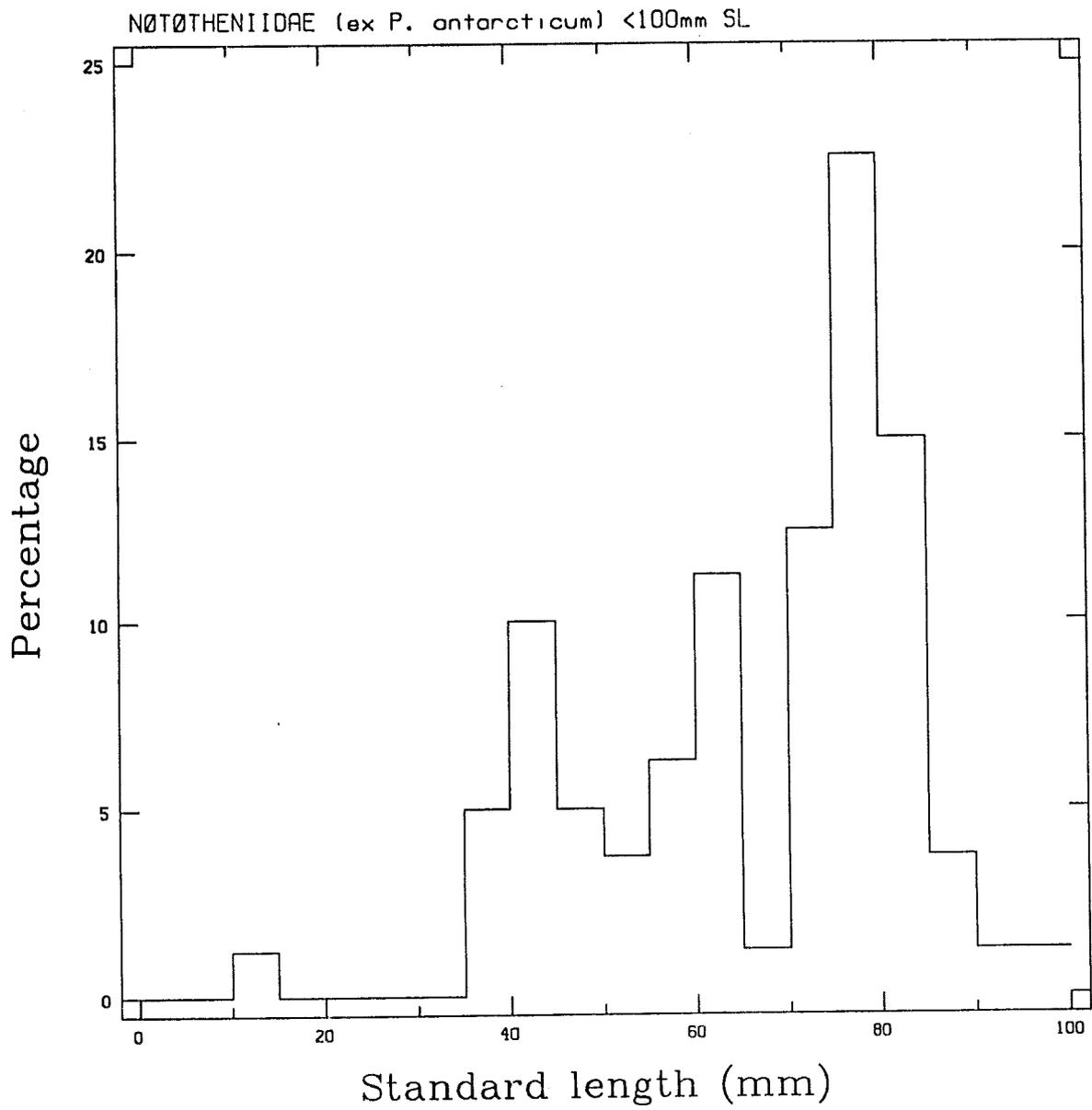


Figure 5: Length frequency of Nototheniidae (excluding *P. antarcticum*) catches.

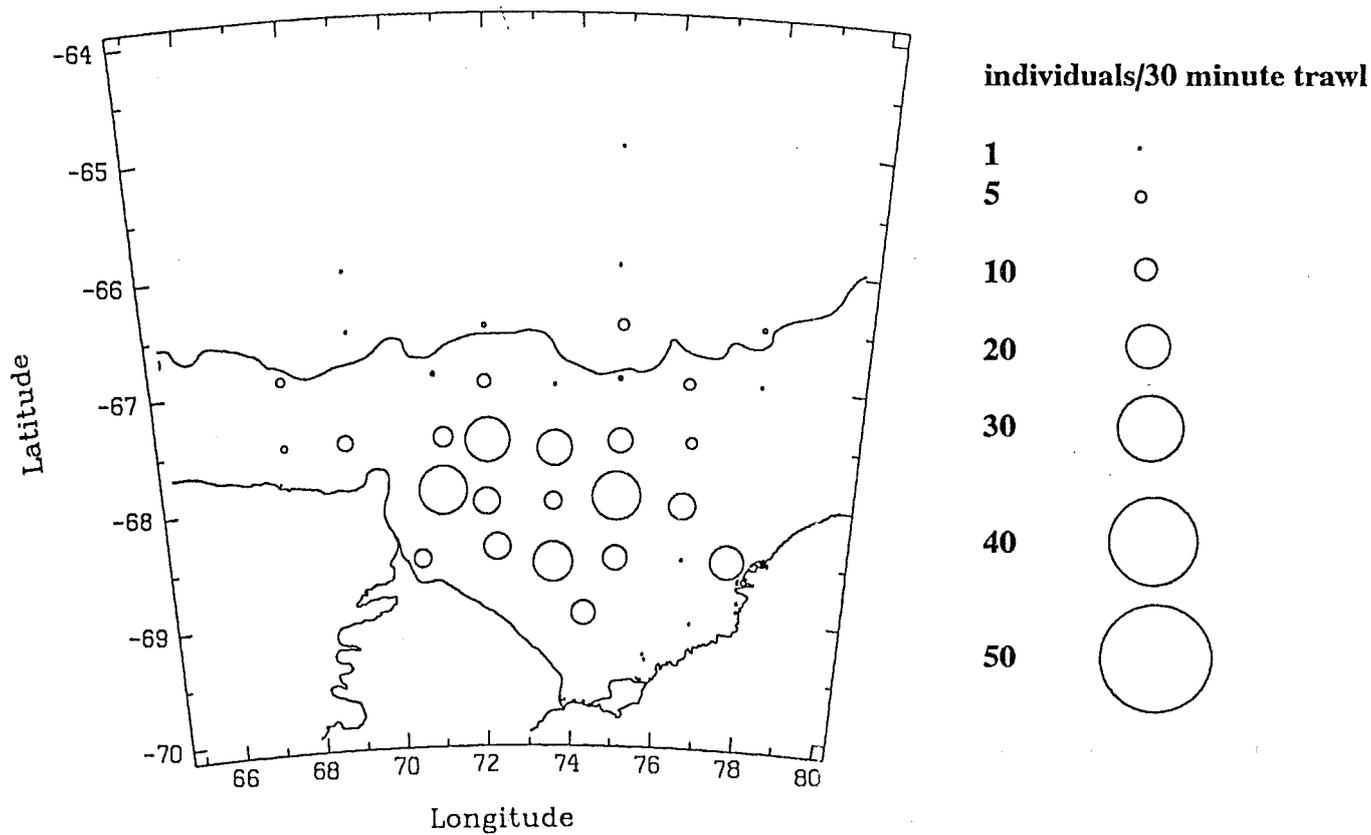


Figure 6: Catches of Channichthyidae juveniles.

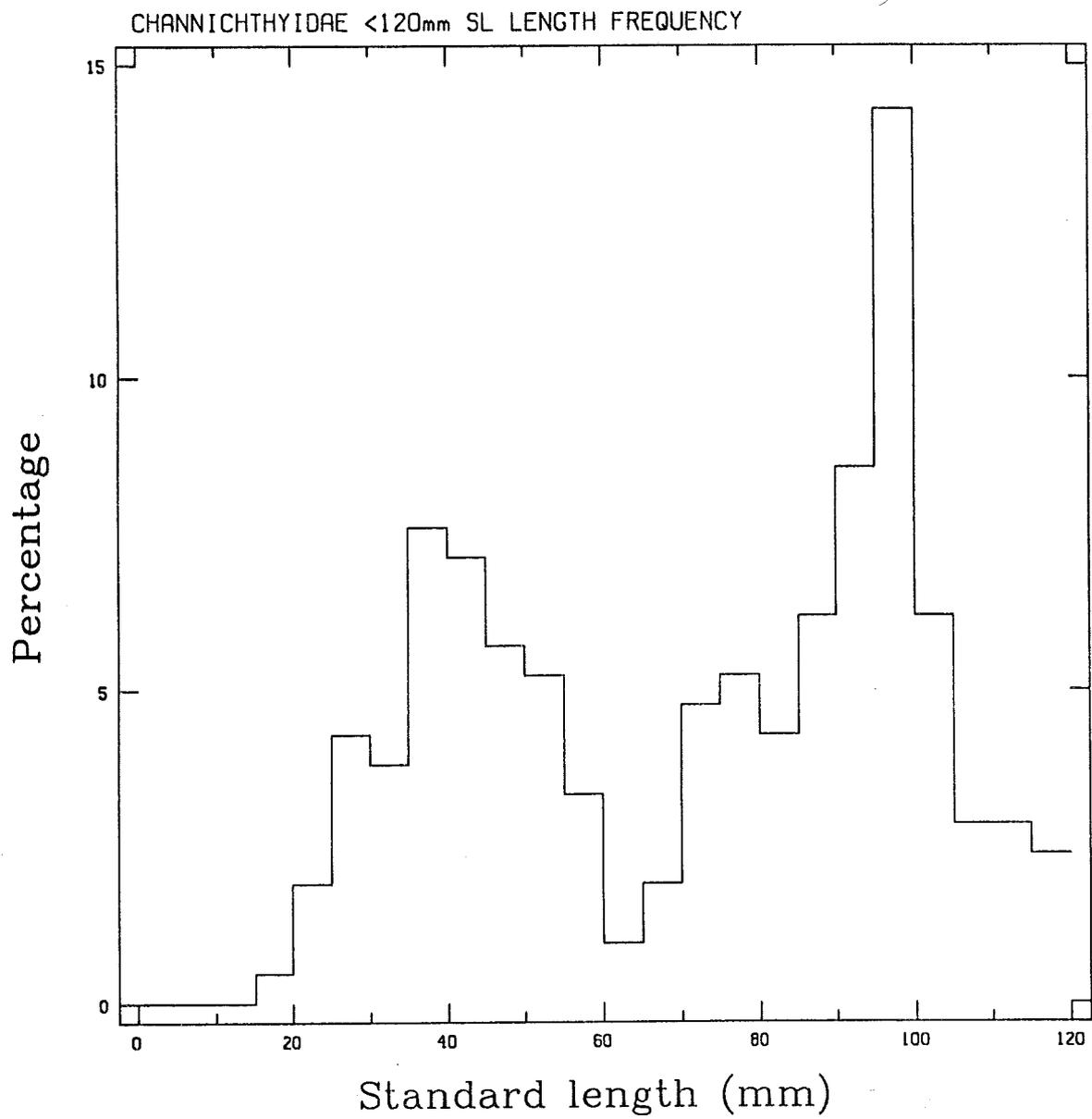


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