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DISTRIBUTION AND RELATIVE ABUNDANCE OF JUVENILE ICEFISH (CHAMPSOCEPHALUS GUNNARI) FROM A TRAWL SURVEY OF THE SOUTH GEORGIA SHELF IN JUNE-JULY 1985

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Abstract

A trawl survey of the distribution and relative abundance of juvenile icefish (Chamsocephalus gunnari) in South Georgia waters was carried out in June-July 1985. Shelf and slope areas extending from the 12 Nautical mile protected zone around South Georgia to the 500 m isobath were sampled with a specially designed juvenile trawl of 13.6 m. The size range of juvenile icefish collected was 82-146 mm. Catches were the highest in the west, south and south-east shelf areas and the greatest abundance was found in shallow waters of 100-200 m depth. A typical pattern of diurnal vertical migration of fish was observed. To obtain a more complete data set, it is recommended that future surveys should cover shallower water areas, including areas within the 12 Nmile zone.

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REPARTITION ET ABONDANCE RELATIVE DES POISSONS DES GLACES (CHAMPSOCEPHALUS GUNNARI) JUVENILES A PARTIR D'UNE ETUDE AU CHALUT SUR LE PLATEAU DE LA GEORGIE DU SUD EN JUIN-JUILLET 1985

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Résumé

Une étude au chalut sur la répartition et l'abondance relative des poissons des glaces (Champsocephalus gunnari) juveniles a été menée en Géorgie du Sud en juin-juillet 1985. Des échantillons ont été prélevés dans des zones de plateau et de pentes s'étendant de la zone protégée de 12 milles marins au large de la Géorgie du Sud jusqu'à l'isobathe de 500 m au moyen d'un chalut de 13,6 m spécialement conçu pour capturer les juvéniles. Les jeunes poissons des glaces capturés mesuraient entre 82 et 146 mm. C'est dans les zones ouest, sud et sud-est du plateau que les prises ont été les plus importantes et la plus grande abondance de poissons se trouvait dans les eaux peu profondes entre 100 et 200 mètres. Un modèle typique de migration verticale diurne des poissons a été observé. Pour

obtenir une série de données plus complète, il est recommandé que les études ultérieures soient menées dans les zones d'eaux moins profondes, y compris celles qui se trouvent dans la zone de 12 milles marins.

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DISTRIBUCION Y ABUNDANCIA RELATIVA DEL PEZ DE HIELO JUVENIL (CHAMPSOCEPHALUS GUNNARI) SEGUN UNA PROSPECCION DE ARRASTRE EN LA PLATAFORMA DE GEORGIA DEL SUR EN JUNIO-JULIO DE 1985

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Resumen

Una prospección de arrastre de la distribución y abundancia relativa del pez de hielo juvenil (Champsocephalus gunnari) en las aguas de Georgia del Sur se llevó a cabo en junio-julio de 1985. Las áreas de la plataforma y de pendiente que se extienden desde la zona protegida de 12 millas náuticas alrededor de Georgia del Sur hasta las isóbatas de 500 m, fueron muestreadas con una red especialmente diseñada para arrastre de peces juveniles de 13.6 m. La fluctuación de tamaños de los peces de hielo juveniles recolectados fue de 82-146 mm. Las mayores capturas fueron en el oeste, al sur y sureste de las áreas de la plataforma, y la mayor abundancia fue encontrada en aguas poco profundas de 100 a 200 m de profundidad. Se observó un modelo típico de migración diurna vertical de peces. Para obtener un conjunto de datos más completo, se recomienda que las prospecciones futuras deberían cubrir áreas de aguas menos profundas, incluyendo áreas dentro de la zona de las 12 millas náuticas.

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РАСПРЕДЕЛЕНИЕ И ОТНОСИТЕЛЬНАЯ ЧИСЛЕННОСТЬ МОЛОДИ БЕЛОКРОВНОЙ РЫБЫ (CHAMPSOCEPHALUS GUNNARI) ПО РЕЗУЛЬТАТАМ ТРАЛОВЫХ СЪЕМОК В ШЕЛЬФОВЫХ ВОДАХ ЮЖНОЙ ГЕОРГИИ В ИЮНЕ-ИЮЛЕ 1985 г.

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Резюме

Траловое обследование распределения и относительной численности молоди белокровной рыбы (Champsocephalus gunnari) в водах Южной Георгии проводилось в июне-июле 1985 г. В районах шельфа и склона, выступающих за пределы охраняемой 12-мильной зоны вокруг Южной Георгии до 500-метровой изобаты, брались пробы тралом размером в 13,6 м, специально сконструированным для ловли молоди. Размеры выловленных молодых особей белокровной рыбы были в пределах 82-146 мм. Наибольшие уловы были взяты в западном, южном и юго-восточном участках шельфа, а наибольшая численность была обнаружена на мелководье глубиной в 100-200 м. Наблюдалась типичная картина дневной вертикальной миграции рыбы. Для получения более полного набора данных рекомендуется, чтобы в будущем съемки проводились на мелководных участках, включая участки внутри 12-мильной зоны.

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DISTRIBUTION AND RELATIVE ABUNDANCE OF JUVENILE ICEFISH (CHAMPSOCEPHALUS GUNNARI) FROM A TRAWL SURVEY OF THE SOUTH GEORGIA SHELF IN JUNE-JULY 1985

Mackerel icefish is one of the major fish species in the waters of South Georgia. The first survey of distribution and abundance of juvenile (0-group) mackerel icefish was conducted by AtlantNIRO in 1985.

MATERIALS AND METHODS

A trawl survey was conducted from 28 June to 13 July 1985. The South Georgian shelf and slope area was divided into 28 zones (strata) with depth ranges of 100-200 m, 200-300 m and 300-500 m. Tow numbers in each stratum* were defined proportionally to the stratum area (approximately one tow per 100 square miles) but not less than two. During the survey the Soviet 13.6 m Juvenile Trawl (designed in AtlantNIRO) was employed. This trawl is made of kapron fibre netting with 20-45 mm mesh size with an inside liner of 5 mm mesh size inserted into the codend. The horizontal opening of the trawl was 8 m; the vertical opening was 6 m. The area covered in 30 minutes was 0.004416 square miles. Fishing operations were made on a 24 hour basis; stations were chosen randomly within the following depth zones : near-bottom (2-5 m off the sea-bed), mid-water and near surface. The duration of each haul was 10 minutes at a towing speed of 3.5 knots. An echo depth-sounder was attached to the headline for monitoring and controlling the trawl movement at different depths.

The shelf and slope area between the 12 Nmile protected zone and 500-m isobath was sampled by trawls. 75 hauls were made and a 24 hour station at one location was sampled with 16 tows.

* the term "stratum" refers to the shelf zone of approximately the same depth

Juvenile mackerel icefish abundance indices were calculated by the formula :

$$\bar{Y}_{st} = \frac{\Sigma N_h \cdot \bar{Y}_h}{N} ,$$

where $\bar{Y}_h$ = mean (in numbers) in h stratum
N_h = h stratum area
N = total strata area
$\bar{Y}_{st}$ = abundance index

This formula was used to calculate abundance indices of mackerel icefish both for different depth zones and for the survey as a whole.

Juveniles of 82 to 146 mm length, corresponding to the age of one year (0-group), were used for the calculation of abundance indices. Catchability was assumed to be 1.

SPATIAL DISTRIBUTION OF JUVENILES

The largest catches of juvenile mackerel icefish were taken in the west, south and south-east shelf areas. Minimum catches were made to the north of the island where juveniles were usually absent from the catches. Juvenile mackerel icefish were dominant at 150-200 m depth. In areas deeper than 300 m, juveniles occurred only as occasional individuals (Table 1).

VERTICAL DISTRIBUTION OF JUVENILE MACKEREL ICEFISH

The upper limit of the vertical distribution of juvenile fish was determined from a haul of the fishery midwater trawl with small-meshed inside liner in the depth range of 0-50 m during night-time. 1600 juvenile mackerel icefish were caught in one hour. A similar haul of a bottom trawl with the same inside liner in the cod-end indicated the occurrence of juvenile fish up to a depth of 500 m.

A 24-hour station of 16 hauls was conducted to study vertical distribution of the juvenile mackerel icefish at one station in a depth of 245-270 m, where the juvenile distribution was determined in the upper, middle and near-bottom layers. Juveniles appeared to concentrate near the bottom during the day-time. Juvenile mackerel icefish rarely occurred in the middle and surface layers during the 24-hour period.

The day-time catches of juvenile fish were in general 8.5 times higher than those at night. This fact in part reflects the different juvenile aggregation patterns during the day-time.

It is suggested that juvenile mackerel icefish undergo diurnal vertical migrations, i.e. fish descend and aggregate near the bottom during day-time and rise into the middle and surface layers and scatter at night.

SIZE COMPOSITION OF JUVENILE MACKEREL ICEFISH

The length of 0-group mackerel icefish in the Juvenile Trawl catches ranged from 82 to 146 mm.

Differences in juvenile size composition occurred both between the various shelf areas and between depth zones. Fish length was lower at depths less than 170 m than deeper.

ABUNDANCE OF JUVENILE FISH

The highest abundance of juvenile mackerel icefish in any catch was 11097 specimens in one haul. According to the results of two surveys the lowest abundance index (0.87) occurred in a depth range of 301-500 m. The highest juvenile abundance index of 553.2 specimens on the average were found at shallow depths of 100-200 m (Table 2).

The accuracy of the abundance indices for juvenile mackerel icefish is indicated by the variance coefficient of 38%.

Thus the 1985 results on distribution and relative abundance of juvenile mackerel icefish in the South Georgia area indicate the association of the bulk of juvenile population with the shallow water part of the shelf in the 12 Nmile near-shore zone.

The results of a survey conducted in the area from the shore to the 500-metre isobath would provide more complete data on the distribution and abundance of the juvenile mackerel icefish.

Table 1 : Juvenile mackerel icefish catches in relation to depth (June-July 1985 trawl survey)

Depth m	Tow numbers	Total catch in numbers	Mean catch per tow	
			in numbers	in %
120-175	29	23556	812.2	83.5
176-225	18	1928	107.1	10.9
226-275	16	183	11.4	1.2
276-325	13	482	37.0	3.8
326-375	-	-	-	-
376-425	4	0	0	0
426-475	1	6	6.0	0.6

Table 2 : Abundance indices for juvenile mackerel icefish in the South Georgia shelf area in June-July 1985

Abundance indices			
Depth range (m)			Total Survey
100-200	201-300	301-500	
577.1 $\pm$ 235.2	23.1 $\pm$ 1.0	0.87 $\pm$ 0.69	235.6 $\pm$ 91.3

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