BIO MASS INDICES AND RECRUITMENT LEVELS FOR HAKE AND OTHER COMMERCIAL SPECIES IN ICSEAF DIVISIONS


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From data obtained on a fisheries research cruise made in September 1987, biomass indices and recruitment levels of hake (Merluccius capensis and M. paradoxus) and other commercially important species were estimated. Low recruitment levels were observed for Merluccius capensis whereas, on the contrary, high numbers of M. paradoxus recruits were found.

Les données obtenues lors d'une campagne de recherche halieutique réalisée en septembre 1987 ont servi à estimer les indices de biomasse et les niveaux de recrutement des deux espèces de merlu (Merluccius capensis et M. paradoxus) et d'autres espèces ayant une importance commerciale. Il en ressort un niveau de recrutement faible pour M. capensis et élevé pour M. paradoxus.

A partir de los datos obtenidos durante una campaña de investigación pesquera llevada a cabo en septiembre de 1987, se estimaron los índices de biomasa y niveles de reclutamiento de las dos especies de merluza Merluccius capensis y M. paradoxus y de otras especies de importancia comercial. Se ha detectado un débil reclutamiento en Merluccius capensis, mientras que M. paradoxus mostró un fuerte nivel de reclutamiento.
INTRODUCTION

Spain continued its biomass and recruitment cruise programme in 1987, for the purpose of determining an abundance index for hake and other commercially important species in ICSEAF Divisions 1.4 and 1.5. The main targets of this research were the two hake species, Merluccius capensis and M. paradoxus, together with certain other commercially important species, e.g., Lophius upsidephalus, Genyodus capensis, Todarodes sagittatus, Austroglossus microlepis and Helicolenus dactylopterus.

Fisheries research in the Convention Area is being undertaken within the framework of ICSEAF in cooperation with other countries conducting fishing activities in the Benguela Current region (Dubrovnik and Macpherson 1987; Payne et al. 1986, 1987).

This paper presents the results of the Benguela XI cruise carried out by the freezer trawler "Chicha Touma" in September 1987 in ICSEAF Divisions 1.4 and 1.5.

METHODS

A total of 68 trawls (66 effective) were made during the cruise (Figure 1). The trawl positions were selected at random, using a semi-stratified method in accordance with ICSEAF recommendations. All trawls were made during daytime in order to avoid the effect of vertical migrations (mainly of hake), which could bias both the length frequencies and the total catch. This migration is more pronounced in Merluccius paradoxus than in M. capensis (Macpherson et al. 1992). Trawl duration was 30 minutes, and all trawls were made using the same gear, a bouchon trawl net with a cod end mesh of 21 mm. Biomass calculations and confidence intervals were performed in accordance with ICSEAF recommendations (Macpherson et al. 1985, 1986, 1987).

MAIN TARGET SPECIES

Merluccius capensis

LENGTH FREQUENCIES

The mean length of Merluccius capensis increases with depth. Figure 2 presents the observed length frequency distribution found in each stratum. There is a well-defined pattern that has been observed repeatedly on the different cruises made to the area since 1983 (Macpherson et al., 1987).

North of 27° S, between 100-200 m, the mean length fluctuates around 25-27 cm. At 200-300 m the mean size increases to between 33 and 52 cm, and from 300 m on, it is from 40-55 cm. Very few individuals were caught at depths of more than 400 m. South of latitude 28° S, the mean length in each stratum is higher than in the north, with a mean size of around 42-46 cm between 100 and 260 m. Deeper than 260 m, the mean length is over 55 cm. This distribution pattern might be related to the existence of two different stocks, which would be supported by certain morphological differences detected in specimens from these two areas.

DISTRIBUTION AND ABUNDANCE

The distribution of Merluccius capensis observed in this survey was similar to that observed in recent years (Figures 3 and 4). The species is found over the entire area. However, at depths below 400 m it is replaced by Merluccius paradoxus.

Size classes smaller than 30 cm (0-, 1- and 2-year-olds) are found mainly in depths shallower than 200 m. The highest densities were found north of 25° S (Figures 3 and 4). Individuals over 30 cm in length are found over the entire area in deeper waters with the greatest densities at 23-24° S and 25° S.

BIOMASS

The biomass estimated using the data collected on this cruise is shown in Table 1. The value (571 750 t) is quite similar to the biomass estimated in July-August 1986 (541 765 t) (Macpherson et al. 1987).

M. paradoxus

LENGTH FREQUENCIES

The mean length of this species increases with depth and in deeper waters, decreases with latitude. In Figure 5 length frequency distribution observed in each stratum is shown.
well-defined pattern has been observed in the area since 1983. Between 100–300 m the mean length fluctuates between 18 and 26 cm. South of 27° S the mean length ranges from 27 to 30 cm between 300 and 500 m; north of this latitude mean sizes are comprised between 29 and 40 cm.

**DISTRIBUTION AND ABUNDANCE**

The distribution observed during the present survey was similar to that observed on previous cruises, covering that part of the area deeper than 200 m.

Size classes: smaller than 30 cm (0–1–, and 2–year-olds) are mainly found south of 26° S, usually at 100–300 m (Figures 6 and 7). Individuals over 30 cm are found mainly in deeper waters. Peak abundance levels were recorded from 26° S to 29° S. Juveniles were practically absent at 23° S and 24° S, where adults are very scarce as well.

**BIOMASS**

The estimated biomass of the species is shown in Table 1. The value obtained (573 650 t) is markedly higher than the figure estimated in July-August 1986 (190 993) (Macpherson et al. 1987).

Recruitment levels of *Merluccius capensis* and *M. paradoxus*

There was a strong decrease in the recruitment level of *Merluccius capensis*. In contrast, a high recruitment level was observed for *M. paradoxus*.

The age composition of *Merluccius capensis* is presented in Table 2. The figures observed are rather unexpected, as the number of individuals in age groups 2 and over is much greater than in previous years. The values detected in age groups 1 and 2 in 1985-86 were approximately 4 800 x 10^6 individuals. In the present estimates, the highest value (age group 2) was much lower, 987 x 10^6.

The age composition of *M. paradoxus* is also shown in Table 2. The values observed for all age groups are higher than those observed in previous surveys, with special reference to age groups 1, 2, and 3.

**OTHER SPECIES**

*Lophius upisicepsalis*

**LENGTH FREQUENCIES**

No significant changes were detected in the length distribution of this species (Figure 8). Evidence in support of the existence of two different stocks (Macpherson et al. 1986, 1987) was again collected (Figures 9 and 10). The first was found north of latitude 27° S, and the second south of latitude 28° S.

The mean size of the northern stock increased with depth and latitude.

**DISTRIBUTION AND ABUNDANCE**

A discontinuity in distribution was found at latitude 27° S. The main concentrations of adults in the northern stock were located at 25° S and 26° S and in the northern portion of 23° S at 200–300 m. The densities obtained were lower than 30 individuals/mile.

The southern stock was distributed south of 28° S. Both adults and juveniles shared the same distribution area. Abundance in this zone was also very low, less than 35 individuals/mile. This pattern was quite similar to the one observed on previous cruises (Macpherson et al. 1987).

**BIOMASS**

The estimated biomass for the present species, 52 430 t, was higher than the value obtained in July-August 1986 (40 552 t) and was also the highest value calculated to date.

*Genypterus capensis*

The highest densities of kingklip were
found near the mouth of the Orange River at depths between 100 and 200 m. Mean size clearly increased with depth (Figure 11). The abundance of the species decreased with latitude: north of 26° S only very low densities of the species, at depths greater than 400 m, were found (Figure 12).

The estimated biomass value (3 440 t) (Table 1) was similar to that obtained in 1986 (July-August).

Austroglossus microlepis

This species was only found at depths shallower than 200 m. Abundance was very low (<5 individuals/mile) over the entire area, except near the mouth of the Orange River. In this zone, the concentrations reached values of 481 individuals/mile (Figure 13).

The estimated biomass (2 580 t) was higher than in July-August 1986 and similar to the value calculated in 1985.

Todarodes sagittatus

The length frequency distribution for this species was quite uniform over the entire area, with mean size around 30 cm mantle length (Figure 14).

As in previous cruises, the species was usually found deeper than 200 m. The highest concentrations occurred at 24° S and 27° S, reaching densities of more than 50 individuals/mile (Figure 15).

The biomass estimate (25 600 t) was higher than values calculated in previous years (5 567-14 943 t) (Macpherson et al. 1987).

Helicolenus dactylopterus

This species was usually found deeper than 200 m, although south of 28° S it was also found between 100 and 200 m. Mean size in-

creased with depth (Figure 16).

The highest densities were found at 23° S and south of 28° S, where the density reached 200 individuals/mile (Figure 17).

The biomass estimate was 11 440 t (Table 1), similar to the biomass calculated in July-August 1986 (11 540 t) and higher than in previous years.

REFERENCES


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FIG. 1. Station positions

FIG. 2. Length distribution of Merluccius capensis
FIG. 3. Distribution of *Merluccius capensis*

FIG. 4. Distribution of *Merluccius capensis*
FIG. 5. Length distribution of *Merluccius paradoxus*

FIG. 6. Distribution of *Merluccius paradoxus*
FIG. 7. Distribution of *Merluccius paradoxus*

FIG. 8. Length distribution of *Lophius upsicepsalus*
FIG. 9. Distribution of Lophius ussiosaphalus

FIG. 10. Distribution of Lophius ussiosaphalus
FIG. 11. Length distribution of Gerypterus capensis

FIG. 12. Distribution of Gerypterus capensis
FIG. 13. Distribution of Austroglossus microlepis

FIG. 14. Length distribution of Todarodes sagittatus
FIG. 15. Distribution of Todarodes sagittatus

FIG. 16. Distribution of Helicoleucus dactylopterus
FIG. 17. Distribution of Helicoleucus dactylopterus