

DISTRIBUTION AND ABUNDANCE OF THE MAIN PELAGIC FISH STOCKS IN THE WESTERN GULF OF GUINEA (Benin, Togo, Ghana & Côte d'Ivoire)

Summary of results from the R/V Dr. Fridtjof Nansen surveys

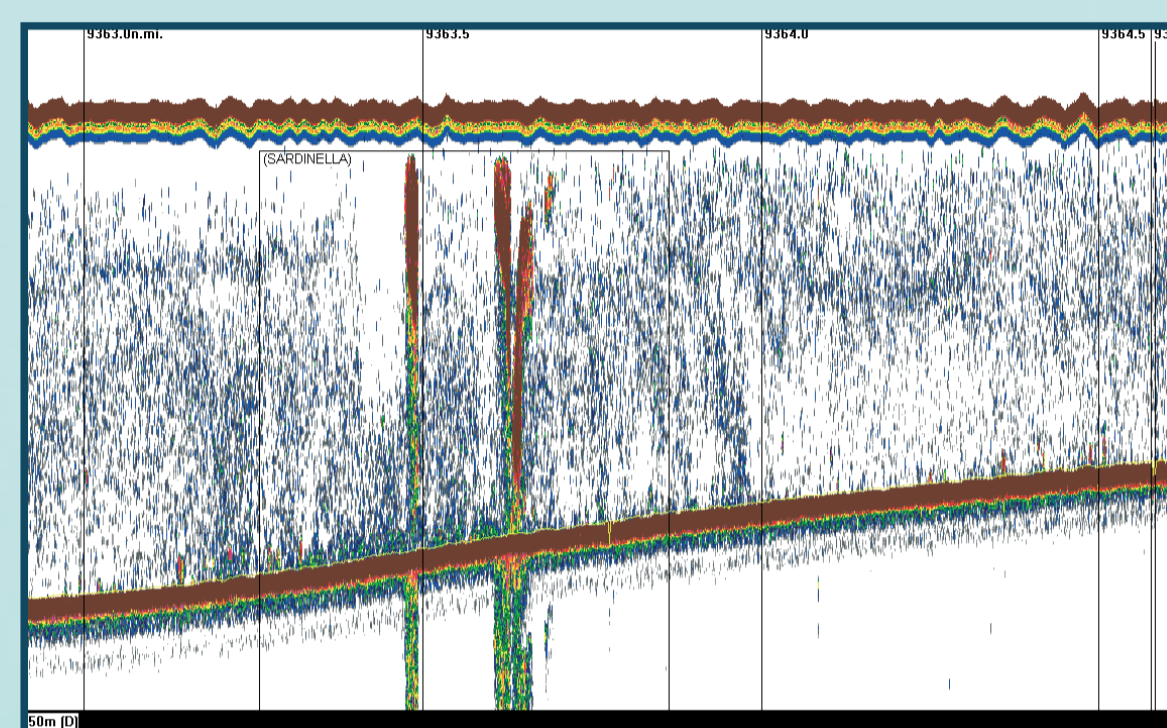
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Background

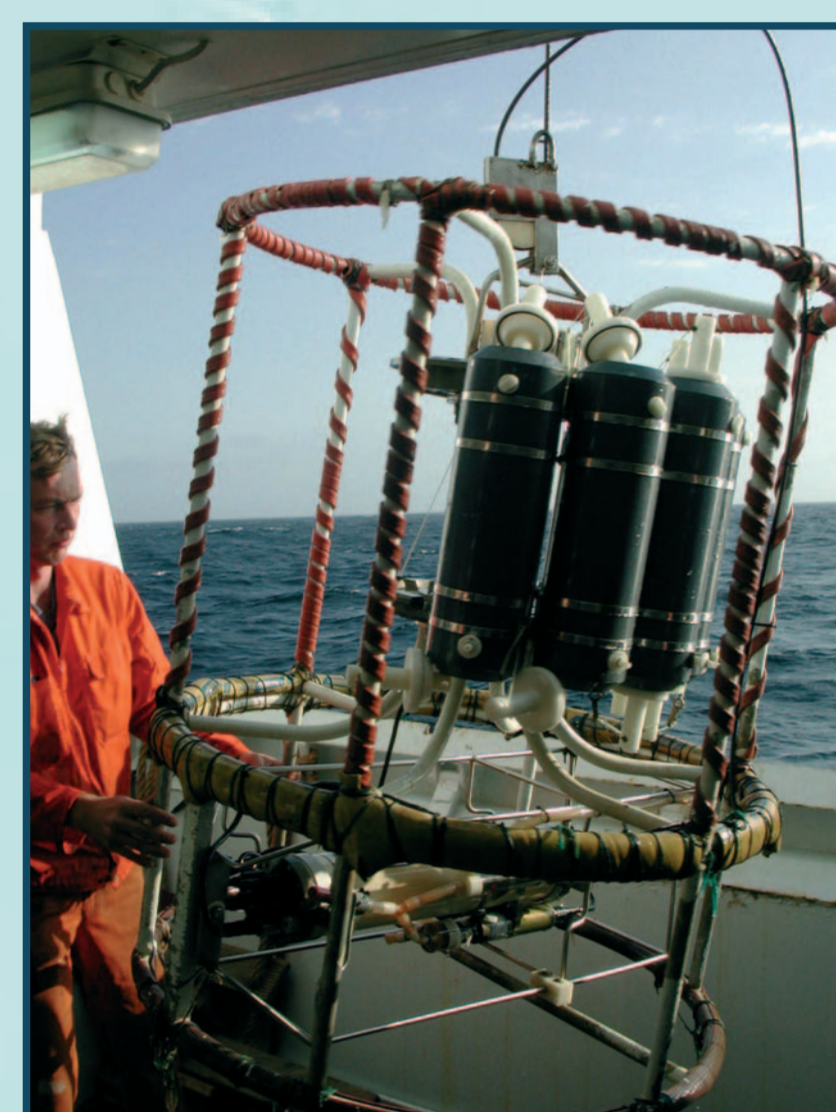
Pelagic species are important in the ecosystem as a link between plankton (which they feed upon) and fish feeding species (for which they serve as food). Following requests from the Governments of Ghana, Benin, Togo and Côte d'Ivoire, the Nansen Programme through the FAO Project "International cooperation with the Nansen Programme. Fisheries Management and Marine Environment" has since 1999 conducted regular surveys with the R/V Dr. Fridtjof Nansen in the Western Gulf of Guinea. Three surveys were also conducted in the 1980s. Since 2005 the surveys have been part of a larger survey programme in the Gulf of Guinea carried out in collaboration with the Guinea Current Large Marine Ecosystem Project (GCLME).

Methods

- Echosounder and echo integration for pelagic fish combined with pelagic and bottom trawling
- Swept-area bottom trawl programme for demersal species/groups
- CTD-sonde for temperature salinity and oxygen
- 1 metre diameter zooplankton net
- The soft-bottom benthic macrofauna sampling was carried out using a Peterson grab with a surface area of 0.20 m²



Example of Echogram of *Sardinella*



CTD Hydrographic sampling



Length measurements are necessary both to study growth and fishing pressure, as well as input to detailed stock abundance estimation.

R/V Dr. Fridtjof Nansen surveys in the Western Gulf of Guinea

2 - 25 June 1981 (Cape Verga, Rep. of Guinea, to Cape St. Paul, Ghana)
7 - 20 August 1981 (Togo to Cameroon)
12 - 20 October 1989 (Côte d'Ivoire and Ghana)
19 April - 6 May 1999
29 August - 17 September 2000
6 July - 9 August 2002
14 May - 8 June 2004
3 May - 29 May 2005
19 May - 7 June 2006

Table 1: Summary of total survey effort 1999-2006

	CTD	Plankton	Benthos	PT	BT	Distance (NM)
1999	91	8	-	10	80	2065
2000	95	6	-	40	86	2230
2002	153	4	-	21	135	2960
2004	134	9	-	20	122	2840
2005	155	9	-	27	138	2865
2006	125	9	9	19	103	2390

PT: Pelagic Trawl; BT: Bottom Trawl

Survey objectives

Main objectives:

- Map distribution and estimate abundance of the main pelagic fish stocks
- Estimate distribution, composition and abundance of demersal species/groups
- Map the general hydrographic regime
- Sampling of zooplankton
- On-the-job training on survey routines

In 2006 two additional objectives were introduced:

- To collect stomach samples of commercial important fish species to increase knowledge on food and feeding habits
- To collect bottom sediment samples to map the benthic biodiversity in the region



The objectives of the surveys are discussed and agreed upon during pre-survey meetings.

Oceanographic conditions

Table 2: Summary of oceanographic conditions 2005 (0-400 m)

	Temp (°C)	Salinity (psu)	Oxygen (ml/L)
Benin-Togo	8-28	34.7-35.4	2-4
Ghana	8-29	34.8-35.4	2-4
Côte d'Ivoire	8-29	34.8-35.0	2-4

Oceanographic conditions may influence distribution, migration, spawning, prey availability, natural mortality and growth. Oceanographic data may also indicate climate or regime changes. Information on temperature, salinity and oxygen are therefore routinely collected at each bottom trawl station and at fixed hydrographic transects. An example of information obtained is provided in Table 2.

Results

Pelagic fish are present over large parts of the study area, and in particular in the central and western parts.

*Sardinella*s (*Sardinella aurita* and *S. maderensis*) and anchovy (*Engraulis encrasicolus*) dominate on the inner shelf, while carangids, scombrids and barracudas are more widely distributed over the entire shelf. *S. maderensis* has a more coastal distribution than *S. aurita*.

A denser and wider distribution was observed for *Sardinella* spp and anchovy in 2000 compared to the other years, when the densities were weak in parts of the study area. Examples of distribution are given in Figures 2 and 4. The 2000 survey was carried out in the upwelling season and as expected high abundances were observed for both sardinella and anchovy that year. High abundance of *Sardinella* spp was also observed in 2004 and 2006. The total acoustic estimates of anchovies are more variable over the time series, with low values observed for 1999, 2002, 2005 and 2006 (Figures 1 and 3).

In general the larger individuals of these species are found in Ghana and Côte d'Ivoire whereas the smaller individuals are found in Benin and Togo.

The distribution of carangids, scombrids and barracudas show relatively similar distribution pattern for most of the years, with the exception of 2002 and 2004, coinciding with the years when the lowest biomass of this species group was observed (Figures 5 and 6).

Conclusions

The results indicate a relatively stable situation, with the absence of marked trends for *Sardinella* spp and the group "Carangids, scombrids, barracudas and hairtail". The variations observed between years could be linked to natural or seasonal variations or to survey uncertainty.

For Anchovy the variations are more distinct and the upwelling seems to have a larger effect on this species as compared with the other groups. This can be seen from the high abundance observed of this species in 2000 when the survey was carried out in the upwelling season, compared to the lower abundance the other years. Other possible factors that could influence the abundance estimate include variations in year class strength or changes in availability to the survey, due to a very coastal distribution.

Dissemination of results

The Directors of Fisheries of the coastal countries and other stakeholders are invited to participate at a post-survey meeting at the end of the each survey where the cruise leaders presents the main results.

This provides an excellent occasion for the managers and scientists to meet and exchange views and experiences.



The results of the surveys are also used in the Working Groups of CECAF.

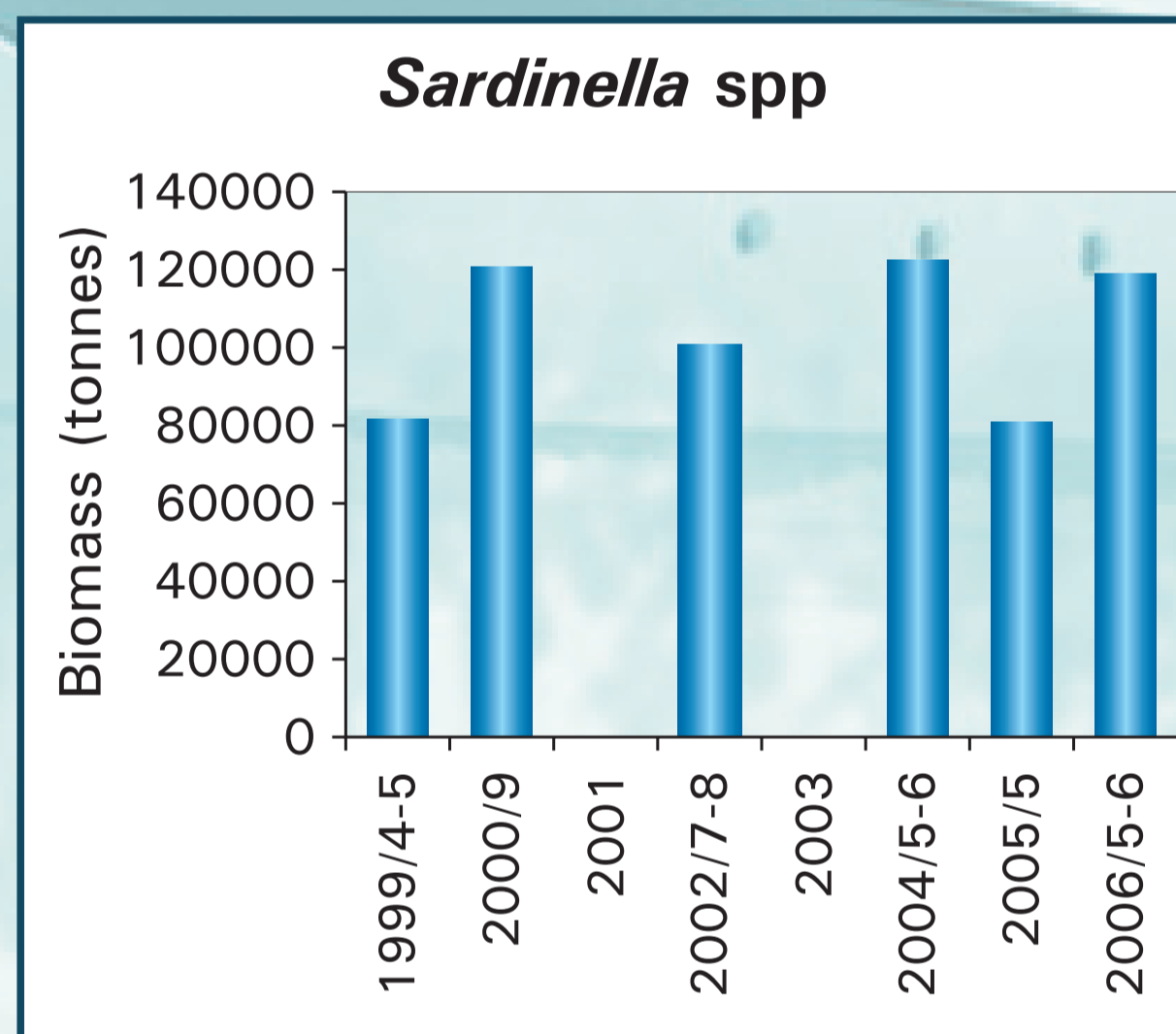


Figure 1: Evolution of biomass (tonnes) of *Sardinella* spp

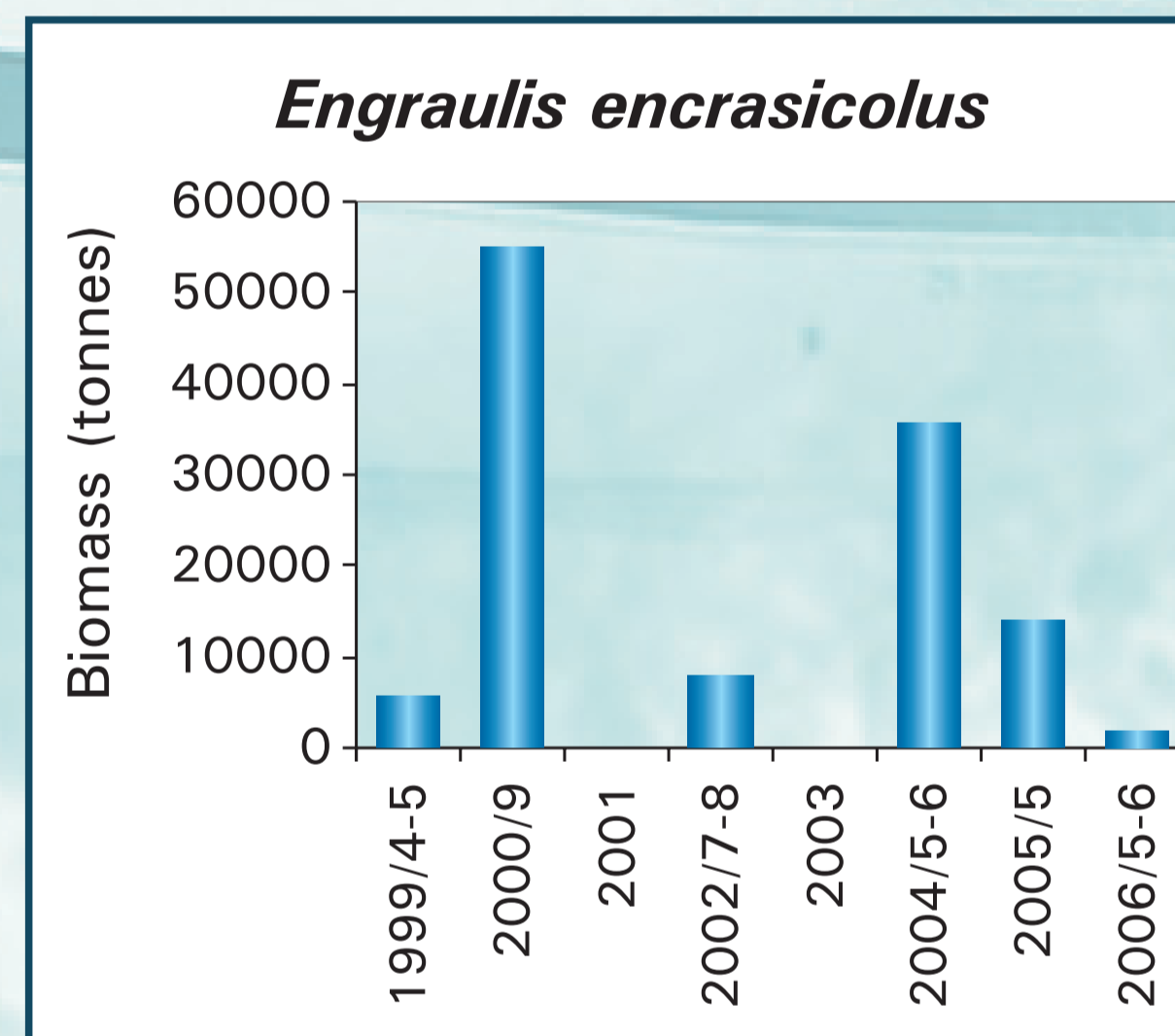


Figure 3: Evolution of biomass (tonnes) of anchovy

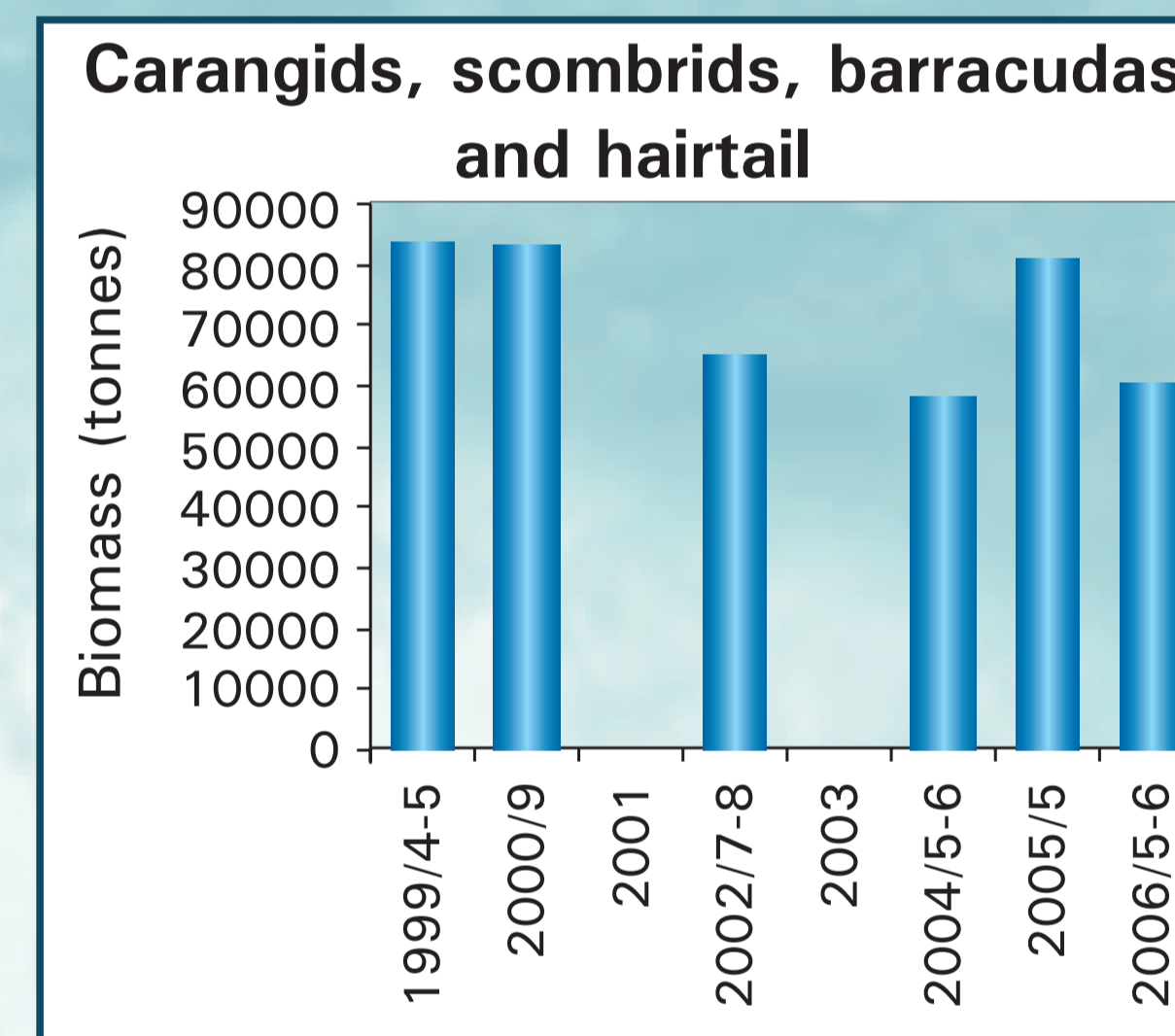


Figure 5: Evolution of biomass (tonnes) of carangids, scombrids, barracudas and hairtail

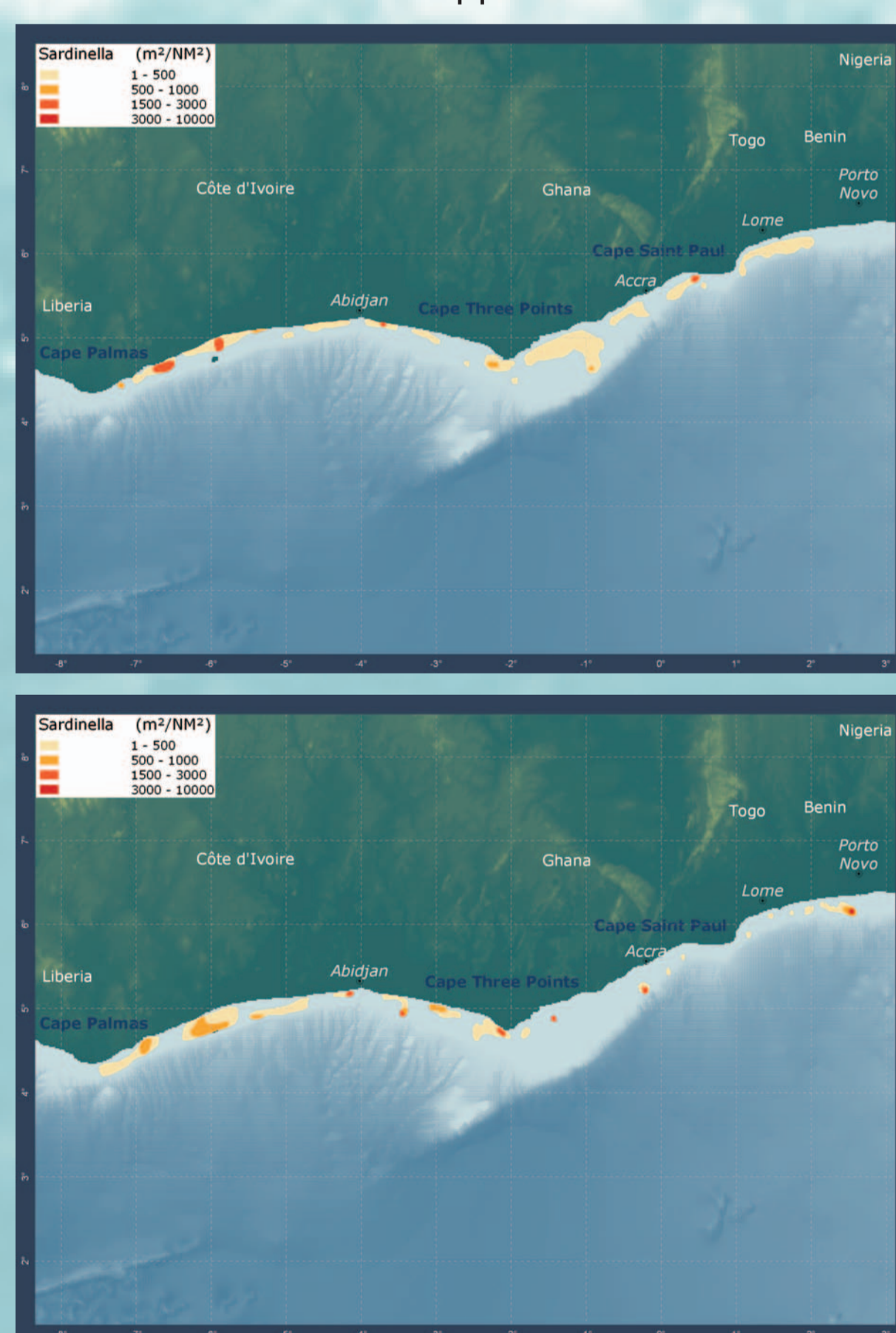


Figure 2: Distribution of *Sardinella* spp in i) September 2000 and ii) May/June 2004

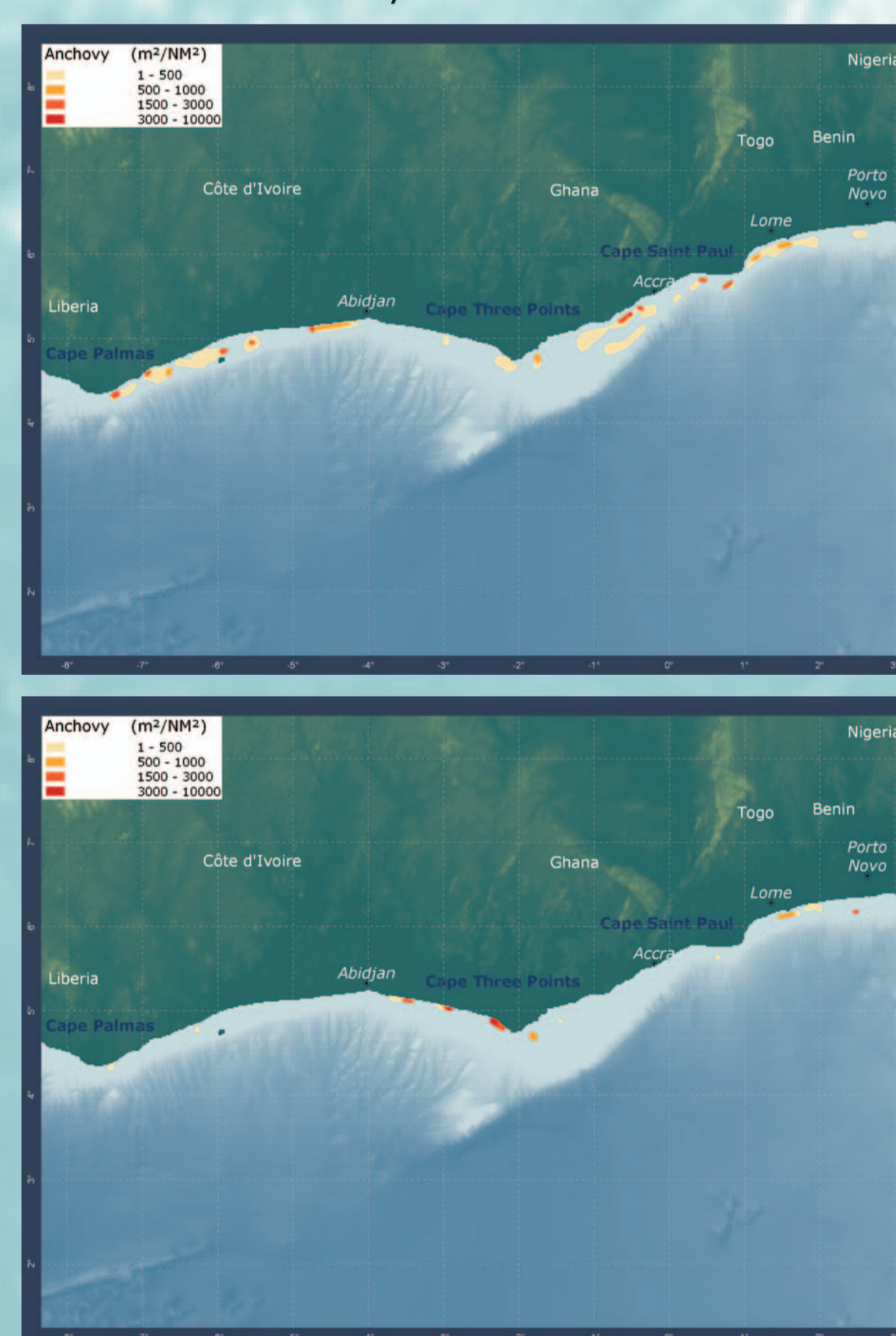


Figure 4: Distribution of anchovy in i) September 2000 and ii) May/June 2004



Figure 6: Distribution of carangids, scombrids, barracudas and hairtail in i) September 2000 and ii) May/June 2004

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- Institute of Marine Research, Bergen, Norway
- FAO, Viale delle Terme di Caracalla, Rome, Italy

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