

Shallow water shrimp bycatch in Sofala Bank - Mozambique: Total catch estimates, discards and biology of main species

by
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Abstract

Penaeus indicus (white shrimp) and *Metapenaeus monoceros* (brown shrimp) are the main shrimp species caught in Mozambican coast in Sofala Bank making up 80% of total catch. The other fish species namely *Otolithes ruber* (croaker), *Johnius amblicephalus* (croaker), *Johnius dussumieri* (croaker), *Pomadasy maculatum*, (grunt), *Trichiurus lepturus* (largehead hairtail), *Pellona ditchela* (indian sardine), *Thryssa vitrirostris* (orangemouth thryssa) and *Arius dussumieri* (blacktip sea catfish), other crustaceans (small shrimps and *Brachyura* (crab), cephalopods such as *Loligo* sp. (squids) and *Sepia* sp. (cuttlefish) form the shallow water shrimp bycatch (Palha de Sousa, 2002; Palha de Sousa, 2003; Palha de Sousa, 2004). Shallow water shrimp is caught by three different sectors: an artisanal fishery and semi-industrial and industrial fleets which operate until 70 m depth. The three sectors explore the stocks of the two main species, *P. indicus* and *M. monoceros*. The less abundant shrimp species such as *P. japonicus*, *P. monodon* and *P. latisulcatus* are caught by the industrial fleet when they fish at deeper waters (Palha de Sousa *et al.*, 2009). The fleets operating in shallow water shrimp fishery are national and joint venture. The semi-industrial fleet work in two areas, one near Angoche and the other south of Beira (Dondo and Machanga), both of them composed by national companies. During 2012, 14 ice semi-industrial vessels operated south of Beira. The number of vessels of the industrial fleet (including the semi-industrial with freezers) in the shrimp fishery was 57 in 2012 compared with 50 in 2011.

This paper summarizes the available knowledge of shallow water shrimp bycatch regarding to species composition, total catch and discards estimates and biological characteristics of the main species.

Introduction

Shallow water shrimp occurs mainly in Sofala Bank, which is located in the central part of Mozambique between 16° 00'S and 21° 00'S, at depths between 5 and 70 meters (Palha de Sousa, 2004a). The shallow water shrimp occurs along the coast mainly in mangrove areas where the juveniles grow. North of 17° 30'S, the continental shelf is narrow with corals and trawling is difficult in these areas. Sofala Bank bottom is mostly sand/mud and the coastline is crossed by rivers, including the delta of the Zambezi with large areas of mangrove forests. The Sofala Bank features large amounts of fishery resources, on which some fisheries developed. Shallow water shrimp bycatch species are composed of fish, other crustaceans and cephalopods (Palha de Sousa, 2002; Palha de Sousa, 2003; Palha de Sousa, 2004).

The climate of the provinces of Sofala, Zambézia and Nampula where the Sofala Bank is located is tropical and humid, with air temperatures ranging between 18° C and 35° C (Massinga and Hatton, 1997). This region experiences high rainfall with an annual average of 1400 mm at Beira. Rain falls throughout the year, but particularly in the summer (November to March). The winds are predominantly easterly/south-easterly (Dutton and Zolho, 1990).

The semi-industrial fleet work in two areas, one near Angoche and the other south of Beira. During 2012, 14 ice semi-industrial vessels operated in Beira fishing ground. In the industrial fleet, the number of vessels (including the semi-industrial with freezers) in shrimp fishery was 57 in 2012. All vessels are trawlers. Shallow water shrimp total catch for industrial fleet was 2.129 tonnes and 122 tonnes for ice semi-industrial fleet (Palha de Sousa *et al.*, 2013).

Aims

The general aims of on board data collection are to estimate total catch, retained and discards.

The specific aims of on board and at landings are to study catch species composition and size composition of the main fish species.

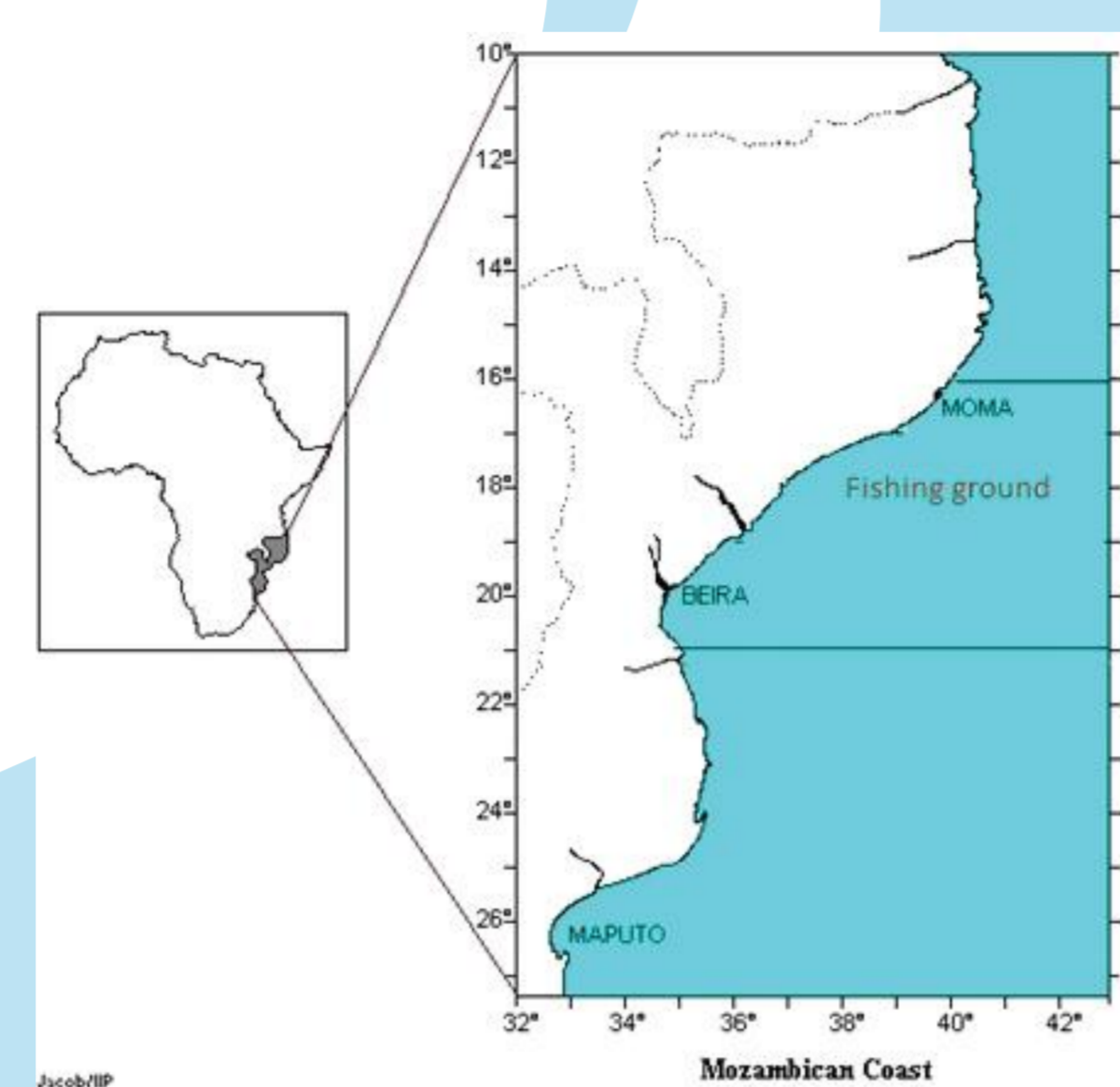
Methodology

During on board sampling program, three trawls were analyzed per day. Estimate of the total catch was done in two trawls and estimate of discards in the third trawl. It was considered as total catch, everything that was included in the net, such as all the marine organisms, stones, mud, old cans and as discards everything that was rejected to the sea. Retained catch was the catch retained on board for human consumption or for sale.

A sample of 20 to 30 kg, in the trawls selected from total catch and from discards, was collected to be analyzed to get information on species composition, size frequency distribution for the main fish species.

During sampling at landings, information was collected from a sample of 20 to 30 kg of the total catch to get data on species composition and size frequency distribution for the main fish species in the trawls.

The fishing company provides information regarding position, depth and date where the samples were collected.



Study area and description of the fishery

The covered area was from 16° 00'S (Nampula province) to 21° 00'S (Sofala province) at depths between 5 to 70 meters.

Bycatch is caught by artisanal, semi-industrial and industrial fisheries (including freezers semi-industrial).

Data presented in this study was collected on industrial fishery.

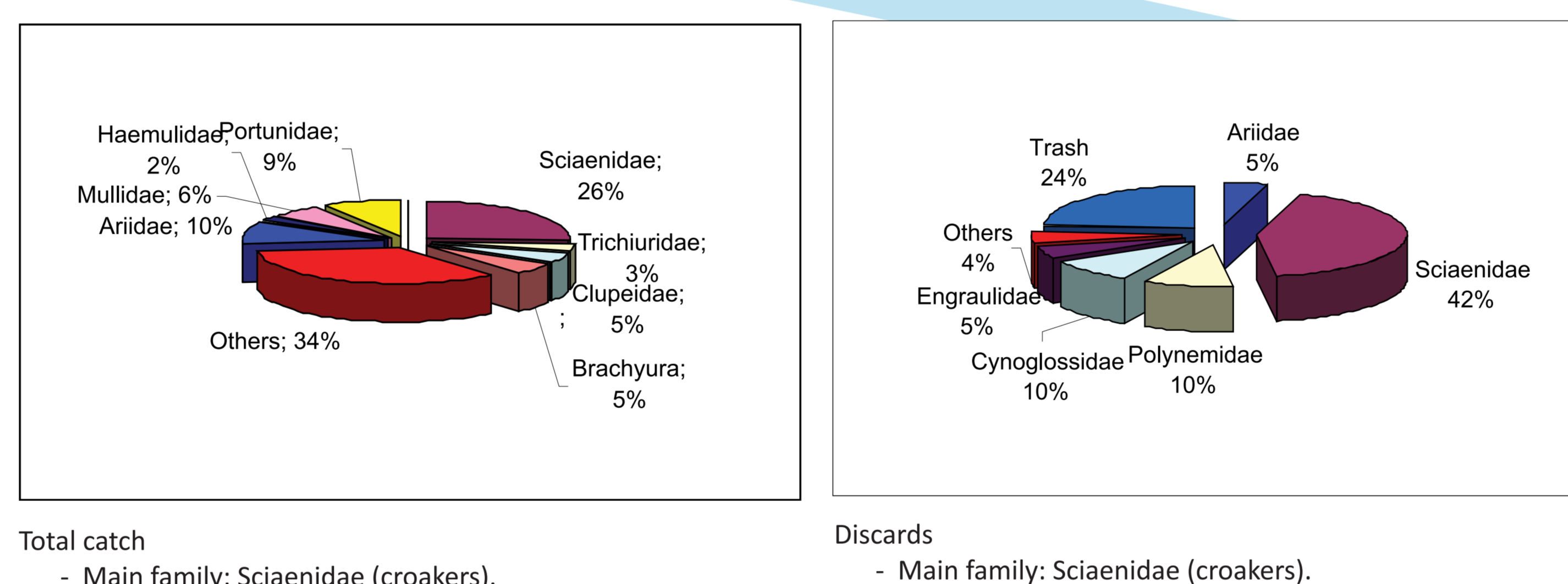
Bycatch data collection

Data collection was undertaken:

- On landings.
- On board at industrial fleet.
- During shallow water shrimp survey.

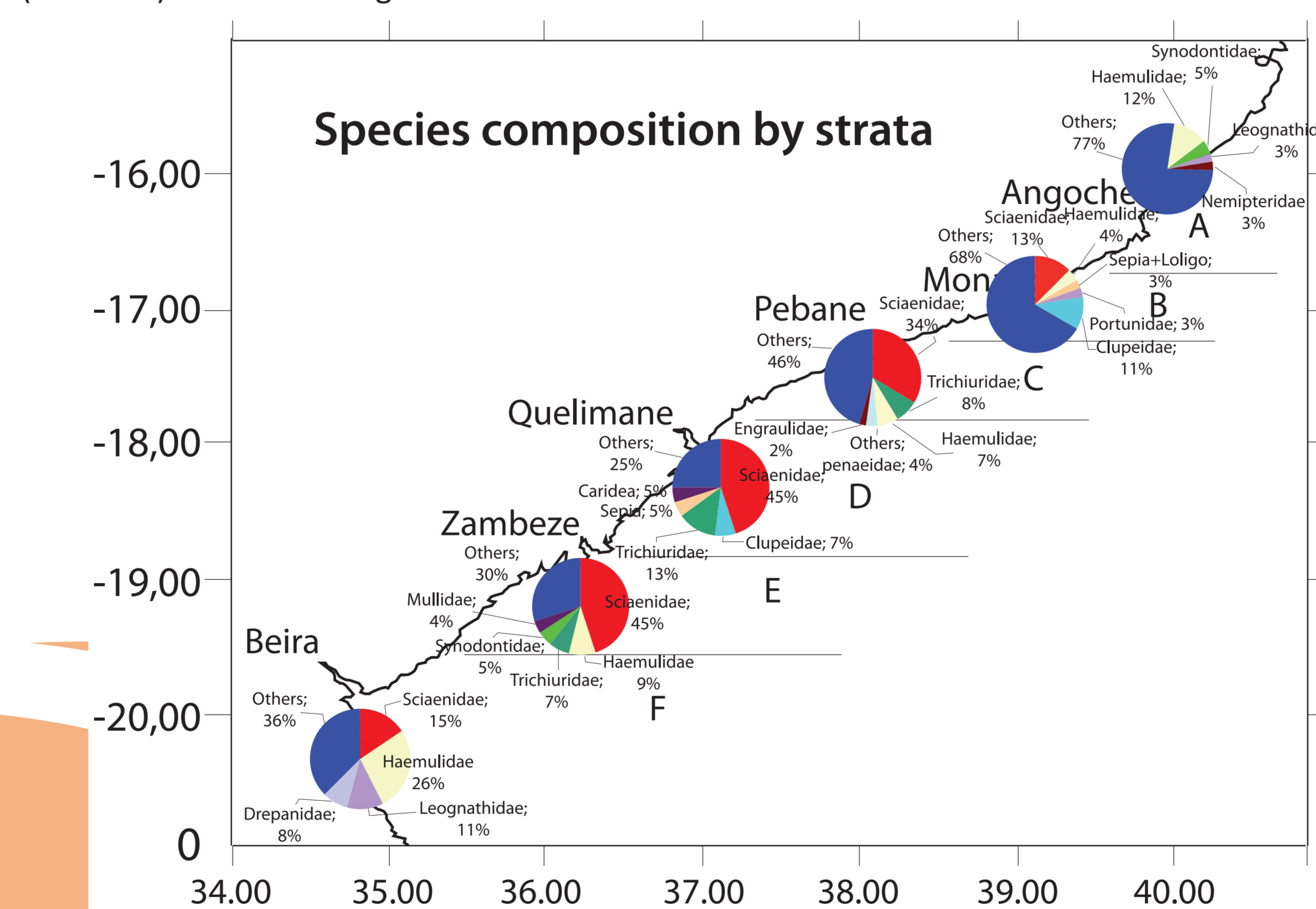
Results

Species composition



Species composition by fishing ground

Species composition varies along the coast and the main family is Sciaenidae (in red) and Haemulidae (in cream) in north of Angoche.



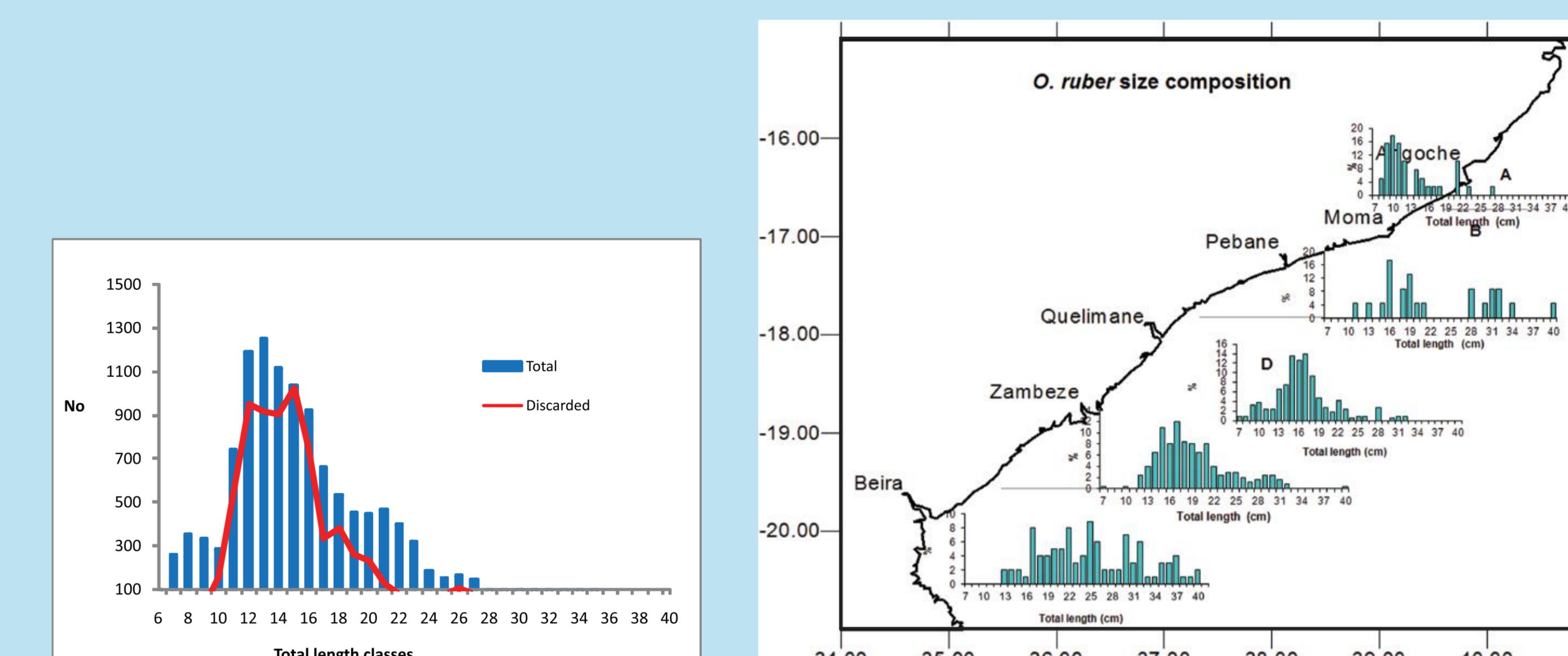
Mean total length of bycatch species by fishing ground

SPECIES	FISHING GROUND						Total	Size 1 st mat
	1	2	3	4	5	6		
<i>O. ruber</i> (Tigertooth croaker)	14.9	16.0	19.9	20.8	19.6	19.7	19.8	22.6
<i>J. dussumieri</i> (Bearded croaker)	10.6	12.1	12.2	11.2	12.5	13.3	12.1	11.5
<i>J. amblycephalus</i> (Bellfish)	11.6	15.4	12.9	12.8	13.6	14.6	13.2	No data
<i>P. maculatum</i> (Sandie grunt)	6.1	12.0	11.7	13.6	13.1	12.5	12.8	No data
<i>T. lepturus</i> (Largehead hairtail)	39.4	40.6	40.0	38.6	42.0	45.8	40.6	44.0
<i>P. ditchela</i> (Indian pellona)	14.7	12.8	13.4	14.0	14.1	15.9	13.6	13.5
<i>T. vitrirostris</i> (Orangemouth thryssa)	12.1	11.6	12.2	13.7	13.8	13.8	13.2	12.1

O. ruber and *T. lepturus* presents size smaller than size at 1st maturity in all fishing grounds



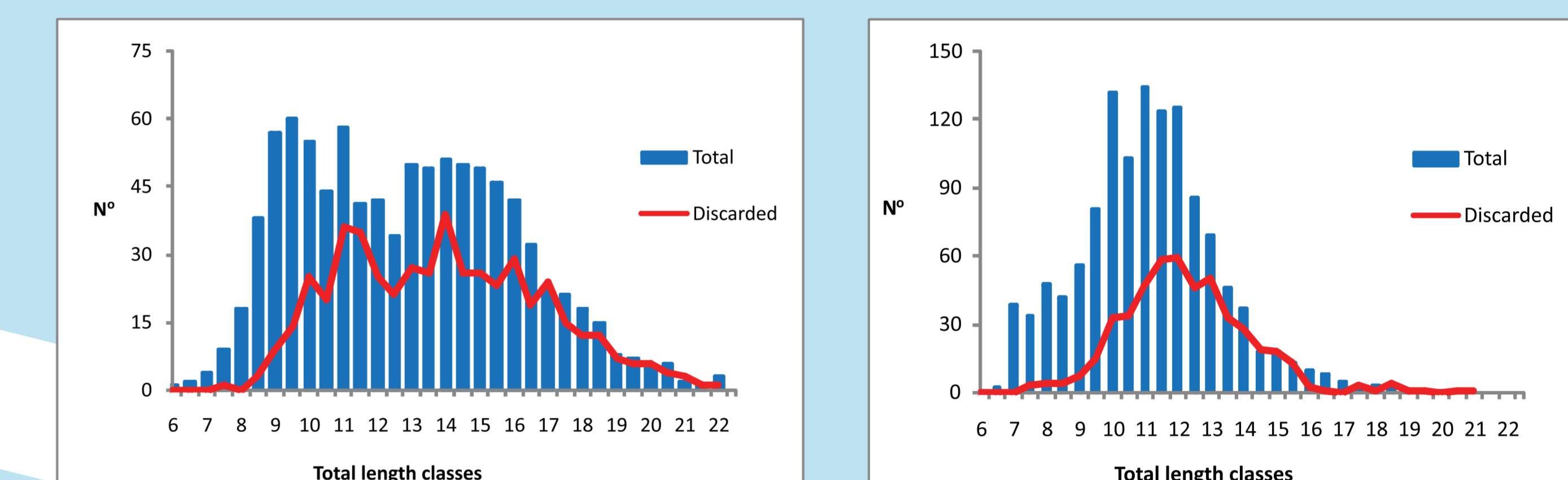
Otolithes ruber size composition



Total length varies between 6 and 40 cm with a mean of 16 cm. Most of the catch is discarded.

Smaller specimens found in north (Angoche). Size increase from north to south. The biggest sizes found near Beira.

Size composition of Johnius amblicephalus and J. dussumieri



Total length varies from 6 to 21 cm with a mean of 13 cm. Most of the catch is discarded.

Total length varies between 6 and 21 cm with a mean of 12 cm. Most of the catch is discarded.

Catch estimates

Estimates of shallow water shrimp bycatch varied between 8512 and 13072 t in 2012. Shallow water shrimp bycatch accounts for 81% of total catch, based on survey and on board data. Retained catch represents 41% total catch. Discards represents 40% total catch.

Acknowledgements

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