

# Biodiversity of invertebrate macrofauna from a shrimp trawl fishery in waters of the Angolan ZEE

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Discard studies are considered fundamental for obtaining information on adverse ecological impacts on marine ecosystems. In this context, shrimp trawl fisheries produce significant by-catch, where invertebrates are present in all sampled fishing hauls. Marine invertebrates are characterized by an exceptional diversity, including many species that are key to the functioning of ecosystems.

This work is meant to be a first step to describe, identify and quantify the invertebrate community structure associated with the striped red shrimp (*Aristeus varidens*) fishery.

Since 2018, the IEO has implemented a scientific observer program onboard Spanish shrimp trawlers in Angola. Direct information on catches and discards of target and bycatch species have been obtained through this program, among other relevant fishery and biological information.

This study focused on six trawl trips conducted in northern and central Angola (Figure 1), in 174 hauls conducted at depths between 425 and 728 m, between November 2018 – December 2021. A number of randomly selected hauls were sampled for discard composition (number of species, weight and number of individuals per species, size of selected species).

A total of 268 364 invertebrate specimens of 40 different species, with a biomass of 1.5 t were captured in the study period (Table 1). Ecological indicators, such as abundance (N), occurrence (F, frequency of appearance of the species in the hauls), species richness (S) and the Shannon-Wiener diversity index (H'), were estimated for each sampled haul (Figure 1 and 2).

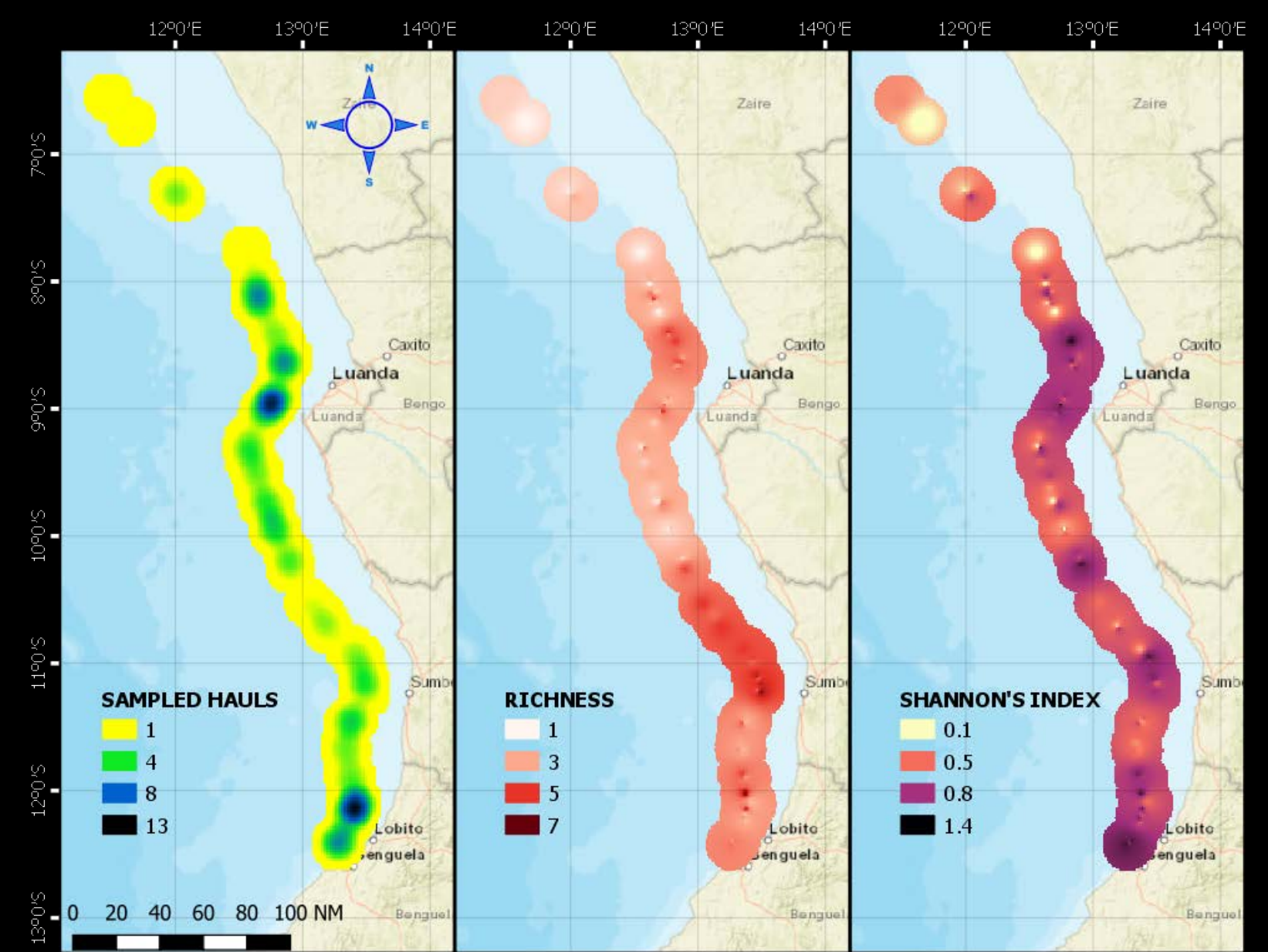


Figure 1.- Geographical distribution by sampled haul of ecological indicators for invertebrates discards for the deep-water shrimp trawling fishery.

**Caridea**

4, 8, 9, 10, 11, 15

**Anomura**

13, 12

**Polychelida**

5, 7

**Brachyura**

6, 14

**Opisthoteuthidae**

**Faunistic List**

- 1 *Aristeus varidens* Holthuis, 1952
- 2 *Chaceon maritae* (Manning & Holthuis, 1981)
- 3 *Aristaeopsis edwardsiana* (J.Y. Johnson, 1868)
- 4 *Nematocarcinus africanus* Crosnier & Forest 1973
- 5 *Stereomastis sculpta* (Smith, 1880)
- 6 *Bathynectes* sp (probably *B. maravigna*)
- 7 *Polycheles typhlops* Heller, 1862
- 8 *Psathyrocaris fragilis* Wood-Mason, 1893
- 9 *Glyphus marsupialis* Filhol 1884
- 10 *Plesionika* spp\*
- 11 *AcanthePHYRA* spp\*\*
- 12 *Munida* spp\*\*\*
- 13 *Lithodes ferox* Filhol 1885
- 14 *Opisthoteuthis* spp\*\*\*\*
- 15 *Systemaspis debilis* (A. Milne-Edwards, 1881)

\* *P. carinata* and *P. martia*, and others not identified at species level  
 \*\* *A. pelagica* and *A. acanthithelsonis*, and others not yet identified  
 \*\*\* *M. intermedia* and *M. speciosa*, and others not yet identified  
 \*\*\*\* *Opisthoteuthis agassizii* and others not yet identified

**Octocorallia**  
**Actiniaria**  
*Parapagurus pilosimanus* Smith, 1879  
*Benthoecetes bartletti* (SI Smith, 1882)  
*Nephropsis atlantica* Norman, 1882  
*Onykia robsoni* (Adam, 1962)  
*Lycoteuthis* spp  
**Scyphozoa**  
*Heterocarpus grimaldii* A. Milne-Edwards & Bouvier, 1900  
*Solenocera africana* Stebbing, 1917  
**Holothuroidea**  
*Macrotritopus defilippi* (Vérany, 1851)  
*Rossia* spp  
*Parapenaeus longirostris* (H. Lucas, 1846)  
*Heterocarpus laevigatus* Spence Bate, 1888  
*Pagurus excavatus* (Herbst, 1791)  
*Venerupis* spp  
**Hexacorallia**  
*Psathyrocaris infirma* Alcock & Anderson, 1894

Table 1.- Most frequent species. (1 – 3): target species of the fishery. (4 to 15): analysed data set (species with a minimum 10% frequency of occurrence in the samples) representing the invertebrate fauna associated with the fishery. Blue: low frequency species (<10% of the hauls) were removed in order to reduce the proportion of zeros in the dataframe.

Diversity revealed a patchy distribution along the Angolan deep-sea fishing zone. Most diversified group was the infraorder Caridea, represented by 6 species, followed by Anomura and Polychelida.

Nematocarcinidae was the most common family, mainly due to a single species, *Nematocarcinus africanus*, present in 21% of the analysed fishing hauls, followed by the blind lobster *Stereomastis sculpta* (13%) and *Bathynectes* sp (12%). *N. africanus*, *S. sculpta* and *L. ferox* were the species mostly contributing to the total invertebrate biomass (70%).

As the composition of macrobenthos is considered a good indicator of fishing pressure, future studies on changes in these communities could assess the effects of trawling on marine ecosystems in the area.

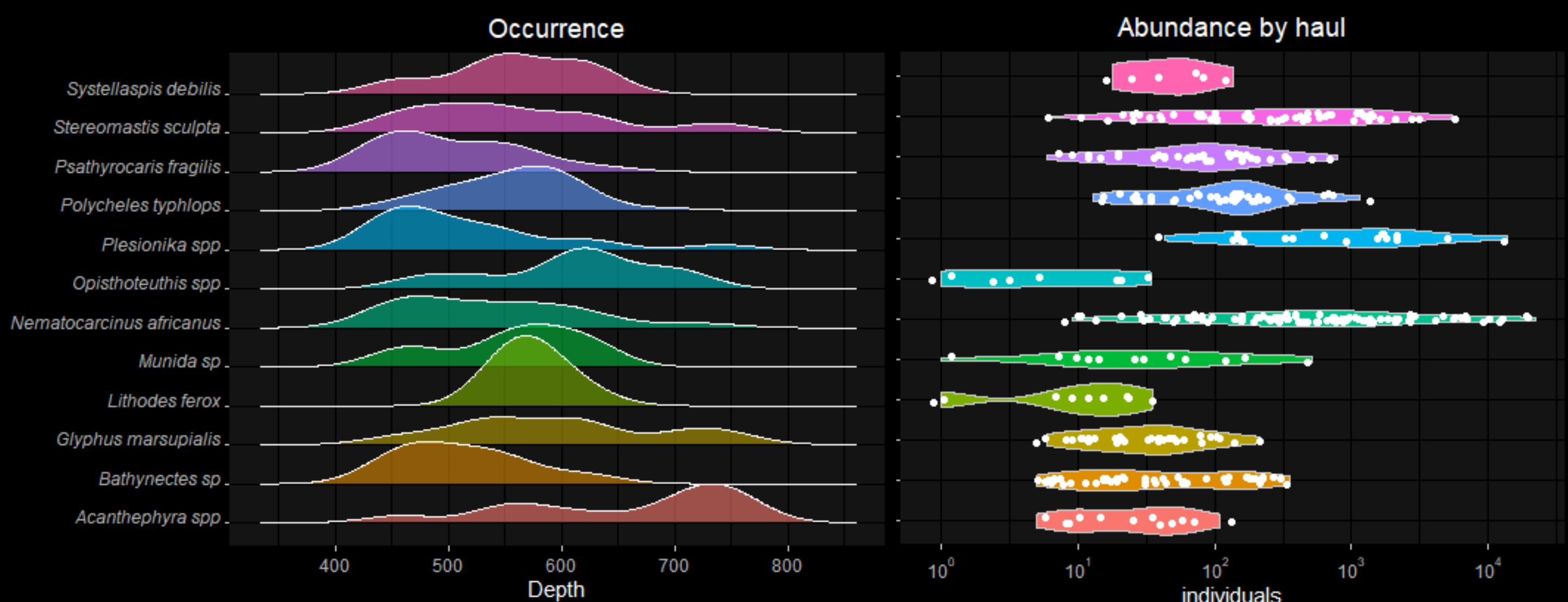


Figure 2.- Invertebrate taxa: in relation to depth (right) and abundance per discard sample (left)