

Introduction

One of the most important human impacts on marine ecosystems is commercial fishing that causes habitat disturbances, the removal of target and non-target species and the return to the sea discarded species (Dayton *et al.*, 1995, Jennings and Kaiser, 1998, Auster and Langston, 1998). Bottom-trawls physically disturb both the habitat as it is dragged across the seafloor (Thrush *et al.*, 1998) and the species living on or near the seafloor. The low selectivity of this fishing gear causes high amounts of discards (Bellido *et al.*, 2011, García de Vinuesa *et al.*, 2012).

A Spanish bottom-trawl shrimp fishery has been traditionally developed in West African fishing grounds, being especially relevant in Mauritanian waters, due to their high productivity.

Objectives

The objectives of this study were:

- To identify the communities impacted by this fishery.
- To analyze the spatial dynamic of the fishery.
- To study the catch composition in this fishery for both the retained fraction and the discards fraction.

Material and methods

In compliance with the EU “Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy”, Spain should perform discards samplings of the Spanish shrimp fishery developed in West Africa. Since 2010, the Oceanographic Institute of Cadiz belonging to the Spanish Institute of Oceanography has developed a “Program of Scientific Observers onboard” in order to study, among other subjects, the discards produced by this fishery.

This work presents the results of the analysis of discards produced by this fleet in Mauritanian waters through the scientific observations carried out in this fishing ground during one annual cycle (2014).

Weights of total catches, retained catches and the volume of discards were recorded for each fishing haul.

All discarded species of a number of representative samples were identified. Cluster analysis was applied to the species abundance-hauls matrix in order to identify faunal associations. Similarity levels between fishing hauls were calculated throughout the Bray-Curtis index. Species composition of each assemblage was described in terms of percentage contribution of each species at the similarity level of each group using the PRIMER statistical packages. The species contribution of retained and discarded species is described for each community.

References

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- Thrush, S. F., Hewitt, J. E., Cummings, V. J., Dayton, P. K., Cryer, M., Turner, S. J., Wilkinson, M. R. (1998). Disturbance of the marine benthic habitat by commercial fishing: Impacts at the scale of the fishery. *Ecological Applications*, 8(3), 866-879.

Results

4 fishing trips
196 fishing days Mar -Dec 2014
996 hauls

Total catches → 553 t
Target species → 74,5 t
By-catch species → 45,5 t
Discards → 433 t

78,5% of total catches discarded and removed to the sea
357 discard species identified

Three assemblages identified → Shelf S, Upper Slope US and Deep Slope DS

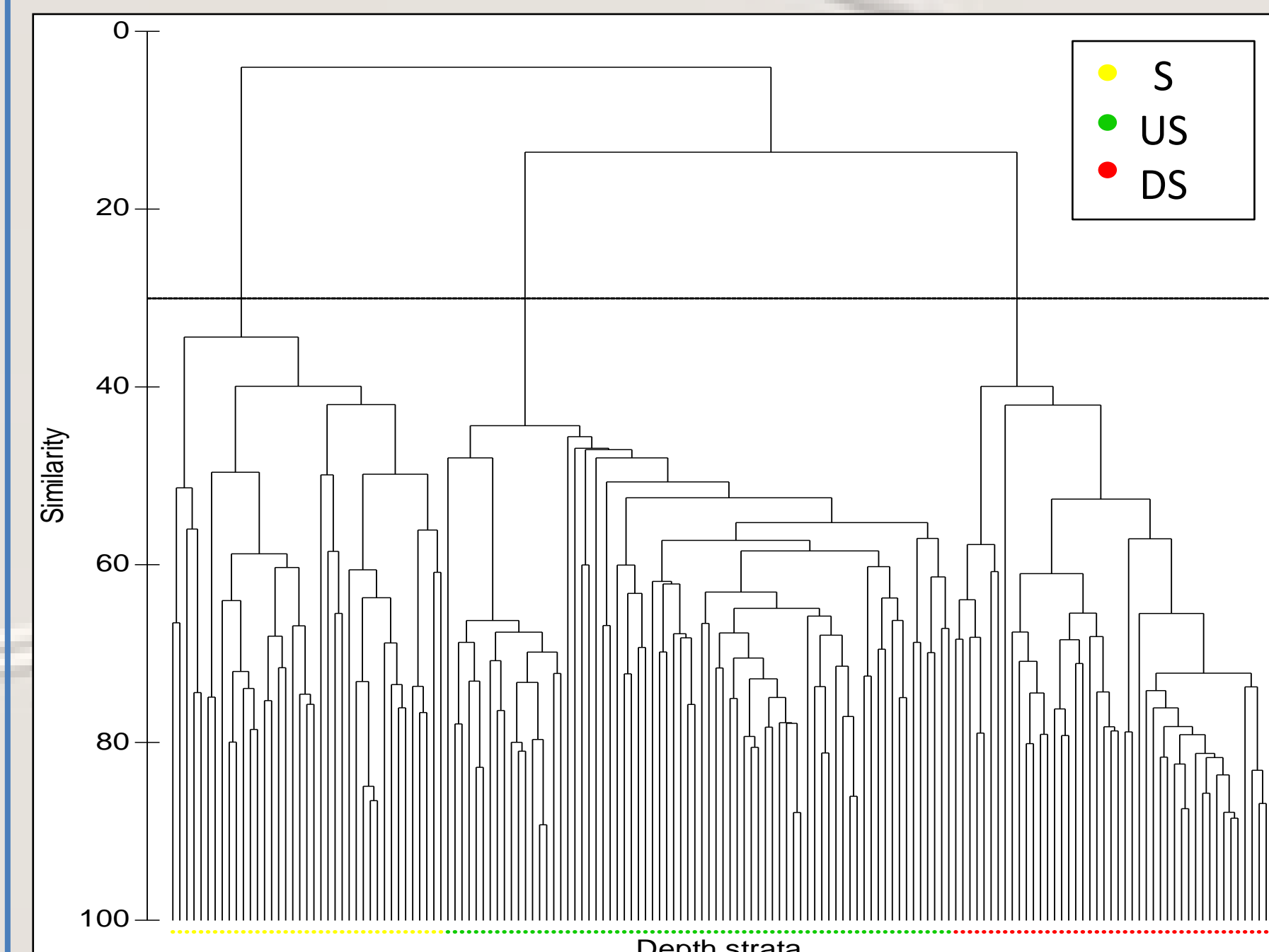


Figure 1. CLUSTER dendrogram plot.

Average similarity of each group:

S → 44,54%

US → 52,37%

DS → 54,64%

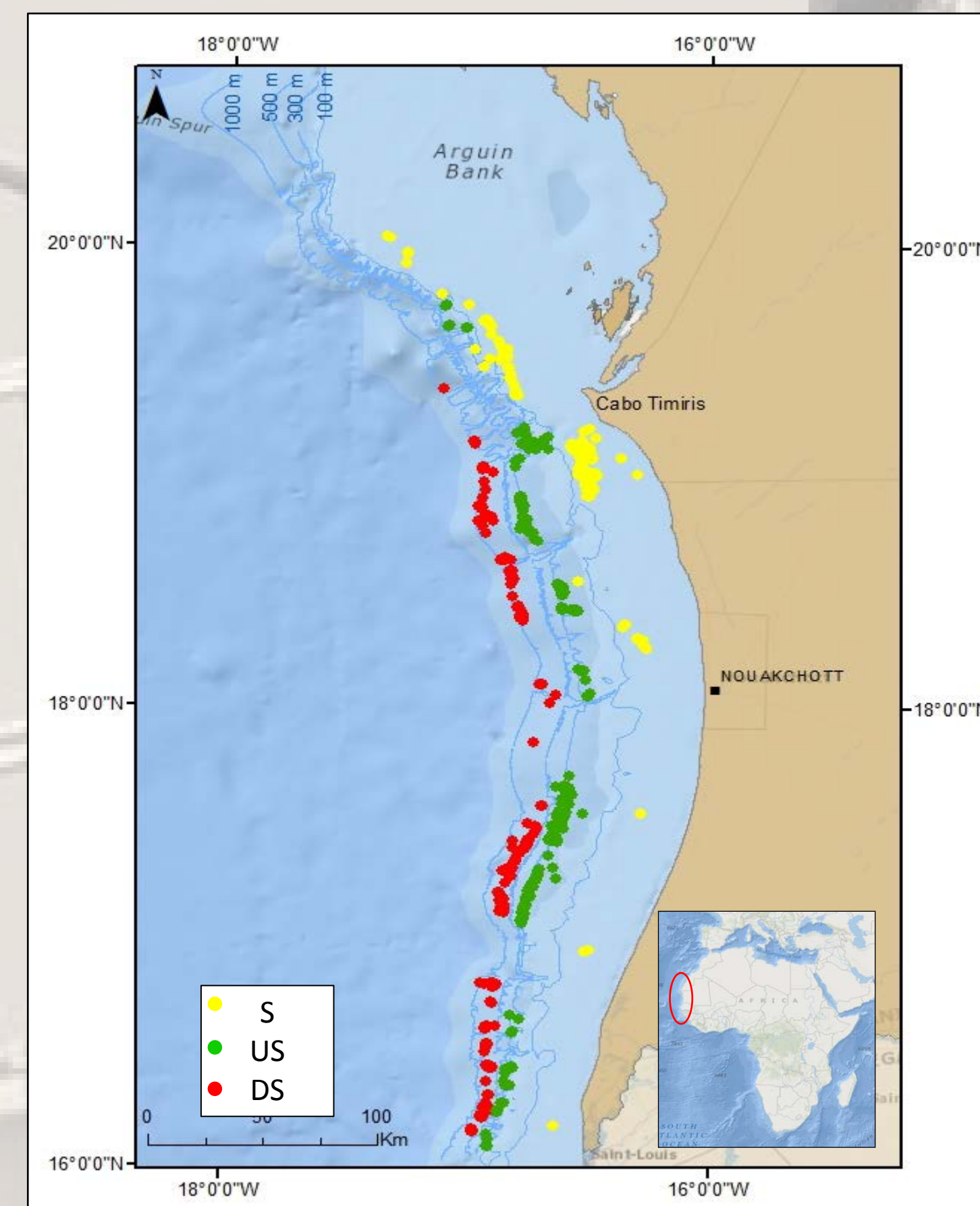


Figure 2. Studied area (EEZ of Mauritania) and fishing hauls grouped by depth strata.

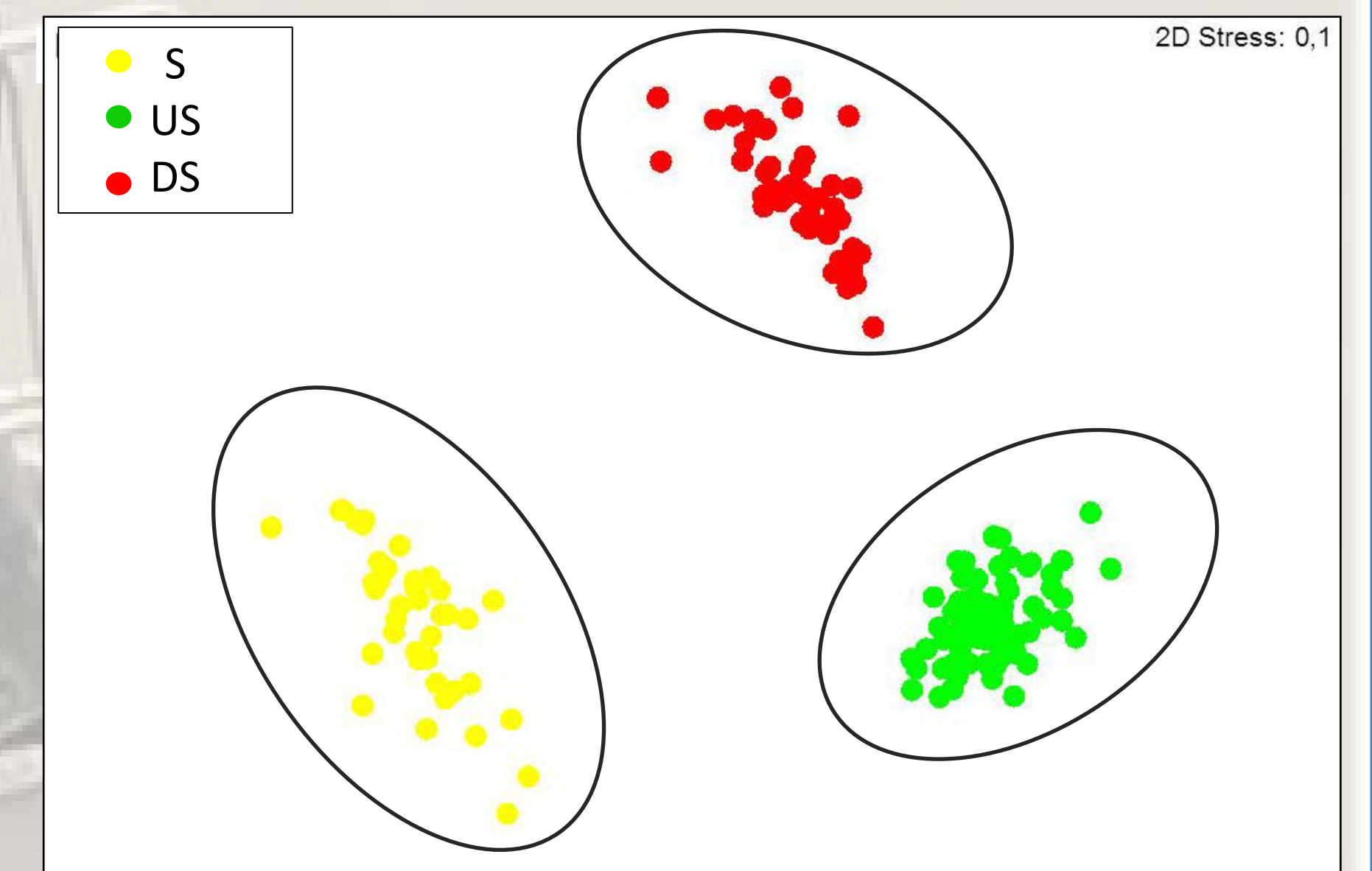


Figure 3. Multidimensional scaling (MDS) plot.

Average between-groups dissimilarity:

US-S → 95,585%

S-DS → 96,57%

DS-US → 86,41%

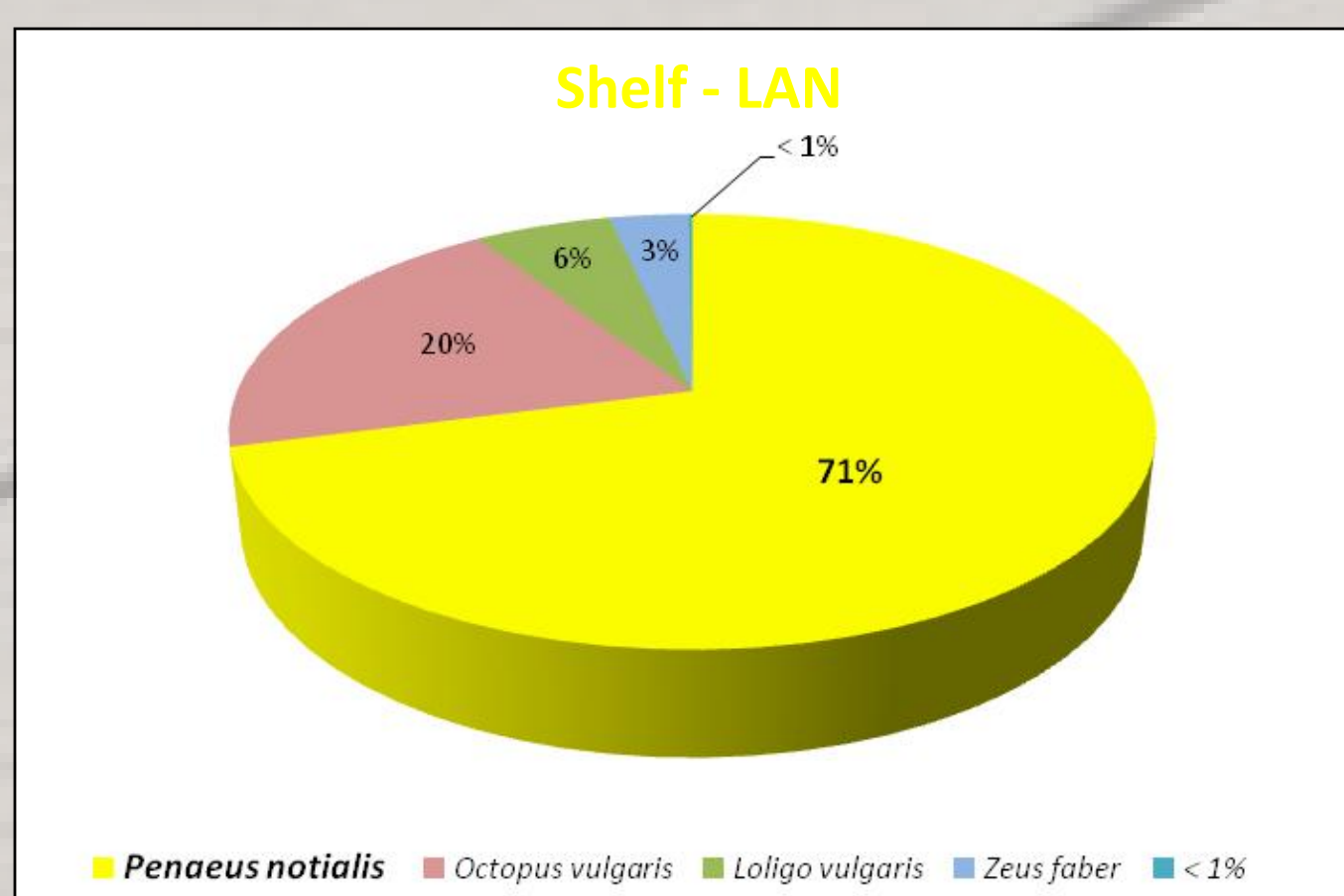


Figure 4. Percentage of retained species in the shelf community, strata P.

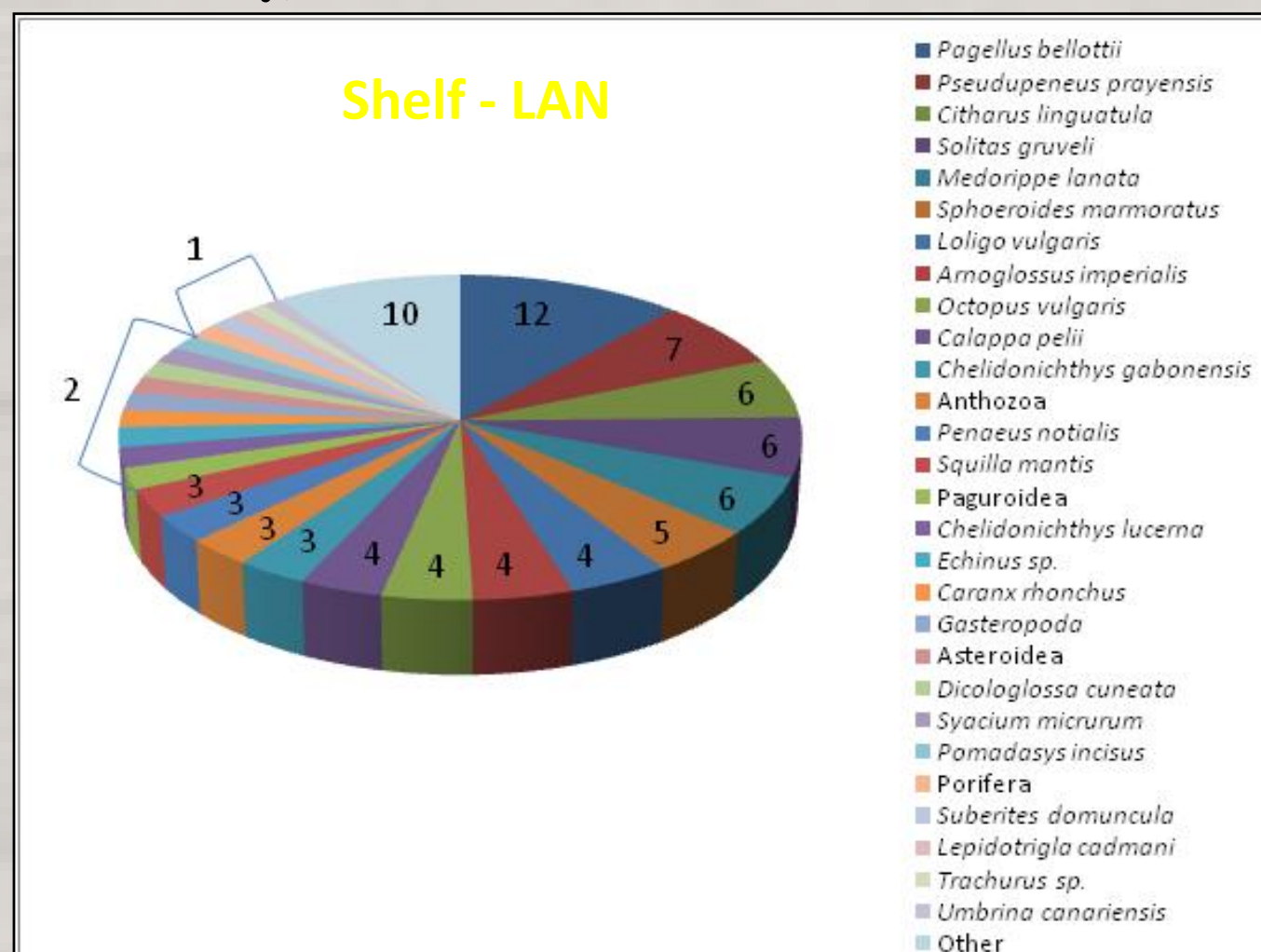


Figure 7. Percentage contribution of main discarded species to the shelf community in strata P.

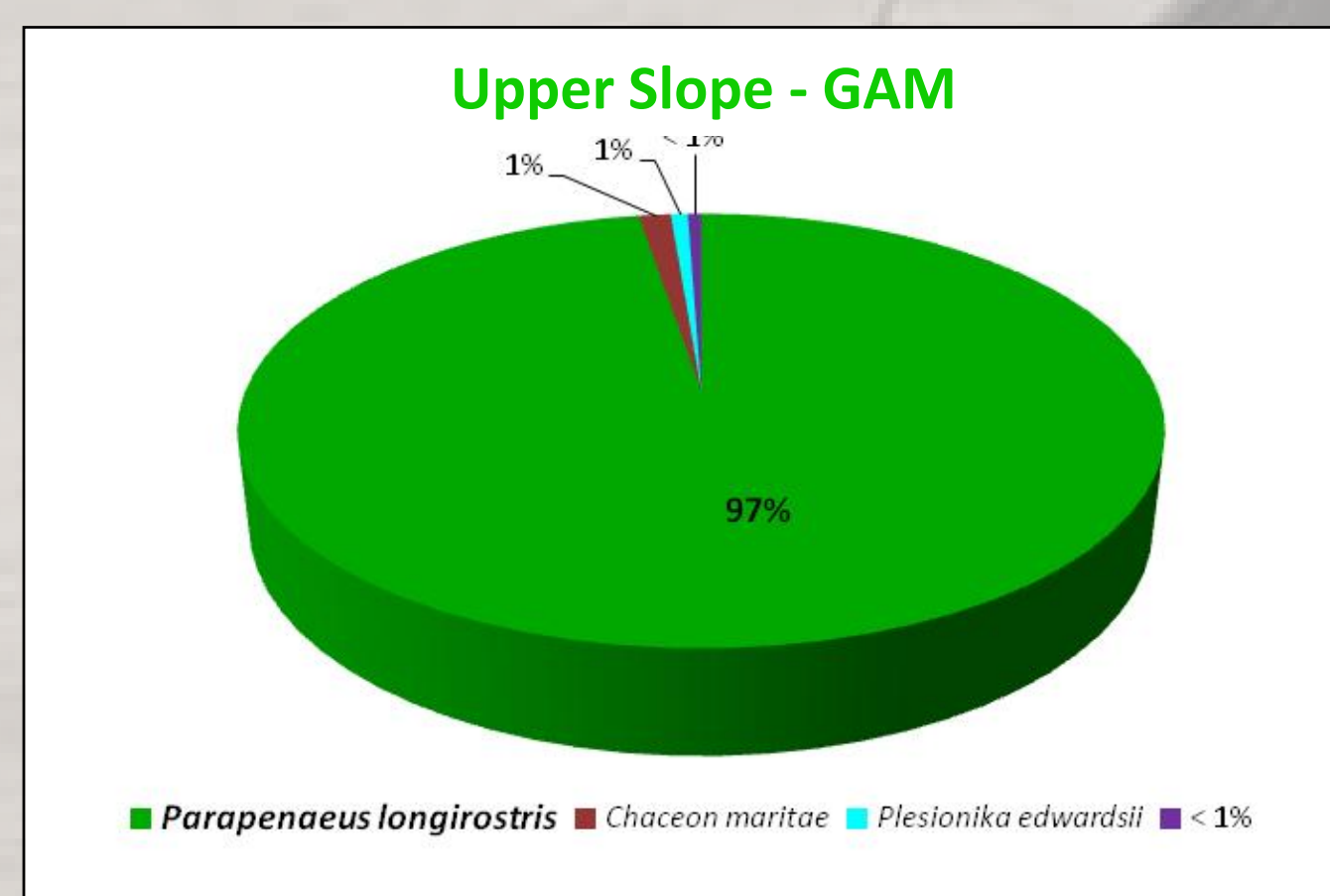
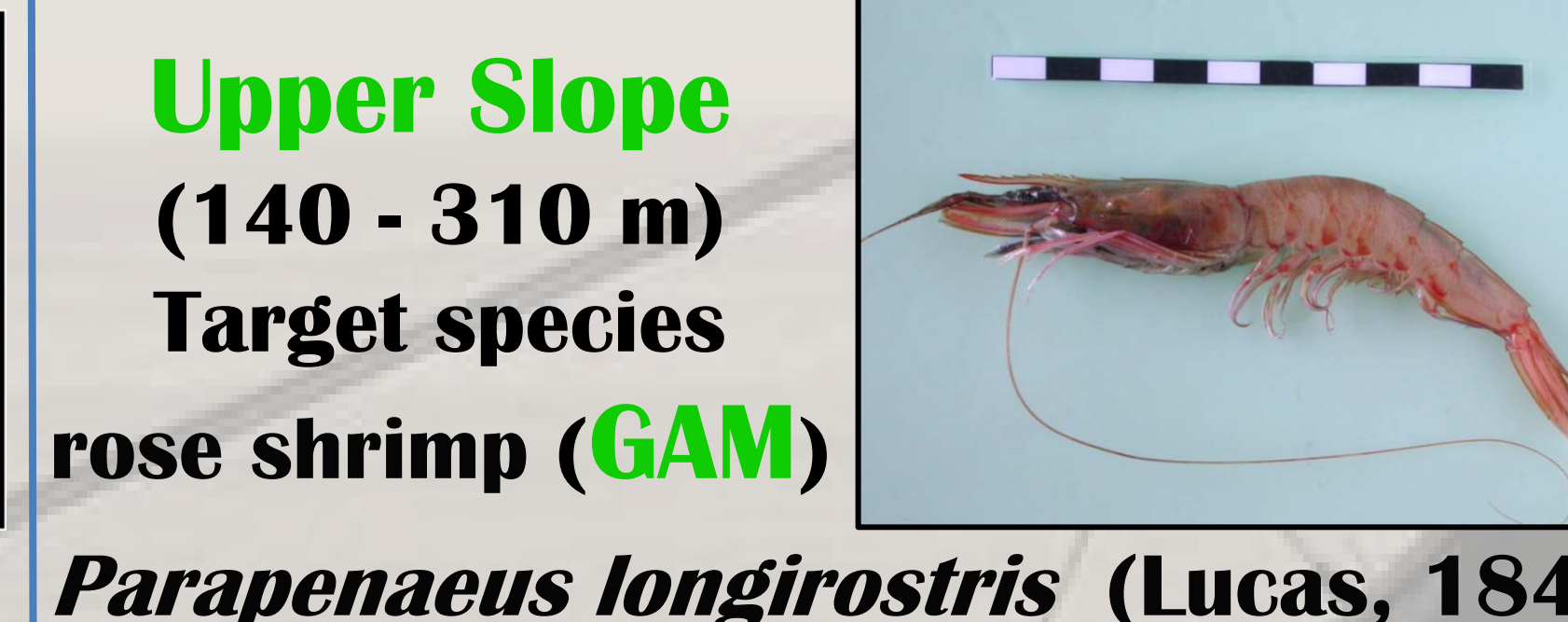


Figure 5. Percentage of retained species in the upper slope community, strata TS.

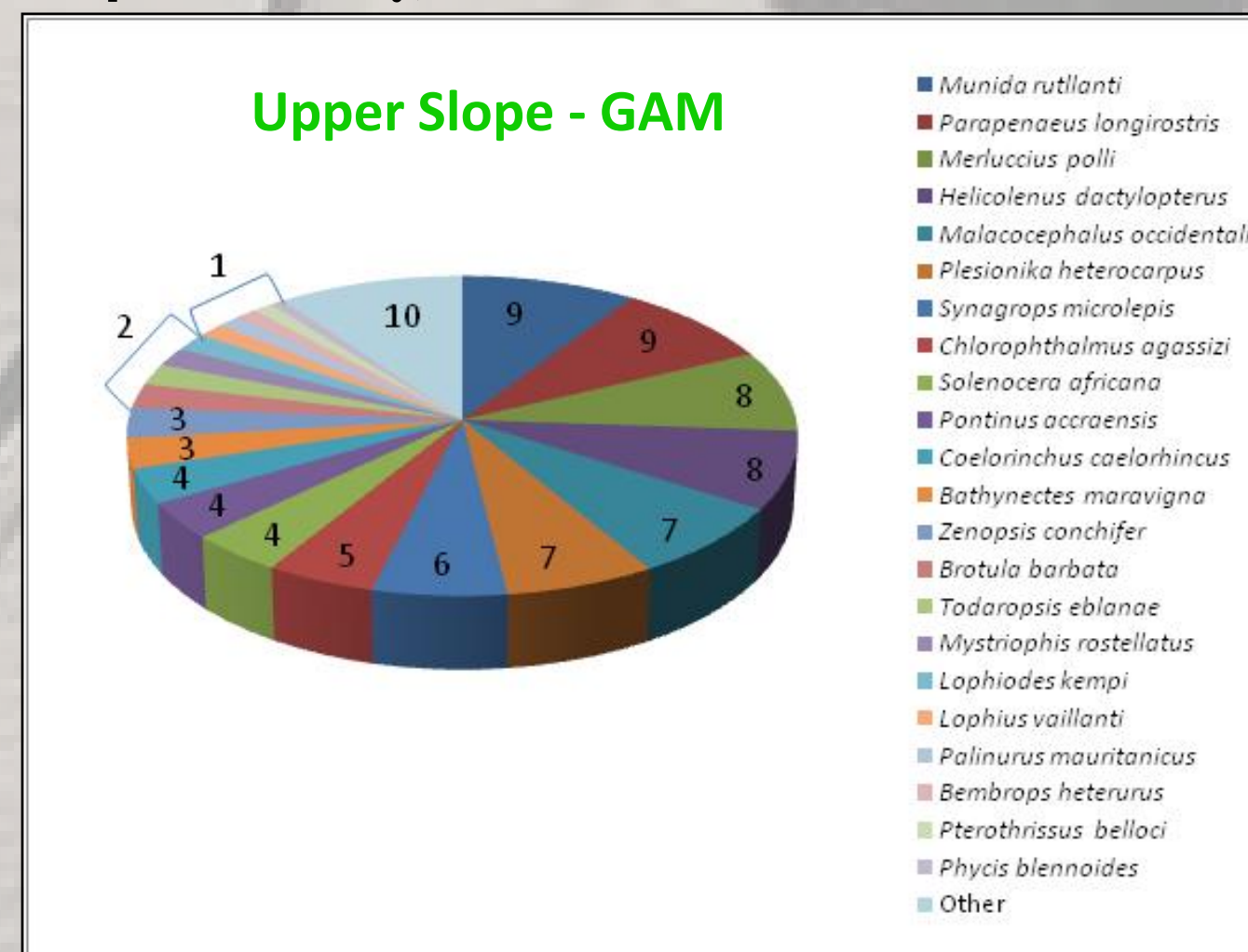


Figure 8. Percentage contribution of main discarded species to the upper slope community in strata TS.

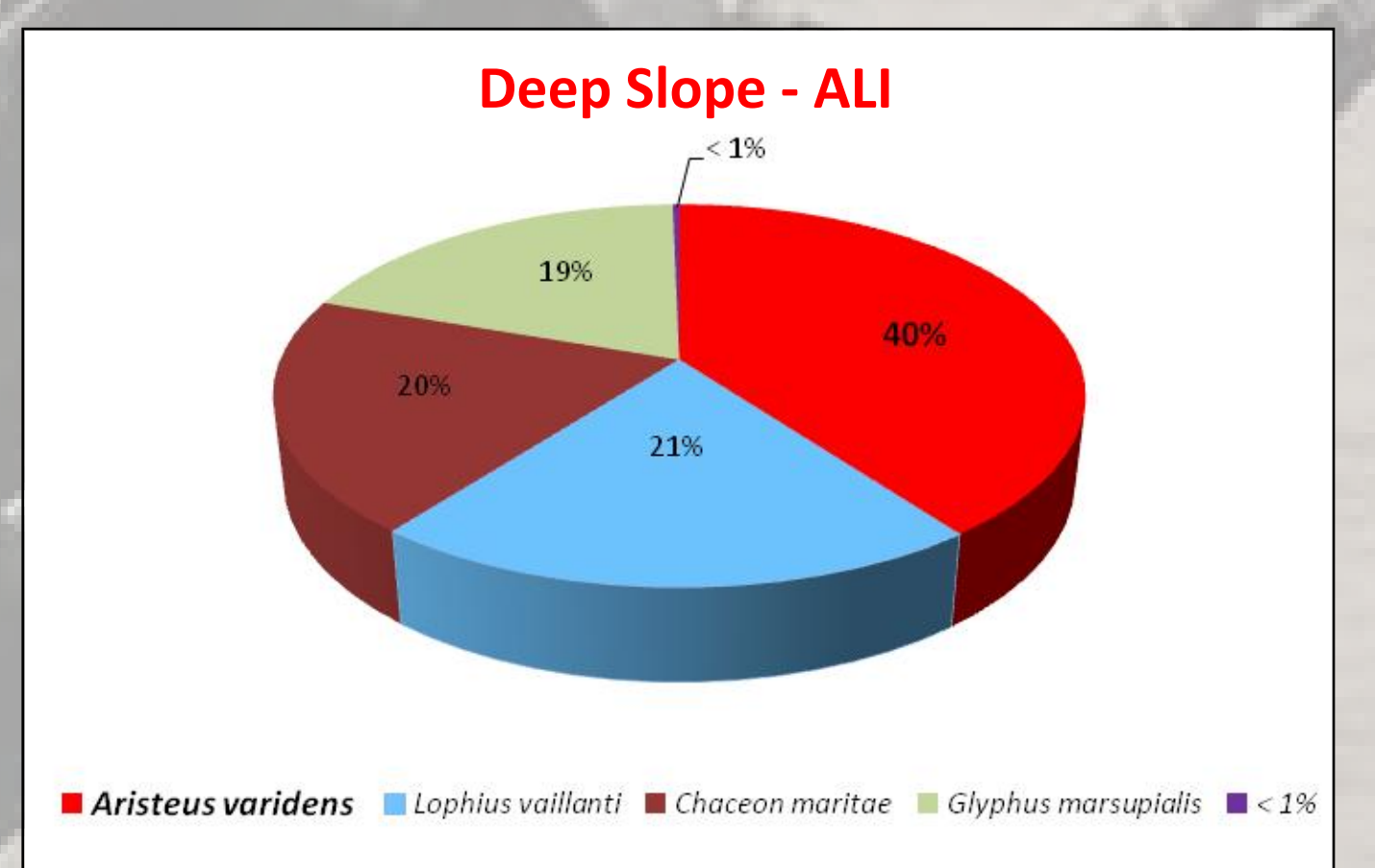


Figure 6. Percentage of retained species in the deep slope community, strata TM.

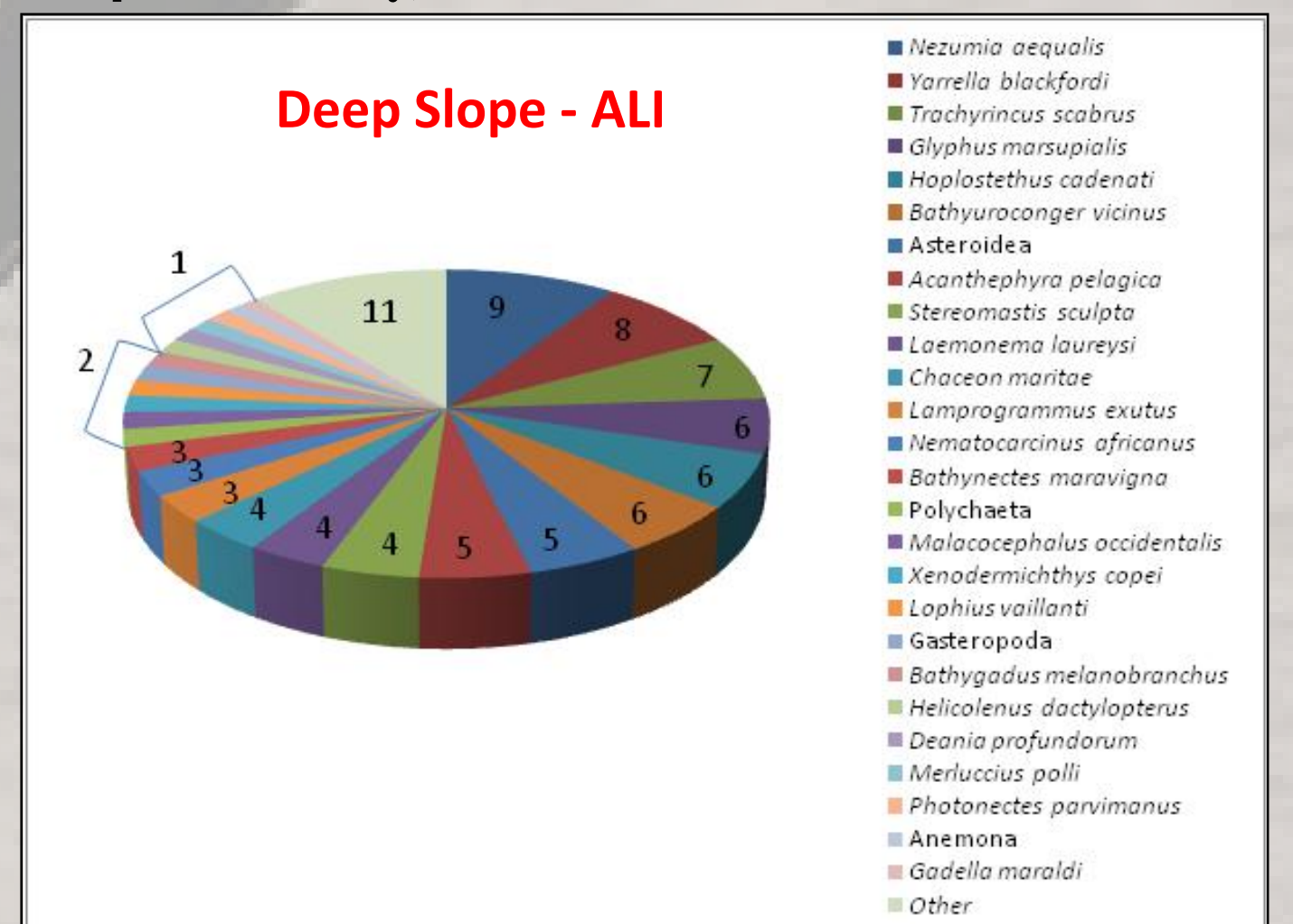


Figure 9. Percentage contribution of main discarded species to the deep slope community in strata TM.

Table 1. Number of hauls sampled, proportion of (kg discards/kg total catches), discard indexes (kg discards/kg retained catch) and capture of target species per unit effort (kg/h) in each strata.

| Strata | Number of hauls | % (D/TC) | KgD/KgRC | CPUE (kg/h) target species |
|--------|-----------------|----------|----------|----------------------------|
| S-LAN | 278 | 84,8 | 10,5 | 10,4 |
| US-GAM | 375 | 76,0 | 9,7 | 39,1 |
| DS-ALI | 343 | 63,8 | 2,7 | 14,4 |

Conclusions

- Discards accounts for 78,5% of catches of this fishery.
- A number of 357 demersal and benthic species (fish, crustaceans, cephalopods and other invertebrates in order of abundance) were identified in the discards.
- Three different communities identified: LAN-Shelf target species *P. notialis* depth strata 30 m-60 m, GAM-Upper Slope target species *P. longirostris* depth strata 140 m-310 m and ALI-Deep Slope target species *A. Varidens* depth strata 610 m-950 m).
- Volume and species composition of by-catch and discards is strongly influenced by depth. Percentage of discards and discard index decrease with depth.
- Main yields are obtained for *P. longirostris*, in the upper slope (stratum US-GAM).