Assessment of biodiversity, distribution, and abundance of deep sea scavenging megafauna

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Introduction

The deep-sea is more vast than 200 m is comparatively. The deep-sea makes up 98% of the ocean, and of that 98% humans have only explored 3% (Gage, 1993). Recent studies have been conducted in various regions and depths of the deep-sea, but knowledge on its ecosystems remains limited.

An expansion of fisheries into deeper waters since the early 1970s as a result of overexploitation of shallow water fish populations (Norse et al., 2012) has further decreased deep-sea species. Deepsea species naturally slowly and have low fecundity due to nutrient deficiency and low temperature at such depths (Brooks et al., 2015), most species, therefore, have low recruitment and are vulnerable to overexploitation (Norse et al., 2012). It is likely that many species are overfished and extirpated before scientists identify them. Bottom-trawling is a particularly stressful fishing method, as it broaches has extremely high mortality rates. The high seas are unexplored outside of Exclusive Economic Zones (EEZs) and are therefore unprotected by governments and difficult to regulate (Norse et al., 2012).

Purpose

This study’s objective was to collect baseline data on the deep-sea species to advocate for protection, management, and future research. Using a trapping method, this study assessed the biodiversity, abundance, and distributions of deep-sea scavenging megafauna in the Exuma Sound, Eleuthera, The Bahamas.

Methods

The study site was chosen because of its location at the Exuma Sound, Eleuthera, The Bahamas. Depths of 1000 m can be accessed as close as 1500 m (1500 m). Rare species of interest must be considered in this study.

A total of 22 rigs was set at depths between 403 m to 1050 m over a three-month period. Seven hundred and eleven organisms were caught and 10 species were identified. The abundance graph relates the number of organisms caught in the depth at any one time. The highest abundance of Bathynomus giganteus was found at 764 m and the highest abundance of the Bathynomus giganteus was found at 1050 m. The trend of the two species of the Bathynomus genus showed that as depth increases, abundance decreases and can be found at depths ranging between 764 m to 1050 m.

Results

Discussion

This study focused on the effects of depth on the species richness and abundance of the organisms found. The first most abundant species caught were Bathynomus giganteus, Bathynomus bowerbanki and Bowerbankia gracilis and Bowerbankia gracilis were as shown in Table 1 and were the primary focus of the data.

As shown in Figure 14, Bathynomus spp. were found at different depths, Bathynomus giganteus at lesser depths than Bathynomus bowerbanki. This could be a result of some being at different environmental preferences between the species such as temperature or depth. As shown in Figure 15, Bowerbankia spp. were found at relatively similar depths. Which could imply that they have similar environmental preferences.

Previous studies showed a decline in species richness of organisms at deeper depths (Angel et al., 1996). This trend showed up in the data, as shown in Figure 13, but only deeper than approximately 700m. This implies that deep-sea trawling must be conducted to fully understand the decline in species richness. Figure 12 showed that the abundance of species decreases as the depth increased, which could imply that there are fewer resources present for organisms at deeper depths.

While this research did fill in knowledge gaps, there were drawbacks worth noting. Firstly, the data collected was not sufficient enough to show that the found trends were significant. The selective nature of the trapping method may have limited our results. It is also worth noting that data was collected over one season in a specific location and depth range. Additionally, the depths with 95% organisms existing in Figure 8 and Figure 9 were only about 750m that because no organisms of the respective genus were caught, could be harsh environmental conditions at each depth.

Further Studies

In future studies, samples should be collected at deeper depths and locations outside of just the Exuma Sound for comparison. Adding bathypelagic mapping will provide further understanding of species assemblages and ecosystems. Additionally, because of the difficulty in identifying the substrates, other data collection methods such as deep sea cameras can be used. Future studies should also consider comparing data over different seasons for analysis for trends in seasonality.

Literature Cited


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