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TITLE: Deep-sea demersal fish species richness in the Porcupine Seabight, NE Atlantic Ocean: global and regional patterns

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ABSTRACT:

Abstract The ichthyofauna of ocean margin regions is characterised by a succession of different species occurring at different depths. This study was aimed at determining whether the resultant pattern of species richness with depth is a consequence of local factors in a given region or whether it simply reflects the global pattern of fish species distribution in the oceans. Along the ocean margin of the temperate NE Atlantic Ocean in the Porcupine Seabight and Abyssal Plain region, 48°–53°N, a total of 108 demersal fish species were identified from 187 trawls at depths from 240 to 4865 m. Fitting of species accumulation curves predicted an asymptote of 120, indicating that the fauna is 90% described. Baited cameras detected 22 scavenging species with a predicted asymptote of 24 species. Scavenging species represented a constant 22.7% (SD 3.5%) of the total species richness throughout the depth range studied. Species richness per trawl varied between a maximum of 16 at 1600 m and 4 on the abyssal plain > 4000 m with no significant influence of sea floor slope (a measure of topographic heterogeneity). Total species richness was 48 at 1600 m and 10 on the abyssal plain. There is a clear transition between slope species above 3000 m and abyssal species below. The depth at which peak species richness occurs (1100–2000 m) coincides with the depth of the permanent thermocline, presence of Mediterranean overflow water (MOW), seasonally strong currents, resuspension of particulate matter, high biomass of benthic filter feeders and pelagic biomass impinging on the slope. We suggest that these factors increase habitat and resource heterogeneity, thus supporting a wider range of fish species. The local pattern of species richness was compared with the global distribution of maximum depths of marine fish species from FishBase. Globally all three Classes of fishes, Agnatha, Chondrichthyes and Osteichthyes, showed a logarithmic decrease in species with depth, with the deepest observed species in each class occurring at 3003 m, 4156 m and 8370 m, respectively. In contrast, the local distribution of species maximum depths is idiosyncratic with a mean of 16.6 species maxima per 500 m at 1000–3000 m depth followed by three species per 500 m at 3500–4000 m and 11 species per 500 m at 5000 m. It is concluded that global patterns of species richness, as a source of recruitment, exert a weak influence on local patterns of species richness. Rather, global species richness is the sum of numerous regional and local patterns, each determined by characteristic environmental conditions.

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