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TITLE: Demersal fish distribution and habitat use within and near Baltimore and Norfolk Canyons, U.S. middle Atlantic slope

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ABSTRACT:

Numerous submarine canyons along the United States middle Atlantic continental margin support enhanced productivity, diverse and unique habitats, active fisheries, and are vulnerable to various anthropogenic disturbances. During two cruises (15 Aug?2 Oct 2012 and 30 Apr?27 May 2013), Baltimore and Norfolk canyons and nearby areas (including two cold seeps) were intensively surveyed to determine demersal fish distributions and habitat associations. Overall, 34 ROV dives (234?1612 m) resulted in 295 h of bottom video observations and numerous collections. These data were supplemented by 40, 30-min bottom trawl samples. Fish observations were assigned to five general habitat designations: 1) sand-mud (flat), 2) sloping sand-mud with burrows, 3) low profile gravel, rock, boulder, 4) high profile, canyon walls, rocks or ridges, and 5) seep-mixed hard and soft substrata, the later subdivided into seven habitats based on amounts of dead mussel and rock cover. The influence of corals, sponges and live mussels (seeps only) on fish distributions was also investigated. Both canyon areas supported abundant and diverse fish communities and exhibited a wide range of habitats, including extensive areas of deep-sea corals and sponges and two nearby methane seeps (380?430 m, 1455?1610 m). All methods combined yielded a total of 123 species of fishes, 12 of which are either new records for this region or have new range data. Depth was a major factor that separated the fish faunas into two zones with a boundary around 1400 m. Fishes defining the deeper zone included Lycodes sp., Dicrolene introniger, Gaidropsaurus ensis, Hydrolagus affinis, Antimora rostrata, and Aldrovandia sp. Fishes in the deep zone did not exhibit strong habitat affinities, despite the presence of a quite rugged, extensive methane seep. We propose that habitat specificity decreases with increasing depth. Fishes in the shallower zone, characterized by Laemonema sp., Phycis chesteri, Nezumia bairdii, Brosme brosme, and Helicolenus dactylopterus, exhibited a variety of habitat use patterns. In general, fish assemblages in the soft substrata areas (dominated by P. chesteri, N. bairdii, Glyptocephalus cynoglossus, Lophius americanus, Merluccius albidus) were different from those in more complex habitats (dominated by Laemonema spp., Hoplostethus spp., B. brosme, Benthocometes robustus, L. americanus, Dysommina rugosa). Although, when present, the dense coral and sponge cover did not statistically affect general fish assemblage patterns in hard bottom habitats, these sessile organisms markedly increased habitat complexity, and some fish species exhibited close association with them. Fish species compositions in the two canyons were not substantially different from the surrounding slopes. However, the diversity of habitats within both the canyons and seeps exerted an important influence on assemblage structure. At least for some species (e.g., B. brosme) canyon and seep environments may be a refuge from intensive bottom fishing activities. We frequently observed evidence of commercial and recreational fishing activity (lost gear on bottom and fishing boats in the area) throughout the canyons and some resulting habitat damage. Conservation measures for the unique and more vulnerable areas (seep and coral habitats) have recently been approved.

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