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TITLE: Habitat Differences in Deep-Sea Megafaunal Communities off New Zealand: Implications for Vulnerability to Anthropogenic Disturbance and Management

AUTHOR: ['Ashley A. Rowden', 'Daniel Leduc', 'Malcolm R. Clark', 'David A. Bowden']

ABSTRACT:

Research on benthic communities in the deep sea has focused largely on habitats in isolation, with few studies considering multiple habitats simultaneously in a comparable manner. The present study aimed to determine the structural differences in benthic communities of continental slope, seamount, canyon, vent, and seep habitats, and assess their relative vulnerabilities to disturbance from bottom trawling and potential seabed mining. Megafaunal invertebrate communities of these habitats were sampled in two regions off New Zealand, in four depth strata between 700 and 1500 m, using an epibenthic sled and a beam trawl. Patterns of community and trophic structure, and the potential influence of environmental variables, were determined using multivariate analyses. The difference in community structure between regions was greater than among habitats and depth strata. Levels of food availability may explain regional differences in community structure, although some influence of fishing disturbance is also possible. Differences in community and trophic structure were most pronounced between the chemosynthetic vent and seep habitats, and other habitats. Differences among these other habitats within a region were inconsistent, except that canyon and slope communities always differed from each other. Community and trophic structural patterns were partly explained by the environmental differences observed among habitats. The relative vulnerabilities of benthic communities to human disturbance in the two regions were determined based on patterns of abundance and feeding mode of the megafauna. Communities of vent and seep habitats were assessed to be more vulnerable to disturbance than those of the other habitats based on a number of habitat-related attributes. However, the relative vulnerability of megafaunal communities at slope, canyon, and seamount habitats could not confidently be assessed on a habitat basis alone. The results of the present study have implications for how regional and habitat differences in benthic communities are incorporated into spatial management options for the deep sea.

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