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TITLE: Seamount benthos in a cobalt?rich crust region of the central Pacific: conservation challenges for future seabed mining

AUTHOR: ['Thomas A. Schlacher', 'Amy R. Baco', 'Ashley A. Rowden', 'Timothy D. O?Hara', 'Malcolm R. Clark', 'Chris Kelley', 'John F. Dower']

ABSTRACT:

Abstract Aim The benthic fauna of seamounts typically includes organisms that are slow?growing, long?lived and sensitive to mechanical disturbance, making seamounts susceptible to anthropogenic impacts. Such impacts may arise from mining cobalt?rich crusts, envisaged for seamounts in the central North Pacific; this scenario requires that environmental guidelines for mining operations on seamounts be developed. Here, we provide the biological information essential for effective conservation planning of deep?sea features targeted for such mining. Location Central North Pacific, Hawaiian Seamount Chain. Methods Spatial analysis of seamount benthos using a large biological dataset (> 600 taxa) obtained from 144 submersible dives (depth range: 113?1985 m) on 27 seamounts covering a distance of over 2200 km of ocean. Results Benthic assemblages of invertebrates are structurally different between seamounts located inside and outside a region with cobalt?rich crusts. This spatial contrast results from variations in species composition and relative abundance of species, rather than differences in species richness, challenging historical notions of an impoverished cobalt?rich crust fauna in the region. Seamount assemblages also have high species turnover with depth and distance at the scale of individual seamounts, but geographic separation was a poor predictor of ecological separation for the region at large. Main conclusion Several implications for the design of spatial management and conservation tools with respect to mining emerge: (1) conservation of seamounts outside the cobalt?rich crust region is unlikely to capture the full range of ecological features found inside the region; (2) conservation areas need to encompass a broad bathymetric gradient; (3) ideally, mining blocks on individual seamounts should not exceed 2 km in length. Overall, the life history characteristics and morphological traits of the deep?water invertebrate fauna typical of seamounts in the region imply that any recovery from mechanical impacts is likely to be very slow.

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