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TITLE: Cold Seep Epifaunal Communities on the Hikurangi Margin, New Zealand: Composition, Succession, and Vulnerability to Human Activities

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ABSTRACT:

Cold seep communities with distinctive chemoautotrophic fauna occur where hydrocarbon-rich fluids escape from the seabed. We describe community composition, population densities, spatial extent, and within-region variability of epifaunal communities at methane-rich cold seep sites on the Hikurangi Margin, New Zealand. Using data from towed camera transects, we match observations to information about the probable life-history characteristics of the principal fauna to develop a hypothetical succession sequence for the Hikurangi seep communities, from the onset of fluid flux to senescence. New Zealand seep communities exhibit taxa characteristic of seeps in other regions, including predominance of large siboglinid tubeworms, vesicomyid clams, and bathymodiolin mussels. Some aspects appear to be novel; however, particularly the association of dense populations of ampharetid polychaetes with high-sulphide, high-methane flux, soft-sediment microhabitats. The common occurrence of these ampharetids suggests they play a role in conditioning sulphide-rich sediments at the sediment-water interface, thus facilitating settlement of clam and tubeworm taxa which dominate space during later successional stages. The seep sites are subject to disturbance from bottom trawling at present and potentially from gas hydrate extraction in future. The likely life-history characteristics of the dominant megafauna suggest that while ampharetids, clams, and mussels exploit ephemeral resources through rapid growth and reproduction, lamellibrachid tubeworm populations may persist potentially for centuries. The potential consequences of gas hydrate extraction cannot be fully assessed until extraction methods and target localities are defined but any long-term modification of fluid flow to seep sites would have consequences for all chemoautotrophic fauna.

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