BIODIVERSITY, CONNECTIVITY & ECOSYSTEM FUNCTION OF DEEP-SEA ORGANIC-RICH WHALE-BONE AND WOOD-FALL HABITATS: A COMPARATIVE EXPERIMENTAL APPROACH.

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Organic-rich habitats islands such as whale-bones and wood-falls may contribute fundamentally to biodiversity, evolutionary novelty, connectivity and ecosystem function within the deep sea, yet over large spatial scales these features have been largely unexplored. We discuss our experimental approach to quantitatively investigate bathymetric and regional variations in biodiversity, connectivity and ecosystem function at deep-sea organic-rich habitats. Four identical benthic landers holding replicate wood, bone and inorganic hard substrates were deployed for 15 months to depths of 1500 and 3000 m, spaced ~400 km along the Washington-Oregon margin. This approach allowed for the collection of taxonomically and functionally diverse macrofaunal communities, key ecosystem engineering (decomposer) taxa, and estimations of substrate decomposition rates. Multivariate analyses revealed that community composition and structure varied with substrate type, location and depth. The abundance of wood-boring bivalves (genus Xylophaga) was greatest in wood substrates deployed to 1500 m, which resulted in a loss of 89% (±3.9%) of the dry wood weight and facilitated the colonisation of an abundant and diverse wood-fall community. Dorvilleid polychaetes (likely grazing upon chemosynthetic bacteria) dominated the 1500 m wood fall assemblages, along with ampharetid polychaetes and triclad platyhelminthes, which have not been observed previously in these deep-sea habitats. Recruitment of Xylophaga was limited on the deeper (3000 m) wood substrates, apparently preventing colonization by other macrofauna, further highlighting the importance of Xylophaga as an ecosystem engineer in modulating habitat availability and influencing macrofaunal community structure.