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EFFECT OF ORGANIC ENRICHMENT AND HYPOXIA ON THE BIODIVERSITY OF BENTHIC COMMUNITIES IN NARRAGANSETT BAY

Excessive input of nitrogen to coastal waters leads to eutrophication and hypoxia that reduce biodiversity and impair key ecosystem services provided by benthic communities; for example, fish and shellfish production, bioturbation, nutrient cycling, and water filtration. Hypoxia is commonly defined in the literature as dissolved oxygen <2.0 mg/l, but this fails to take into account sub-lethal effects on benthic organisms (such as lowered growth rate) that occur at levels up to 4 or 5 mg/l. Constraints on the upper limit of biodiversity imposed by organic overenrichment (total organic carbon in sediments) and hypoxia in the coastal waters of the northeastern US result in a loss of potential biodiversity, shown by a 95th quantile regression of species richness versus dissolved oxygen. The mean species richness of benthic community at stations in seasonally-hypoxic areas of Narragansett Bay, Rhode Island was significantly lower than those in normoxic areas, as was a multidimensional scaling of Bray-Curtis species abundances. Many rare species found in normoxic areas were not present in hypoxic areas. Eutrophication-related reductions in benthic community ecosystem production functions lead to a loss of things valued by the human population surrounding and using the Bay.