

Soft-Sediment Biodiversity Monitoring: Infaunal Community Variation in the Rhode River

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Human population expansion has led to increasing levels of anthropogenic influence on estuarine ecosystems. These nearshore marine environments perform many valuable ecosystem services and contain high levels of biodiversity. Marine Global Earth Observatories (MarineGEO), a collaborative worldwide research program funded by the Smithsonian Institution, examines estuaries and other coastal ecosystems across large spatial and temporal scales in order to better understand and protect marine biodiversity. While MarineGEO has previously examined mangroves, coral reefs, and seagrass beds, little study has been done on soft-sediment habitats. This project established MarineGEO's biodiversity sampling protocol for soft-sediment ecosystems and conducted the first comprehensive habitat-based infauna survey of the Rhode River. During the summer of 2014, infaunal invertebrate communities were sampled across various soft-sediment habitats over the course of three days. Sites were randomly chosen following a proportion-based sampling design. A total of 153 samples were collected along with abiotic site characteristics. Due to time constraints, only 46 samples have been identified to species level and analyzed thus far. Subsample analysis resulted in the identification of 41 species, representing 5 different phyla. Infaunal community composition was found to vary significantly between habitat types. Abundance, richness, and diversity were the highest among artificial habitats. Sediment composition within artificial habitats was similar, offering an explanation of community trends. Similarity found within habitats can be explained by the prevalence of dominant species or low diversity across the habitat. Species distributions reflected life-history characteristics and habitat preferences, showing that infaunal invertebrate biogeography might be more complex than otherwise predicted. Overall, the study found that habitat-based sampling is an appropriate means of understanding and monitoring infaunal biodiversity. By establishing MarineGEO's soft-sediment sampling protocol, this project set a precedent in a long line of ecological studies of valuable coastal soft-sediment communities.