

Delaware Bay Benthic Mapping Project: Using Acoustical Techniques in an Estuarine Setting to Identify and Map Bottom Habitat and Sub-Bottom Sediments

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Abstract

The Coastal Program of the Delaware Department of Natural Resources and Environmental Control is carrying out a bottom and sub-bottom imaging project to identify and map the benthic habitat and sub-bottom sediments of Delaware Bay. This project integrates the use of three types of acoustical systems: RoxAnn seabed classification, chirp sub-bottom profiling, and multi-beam bathymetric mapping. Verification of the acoustic data with bottom and sub-bottom sediments is performed through the collection of grab and core samples and underwater video images.

The RoxAnn system measures bottom hardness and roughness along a ship's track and, when correlated with ground-truth grab samples and video, is used in the classification of bottom sediments. RoxAnn is being used to constrain the distribution of bay bottom sediments and has identified the spatial extent and relative density of oyster shell on the bay bottom. Sub-bottom profiles, collected using an Edgetech X-STAR chirp sonar system, are integrated with the RoxAnn data to constrain the thickness and continuity of bottom sediments and to map potential/past offshore sand borrow sites that can be/have been used for beach replenishment. The chirp data has been integrated with additional information from sediment cores to develop maps of suitable sand deposits for replenishment based upon location, thickness, overburden, and grain size. The sub-bottom data can also be used to study the deposition and/or erosion of sediments and the recent evolution of the estuary. The morphology of select areas of the bay bottom is being mapped using a Reson 8124 multibeam bathymetric system. The system has been used to map high-interest areas of the bay including natural and artificial reefs, oyster beds, and critical fish habitat. The bathymetry of downstream reaches of several rivers that drain into the bay has also been mapped to constrain their channel morphology.