

DELAWARE BAY BENTHIC MAPPING PROJECT: PROVIDING CONSTRAINTS ON CONSERVATION OF THE ESTUARY

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The Coastal Program of the Division of Soil and Water Conservation within Delaware's Department of Natural Resources and Environmental Control, the University of Delaware, the Partnership for the Delaware Estuary, and the New Jersey Department of Environmental Protection are partnering in an acoustic imaging project to identify and map the bottom and sub-bottom sediments of Delaware Bay. The goal of this project is to provide data that can be used in the delineation of the Bay's benthic habitats and sub-bottom features. It is designed to provide a base map for the bay bottom and sub-bottom that current and future studies can use as a framework. This critical information, compiled into a GIS database, provides decision makers with much needed scientific data that can be used in developing policies for the conservation of this estuary.

Delaware Bay is both ecologically and economically important. It is home to the world's largest population of horseshoe crabs, as well as, oysters, sturgeon, and a variety of commercial and recreational fishes. Approximately 2,900 ships transit the bay yearly arriving to and departing from the fourth largest port complex in the United States. The complex is the largest port for petroleum on the East Coast. The bottom of Delaware Bay represents almost one quarter of the surface area of the State of Delaware and is one of its least understood areas.

The project integrates the use of three types of acoustical systems: RoxAnn seabed classification, chirp sub-bottom profiling, and multibeam 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. A RoxAnn acoustic system measuring bay bottom hardness and roughness is correlated with ground-truth grab samples and video to classify bottom sediments. The RoxAnn data is being used to map the distribution of these sediments and has identified the spatial extent and relative density of oyster shell and the distribution of coarse-grained sediments that are essential habitat for sturgeon. 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 offshore sand borrow sites that can be used for beach replenishment. The chirp data has been integrated with additional information from sediment cores to develop maps of suitable offshore sand deposits based upon location, thickness, overburden, grain size. Using the RoxAnn sediment classification data, these potential sites are then delineated to areas that would minimize the effects upon essential fish habitat. The morphology of select areas of the bay bottom is being

mapped using a Reson 8124 multibeam bathymetric system. The system has thus far been used to map selected high-interest areas of the bay including artificial reefs, *Sabellaria vulgaris*, and *Hydroides dianthus* reef-like habitats, and oyster beds. The downstream reaches of several rivers that drain into the middle portion of Delaware Bay have also been mapped to assess the bathymetry and changes in channel morphology of these shallow tidally influenced systems.