

Delaware Sea Grant Project:

AUV-based geoacoustical mapping of benthic habitats in Delaware Bay (R/ECO-6)

Investigators:

Arthur Trembanis and Doug Miller, University of Delaware

Project Abstract:

We propose to map selected, high priority hard bottom benthic habitats in Delaware Bay using newly acquired AUV hardware and state-of-the-art software. Although widely recognized to play key roles in the ecology and functioning of estuarine ecosystems, hard bottom habitats in particular have not been studied commensurately with their perceived importance. Despite over 60 years of scientific study of the benthos in this estuary, there has been no attempt at a synthesis nor construction of habitat maps. Our specific objectives for this project are: 1) Compile, synthesize, and overlay in a geospatial framework decades of existing survey data and select priority hard bottom sites for Delaware Bay; 2) Field-survey these highest priority areas to validate technology and develop protocols for shore- and small-boat based AUV operations; and 3) Assess interannual variability by re-mapping selected sites and to complete mapping of habitats identified during first-year operations.

Based on our review of the literature for historical surveys, we have chosen several benthic hard bottom communities known from Delaware Bay. The high priority habitats we have selected are of recognized resource management importance and include 1) those intensively managed for productivity (oyster grounds), 2) sites used for sand mining and storage for beach nourishment projects (*Sabellaria* beds), and 3) locations targeted for recreational fishing (serpulid reefs and nodule or “coral” beds).

We will employ the newest high resolution mapping technology (Geoswath interferometric bathymetric sonar) from a programmable autonomous underwater vehicle platform (UD Gavia AUV). Advanced software, Geotexture®, will allow us to produce map layers semi-automatically based on several characteristics of the return echoes. We have demonstrated in previous mapping efforts that this technology has several distinct advantages over traditional surface vessel-based operations and results in much greater data density and quality as well as the ability to work directly from shore and in shallow zones inaccessible to a surface vessel. Ground truthing acoustic results will be accomplished from smallboats (PONAR grabs and dredges) and coring by SCUBA as needed.

Existing data now offer a tantalizing glimpse of trends in the benthos over a time of great ecosystem modification, including eutrophication and partial recovery, loss of the menhaden fishery, and considerable industrialization and coastal development in the watershed. This project will provide for the first time the most comprehensive tabulation of studies, from existing data sources and sites of hard bottom communities in Delaware Bay. Our field operations will refine and develop methodologies for mapping these hard bottoms and for the first time establish a baseline survey for selected habitats at one time using a uniform methodology.