Motivation

The goal of this study is to provide new information on the spatial extent of hard-bottom habitats in Delaware Bay and the physical conditions that affect these in the intertidal and offshore regions. Understanding the feedbacks between sediment transport and hard-bottom habitats is important since these regions are highly productive and support enhanced biodiversity, including commercial and recreationally fished species. A comparison to offshore hard-bottom habitats will provide insight on how organisms adapt to different hydrologic regimes.

Future Work

Initial surveys of the bay to locate hard bottom areas begin in June 2009. We will choose target sites for longer instrumented studies beginning in the fall of 2009, continuing through the spring of 2011. Repeat mapping using the AUV will occur annually.

Data

To determine the feedbacks between biological and physical processes in the hard bottom areas we need to measure several properties.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
<th>Rationale</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathymetry</td>
<td>Bottom topography and relief</td>
<td>Locate hard bottom areas</td>
<td>AUV Geoswath</td>
</tr>
<tr>
<td>Backscatter</td>
<td>Strength of sound reflection</td>
<td>Determine bottom type</td>
<td>AUV, Side-scan sonar, rotary sonar</td>
</tr>
<tr>
<td>Currents/Waves</td>
<td>Predominant speed and direction</td>
<td>Determine sediment mobilization</td>
<td>ADCP</td>
</tr>
<tr>
<td>Turbidity</td>
<td>Water clarity due to suspended sediment</td>
<td>Determine constraints on ecology</td>
<td>ADCP, AUV turbidity sensor</td>
</tr>
<tr>
<td>Sediment Properties</td>
<td>Bed composition and grain size</td>
<td>Determine suitable substrate</td>
<td>Ponor benthic grab sampler</td>
</tr>
<tr>
<td>Water Quality</td>
<td>Temperature, salinity, dissolved oxygen, chlorophyll concentration</td>
<td>Determine range of chemical properties</td>
<td>AUV sensors</td>
</tr>
</tbody>
</table>

Summary

We will use interferometric sonar mounted on an AUV to locate hard bottom areas in Delaware Bay. These environments are important hotspots for ecological diversity and abundance in Delaware Bay. Target areas will be studied seasonally for two years to determine physical and biological feedbacks. Understanding the hydrological and geological conditions necessary to support these ecosystems will aid in management of these areas.

Acknowledgements

Thanks to Jill Brown, Dr. Danielle Kreeger and Dr. Doug Levin. This project is part of “AUV-based Geoacoustical Mapping of Benthic Habitats in Delaware Bay” supported by Delaware Sea Grant project number R/ECO-6.

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