

## Coastal Observation Technology System Project Summary – 2006

**Project Name/Title:** Center of Excellence for Coastal Ocean Observation and Analysis

**Date Project Initiated:** August 2002

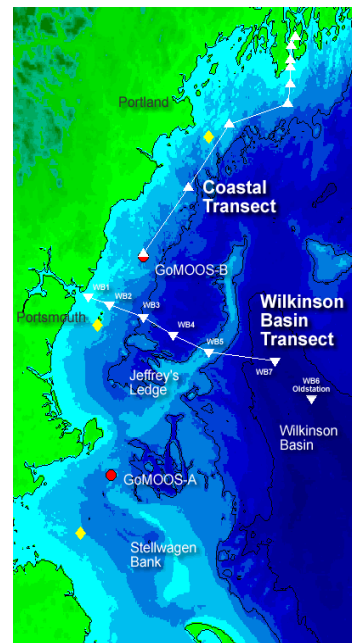
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### Brief Project Summary:

The goal of this project is to create a monitoring system for the coastal marine ecosystem of the western Gulf of Maine as part of the Integrated Ocean Observing System. Research conducted by UNH's Coastal Observing Center is laying the foundation for an observing system with the capability to detect, model, and ultimately forecast changes in the ecosystem. Our research will lead to an understanding of the factors controlling the ecosystem, and thus will play a role in decisions related to ecosystem-based management. The system is designed to serve the information needs of fisheries and coastal resource managers, educators, and scientists. The western Gulf of Maine region is centered at the entrance to the Great Bay Estuary at Portsmouth Harbor, and extends north to the Kennebec River Estuary and south to Cape Cod. The figure directly right illustrates this region.



Benefits from the observing system will be:

- Effects of climate and human-induced influences on the ecosystem will be understood.
- Information generated will facilitate ecosystem-based fisheries management.
- Methods demonstrated can be translated to other coastal ocean observing systems.

The system includes three subsystems:

- Data acquisition: A combined effort using remote sensing and *in situ* monitoring with an emphasis on developing automated methods amenable to operational use.
- Data management and distribution: WebCOAST is the portal for our data as well as other information including historical archives and inventories of monitoring programs.
- Modeling and analysis: Coupled physical-biological models for the region and other products created will benefit scientists, resource managers, teachers and students.

### **Accomplishments to Date:**

- Since June 2004, a comprehensive suite of ecological and environmental data have been acquired at 16 stations on a monthly basis. The data are routinely served on WebCOAST.
- A time series beginning in 2000 of 8-day averaged SST and chlorophyll satellite observations for the Northeast are available on WebCOAST. The data are from the MODIS sensors.
- Our robotic sun photometer (SeaPRISM) at the Martha's Vineyard Coastal Observatory is producing multiyear ocean color ground truth data for MODIS satellite improvement work.
- A custom-built flow-through system was used to measure the seasonal pCO<sub>2</sub> cycle in the western Gulf of Maine; results were reported at a conference in Woods Hole in Aug. 2005.
- A buoy utilizing new nutrient and optical sensors was deployed in the Great Bay between April and December 2005 and hourly data displayed in the context of historical trends.
- A MIP sensor targeted for detecting saxitoxin, the "red tide" toxin, has been developed capable of detecting very low levels (500 ppb) of caffeine which is an analyte to saxitoxin.
- The Gulf of Maine Council searchable database of Gulf of Maine monitoring programs housed on WebCOAST was made publicly available on the Council's website in 2005.
- As one of 22 member organizations comprising the Gulf of Maine Ocean Data Partnership, our data and metadata are registered with US and Canadian data discovery portals.
- An ecological community index characterizing seasonal patterns in the zooplankton assemblages in 2002-2003 was published in *Marine Ecology Progress Series* in 2005.
- The 2004 Earth Exploration Toolbook chapter, entitled "When is Dinner Served? Predicting the Spring Phytoplankton Bloom in the Gulf of Maine," has received national acclaim.
- In collaboration with GoMOOS, we have conducted two Educator Institutes at UNH in June 2004 and 2005. The twenty teachers attending each workshop gave us excellent scores.
- Workshops were held in July 2004 and 2005 focusing on integrating ocean observing data with ecosystem models to meet the needs of resource managers in the Gulf of Maine.

### **Current Year Objectives:**

- A remote-sensing reflectance model for the Western Gulf of Maine will be parameterized and validated and used to map optically active constituents using remote sensing data.
- Environmental conditions in 2003-2006 will be analyzed to assess the impact of the 2005 record-high freshwater runoff on the ecosystem and to investigate causes of the red tide.
- A transport model will be used to investigate the fate of cod larvae hatched from eggs spawned at known cod spawning sites in the western Gulf of Maine.
- We will begin publishing a semi-annual Report on the Status of the Western Gulf of Maine.

**Partners:** Gulf of Maine Ocean Observing System (GoMOOS), Northeast Fisheries Science Center, Gulf of Maine Council, Cooperative Institute for Coastal and Estuarine Technology (CICEET), Great Bay and Wells National Estuarine Research Reserve, Seacoast Science Center, the Northeast Consortium, and modelers at UMaine and UMass-Dartmouth.