



Real-time Coastal Observation Network (ReCON)



The need for development of regional coastal observing systems has been highlighted by the NOAA Strategic Plan, the National Ocean Partnership Program, the Ocean Research Priorities Plan, and Ocean.US. Continual assessment of the status and trends in coastal environments permits identification of perturbations that may signal changes in the ecosystem, puts current trends into an historical framework, allows us to differentiate true environmental change from variance, and provides a context to assess the impact of predicted changes. The goal of the ReCON project is to develop a national network of low cost coastal buoys capable of seabed to sea-surface observations. The ReCON system has been designed from the beginning with a built-in capability to expand buoy observation sites to meet regional and national integrated observing system requirements.

PROJECT DESCRIPTION

While legacy systems currently provide the majority of data for a national Integrated Ocean Observing System (IOOS), a high bandwidth system using commercial networking standards will be required to provide real-time whole water column observations of physical, chemical, and biological variables. The ReCON project will include deployment of real-time *in situ* biological and chemical sensors, including fisheries acoustics for biomass estimation, in support of NOAA IOOS. On-water observation networks will include the development of fiber optic cabled and high-bandwidth wireless systems utilizing advanced database management systems. The project will establish a test bed for observing system network design studies and develop enhanced verification capabilities as outlined in NOAA's 5-Year Research Plan. In addition to advancing NOAA's scientific real-time data acquisition capability, the project is making relevant data accessible to the public and educational institutions through a web-based data interface accessible using current internet technology.

WHAT ARE THE GOALS?

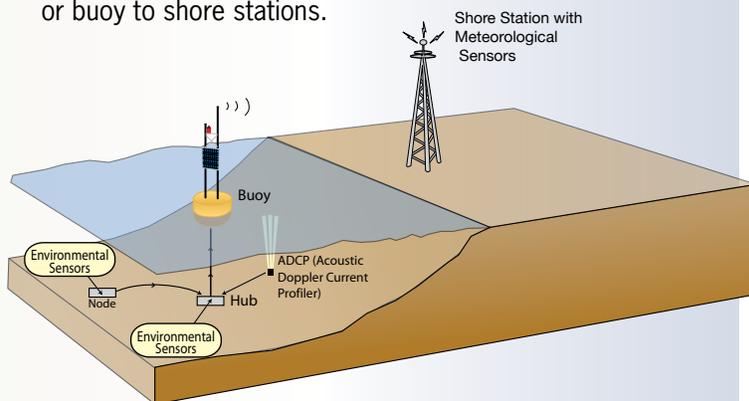
- ◆ Collect long-term data sets for physical, biological, chemical, and meteorological parameters in the Great Lakes.
- ◆ Deploy observations systems on portable, low cost buoys and fixed platforms of opportunity.
- ◆ High bandwidth, wireless Ethernet-based system.
- ◆ Real-time, secure data access.
- ◆ Universal sensor interfaces.
- ◆ Guest port access: data delivered to a common database or a single user.
- ◆ Develop partnerships with private, Federal, University, and State entities to operate and maintain observations sites through regional associations.

www.glerl.noaa.gov



ReCON Observation Sites in 2007

Portable ReCON buoys can be networked buoy to buoy or buoy to shore stations.



DATA MANAGEMENT AND COMMUNICATIONS

As NOAA's coastal observing system is put into place, there will be a need for an integrated set of data management and communications functions that will allow system users both real-time and archival access to the large datasets that will be created. The datasets will include an array of data types from physical and chemical measurements to biological information to video feeds of selected events.

DEMONSTRATED RESULTS

ReCON systems were deployed at seven locations during the 2007 field season ensuring the safety of drinking water for 1.5 million Cleveland, OH residents, supporting hypoxia and harmful algal bloom studies on Lake Erie, providing physical observations and underwater imagery at the NOS Thunder Bay National Marine Sanctuary on Lake Huron, and supporting NWS marine safety and rip current warning objectives on Lake Michigan.

SYSTEM DESCRIPTION

The ReCON system currently in place in the Great Lakes has national and regional applications. This wireless Internet observation system, with shore stations at four coastal locations covering approximately 800 square miles of sea surface, uses commercially available networking equipment allowing straightforward integration into a nationwide network (see figure below). Each system collects meteorological data and provides sub-surface measurements of chemical, biological, and physical parameters. The system is designed to allow controlled access to multi-institutional users through surface buoys and sub-surface sensor guest ports

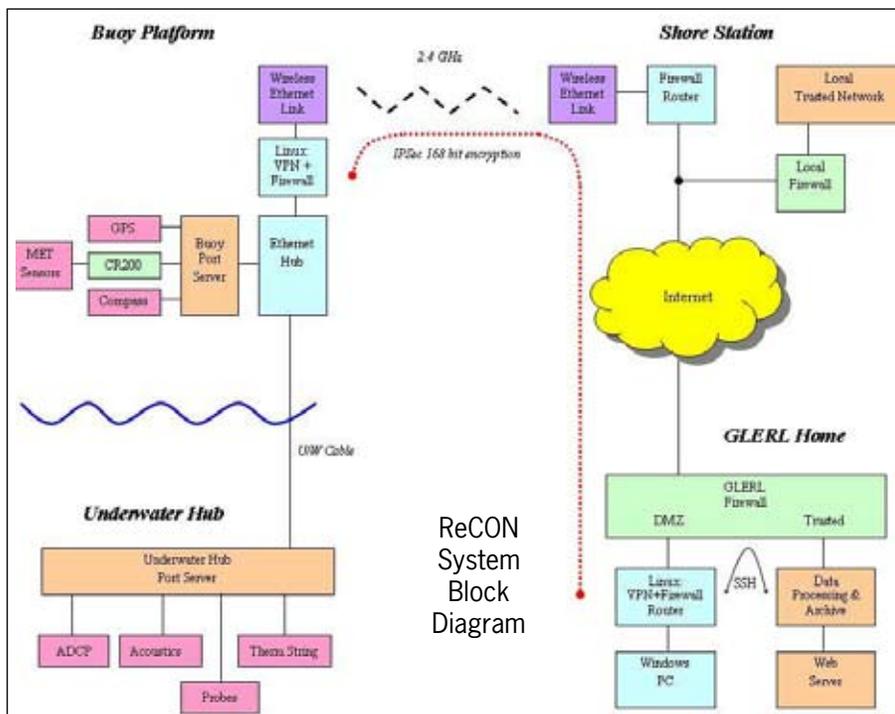


located on an underwater hub. The observation network currently provides environmental data to state, federal, and university researchers, educators and resource managers. Overall, this type of effort will be an important contribution to NOAA's leadership in supporting and promoting observation system development.

WHY ARE LONG-TERM MONITORING AND ASSESSMENT NEEDED?

Understanding and predicting changes in an ecosystem require baseline observations on natural scales of variability to:

- ◆ Identify perturbations and changes.
- ◆ Put current trends into historical framework.
- ◆ Provide context to assess impact of predicted changes.



EXAMPLES OF CURRENT USERS

- ◆ **Commercial Shipping** - Water level forecasts, waves, ice conditions.
- ◆ **Coast Guard** - Search and rescue, currents.
- ◆ **Boaters** - Waves, webcams, meteorology.
- ◆ **Sportsfishing Community** - Satellite thermal fronts, bathymetry.
- ◆ **Education and Museums** - Live imagery, environmental data.
- ◆ **Marina Operators** - Water level forecasts.
- ◆ **Scientists**
- ◆ **Power Industry** - Water levels, temperature.
- ◆ **Municipal Water Intakes** - Temperature, oxygen, pH.
- ◆ **Hazmat** - Currents.