

**Southeast Coastal Ocean Observing Regional Association (SECOORA):
Coordinated Monitoring, Prediction and Assessment to
Support Decision-Makers Needs for Coastal and Ocean Data and Tools**

Program Performance Report

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Project Summary

Southeast Coastal Ocean Observing Regional Association (SECOORA) and its members are integrating and augmenting existing observational, modeling, data management and education assets in the southeastern US domain to create an end-to-end Regional Coastal Ocean Observing System (RCOOS) in support of user-defined needs for improved coastal and ocean decision making.

With this grant funding SECOORA is:

1. Sustaining SECOORA as a Regional Information Coordination Entity (RICE). This will ensure that stakeholder needs are met through assessment and governance mechanisms that effectively prioritize the distribution of RCOOS-related funding, and coordination of projects and other resources that are required to meet critical regional needs;
2. Sustaining and expanding a coastal and ocean observing subsystem for the Southeast that provides coordinated monitoring, assessment and prediction, and includes moored and coastal stations, high frequency radars (HFR), gliders and storm event monitoring subcomponents;
3. Supporting a multi-scale modeling subsystem that includes regional ocean, shelf and estuarine circulation (nowcast/forecast); estuarine and surge/inundation prediction (nowcast/forecast); and user-defined modeling needs; and which uses the observing subsystem for verification, assimilation, and operation;
4. Supporting the Data Management and Communication (DMAC) subsystem to optimize operations, facilitate technology evolution / transfer, and address structural / project management complexities; and
5. Supporting an education and outreach subsystem partnered with other RAs and marine education efforts that engages diverse education and stakeholder audiences to understand the benefits of ocean observing to society.

Progress and Accomplishments

For the NOAA Year 1 (FY11) award, SECOORA issued no cost extension to 13 subawards (one - two month, six - six month, and six - 12 month) as they were behind schedule in expending their funds. We received NOAA Year 2 (FY12) award during this reporting period. After the contractual review and account establishment for the Year 2 award, funding for SECOORA sub-awards were disbursed during this reporting period to partner institutions. For consistency and ease to track the progress being made, the goals and objectives numbering remains the same as the "Revised Scope of Work - Year 1 and Year 2" awards submitted on May 6, 2011 and March 5, 2012 respectively. Specific details regarding progress made are detailed in the following sections below.

Goal 1: Sustain SECOORA as a Regional Information Coordination Entity (RICE)

Milestones: The following provides milestones update for this goal and additional details are described in the table that follows.

- A. Provide timely grant reports to NOAA:** Submitted 2012 NOPP annual report and IOOS Semi-annual report as required during this reporting period.
- B. Hold Board Meeting Fall 2012 and Member Meeting 2013:** Fall 2012 Board meeting is scheduled to be held on Dec 5-6, 2012 at Atlanta. Planning for Spring 2013 Member meeting is underway.
- C. Publish e-newsletters and other outreach material:** Compiled and sent relevant news and distributed the same via e-newsletters. We also posted events based news (hurricane, red tide etc.) and outreach materials on the "Latest News" section of our web site.
- D. Coordinate with GCOOS on FL activities:** Debra Hernandez attended the GCOOS board meeting held 26-28, 2012 at Corpus Christy, TX. Debra presented a talk on on-going SECOORA's projects and priorities and identified areas of collaboration with GCOOS-RA. Pat Welsh, SECOORA Board presented a talk on the Basic Observation Buoy (BOB), an activity GCOOS-RA is interested in pursuing. Glider operations, BOB and DMAC are being discussed as potential areas of collaborations.
- E. SECOORA Web site updates focused on data portal expansion, and PI project news:** Ongoing.
- F. Work with IOOS Association (formerly known as NFRA) and IOOS Program Office to effectively respond to NOAA and other National level requirements:** Debra Hernandez served as one of the leads for IOOS Summit "User Requirements" chapter. SECOORA staff provided input and information as and when required during this reporting period. Activities included participation in IOOS Associations calls and meetings, IOOS RA DMAC meeting planning and attendance, Certification criteria review, quarterly milestone reporting, and QARTOD Dissolved Oxygen manual review.
- G. Refine and maintain RCOOS Conceptual Operations Plan:** Ongoing.
- H. Support regional collaboration:** East coast RAs and IOOS joint exhibit booth at Oceans 2012 MTS/IEEE conference, conference calls with IOOS Association and other RAs on relevant on-going activities, coordination of FL activities with GCOOS, IOOS RA DMAC, Eye on Earth collaboration with NANOOS are examples for this activity.
- I. Evaluate mechanisms to track operational statistics, product usage, and outcome measures and metrics:** Currently tracking website usage with Google Analytics (GA). We have launched a detailed review of the GA results for the past six months to understand the end users and time spent on sections of the web site to implement improvement to the web site. SECOORA DMAC

technical support personnel also implemented uptime alerts for observation and modeling subsystems.

SECOORA Activities	Progress
<ul style="list-style-type: none"> • Ensure continued and efficient Governance, Management and Operations of the RA. • Provide forums, i.e. workshops, meetings, that enable stakeholder assessment and engagement. • Coordinate with the Governor's South Atlantic Alliance (GSAA). • Ensure SECOORA plans and gaps analysis align with NFRA and IOOS office guidance and/or requirements. • Refine and maintain RCOOS Conceptual Operations Plan. • Develop materials for RA Certification. 	<p>Staff fiscal activities:</p> <ul style="list-style-type: none"> • Provided fiscal and overall project management for year 1 and year 2 awards, and continued to manage primary partner institutions subawards. • Held bi-monthly administration meetings to ensure efficient and effective fiscal operations. • A part time bookkeeper (Chiaki Kight) and business manager (Megan Lee) managed the contracts and financials for these awards. • SECOORA had its FY12 financial audit during this reporting period. Megan Lee, Debra Hernandez and Chiaki Kight coordinated the same. <p>SECOORA Board and PI Coordination</p> <ul style="list-style-type: none"> • Continued to hold monthly conference calls with RCOOS PIs to ensure in-reach, coordination and collaboration within each RCOOS subcomponent and among PIs. Also held DMAC activities coordination calls. • Held monthly Board conference calls during this reporting period. • Executive Committee continued to meet monthly. The Finance and Audit Committee met on 07/18/12 and 10/10/12. • Held annual Members, Board and PIs meetings in Miami, FL May 7-9, 2012. <p>External Coordination Activities:</p> <ul style="list-style-type: none"> • Submitted the year 2 GSAA proposal. Debra Hernandez attended the GSAA Annual meeting on Sept 6 and 7 at Charleston. • Coordinated and held the SECOORA/GSAA Regional Information Management System Meeting in Georgetown, SC on November 8 – 9, 2012. • Executive Director continued to participate on monthly “Partner Arm” calls of the GSAA. • Participated in monthly IOOS Association and IOOS conference calls, including Executive Director participation on the IOOS Association Executive Committee, and attended the IOOS Association/IOOS Annual meeting. • Fifteen SECOORA staff and members participated in the IOOS Summit, including submitting whitepapers, participating on the Program Steering Committee, leading IOOS Summit Report chapter development, and attending the meeting. • Vembu Subramanian presented a poster on SECOORA’s Regional Build Out Plan at the TOS/ASLO/AGU Ocean Sciences Meeting in Salt Lake City, Utah on February 20-24, 2012. • SECOORA shared an exhibit booth with GCOOS-RA at the Science Festival in St. Petersburg on October 27, 2012. • Vembu Subramanian represented SECOORA at the FIO-USCG Hydrodynamic Modeling in Support of Potential Oil Spills in SE Florida. • Vembu Subramanian delivered a talk on SECOORA RCOOS activities and projects at the Florida Gulf Coast University Department of Marine and Ecological Sciences, Fort Myers on September 28, 2012. • SECOORA shared an exhibit booth with NERACOOS, MARACOOS and US IOOS at the Oceans’12 MTS/IEEE conference (Oct. 14 – 19, 2012) in Virginia Beach, VA <p>Efforts to Leverage IOOS Funding:</p> <ul style="list-style-type: none"> • Continued partnership with the NERRS CDMO, SCDNR on Biological project and USC Long Bay HF Radar particle trajectory activities. • Continued partnership with GSAA, resulted in Year 2 funding to continue our development of a Regional Information Management System for the GSAA.

Goal 2: Sustain an Observing Subsystem for the SE

Milestones: The following provides milestones update for the observing subsystem goal and additional details are described in the table that follows.

- A. Operate and maintain moored and coastal stations (COMPS, SEAKEYS and Carolina RCOOS):**
COMPS and Carolina RCOOS assets are maintained. SEAKEYS is using the funds allocated in year 2 to close down FIO SEAKEYS operations.
- B. Report moored and coastal stations data to secoora.org and NDBC:** Ongoing
- C. Operate and Maintain Priority Radars**
 - i. **Hourly surface current maps from the various subregions via individual and SECOORA web sites:** Ongoing.
 - ii. **Estimates of significant wave heights from the HF radar data:** Estimates of significant wave heights from the HF radar data are provided on an experimental basis by WERA HF Radar operators within the region.
 - iii. **Develop/report performance metrics of CODARs and WERAs throughout the SE including accuracy estimates of the surface currents:** HF Radar operators in our region use the National HFR site to report the site performance metrics. The work on accuracy estimates of the surface currents is moving forward.
 - iv. **Provide the radial currents to the National Servers (SIO/Rutgers) for the National HF radar network:** Ongoing.
- D. Update Asset inventory and provide performance metrics:** Asset inventory work is progress and will be completed and integrated in to web site by the end of this year. We have developed observational and forecast model system alerts which will be expanded to provide metrics. Plans are to work with the IOOS asset inventory and IOOS Parameter Vocabulary on linkages to our asset inventory efforts.

Institution/Activities	Progress
Objective 2.1: Sustain Moored and Coastal Stations	
University of South Florida (Weisberg) Support COMPS moorings	Support is continued for four surface moorings (C10, C12, C13 and C14) and two sub-surface moorings (C11 and C15) and C21 near shore tower. An additional mooring C20 off of Sarasota that measures waves and meteorological parameters was deployed during this reporting period. C20 will continue to be maintained in future depending upon funding. Data acquired from C10, C12 and C13 are sent to SECOORA and NDBC. C14 mooring is scheduled to be turned around in January 2013. Data from C20 and C21 are under evaluation and will be sent to NDBC after the review of the data.
University of South Florida (Merz) Support in-shore tidal meteorological stations	Support is continued for seven USF COMPS Coastal Stations. Spares purchase and periodic site maintenance visits were carried out during this reporting period. All coastal stations are reporting data to SECOORA and NDBC and made available via Global Telecommunication System (GTS).
Florida Institute of Oceanography (Virmani) Support SEAKEYS moored network	Of the 8 SEAKEYS stations, one station is reporting meteorological and oceanographic data; three stations are only reporting meteorological data; one is reporting intermittent meteorological data and the other three stations are no longer operational. SEAKEYS is using the funds allocated in Year 2 to close down FIO SEAKEYS operations.

Institution/Activities	Progress
Objective 2.1: Sustain Moored and Coastal Stations	
University of North Carolina - Wilmington (Leonard)- Support Carolina RCOOS network	University of North Carolina Wilmington (UNCW) continued to operate and maintains 6 oceanographic buoys and 2 wave buoys in Onslow and Long Bay and one pier station in Brunswick County, NC. All data collected are provided to SECOORA and NDBC and made available via Global Telecommunication System (GTS).
Objective 2.2: Maintain High Frequency Radar Operations	
University of South FL (Weisberg) Support three CODAR and two WERA radar arrays on the West Florida Shelf	The College of Marine Science (CMS), University of South Florida (USF) continues to operate five HF-radar systems on the West Florida Shelf (WFS) and deliver data to SECOORA and National HF Radar network. Performance evaluation is underway between CODAR/WERA/Offshore buoy measured velocity data with report in preparation. Preliminary results show that WERA has at least about the same accuracy as the CODAR in measuring the surface currents. Preliminary comparison of WERA and wave model derived significant wave heights was performed for a period of two months, and more detailed comparison is in progress. The performance metrics of the CODAR systems indicate operation for 97.5%, 99.3% and 98.9%, % of the current period for the Reddington Shore, Venice and Naples, respectively. The performance metrics of the WERA systems indicate operation for 93.7% and 94.4% for the period from June – November 2012 for the Fort DeSoto and Venice, respectively. USF CMS hosted the NOAA/IOOS HF Radar ROWG#6 meeting in St. Petersburg from November 13-15, 2012. In Year 2, USF identified four CODAR priority sites that include three CODAR sites currently in operation and one to be added in the future.
Skidaway Institute of Oceanography (SkIO) (Savidge) Support two WERA radar arrays on St. Catherine's and Jekyll Island, GA	Skidaway Institute of Oceanography (SkIO) continued to operate two WERA HF-radars on St. Catherine's Island and Jekyll Island GA for this reporting period. The data are being continuously provided to SECOORA and the US National HFR Network archive in near-real time. Estimates of wave and wind parameters are also made, as experimental products. The performance metrics of the system indicate operation for 86.3% and 91.8% of t for the period from June – November 2012 for the St.Catherine's, GA and Jekyll Island, GA stations, respectively.
University of Miami (Shay) Support three WERA radar arrays at Crandon, Virginia Key and Dania Beach	The University of Miami operates WERA HF-radar installations on Key Biscayne, Virginia Key and Dania Beach. These radars are estimating significant wave heights for the National Weather Service marine forecast models and provide mean radials at hourly intervals to SECOORA and the US National HF Radar network archive. The principal investigator is currently working with Broad Key Florida personnel on site identification and associated logistics to deploy an eight element WERA HF-radar system. The performance metrics of the system indicate operation for 86.5%, 79% and 80.5% for the period from June – November 2012 for the Key Biscayne, Virginia Key and Dania Beach, respectively.
University of NC - Chapel Hill (Seim) Support two CODAR radar arrays on the Outer Banks of NC	The University of North Carolina Chapel Hill operates two CODAR-radar installations on the Outer Banks of North Carolina. System performance and data delivery from the sites have been excellent for this reporting period. The systems were fully operational for the duration of Hurricane Sandy, with only a two day communication outage for the Buxton Radar which relied on generator power. Hourly data from the systems are delivered to SECOORA and US National HF Radar network archive. The performance metrics of the system indicate operation for 93.4% and 99.9% for the period from June – November 2012 for the Duck, NC and Cape Hatteras, NC stations, respectively.
University of South Carolina (Voulgaris) Re-install, operate and maintain one	The University of South Carolina is currently operating two WERA HF radar stations on Georgetown, SC (south part of Long Bay – relocated from Pritchards Island, SC)

Institution/Activities	Progress
Objective 2.1: Sustain Moored and Coastal Stations	
HFR in SC (potentially Long Bay) (Year 1) and operate and maintain two priority WERA sites in Year 2	and Fort Caswell, NC. The Fort Caswell station was established with funding from NSF project. In Year 2, the Fort Caswell, NC HF radar site was identified as one of the priority radars. USC will maintain these two stations with the funding from SECOORA. USC focused its efforts during most of this reporting period on maintaining and fine tuning the two systems for their continuous, reliable operation. Since June 2012, both stations have been in operation continuously and provide half-hourly surface current maps via the PI's and the SECOORA web sites and estimates of significant waves heights on an experimental basis. The performance metrics of the system indicate operation for 96.1% and 95.1% for the period from June – November 2012 for the Fort Caswell, NC and Georgetown, SC stations, respectively. The data from each station are provided in near real-time to SECOORA and US National HF Radar network.

Goal 3: Support a Multi-Scale Multi-Resolution Modeling Subsystem

Milestones: The following provides a milestones update for the modeling subsystem goal and additional details are described under each institution's PIs activities.

A. Support and enhance SABGOM model

B. Provide real-time forecasting of inundation and storm surge

- i. Begin forecasting in Domain 1 (East Coast Florida – ECF) and 2 (SouthWest Florida – SWF)
- ii. Establish Necessary Data Standards with DMAC

C. Develop data products derived from satellite and in situ observations for fisheries stock assessment

D. Provide decision support tool for beach/shellfish WQ advisories

- i. Develop Geographic Information Systems-based modules to extract and visualize radar derived rainfall data and modeled currents and salinity estimates over user specified boundaries (e.g. watershed boundaries)

Institution/Activities	Progress
North Carolina State University (He) Support and enhance SABGOM model	The North Carolina State University-enhanced South Atlantic Bight Gulf of Mexico (SABGOM) model is being run on 24/7-basis, providing 3-D regional ocean predictions. The model output (temperature, salinity and currents) is made available via SECOORA web site. Data Assimilation (DA) scheme is currently being tested. The DA scheme, once fully implemented, will be able to assimilate observations including satellite sea surface temperature, sea surface height, HF Radar surface currents, and glider observed hydrography to improve SECOORA regional ocean circulation predictions. The NCSU SABGOM modeling team is currently working with SECOORA data management team to standardize model output and data products via the establishment of THREDDS server and SECOORA interactive map display.

Institution/Activities	Progress
<p>University of Florida (Sheng) and North Carolina State University (Xie)</p> <p>Provide real-time forecasting of inundation and storm surge.</p>	<p>University of Florida’s CH3D ECF and SWF domain models are now running in Nowcast/Forecast (3 days forecast) mode. Northern Gulf of Mexico (NGOM) and SouthEast Florida (SEF) model domains setup is underway. Model domains are being updated with latest available bathymetry and topography data (LIDAR). North Carolina State University Coastal Marine Environment Prediction System (CMEPS) has completed storm surge inundation forecast system for Florida SE domain, Georgia South Carolina domain (GASC) and South Carolina North Carolina domain (SCNC).UF and NCSU are working with SECOORA DMAC to establish necessary data standards to make the model data available via THREDDS server.</p>
<p>ROFFS (Roffer), University of Miami CIMAS (Muhling), and SAFMC (Pugliese)</p> <p>Develop data products derived from satellite and in situ observations for fisheries stock assessment.</p>	<p>The project team acquired fisheries data from South Carolina Department of Natural Resources (SCDNR) Marine Resources Monitoring, Assessment, & Prediction (MARMAP) program. After receiving and reviewing the data, efforts were focused on four ecologically and economically important species: grey triggerfish (<i>Balistes capriscus</i>), black seabass (<i>Centropristis striata</i>), red porgy (<i>Pagrus pagrus</i>), and vermilion snapper (<i>Rhomboplites aurorubens</i>) over the 1990-2008 period. These were derived from the MARMAP fishery independent research cruises instead of the SEAMAP cruises. Working habitat models for these species were derived based on location, depth, water temperature and salinity using neural networks classification modeling. The models were evaluated using the catch during the June – August, 2008 fish trap sampling season as shown in Figure 1. This marks significant progress for the project as it demonstrates that the derived habitat model provides realistic results in that the fish were mostly caught in the high probability of occurrence areas.</p>
<p>University of South Carolina (Porter)</p> <p>Provide a decision support tool for beach/shellfish water quality advisories.</p>	<p>University of South Carolina and University of Maryland continued to support the enhancement of the pre-emptive decision support tool for issuance of beach swimming advisories by South Carolina Department of Health and Environmental Control (SCDHEC). The CART and Linear Regression Models were enhanced and the automated system runs once a day at 6:00am or upon user request and consists of two main parts: 1) Data retrieval - The prediction system uses observational data from the SECOORA near real-time database, NEXRAD precipitation data downloaded and processed from the Southeast River Forecast Center and NOS Tide Data downloaded and processed from the NOS website, and; 2) Product output – An email of the test results and map output is made available to SCDHEC users via SECOORA web site. The web and Mobile Phone application design and development have been completed. The applications are under evaluation and will be integrated into SECOORA web site during the next reporting period.</p>

Goal 4: Enhance the DMAC Subsystem

Milestones: Updates on activities are described in “progress” column of the following table. Note that USF portion of the DMAC funding was cut in year 2.

Institution	Progress
<p>University of SC (Porter), University of NC – Chapel Hill (Seim)</p> <ul style="list-style-type: none"> Service data providers and RCOOS 	<p>Support and service for data providers and RCOOS PIs are continued. We are actively recruiting new data providers and will get the same integrated into SECOORA data portal.</p> <ul style="list-style-type: none"> The SECOORA DMAC has established THREDDS and ERRDAP servers to

Institution	Progress
<p>subsystem PIs</p> <ul style="list-style-type: none"> • Assess SOS response formats • Integrate SECOORA asset inventory into the SECOORA webpage • Review QARTOD activities • Work with IOOS Program office and GCOOS-RA on a pilot project to implement IOOS DMAC Biological Observations Standards in SECOORA 	<p>enhance data dissemination. SECOORA DMAC conducted conference calls with the SECOORA subsystem PIs and modelers within the SE region to demonstrate the established server capabilities. The Observations (in-situ, HF Radar and Satellite) and model data (circulation, atmospheric, and storm surge run by SECOORA region modelers) will be made available via the interactive map display web site. SECOORA DMAC has also enhanced its data and interactive maps portal. The enhancements include hurricane track display, glider mission tracks display and incorporating SECOORA PIs suggestions/ideas and needs.</p> <ul style="list-style-type: none"> • SECOORA DMAC is working with IOOS RA DMAC on Sensor Observation Service (SOS) reference implementation. The IOOS SOS service 52 North Schema was reviewed for possible use for SECOORA data delivery. After review, it was decided to continue adapting OOSTethys Sensor Observation Service. The SOS service validate and comparison wiki documentation url is: http://code.google.com/p/ioostech/wiki/SOSTesting. SECOORA also participated in the annual IOOS RA DMAC planning meeting and led the session on defining roles and responsibilities of RA DMAC within Federal backbone at the meeting held in September 2012. • SECOORA DMAC together with NERRS CDMO participated in drafting the Manual for Real-Time Quality Control of Dissolved Oxygen. Work also involved soliciting comments from the membership, compiling and submitting input to IOOS program office and NDBC. • NWS Marine Weather Portal product was integrated into SECOORA web site during this reporting period. • Eye on Earth: The U.S. Integrated Ocean Observing System (IOOS®) web map application combines the latest water temperature, salinity, and water levels from the U.S. IOOS Northwest Association of Networked Ocean Observing System (NANOOS) and the Southeast Coastal Ocean Observing System (SECOORA) Regional Associations. The web map is the outcome of collaboration between the EEA, U.S. IOOS, NANOOS and SECOORA, and ESRI to integrate U.S. IOOS data and the Eye on Earth Network. • US IOOS Program Office, SECOORA and GCOOS-RA organized and hosted the first workshop of the IOOS Biological Observations Data project June 25 - 26, 2012 at Florida Fish and Wildlife Commission/Fish and Wildlife Research Institute (FWC/FWRI) in St. Petersburg, FL. Attendees included subject matter experts, data managers, data providers and customers from NOAA National Coastal Data Development Center (NCDDC), FWC/FWRI, University of South Florida College of Marine Science, Duke University Nicholas School of the Environment, USGS Ocean Biogeographic Information System USA, South Carolina Department of Natural Resources (SCDNR), NOAA Southeast Fisheries Science Center (SEFSC) Galveston Lab and South Atlantic Fishery Management Council (SAFMC). Data providers (SCDNR Marine Resources Monitoring, Assessment and Prediction (MARMAP) and SEFSC Galveston Lab Comparative Analysis of Gulf Estuarine EcoSystems (CAGES)) and data users (USF, FWC/FWRI and SECOORA) presented their requirements at the workshop. Participants reviewed the project goals/objectives and developed an implementation plan to move forward. SECOORA is working with SCDNR and OBIS USA to deliver MARMAP fisheries

Institution	Progress
	<p>independent data via ERRDAP server.</p> <ul style="list-style-type: none"> • SECOORA DMAC participated in a NOAA Coastal Service Center sponsored Regional Data Management and Portal Development Workshop June 27-28 in Charleston, SC. • SECOORA DMAC has been working on upgrading and completing the SECOORA asset inventory application. The inventory application will have a versatile inventory interface, platform manager editing and display capabilities of SECOORA region coastal ocean observing assets. The workflows and inventory application documentation will be made available once the application is integrated and rolled out live via SECOORA web site. • SECOORA DMAC completed an update to SECOORA Parameter Vocabulary and transitioned it to IOOS Parameter Vocabulary. This vocabulary, now expanded to nearly 200 terms, improves the accessibility and understanding of data and observations of winds, tides, currents, water quality, and chemistry of our coastal waters and oceans. The SECOORA Vocabulary and the IOOS Parameter Vocabulary are both registered with Marine Metadata Initiative's Ontology Registry and Repository. • The SECOORA Governors South Atlantic Alliance (GSAA) Regional Information Management System project is underway. SECOORA DMAC efforts are supporting ESRI catalog 'geoportal' installation and review for use within project and ArcGIS server installed for GIS infrastructure needs. GSAA IMS Portal has been established.

Goal 5: Support a Targeted and Leveraged Education and Outreach Subsystem

Important Note: Primary partners in Year 1 included Kennesaw State University (L. Adams), University of North Florida (P. Welsh), University of North Carolina System (L. Leonard), COSSEE-SE (L. Spence) and SECOORA (D. Hernandez). Due to funding limitations, objectives under this goal have been severely reduced. For Year 2, the primary focus of the Education and Outreach (E&O) subsystem is to engage stakeholders regarding observing technologies, data, products, and services. Note that Goals 1, 3, and 4 include outreach activities that complement and contribute to the E&O subsystem. We have listed work carried out during this reporting period in the following table.

Education and Outreach Activities carried out (Primary Partners in Year 1 and SECOORA staff)
<p>On April 25, 2012, the Masters of Arts in Teaching (MAT) for pre-service teachers at Kennesaw State University met at the Chattahoochee River in Roswell, GA to take part in the aquatic observatory module that the PI developed. The students were able to aid in the deployment of the Basic Observation Buoy (BOB) and as a group collect data from the Chattahoochee River. The pre- service teachers learned about the importance of ocean observing and SECOORA's observing systems. KSU continued to maintain the Hilton Head BOB Monitoring Station at Jarvis Creek, located at the Coastal Discovery Museum in Hilton Head Island.</p>
<p>UNCW, in conjunction with the Monterey Bay Aquarium Research Institute, KSU and SECOORA, hosted the EARTH educator's workshop from July 8-July 13, 2012 on the UNCW campus. Twenty-five participants, representing 12 states, attended the workshop. The focus of the 2012 workshop was on ocean observatories and the theme was "Real Time Science". SECOORA PIs made presentations on their observing, data management, education and outreach and research activities. Carolinas RCOOS oceanographic field technicians provided hands-on demonstrations of oceanographic instruments that are used for research cruises as well as on moorings (e.g. CTD, WeatherPak, YSI). EARTH 2012 workshop materials are available at http://www.mbari.org/earth/. UNCW teamed with USC HF Radar PI and education staff at North</p>

Education and Outreach Activities carried out (Primary Partners in Year 1 and SECOORA staff)

Carolina Baptist Assembly and developed education and outreach materials for HF Radar systems and continue to maintain the web portal for the SECOORA Basic Observation Buoy effort. UNCW was also engaged in teaching students to design, construct and deploy Basic Observation Buoy.

COSEE SE and University of Georgia Marine Extension Service have piloted the elementary basic observation buoy (eBOB) project in five schools: two Charleston County schools, Mitchell Elementary School and Murray LaSaine Elementary School, both currently involved with the COSEE SE's South Carolina Amazing Coast elementary project; two Savannah schools, St Andrews School and independent school; and two Athens-Clarke County schools, Whit Davis Elementary and Fowler Drive Elementary. Over 100 elementary students have constructed 22 buoys with at least 15 teachers observing and being engaged.

SECOORA is engaged in marketing and outreach activities such as monthly e-newsletter, developing success stories articles and other outreach materials, and displaying regional coastal ocean observing projects and observing capabilities at Oceans Sciences and Marine Technology society and other relevant conferences. The staff and SECOORA PIs are also actively engaged in reaching out to the stakeholders such as National Weather Service Weather Forecasting Offices (WFOs), Emergency Resources Managers and United States Coast Guard (USCG) on developing products and services that will be utilized in emergency response situations.

Scope of Work

Scope of work remains as proposed for Year One. In Year 2, we committed \$600K towards priority radars and that resulted in reduction of funding to other subsystem components. University of South Florida DMAC component funding was discontinued in year 2. Funding for the Education and Outreach component was also reduced and the primary partners listed in Year 1 were not funded as outlined in the revised scope of work for Year 2.

Personnel and Organizational Structure

No major changes in personnel or organizational structure were made during this reporting period. A current list of Board and committee members is available on our [website](#). Lundie Spence and Mike Spranger vacated their board seats. Megan Lee, Debra Hernandez and Chiaki Kight worked on SECOORA FY12 audit during this reporting period. We will be holding the Fall 2012 Board meeting in Atlanta (December 5-6, 2012). Planning for Spring 2013 annual members meeting is underway.

Budget Analysis

SECOORA's October 31, 2012 financial report shows over \$1.2M of Year One funds and \$800K of Year 2 funds have been expensed. We are within budget and on track with spending. IOOS Year 1 funds are being drawn down rapidly. There were several six month no cost extensions granted to Subawardees, which expire on 11/30/12. We started to draw IOOS Year 2 funds in October 2012. SECOORA continues to receive invoices regularly from our Subawardees and we process them at one of two bi-monthly meetings. All invoices are paid within forty-five days. SECOORA continues to draw from ASAP monthly. As a reminder SECOORA pays out its monthly operational costs (i.e. payroll, etc.) and then conducts the ASAP draws in the middle of the following month for both the preceding month's operation expenses and the Subawardee invoices.

Publications and Presentations

- Lenes, J.M., B.P. Darrow, J.J. Walsh, J.K. Jolliff, F.R. Chen, R.H. Weisberg, and L. Zheng (2012), A 1-D simulation analysis of the development and maintenance of the 2001 red tide of the ichthyotoxic dinoflagellate *Karenia brevis* on the West Florida shelf. *Cont. Shelf Res.*, 41, 92-100, doi:10.1016/j.csr.2012.04.007.
- Liu, Y. and R.H. Weisberg, S. Vignudelli, L. Roblou and C.R. Merz (2012), Comparison of the X-TRACK Altimetry Estimated Currents with Moored ADCP and HF radar Observations on the West Florida Shelf, *Adv. In space Sci.*, 50, 1085-1098.
- Liu, Y and R.H. Weisberg (2012), Seasonal Variability on the West Florida Shelf, manuscript submitted to *Prog. in Oceanogr.*
- Weisberg, R.H., Y. Liu, C.R. Merz, J.I. Virmani, and L. Zheng (2012) Alternative Power Generation for Florida by Mechanical and Solar Means, submitted to *Mar. Tech. Soc. Jour.*
- Xie, L. and B. Liu, 2012: Improving tropical cyclone track-intensity-size forecasts using Scale Selective Data Assimilation, Seventh International Conference on Tropical Cyclones, October 30-November 2, 2012, Zhoushan, China.
- Li, R., L. Xie, and C. Guan, 2012: Influence of domain size on storm surge simulation, Seventh International Conference on Tropical Cyclones, October 30-November 2, 2012, Zhoushan, China.

Rob Ragsdale, Eric Vowinkel, Dwayne Porter, Pixie Hamilton, Ru Morrison, Josh Kohut, Bob Connel, R. Heath Kelsey, and Phil Trowbridge. 2011. Successful integration efforts in water quality from the integrated ocean observing system regional associations and the national water quality monitoring network. *Marine Technology Society Journal* 45(1): 19-28.

Haines, S., V. Subramanian, E. Mayorga, D. Snowden, R. Ragsdale, C. Rueda and M. Howard. IOOS vocabulary and ontology strategy for observed properties. *Proc. MTS/IEEE Oceans 2012*, Hampton Roads, VA.

Martinez-Pedraja, J., L. K. Shay, B. K. Haus, and C. Whelan, 2012: Interoperability between CODAR and WERA high frequency radar surface current signals in the Florida Current. *J. Atmos. and Oceanogr. Tech.*, (to be submitted).

Outreach Materials (Non-Refereed)

USF Robert Weisberg

Invited Lecture on WFS Modeling to FIO-USCG on Oil Spill tracking, 10/23/2012

ROFFS Inc. Mitch Roffer

Invited Lecture Gainesville (FL) Offshore Sport Fishing Club on 10/23/2012

Invited Lecture SPIE Remote Sensing & Security+Defense Conference. Sept. 24-27, 2012

USC George Voulgaris

Invited Lecture and HF Radar site visit at Management of DeBordieu Colony Community Association, 10/26/2012

Invited Lecture on the use of HF Radars in the NC Beach, Inlet and Waterway Association Annual 2012 Annual meeting

UM Nick Shay

How real-time data and models help forecast oil spills and hurricanes, Monty's Raw Bar, 2550 South Bayshore Dr., Coconut Grove, FL, 10/24/2012

UF Peter Sheng

Invited Lecture on Storm surge modeling to FIO-USCG on Oil Spill tracking, 10/23/2012

Numerous outreach materials have been developed for specific audiences and are available at www.secoora.org.

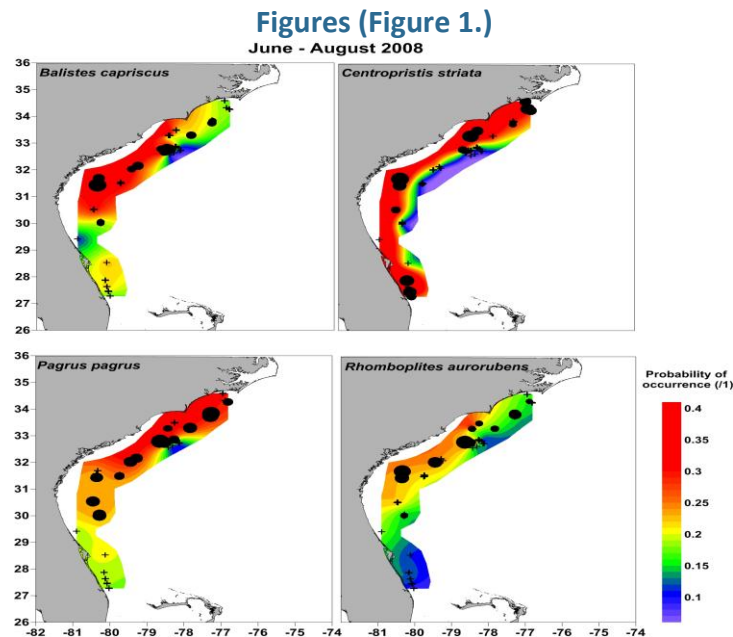


Figure 1: Comparison of the derived working habitat models based on 18 years (1990-2008) of catch and environmental data and actual catch from MARMAP fish trap surveys from grey triggerfish (*Balistes capriscus*), black seabass (*Centropristis striata*), red pogy (*Pagrus pagrus*), and vermilion snapper (*Rhomboplites aurorubens*) over the 1990-2008 period. These were derived from the MARMAP fishery independent fish trap surveys. The probability of occurrence was derived from neural network modeling with v-fold cross validation. Large dots indicate catch locations and the “+” symbol indicates where fish were not caught.

December 2012 SECOORA Annual Supplemental Information

Products and Services (Regional and National)

Beach Water Quality Portlet – A Collaborative effort funded by SECOORA

In partnership with the South Carolina Department of Health and Environmental Control (SCDHEC), our collaborative team (University of South Carolina and University of Maryland) has enhanced a user application for prediction and analysis of a public health concern; i.e. primary contact to bacterial-laden swimming waters. This effort incorporates data required for supporting SCDHEC decisions to issue beach swimming advisories. Utilizing real-time (streamed) data, delayed mode data, and predictive models, this tool provides a mechanism to disseminate information to a variety of potential users, including SCDHEC and other, local government officials. GIS-based tools allow direct access to monitoring data, the models, and user-friendly presentations to provide processed information required for making swimming advisory decisions. The automated prediction system is scheduled to run once a day at 06:00 am to have results available for SCDHEC at the start of business. Once the calculations are complete, the users at SCDHEC are sent an email detailing the test results broken down per station. A map, <http://rcoos.org/wqportlet/> (Figure 2) is generated showing the test region with each test station.

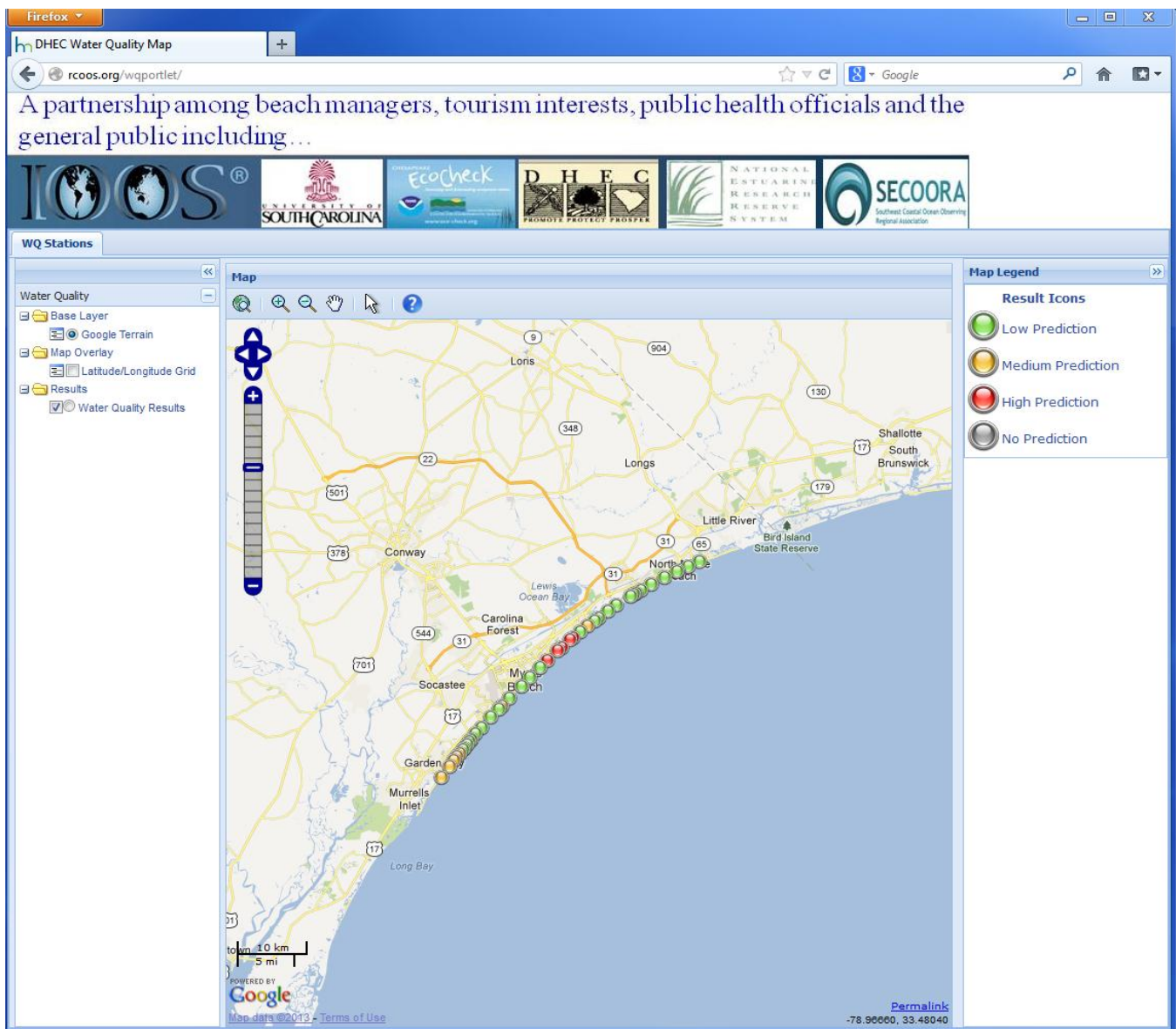


Figure 2. SECOORA Beach Water Quality Portlet

The stations are color coded to show the results at a glance: Green are low predictions, Yellow are medium predictions, Red are high predictions and Grey indicates the inability to perform the test. The user can click on a station to see the details of the test. Currently, we are designing a web and mobile application that will deliver the results of the current beach advisories, monitoring results and historical data, daily forecast results, and educational information on bacteria pollution issues, forecast methods, etc.

Model Data Products

We are working on integrating model outputs via THREDDS (<http://129.252.139.124/ncWMS/godiva2.html>) enabled WMS services onto interactive maps. The goal is to allow users to overlay various models such as SECOORA funded South Atlantic Bight Gulf of Mexico (SABGOM) model and storm surge inundation forecast system for select different temporal offsets for hindcast/forecast models and to graph time series data from the models at a given location.

Marine Weather Portal

The Marine Weather Portal (<http://secoora.org/data/marineweatherportal>) application was integrated into the SECOORA web site. The Marine Web Portal provides marine observations, forecasts and short and long-fuse warnings for the coastal waters of North Carolina, South Carolina and northern Georgia and the Atlantic and Gulf Coast areas of the Southern Region. Currently, region-specific information on marine and coastal conditions is collected by, stored and disseminated from a wide range of government and academic institutions and includes a variety of information types and protocols. This product helps meet the need for improved, coordinated delivery of relevant information to a broad user community. One of the most efficient ways for coastal ocean observing systems to disseminate marine information to the public is through a partnership with local NOAA/NWS Weather Forecast Offices (WFOs), since the targeted audiences already rely on these offices for marine observations and forecast needs. This product was developed by UNC Wilmington, Second Creek Consulting, the University of South Carolina, and the University of South Florida, in cooperation with NOAA's National Weather Service and SECOORA. The Marine Weather Portal product is currently used by Wilmington, NC (<http://www.erh.noaa.gov/ilm/marine/>), Corpus Christy, TX (<http://www.srh.noaa.gov/crp/?n=marine>) and Brownsville, TX (<http://www.srh.noaa.gov/bro/?n=marine>) Weather Forecast Offices. Funding for the project was provided by NOAA's Integrated Ocean Observing System.

Eye on Earth

The U.S. Integrated Ocean Observing System (IOOS) Program, NANOOS, SECOORA, the European Environment Agency (EEA) and ESRI have partnered to enable IOOS data (Surface Water Temperature, Salinity and Water Level data from SECOORA and NANOOS) on the Eye on Earth Network online portal. Phase 1 (November 2012) is hourly KML file creation for Eye on Earth Site and Phase 2 is to implement KML creation using IOOS SOS Dif library to retrieve data.

Interactive Map

SECOORA has established [THREDDS](#) and [ERRDAP](#) servers to enhance data dissemination. SECOORA conducted conference calls with the SECOORA subsystem PIs and modelers within the SE region to demonstrate the established server capabilities. The Observations (in-situ, HF Radar and Satellite) and model data (circulation, atmospheric, and storm surge run by SECOORA region modelers) will be made available via the [interactive map display web site](#). SECOORA has also enhanced its data and interactive maps portal. The enhancements include hurricane track display, glider mission tracks display and incorporating SECOORA PIs suggestions/ideas and needs.

Data Management

Standards based DMAC and Participation in IOOS Data Management Activities

SECOORA has an established, strong, innovative, integrated, and standards based productive data management and communications component, which provides a model for many aspects of regional and national IOOS DMAC requirements. The current DMAC system has evolved through efforts of successive sub-regional programs and a coalescence of regional efforts. The result is a system that incorporates tested optimum approaches, provides high value for the investment through extensive leveraging and high productivity, and continues to provide leadership for the IOOS as it works towards an effective national system of coordinated RAs. Recognizing data management component as one of the core component of the RA, SECOORA is currently working with the data management funded institutions towards building a robust IT and Data Management infrastructure.

We intend to continue our participation and be highly active in national discussions, forums, and workshops focused on IOOS DMAC and its essential role in optimization of ocean observations and their application to important services, e.g. coastal marine spatial planning. We will also expand our current conversations and interactions with other RAs (e.g. GCOOS, NANOOS), where considerable progress and efficiencies are enabled through shared problem-solving, code sharing, and tool application.

Data Sharing and Provision of Regional in-situ observations to WMO GTS

SECOORA is currently supporting University of South Florida COMPS and University of North Carolina Wilmington network of coastal and offshore buoy stations network. The meteorological and in-water observations (water level, currents, water temperature and salinity) are provided to National Data Buoy Center (NDBC) for further dissemination to GTS. SECOORA recently helped National Weather Service WFO in Key West in getting National Park Service Whipray Basin station (WRBF1) wind data to NDBC and to GTS. The forecasters have found great value in having access to this data. SECOORA constantly recruits new data providers and will support the new data providers to send their data to NDBC to get disseminated via GTS as well as help them adopt the common standards required for interoperability. SECOORA will provide guidance and technical assistance to enable additional data capture and incorporation. SECOORA has established access to data via common data formats such as ASCII, ESRI shape file, Google KML file etc. via its web site. SECOORA is working with IOOS RA DMAC on Sensor Observation Service (SOS) reference implementation. The IOOS SOS service 52 North Schema was reviewed for possible use for SECOORA data delivery.

SECOORA/IOOS Parameter Vocabulary

SECOORA DMAC completed an update to SECOORA Parameter Vocabulary and transitioned it to IOOS Parameter Vocabulary. This vocabulary, now expanded to nearly 200 terms, improves the accessibility and understanding of data and observations of winds, tides, currents, water quality, and chemistry of our coastal waters and oceans. The SECOORA Vocabulary and the IOOS Parameter Vocabulary are both registered with Marine Metadata Initiative's Ontology Registry and Repository.

Data Storage and Archive

SECOORA is currently working with National Oceanographic Data Center (NODC) to archive the region's in-situ and remotely sensed observations. The preparation of Submission Information Form (SIP) is underway and SECOORA aims to establish an automated procedure to archive its observations by December 2013. SECOORA will coordinate with sub-regional data providers on this activity. SECOORA will also work with IOOS and other RAs on archiving HF Radar observations and Glider mission observations

Observing Assets

Asset Inventory and Ocean Acidification Platforms

SECOORA is working on upgrading and completing the SECOORA asset inventory application. The inventory application will have a versatile inventory interface, platform manager editing and display capabilities of SECOORA region coastal ocean observing assets. The latest version of the asset inventory can be accessed via <http://inventory.secoora.org/>. A snap shot is attached in Fig. 3. The workflows and inventory application documentation will be made available once the application is integrated and rolled out live via SECOORA web site. We will also work with IOOS on its asset inventory initiative and provide technical documentation on SECOORA asset inventory to IOOS and other RAs via our web site. Currently, SECOORA does not support ocean acidification monitoring with IOOS funds, but some members of SECOORA are engaged in Ocean Acidification related monitoring efforts.

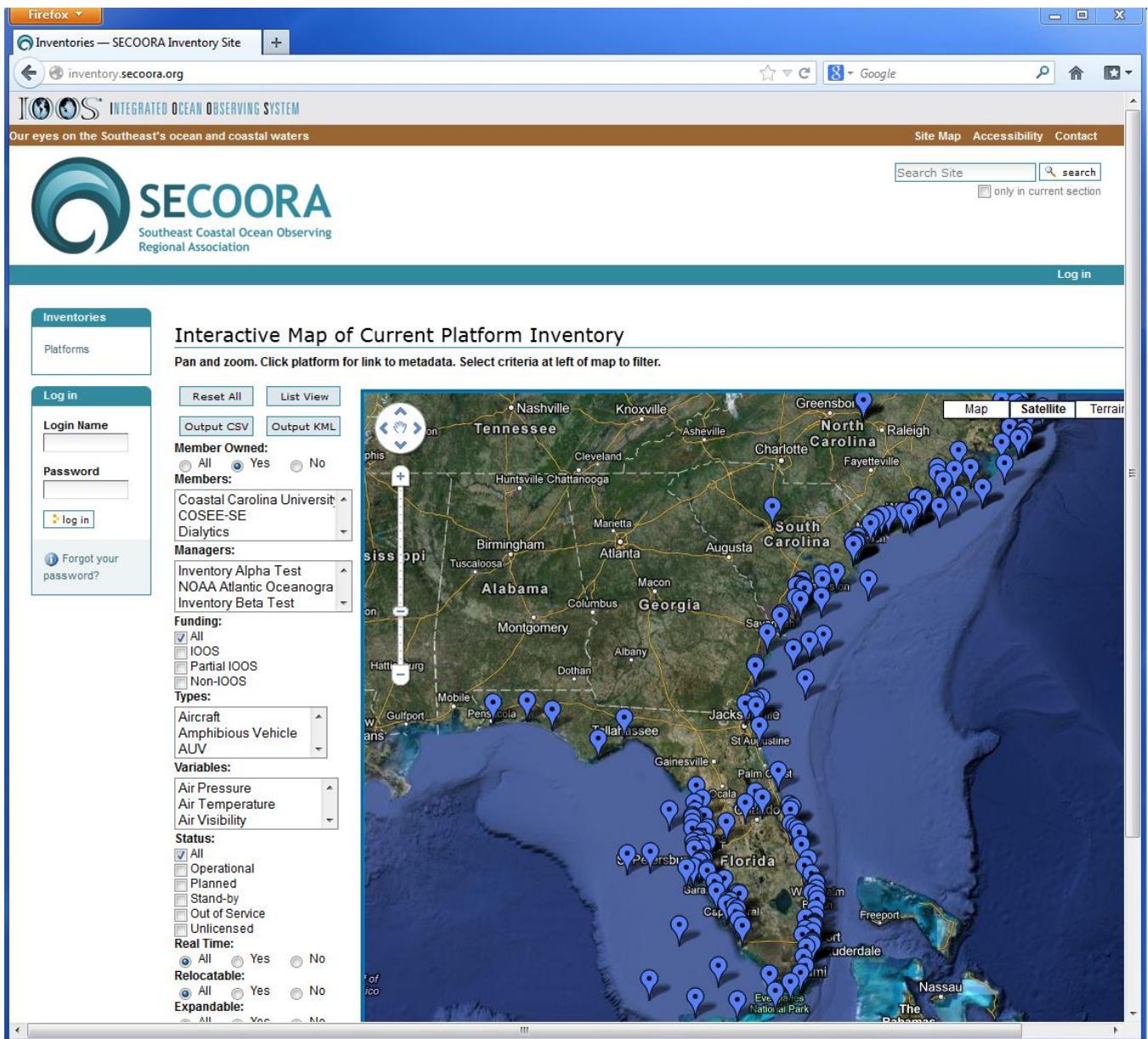


Figure 3. SECOORA Asset Inventory Application