

Gulf Observing System

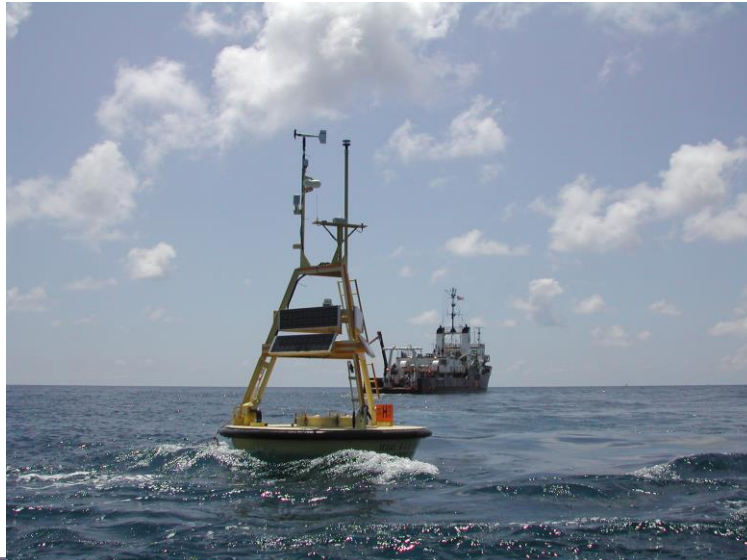
GCOOS Build-out Plan

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System (GCOOS) Regional Association*

Gulf Observations & Monitoring Workshop # 2

Overview

- GCOOS-RA 10-year History with Stakeholders
- Gulf of Mexico Observing System Plan
- GCOOS-RA Activities and Recommendations from the GOMRI Oil Spill Conference Session on Gulf Observing and Monitoring



Texas Automated Buoy System buoy for oil spill response (Credit: TAMU Geochemical and Environmental Research Group)

GCOOS-RA History

- Global Ocean Observing System >U.S. IOOS>GCOOS (10+ years old)
- 5 themes of GCOOS
 - *Public Health and Safety*
 - *Healthy Ecosystems and Water Quality*
 - *Mitigation of Effects of Coastal Hazards*
 - *Safe and Efficient Marine Operations*
 - *Long-Term Ocean Variability and Changes*
- Membership and Partnership Model

DATA SOURCES		
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Data Portal and Products:

- Integrated Data for Emergency, Resource Managers and Others
- Data Products to Meet Public Stakeholder Needs
- Integrated Data for Private Sector Use in Building Business

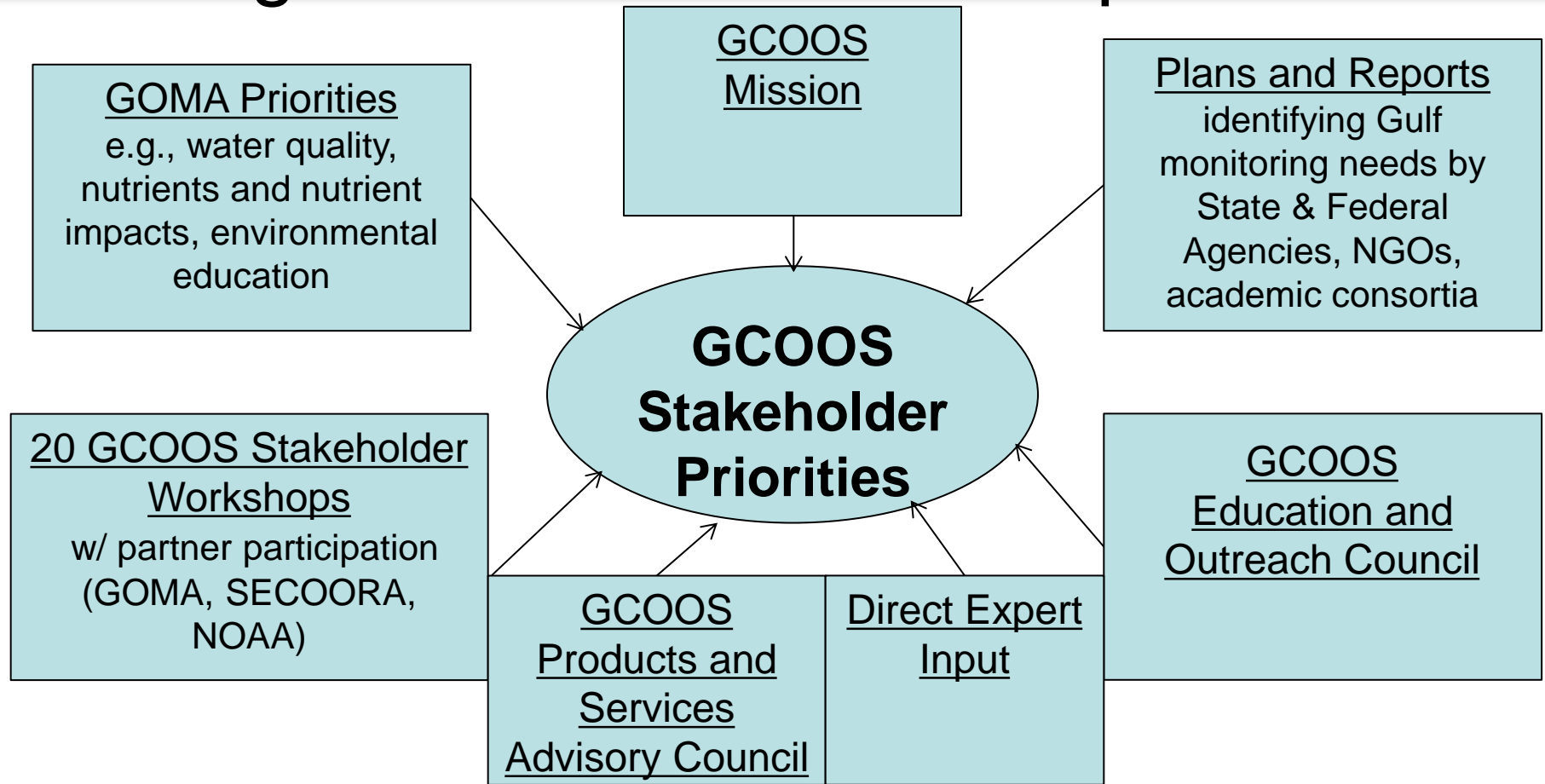
Gulf of Mexico Observing System Plan

GCOOS Build-out Plan V.2.0

- A vision to 10 years out: What would a comprehensive Gulf-wide observing and monitoring system involve to meet multiple stakeholder needs?
- Costs included
- Evolving document
- Estuarine (head of tide) to offshore

Online at: <http://gcoos.tamu.edu/BuildOut/BuildOutPlan-V2.pdf>

Gulf of Mexico Observing System Plan: Integrated Stakeholder Requirements



See Workshop Reports at http://gcoos.tamu.edu/?page_id=391

GCOOS-RA Stakeholder Workshops

Name	Dates	Location
The Gulf of Mexico Regional Workshop on an Integrated Data System for Oceanography	31 October-2 November 2000	Stennis Space Center, MS
The NVOIS Workshop for Managers of Coastal Observing System Activities in the Gulf of Mexico	14-15 January 2003	Stennis Space Center, MS
A Workshop to Explore Private Sector Interests and Roles in the U.S. Integrated Ocean Observing System; Focus on the Southeastern U.S. and Gulf of Mexico	2-4 March 2004	Marathon Oil Company, Houston, TX
The HABSOS-GCOOS Workshop	13-15 April 2004	St. Petersburg, FL
The Next Steps in the Gulf of Mexico	7-8 July 2004	College Station, TX
The GCOOS and the Private Sector: Oil and Gas and Related Industry Workshop	2-4 November 2005	Houston, TX
The GCOOS-SECOORA-NOAA CSC Storm Surge & Inundation Workshop	24-26 January 2007	New Orleans, LA
First GCOOS-GOMA Workshop on a Harmful Algal Bloom Observing System Plan for the Gulf of Mexico	14-16 November 2007	New Orleans, LA
The Eastern Gulf of Mexico Recreational Boaters Workshop	4-5 February 2009	St. Petersburg, FL
Second GCOOS-GOMA Workshop for a Harmful Algal Bloom Integrated Observing System Workshop	21-23 April 2009	St. Petersburg, FL
The Western Gulf of Mexico GCOOS Educator GPS Workshop	23-24 April 2009	Corpus Christi, TX
The Eastern Gulf of Mexico GCOOS Educator GPS Workshop	30 April - 1 May 2009	Dauphin Island, AL
The Western Gulf of Mexico Recreational Boaters Workshop	28-29 May 2009	Clear Lake, TX
GCOOS-GOMA-SECOORA Ecosystem Modeling Workshop	14-16 October 2009	St. Petersburg, FL
Third GCOOS-GOMA HABIOS Workshop	26-28 March 2012	Pensacola, FL
Southwest Florida Potential Water Quality Providers Workshop	28 June 2012	Sanibel, FL
Integrated Water Quality Network meeting	12 March 2013	New Orleans, LA
Ecosystem Modeling Workshop	7-8 April 2014	Houston, TX
GCOOS Workshop with Non-Governmental Organizations	10-11 June 2014	Houston, TX



iTag Workshop on Animal Tagging, June 2014, St. Pete, FL



Stakeholder Priorities - All Sectors

Priority Product or Data	Stakeholder Sectors
Obtain accurate bathymetry and topography with consistent vertical control between data sets in the coastal zone, including locations of shorelines.	Emergency managers, surge modelers, recreational boaters (bathymetry and shorelines), urban planners and developers, insurance industry (topography and shorelines), oil and gas, marine transportation (shorelines and navigationally significant waters, especially federally mandated channels, approaches, and anchorages)
Improve coverage of real-time currents in the coastal zone and navigable estuaries using HF radars as primary technique.	Marine transportation, recreational boaters, oil and gas sector, Coast Guard SAR
Improve real-time, offshore meteorology measurements (V, P, T, H).	Oil and gas sector, Coast Guard SAR, surge modelers, HABs monitoring, recreational boaters
Improve forecasts and nowcast models of sea level, winds, and waves; this requires added real-time measurements.	Recreational boaters, oil and gas sector, Coast Guard SAR, storm surge modelers, emergency managers
Improve hurricane severity forecasts.	Emergency managers, oil and gas sector, recreational boaters
Improve forecasts and nowcasts of surface currents offshore.	HABs tracking, oil and gas sector, Coast Guard SAR
Improve severe weather monitoring, forecasting, and dissemination.	Oil and gas sector, recreational boaters, HABs tracking and fate
Enhance measurements of water quality parameters.	Oil and gas sector, recreational boaters, HABs detection and fate
Implement a modern, real-time current and water level observing system in all major ports.	Marine transportation, recreational boaters
Establish coastal storm surge/inundation maps for mitigation planning (not real time).	Oil and gas sector, insurance, real estate, planners, emergency managers
Improve information on and forecasts of visibility.	Coast Guard SAR, recreational boaters
Produce upper ocean profiles of temperature, salinity, and currents.	Oil and gas sector, recreational boaters (near artificial reefs and major diving locations)
Produce reliable forecast maps of three-dimensional currents offshore.	Oil and gas sector
Improve real-time forecasts of coastal inundation.	Emergency managers, general public
Increase number of stations monitoring HABs.	Public and animal health officials, HABS monitoring network
Improve data and product dissemination techniques taking into account the sophistication of the user.	Requirement of all sectors

Gulf of Mexico Observing System Plan: Based on Integrated Stakeholder Requirements

- Surface currents and waves network
- Fixed mooring network
- Autonomous meteorological measurement network,
- Glider and AUV network
- Satellite observations and products
- Aircraft observations
- Bathymetry and topography mapping network
- Water level network
- Enhanced PORTS® network
- Outreach and Education
- Harmful Algal Bloom Integrated Observing System
- Ecosystem monitoring
- Water quality and beach quality monitoring
- Hypoxia monitoring
- Monitoring of river discharge
- Physical modeling
- Ecosystem modeling
- Data management and communications system
- Research – input into new technology development

Gulf of Mexico Observing System Plan – Updates

- All sections
- Broader ecosystem monitoring
 - Expanded Water Quality section
 - GOMA/GCOOS Water Quality Monitoring Plan for State waters
 - Integrated Water Quality Network
 - Improved HAB Integrated Observing System
 - Updated Hypoxia Monitoring Section
- New Ecosystem Monitoring section
 - Context and Existing Capabilities, Example Plans and Reports, Needs, Recommendations
 - Living Marine Resources (Fisheries, Marine Mammals, Sea Turtles, Plankton, Shore- and Sea-birds)
 - Habitats
 - Monitoring for Restoration Projects



Ecosystem Monitoring Section:

Initial Enhancements to Assets in Plan - examples

- Additional sensors on moorings (e.g., CTD, cameras, hydrophones, VHF and VR2W (bird/animal tag) receivers, particle imagery sensors, flow cytometers)
- Additional receivers for animal and bird tagging on HF radar stations
- Additional sensors on gliders and Autonomous Underwater Vehicles (e.g., passive acoustics, CTDs, cameras, flow cytometers, hydrocarbon sensors)
- Additional sensors on aircraft observations and Unmanned Aerial Vehicles (e.g., cameras, LIDAR, bird/animal tag receivers)
- Additional river gauges, e.g., Mobile and Perdido Bays

Ecosystem Monitoring Section:

Implementation of a Collaborative Forum for Enhancing Gulf Ecosystem Observing/Monitoring

- The Collaborative of stakeholders and decision-makers will further the development of a Gulf ecosystem monitoring and observing system. It will:
 - Identify ecosystem indicators,
 - Identify/acquire/freely serve legacy ecosystem data sets,
 - Identify and support extant sustained ecosystem monitoring subsystems in the Gulf,
 - Provide a sound basis (prioritization) for initiating new observing and monitoring for stakeholders,
 - Initiate pilot projects,
 - Initiate pre-operational observing and monitoring subsystems,
 - Re-evaluate new subsystems for stakeholder needs, and
 - Maintain and expand the Gulf observing and monitoring network.

GOMRI Session Recs. and GCOOS Activities

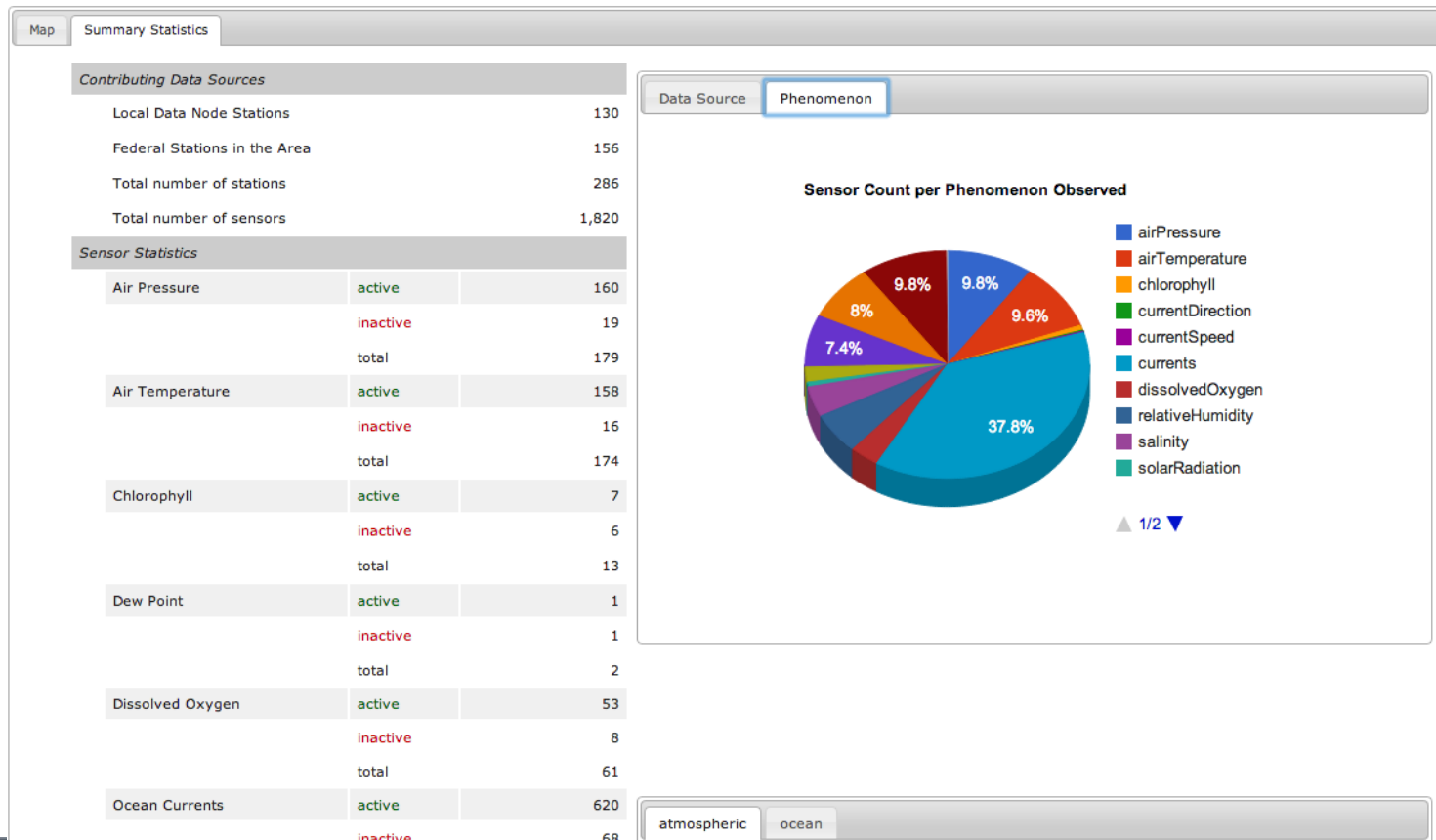
GOMRI Session Overall Recs.	GCOOS Activities
Develop an effective Business Model	Business Model and Development Plan
Highlight advanced technologies	Technology development research in Gulf of Mexico Observing System Plan
Quantify economic value of an observing system	GCOOS-RA Board identified this need and member, BOEM, funded ongoing 3-year study at LSU
Building consensus and vision	20 stakeholder workshops, Gulf Observing System Plan, organizational structure (multi-sector Board – private, governmental, academic, outreach/education reps.; stakeholder-based councils, committees, and task teams)
Gap assessment and analysis	Done for moorings, HF radar, hypoxia, HABS, more as part of System Plan
Improved communication of monitoring products	GCOOS Data Products page – more work identified in the System Plan
Single location for accessing data	GCOOS Data Portal – more in System Plan

Additional GOMRI Session Recs. and GCOOS/Related Activities

Additional GOMRI Session Recs.	GCOOS/IOOS Activities
“Community of Practice” Standards	QARTOD QA/QC standards for water level, in situ temperature, in situ salinity, dissolved oxygen, in situ waves, in situ currents; GOMA WQ PIT recommendations; DMAC standards; IOOS core variables list.
“System of Systems” Approach	GCOOS is partnership model based on existing systems
Inventory of assets	IOOS inventory -regional system assets
Improve communication of benefits	GCOOS communications team, BOEM/LSU study, more in Plan
Data management requirements	GCOOS DMAC = portal, products, tools and technical assistance for data providers, more in Plan; IOOS DMAC standards

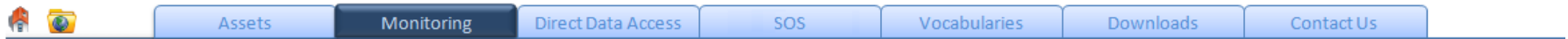
GCOOS Inventory of Data Assets

- <http://data.gcoos.org> , click on “Assets”, “System Statistics”
- Show counts by “Data Source” or “Phenomenon”



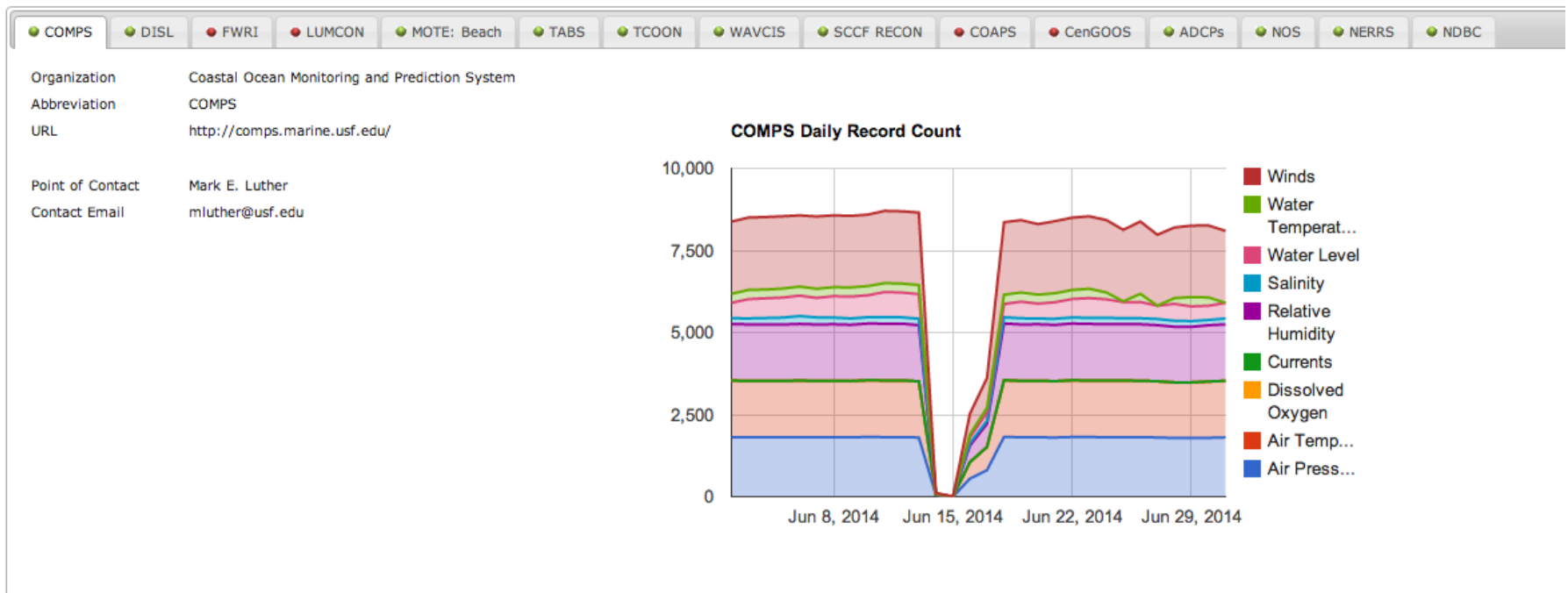
GCOOS Counts of Observations

- <http://data.gcoos.org> , click on “Monitoring”, then on individual tab for each data provider



Stations and Sensors Monitoring (based on the Data Repository)

The following is a monitoring system that tabulates the status of the sensors deployed by the region by the Local Data Nodes (LDNs). [Click here](#) to download a table listing of all the assets, [click here](#) for all non-federal assets and [click here](#) for all federal assets contributing data to the portal.



Summary

- GCOOS has identified and helped meet stakeholder needs in the Gulf of Mexico for a decade; continuing to support and expand our “system of systems” model.
- GCOOS has led the development of a stakeholder-based comprehensive Gulf of Mexico Observing System Plan – V.2.0 is available on the GCOOS website; continuing to collaborate for its implementation.
- Many recommendations from the GOMRI Oil Spill Conference session on ocean observing and monitoring have been started by GCOOS or inspired GCOOS to include them in the Gulf of Mexico Observing System Plan.