



Developing a Sentinel Site Research and Monitoring Program in the Delaware National Estuarine Research Reserve

Lyndie Hice-Dunton, Ph.D., Christina (Pinkerton) Whiteman, Drexel Siok, Kenneth Smith, Mike Mensinger, and Robert Scarborough, Ph.D.

Delaware National Estuarine Research Reserve, Delaware Coastal Programs
Delaware Department of Natural Resources and Environmental Control



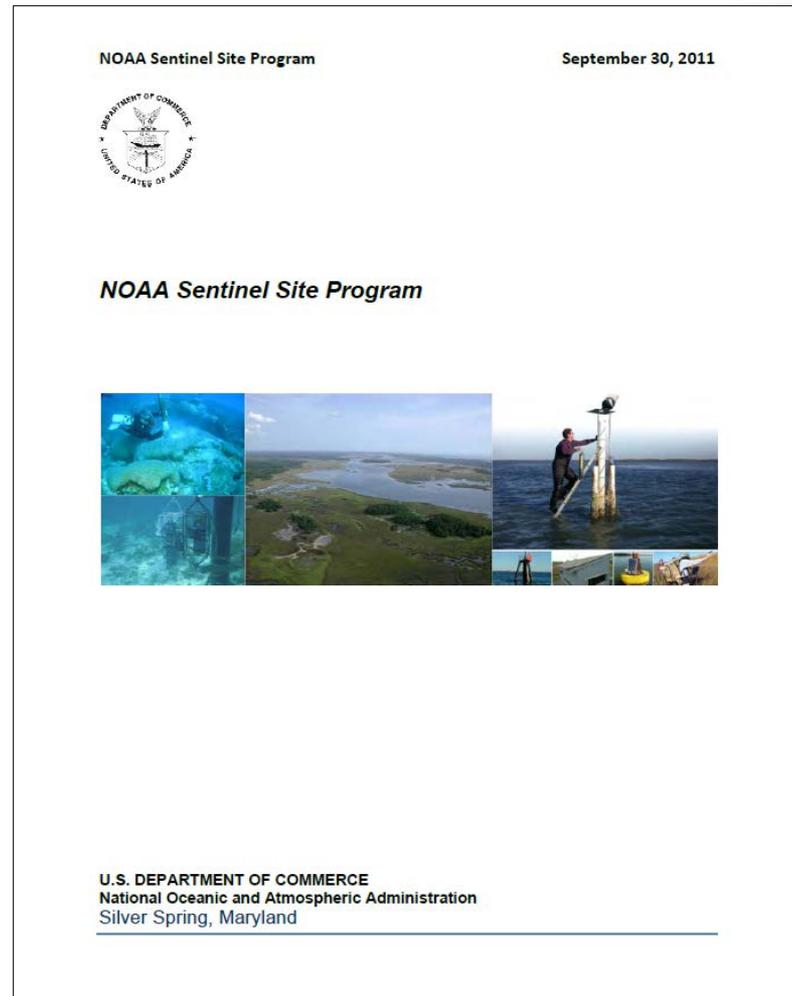


NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

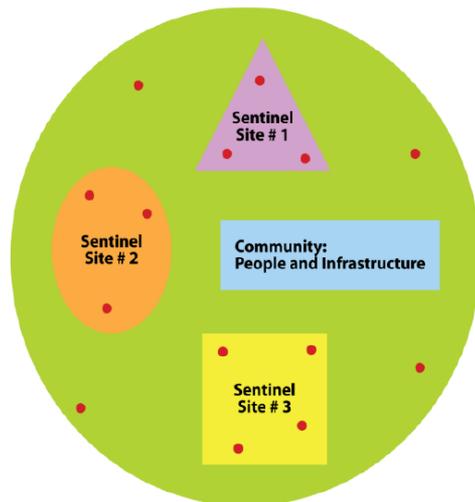


NOAA Sentinel Site Program

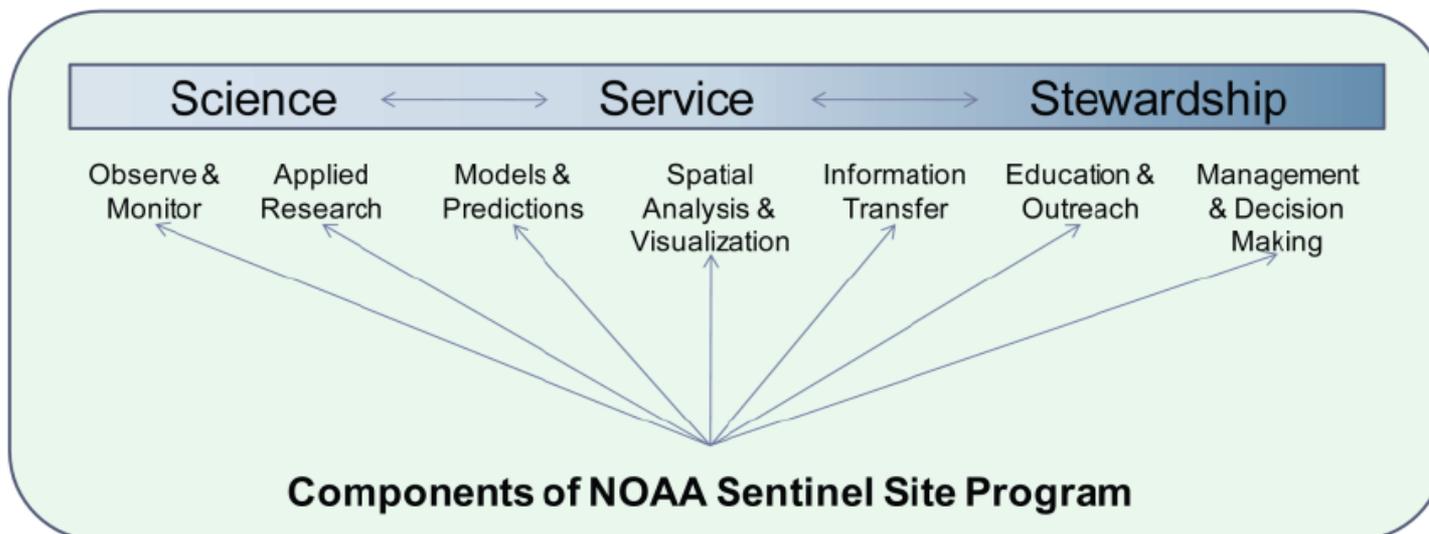
- Place-based, issue-driven approach
- Address questions of local, regional, and national significance
- Builds off National Marine Sanctuaries, National Estuarine Research Reserves, and other resources



NOAA Sentinel Site Program

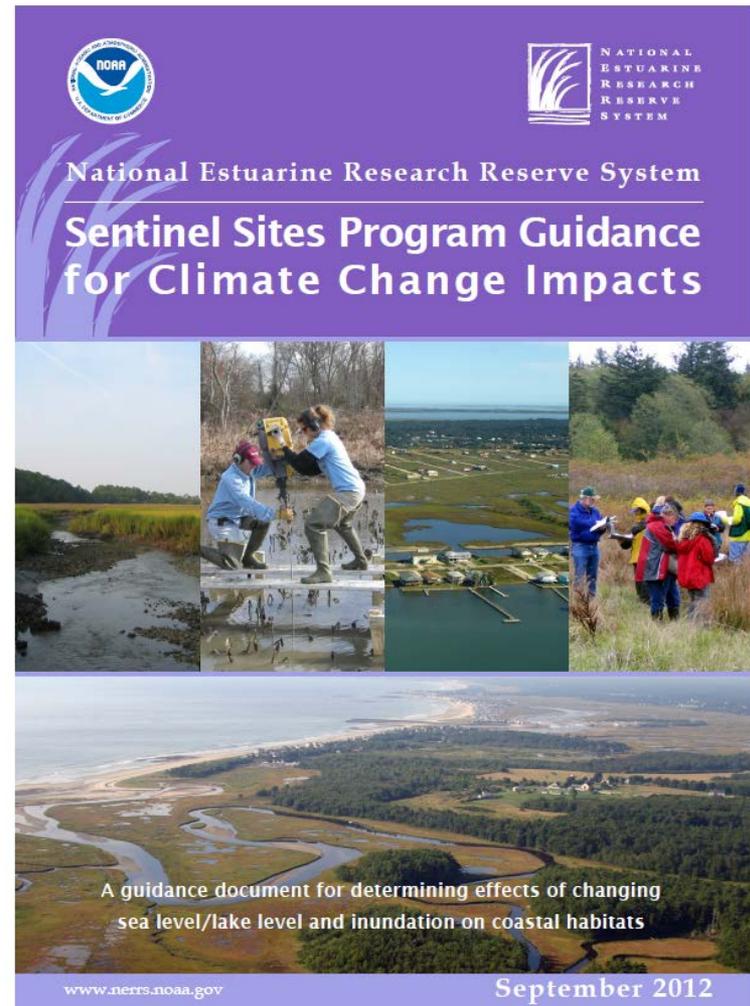


- Sentinel Site Cooperative**
Spatial extent within which the lessons learned are relevant and the socioeconomic impacts are measurable
- Community**
Social and economic systems associated with local communities
- Sentinel Site**
Managed, protected areas (including, but not limited to, NERR and NMS sites)
- Sentinel Station**
Instrument and measurement platforms



NERRS Sentinel Site Guidance

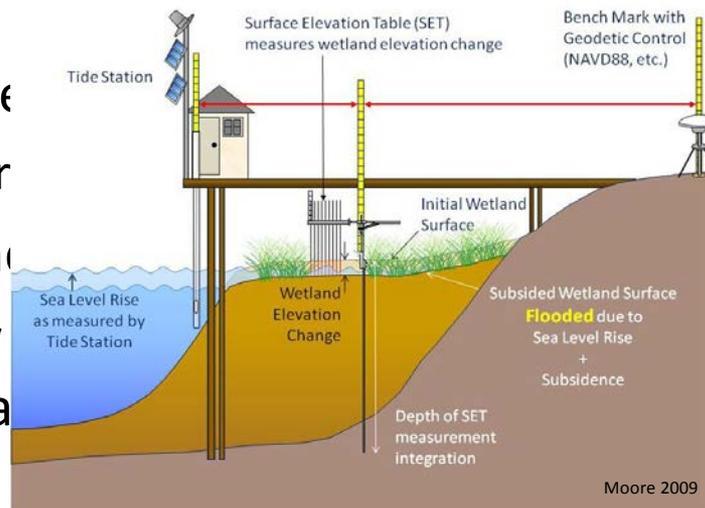
- Framing Questions:
 1. What are the current distributions of vegetation communities with respect to elevation and tidal range and how sensitive are they to interannual and episodic variability?
 2. What is the response of the vegetation community to long term changes in local water levels and inundation patterns?
 3. What is the response of sediment elevation of marsh habitats to episodic inundation and longer term changes in local water levels and inundation patterns?



NERRS Sentinel Site Requirements

- Water quality data collection and monitoring
- Meteorological data collection and monitoring
- Tidal marsh, mangrove, or SAV monitoring
- Wetland surface elevation change measurements
- Vertical reference system for water level measurements
- Ability to detect elevation changes

- Formal Sentinel
 - Addresses Pr
- All follow stan
- Data regularly
- Centralized Da



Plan required
t Issues

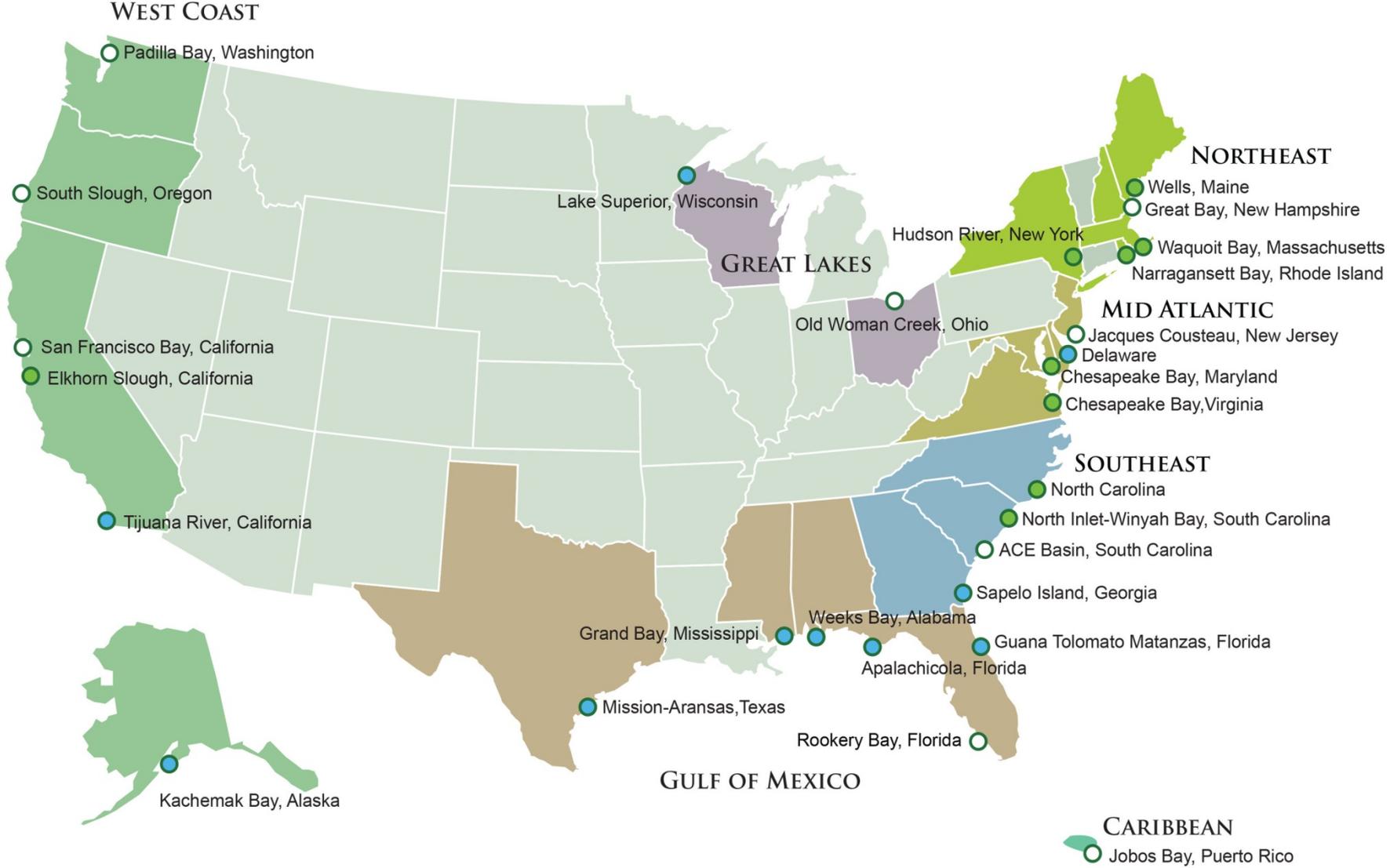
QA/QC controls

translated to NERRS

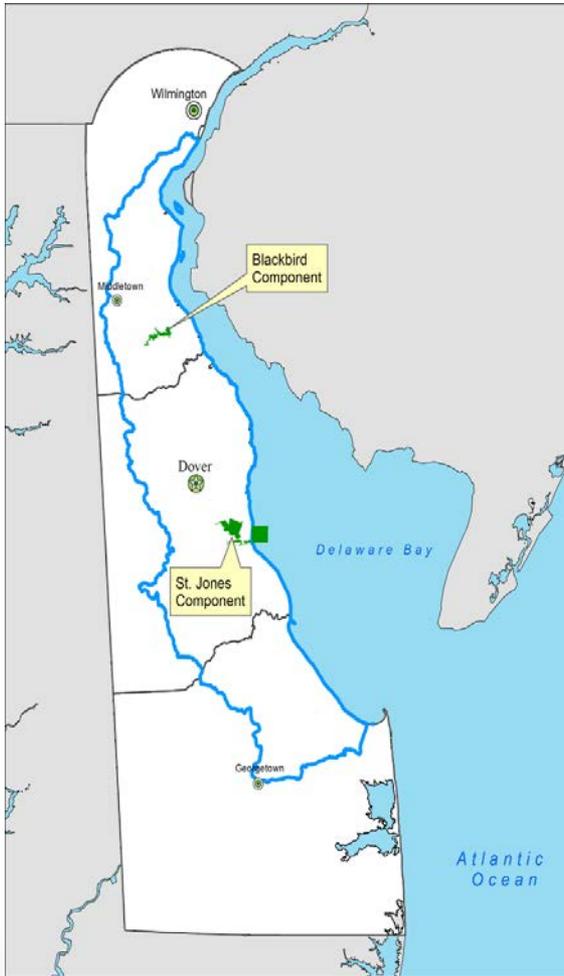
)

NERRS Sentinel Site Status

- **Date of SS Status Unknown**
- **Current Sentinel Sites**
- **Reserves Expecting to be Sentinel Sites within Two years**



Delaware National Estuarine Research Reserve (DNERR)



DNERR Sentinel Site Research

- Water quality data collection and monitoring
- Meteorological data collection and monitoring
- Tidal marsh vegetation monitoring
- Wetland surface elevation change measurements
- Vertical reference system for water level measurements
- Ability to detect elevation changes

Meteorological and Water Quality Data Collection

- Meteorological Data
 - 1 station in each reserve component
 - Installed 2000 & 2002
 - Parameters
 - Air Temperature
 - Wind Speed & Direction
 - Relative Humidity
 - Barometric Pressure
 - Precipitation
 - Photosynthetically Active Radiation (PAR)
- Water Quality Data
 - 3 sites in Blackbird Creek
 - 4 sites in St. Jones River
 - Installed 1995-2012
 - Parameters
 - Temperature
 - Salinity
 - Specific Conductivity
 - Water Level (NAVD88)
 - Dissolved Oxygen (mg/L & % sat.)
 - Turbidity
 - Nutrients



Centralized Data Management Office (CDMO)



NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM
Centralized Data Management Office

Home

About CDMO

About Data

Get Data

Web Services

Contact CDMO



View / Download Data



Real Time Monitoring Data

Choose Reserve...

DELSJMET 01/29/14 10:30 AM
DELSLWQ 01/02/14 01:30 PM



Air Temperature: -9.9 °C (14 °F)
Wind Speed: 3.4 m/Sec (08 mph)
Water Temperature: 3.9 °C (39 °F)
Salinity: 21.2 PPT
Dissolved Oxygen: 11.1 mg/L

CDMO News

The CDMO is excited to announce the launch of our new **SWMP Mobile application**. Near real-time SWMP data is now available on your smartphone or tablet at: www.nerrsdata.org/mobile

Our **Data Export System** has been updated and now has enhanced graphing capabilities! Want to easily export or graph data? If so, check out our [Data Export System!](#)

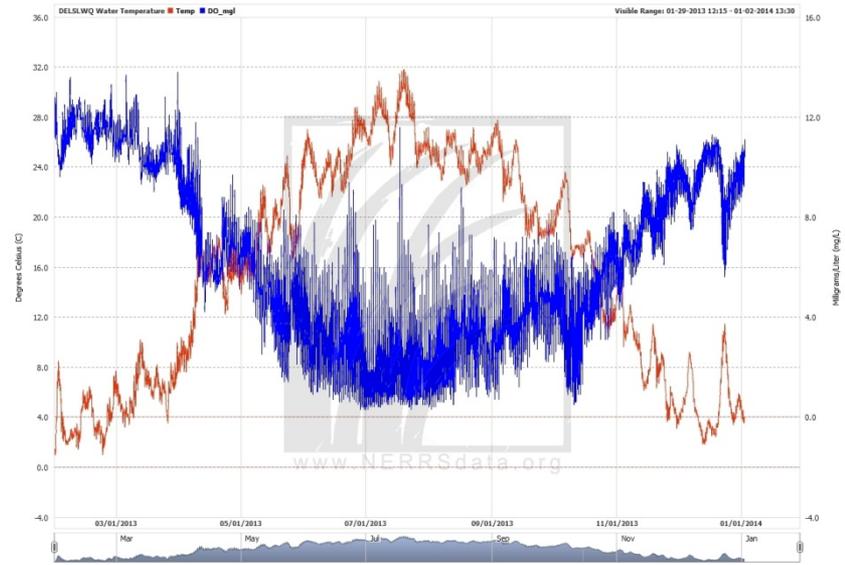
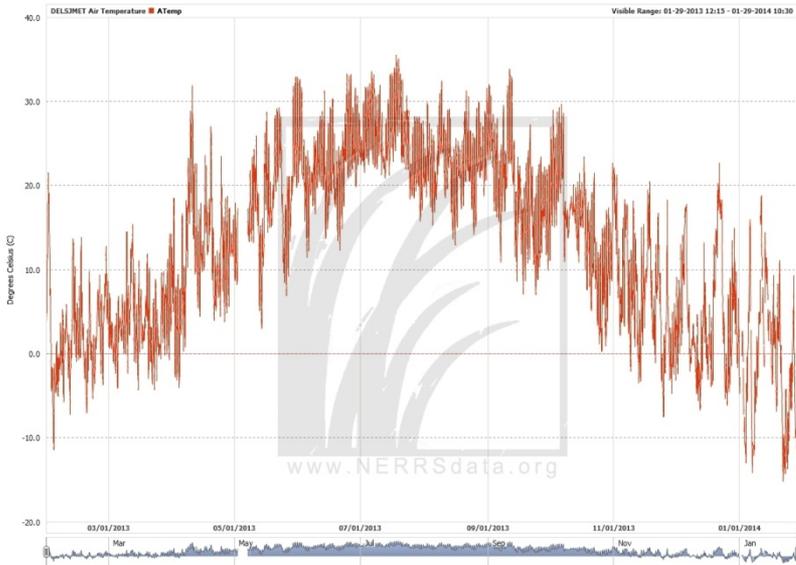
Department of Commerce | NOAA | National Ocean Service | Ocean and Coastal Resource Management | NERRS | Webmaster

Site hosted by NOAA National Estuarine Research Reserve, Centralized Data Management Office.



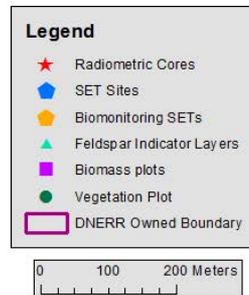
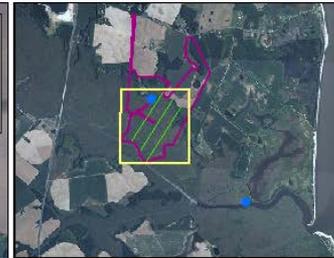
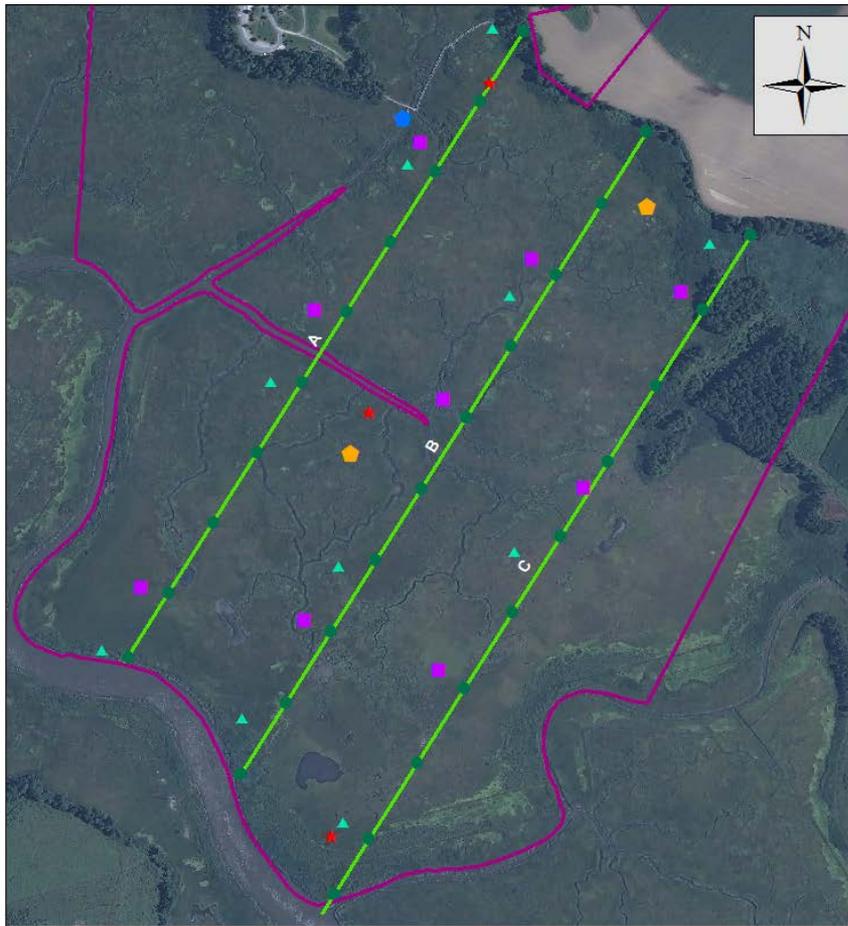
<http://cdmo.baruch.sc.edu/>

Centralized Data Management Office (CDMO)



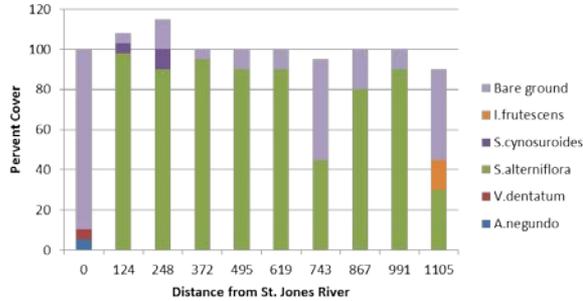
<http://cdmo.baruch.sc.edu/>

Tidal Marsh Vegetation Monitoring

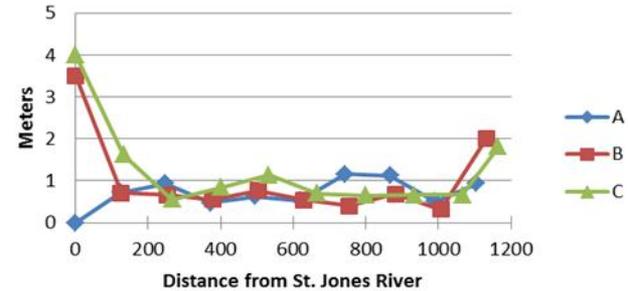


Tidal Marsh Vegetation Monitoring

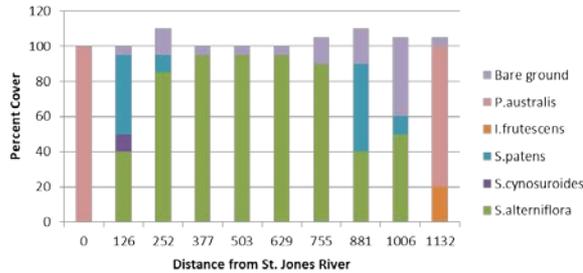
Transect A



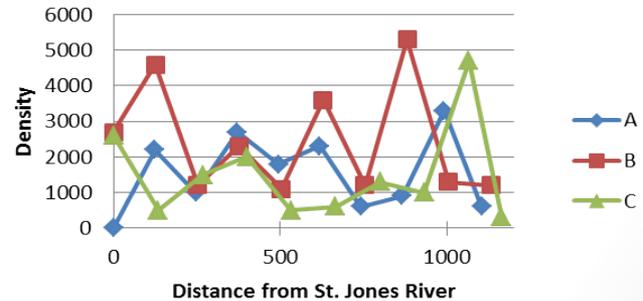
Canopy Height of Vegetation Species



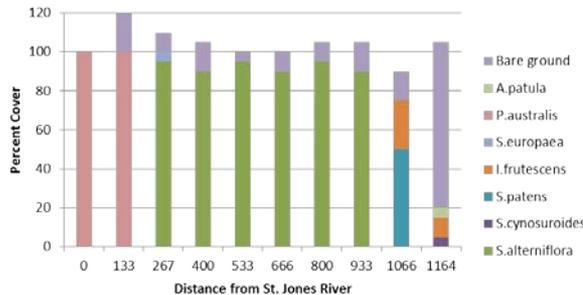
Transect B

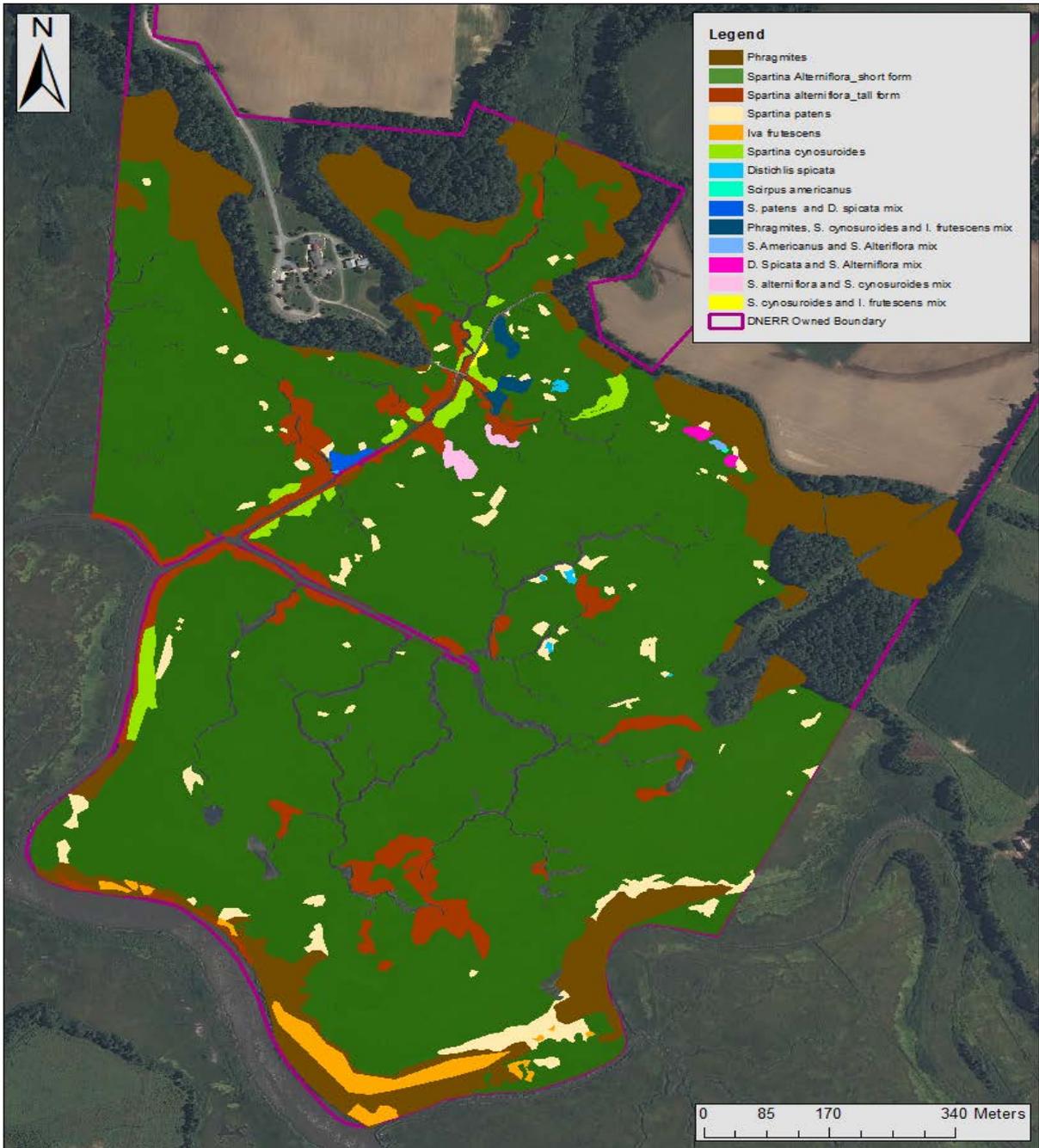


Vegetation Density



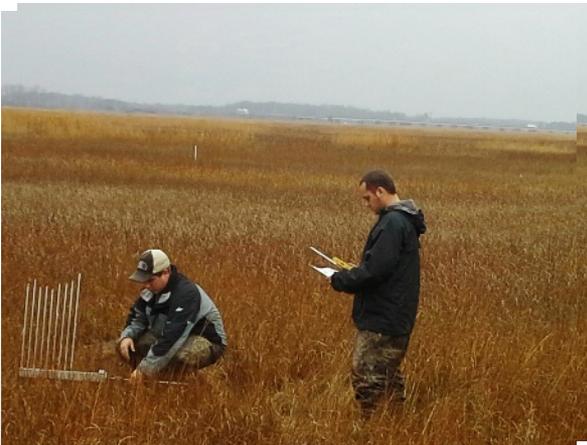
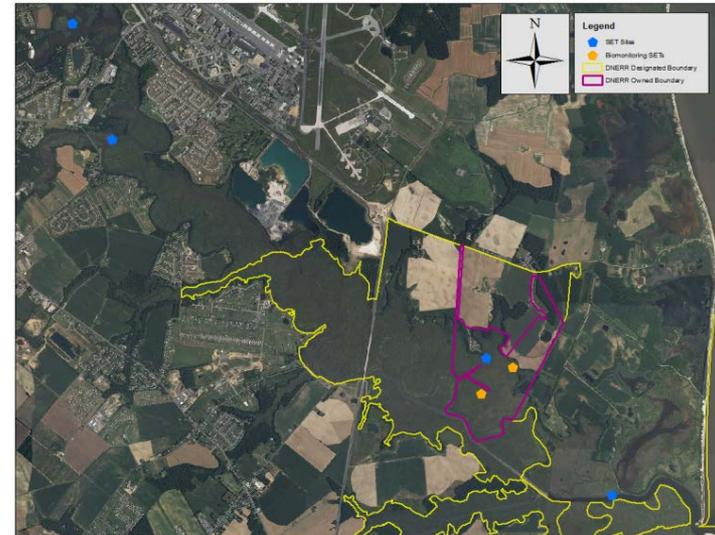
Transect C





Surface Elevation Change Measurements

- 6 Sites in St. Jones
- 4 sites in Blackbird Creek
- Installed 2004-2012
 - Surface Elevation Tables (SETs)
 - Feldspar Indicator Layers
 - Monitored every 2-6 months



Vertical Reference System for Water Level Measurements

Height Modernization



Ability to Detect Elevation Changes

Site Surveys



Future Projects

- Expansion to the Blackbird Creek Component
- Habitat mapping and monitoring of ecotone boundaries
- Nekton sampling
- Incorporating marsh bird survey data



DNERR Sentinel Site Progress

- ✓ Water quality data collection and monitoring
- ✓ Meteorological data collection and monitoring
- ✓ Tidal marsh vegetation monitoring (St. Jones)
- ✓ Wetland surface elevation change measurements
- ✓ Ability to detect elevation changes

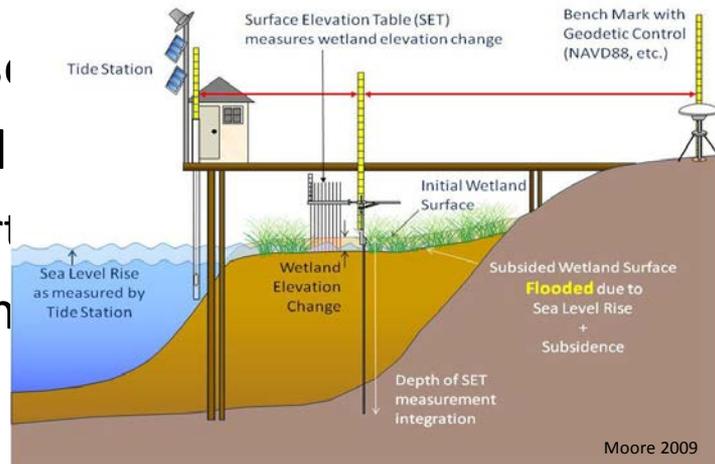
In progress for 2014:

- Vertical reference system for water level measurements
- Vertical Control Plan Document
- Sentinel Site Plan Document
 - Invitational Research Symposium March 2014

Opportunities at the DNERR & Future Directions

- Comprehensive data synthesis
- Collaborative research with local and regional partners
- Broader scale monitoring and data synthesis
 - Statewide research networks- SETs, Height Modernization, etc.
 - Potential for local cooperative sites
 - Regional/National Sentinel Site Networks

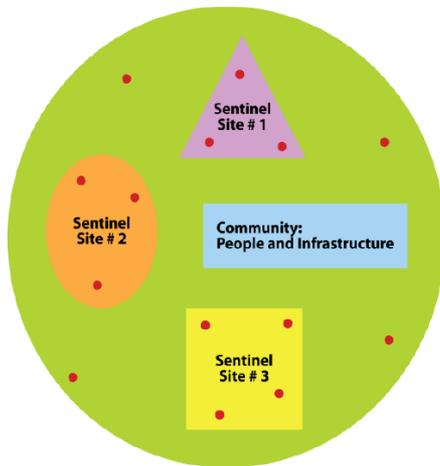
- Site-based research
- Education and outreach
 - Broad opportunities
- Coastal Training



ment decisions

ers

NOAA Sentinel Site Program

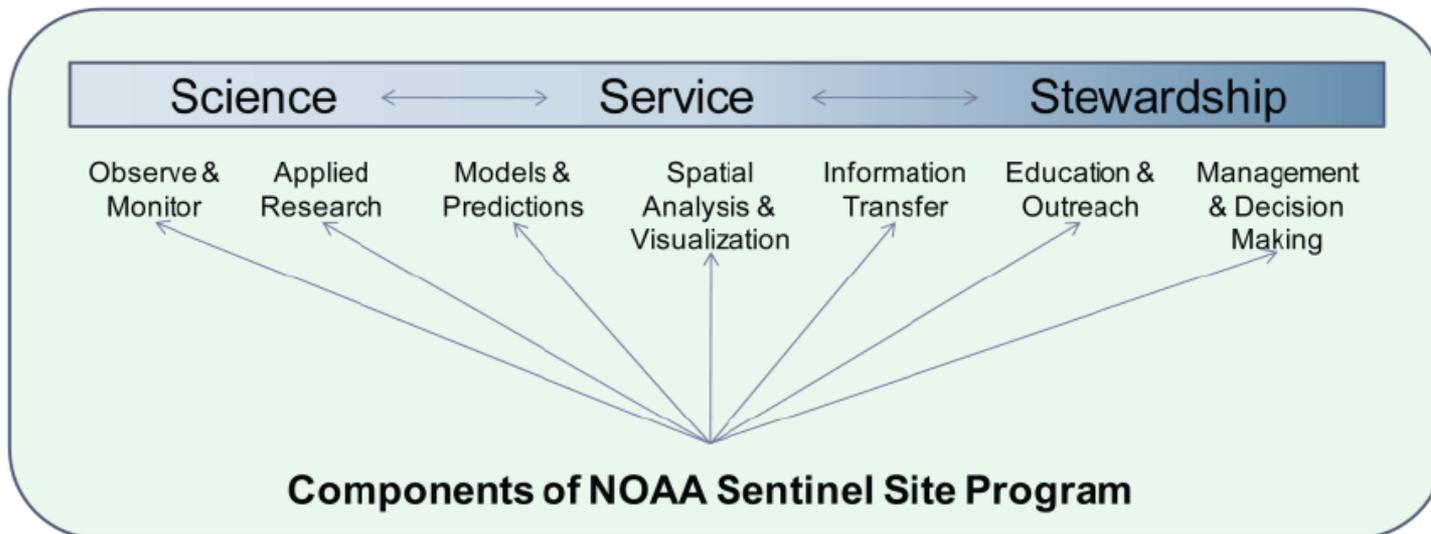


- Sentinel Site Cooperative**
Spatial extent within which the lessons learned are relevant and the socioeconomic impacts are measurable
- Community**
Social and economic systems associated with local communities
- Sentinel Site**
Managed, protected areas (including, but not limited to, NERR and NMS sites)
- Sentinel Station**
Instrument and measurement platforms

The NOAA Sentinel Site Cooperatives

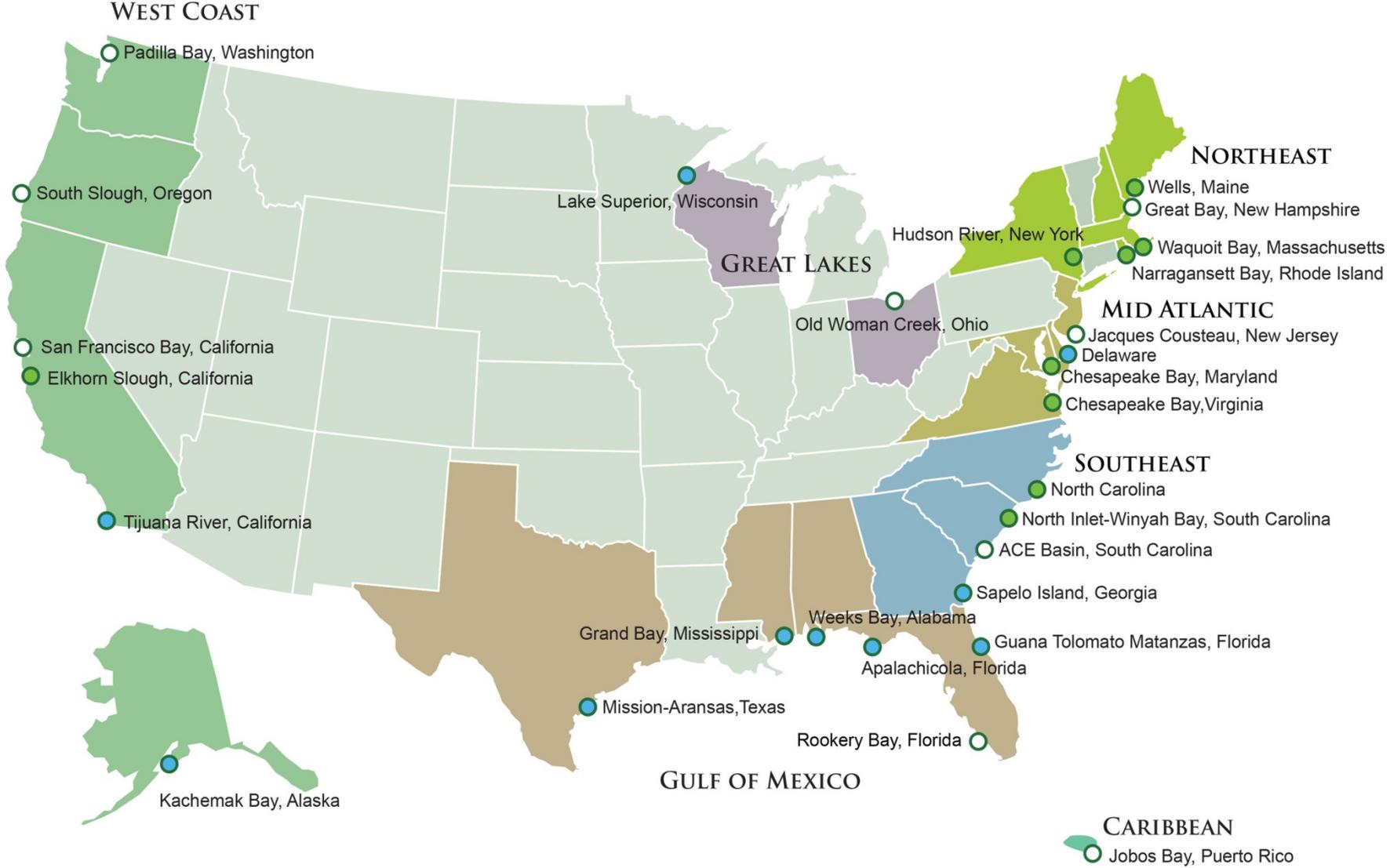


<http://oceanservice.noaa.gov/sentinel/sites/>



NERRS Sentinel Site Status

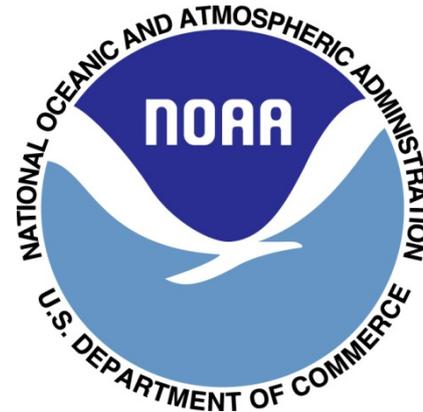
- **Date of SS Status Unknown**
- **Current Sentinel Sites**
- **Reserves Expecting to be Sentinel Sites within Two years**



Acknowledgements



NATIONAL
ESTUARINE
RESEARCH
RESERVE
SYSTEM



For more information:

Lyndie.Hice-Dunton@state.de.us

302.739.6377

www.nerrs.noaa.gov