



Building Resilience in the Wake of Hurricane Sandy

USGS Web Services



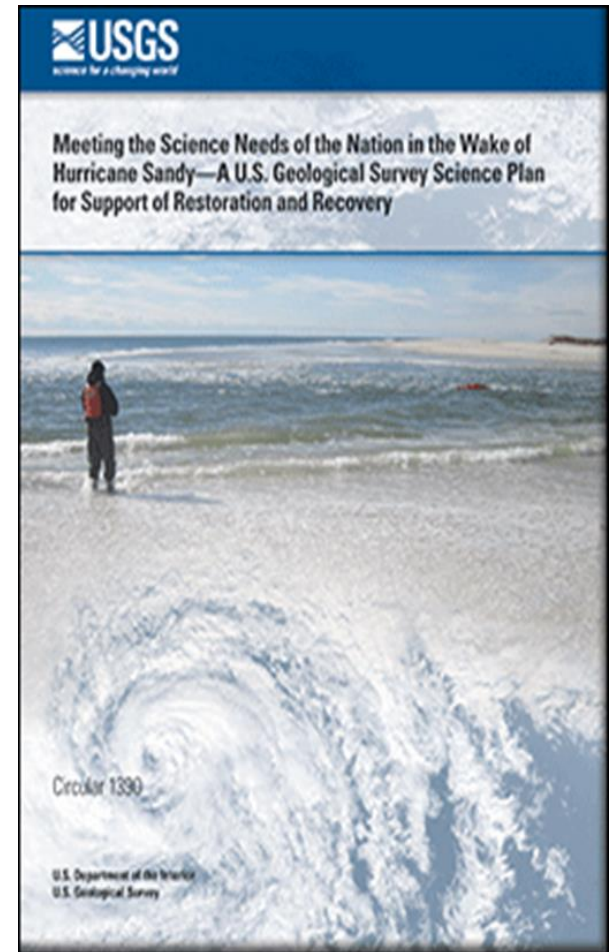
Photo: NOAA



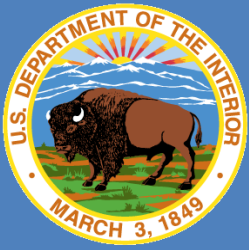
USGS Hurricane Sandy Science Plan



5. Impacts on Ecosystems
4. Impacts on Environmental quality
3. Hydrology of surge, waves and tides and impacts on bays and estuaries
2. Physical Impacts on coastal beaches and barrier islands
1. Topographic and bathymetric data essential to hurricane impact assessment & response



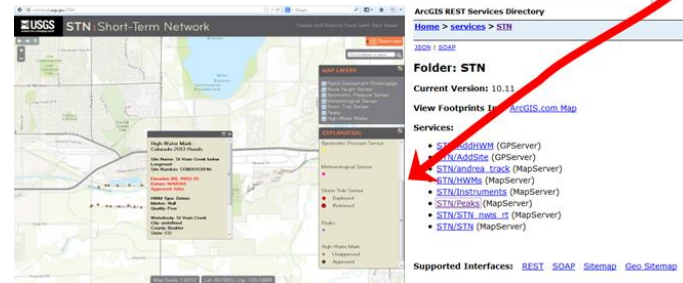
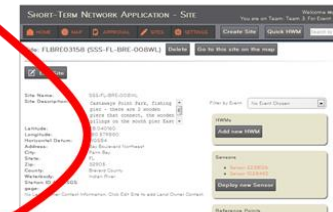
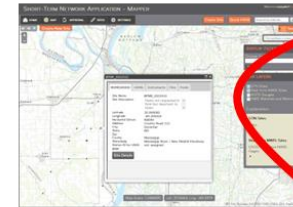
<http://pubs.usgs.gov/circ/1390>



SWaTH Network Operation



- Short-Term Mapper (STN) Application Launched with decision to deploy
- Data Collected by field crews
 - Deployments, retrievals, etc.
- Data ingested into STN
 - Automated for Real time Gages and Rapid Deployment Gages
 - Downloaded and transferred for non-real time instruments
- QA/QC processing
- STN Provisional Data release
 - Mapper
 - DataServices



<https://water.usgs.gov/floods/events/2012/sandy/sandymapper.html>



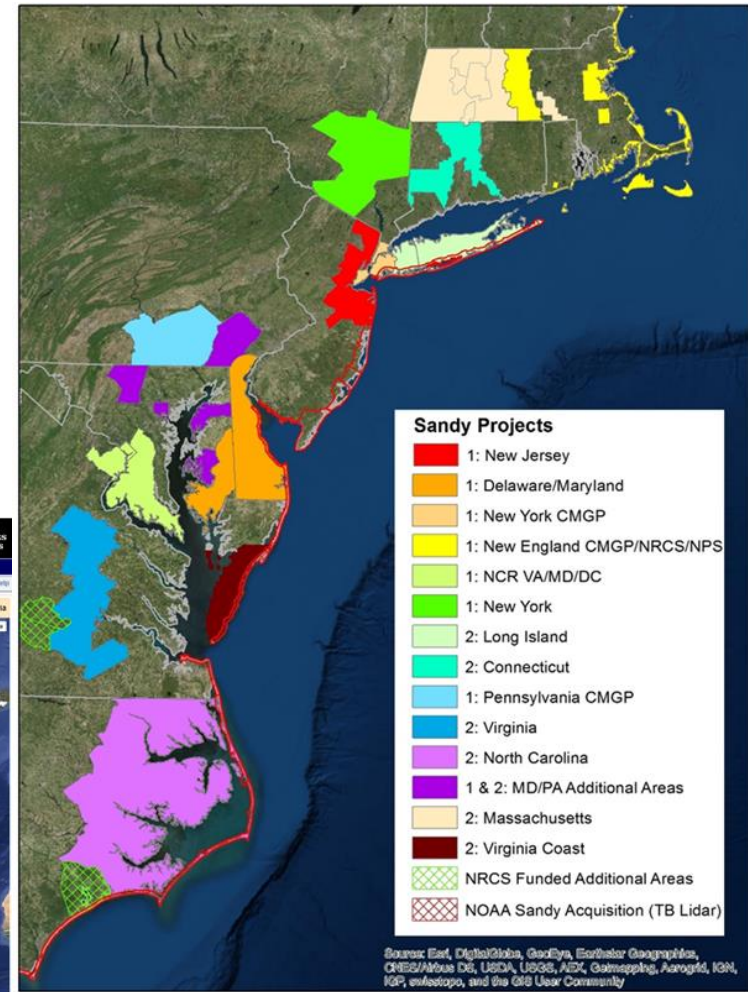
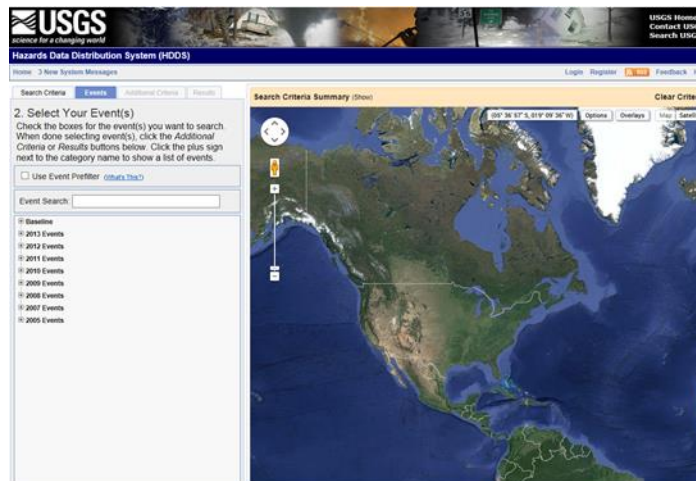
Coastal Topographic and Bathymetric Data



Accurate Elevation data is the fundamental underpinning for assessing all storm-related impacts.

Three activities funded :

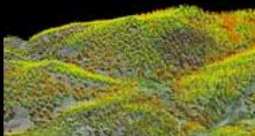
- **Topographic Surveys (lidar) for impact area assessment and reconstruction (3DEP)**
- **Establish a Sandy Region Coastal National Elevation Database (CoNED)**
- **Improved Delivery Systems for Hazards, Topographic and Bathymetric Elevation Data**



Welcome to the USGS Center for LIDAR Information Coordination and Knowledge

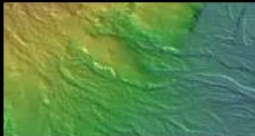
[Home](#) [Websites/References](#) [Data Access](#) [Contact Us](#)

Discrete-return point clouds



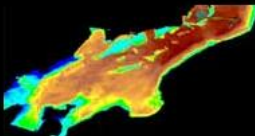
Find out more about discrete-return lidar: See if publicly-available lidar is in your area of interest; look for articles and other websites about lidar.

Bare Earth

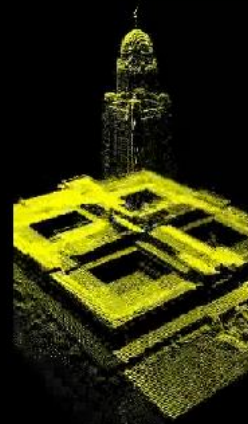


Find out more about the USGS bare earth derivatives from lidar: Go to our National Elevation Dataset (NED) page. NED contains bare earth elevation data created by lidar and other sources.

USGS-NASA-NPS EAARL Data



Find out more about USGS Coastal and Marine Geology Program's collaboration with NASA and NPS to publish data acquired by the Experimental Advanced Airborne Research Lidar (EAARL) system. Optionally, visualize and download lidar data and CIR imagery in Google Earth.



Mission

There has been increasing demand for research utilizing all information generated from lidar remote sensing data and not just bare earth digital elevation models (DEMs). While this technology has been a proven mapping tool, effective for generating high-quality DEMs, research requires the entire point cloud of this remote sensing data for analysis.



CLICK
Center for LIDAR Information Coordination and Knowledge

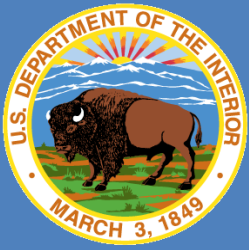
Upcoming Events / Recent Links

[USGS-NGP Lidar Base](#)

HS Tidal Marsh Resil.....docx

Show All

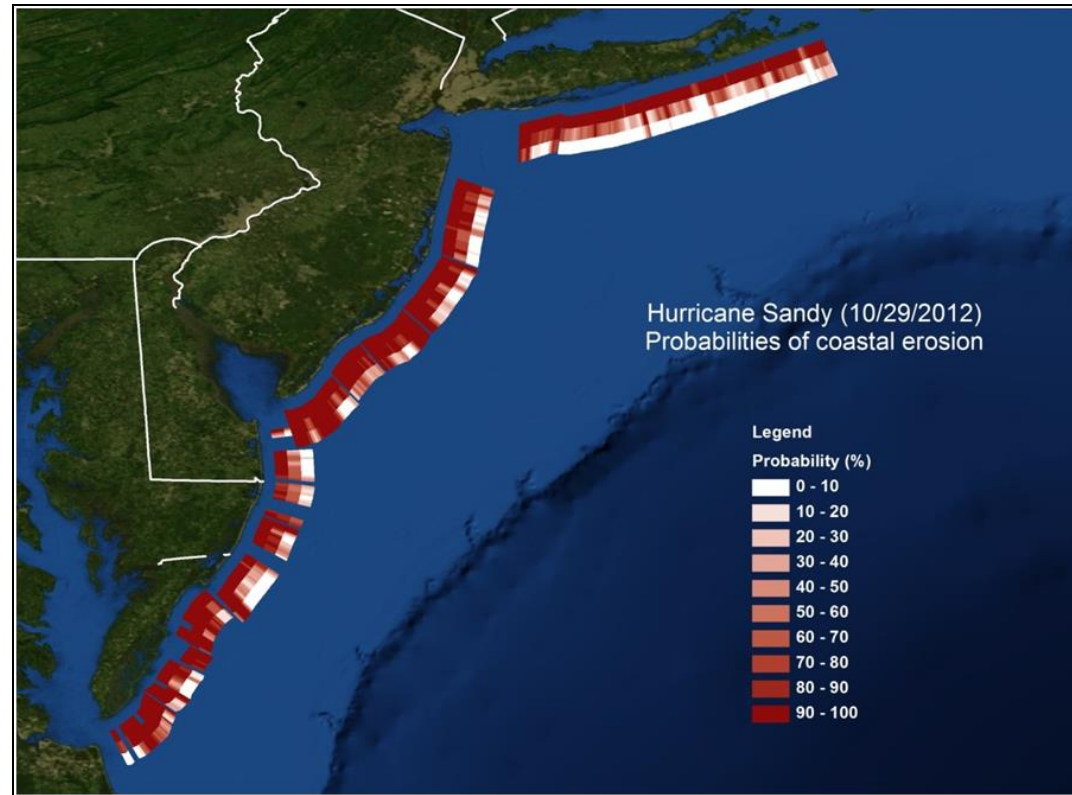
<http://lidar.cr.usgs.gov/>



Real-time Forecast of Coastal Erosion – Hurricane Sandy



- **Inputs:**
 - Lidar-based shorelines, dunes (USGS, USACE)
 - Storm surge (NOAA)
 - Wave conditions (NOAA)
 - Wave runup (USGS)
- **Output: Probabilities of**
 - Collision & Dune erosion
 - Overwash
 - Inundation
- Assessments are posted online and updated with current NHC meteorology as the storm approaches landfall.



% of coast very likely to experience coastal change :			
	Dune erosion (inner)	Overwash (middle)	Inundation (outer)
Long Island, NY	93	12	4
New Jersey	98	54	21
Delmarva	91	55	22

USGS Coastal Change Hazards Portal
science for a changing world

All ▾ Search... 🔍 🗑️ ?

Map of North America showing coastal change hazards. The map includes labels for Russia, Canada, United States, Mexico, and Venezuela. Major cities like Vancouver, Seattle, San Francisco, Los Angeles, Chicago, Detroit, Toronto, Boston, New York, Philadelphia, Washington, Atlanta, Dallas, Houston, Miami, Havana, Mexico City, Port-au-Prince, Santo Domingo, Caracas, and Bogota are marked. The North Pacific Ocean is labeled. A scale bar indicates 1000 km and 500 mi.

Map Controls: +, -, 📍, 📏

Dropdown Menu:

- All
- Products
- Products - Extreme Storms
- Products - Shoreline Change
- Products - Sea-level Rise
- Location

Filter List:

- > Hurricane Joaquin New
- > Extreme Storms
- > Shoreline Change
- > Sea-level Rise

<http://marine.usgs.gov/coastalchangehazardsportal/>

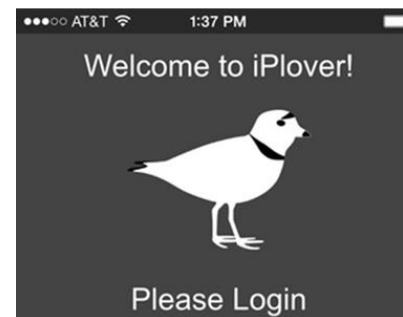
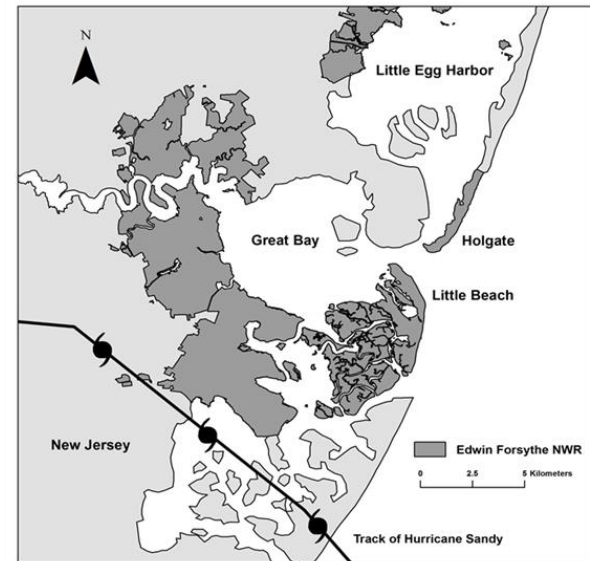


Ecosystems



Highlight--Piping Plovers at E.B. Forsythe NWR and beyond

- **Historical analysis to determine effects of major storms and other ecological factors on Piping Plover nesting.**
- **Evaluate impacts of Hurricane Sandy and recovery efforts on critical habitat and plover population**
- **Expand approach to study factors affecting Plovers across their range on Atlantic Seaboard *model and forecast services and changes***

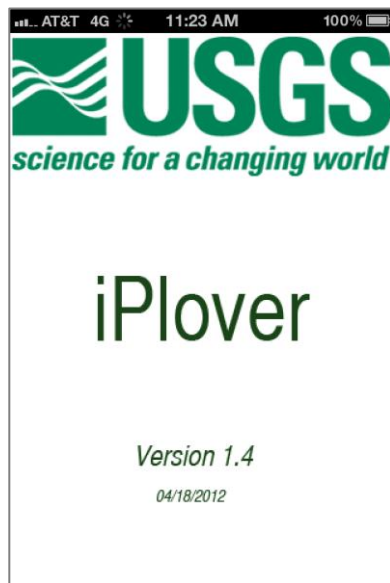


iPlover: feeding SLR, plover (and other) models with standardized observations

- Deploy to select DOI partners; provide protocols
- Vastly increase spatial domain
- Can deal with fuzzy observations
- Collection requirements based on what we've learned to date



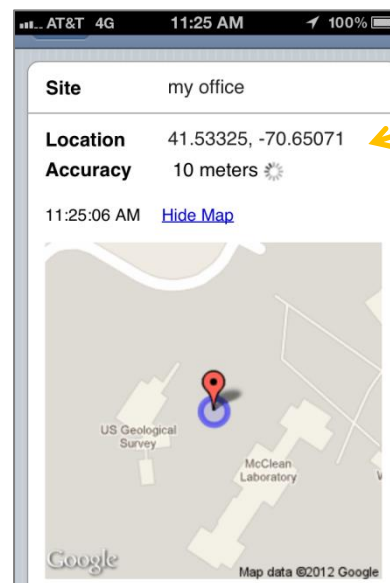
There's an app
for that



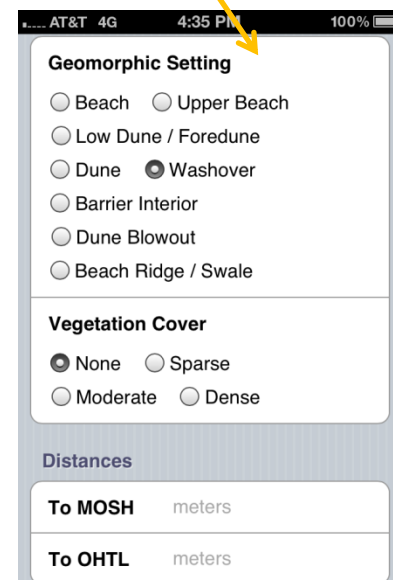
Unofficial splash
screen



Unofficial icon



DATA!





Synthesis



E. B. Forsythe NWR: Location of Hurricane Sandy Wetland Synthesis

A foundation for a National Assessment of Wetland Physical Change

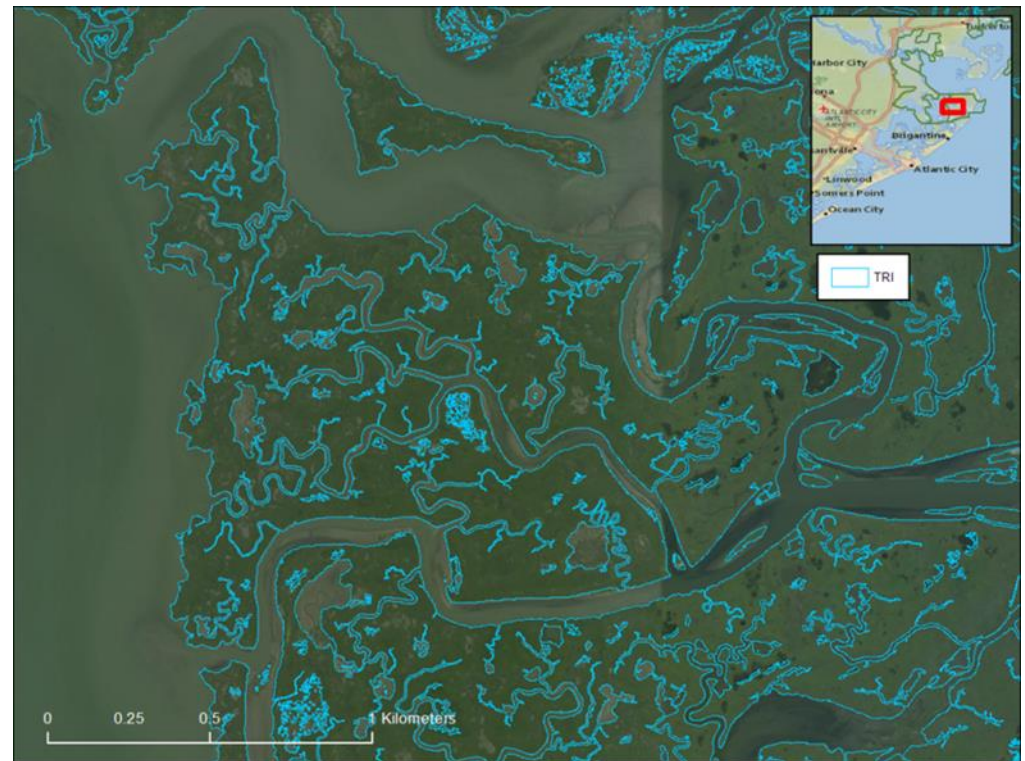
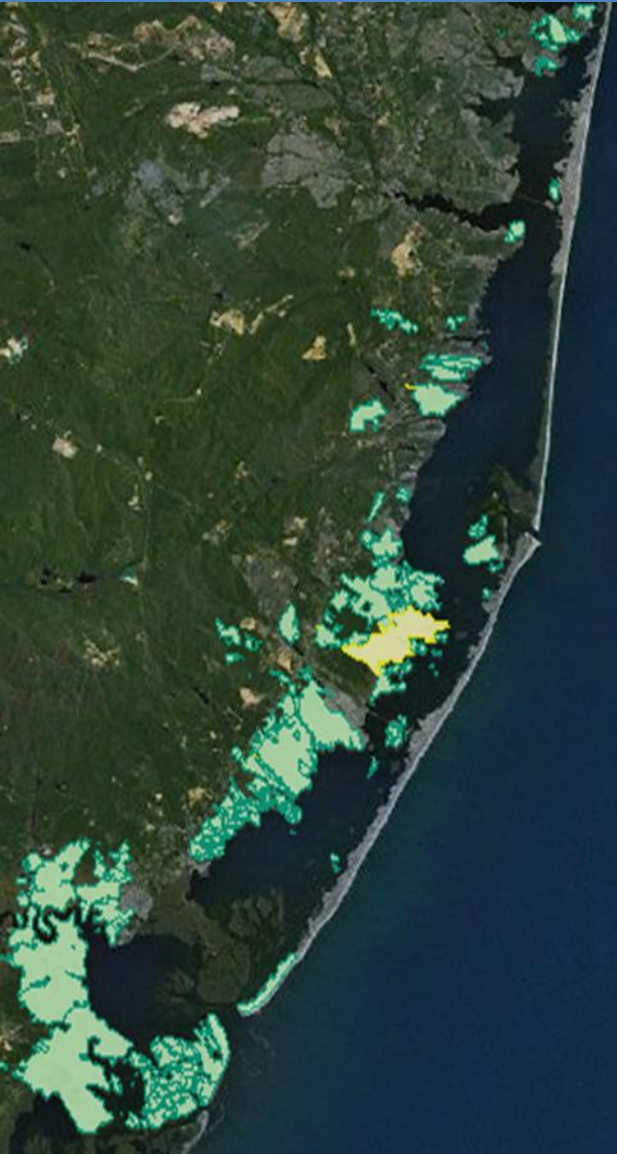
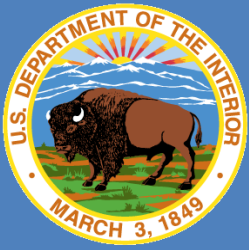


Figure 1. Forsythe NWR – Wetland land/water delineation based on the terrain roughness index (TRI).



Synthesis



PRIMARY LAYERS

DRIVERS

- tides, waves, SLR
- soil type, salinity, vegetation
- elevation, overwash

RESPONSES

- accretion, burial
- lateral erosion, collapse
- dieback, vegetation changes

CHANGES TO SERVICES

- carbon sequestration
- wave attenuation
- habitat provision

DERIVED LAYERS

Wetland Vulnerability Index:
Combines physical and biological
drivers to estimate relative
vulnerability

Ecosystem Services Bundles:
Combines value of bundled
services to estimate spatial
gradients

Focus on drivers, responses, and services that
can be quantified on regional scale, one
estuarine complex at a time

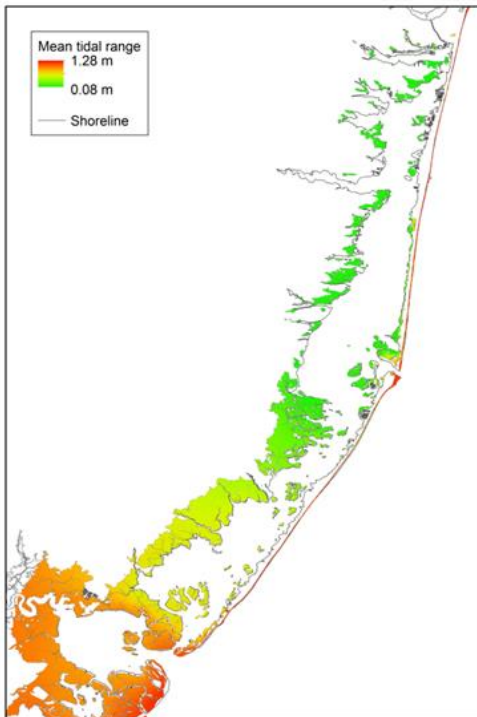


Synthesis

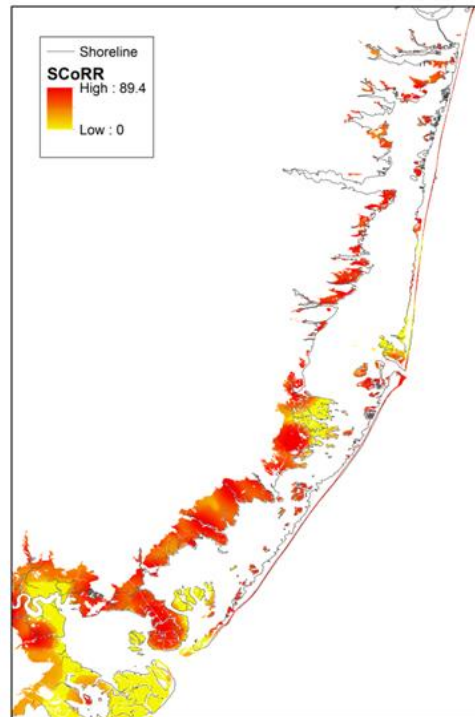


Examples of preliminary layers

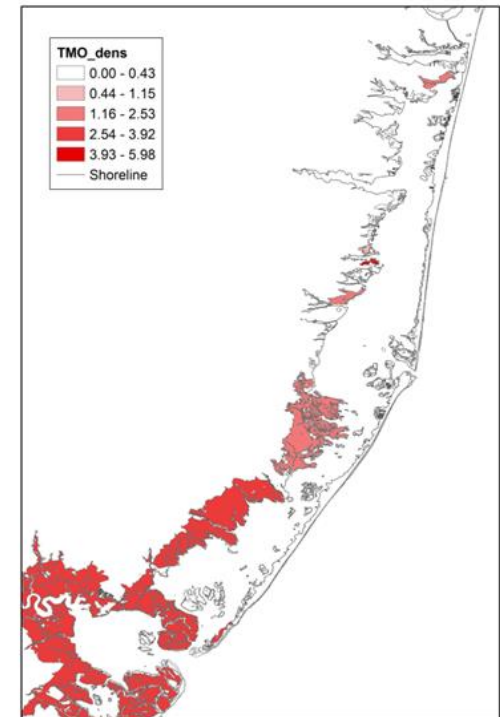
Tide range (driver)



**Contaminant
exposure (driver)**



Bird density (service)





DOI Hurricane Sandy Program Websites and Resources

- DOI Hurricane Sandy Program: <https://www.doi.gov/hurricanesandy>
- DOI Metrics Expert Group Report:
<https://www.doi.gov/hurricanesandy/news/hurricane-sandy-project-metrics-report>
- DOI Hurricane Sandy Projects map:
<http://fws.maps.arcgis.com/apps/MapSeries/index.html?appid=17a3ad1b05884d369c0b24fbcd57b6b9>
- U.S. Fish and Wildlife Service: <http://www.fws.gov/hurricane/sandy/>
- U.S. Geologic Survey: <http://www.usgs.gov/hurricane/sandy/>
- National Park Service:
<https://www.arcgis.com/apps/MapSeries/?appid=d953beffd6704440bb2464283e7bd740>
- NFWF: <http://www.nfwf.org/hurricanesandy/Pages/home.aspx>
- BOEM: <http://www.boem.gov/Hurricane-Recovery-Initiatives/>