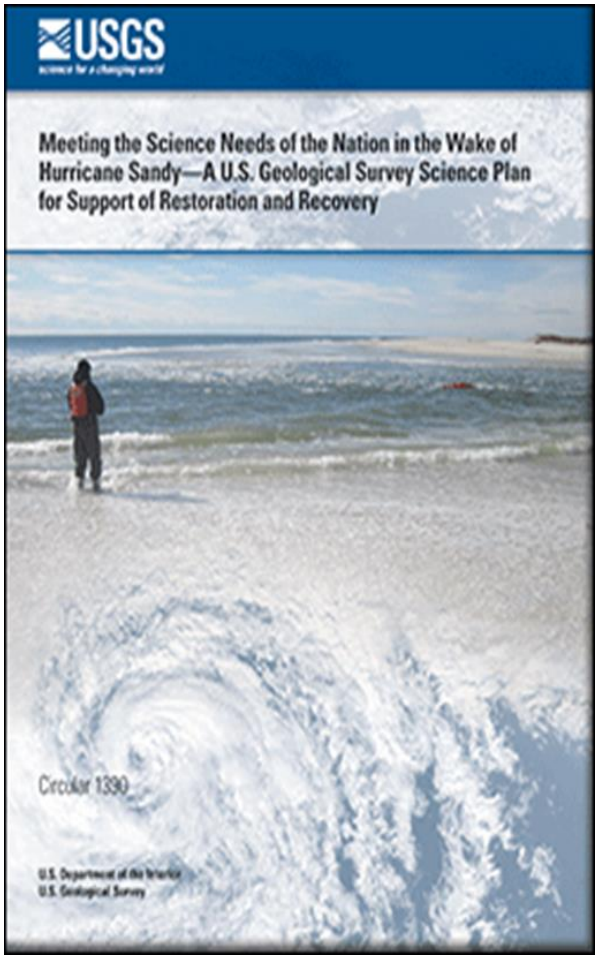
Building Resilience in the Wake of Hurricane Sandy

USGS Web Services

Photo: NOAA

USGS Hurricane Sandy Science Plan

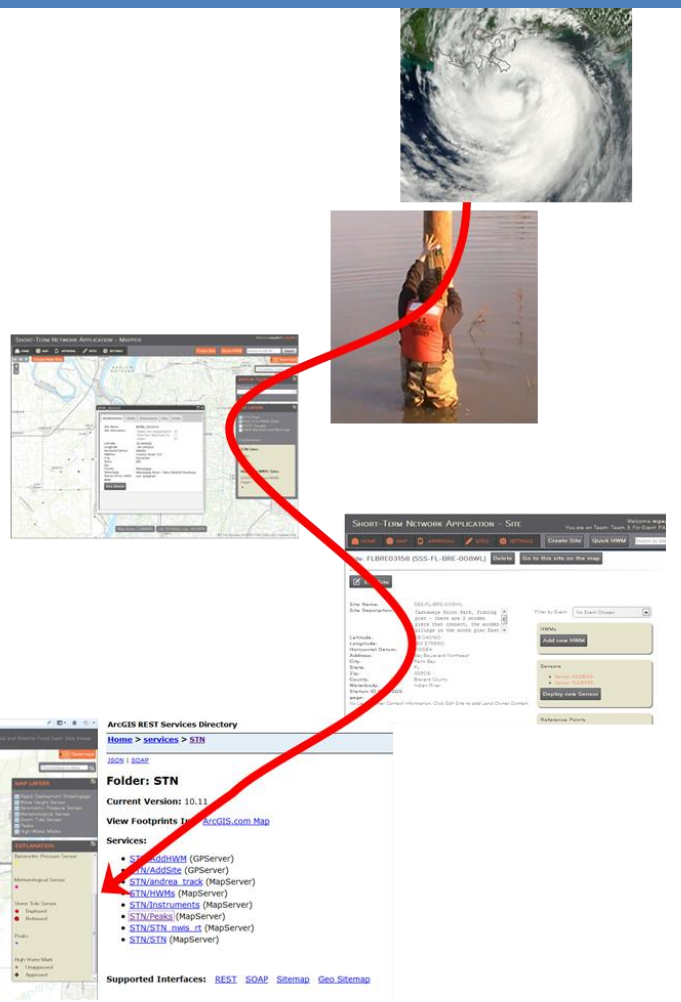
5. Impacts on Ecosystems
4. Impacts on Environmental quality
3. Hydrology of surge, waves and tides and impacts on bays and estuaries
2. Physical Impacts on coastal beaches and barrier islands
1. Topographic and bathymetric data essential to hurricane impact assessment & response



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**
  - **Data Services**



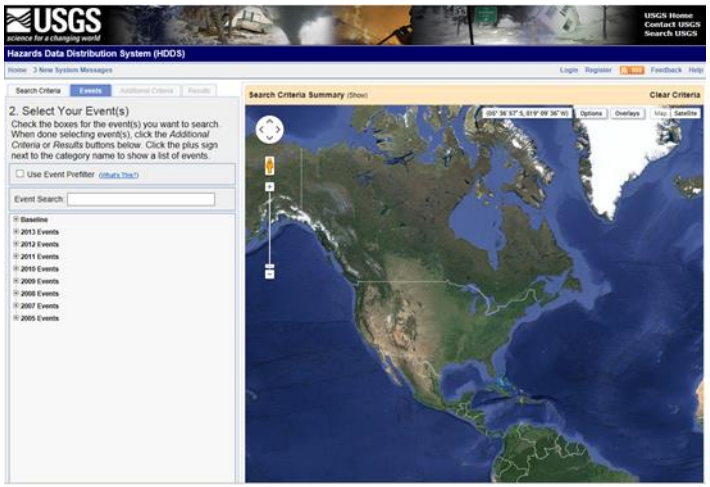
https://water.usgs.gov/floods/events/2012/sandy/sandymapper.html

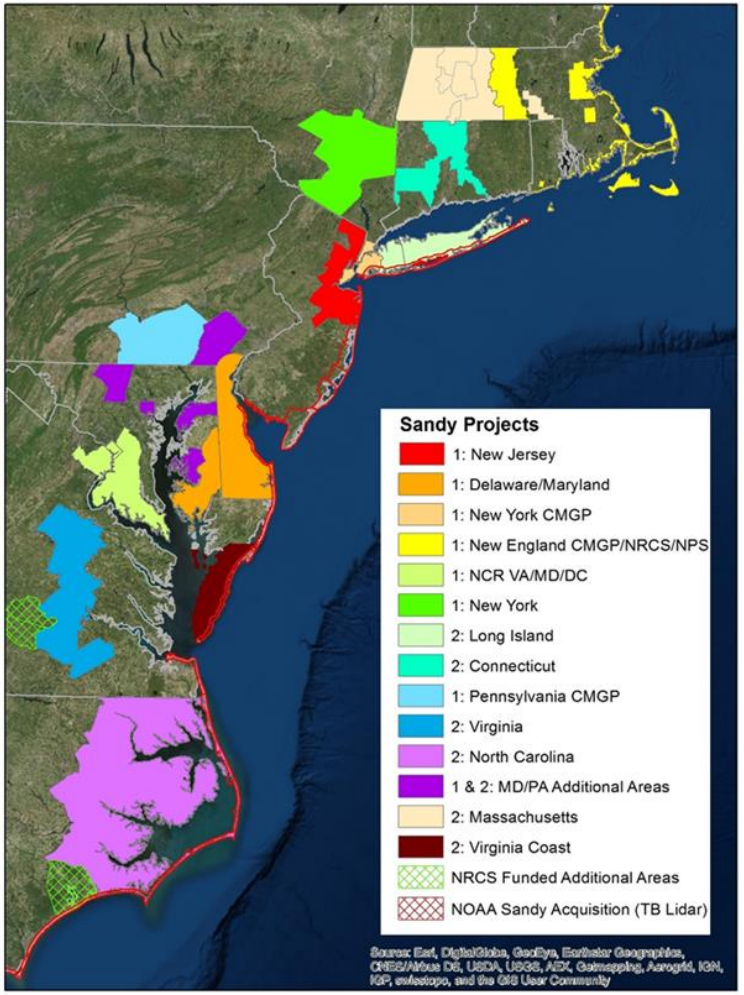
Coastal Topographic and Bathymetric Data

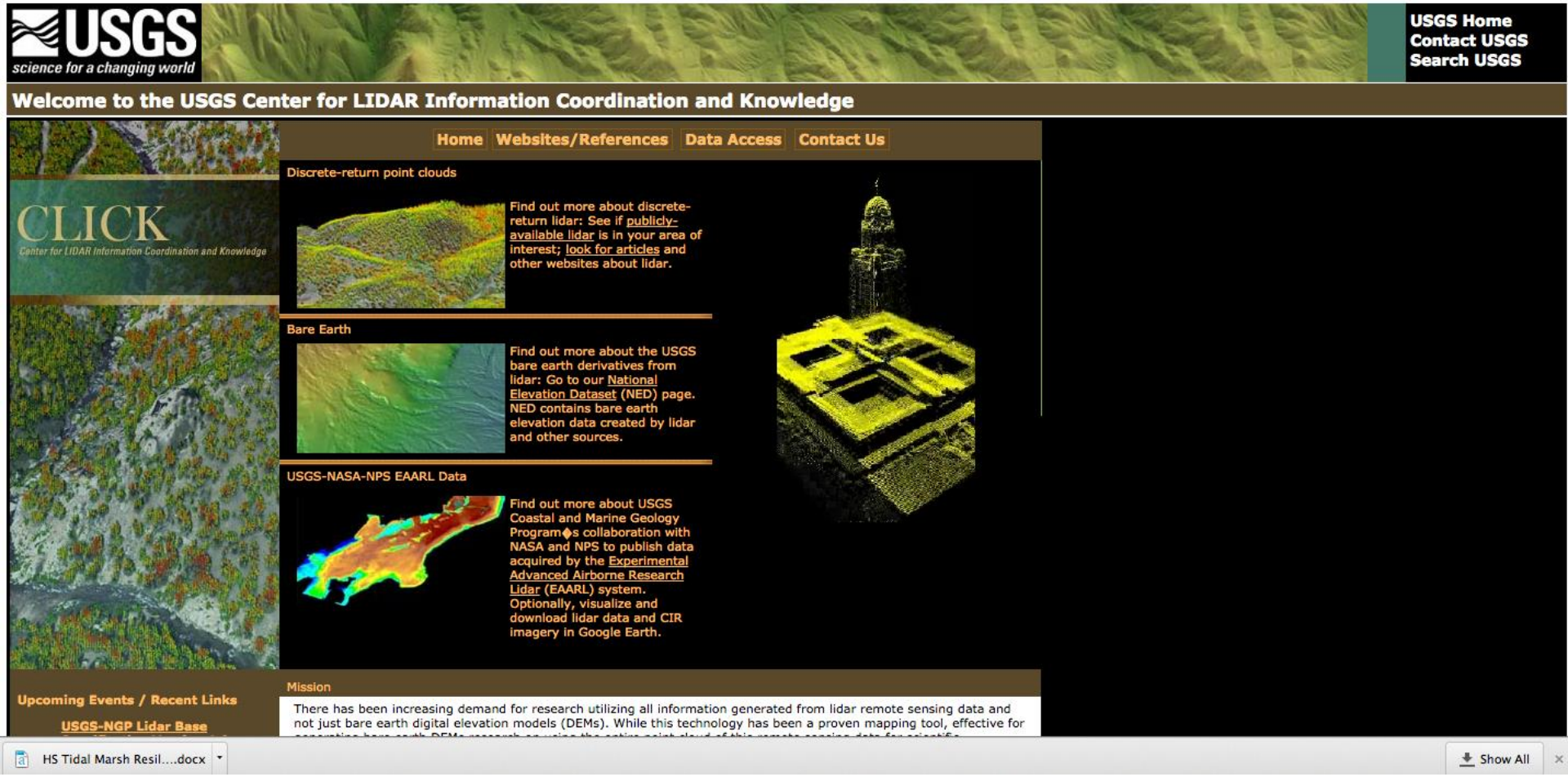
Accurate Elevation data is the fundamental underpinning for assessing all storm-related impacts.

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**



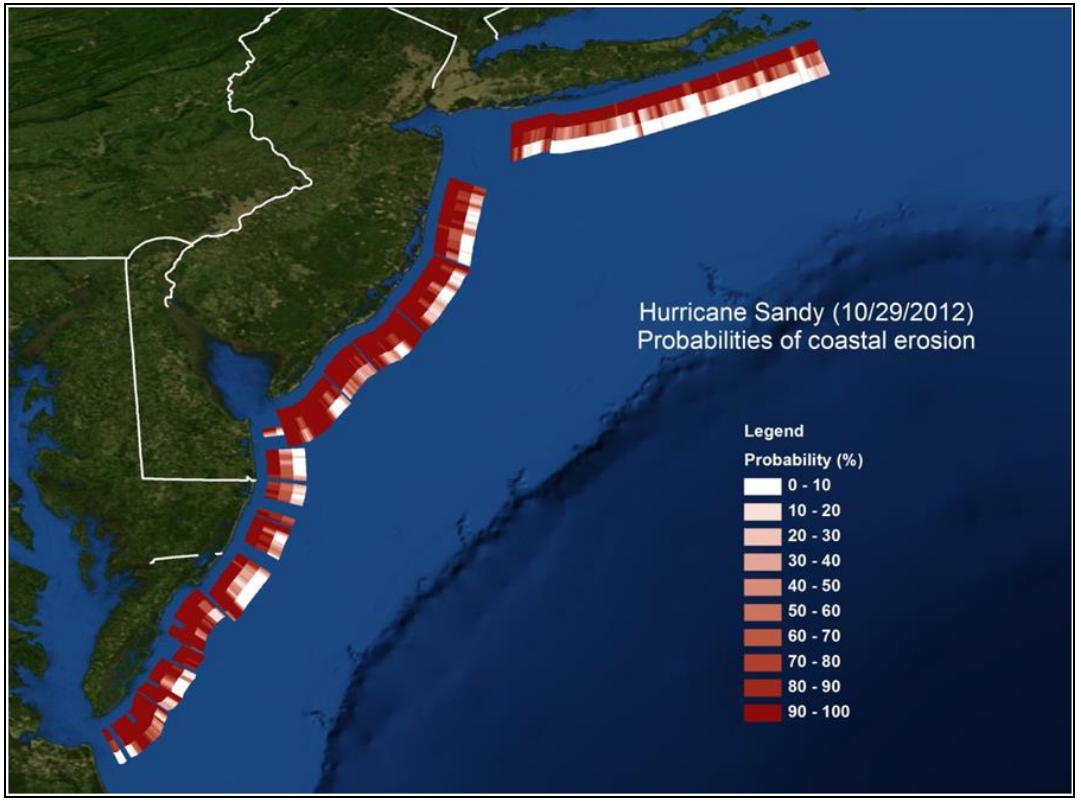




http://lidar.cr.usgs.gov/

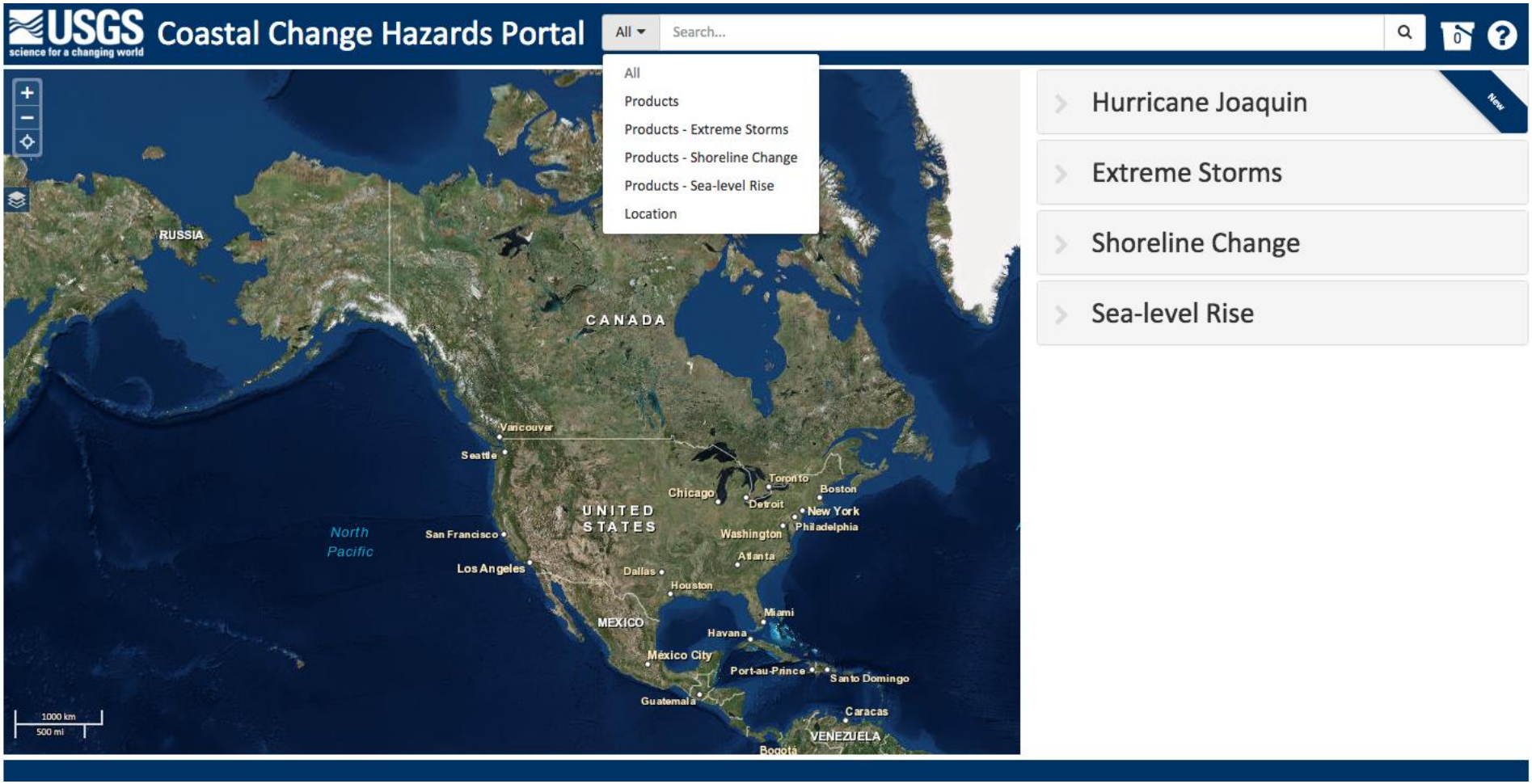
Real-time Forecast of Coastal Erosion – Hurricane Sandy

- **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

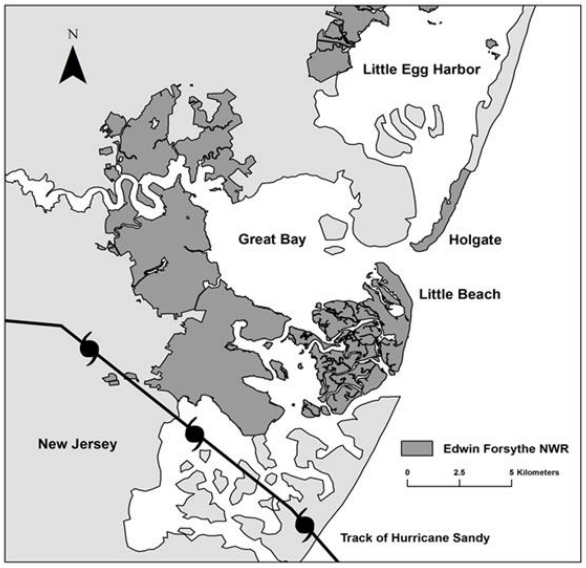


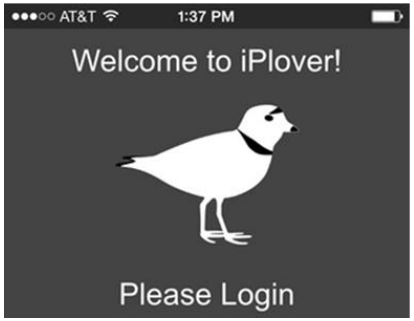
http://marine.usgs.gov/coastalchangehazardsportal/

Ecosystems

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

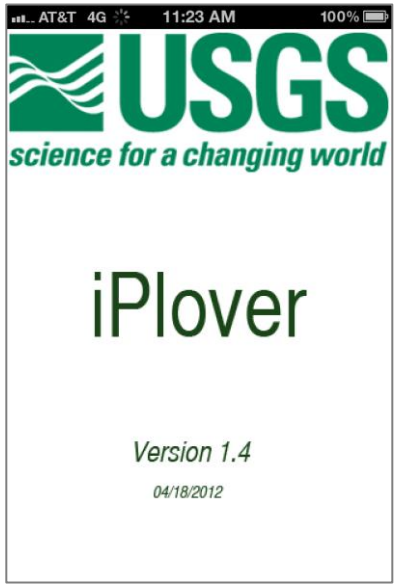
- **Historical analysis to determine effects of major storms and other ecological factors on Piping Plover nesting.**
- **Evaluate impacts of Hurricane Sandy and recovery efforts on critical habitat and plover population**
- **Expand approach to study factors affecting Plovers across their range on Atlantic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





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

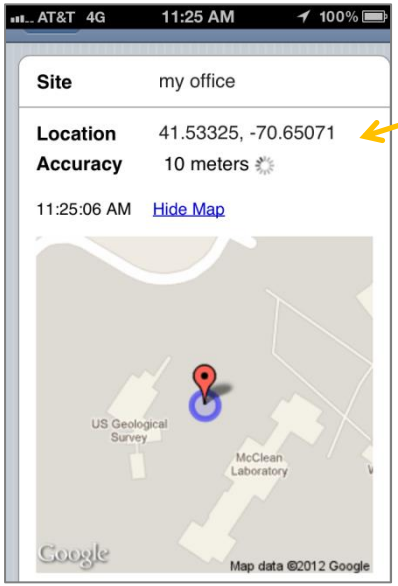
There's an app for that



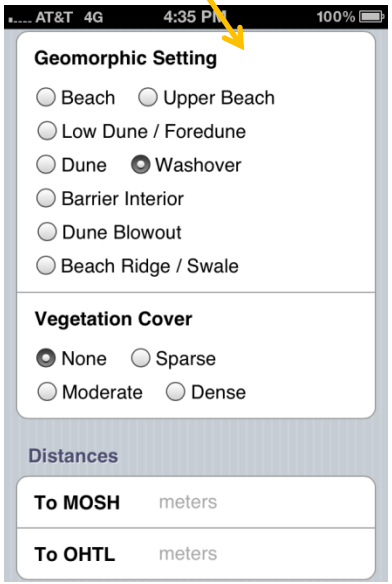
Unofficial splash screen

Unofficial icon

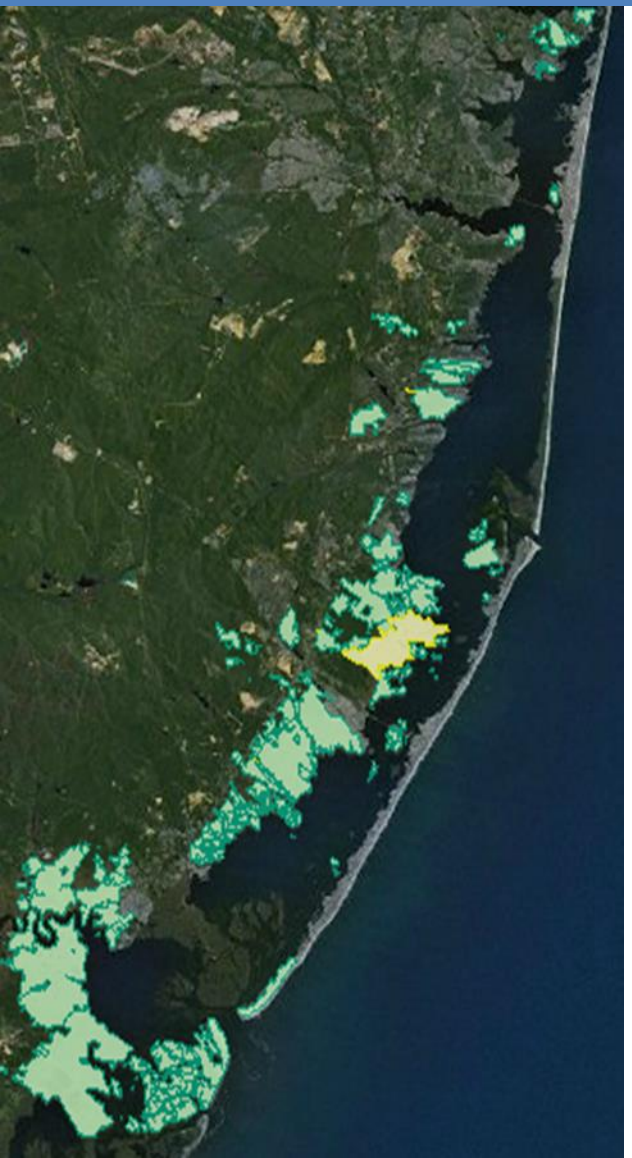
- **Deploy to select DOI partners; provide protocols**
- **Vastly increase spatial domain**
- **Can deal with fuzzy observations**
- **Collection requirements based on what we've learned to date**



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

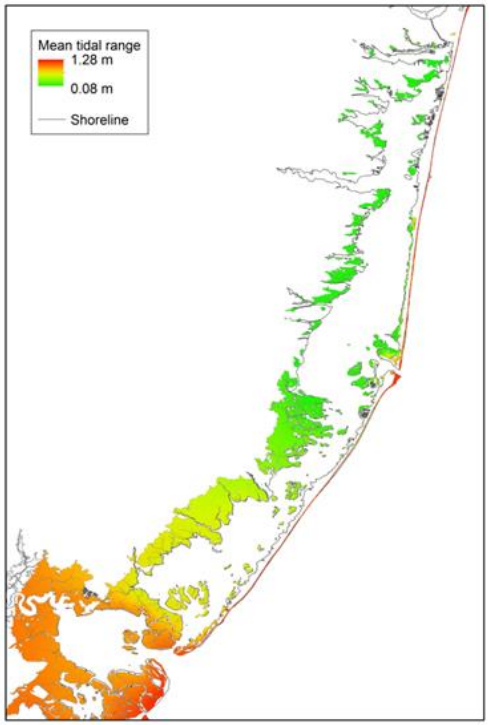
Ecosystem Services Bundles: Combines value of bundled services to estimate spatial gradients

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

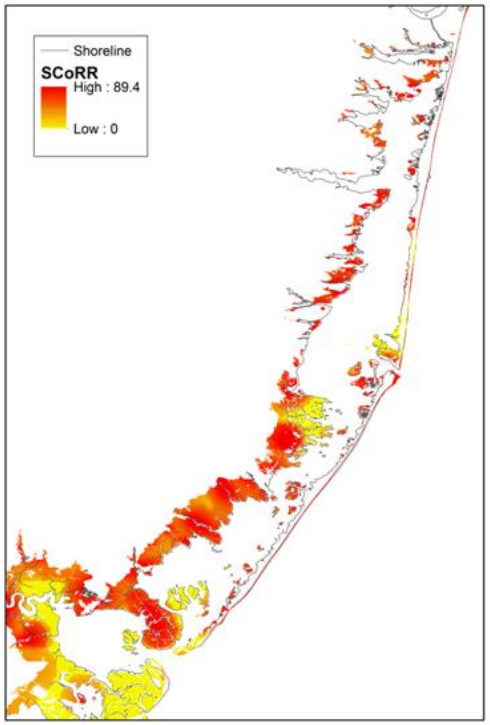
Synthesis

Examples of preliminary layers

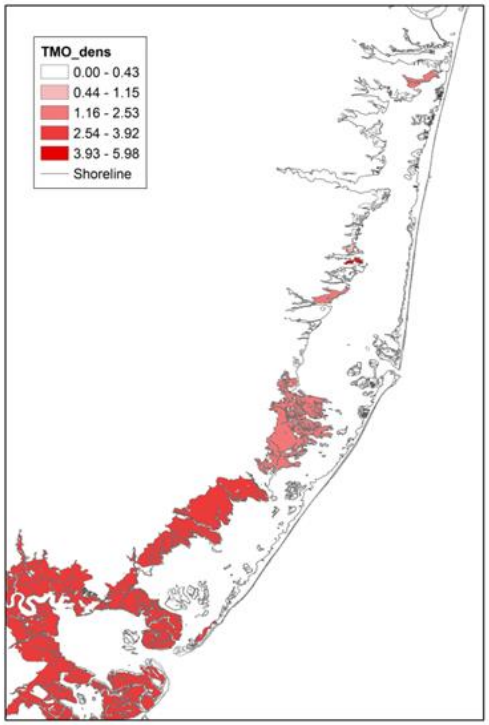
Tide range (driver)



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/***