



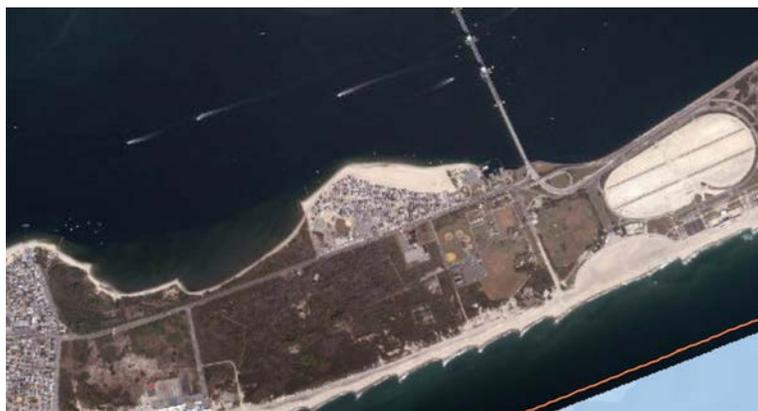
Geospatial Data Management

Powering Storm Preparedness & Response

What can a map tell you? Certainly where you are, but also so much more: Has a shoreline moved from where it used to be? How high is a building above sea level? What are the chances that building will flood during future storms or future sea level rise?

To answer any of these questions you need information, or data—specifically, geospatial data: information that corresponds to particular coordinates on the face of the planet, coordinates that can be located again and again to see if conditions there change.

When Superstorm Sandy hit the northern Atlantic coast in 2012, it struck Assateague Island National Seashore (pictured above), Fire Island National Seashore, and Gateway National Recreation Area. The National Park Service (NPS) recognized that certain forms of geospatial data could crucially guide efforts to determine



(a) how the storm impacted the parks, and (b) how staff can build more efficiency and resiliency into future storm response.

The NPS-funded Geospatial Data Management project is creating practical map-based solutions to on-the-ground problems, helping coastal National Parks further prepare for future impacts from sea level rise and storms like Sandy.

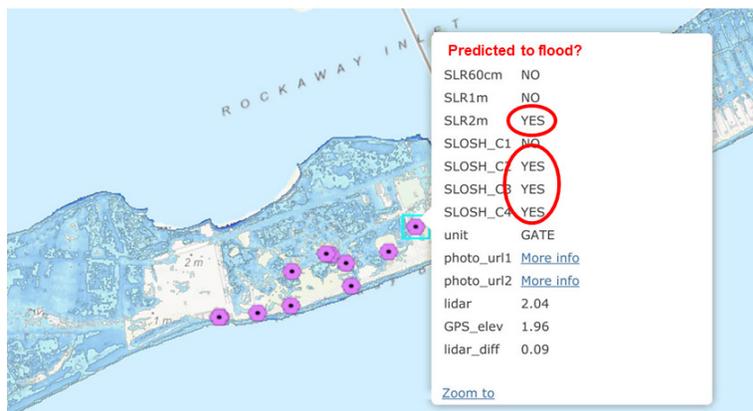
A lot goes into making a map. The Geospatial Data Management project has streamlined answering many map-based questions by:

- providing each park with a tailored database of high-quality spatial info and specific-use maps that empower NPS personnel and first responders;
- synthesizing spatial data, photos, and model output into web-based interactive applications that can be accessed quickly by multiple users and the public; and
- generating time-saving protocols that help NPS staff to more quickly and easily create their own maps.

Q: What is the ultimate goal?

A: To empower NPS personnel and first responders

The Geospatial Data Management project was established to ensure that data, resources, workflows, and technological capabilities are in place before the next big storm—to help NPS staff prepare and recover. Essentially, it makes sure that staff have tools ready and at hand, with clear instructions for how to use them.



Three images show the same site at Gateway National Recreation Area: oblique aerial photo taken days after Sandy (top left); satellite imagery taken in 2013 (bottom left); and an interactive map of sentinel sites, for which information can be displayed (right)—here, we see that models indicate the site will likely not flood at < 1 m of sea level rise but will at ≥ 2 m and during a hurricane with a strength \geq Category 2.

Q: What forms does “data management” take?

A: Tailored databases and web-based applications

The Geospatial Data Management team has adopted multiple approaches to delivering information to NPS staff, in order to accommodate different levels of technical skill and satisfy different needs:

Tailored databases are...

- Comprehensive sets of data that can be layered to create information-rich maps
- Delivered by flash drive
- Operational on a laptop with mapping software, independent of Internet or electricity
- Functional in the field on mobile devices
- Helpful for independent map-making
- Supplemented with accompanying documentation for all data
- Essential for performing analyses (e.g., determining changes in elevation)
- Best suited for medium to high technical skill

Web-based applications are...

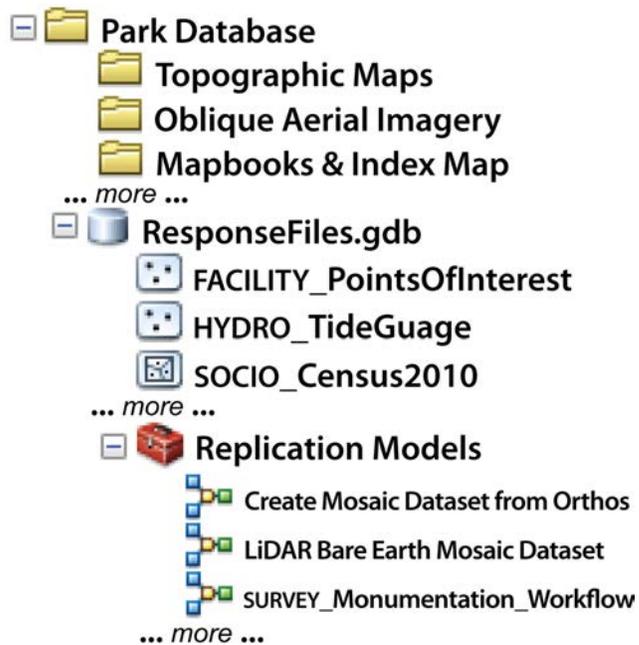
- Easy-to-use story maps, map-based journals, and more, prepared by professionals in response to individual parks’ needs
- Online, accessible to NPS staff anywhere with an Internet connection (incl. high-speed wireless and WiFi hotspots)
- Hosted in the cloud by a commercial provider, increasing trust that these services will be available during incidents with power loss
- Quickly viewable without importing individual data layers, data processing, or using specialized software
- Suitable for users with low technical skill

Both are...

- Interactive
- Useful for answering map-based questions, examining imagery, finding specific locations, & guiding response and recovery
- Accessible via Internet or mobile devices

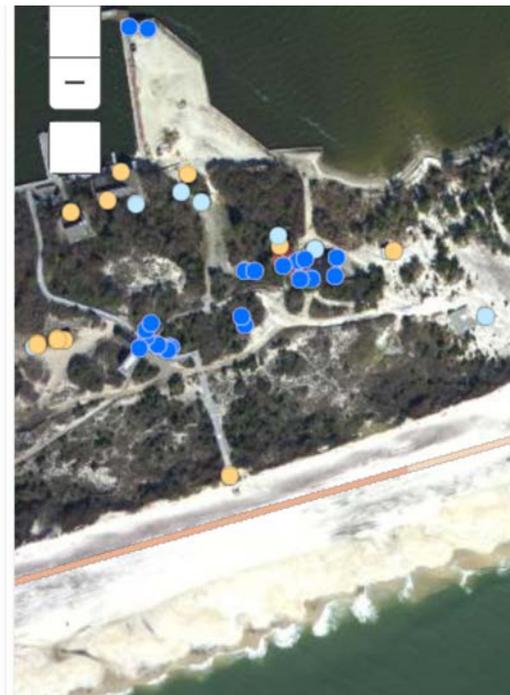


Panchromatic Quickbird Satellite imagery for the Jamaica Bay Unit of Gateway National Recreation Area, 2013. Credit URI Environmental Data Center.



Legend

- FIIS Infrastructure at Risk from a C2 Storm Surge**
- FIIS Buildings C2
- Wet
 - Probably Wet
 - Maybe Dry
- USGS Prob. of Dune Overwash (Post Sandy)
- 19%
 - 23%
 - 24%
 - 27%
 - 28%
 - 34%
 - 35%
 - 36%



The tailored databases contain digital toolboxes that help NPS staff to easily keep spatial information up to date. If a newer version of a dataset becomes available, for instance, staff can run streamlined, pre-programmed tools to regenerate maps that had been based on older data, updating useful maps with little additional effort.

At Fire Island National Seashore, team staff used computer models to predict whether buildings will flood under various storm scenarios. These models were improved by including first floor elevations for these buildings. NPS staff can use this information to prioritize which buildings to fortify with sandbags as a storm approaches. Credit URI Environmental Data Center.

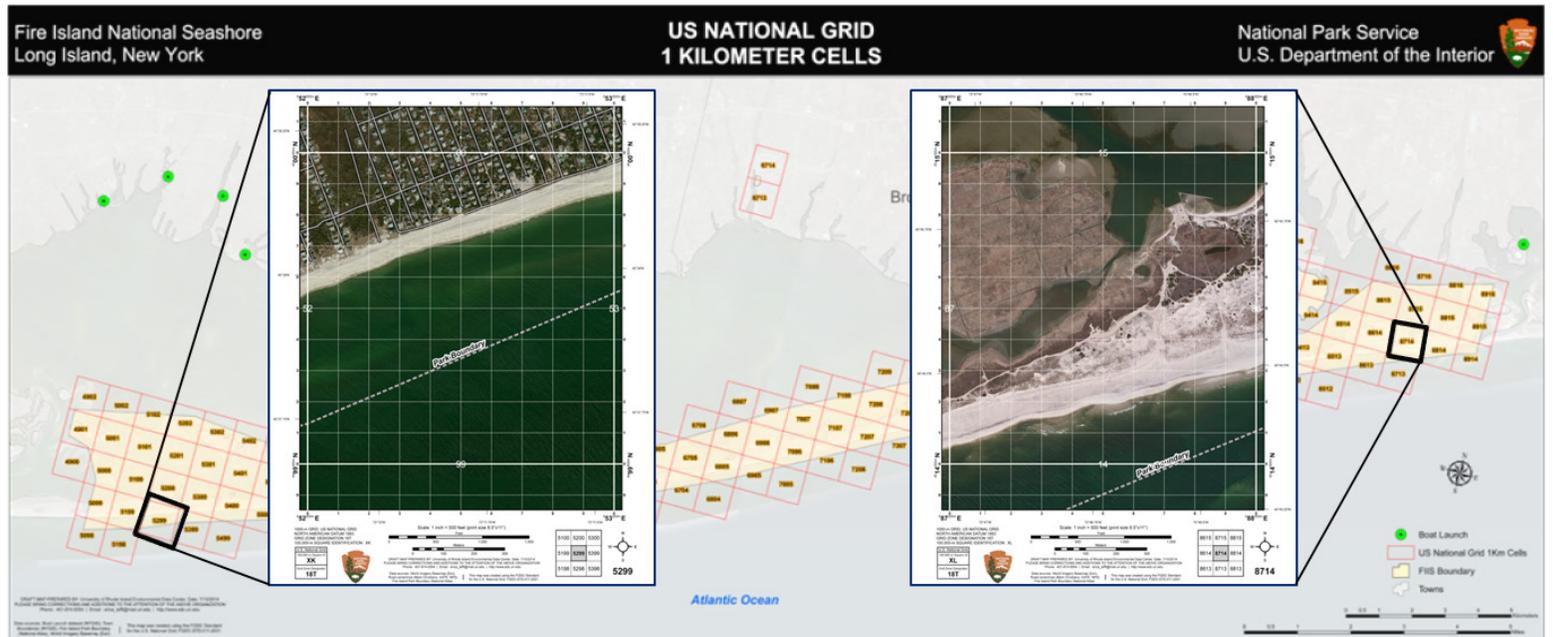


An online interactive “swipe map” allows simultaneous viewing of topography, satellite imagery, and georeferenced aerial photos at coastal parks.

Q: What other products have resulted from this project?

A: Many, including custom-made digital atlases

Imagine a large spiral-bound atlas of high-resolution aerial views that shows every square inch of a National Park, but fits on a phone or tablet and so can be carried easily by first responders. Team staff have created just such an atlas, in the form of digital mapbooks and accompanying index maps that correspond to a standardized, nationwide system of 1-km x 1-km grid squares used for search and rescue. These maps can be used as a universal way to locate people and things, even when normal landmarks are unrecognizable.



Screenshot example of custom-made digital atlases. Credit URI Environmental Data Center.



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