



## Sea Level Change and Storm Surge Projections

### Background

Climate change presents numerous challenges for management of U.S. National Park Service (NPS) natural and cultural resources and infrastructure. 92% of U.S. coastal national parks are, or will be, affected by sea level rise. Climate impacts in the coastal zone are real and affect current park operations. Park managers need the best available sea level rise and storm surge projections for park planning, including general management plans, foundation documents, and state of the park reports. It was announced in September 2013, that the NPS has taken the proactive approach to identifying and addressing these issues by funding a sea level and storm surge project that will examine 118 coastal parks. The aim of this project is to determine how vulnerable to sea level change and flooding from coastal storms these parks are so that we can protect these resources before they are lost forever. Rising sea level coupled with storm events like Hurricanes Katrina and Sandy are endangering habitats and cultural resources and will require changes to coastal infrastructure. These climate change impacts in the coastal zone are discussed in further detail in a September 2013 article in *Park Science*; <http://go.usa.gov/Wn3A>

### Approach

Human emissions of greenhouse gases are changing the sea level around the world. Although it is not possible to directly attribute any single hurricane to human climate change, the storm surges caused by hurricanes exacerbate damage from climate change caused sea level rise. This project is working to provide park managers and planners with the best available science that can be incorporated into park documents. The team from the University of Colorado Boulder are in the process of compiling sea level change data under a number of climate scenarios. These data contain information gathered from the Intergovernmental Panel on Climate Change and U.S. Army Corps of Engineers. Sea level change scenarios have been combined with NOAA sea, lake, and overland surges from hurricanes (SLOSH) models to estimate which areas could be inundated by sea level changes and storm surges over the next century.

The following either have or will be produced as part of this project:

- Data are currently being incorporated into interim projects, such as foundation documents, state of the park reports, or other planning documents, as it becomes available.
- A website providing access to sea level change and storm surge data resulting from this project; <https://www.flickr.com/photos/125040673@N03/sets/>
- Interpretive waysides exhibits have already been installed at Gulf Islands National Seashore. More waysides are expected to be installed in Jean Lafitte National Historical Park and Preserve and Fire Island National Seashore in 2016.
- A comprehensive "Sea Level Change in the National Park System" report will be released in late 2016.

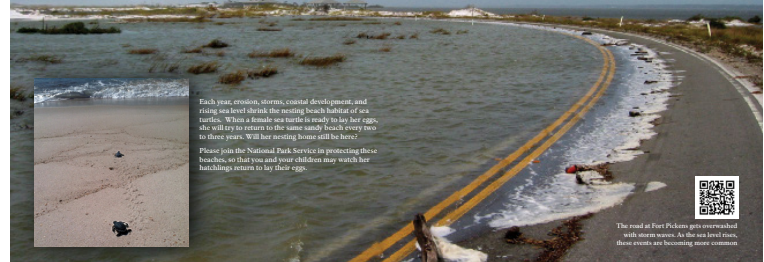
### See Change...

The earth's climate is changing, raising sea level and increasing the frequency of storm surges. Erosion and rising sea level change the shape and size of barrier islands and mainland shorelines along the Gulf Coast.

The roots of coastal plants slow erosion by anchoring the land. As sea level rises, increased salt content in the soil will kill the plants leaving the land exposed to more erosion. In many places, the amount of dry land is decreasing at a significant rate.

The Gulf Coast draws millions of visitors to relax in the bright sun, play in the crystal blue surf, explore the snow white beaches, and watch for wildlife. Yet, this dry land, at the edge of rising waters, could be claimed by the Gulf of Mexico forever.

Gulf Islands National Seashore is investing in energy efficient equipment and seeking new sustainable solutions to help keep these shores from disappearing beneath the rising sea.



An example of one the waysides created for this project. Photo courtesy of Gulf Islands National Seashore.

Given the impact of such events such as Hurricane Sandy, there is increasing public awareness of climate change in the coastal zone. The goals of this project are to provide the best available data regarding sea level change and storm surges for parks across the country. Educational materials to inform the public are being developed in coordination with NPS personnel. This project will help efforts to adapt to climate change over the coming century by providing data over multiple time horizons. This is a three year project that will be completed by the NPS Centennial in 2016.

Researchers on this project include:

- Dr. Maria Caffery; University of Colorado, Boulder; PI
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- Leanne Lestak; University of Colorado, Boulder, INSTARR; Collaborator

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<http://www.nps.gov/climatechange>