

Sea Level Rise Visualization & Surface Elevation Tables (SETs) for Alabama, Mississippi, & Florida



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K. Van Wilson, USGS

Sea Level Rise Visualization



<http://gom.usgs.gov/slr/index.html>

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SEA-LEVEL RISE VISUALIZATION FOR ALABAMA, MISSISSIPPI, AND FLORIDA

About this project

This pilot project is a collaborative effort of National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center and the U.S. Geological Survey (USGS) National Wetlands Research Center and the USGS Mississippi Water Science Center.



Sea-Level Rise Viewer

The areas shaded in blue show lands vulnerable to sea-level rise for the coasts of Alabama, Mississippi, and Florida (from the Alabama state line to the eastern boundary of St. Mark's National Wildlife Refuge). The visualization tool illustrates the scale of potential flooding, not the exact location, and does not account for erosion, subsidence, sediment accretion, or future construction. Water levels are shown as they would appear during an average high tide (the inundation data are referenced to the mean higher high water [MHHW] datum). Rising sea levels will cause daily high tides to reach farther inland.

Inundation data




<http://gom.usgs.gov/slr/index.html>

Inundation data

The inundation data displayed in this map viewer were developed by K. Van Wilson, P.E., at the USGS Mississippi Water Science Center.

The inundation zones were derived from a 3-meter resolution light detection and ranging (Lidar)-based digital elevation model (DEM). The DEM is referenced to the North American Vertical Datum of 1988. All cells in the DEM grid below 1 to 6-foot thresholds were designated as inundated by potential sea-level rise regardless of hydrologic connectivity, which is similar to a "bathtub" model. The map viewer does not provide inundation data for Mississippi's barrier islands.



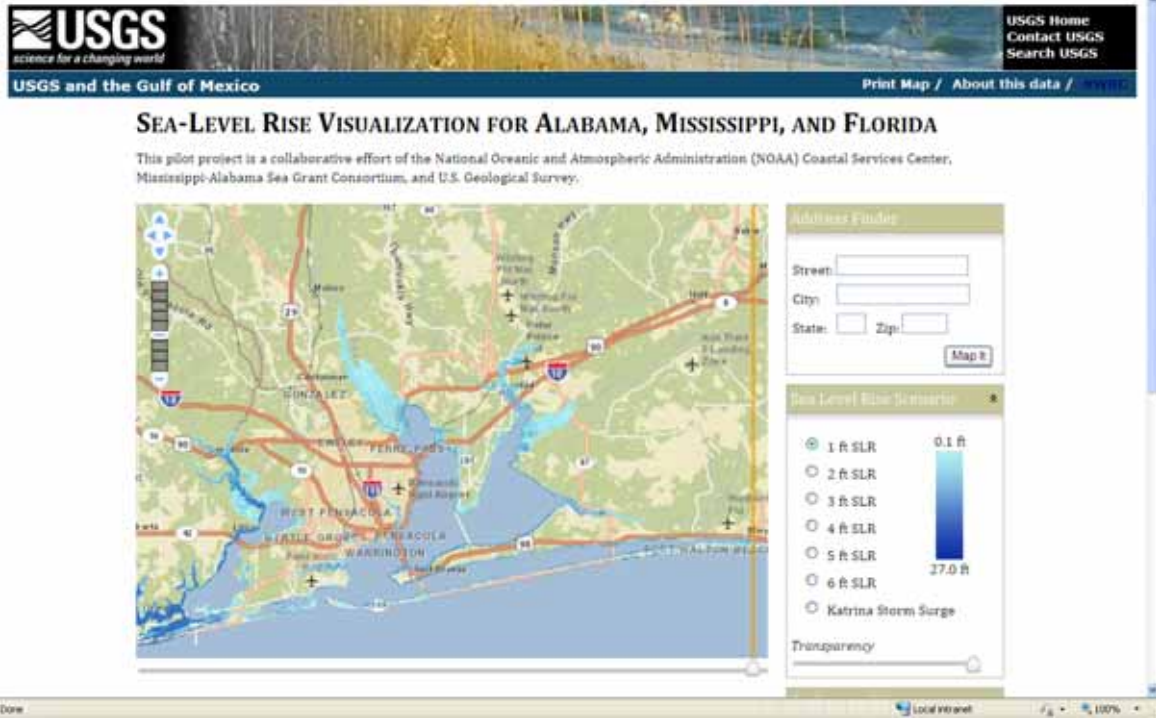
The population map overlay depicts population counts from the year 2010 within U.S. Census Bureau blocks. This information was included to help identify locations where large numbers of residents are vulnerable to inundation by potential sea-level rise.

Uncertainties in Elevation Data

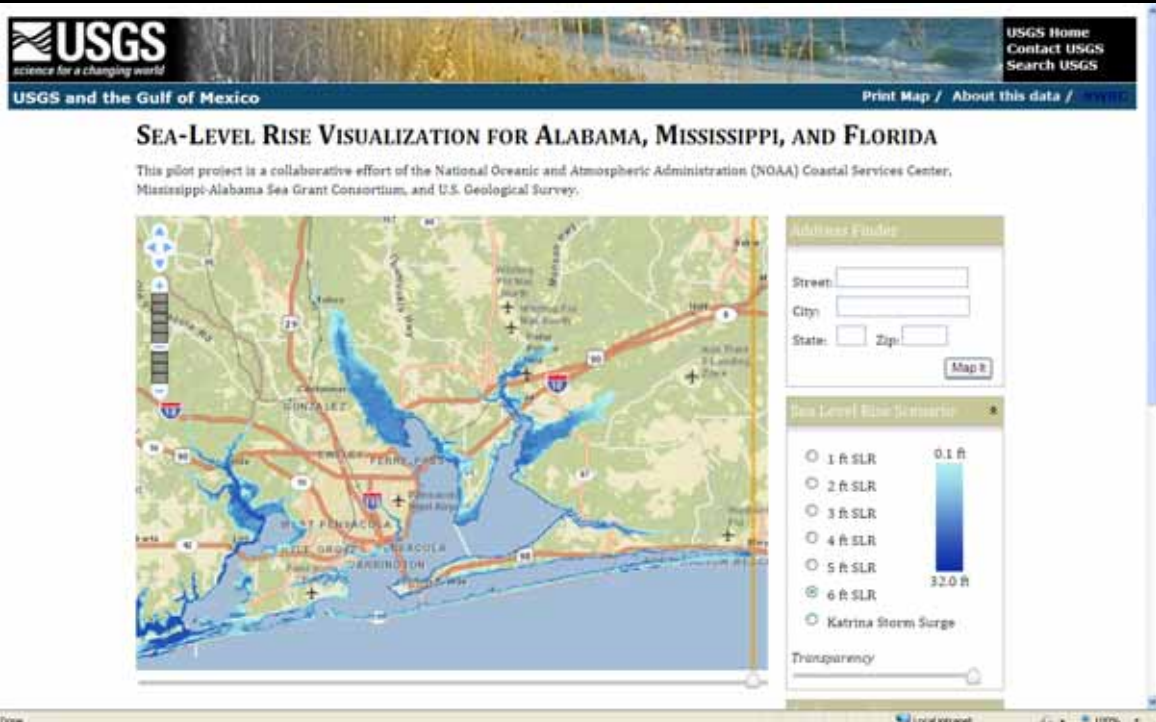
The user of this viewer should keep in mind the given water surface elevation plus and minus 1.2 ft for Alabama & Mississippi and plus and minus 0.8 ft for Florida in estimating inundation areas for upper and lower extremes based only on the accuracy of the LiDAR. The use of the 1 ft increments of sea level rise inundations shown on this viewer can be used to assist the user in visualizing the upper and lower extremes for a selected sea level rise. For example, for a sea level rise inundation of 3 ft, the user could select the 4 ft and 2 ft sea level rise inundations to help show the upper and lower extremes of the possible inundation. The user should also keep in mind that there are errors in some areas for these selected inundations that could be larger than 1.2 ft.



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Right click a location with mouse and get inundation depth.

Depth: 6.0 ft

Address Finder

Street:
City:
State: Zip:

Map

Sea Level Rise Scenario

1 ft SLR
 2 ft SLR
 3 ft SLR
 4 ft SLR
 5 ft SLR
 6 ft SLR
 Katrina Storm Surge

0.1 ft
32.0 ft

Transparency



<http://gom.usgs.gov/slr/index.html>

Depth: 6.0 ft

About This Data Viewer

The map illustrates the scale of potential flooding, not the exact location, and does not account for erosion, subsidence, or future construction. Water levels are shown as they would appear during an average high tide. Rising sea levels will cause daily high tides to reach farther inland.

Users should be cautious when obtaining the depths at point of interest. For some areas the shown depth is less than the actual depth because the lidar-based DEM elevation is above the actual bare earth. Places where the DEM elevation can be above the actual bare-earth elevation are where the DEM elevation is up in the vegetation canopy and where it actually represents a water surface in a stream channel or bay area and does not account for any depth below.

[View the Flood Frequency Predictions](#)

This pilot project is a collaborative effort of National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center and the U.S. Geological Survey.

Background Layer

Satellite Imagery
 Street Map
 Terrain
 Topographic Map

Overlay Layer

Population

Population count in 2010
0 1000+

Transparency

Roads

Accessibility FOMA Privacy Policies and Notices

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URL: <http://gom.usgs.gov>
Page Contact Information: Craig Conzelmann, 337-266-8842
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FLOOD FREQUENCY PREDICTIONS FOR THE GULF COAST

Pie Charts - Sea Level Rise Increases Flood Frequencies
Sea level rise can turn minor tidal flooding into a daily event. Based on analysis of three years (Oct 2007 to Sep 2010) of observed tides at Mobile, AL (L. Brown, NOAA CO-OP's written submission, 2014).

Percent of Time for High Tides With or Without Flooding During the Year

■ Flooding ■ No Flooding

No Sea Level Rise
1%
99%

With no sea level rise (current conditions), only about 1% of time flooding occurs at Mobile, AL. About 1% or less of time flooding occurs at Waveland, MS, and Pensacola, Panama City, and Apalachicola, FL.

Sea Level Rise 0.5 m (1.6 ft)
41%
59%

With 0.5 m (1.6 ft) sea level rise, about 39% of time flooding could occur at Mobile, AL. About 22% to 50% of time flooding could occur at Waveland, MS, and Pensacola, Panama City, and Apalachicola, FL.

Sea Level Rise 1 m (3.3 ft)
22%
78%

With 1 m (3.3 ft) sea level rise, about 70% of time flooding could occur at Mobile, AL. About 90% to 98% of time flooding could occur at Waveland, MS, and Pensacola, Panama City, and Apalachicola, FL.

Based on additional NOAA CO-OP's analyses of three years of tide data at Waveland, MS, and Pensacola, Panama City, and Apalachicola, FL (L. Brown, NOAA CO-OP's written submission, 2010, 2011).

Map - Current Storm Tide Flood Levels
This map shows minor flooding from the Gulf that now happens only during storm events. Minor flooding (minimal or no property damage, but possibly some public inconvenience) is at 3 ft MLLW or elev. 2.5 ft NAVD83 threshold selected by the National Weather Service for issuing coastal flood advisories at Mobile, AL.

Done

Local Intranet

100%



The Sea Level Rise Visualization was built upon previous work, which included the development of:

Internet Map Serving the Hurricane Katrina Maximum Storm Tide in Alabama, Mississippi, and Louisiana

<http://gisdata.usgs.gov/website/gulf>



Surface Elevation Tables (SETs)



Six Surface Elevation Tables (SETs) installed in AL and MS



<http://www.pwrc.usgs.gov/set/>

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Potomac Wildlife Research Center

Surface Elevation Table (SET)

by Donald R. Cahoon, Ph.D and James Lynch

The Surface Elevation Table (SET) is a portable mechanical leveling device for measuring the relative elevation change of wetland sediments. This website presents information on the purpose, design, and use of the SET. The website is specifically designed to be a forum for researchers in wetland science who use or might use the device and to offer more information about the proper use of the SET and interpretation of its data. But we encourage anyone who wants to learn more about research techniques and their development to visit the site as well.

Five Island N.S., NY, USA

A: SET concepts and Theory:

- Surface Elevation Table
- Marker Horizons
- Shallow Subsidence

B: Types of SET devices:

- Original SET
- Rod SET (deep, shallow)

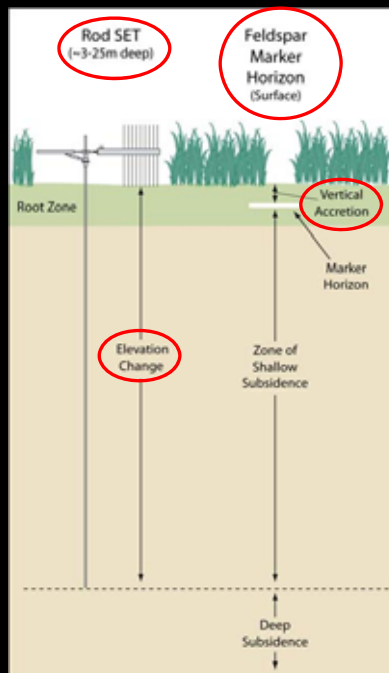
C: Installation of SET:

- Platforms
- Benchmarks:

Precise measures of sediment elevation in wetlands are necessary to determine rates of elevation change, particularly relative to sea level rise, and to gain an understanding of the processes responsible for elevation change. The SET provides a nondestructive method for making highly accurate and precise measurements of sediment elevation of intertidal and subtidal wetlands over long periods of time relative to a fixed subsurface datum. This technique overcomes many of the limitations of methods currently used to estimate elevation such as sedimentation pins, and precision surveying.



<http://www.pwrc.usgs.gov/set/>



SET Installs



SETs with and without tidal inundation of marsh



SET Readings



GPS for SET elevation



SET Elevations above NAVD88

- Tops of all SETs near elev. 2 ft
- Ground at all SETs near elev. 1 ft
- Minimum steel rod tip elev. -44 to -79 ft
(or 44 to 79 ft below NAVD88)



SET Marker Horizon Plots



SET Marker Horizon Plots



 USGS

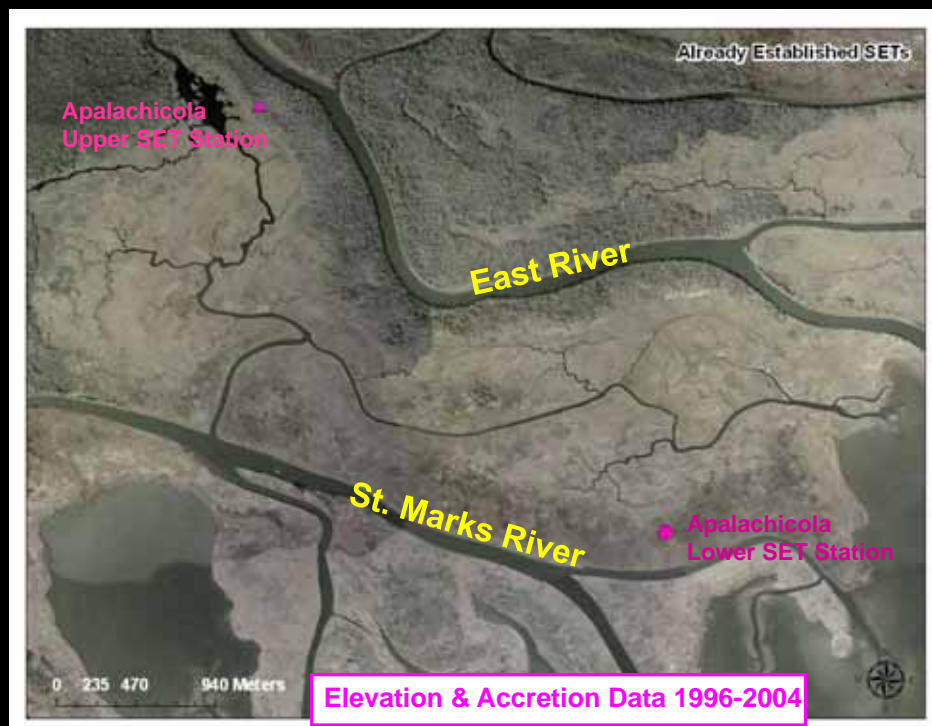
We need to continue SET readings and analyses to better understand vertical change that is taking place on the Gulf Coast.

 USGS

We are still seeking funding to continue these readings and possibly include readings for SETs installed by FGS and FSU in Apalachicola Bay that have not been read in the last 7-8 years.



SET Station Locations in Apalachicola Delta



Provided by Joe Donoghue (FSU) on June 22, 2011

SET readings and analyses across the Gulf Coast could also be combined with other types of data:

- **historical NGS BM Surveys,**
- **tidal records,**
- **CORS, and**
- **InSAR.**

Results of historical NGS BM surveys, tidal records, CORS, and InSAR analyses were used in a recent USGS-FHWA subsidence study of Mobile County, AL. (See following slide for data example.)



Data used in the Mobile County, AL, study

