

# FDOT's Sea Level Scenario Sketch Planning Tool

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Southeast Florida Regional Climate Change Compact  
RCAP Stormwater Workshop  
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A1A

Fort Lauderdale,  
Hurricane Sandy,  
October 2012

Photo Credits:

Susan Stocker, Sun Sentinel





# Florida's Exposure

**Florida's population – 19.5 million people**

Climate Central analysis “finds that floods rising 3 feet above the high tide line at Key West are near certain this century under any sea level rise scenario” (Nov 2013)

**Less than 3 feet above high tide:**

- 2,120 square miles of land
- Nearly 490,000 people
- \$156 billion in property value
- 300,000 homes
- 2,555 miles of road



# Policy Framework



## Florida's Energy & Climate Change Action Plan

*October 15, 2008*

*Governor's Action Team on Energy & Climate Change*

## 2060 Florida Transportation Plan



**HORIZON**  
2060  
*a new era for transportation in florida*



# FDOT's SLR Research

## **FAU's Research Report** (completed Jan 2012)

Comprehensive analysis of SLR projections, studies, models and methodologies used in Florida. Resulting recommendations:

- (1) Apply U.S. Army Corps of Engineers (USACE) methodology to develop statewide and regional projections of SLR*
- (2) Develop a sketch planning tool to identify potentially vulnerable infrastructure*

## **UF GeoPlan Center Research**

- \* Implement FAU recommendations
- \* Phase 1: Feb 2012 - Oct 2013, Phase 2: Dec 2013 – June 2015

# UF GeoPlan Phase 1 Goals

- ❖ **Map Inundation:** Map where & when inundation is projected to occur in Florida. Use USACE methods to develop statewide and regional sea level change projections by decade 1992 - 2100.
- ❖ **Develop GIS planning tool** to facilitate identification of transportation infrastructure potentially at risk to projected sea level changes.



# Project Team

## Florida Department of Transportation, Office of Policy Planning

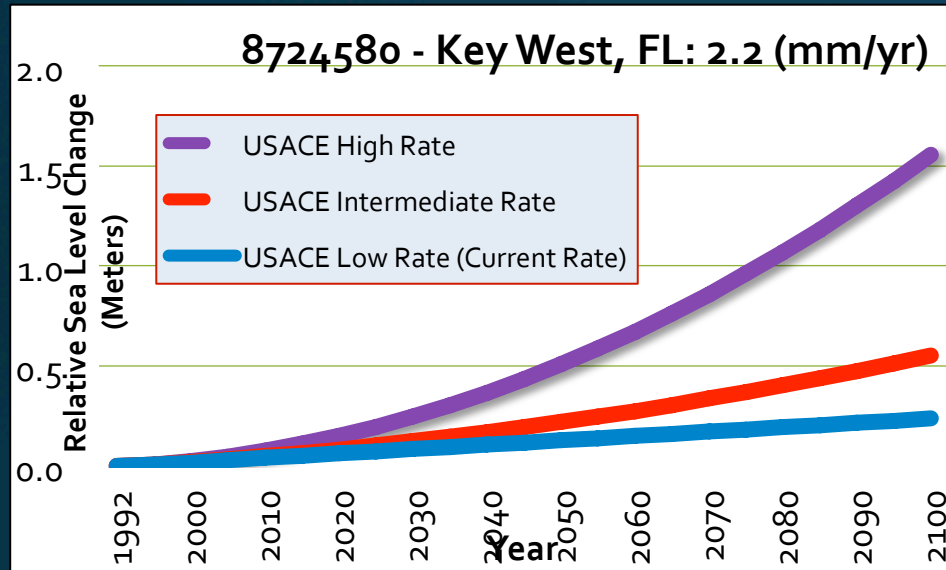
- Maria Cahill, Project Manager

## University of Florida GeoPlan Center

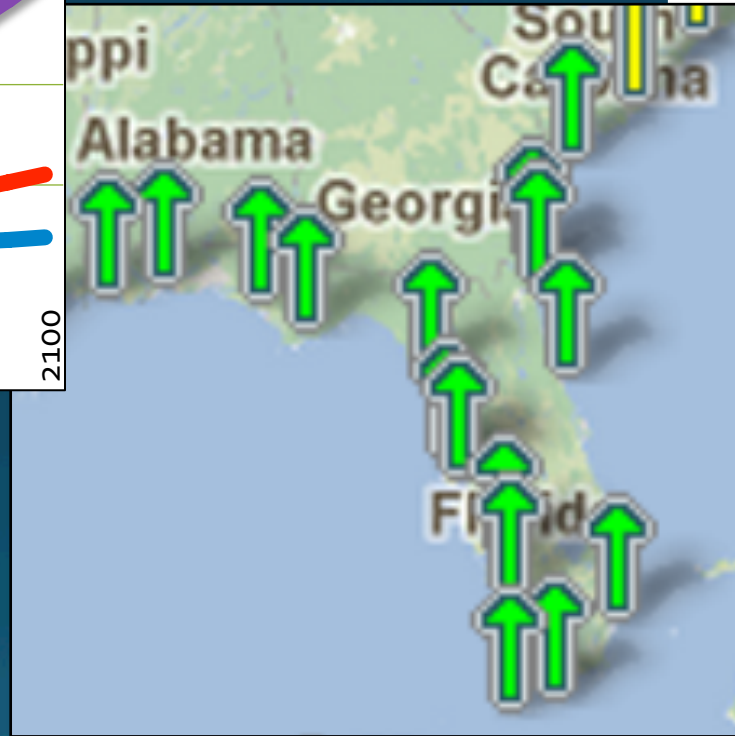
- Crystal Goodison, Principle Investigator – Phase 2
- Alexis Thomas, Principle Investigator – Phase 1
- Russell Watkins, Ph.D, Co-PI – Phase 1
- Reginald Pierre-Jean, Software Developer
- Katherine Norris, GIS Analyst
- Sam Palmer, GIS Analyst
- Daniel Downing, Web GIS Specialist
- Lance Barbour, Systems Administrator



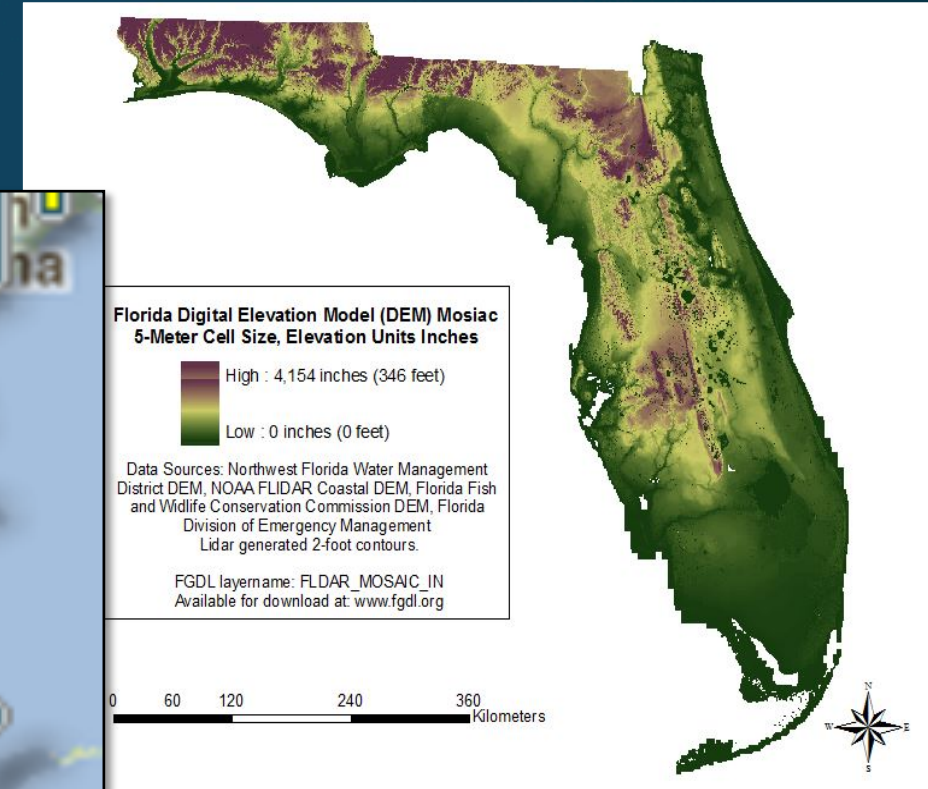
# Mapping Inundation: Data Inputs



USACE Sea Level Change Projections & Methods



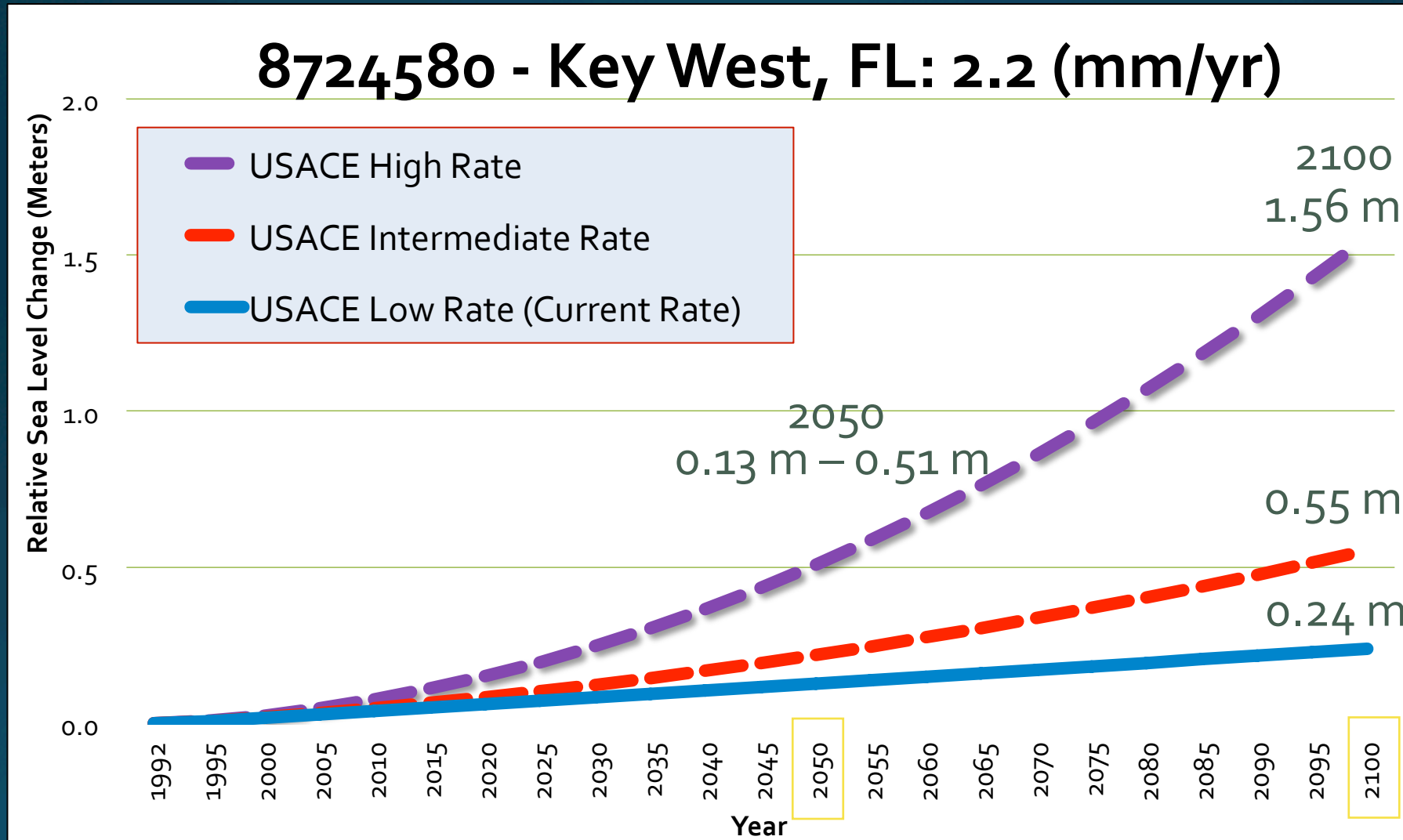
NOAA Tide Gauge Data & Sea Level Trends



Digital Elevation Model



# USACE Sea Level Change Projections



# Mapping Inundation: Output Data Layers

- Hundreds of layers, each representing a scenario:  
**Where Scenario =**  
**Region, Year, Projection, Tidal Datum**
- Region: statewide or for FDOT District
- Year: decadal intervals, 2040 – 2100
- Projection: USACE – low/ historic, intermediate ,or high
- Tidal Datums: **MHHW**, MHW, **MSL**, MLW, MLLW
- Bathtub inundation and hydro-connected inundation



# SLR Inundation Data Layers

Subset of Old Tampa Bay  
Clearwater Beach Tide Gauge  
2060, High Curve, MHW  
1-meter inundation

 Inundation with Hydro-  
connectivity filter

 Bathtub Inundation





# Potentially Affected Transportation Infrastructure

- Intersected inundation layers with **transportation layers**: roadways, rails, rail freight connectors, SIS airports, SIS sea ports
- Focus on State owned facilities
- Planning horizons: 2040, 2060, 2080, 2100
- **Outputs**: GIS layers identifying potentially at-risk transportation facilities w/ approximate miles or area affected/ inundated





# UF GeoPlan Phase 1 Goals

❖ **Map Inundation:** Map where & when inundation is projected to occur in Florida. Use USACE methods to develop statewide and regional sea level change projections by decade 1992 - 2100.

❖ **Develop GIS planning tool** to facilitate identification of transportation infrastructure potentially at risk to projected sea level changes.

# Sea Level Scenario Sketch Planning Tool



## Map Viewer

- **Visualize** areas of **inundation** and affected infrastructure
- Low technical expertise needed, no GIS software needed



## GIS Data Layers

- SLR Inundation Surfaces & Affected Infrastructure layers
- GIS Software and intermediate GIS expertise needed



## SLR Inundation Surface Calculator

- Create custom inundation layers
- Intermediate/Advanced technical/ GIS expertise needed



# Map Viewer Demo

# SLR Inundation Surface Calculator, ArcMap

The screenshot displays the ArcMap interface with the SLR Calculator dialog box open. The dialog box is divided into several sections for configuring the calculation:

- State:** Includes a dropdown menu set to "Key\_West".
- Sea Level Trend Value:** Offers two options: "Select Sea Level Trend Values" (with sub-options for "FDOT District" and "Tide Station") and "Custom Sea level Trend Values" (with a text input field and a unit dropdown set to "Inches").
- Year(s):** A list of years from 2060 to 2100 with checkboxes.
- Projection Curve:** "Select USACE Projection Curve(s)" with options for "USACE High Rate", "USACE Intermediate (Medium) Rate", and "USACE Low Rate (Historic Rate)".
- Tidal Datum:** "Select Tidal Datum(s)" with options for "All", "Mean Lower Low Water", "Mean Low Water", "Mean Sea Level", "Mean High Water", and "Mean Higher High Water".
- Digital Elevation Model (DEM):** "Choose Digital Elevation Model (DEM)" with an "Open" button and a "Select File" text box.
- Outputs:** Includes "Inundation Surface Bathtub Model" (with "Bathtub Output (Raster)" and "Bathtub Output (Polygon)" options) and "Inundation with Hydro-connectivity Filter" (with "Inundation Hydro-connectivity (Raster)" and "Inundation Hydro-connectivity (Polygon)" options).
- Output location:** A section for specifying the output file path.

The central map shows a coastal region with a blue-shaded area representing inundation. The right-hand side of the interface features a "Table Of Contents" panel with the following layers:

- SLRS\_1\_Meters\_HC (checked, blue color swatch)
- SLRS\_1\_Meters\_Bathtub (unchecked, yellow color swatch)
- Imagery (checked)
- Boundaries and Places (unchecked)
- Transportation (unchecked)
- Imagery (checked)

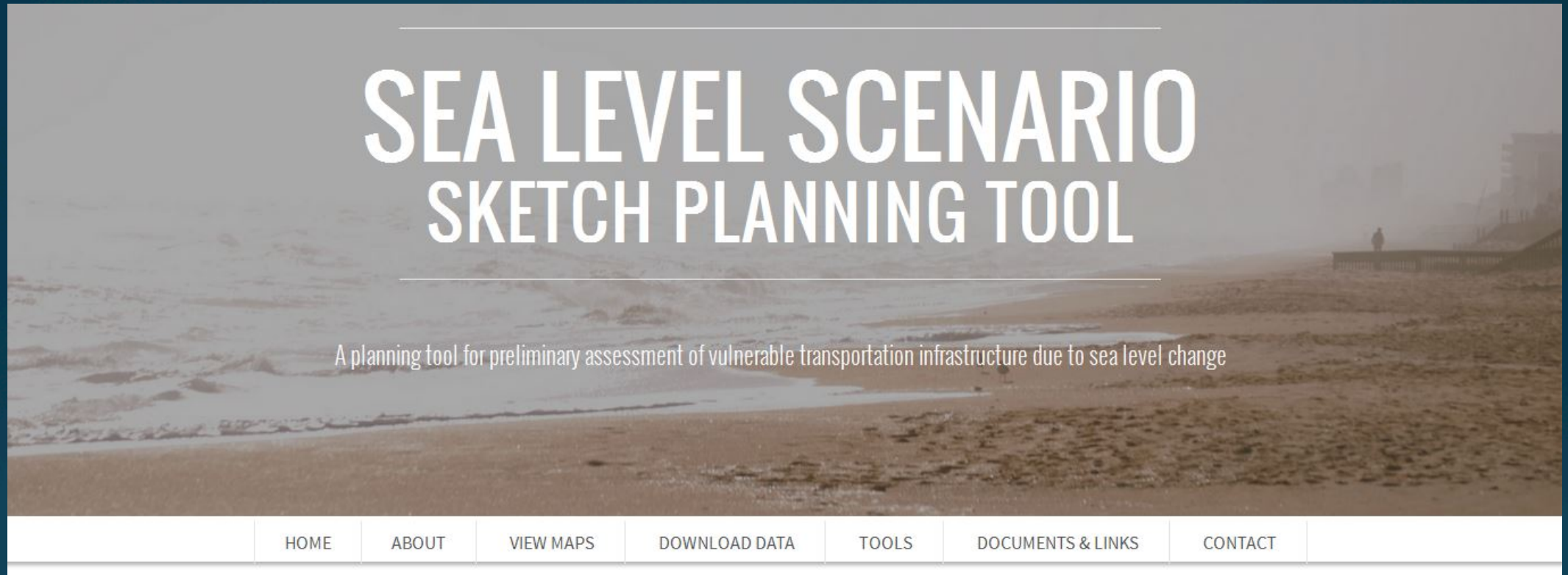


# GeoPlan Phase 2 Research

- Work with FHWA Climate Resiliency Adaptation pilots (Hillsborough MPO and Broward MPO) and other communities (Satellite Beach, Monroe County) doing adaptation planning:
  - Test tools and gather feedback
  - Enhance and refine tools based on input
  - Look at local versus state/ regional approach
- Data Enhancements:
  - Explore increased resolution of data inputs, close data gaps (ex: bridge data)
- Research methods for modeling storm surge & inland flooding

# Project Website

<http://sls.geoplan.ufl.edu>



- \*Map Viewers
- \*GIS Data
- \*SLR Calculator
- \* Final report and supporting documentation