

# Map Viewer User Guide

## Sea Level Scenario Sketch Planning Tool

Version 3, 2020

University of Florida GeoPlan Center



### Introduction

The purpose of this document is to guide users on how to use the Sea Level Scenario Sketch Planning Tool Map Viewer (Version 3). The map viewer visualizes transportation assets and their exposure to **current flood risk** (100-year and 500-year floodplains and hurricane storm surge zones) and **future flood risk** using sea level rise (SLR) scenarios from the U.S. Army Corps of Engineers (USACE, 2013) and the National Oceanic and Atmospheric Administration (NOAA, 2017)/ 4<sup>th</sup> National Climate Assessment.

The SLS Sketch Planning Tool was created by the University of Florida GeoPlan Center with funding from the Florida Department of Transportation. SLR scenarios and transportation analyses were updated in 2020 with updated input data and a new map viewer was developed for data visualization. The SLS Sketch Planning tool can assist in understanding how and when future sea level rise may impact the transportation system.

The SLS Sketch Planning Tool includes: (1) Online map viewer for visualizing current and future flood risk under SLR scenarios and potentially affected transportation infrastructure. (2) GIS data layers of SLR inundation and affected transportation; and (3) ArcMap add-in tool for creating GIS layers of SLR inundation.

### Accessing the Map & Supported Browsers

The map viewers are accessible from the project website: <http://sls.geoplan.ufl.edu>

From the website, click on the “View Maps” tab at the top of the page to access the map viewers.

**The Map Viewer is best viewed in Google Chrome or Mozilla Firefox.**

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## SLR Projections and Areas Mapped

Users can explore areas of projected inundation (flooding) and potentially affected infrastructure for nine SLR scenarios over five decades: 2040, 2060, 2070, 2080, and 2100. SLR projections mapped include: USACE 2013 and NOAA 2017. The table to the right shows the nine SLR projections mapped, along with their naming Key used in the Sketch Tool.

USACE (2013). Incorporating Sea Level Change into Civil Works Programs. [ER 1100-2-8162](#).

NOAA (2017): [NOAA Technical Report NOS CO-OPS 083](#), Global and Regional Sea Level Rise Scenarios for the United States.

SLR projections were generated using the USACE Sea Level Change Curve Calculator (2019.21).

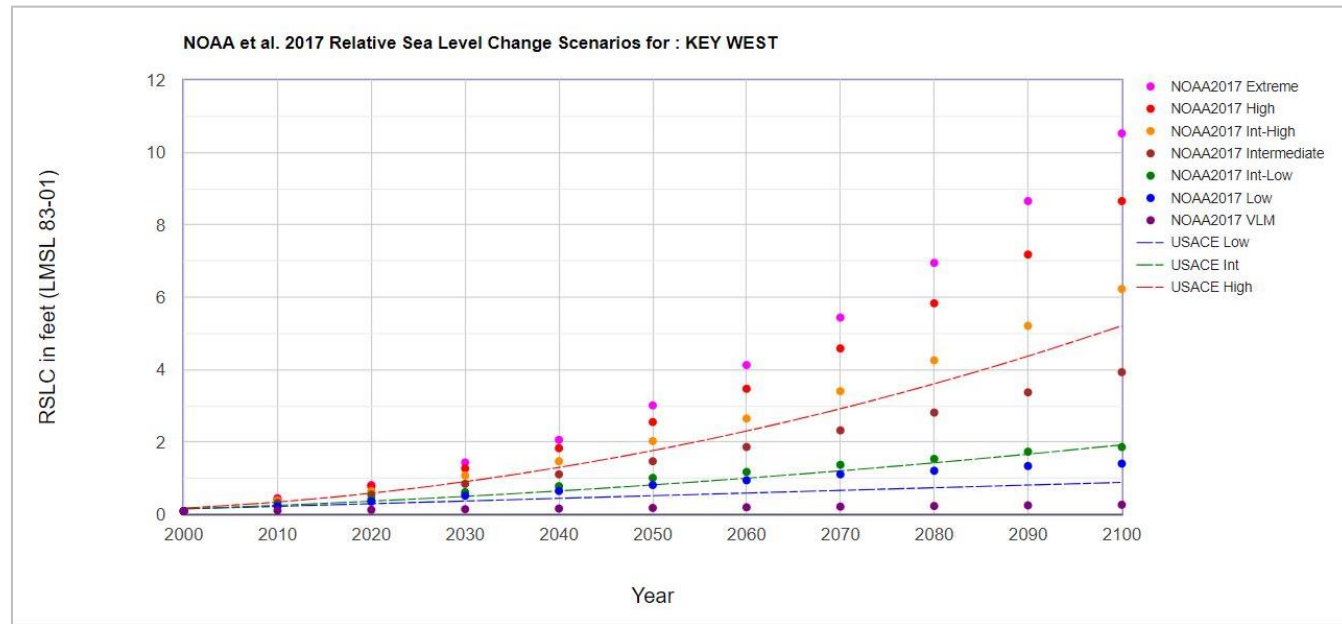
\*These global averages. Relative SLR values are higher for FL.

This graph shows the projected amounts of relative SLR for Key West, FL from 2000 – 2100 using the nine SLR projection curves.

USACE Sea-Level Change Curve Calculator  
[https://cwbi-app.sec.usace.army.mil/rccslc/slcc\\_calc.html](https://cwbi-app.sec.usace.army.mil/rccslc/slcc_calc.html)

## SLR Projection Curves

Key	SLR Curve Description	Global SLR* (relative to mean sea level) by 2100
C1	USACE 2013 Low Rate	~ 8 inches (or 0.2m)
C2	USACE 2013 Intermediate Rate	~ 1.6 feet (or 0.5 m)
C4	USACE 2013 High Rate	~ 5.0 feet (or 1.5 m)
N1	NOAA 2017 Low	~ 1.0 foot (or 0.3m)
N2	NOAA 2017 Intermediate-Low	~ 1.6 feet (or 0.5m)
N3	NOAA 2017 Intermediate	~ 3.3 feet (or 1.0m)
N4	NOAA 2017 Intermediate-High	~ 5.0 feet (or 1.5m)
N5	NOAA 2017 High	~ 6.6 feet (or 2.0m)
N6	NOAA 2017 Extreme	~ 8.2 feet (or 2.5m)



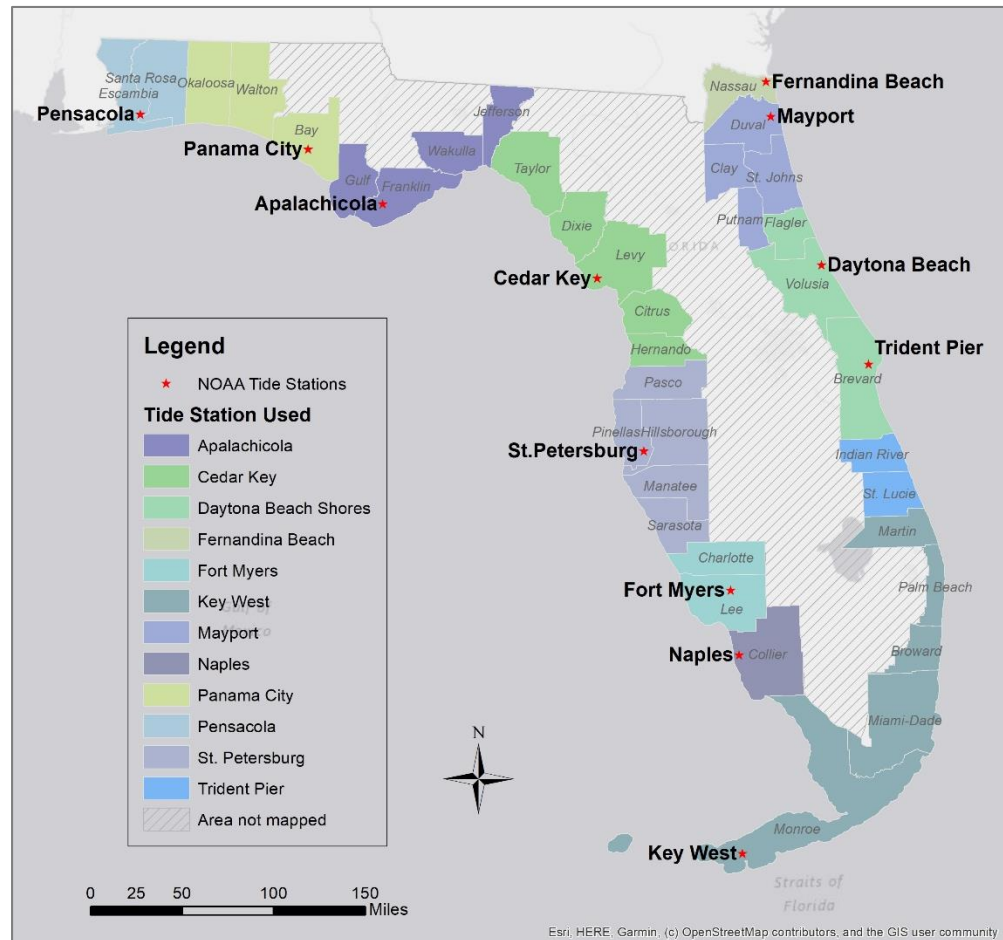
### Areas Mapped, Sea Level Trends & Tide Stations Used in Inundation Mapping

SLR scenarios were mapped by county using local tide gauge data and sea level trends. The map to the right shows the coastal areas mapped and tide stations used for each county. Some areas were not mapped due to the lack of high resolution elevation data.

The USACE Sea-Level Change Curve Calculator (2019.21) was used to generate projected SLR values by station, SLR projection, and decade (2040 – 2100). Twelve Florida tide stations were used. Decades 2050 and 2090 are not displayed in the map viewer, but are available for download.

Projected inundation was mapped on top of Mean Higher High Water (MHHW), using a tidal surface grid (obtained from NOAA Office of Coastal Management) that represented MHHW conditions around the State. Inundation surfaces were mapped using a 5-meter horizontal resolution, lidar-based Digital Elevation Model (DEM).

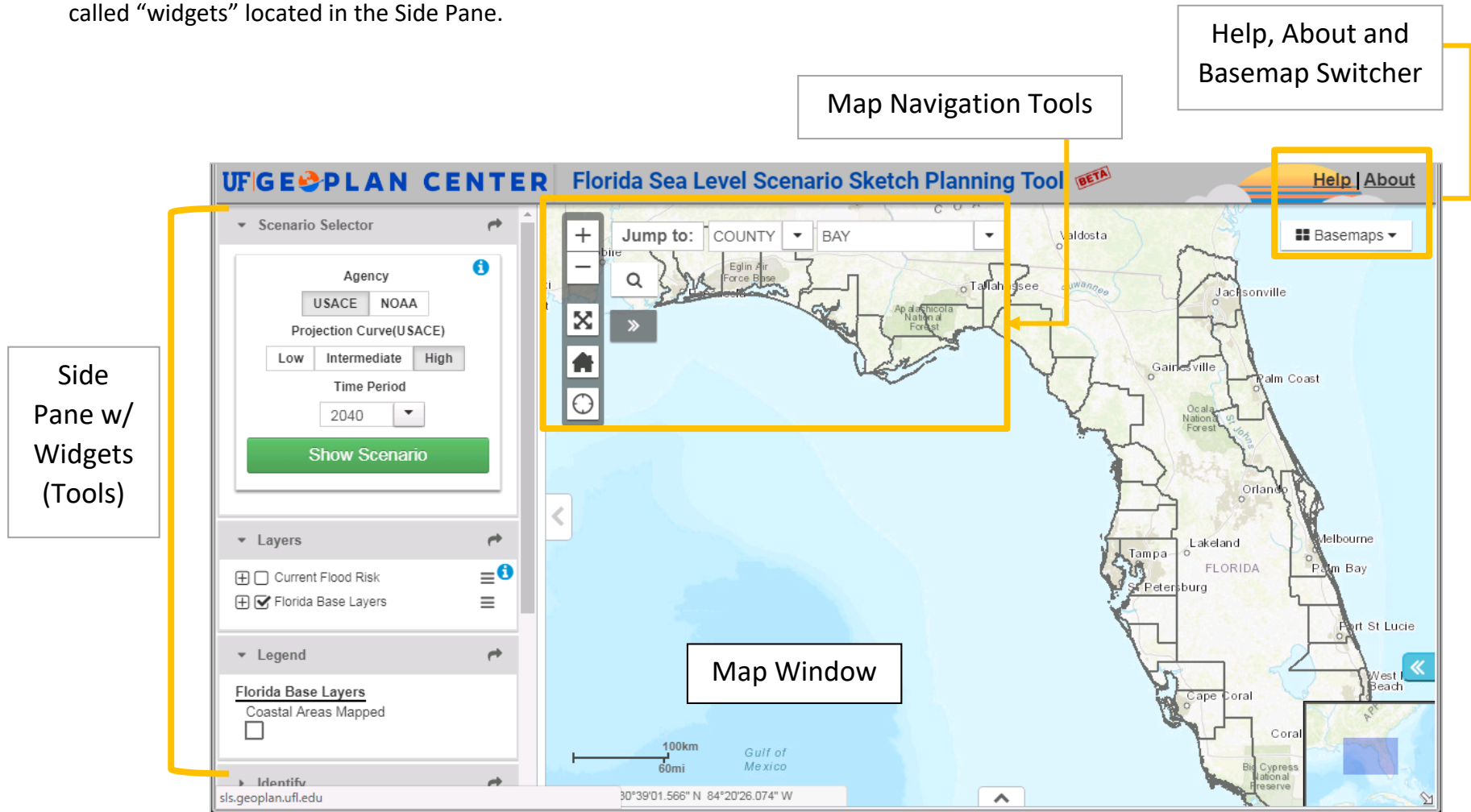
A standard bathtub model and enhanced bathtub model with hydro-connectivity assessment were both produced. Only the hydro-connectivity model outputs are displayed in the map viewer, though bathtub models are available for download.



**Coastal Areas Mapped and Tide Stations used by County for Inundation Mapping**

# Map Viewer – Overview

This is the default view of the Map Viewer. This User Guide will explain how to use the map navigation tools and additional tools, called “widgets” located in the Side Pane.



## Map Navigation Controls

The Map controls are in the top left corner of the map. On opening the map viewer, the default map control is pan. Left-click and drag the mouse to pan on the map.

### Vertical Navigation Bar



#### Fixed Zoom In/ Zoom Out:

Zooms in and out of the map. If you have a scroll wheel on your mouse or keyboard, then you can zoom in or out on the map, regardless of the map control selected.



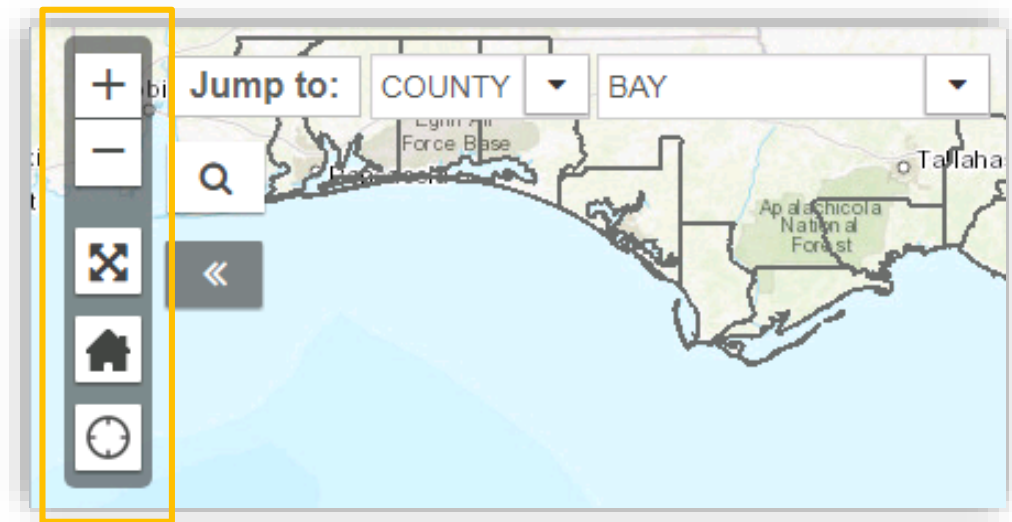
**Full Screen:** Expands the browser to the full extent of your computer screen. To get out of full screen, simply hit the Esc button.



**Home:** Zooms to the default extent of the map, which is the State of Florida.



**Locate Me:** Zooms the map to your current physical location (level of accuracy depends on your location). You first need to allow the map to access your location.



After clicking the Locate Me button, the compass icon will change to a square stop icon and on the map, there will be a blue dot with a blue circle around it. Remember to click on the Stop button to close the Locate Me. Your map will stay in the same place.

## Jump to

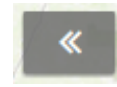
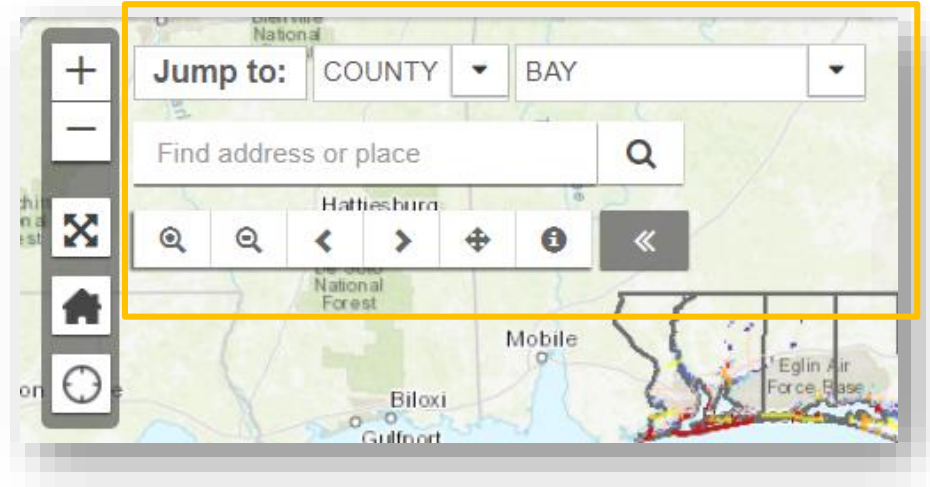
Zooms to predefined regions. First, choose a region type (County, FDOT District, MPO or State). Then select a region from the list.



## Address Locator

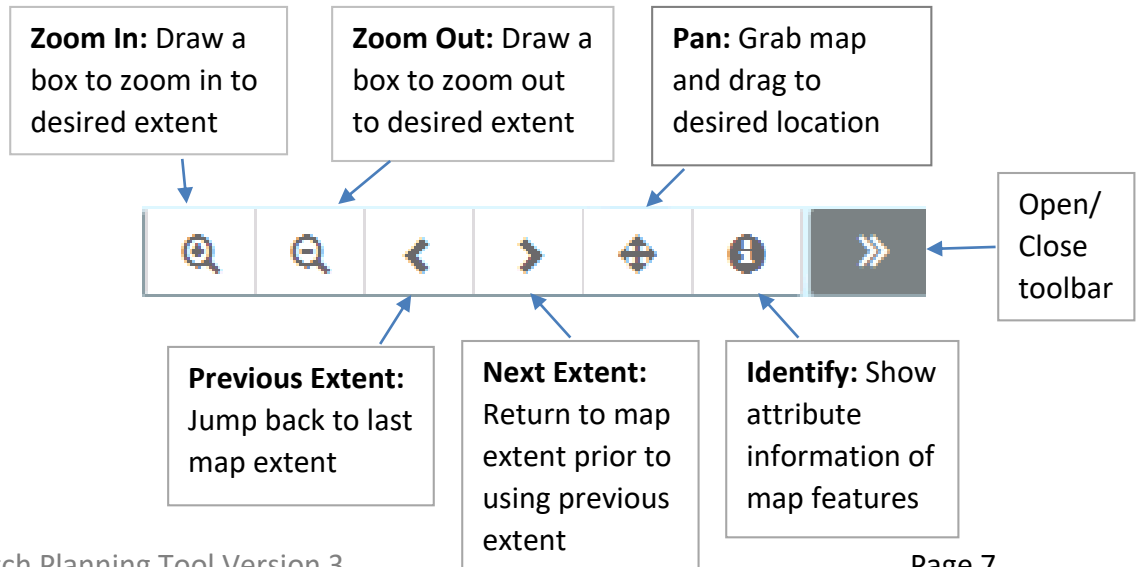
Zooms to an address. First, click on the magnifying glass to open the tool. Then enter a valid address in the input box and hit enter. The map will zoom to that address. The input box will auto-complete with known addresses.

To minimize the address locator, first click **in** the box (where it says “Find address or place”) and then click anywhere on the map.



## Additional Map Navigation Toolbar

Toolbar with additional map navigation tools. By default, the toolbar is closed. Click the double arrows to open the tool bar.



## Help

The Help link opens a pop-up window that contains introductory information about the map viewer, a list of map navigation short cuts for the mouse and keyboard, and links to User Guides. This is the same pop-up window that appears on the first load of the website.

## About

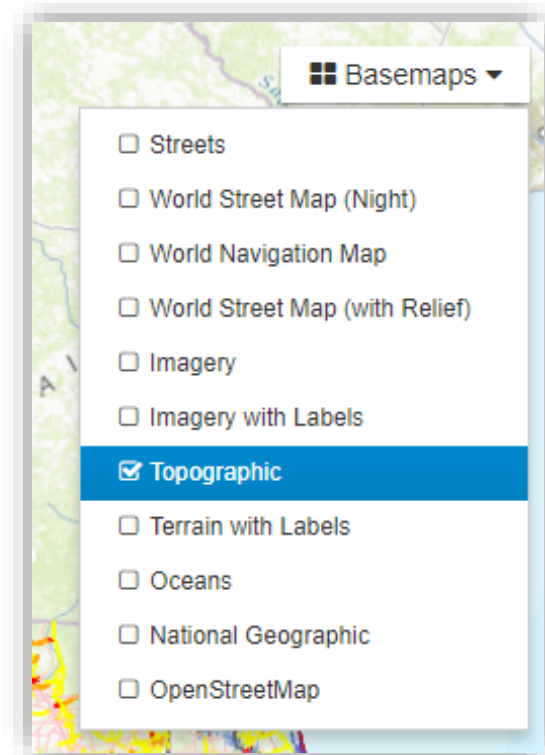
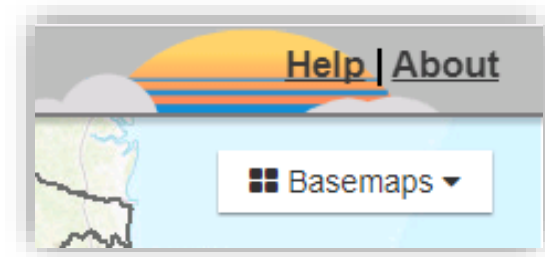
The About link will open the Sea Level Scenario Sketch Planning Tool main website in another browser tab or window. The website contains more information about this project.

## Basemap Switcher

The widget allows you to change the basemap of your map. The topographic basemap is displayed by default.

To change the basemap, first click on the basemap menu to see the available maps. Then check the basemap you would like to use and the map will be refreshed with your choice.

These basemaps are pulled from ArcGIS online, and periodically, they are unavailable. If the basemap you chose does not display, then choose another one.





# Widget Controls

Widgets are tools that allow you to interact with the map and data. The widgets are in the side pane (left side of map viewer) and each widget is represented by a gray bar.

The widgets are designed to open and close. You can open the widget to see more detail and close the widget to save space and reduce visual clutter. Some widgets are open by default, including the Scenario Selector, Layers and Legend widgets.

Additionally, the widgets are designed to “dock” and “undock” from the left side pane to give you flexibility on where you want to place the tools.

## Open/ Close Widgets

To open a widget, click on the gray bar near the widget name. Closed widgets have an arrow pointing to the right, while open widgets have an arrow pointing down.

## Dock/ Undock Widget

Undocking allows you to move the widget outside of the side pane. To undock, drag and pull from the grey bar. The left pointing arrow indicates the widget is undocked.

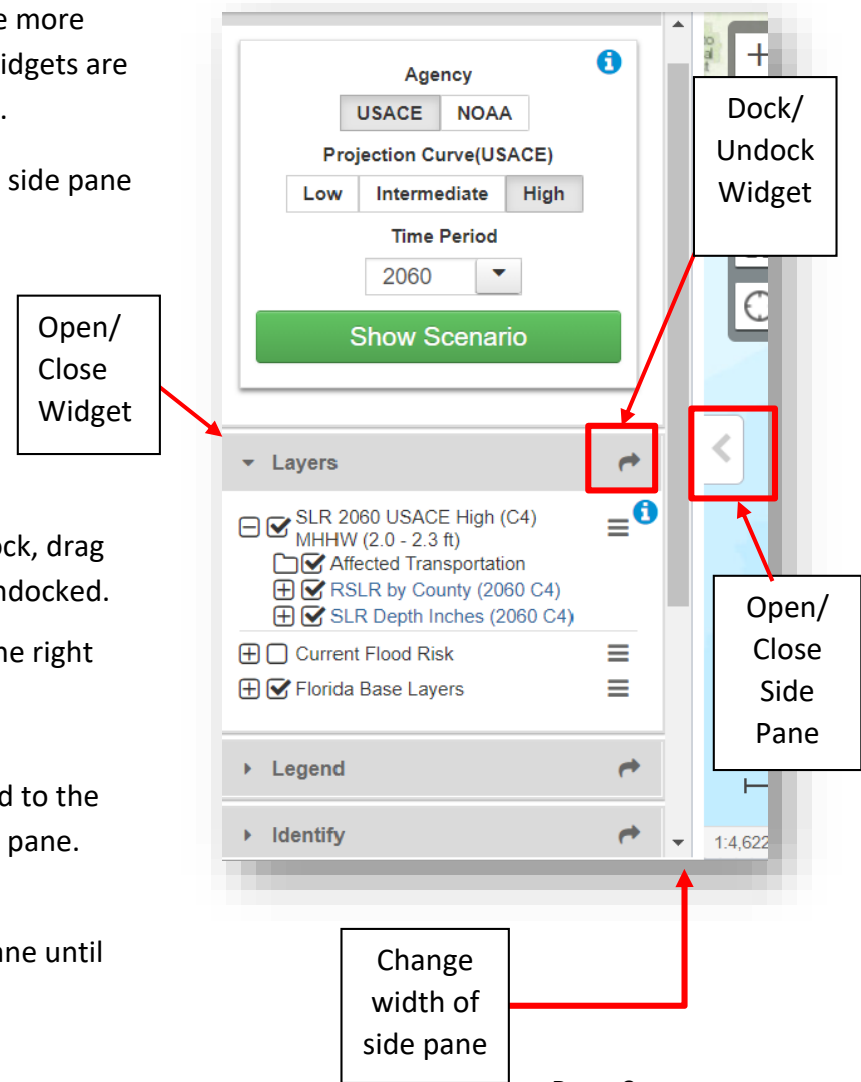
To dock the widget back to the side pane, click on the left pointing arrow. The right pointing arrow indicates the widget is docked.

## Open/ Close Side Pane

Click the left pointing arrow to close the side pane. The map will now expand to the full extent of the browser. Click on the right pointing arrow to open the side pane.

## Change Width of Side Pane

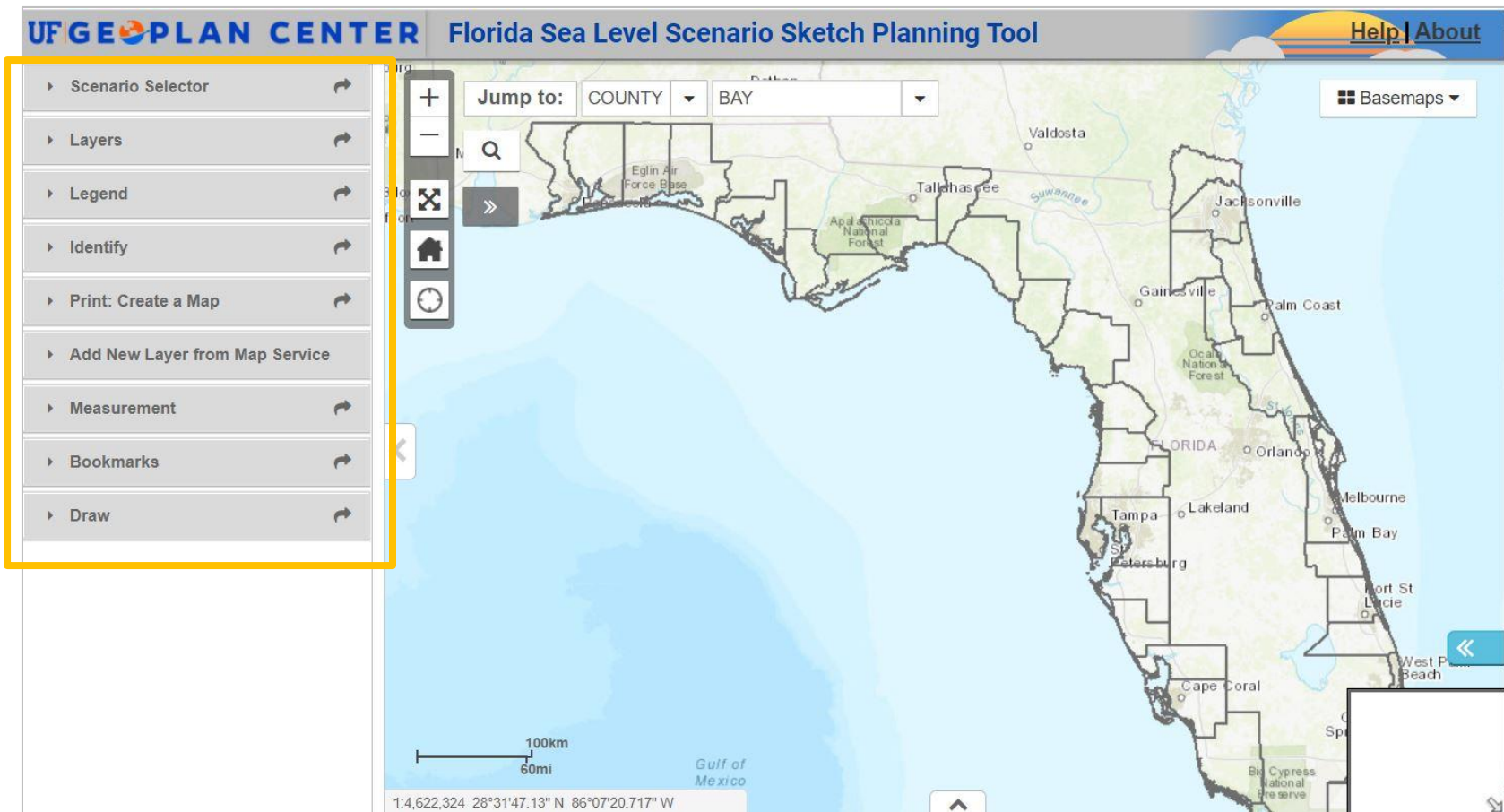
To change the width of the side pane, mouse over the right border of the pane until you see the double arrows, then drag to the desired width.



## Tools aka “Widgets”

The widgets are located in the side pane on the left side of the map viewer. Below is a view of the map with all widgets closed. If you have not read the prior page on Widget Controls, you should do that now.

The following pages will go into detail on each widget. We will first discuss the Layers Widget, then the Scenario Selector Widget, and then the other widgets in the order they are shown below. Since the Scenario Selector adds layers to the Layers widget, it is important to discuss the Layers Widget first.



## Layers

The Layers widget includes the map layers available for display. Each group of layers is a map service. By default, two map services are included in the widget:

### Current Flood Risk & Florida Base Layers.

- **Current Flood Risk** includes current floodplain and storm surge layers and roadways exposed to current flood risks.
- **Florida Base Layers** contains base roads data, a polygon layer representing areas mapped, and elevation data.
- SLR Scenario data layers must be added by the user through the Scenario Selector.

*Please see the information icon for more information about the data layers.*

## Working with Layers

### Open/ Close Map Service

To open the map service, click on the plus + sign to the left of the name. To close the map service, click on the minus – sign to the left of the name.

### Open/Close Folders

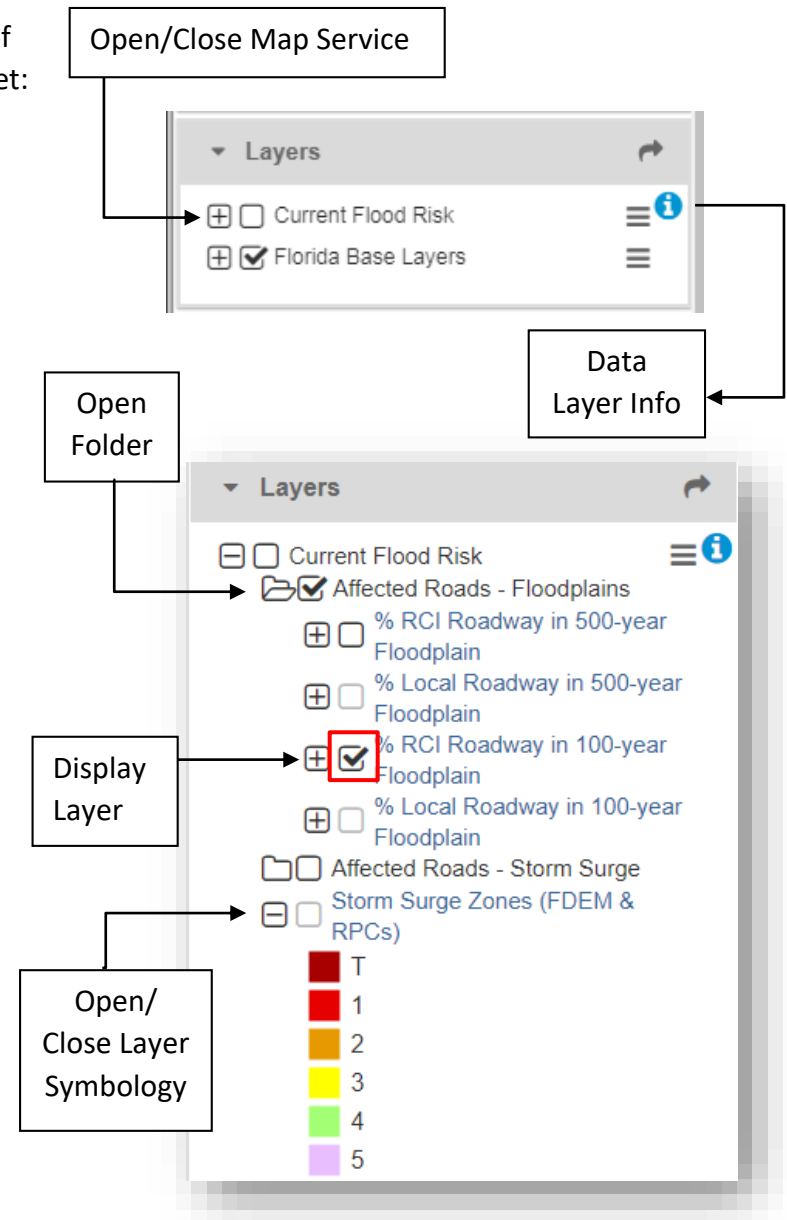
Click on the closed folder icon to open that folder and see the individual layers. To close the folder, click on the open folder icon.

### Turning on Visibility of Layers

To “turn on” or display a layer on the map, check the empty box next to the layer name. Layers that are visible in the map will already have a check box.

### Show/ Hide Symbology

The plus signs next to individual layers control whether show/ hide legend



## Layer Controls:

On the right side of each map service, there is a menu with additional layer settings.



## Move Up/ Move Down

Allows you to re-order the map services in the Layers Widget. Move up will move the map service up and Move Down will move the map service down. The option will be greyed out if that operation is not available.

## Turn On All Sublayers/ Turn Off All Sublayers

Controls layer visibility. Turns on or off all the layers in that map service.

## Transparency

Allows you to change the transparency of the map layers. A slider bar allows you to change the map layer transparency from 0 to 100%, where 0% is opaque and 100% makes the map layers completely transparent/invisible. The transparency setting controls all the layers in the map service.

## Layer Swipe

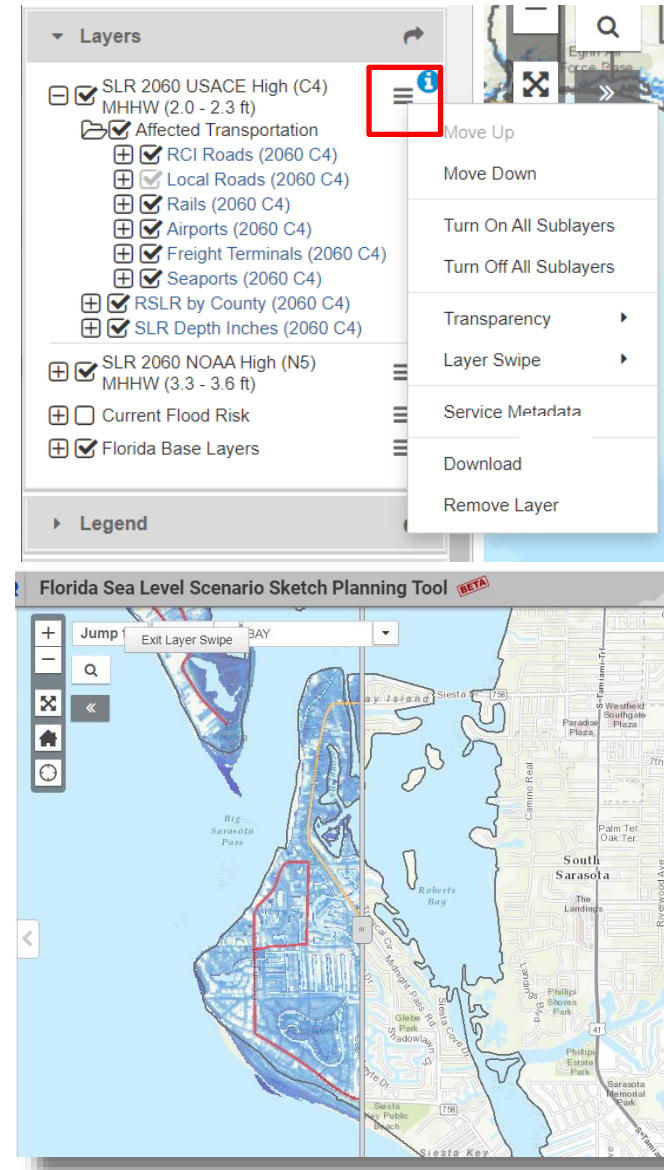
Allows you to pull or swipe one map service on and off over the map. You can do a vertical or horizontal swipe. The example to the right shows a vertical swipe, with SLR layers. **Tip: When using Layer Swipe with two SLR scenarios, start the swipe from the scenario with more SLR.**

## Remove Layer

Removes SLR Scenario map services from the Layers Widget. We recommend looking at no more than 3 scenarios at a time. The maximum number of scenarios that can be added is 6.

## Download

Download the data as a map package.



## Scenario Selector

The Scenario Selector is how you add SLR layers to the map. It requires 3 inputs: Agency, Projection Curve and Time Period.

- 1. First, choose an Agency:** This is the source agency of the SLR projection.

**USACE** = United States Army Corps of Engineers (2013)

**NOAA** = National Oceanic and Atmospheric Administration (2017)

After selecting the Agency, the Projection Curves will automatically change to show the curves for that agency.

- 2. Next choose a Projection Curve**

Projection Curve (USACE):

**Low** = About 4-11 inches SLR by 2100

**Intermediate** = About 1.4 - 2.0 feet SLR by 2100

**High** = About 4.7 -5.3 feet by 2100

Projection Curve (NOAA 2017):

**Low** = About 1.2- 1.5 feet SLR by 2100

**Int Low** = Intermediate Low, about 1.6 – 2.0 feet SLR by 2100

**Int** = Intermediate, about 3.6 – 4.0 feet SLR by 2100

**Int High** = Intermediate High, about 5.9 – 6.3 feet SLR by 2100

**High** = About 8.2 – 8.7 feet SLR by 2100

**Extreme** = About 10.2 – 10.7 feet SLR by 2100

- 3. Next, choose a Time Period**

Decades available: 2040, 2060, 2070, 2080, 2100

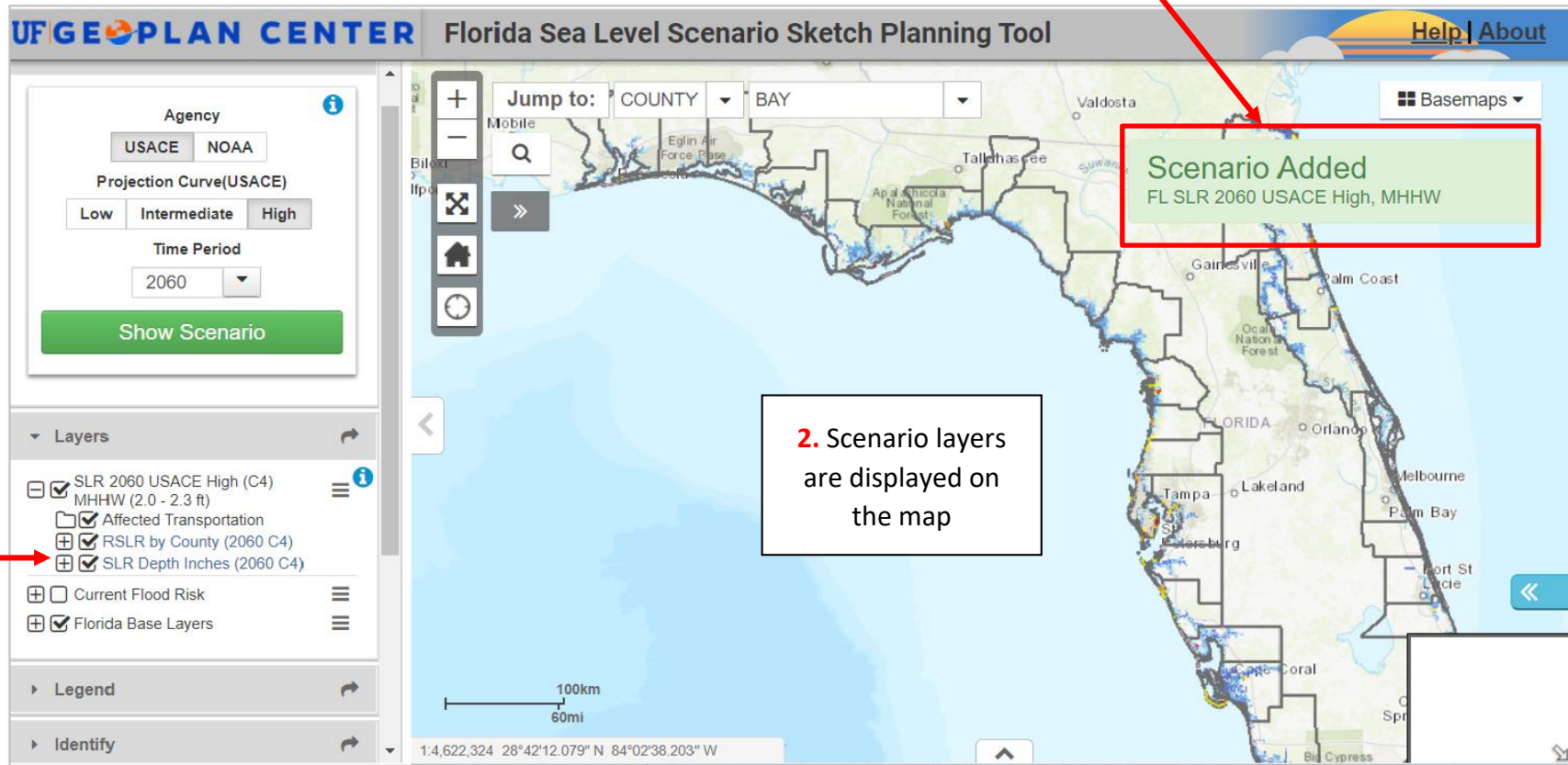
- 4. Finally, click “Show Scenario”**

The map layers for the scenario selected will be added to the map.

The image shows two screenshots of the 'Scenario Selector' interface. The left screenshot shows the initial selection screen with a blue information icon (i) in the top right corner. Red numbers 1, 2, 3, and 4 are overlaid on the interface to indicate the steps: 1. Agency (USACE or NOAA), 2. Projection Curve (USACE) (Low, Intermediate, High), 3. Time Period (2040), and 4. Show Scenario button. The right screenshot shows the same interface after selecting NOAA, with the Projection Curve options updated to NOAA 2017 options (Low, Int Low, Int, Int High, High, Extreme). A pop-up window titled 'Scenario Selector' is overlaid on the bottom right, providing instructions: 'To view a SLR scenario, please choose one of each of the following: 1 - First choose a source Agency (either USACE or NOAA) for projections. • USACE = U.S. Army Corp of Engineers sea level projections. • NOAA = National Oceanic and Atmospheric Administration sea level projections. 2 - Next choose the projection curve, C = curve, the higher the number the larger the SLR. USACE has three projections: • C1 = USACE Low • C2 = USACE Intermediate • C4 = USACE High. NOAA has four projections: • N1 = NOAA Low • N2 = NOAA Intermediate Low • N3 = NOAA Intermediate • N4 = NOAA Intermediate High • N5 = NOAA High • N6 = NOAA Extreme'. A callout box on the right says 'Scenario Selector Pop-up Help Click on blue info icon to access' with an arrow pointing to the information icon in the screenshot above.

## Using the Scenario Selector

1. After choosing a scenario and clicking “Show Scenario”, a message will appear in the top right to indicate whether the scenario loaded properly.



2. Scenario layers are displayed on the map

3. Scenario layers are added to the Layers Widget. By default, three layers are visible on the map: Affected Roads, RSLR by County and SLR Depth Inches.

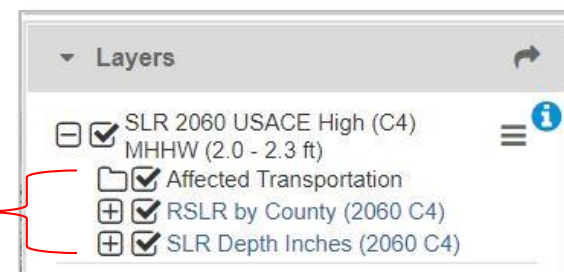
## Exploring the SLR Scenario Layers

There are eight data layers added with each SLR scenario map service.

Three of these layers are visible on the map by default (these are listed in bold):

1. **RCI Roads:** RCI Roads affected by SLR scenario
2. **RSLR by County:** SLR over MHHW amount by county
3. **SLR Depth Inches:** Extent and depth of flooding in inches
4. Local Roads: Local roads affected by SLR scenario
5. Rails: Rails affected by SLR scenario
6. Airports: Airports affected by SLR scenario
7. Freight Terminals: Freight terminals affected by SLR scenario
8. Seaports: Seaports affected by SLR scenario

Layers visible by default



*For more information on the individual layers, see the metadata with each layer.*

## Scenario Naming

The Scenario Name includes the year, projection curve, and amount of relative SLR above MHHW.

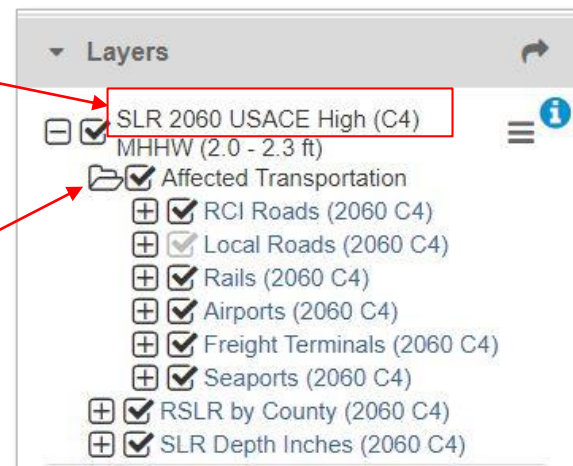
**Ex:** In the image to the right, the scenario loaded is USACE, High, and 2060. As a result, the SLR Scenario loaded is:

“SLR 2060 USACE High (C4) MHHW (2.0 – 2.3 ft)”

Relative SLR is a range because projections were generated by county and vary slightly based on local sea level trends. All six layers are named with “2060 C4” to indicate the SLR scenario.

Scenario Name

Expand Affected Transportation folder to show more layers

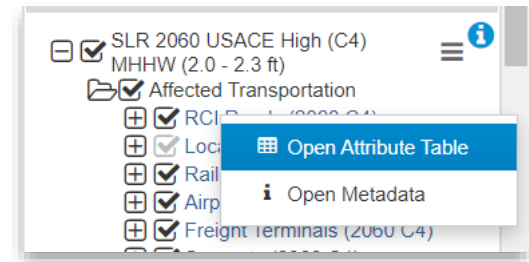


## SLR Curve Key

N1	NOAA 2017 Low	C1	USACE 2013 Low
N2	NOAA 2017 Intermediate-Low	C2	USACE 2013 Intermediate
N3	NOAA 2017 Intermediate	C4	USACE 2013 High
N4	NOAA 2017 Intermediate-High		
N5	NOAA 2017 High		
N6	NOAA 2017 Extreme		

## Attribute Table

The Attribute Table is accessed from the Layers Widget. To open the Attribute Table, click on the Layer Name to reveal the “Open Attribute Table” option.

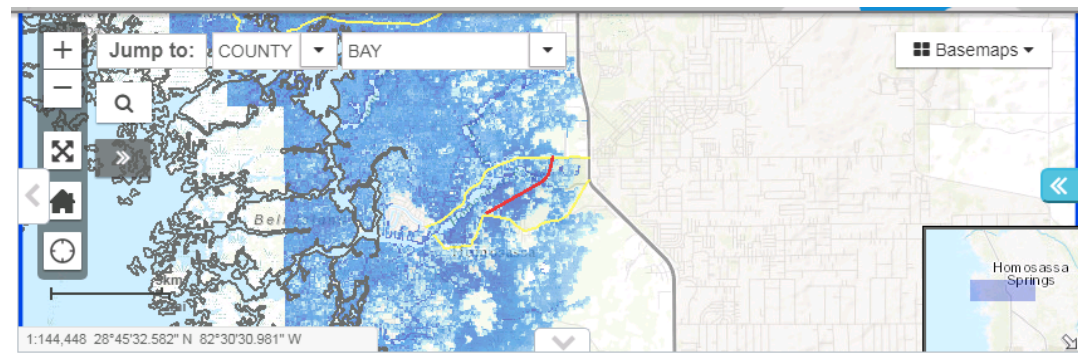


On load of the Attribute Table, only records for the features in the map view/ extent are loaded to the table. The “Extent Box” is the map extent used to fetch records from the data layer. The attribute table does not load records automatically as you zoom in/out/pan on the map. If you zoom in or out or pan, then click “Refresh Table” to reload the records in the map view.

### Zoom Menu

**Zoom to selected features:** Zooms to selected feature(s) on map. First select a feature on the map and then select this option.

**Zoom to Extent Box:** Zooms to blue Extent Box



### Clear Menu:

**Clear Selected Records:** Clears any selected feature from both the table and map.

**Clear Extent Box –** Clears the blue extent box from the map. Records are kept in the table.

**Clear Table –** Clears all records in the table.

### Refresh Table:

Reloads the records in the attribute table based on the current map view extent

### Export

Exports the records in the table to either an Excel Spreadsheet (xlsx or xls) or a comma-delimited files (csv).

Roads (2060 C4) [x]

Zoom Clear Refresh Table Selected Records Export

NAME	Functional Class	Feet Affected	% Affected (2060)	Begin Mile Pt	End Mile Pt	Length of Segn
S CHEROKEE WAY	RURAL: MAJOR CO...	3,009	16	0.000	3.470	18,319.661
THREE SISTERS SP...	URBAN: MINOR CO...	1,107	16	0.000	1.298	6,840.736
W FISHBOWL DR	RURAL: MINOR COL...	4,472	57	0.000	1.494	7,876.092
W FORT ISLAND TRL	RURAL: MINOR COL...	2,270	5	0.000	9.187	48,480.318
W HALLS RIVER RD	RURAL: MAJOR CO...	1,592	10	0.000	3.161	16,666.927
W OZELLO TRL	RURAL: MINOR COL...	7,526	20	0.000	6.964	36,772.057

1 - 6 of 6 results



## Legend

The Legend Widget displays the symbology of the map layers currently displayed in the map. This widget is located under the Layers Widget and by default, this widget is expanded/ open.

The Legend Widget automatically builds a legend for the map layers that are currently visible in the map. If you uncheck a layer (to stop displaying it), then you will need to zoom in or zoom out to refresh the Legend.

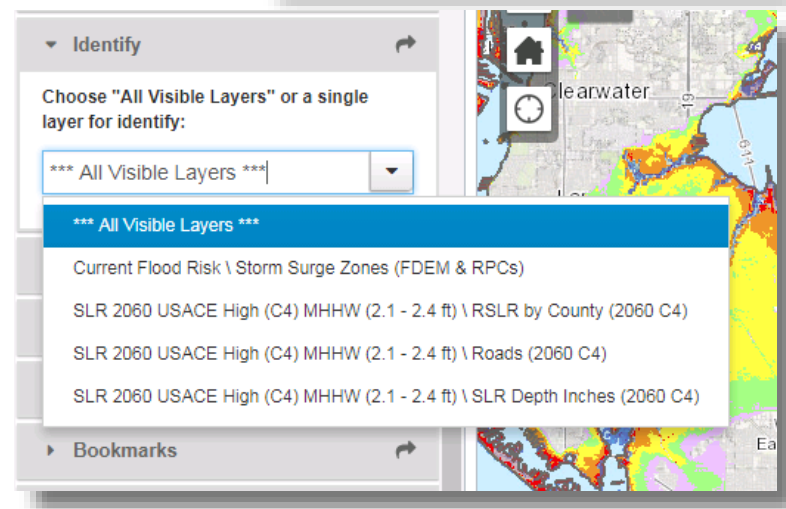
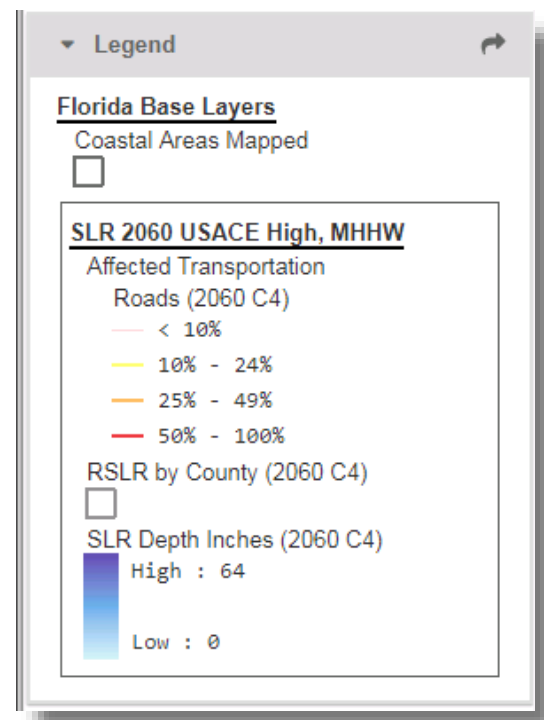
## Identify

The Identify Widget controls which layers are available for use in the Identify Tool.

The Identify Tool displays attribute values of features on the map. The Identify Tool is located on the map with the map navigation tools, but can also be accessed by a single left-click on the map (no matter what map navigation tool is selected).

By default, the Identify settings are configured to show attributes from **\*\*\* All Visible Layers \*\*\***, which means all layers that are *currently* visible in the map.

If you want to only see attribute values of a single map layer, then first open the Identify Widget, next click on the dropdown menu, and then select a single layer.



## Print: Create a Map

The Print Widget allows you to create a map of the current map view. This widget is not open by default. First, open the widget by clicking on the arrow on the left side of widget. In the widget, there are various settings to configure.

### Print Settings:

**Title:** Map Title. The default is “Slr Viewer Map”. Change to desired title.

**Format:** The default file format is PDF. Available formats include: PDF, EPS, GIF, JPG, PNG32, PNG8, SVG, and SVGZ.

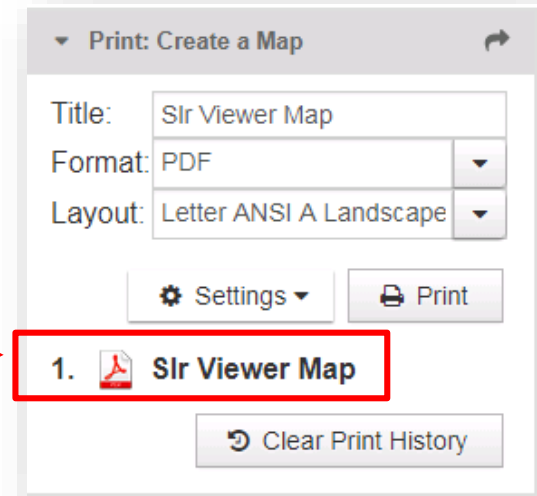
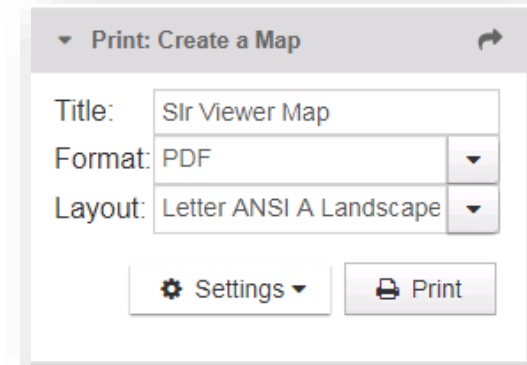
**Layout:** The layout controls the paper size and printing orientation (portrait or landscape). The default layout is Letter ANSI A Landscape (8.5” x 11”). ANSI is short for the North American ANSI series paper sizes.

Available layouts include: A3 Landscape, A3 Portrait, A4 Landscape, Letter ANSI A Landscape, Letter ANSI A Portrait, MAP\_ONLY, Tabloid ANSI B Landscape, Tabloid ANSI B Portrait. Sizes: A3 = 11.7” x 16.5”, A4 = 8.3” x 11.7”, Letter ANSI A = 8.5” x 11”, ANSI B = 11” x 17”. MAP\_ONLY: no legend or scale bar included.

**Additional Settings Menu:** Additional map settings are accessed through the Settings menu. These settings control the map scale/ extent, scale bar units, legend, print quality, and map only option.

**Preserve: Map Scale or Map Extent:** When creating the map with the desired layout size, choose whether to preserve map scale or map extent.

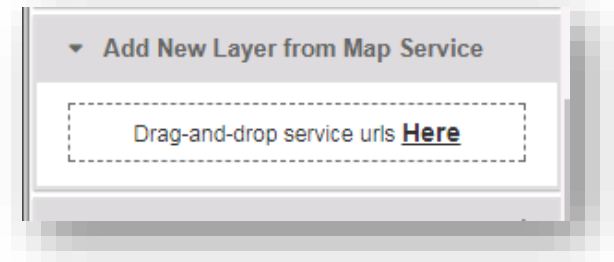
After choosing the desired options, click the Print button and wait for your map to be produced.



When your map is done, it will appear here. Click on it to open & save.

## Add New Layer from Map Service

This widget allows you to add some external map service layers to the map viewer. Using the map service's REST endpoint, you can drag and drop the service URL into the widget. Please note, some types of map services (including fused map caches) are not supported. For a working example, follow these steps to connect to FEMA's National Flood Hazard Layer (NFHL) map service:



1. Click on the “Add New Layer from Map Service” widget to open the tool. It will say “Drag-and-drop service urls **Here**”.
2. In a separate browser, navigate to: <https://hazards.fema.gov/gis/nfhl/rest/services/public/NFHL/MapServer>
3. In the blue bar at the top, where it says: Home > services > public > NFHL (MapServer), **click and drag where it says “NFHL (MapServer)” and pull it over to the map viewer widget where it says: “Drag-and-drop service urls Here”.**



## Measurement

The Measurement Widget includes tools to measure area, distance, and location.

### Area and distance measurements:



1. First, choose the type of measurement – area or distance.
2. Next, choose the desired units. The default area unit is Square Miles. The default distance unit is Miles.
3. Next, using single left-clicks, draw a polygon of the area you want to measure or draw a line. Use a double-click to finish the drawing.
4. The measurement will be displayed in the widget under where it says: “Measurement Result”. If you want to see the measured amount in a different unit, click the unit dropdown and choose another unit of measurement.

When you move the map, the measurement result will clear itself. Make sure to write the number down if you need to reference it later.

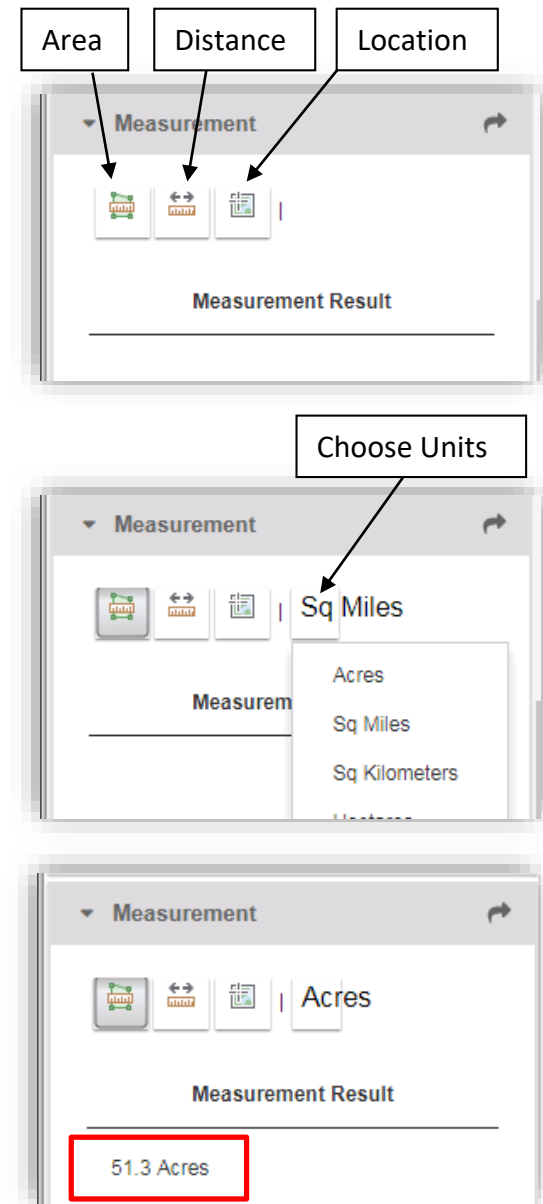
### Location Measurement:

The location measurement reveals the latitude and longitude of a location.

First, click the location button. Then choose the units: either Degrees (for decimal degrees) or DMS (for Degrees Minutes Seconds).

Measurement Result		
	Latitude	Longitude
	28.364863	-82.700502
	28.39084	-82.668487

Next, click on the map where you want to reveal the latitude and longitude. The latitude and longitude will display in the widget under “Measurement Result”.



## Bookmarks

The Bookmarks Widget allows you to “bookmark” or save a specific geographic area (map extent), so you can easily zoom to that area.

To add a bookmark, first zoom to the map area that you want to save. Then open the widget (it is closed by default) and click “Add Bookmark”. Next, type a name for your bookmark (ex: “Crystal River”).

To zoom to your bookmark, simply click on the Bookmark name.

The bookmarks can be renamed by clicking the pencil icon. They can be deleted using the X icon. Your bookmarks are stored within your browser, so if you clear your browser cache, they will no longer persist.



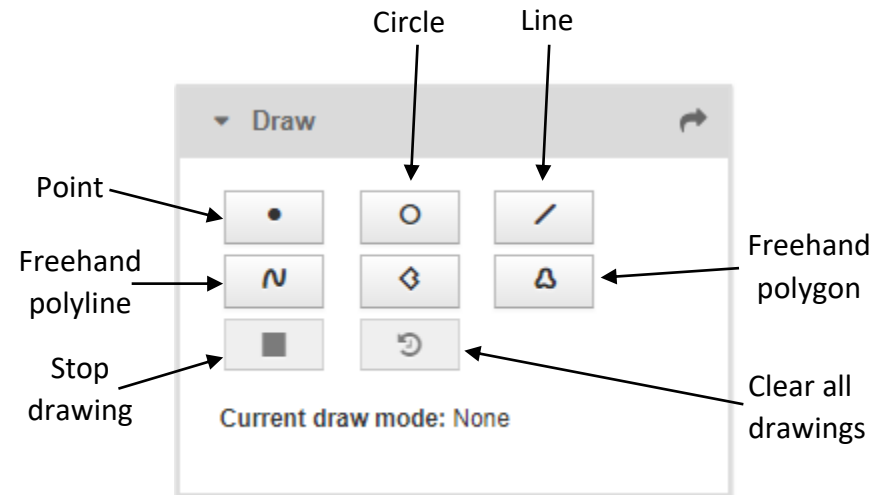
## Draw

The Draw Widget allows you to draw lines and shapes directly on the map.

This widget is closed by default.

To draw on the map, first open the Draw widget. Then click on the type of shape you want to draw. Start drawing on the map with a single left-click. You will be prompted on screen with additional instructions on how to continue and/or finish our drawing.

As you zoom in and out on the map, your drawings will persist until you click “Clear All drawings” button or reload your browser.

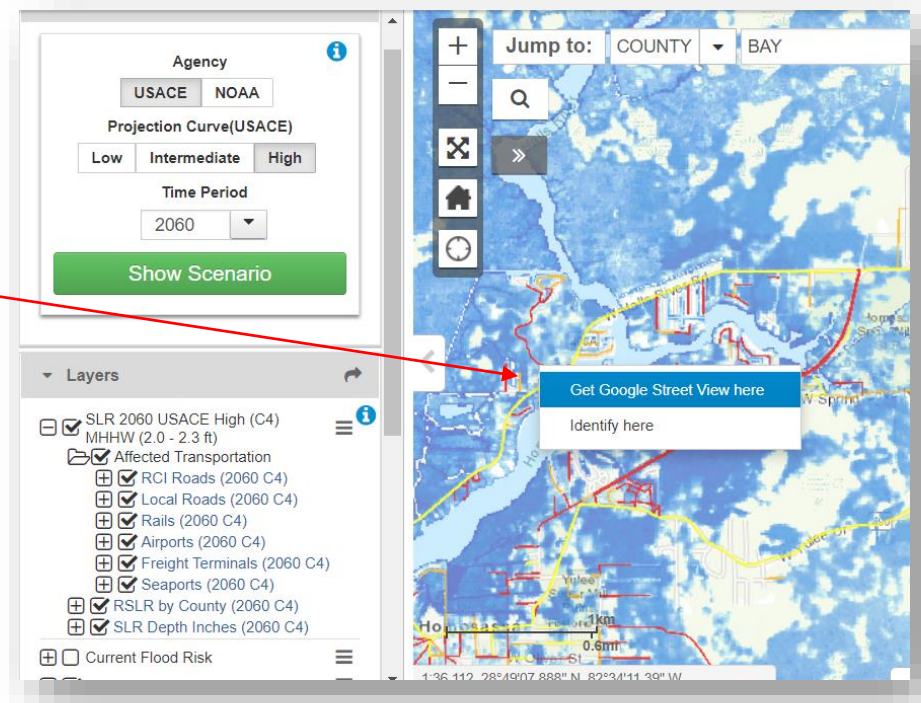


## Get Google Street View Here

This function allows you to open Google Street View in another browser window. This tool is useful for exploring road conditions where potential inundation is expected to occur.

To use the Get Google Street View Here:

- In the map, right-click **along a road**. Then click “Get Google Street View here”
- A new window/ tab will open with Google Street View (if it is available for that location).
- If Google Street View is not available for the location selected, then a new window will still open, but the Google Street View screen will be all black. You can simply exit the black screen and return to Google maps by clicking on the left pointing arrow in the top left corner of the screen.



Note: In Version 2 of the Sketch Tool Map Viewer, this was a widget. Due to recent Google Street View licensing fees, this widget was discontinued and replaced with the functionality described above.

