

Sea Level Scenario Sketch Planning Tool
GIS Data: Sea Level Rise (SLR) Inundation Surfaces
University of Florida GeoPlan Center
Version 3, November 2020

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Description

Each download contains a zipped ArcGIS 10.7.1 ESRI File Geodatabase (FGDB) with multiple inundation surfaces (feature classes) for one decade and one tidal datum. There are many feature classes included in each download (up to 54), so please read this document carefully.

SLR scenarios are mapped by county using local tide gauge data and sea level trends. Inundation surfaces were created by the University of Florida GeoPlan Center using the United States Army Corps of Engineers (USACE) Sea-Level Change Curve Calculator (2019.21), USACE SLR projections (ER 1100-2-8162, 2013), National Oceanic and Atmospheric Administration (NOAA) SLR projections (2017), NOAA tide gauge data, NOAA tidal surfaces, and a 5-meter horizontal resolution Digital Elevation Model (DEM).

Inundation model outputs include a simple bathtub model and a modified bathtub model that applies a hydrologic connectivity filter to remove isolated inundated areas not connected to a major waterway. The FGDB also includes feature classes representing the approximate *depth* of flooding for a SLR scenario and features classes simply representing the *extent* of flooding for a SLR scenario. Both vector and raster formats of the SLR Inundation Surfaces are contained in the FGDB download.

For more information and full technical methods, please see the metadata included with the feature classes, as well as the project website: <http://sls.geoplan.ufl.edu>

What's New in Version 3

Here is a brief list of changes made since Version 2 of the Sketch Planning Tool (released in 2017):

- Replaced NOAA 2012 projections with NOAA 2017 projections.
- Models were run with updated Lidar data, where available.
- USACE Projections were re-mapped to account for updated Lidar.

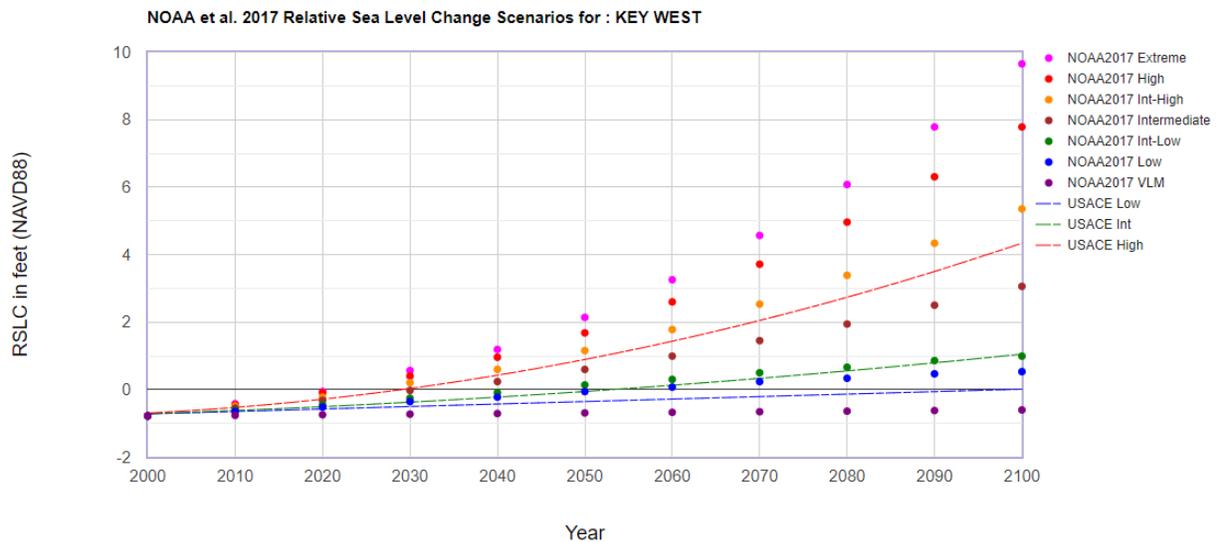
SLR Projections Mapped

Relative sea level rise values for nine future SLR projections were generated using the USACE Sea-Level Change Curve Calculator (“USACE Calculator”) 2019.21 (<http://www.corpsclimate.us/ccaces/curves.cfm>). Nine SLR projections from two sources were mapped:

- **USACE (2013):** U.S. Army Corps of Engineers [ER 1100-2-8162](#) Sea Level Rise Projections. Three projections: Low (historic rate), Intermediate, and High.
- **NOAA (2017):** [NOAA Technical Report NOS CO-OPS 083](#): Global and Regional Sea Level Rise Scenarios for the United States. Six projections: Low, Intermediate-Low, Intermediate, Intermediate-High, High, and Extreme.

The USACE Calculator was used to generate relative SLR values for twelve FL stations. Values were adjusted to MSL(83-01) datum. Values were then added to tidal surface representing MHHW conditions.

The graph below shows an output from the USACE Calculator for the Key West tide gauge, showing the nine SLR projections mapped. NOAA Projections are shown as dots and USACE projections as dashed lines.



In the Sketch Tool, SLR inundation datasets are named with a “C1”, “C2”, or “C4” to indicate USACE 2013 projections or “N1” through “N6” to indicate NOAA 2017 projections.

Key - Sketch Tool Dataset	SLR Projection
C1	USACE 2013 Low
C2	USACE 2013 Intermediate
C4	USACE 2013 High
N1	NOAA 2017 Low
N2	NOAA 2017 Intermediate-Low
N3	NOAA 2017 Intermediate
N4	NOAA 2017 Intermediate-High
N5	NOAA 2017 High
N6	NOAA 2017 Extreme

Note: datasets named with C3 and C5 are no longer used – they were used in the Sketch Tool Version 2 (2017) to represent two of the NOAA 2012 projections.

Inundation Models

Inundation models used include a bathtub model and a modified bathtub model:

- **Bathtub Model:** Identifies all areas under a target elevation as potentially flooded, regardless of hydrologic connectivity.
- **Hydro-connectivity Model (“Modified Bathtub”):** applies a hydrologic connectivity filter to remove isolated inundated areas not connected to a major waterway.

Tidal Datums

SLR values are mapped on top of Mean Higher High Water (MHHW) tidal datum. A statewide grid, representing Mean Higher High Water (MHHW) and developed by NOAA’s Office of Coastal Management (OCM), was used for mapping SLR on top of MHHW conditions.

Output Feature Classes Included

Each scenario has six output features classes. The six layers represent the same amount of relative SLR, but the extent of flooding is different for bathtub and hydro-connectivity model outputs (which remove isolated inundated areas not connected to a major waterway). Additionally, some outputs are in vector (polygon format), while others are in raster format. Finally, depth grids are available in raster format, which approximate the amount of flooding in inches for the scenario.

Each FGDB contains nine scenarios (projection curves) for one decade. Hence, there are up to 54 feature classes in each FGDB (9 scenarios x 6 outputs per scenario). Please note: some SLR scenarios may not produce flooding on land; for those there are no output layers.

Example Output Feature Classes (6) for One Scenario:

Outputs - Filename	Data Type	Inundation Model	Layer Description
VOL_2040_C1_MHHW	Raster	Hydro-connectivity	Volusia County SLR Inundation Extent, 2040, USACE Low/ NOAA Low, MHHW, HC model, Raster Assesses the hydro-connectivity of inundated areas in the Bathtub model; drops out isolated inundated areas not hydrologically connected to an ocean or bay.
VOL_2040_C1_MHHW_D	Raster	Hydro-connectivity	Volusia County SLR Inundation Depth, 2040, USACE Low/ NOAA Low, MHHW, HC model, Raster Assesses the hydro-connectivity of inundated areas in the Bathtub model; drops out isolated inundated areas not hydrologically connected to an ocean or bay.
VOL_2040_C1_MHHW_P	Vector	Hydro-connectivity	Volusia County SLR Inundation Extent, 2040, USACE Low/ NOAA Low, MHHW, HC model, Vector Assesses the hydro-connectivity of inundated areas in the Bathtub model; drops out isolated inundated areas not hydrologically connected to an ocean or bay.
VOL_2040_C1_MHHW_BATH	Raster	Bathtub	Volusia County SLR Inundation Extent, 2040, USACE Low/ NOAA Low, MHHW, Bathtub, Raster Identifies all areas under a target elevation as flooded, regardless of hydrologic connectivity.
VOL_2040_C1_MHHW_BATH_D	Raster	Bathtub	Volusia County SLR Inundation Depth, 2040, USACE Low/ NOAA Low, MHHW, Bathtub, Raster Identifies all areas under a target elevation as flooded, regardless of hydrologic connectivity.
VOL_2040_C1_MHHW_BATH_P	Vector	Bathtub	Volusia County SLR Inundation Extent, 2040, USACE Low/ NOAA Low, MHHW, Bathtub, Vector Identifies all areas under a target elevation as flooded, regardless of hydrologic connectivity.

Example feature classes in one FGDB download

This image shows the inundation surfaces (feature classes) included with a single FGDB download.

Brevard County 2040 MHHW SLR Inundation Surfaces

The FGDB contains inundation surfaces for all nine SLR projection curves for the 2040 time period, mapped on Mean Higher High Water (MHHW).

- [-] BREV_2040_MHHW.gdb
 - [+] BREV_2040_C1_MHHW
 - [+] BREV_2040_C1_MHHW_BATH
 - [+] BREV_2040_C1_MHHW_BATH_D
 - [+] BREV_2040_C1_MHHW_BATH_P
 - [+] BREV_2040_C1_MHHW_D
 - [+] BREV_2040_C1_MHHW_P
 - [+] BREV_2040_C2_MHHW
 - [+] BREV_2040_C2_MHHW_BATH
 - [+] BREV_2040_C2_MHHW_BATH_D
 - [+] BREV_2040_C2_MHHW_BATH_P
 - [+] BREV_2040_C2_MHHW_D
 - [+] BREV_2040_C2_MHHW_P
 - [+] BREV_2040_C4_MHHW
 - [+] BREV_2040_C4_MHHW_BATH
 - [+] BREV_2040_C4_MHHW_BATH_D
 - [+] BREV_2040_C4_MHHW_BATH_P
 - [+] BREV_2040_C4_MHHW_D
 - [+] BREV_2040_C4_MHHW_P
 - [+] BREV_2040_N1_MHHW
 - [+] BREV_2040_N1_MHHW_BATH
 - [+] BREV_2040_N1_MHHW_BATH_D
 - [+] BREV_2040_N1_MHHW_BATH_P
 - [+] BREV_2040_N1_MHHW_D
 - [+] BREV_2040_N1_MHHW_P
 - [+] BREV_2040_N2_MHHW
 - [+] BREV_2040_N2_MHHW_BATH
 - [+] BREV_2040_N2_MHHW_BATH_D
 - [+] BREV_2040_N2_MHHW_BATH_P
 - [+] BREV_2040_N2_MHHW_D
 - [+] BREV_2040_N2_MHHW_P
 - [+] BREV_2040_N3_MHHW
 - [+] BREV_2040_N3_MHHW_BATH
 - [+] BREV_2040_N3_MHHW_BATH_D
 - [+] BREV_2040_N3_MHHW_BATH_P
 - [+] BREV_2040_N3_MHHW_D
 - [+] BREV_2040_N3_MHHW_P

These six layers are for one scenario: USACE Low (C1) SLR for Brevard County, 2040, mapped on top of MHHW. The amount of relative SLR and the tide station used is included in the attribute table of the inundation extent feature classes.

Example Outputs for USACE High (C4):

- [+] BREV_2040_C4_MHHW → Inundation Extent, Hydro-connectivity model (Raster)
- [+] BREV_2040_C4_MHHW_BATH → Inundation Extent, Bathtub Model (Raster)
- [+] BREV_2040_C4_MHHW_BATH_D → Depth Grid, Bathtub Model (Polygon)
- [+] BREV_2040_C4_MHHW_BATH_P → Inundation Extent, Bathtub Model (Polygon)
- [+] BREV_2040_C4_MHHW_D → Depth Grid, Hydro-connectivity model (Raster)
- [+] BREV_2040_C4_MHHW_P → Inundation Extent, Hydro-connectivity model (Polygon)

Contents continued...

- [+] BREV_2040_N4_MHHW
- [+] BREV_2040_N4_MHHW_BATH
- [+] BREV_2040_N4_MHHW_BATH_D
- [+] BREV_2040_N4_MHHW_BATH_P
- [+] BREV_2040_N4_MHHW_D
- [+] BREV_2040_N4_MHHW_P
- [+] BREV_2040_N5_MHHW
- [+] BREV_2040_N5_MHHW_BATH
- [+] BREV_2040_N5_MHHW_BATH_D
- [+] BREV_2040_N5_MHHW_BATH_P
- [+] BREV_2040_N5_MHHW_D
- [+] BREV_2040_N5_MHHW_P
- [+] BREV_2040_N6_MHHW
- [+] BREV_2040_N6_MHHW_BATH
- [+] BREV_2040_N6_MHHW_BATH_D
- [+] BREV_2040_N6_MHHW_BATH_P
- [+] BREV_2040_N6_MHHW_D
- [+] BREV_2040_N6_MHHW_P

Naming Convention of Feature Classes

Each feature class is named according to the key below and indicates the SLR scenario mapped (county, year, SLR projection curve, tidal datum), inundation model type (bathtub or hydro-connectivity), data format (raster or vector/ polygon) and flooding depth or extent.

Naming Key:

[COUNTY]_[YEAR]_[CURVE]_[TIDAL DATUM]_[BATH or N/A]_[D or N/A]_[P or N/A]

WHERE:

*COUNTY = County Name (some counties are only partially mapped)

*YEAR = Decade (2040, 2050, 2060, 2070, 2080, 2090 or 2100)

*PROJECTION_CURVE

C1 - USACE Low

C2 - USACE Intermediate

C4 - USACE High

N1 - NOAA Low

N2 - NOAA Intermediate-Low

N3 - NOAA Intermediate

N4 - NOAA Intermediate-High

N5 - NOAA High

N6 - NOAA Extreme

*TIDAL_DATUM

MHHW = Mean Higher High Water

*BATH or N/A -

BATH = Bathtub inundation model

N/A (BLANK) = Modified bathtub model with hydrologic connectivity filter applied

*D or N/A

D = Depth Grid (Where depth is represented in inches of flooding)

Depth grids are only available in raster format

N/A = If no D in filename, then the feature class represents inundation **extent**

*P or N/A

P = Polygon (vector) format

N/A = If no P in filename, then the feature class is a raster