Sea Level Scenario Sketch Planning Tool

GIS Data: Sea Level Rise (SLR) Inundation Surfaces

University of Florida GeoPlan Center, June 2017

Contents

Description

Each download contains a zipped ArcGIS 10.4.1 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 30), 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 (2015.46), USACE SLR projections (2013), National Oceanic and Atmospheric Administration (NOAA) SLR projections (2012), 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

SLR Projections Mapped

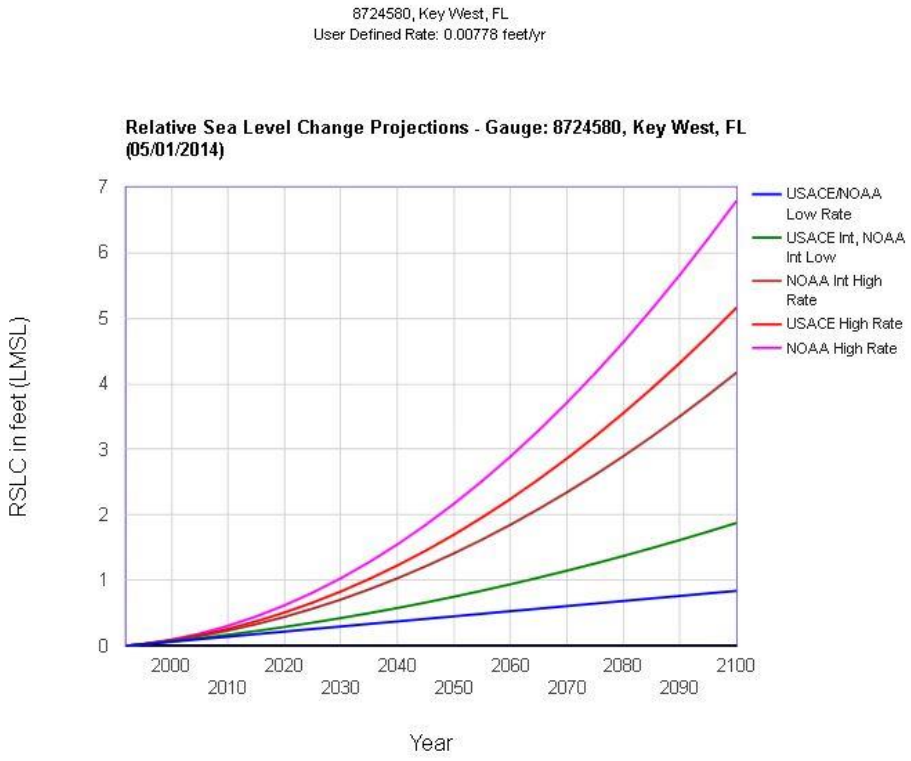
Five SLR projection curves from the USACE (2013) and NOAA (2012) were used for mapping inundation (listed below). Each dataset is named with a “C1” through “C5” to indicate the SLR curve used.

SLR Projections Mapped:

C1 = USACE Low (2013)/ NOAA Low (2012)
C2 = USACE Intermediate (2013) / NOAA Intermediate Low (2012)
C3 = NOAA Intermediate High (2012)
C4 = USACE High (2013)
C5 = NOAA High (2012)

The USACE Sea-Level Change Curve Calculator (2015.46) and 2015 NOAA Sea level trends for ten tide stations were used to generate relative SLR values: http://www.corpsclimate.us/ccaceslcurves.cfm

Example output graph from the USACE Calculator for Key West tide gauge, showing the five SLR projection curves mapped.



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

Tidal surface grids representing Mean Higher High Water (MHHW) and Local Mean Sea Level (MSL) in Florida were obtained from NOAA's Office of Coastal Management (OCM) in 2016. For each county, relative SLR in feet was added on top of MHHW and MSL tidal 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 five scenarios (curves) for one decade and tidal datum. Hence, there are up to 30 feature classes in each FGDB (Five scenarios x 6 outputs per scenario). There are some SLR scenarios that do not produce flooding on land; for those there are no output layers.

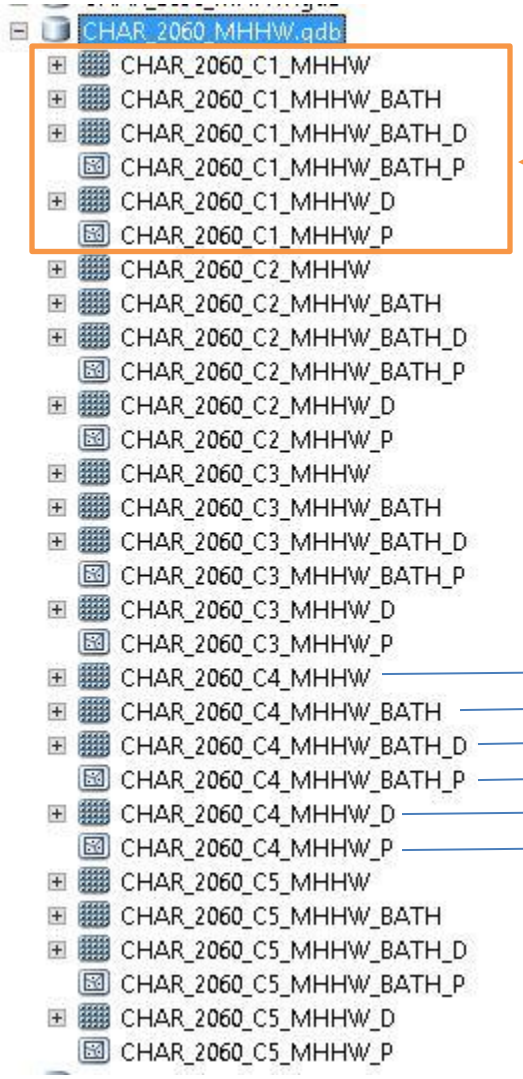
Example Output Feature Classes (6) for One Scenario:

Outputs - Filename	Data Type	Inundation Model	Layer Descript
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

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

Charlotte County 2060 MHHW SLR Inundation Surfaces
The FGDB contains inundation surfaces for all five SLR projection curves (C1 – C5) for the 2060 time period, mapped on Mean Higher High Water (MHHW).



These six output layers are for one scenario: USACE Low/ NOAA Low (C1) SLR Curve for Charlotte County, 2060, 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):

- CHAR_2060_C4_MHHW → Inundation Extent, Hydro-connectivity model (Raster)
- CHAR_2060_C4_MHHW_BATH → Inundation Extent, Bathtub Model (Raster)
- CHAR_2060_C4_MHHW_BATH_D → Depth Grid, Bathtub Model (Polygon)
- CHAR_2060_C4_MHHW_BATH_P → Inundation Extent, Bathtub Model (Polygon)
- CHAR_2060_C4_MHHW_D → Depth Grid, Hydro-connectivity model (Raster)
- CHAR_2060_C4_MHHW_P → Inundation Extent, Hydro-connectivity model (Polygon)

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/ NOAA Low
- C2 - USACE Intermediate/ NOAA Intermediate Low
- C3 - NOAA Intermediate High
- C4 - USACE High
- C5 - NOAA High

*TIDAL_DATUM

- MHHW = Mean Higher High Water
- MSL = Mean Sea Level

*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