GIS Data Download Guide

Affected Transportation Infrastructure: Current & Future Flood Exposure

Sea Level Scenario Sketch Planning Tool, Version 3, November 2020
University of Florida GeoPlan Center

Contents

Description

This download contains analyses of transportation facilities exposed to current flooding and future flooding under various sea level rise (SLR) scenarios. Transportation infrastructure analyzed in these dataset include roadways, rails, airports, freight terminals, seaports, and spaceports from a variety of data sources.

Each download contains a zipped ArcGIS 10.7.1 ESRI File Geodatabase (FGDB) with multiple feature classes that include analyses of infrastructure exposure to nine SLR projections. SLR inundation layers were created by the University of Florida GeoPlan Center and mapped by county using local tide gauge data and sea level trends. Inputs included 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. Transportation data was intersected against the hydro-connectivity inundation model outputs. Fields were added to the data to indicate the amount and percentage of each infrastructure facility potentially affected under each SLR scenario. For linear facilities (roadways and railways), fields show feet and percentage of each segment affected. For areal facilities (airports, freight terminals, seaports, and spaceports), fields show acres and percentage of each area affected.

This dataset was created for the Sea Level Scenario Sketch Planning Tool. 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

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/ccaceslcurves.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 tide stations. Values were adjusted to MSL(83-01) datum. Values were then added to tidal surface representing MHHW conditions.

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.

For more information on the SLR models, please see the document: "Guide to GIS Data: SLR Models": https://sls.geoplan.ufl.edu/download-data/

Transportation Data Used in this Analysis

RCI Roads: The base RCI data was created by merging RCI On-system and RCI Off-System Roads. Attributes were added to represent Average Daily Traffic, Number of Lanes, Functional Classification, Federal Aid, and Evacuation route status. The FDOT GIS On-systems Roads feature class provides spatial information on active main-line roads maintained by Florida DOT. Off-System roads consist of roads not maintained by Florida DOT that are city or county owned.

TIGER Roads: This dataset was included to represent local roadways, many of which are not included in the FDOT RCI data. These roads are sourced from the 2018 version of the US Census Bureau TIGER/Line dataset.

Rails: Railways in this dataset come from the Florida Dept of Transportation (FDOT) Strategic Intermodal System and from the FDOT Transportation Statistics Office. The dataset was created by combining railways from the 2019 SIS and 2014 TRANSTAT datasets from FDOT.

Facilities: This dataset contains analyses of airports, freight terminals, seaports, and spaceports. Facilities come from the 2019 Strategic Intermodal System (SIS) and from the UF GeoPlan Center. The field, FAC_TYPE indicates the type of facility.

Transportation Analyses and SLR Scenario Fields

The base transportation data was intersected against 63 SLR inundation layers, each representing a different amount of SLR and time period. 63 scenarios = 9 SLR Projection Curves x 7 decades (2040, 2050, 2060, 2070, 2080, 2090, 2100).

For each facility that intersected a SLR inundation layer, the number of feet or acres intersecting was calculated. Individual intersecting segments or areas were then joined back to the base transportation data to calculate the total feet/acres and percentage of facility affected. Fields were added back to the base transportation data to summarize the impacts per facility.

Each scenario analysis field represents the feet or acres and percentage of the infrastructure facility that is affected under a particular SLR scenario. The SLR scenario is indicated in the field name. For facilities with no effects (no intersecting SLR scenarios), a null value is listed.

Example SLR Scenario Fields for Nine SLR Projections for RCI Roads for One Decade (2090):

Field Name	Description
C1MHHW90FT	Feet of roadway segment affected 2090 USACE Low/NOAA Low, MHHW
C1MHHW90PC	Percent of roadway segment affected 2090 USACE Low/NOAA Low, MHHW
C2MHHW90FT	Feet of roadway segment affected 2090 USACE Int/NOAA Int Low, MHHW
C2MHHW90PC	Percent of roadway segment affected 2090 USACE Int/NOAA Int Low, MHHW
C4MHHW90FT	Feet of roadway segment affected 2090 USACE High, MHHW
C4MHHW90PC	Percent of roadway segment affected 2090 USACE High, MHHW

N1MHHW90FT	Feet of roadway segment affected 2090 NOAA Low, MHHW
N1MHHW90PC	Percent of roadway segment affected 2090 NOAA Low, MHHW
N2MHHW90FT	Feet of roadway segment affected 2090 NOAA Intermediate-Low, MHHW
N2MHHW90PC	Percent of roadway segment affected 2090 NOAA Intermediate-Low, MHHW
N3MHHW90FT	Feet of roadway segment affected 2090 NOAA Intermediate, MHHW
N3MHHW90PC	Percent of roadway segment affected 2090 NOAA Intermediate, MHHW
N4MHHW90FT	Feet of roadway segment affected 2090 NOAA Intermediate-High, MHHW
N4MHHW90PC	Percent of roadway segment affected 2090 NOAA Intermediate-High, MHHW
N5MHHW90FT	Feet of roadway segment affected 2090 NOAA High, MHHW
N5MHHW90PC	Percent of roadway segment affected 2090 NOAA High, MHHW
N6MHHW90FT	Feet of roadway segment affected 2090 NOAA Extreme, MHHW
N6MHHW90PC	Percent of roadway segment affected 2090 NOAA Extreme, MHHW

Current Flood Risk Fields

For RCI and TIGER roads, the base transportation data was also intersected with current flood risk layers to analyze each road segment's exposure to current flood risks. Layers analyzed include:

- 100-year and 500-year floodplains from Federal Emergency Management Agency (FEMA) Digital Flood Rate Insurance Maps (DFIRM). FEMA Floodplain data was sourced from the Florida Geographic Data Library, filename: DFIRM_FLDHAZ_OCT19.
- Storm Surge Zones from the Florida Division of Emergency Management (FDEM) and Florida's Regional Planning Councils (RPC). Source date: 2017. Downloaded from https://maps.floridadisaster.org/data/Storm_surge_zones_gdb.zip

These current flood risk do not include consideration of SLR: they only capture the amount of roadway that intersects with current storm surge zones and floodplains. The current flood risk fields follow the same naming convention as the SLR Scenario fields.

Current Flood Risk Fields (RCI and TIGER Data):

Field Name	Description	Data Source
CAT_T_FT	Feet of roadway segment that intersects Tropical Storm Surge Zone	FDEM/ RPC
% Category T	Percent of roadway segment that intersects Tropical Storm Surge Zone.	FDEM/ RPC
CAT_1_FT	Feet of roadway segment that intersects Category 1 Storm Surge Zone	FDEM/ RPC
% Category 1	Percent of roadway segment that intersects Category 1 Storm Surge Zone	FDEM/ RPC
CAT_2_FT	Feet of roadway segment that intersects Category 2 Storm Surge Zone	FDEM/ RPC
% Category 2	Percent of roadway segment that intersects Category 2 Storm Surge Zone	FDEM/ RPC
CAT_3_FT	Feet of roadway segment that intersects Category 3 Storm Surge Zone	FDEM/ RPC
% Category 3	Percent of roadway segment that intersects Category 3 Storm Surge Zone	FDEM/ RPC
CAT_4_FT	Feet of roadway segment that intersects Category 4 Storm Surge Zone	FDEM/ RPC
% Category 4	Percent of roadway segment that intersects Category 4 Storm Surge Zone	FDEM/ RPC
CAT_5_FT	Feet of roadway segment that intersects Category 5 Storm Surge Zone	FDEM/ RPC
% Category 5	Percent of roadway segment that intersects Category 5 Storm Surge Zone	FDEM/ RPC
DFIRM100FT	Roadway segment length in feet that intersects the 100-Year Floodplain	FEMA
% 100-Year Floodplain (DFIRM)	% of Roadway segment length that intersects the 100-Year Floodplain	FEMA
DFIRM500FT	Roadway segment length in feet that intersects the 500-Year Floodplain only. Please note: the spatial extent of the 500-year floodplain does not include the 100-year floodplain.	FEMA
% 500-Year Floodplain (DFIRM)	% of Roadway segment length that intersects the 500-Year Floodplain. Please note: the spatial extent of the 500-year floodplain does not include the 100-year floodplain.	FEMA
DFIRMTOTFT	Total length of roadway segment that intersects DFIRM floodplains. [DFIRM100FT + DFIRM500FT]	FEMA
DFIRMTOTPC	Total % of roadway segment that intersects DFIRM floodplains. [DFIRM100PC + DFIRM500PC]	FEMA

Bridge Data Corrections

It is a known issue that some bridge approaches are incorrectly identified as affected by SLR. Because the Lidar elevation data is a bare earth model, the elevation of the bridge approach reported in the DEM is the ground elevation under the bridge. UF GeoPlan attempted to correct for this issue by using source Lidar to create Digital Surface Models to represent the elevation of the bridge decks.

This process was only completed for areas with breakline data for overpasses, including the following counties: Bay*, Brevard, Broward, Calhoun*, Charlotte, Clay, Collier*, Dixie, Duval*, Escambia, Flagler*, Franklin*, Gilchrist, Glades, Gulf*, Hendry, Highlands, Hillsborough, Indian River, Jefferson, Lafayette, Lee*, Leon, Levy, Liberty, Manatee*, Martin, Miami-Dade*, Monroe, Nassau, Okaloosa, Okeechobee, Palm Beach*, Pasco, Pinellas, Putnam, Santa Rosa, Sarasota*, St. Johns*, St. Lucie, Taylor, Wakulla, Walton*, and Washington*.
* *Indicates that only part of county was corrected, due to data availability*