Florida Statewide Regional Evacuation Study Program

Storm Tide Atlas

Jefferson County

Volume 7-2
Book 3 of 5

Florida Division of Emergency Management

Apalachee Florida Regional Council

Apalachee Florida Region

2014

Includes Hurricane Evacuation Study

Statewide Regional Evacuation Study Program

STATEWIDE REGIONAL EVACUATION STUDY PROGRAM

Volume 7-2

Storm Tide Atlas

Book 3 – Jefferson County

Prepared by

APALACHEE REGIONAL PLANNING COUNCIL

APALACHEE REGION STORM TIDE ATLAS

Volume 7-2
Book 3
Jefferson County

This Book is part of Volume 7 of the ***Statewide Regional Evacuation Study*** (SRES) Program and one of five county books in the Apalachee Region Storm Tide Atlas Series. This book covers Jefferson County; while Books 1, 2, 4 and 5 cover Franklin Gulf, Leon and Wakulla Counties respectively. The atlas maps identify those areas subject to potential storm tide flooding from the five categories of hurricane on the Saffir-Simpson Hurricane Wind Scale as determined by the NOAA's numerical storm surge model, SLOSH (updated 2009).

The Storm Tide Atlas originally published in 2010 and updated with new SLOSH data in 2014, is the foundation of the hazards analysis for storm tide and a key component of the SRES. The Technical Data Report, Volume 1 of the SRES, builds upon this analysis and includes the revised evacuation zones and population estimates, results of the evacuation behavioral data, shelter analysis and evacuation transportation analyses. The Study, which provides vital information to state and local emergency management, forms the basis for county evacuation plans.

The Atlas was produced by the Apalachee Regional Planning Council with funding by the Florida Legislature and the Federal Emergency Management Agency through the Florida Division of Emergency Management.

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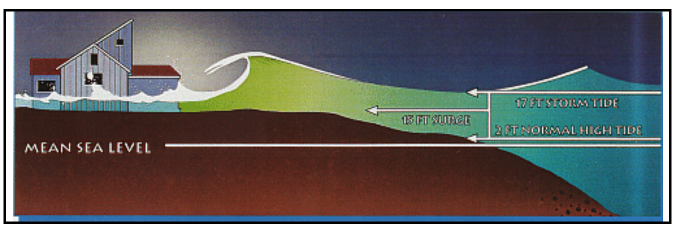
STORM TIDE ATLAS

BOOK III – JEFFERSON COUNTY

A. Introduction

A comprehensive emergency management program requires attention to four (4) key inter-related components: preparedness, response, recovery and mitigation. Preparing and avoiding or reducing potential loss of life and property damage - preparedness and mitigation - requires accurate and precise hazard and vulnerability analyses. These analyses are the foundation for evacuation and disaster response planning, as well as the development of local mitigation strategies designed to reduce the community's overall risk to disasters. This Atlas series provides information to state, county and local emergency management officials and planners for use in hurricane preparedness and coastal management in the Apalachee Bay Region including. It is part of a statewide effort to enhance the ability to respond to a hurricane threat, facilitate the evacuation of vulnerable residents to a point of relative safety and mitigate our vulnerability in the future. The Statewide Regional Evacuation Study (SRES) Program provides a consistent, coordinated and improved approach to addressing the state and regional vulnerability to the hurricane threat.

The specific purpose of this Atlas is to provide maps which depict storm tide heights and the extent of stillwater, storm surge coastal flooding inundation from hurricanes of five different intensities in the Apalachee Bay area. In 2013 the Apalachicola Bay Basin was updated and he Storm Tide Atlas was updated in 2014 by the Apalachee Regional Planning Council based on the most recent data. The Study is a cooperative effort of the Florida Division of Emergency Management, the Florida Department of Transportation, the Florida Regional Planning Councils and the county emergency management agencies.



B. SLOSH Model

The principal tool used for analyzing the expected hazards from potential hurricanes affecting the study area is the Sea, Lake and Overland Surges from Hurricane (SLOSH) numerical storm surge prediction model. The SLOSH computerized model predicts the storm tide heights that result from hypothetical hurricanes with selected various combinations of pressure, size, forward speed, track and winds. Originally developed for use by the National Hurricane Center (NHC) as a tool to give geographically specific warnings of expected surge heights during the approach of hurricanes, the SLOSH model is utilized in regional studies for several key hazard and vulnerability analyses.

The SLOSH modeling system consists of the model source code and the model basin or grid. SLOSH model grids must be developed for each specific geographic coastal area individually incorporating the unique local bay and river configuration, water depths, bridges, roads and other physical features. In addition to open coastline heights, one of the most valuable outputs of the SLOSH model for evacuation planning is its predictions of surge heights over land into inland areas.

The first SLOSH model for the Apalachee Bay area was completed in 1984. The model was developed by the Techniques Development Lab of the National Oceanic and Atmospheric Administration (NOAA) under the direction of the late Dr. Chester P. Jelesnianski. In March 1997 the NHC updated the SLOSH model for the Apalachicola Bay basin. A major improvement to the model was the incorporation of wind speed degradation overland as the simulated storms moved inland. This duplicated the pressure "filling" and increases in the radii of maximum winds (RMW) as the hurricanes weaken after making landfall.

In 2013 the NHC updated the SLOSH grid for the Apalachicola Bay basin. The updated SLOSH model basin reflects major improvements, including higher resolution basin data and grid configurations and increased geographic area covered. Faster computer speeds allowed additional hypothetical storms to be run for creation of the Maximum of Maximums[1] (MOMs) or the maximum potential storm tide values for each category of storm.

1. Hypothetical Storm Simulations

Surge height depends strongly on the specifics of a given storm including, forward speed, angle of approach, intensity or maximum wind speed, storm size, storm shape, and landfall location. The SLOSH model was used to develop data for various combinations of hurricane strength, wind speed, and direction of movement. Storm strength was modeled using the central pressure (defined as the difference between the ambient sea level pressure and the minimum value in the storm's center), the storm eye size and the radius of maximum winds using the five categories of hurricane intensity as depicted in the Saffir-Simpson Hurricane Wind Scale (see Table 1).

Table 1
Saffir-Simpson Hurricane Wind Scale

Category	Wind Speeds	Potential Damage
Category 1	(Sustained winds 74-95 mph)	*Very dangerous winds will produce some damage*
Category 2	(Sustained winds 96-110 mph)	*Extremely dangerous winds will cause extensive damage*
Category 3	(Sustained winds 111-130 mph)	*Devastating damage will occur*
Category 4	(Sustained winds 131-155 mph)	*Catastrophic damage will occur*
Category 5	(Sustained winds of 156 mph and above)	*Catastrophic damage will occur*

1 Maximum of Maximum Envelope of Water (MOM)

The modeling for each tropical storm/hurricane category was conducted using the mid-range pressure difference (△p, millibars) for that category. The model also simulates the storm filling (weakening upon landfall) and radius of maximum winds (RMW) increase.

Ten storm track headings (WSW, W, WNW, NW, NNW, N, NNE, NE, E, ENE) were selected as being representative of storm behavior in the West Central Florida regions, based on observations by forecasters at the NHC. For each set of hurricane tracks in a specific direction, storms were run at forward speeds of 5, 10, 15 and 25 mph. For each direction of approaching storm at each speed, storms were run at two different sizes (20 statute mile radius of maximum winds and 35 statute miles radius of maximum winds). Finally, each scenario was run at both mean tide and high tide. Both tide levels are now referenced to North American Vertical Datum of 1988 (NAVD88) as opposed to the National Geodetic Vertical Datum of 1929 (NGVD29) used in the previous study. A total of 14,454 runs (compared to the 735 runs in 2006) were made consisting of the different parameters shown in Table 2.

Table 2
Apalachicola Bay Basin Hypothetical Storm Parameters
Directions, speeds, (Saffir-Simpson) intensities, number of tracks and the number of runs.

Direction	Speeds (mph)	Size (Radius of Maximum winds)	Intensity	Tides	Tracks	Runs
W	5,10,15, 25 mph	20 statute miles; 35 statute miles	1 through 5	Mean/High	13	858
WNW	5,10,15, 25 mph	20 statute miles; 35 statute miles	1 through 5	Mean/High	14	924
NW	5,10,15, 25 mph	20 statute miles; 35 statute miles	1 through 5	Mean/High	16	1056
NNW	5,10,15, 25 mph	20 statute miles; 35 statute miles	1 through 5	Mean/High	34	2244
N	5,10,15, 25 mph	20 statute miles; 35 statute miles	1 through 5	Mean/High	35	2310
NNE	5,10,15, 25 mph	20 statute miles; 35 statute miles	1 through 5	Mean/High	34	2244
NE	5,10,15, 25 mph	20 statute miles; 35 statute miles	1 through 5	Mean/High	32	2112
ENE	5,10,15, 25 mph	20 statute miles; 35 statute miles	1 through 5	Mean/High	28	1848
E	5,10,15, 25 mph	20 statute miles; 35 statute miles	1 through 5	Mean/High	13	858
TOTAL						14,454

2. The Grid for the Apalachee Bay SLOSH Model

Figure 1 illustrates the area covered by the grid for the Apalachicola Bay basin SLOSH Model. To determine the surge values the SLOSH model uses a telescoping elliptical grid as its unit of analysis with 188 arc lengths (1<I>188) and 215 radials (1<J> 215). Use of the grid configuration allows for individual calculations per grid square which is beneficial in two ways: (1) provides increased resolution of the storm surge at the coastline and inside the harbors, bays and rivers, while decreasing the resolution in the deep water where detail is not as important; and (2) allows economy in computation.

The Apalachicola Bay basin was refined and enlarged in 2013, see Figure 2. The grid for the updated basin contains twice as many arc lengths and radials as the original grid. This means that the updated basin has a smaller grid size, 0.05 square miles closest to the pole versus 0.20 square miles, which increases the total number of grid polygons from 5,355 to 31,360.

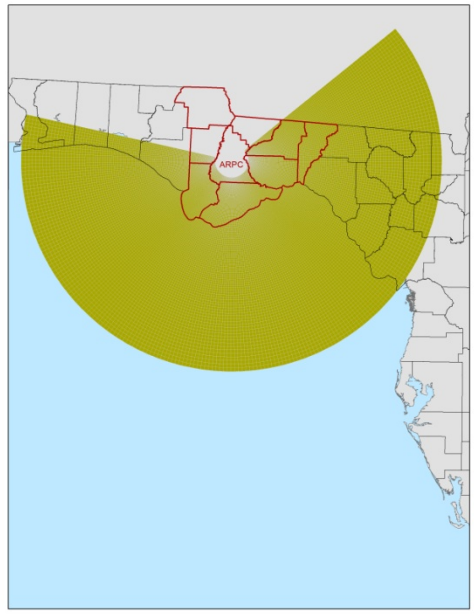


Figure 1 - SLOSH Grid

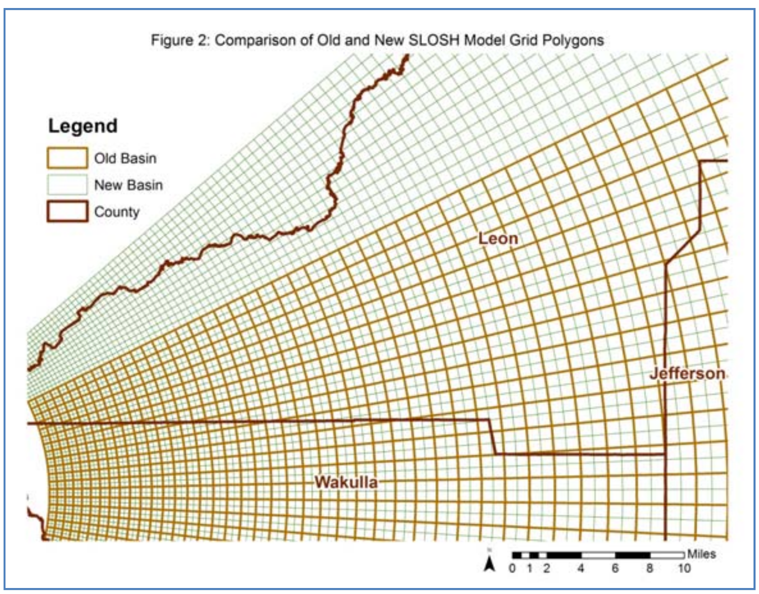


Figure 2 - SLOSH Grid Comparison

3. Storm Scenario Determinations

As indicated, the SLOSH model is the basis for the "hazard analysis" portion of coastal hurricane evacuation plans. Thousands of hypothetical hurricanes are simulated with various Saffir-Simpson Wind categories, forward speeds, landfall directions, and landfall locations. An envelope of high water containing the maximum value a grid cell attains is generated at the end of each model run. These envelopes are combined by the NHC into various composites which depict the possible flooding. One useful composite is the Maximum Envelope of Water (MEOW) which incorporates all the envelopes for a particular category, speed, and landfall direction. Once surge heights have been determined for the appropriate grids, the maximum surge heights are plotted by storm track and tropical storm/hurricane category.

These plots of maximum surge heights for a given storm category and track are referred to as MEOWs. The MEOWs or reference hurricanes can be used in evacuation decision making when and if sufficient forecast information is available to project storm track or type of storm (different landfalling or paralleling, storms).

The MEOWs provide information to the emergency managers in evacuation decision making. However, in order to determine a scenario which may confront the county in a hurricane threat 24-48 hours before a storm is expected, a further compositing of the MEOWs into Maximums of the Maximums (MOMs) is usually required.

The MOM combines all the MEOWs of a particular category. The MOMs represent the maximum surge expected to occur at any given location, regardless of the specific_storm track/direction of the hurricane. The only variable is the intensity of the hurricane represented by category strength (Category 1-5).

The MOM surge heights, which were furnished by the NHC, have two values, mean tide and high tide. Mean tide has 0' tide correction while high tide has a 1' tide correction added. The storm tide limits include the adjustment for mean high tide. All elevations are now referenced to the NAVD88 datum.

These surge heights were provided within the SLOSH grid system. The range of maximum surge heights (low to high) for each scenario is provided for each category of storm (MOM) on Table 3. It should be noted again that these surge heights represent the maximum surge height recorded in the county from the storm tide analysis including inland and back bay areas where the surge can be magnified dependent upon storm parameters.

Table 3
Potential Storm Tide Height(s) ** by County
(In Feet above NAVD88)

*Storm Strength	Franklin	Gulf	Jefferson	Leon	Wakulla
Category 1	up to 7.7’	up to 5'	up to 9.6'	N/A	up to 9.4’
Category 2	up to 13.6'	up to 10.6'	up to 17'	up to 14'	up to 17.7'
Category 3	up to 19'	up to 15.7'	up to 24.6'	up to 22.6'	up to 24'
Category 4	up to 23.7'	up to 23.5'	up to 31'	up to 28.2'	up to 30.2'
Category 5	up to 28.5'	up to 27'	up to 36.5'	up to 34.7'	up to 36.3'

** Based on the category of storm on the Saffir-Simpson Hurricane Wind Scale*
*** Surge heights represent the maximum values from SLOSH MOMs*

C. Creation of Storm Tide Zones

The maps in this atlas depict SLOSH-modeled heights of storm tide and extent of flood inundation for hurricanes of five different intensities. As indicate above, the storm tide was modeled using the Maximum of Maximums (MOMs) representing the potential flooding from the five categories of storm intensity of the Saffir/Simpson Hurricane Wind Scale.

1. Determining Storm Tide Height and Flooding Depth

SLOSH and SLOSH-related products reference storm tide heights relative to the model vertical datum, NAVD88. In order to determine the inundation depth of surge flooding at a particular location the ground elevation (relative to NAVD88) at that location must be subtracted from the potential surge height.[2] Surge elevation, or water height, is the output of the SLOSH model. At each SLOSH grid point, the maximum surge height is computed at that point.

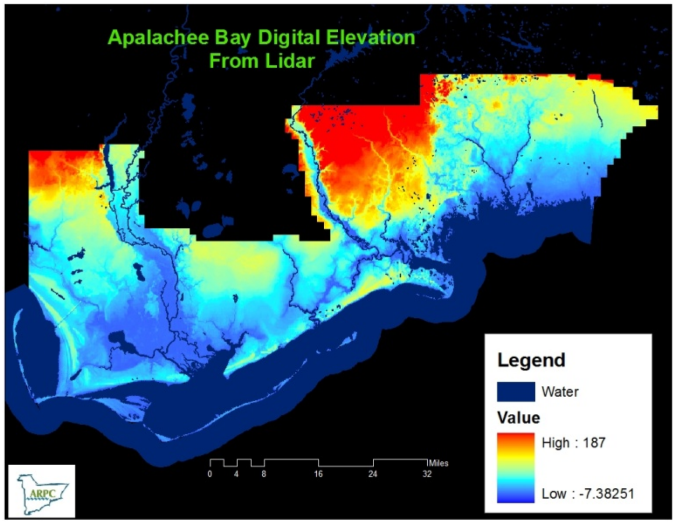


Figure 3 - Digital Elevation from LIDAR

Within the SLOSH model an average elevation is assumed within each grid square. Height of water above terrain was not calculated using the SLOSH average grid elevation because terrain height may vary significantly within a SLOSH grid square. For example, the altitude of a 1-mile grid square may be assigned a value of 1.8 meters (6 feet), but this value represents an average of land heights that may include values ranging from 0.9 to 2.7 meters (3 to 9 feet). In this case, a surge value of 2.5 meters (8 feet) in this square would imply a 0.7 meters (2 feet) average depth of water over the grid's terrain. However, in reality within the grid area portion of the grid would be "dry" and other parts could experience as much as 1.5 meters (5 feet) of inundation. Therefore, in order to determine the storm tide limits, the depth of surge flooding above terrain at a specific site in the grid square is the result of subtracting the terrain height determined by remote sensing from the model-generated storm tide height in that grid square.[3]

2 It is important to note that one must use a consistent vertical datum when post-processing SLOSH storm surge values

3 Note: This represents the regional post-processing procedure. When users view SLOSH output within the SLOSH Display Program, the system uses average grid cell height when subtracting land.

2. Storm Tide Post-Processing

The Atlas was created using a Toolset wrapped into ESRI's ArcGIS mapping application, ArcMap. The surge tool was developed for the SRES Program by the Tampa Bay Regional Planning Council, who had used a similar tool for the previous Evacuation Study Update. This tool enabled all regions within the state of Florida to process the SLOSH and elevation data with a consistent methodology.

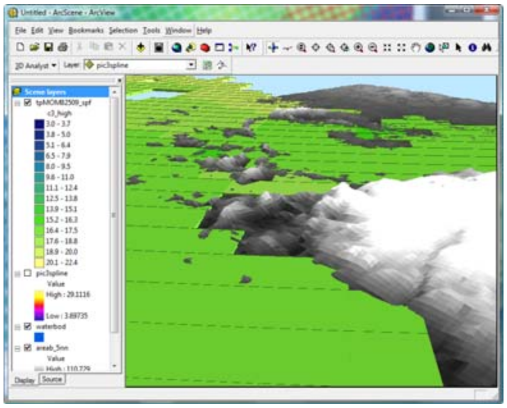


Figure 4 - SLOSH Display

The tool translates the lower resolution SLOSH grid data into a smooth surface resembling actual storm tide and terrain, processing it with the high resolution elevation data derived from LIDAR. The image on the left represents how the data would look as it appears directly from SLOSH Model output.

Processing all the data in the raster realm, the tool is able to digest large amounts of data and output detailed representations of surge inundation.

The program first interpolates the SLOSH height values for each category into a raster surface using spline interpolation. This type of interpolation is best for smooth surfaces, such as water and slow changing terrain. The result is a raster surface representing the surge height for a category that can be processed against the raster digital elevation model from the LIDAR. The "dry" values (represented as 99.9 in the SLOSH Model) are replaced by an average of the inundated grids surrounding current processed grid. An algorithm performs this action utilizing the range of values in the current category of storm being processed.

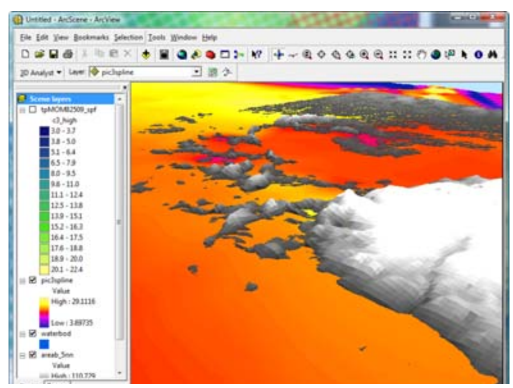


Figure 5 - SLOSH Display Post Processing

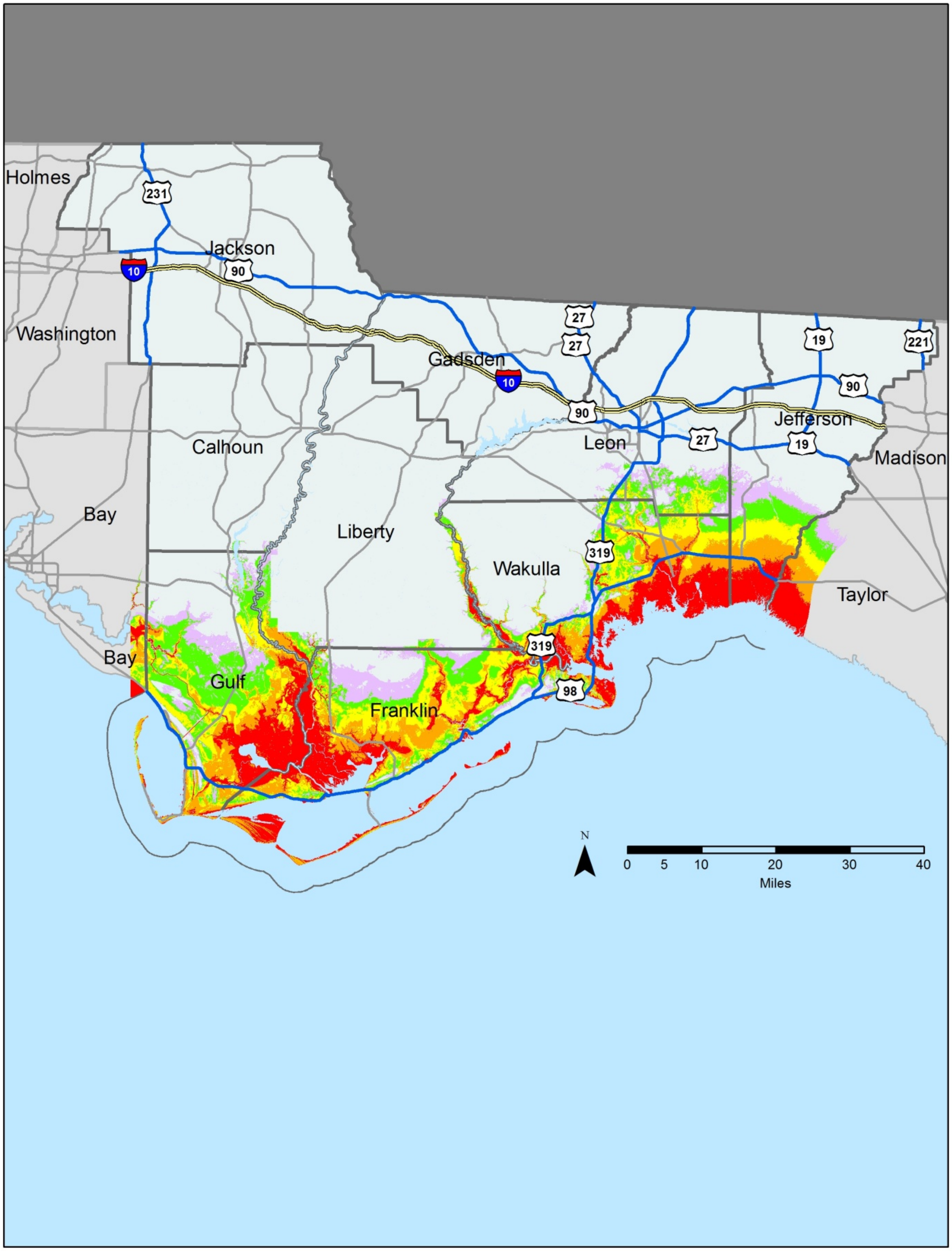
Using this methodology, once the elevation is subtracted from the projected storm tide, the storm tide limits are determined. The output of the tool is a merged polygon file holding all the maximum inundation zones for Category 1 through Category 5 hurricanes. The output, depicted in this Storm Tide Atlas, is determined consistent with the coastal areas throughout the state.

Additionally, Volume 9: Depth Analysis Atlas was created to depict the surge depth ranges of the inundation as shown in the Storm Tide Atlas. The surge depth ranges are the MOMs surge height minus the ground elevations. This detailed depth data was modeled using GIS and included the same datasets used in the surge inundation modeling that produced the storm tide limits.

Figure 6 presents a compilation of the *Storm Tide Atlas* for the region.

Figure 6

Storm Tide Limits for the Apalachee Bay Region



D. Variations to Consider

Variations between modeled versus actual measured storm tide elevations are typical of current technology in coastal storm surge modeling. In interpreting the data emergency planners should recognize the uncertainties characteristic of mathematical models and severe weather systems such as hurricanes. The storm tide elevations developed for this study and presented in the *Storm Tide Atlas* should be used as guideline information for planning purposes.

1. Storm Tide & Wave Height

Regarding interpretation of the data, it is important to understand that the configuration and depth (bathymetry) of the Gulf bottom will have a bearing on surge and wave heights. A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water in close proximity to the shoreline, tends to produce a lower surge but a higher and more powerful wave. Those regions, like the Apalachee Bay Region, which have a gently sloping shelf and shallower normal water depths, can expect a higher surge but smaller waves. The reason this occurs is because a surge in deeper water can be dispersed down and out away from the hurricane. However, once that surge reaches a shallow gently sloping shelf it can no longer be dispersed away from the hurricane, consequently water piles up as it is driven ashore by the wind stresses of the hurricane. Wave height is NOT calculated by the SLOSH model and is not reflected within the storm tide delineations.

2. Forward Speed

Under actual storm conditions it may be expected that a hurricane moving at a slower speed could have higher coastal storm tides than those depicted from model results. At the same time, a fast moving hurricane would have less time to move storm surge water up river courses to more inland areas. For example, a minimal hurricane or a storm further off the coast such as Hurricane Dennis could cause extensive beach erosion and move large quantities of water into interior lowland areas. In the newest version of the Apalachee Bay SLOSH model, for each set of tracks in a specific direction, storms were run at forward speeds of 5, 10, 15 and 25 mph.

3. Radius of Maximum Winds

As indicated previously, the size of the storm or radius of maximum winds (RMW) can have a significant impact on storm surge especially in bay areas and along the Gulf of Mexico. All of the hypothetical storms were run at two different sizes, 25 mile radius of maximum winds and 30 mile radius of maximum winds.

4. Astronomical Tides

Surge heights were provided by NOAA for both mean tide and high tide. Both tide levels are referenced to North American Vertical Datum of 1988. The storm tide limits reflect high tide in the region.

5. Accuracy

As part of the SRES, all coastal areas as well as areas surrounding Lake Okeechobee were mapped using remote-sensing laser terrain mapping (LIDAR[4]), providing the most comprehensive, accurate and precise topographic data for this analysis. As a general rule, the vertical accuracy of the laser mapping is within a 15 centimeter tolerance. However, it should be noted that the accuracy of these elevations is limited to the precision and tolerance in which the horizontal accuracy for any given point is recorded. Other factors such as artifact removal algorithms (that remove buildings and trees) can affect the recorded elevation in a particular location. For the purposes of this study, the horizontal accuracy cannot be assumed to be greater than that of a standard USGS 7 minute quadrangle map, or a scale of 1:24,000.

E. Points of Reference

County emergency management directors selected reference points which include key facilities or locations critical for emergency operations. The table below includes the map identification number, descriptions of the selected points and the elevation of the site. The elevation is based on the digital elevation data provided by the LIDAR. It should be noted that if the site is large, elevations may vary significantly. The table also provides the storm tide value from the SLOSH value and the depth of inundation (storm tide value minus the ground elevation) at the site.

4 Light Imaging Detection and Ranging

Table 4

Points of Reference

Map ID	NAME	Elevation	C1 DPTH[5]	C2 DPTH	C3 DPTH	C4 DPTH	C5 DPTH	C1 SURGE[6]	C2 SURGE	C3 SURGE	C4 SURGE	C5 SURGE
1	Ochlocknee River Bridge (98)	6.0	2.9	8.3	12.9	17.1	21.0	8.9	14.3	18.9	23.1	27.0
2	Ochlocknee River Bridge (319)	6.0	1.6	7.8	12.9	17.4	22.0	7.6	13.8	18.9	23.4	28.0
3	Sopchoppy River Bridge (N)	6.0	1.6	7.8	12.9	17.4	22.0	7.6	13.8	18.9	23.4	28.0
4	Wakulla River N Bridge	2.0	6.0	13.0	21.0	27.2	32.0	8.0	15.0	23.0	29.2	34.0
5	Wakulla River S Bridge (98)	3.0	5.1	13.9	19.5	25.4	30.0	8.1	16.9	22.5	28.4	33.0
6	St. Marks River Bridge (98)	6.0	0.0	7.9	17.3	23.4	28.0	Dry	13.9	23.3	29.4	34.0
7	Wakulla County EOC	27.0	0.0	0.0	0.0	0.0	6.0	Dry	Dry	Dry	Dry	33.0
8	Purdom Power Plant	1.0	9.2	16.3	21.7	26.5	31.0	10.2	17.3	22.7	27.5	32.0
9	Eden Springs ALF	30.0	0.0	0.0	0.0	0.0	0.0	Dry	Dry	Dry	Dry	Dry
10	Crawfordville Elementary	42.0	0.0	0.0	0.0	0.0	0.0	Dry	Dry	Dry	Dry	Dry
11	Riversink Elementary	8.0	0.0	0.0	0.0	14.5	24.0	Dry	Dry	Dry	22.5	32.0
12	St. Marks Powder	9.0	0.0	8.0	13.7	19.4	24.0	8.7	17.0	22.7	28.4	33.0
13	John Gorrie Bridge (E side)	10.0	0.0	0.6	4.5	7.8	11.0	5.7	10.6	14.5	17.8	21.0
14	St. George Island Bridge (N)	4.0	2.8	6.6	10.7	14.3	17.0	6.8	10.6	14.7	18.3	21.0
15	St. George Island Bridge (S)	6.0	0.2	4.0	7.4	10.9	14.0	6.2	10.0	13.4	16.9	20.0
16	Ochlocknee River Bridge (98)	3.0	5.2	11.2	15.6	19.7	24.0	8.2	14.2	18.6	22.7	27.0
17	Ochlocknee River Bridge (319)	1.0	6.6	12.8	17.9	22.4	27.0	7.6	13.8	18.9	23.4	28.0
18	Weems Hospital	17.0	0.0	0.0	0.0	0.3	3.0	Dry	Dry	Dry	17.3	20.0
19	Franklin County Sheriff's Office	18.0	0.0	0.0	0.0	0.1	4.0	Dry	Dry	Dry	18.1	22.0
20	Franklin County EOC	15.0	0.0	0.0	0.0	2.2	5.0	Dry	Dry	Dry	17.2	20.0
21	Intercoastal Bridge (S side)	6.9	0.0	0.0	0.0	8.4	13.1	Dry	Dry	Dry	15.3	20.0
22	Overstreet Bridge (W side)	8.2	0.0	0.0	0.0	3.0	3.8	Dry	Dry	Dry	11.2	12.0
23	Sacred Heart Hospital	12.0	0.0	0.0	9.4	12.2	16.0	Dry	Dry	11.4	14.2	18.0
24	Gulf County EOC	16.5	0.0	0.0	0.0	0.0	1.5	Dry	Dry	Dry	Dry	18.0

5 DPTH refers to the depth of inundation at the site (storm surge value minus the ground elevation)
6 SURGE refers to the storm surge value from the SLOSH Model

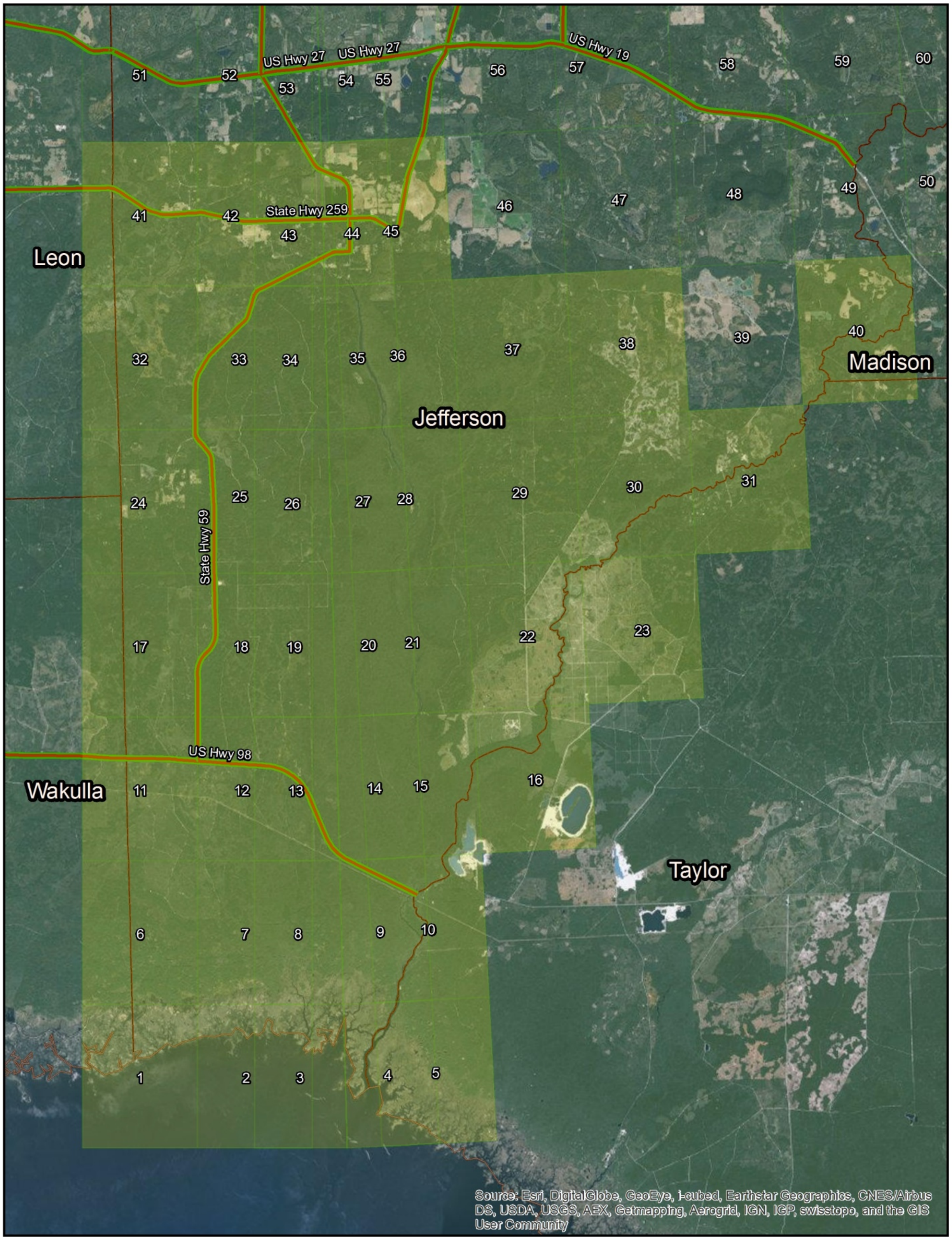
F. Storm Tide Atlas

The surge inundation limits (MOM surge heights minus the ground elevations) are provided as GIS shape files and graphically displayed. The maps consist of base maps (1:24000) including topographic, hydrographic and highway files. Detailed shoreline and storm tide limits for each category of storm were determined using the region's geographic information system.

The purpose of the maps contained in this Atlas is to reflect a worst probable scenario of the hurricane storm tide inundation and to provide a basis for the hurricane evacuation zones and study analyses. While the storm tide delineations include the addition of an astronomical mean high tide and tidal anomaly, it should be noted that the data reflects only stillwater saltwater flooding. Local processes such as waves, rainfall and flooding from overflowing rivers, are usually included in observations of storm tide height, but are not surge and are not calculated by the SLOSH model. It is incumbent upon local emergency management officials and planners to estimate the degree and extent of freshwater flooding as well as to determine the magnitude of the waves that will accompany the surge.

Figure 7 provides an index of the map series for Jefferson County.

Figure 7
Atlas Map Index – Jefferson County



G. Notes on Storm Tide

Historically the SLOSH storm surge analysis focused on "average" storm parameters (size and forward speed), although the intensity and angle of approach was modeled to include direct strikes and catastrophic intensity. In the 2014 Regional Evacuation Study Update, over 14,000 hypothetical hurricanes were included in the SLOSH suite of storms modeled varying forward speeds and the radii of maximum winds to include the large storm events. This allowed for the development of a truer picture of the storm surge vulnerability in the region. The five categories of hurricane reflect a "worst probable" storm tide limit for hurricanes holding the wind speed constant (consistent with the Saffir-Simpson Hurricane Wind Scale) while varying storm parameters include size, forward speed and angle of approach.

This has led to some confusion regarding evacuation decision making since hurricane evacuations are based primarily on storm surge vulnerability. NOAA is working to enhance the analysis and prediction of storm surge. Direct estimates of inundation are being communicated in the NHC's Public Advisories and in the weather forecast office's hurricane local statements. NHC's probabilistic storm surge product, which provides the likelihood of a specific range of storm surge values, became operational in 2009, and the NWS Meteorological Development Laboratory provided experimental, probabilistic storm surge products for 2010. Finally, the NWS is developing a procedure for issuing explicit storm surge warnings which will be implemented in 2015. In all of these efforts, the NWS is working to provide specific and quantitative information to support decision-making at the local level.[7] NOAA continues to emphasize that the hurricane forecasts are not 100% accurate and dependent upon many factors.

Jefferson County
Storm Tide Limits

Category 1	up to 9.6 feet
Category 2	up to 17 feet
Category 3	up to 24.6 feet
Category 4	up to 31 feet
Category 5	up to 36.5 feet

To the left are the storm tide limits identified for Jefferson County under the five (5) categories of hurricane on the Saffir-Simpson Hurricane Wind Scale. It is important to recognize the following:

- The surge tide values represent the highest surge height elevation above a standard datum (NAVD88) predicted by the model in the entire county and will only be appropriate for selected areas.
- Typically the highest surge tide values are NOT the surge heights predicted at the coast. The highest storm tide values are typically experienced inside bays and up rivers and inlets (water above ground).
- For surge heights at specific locations, please refer to Volume 9: Depth Analysis Atlas.

7 www.nhc.noaa.gov/sshws_statements.shtml