Mobile County, Alabama
Hurricane Surge Atlas
INTRODUCTION

Storm Surge Maps

Storm surge is the abnormal rise in water level caused by the wind and pressure forces of a hurricane or tropical storm. Storm surge produces most of the coastal flood damage and drowning associated with hurricanes. The purpose of this Atlas is to provide hurricane surge maps showing the surge vulnerable areas for the five hurricane categories. The maps reflect a “worst-case” scenario of hurricane storm surge inundation for each storm category and are used to determine the limits of hurricane evacuation zones. The maps summarize surge height estimates made using the SLOSH (Sea, Lake and Overland Surges from Hurricanes) Model. The model was supplied with data from hypothetical storms and the resulting surge calculations were composited to produce the maps. The late Chester Jeslesnianski of the National Oceanic and Atmospheric Administration, National Weather Service developed the model. The Storm Surge Division of the National Hurricane Center, headed by Brian Jarvinen conducted the storm surge computations and analysis.

The SLOSH Model

The proficiency of the SLOSH Model has been evaluated by a comparative analysis of modeled and observed surges at 523 sites during 10 hurricanes. The mean absolute error in surge height calculations by SLOSH was 1.4 ft. Although the error range was from –7.1 ft. to +8.8 ft., the standard deviation was only 2.0 ft. and 79 percent of the errors lay within one standard deviation of the mean error, -0.3 ft.

Hypothetical Storm Simulations

The SLOSH Model was used to develop data for various combinations of hurricane strength, wind speed, and direction of movement. Storm strength was modeled by use of the central pressure, the storm eye size and the radius of maximum winds (RMW) using the five categories of hurricane intensity as depicted in the Saffir-Simpson Hurricane Scale shown in Table 1. The modeling for each hurricane category was conducted using the mid-range pressure difference (AP, millibars) for that category.

Table 1. Saffir/Simpson Hurricane Scale.

Storm	Central Pressure		Wind Speed		
Category	Millibars	Inches (Hg)	Miles per Hour	Knots	Damage
1	> 980	> 28.9	74 - 95	64 - 83	Minimal
2	965 - 979	28.5 - 28.9	96 - 110	84 - 96	Moderate
3	945 - 964	27.9 - 28.5	111 - 130	97 - 113	Extensive
4	920 - 944	27.2 - 27.9	131 - 155	114 - 135	Extreme
5	< 920	< 27.2	> 155	> 135	Catastrophic

Storm Scenarios

Once surge heights have been determined for the individual tracks, the maximum surge heights are plotted by storm track and hurricane category. These plots of maximum surge heights for a given storm category and track are referred to as Maximum Envelopes of Water (MEOWs). The surge inundation limits displayed on the maps in this Atlas reflect a further compositing of the MEOWs into Maximums of the Maximum (MOMs). The MOMs represent the maximum surge expected to occur at any given location, regardless of the storm track or direction of the hurricane. The only variable is the intensity of the hurricane represented by category strength. The MOM surge heights which were furnished by the National Hurricane Center, as displayed in this Atlas, include an upward adjustment to reflect observed tidal anomalies before arrival of a hurricane and arrival of surge at a mean high astronomical tide (Total +2.0 ft. adjustment).

In order to determine the ultimate depth of surge flooding at a particular location, for a given hurricane, the ground elevation at that location must be subtracted from the respective hurricane category surge elevation. The surge elevations are show on each map panel at pre-selected locations called time history points. All time history points are also shown in Table 2. All hurricane surge elevations are referenced to the National Geodetic Vertical Datum (NGVD). United States Geological Survey (USGS) quadrangle sheets, or other appropriate topographic reference maps which are based on the same datum can also be used to determine approximate ground elevations at other specific locations. However, the accuracy of these elevation data will be limited to the precision and tolerance associated with that map. For the Mobile County Surge Atlas, topographic data from USGS 7.5-minute Digital Elevation Models (DEMs) were used to determine the ultimate storm tide limits for each storm category.

Surge And Wave Heights

It is important to understand that the configuration and depth (bathymetry) of the ocean (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. 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 “escape”, consequently, water “piles-up” as it is driven ashore by the wind stresses of the hurricane.

The surge data included in this Atlas reflects only still water flooding. Local processes, such as waves, rainfall and flooding from overflowing rivers, are usually included in “observations" of storm surge height, but are not shown in this atlas and are not calculated by the SLOSH Model. It is incumbent upon local emergency management officials and planners to prepare for potential inland flooding along rivers and streams from heavy rainfall, and anticipate additional damage and higher water levels along shorelines and beachfronts due to waves that will accompany the surge.

How The Maps Were Made

The base map data prepared for this Atlas was created from digital USGS base maps at a scale of 1:100,000. Hurricane surge limits for each category of storm were determined by a grid-based analysis using Arcview Spatial Analyst software. The ground data came from USGS 7.5 minute DEM’s. The water surface elevations were obtained from the SLOSH model.

Prepared by:

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TABLE 2 – Mobile County Time History Points

SURGE HEIGHTS IN FEET ABOVE M.S.L.
BY HURRICANE STORM CATEGORY

POINT #	POINT NAME	CAT1	CAT2	CAT3	CAT4	CAT5
1	GRAND BAY	7.7	13.0	17.0	20.4	23.1
2	BAYOU LA BATRE	7.7	12.7	17.0	20.1	23.3
3	CODEN	7.3	12.3	16.4	19.7	22.5
4	FOWL RIVER BAY	7.0	11.3	14.9	18.0	20.7
5	WEST FOWL RIVER	6.9	11.1	14.2	17.1	20.4
6	HERON BAY	5.1	8.1	11.6	14.6	17.4
7	CEDAR POINT	5.8	9.0	12.1	15.0	17.6
8	LITTLE DAUPHIN ISLAND	4.5	7.0	10.0	12.6	14.9
9	DAUPHIN ISLAND AIRPORT	5.3	8.1	11.0	13.5	15.9
10	DAUPHIN ISLAND, GULF SIDE	5.3	7.5	10.1	12.4	14.6
11	NEW DEVELOPMENT, SOUND SIDE	5.7	8.6	11.6	14.3	16.9
12	NEW DEVELOPMENT, GULF SIDE	5.6	8.0	10.9	13.4	16.1
13	WEST DAUPHIN ISLAND, SOUND SIDE	5.4	8.2	11.1	13.6	16.1
14	WEST DAUPHIN ISLAND, GULF SIDE	5.3	7.8	10.4	12.8	15.2
15	DELCHAMPS	5.7	9.0	12.9	16.6	19.3
16	SOUTH ORCHARDS/FOWL RIVER	6.0	9.5	14.0	17.2	20.2
17	MON LOUIS	5.9	9.2	13.2	16.9	20.1
18	BELLEFONTAINE	6.3	9.8	13.9	17.8	20.9
19	DEER RIVER ENTRANCE	6.4	10.1	14.0	18.0	21.1
20	DEER RIVER	6.6	10.3	14.4	18.2	21.5
21	DOG RIVER ENTRANCE	6.7	10.4	14.3	18.1	21.6
22	HOLLINGERS ISLAND	6.5	10.5	14.4	18.2	21.7
23	MANN	6.6	10.5	14.5	18.3	21.9
24	HALLS MILL CREEK	6.8	10.5	14.5	18.5	22.4
25	LLOYDS	7.0	10.6	14.6	18.5	22.8
26	NESHOTA	7.0	10.5	14.4	18.3	23.0
27	MCDUFFIES ISLAND	7.2	10.9	14.8	18.3	22.8
28	GARROWS BEND	7.2	10.9	14.8	18.3	22.7
29	CHOCTAW POINT	7.1	10.8	14.6	18.3	22.7
30	BANKHEAD TUNNEL, WEST ENTRANCE	6.9	11.2	14.4	18.5	22.8
31	BANKHEAD TUNNEL, EAST ENTRANCE	6.9	10.5	14.4	18.5	22.8
32	ALABAMA STATE DOCKS	6.7	10.2	14.6	18.7	23.0
33	PRICHARD	6.7	10.2	14.6	18.7	23.1
34	THREE MILE CREEK	6.0	10.3	14.7	18.8	23.1
35	MOBILE CHANNEL	6.6	10.2	14.6	18.7	23.0
36	BLAKELEY ISLAND	6.7	10.1	14.7	18.8	23.2
37	CHICKASAW	6.6	9.5	14.8	19.0	23.3
38	CHICKASAW CREEK POINT #1	6.7	9.6	14.9	19.2	24.5
39	CHICKASAW CREEK POINT #2	6.6	9.5	16.1	19.3	23.3
40	CHICKASAW CREEK POINT #3	6.6	9.5	13.7	16.9	19.8
41	SARALAND	6.5	10.0	14.8	19.1	24.0
42	SATSUMA	6.6	9.8	14.7	19.0	23.9
43	CREOLA	6.7	9.8	14.9	19.0	24.1
44	BIG BAYOU CANOT & RR BRIDGE	6.6	9.9	14.6	18.9	23.3
45	SIZEMORE LANDING	6.4	9.3	14.4	18.7	24.8