

Improving Storm Surge Risk Communication



HURRICANE
EVACUATION
ROUTE

Jamie Rhome
National Hurricane Center

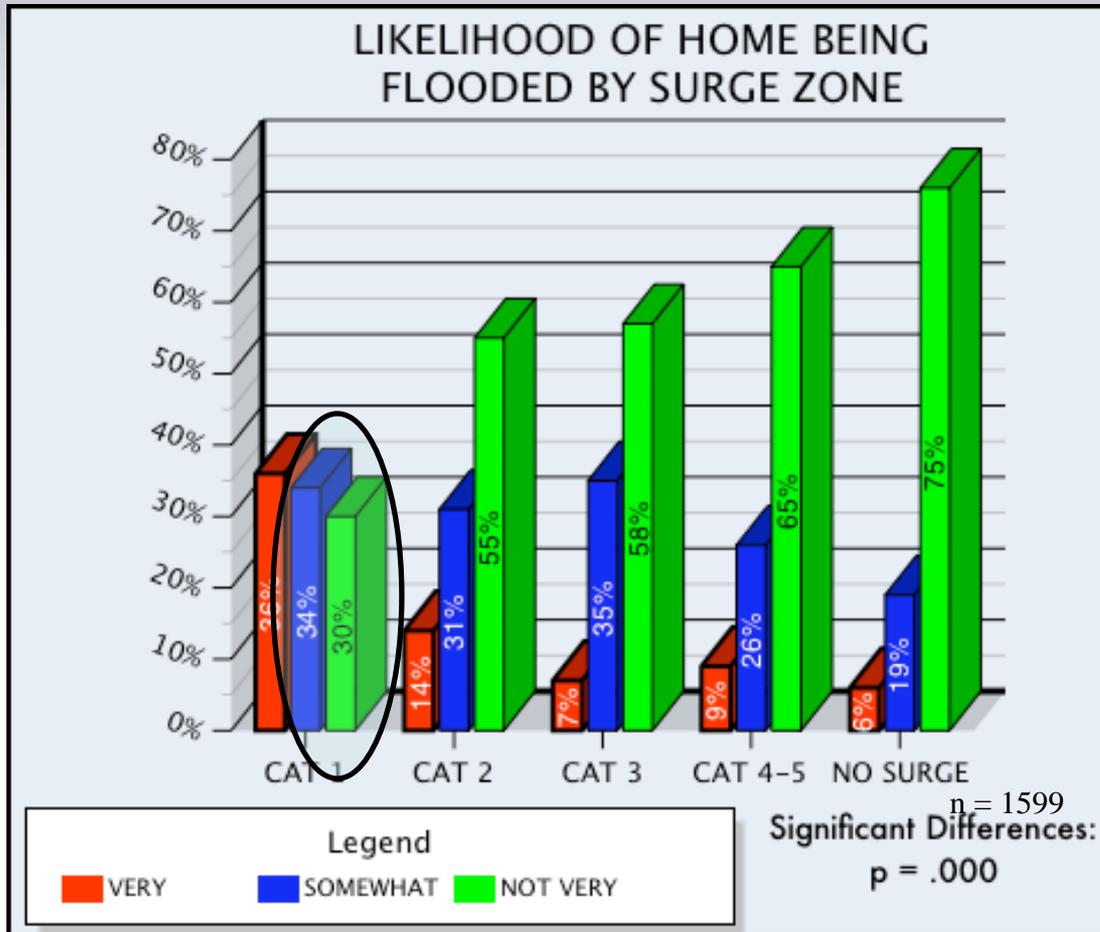
Betty Hearn Morrow
SocResearch Miami

Current Understanding



- In one exploratory study, only 2 out of 33 coastal emergency managers believed the residents in their region understood surge
 - Morrow 2007
- In spite of forecast information most residents in the path of Hurricane Ike were taken by surprise by storm surge
 - Morss & Hayden 2010
- When asked what the expected sea level would be if a 15-foot surge occurs at the time of a 2-foot tide, only 19% gave the correct answer
 - Morrow & Gladwin 2007

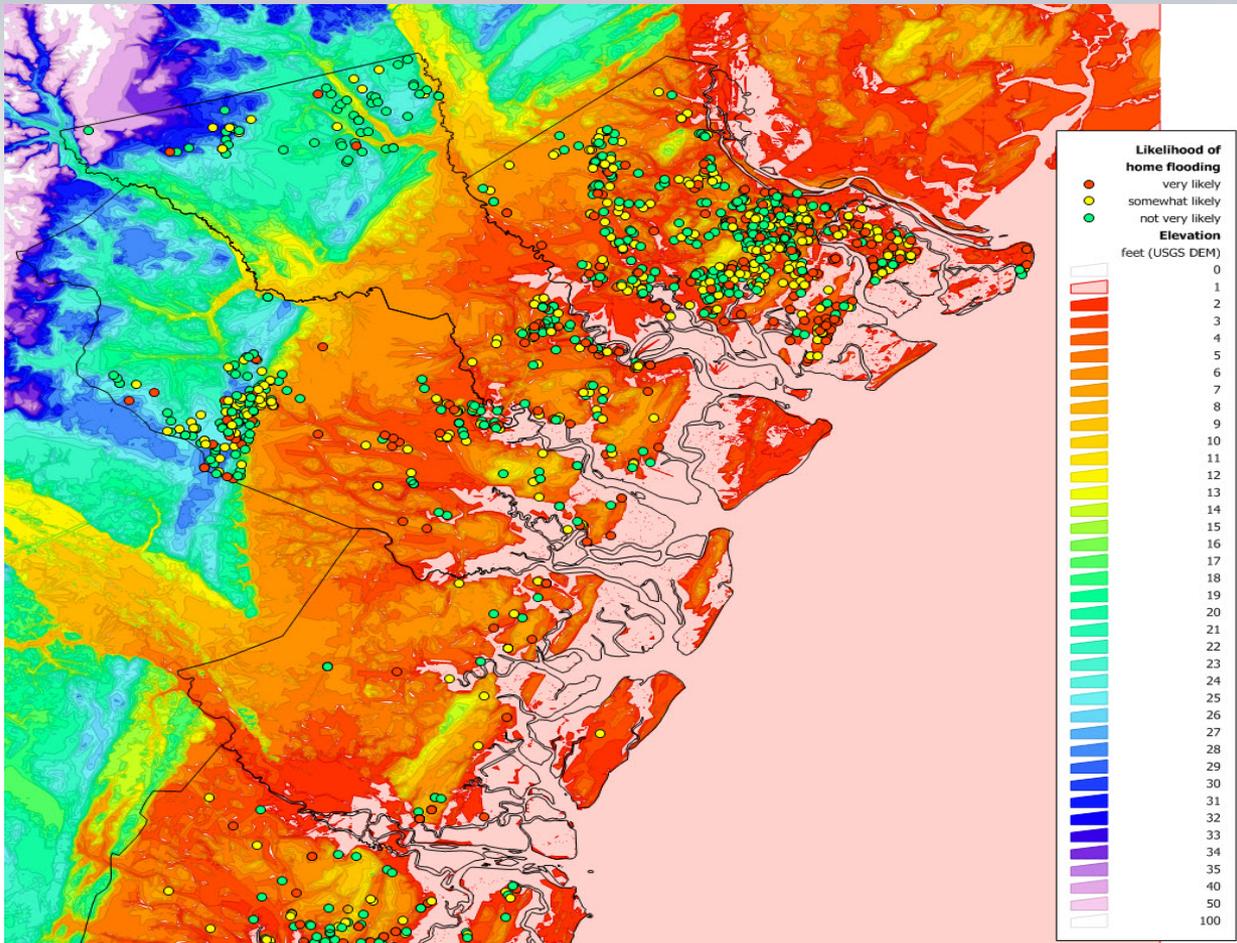
Knowing Vulnerability



Of those in Cat 1 zone, about one third are each of these:

- **Very concerned**
- **Somewhat concerned**
- **Not very concerned**

Knowing Vulnerability



Likelihood Would Be Flooded in Major Hurricane:

-  Not Very Likely
-  Somewhat Likely
-  Very Likely

Each dot = one interview

Coastal Georgia Evacuation Study. 2010. Morrow & Gladwin through Dewberry. 2009 for FEMA and USACE.



Steps to Effective Surge Response

A

Understand the Hazard

Educational aids to show surge and its potential effects

B

Receive the Message

Multiple sources, i.e. TV, radio, internet, cellphones, etc.

C

Understand the Message

Clear, concise, known terminology

D

Believe Applies to Them

Personalized message thru maps, visuals, photos, etc.

E

Know What to Do

Appropriate action statements.



Appropriate Protective Action

A Dedicated Outreach Campaign



New Interactive Website



Storm Surge Overview - Mozilla Firefox

http://www.nhc.noaa.gov/ssurge/ssurge_overview.shtml

National Weather Service
National Hurricane Center

Storm Surge Overview

Storm Surge Unit | Surge Overview | SLOSH | Surge Products | Local Impacts | FAQ | Resources

Contents:

- Introduction
- Storm Surge vs. Storm Tide
- Factors Impacting Surge
- Notable Surge Events
- Surge Vulnerability Facts

Introduction

Along the coast, storm surge is often the greatest threat to life and property from a hurricane. In the past, large death tolls have resulted from the rise of the ocean associated with many of the major hurricanes that have made landfall. Hurricane Katrina (2005) is a prime example of the damage and devastation that can be caused by surge. At least 1500 persons lost their lives during Katrina and many of those deaths occurred directly, or indirectly, as a result of storm surge.

Storm Surge vs. Storm Tide

Storm surge is an abnormal rise of water generated by a storm, over and above the predicted astronomical tides. Storm surge should not be confused with storm tide, which is defined as the water level rise due to the combination of storm surge and the astronomical tide. This rise in water level can cause extreme flooding in coastal areas particularly when storm surge coincides with normal high tide, resulting in storm tides reaching up to 20 feet or more in some cases.

Local forecast by "City, St" or "ZIP"

Alternate versions: Text-only | PDA | Cell

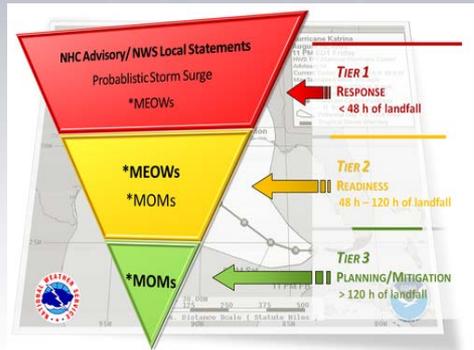
Get Storm Info: Satellite | Radar | Aircraft Recon | Advisory Archive | Experimental | Mobile Products | E-mail Updates | AudioPodcasts | GIS Data | RSS | Help with Advisories

Marine Forecasts: Atlantic and E Pacific | Analysis Tools | Gridded Marine | Help with Marine

Hurricane Awareness: Be Prepared | Learn Storm Surge | Frequent Questions | Research | Hurricane Hunters | Saffir-Simpson Scale | Forecasting Models | Glossary/Acronyms | Storm Names | Breakpoints

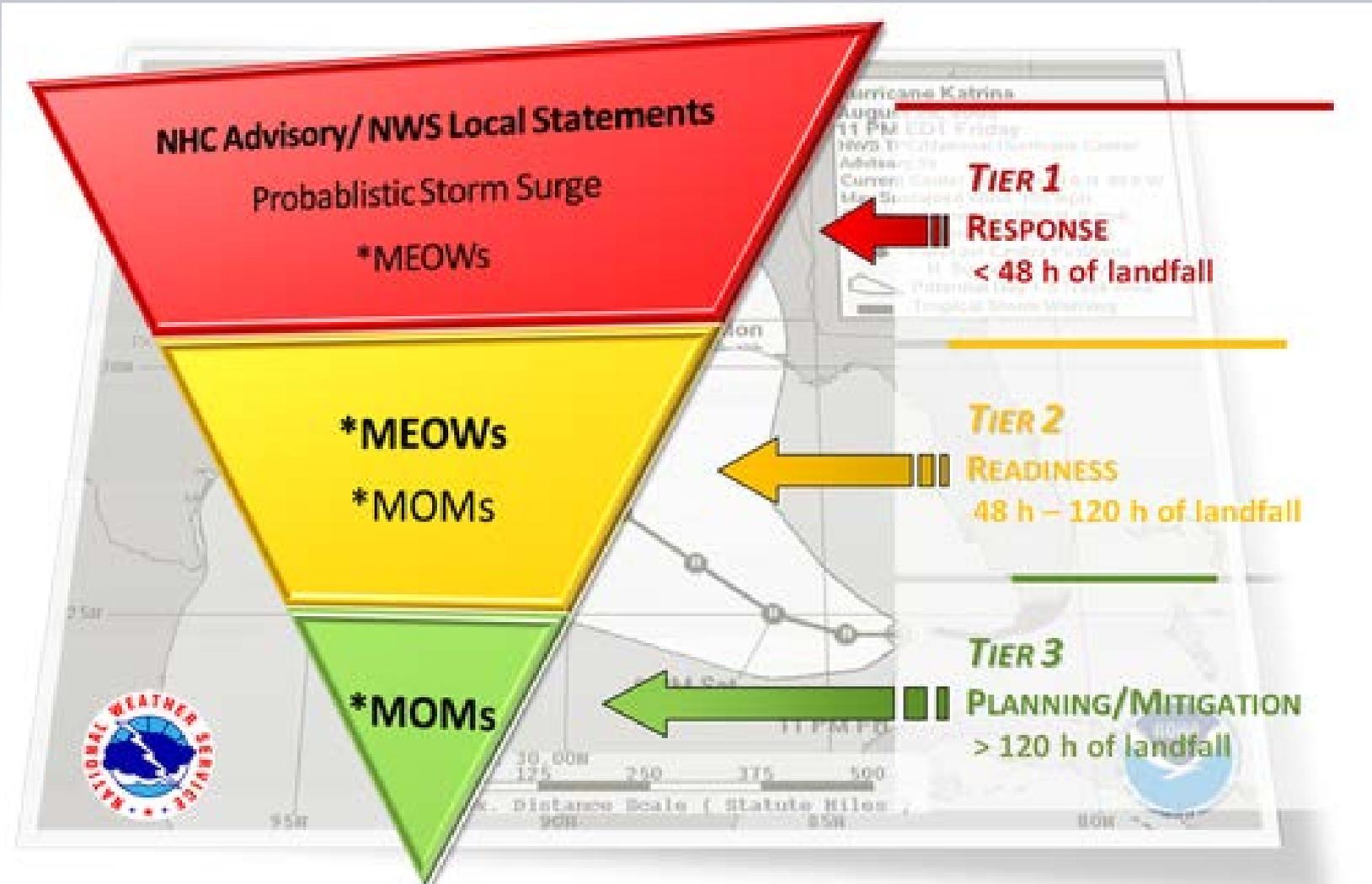
Hurricane History: Seasons Archive | Forecast Accuracy | Climatology | Most Extreme

About the NHC: Mission and Vision | Personnel | Visitors | NHC Virtual Tour | Library | Joint Hurr Testbed | The NCEP Centers | Contact Us - Help



National Weather Service - Since 1870

Improving Access to and Clarifying our Products



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Appropriate Protective Action

Multiple Messages Multiple Channels



Use of Technologies Survey Charleston, SC (2008)

- 70% have cell phones
- 67% over age 65 have cell phones
- 60% said they would use cell phone to contact family in emergency
- 56% under age 29 use texting
- 6% over 65 used texting

Providing Access to Resilience-Enhancing Technologies for Disadvantaged Communities and Vulnerable Populations. Oak Ridge Associated Universities. Oak Ridge Associated Universities. www.ornl.gov/university-partnerships/files/The-PARET-Report.pdf

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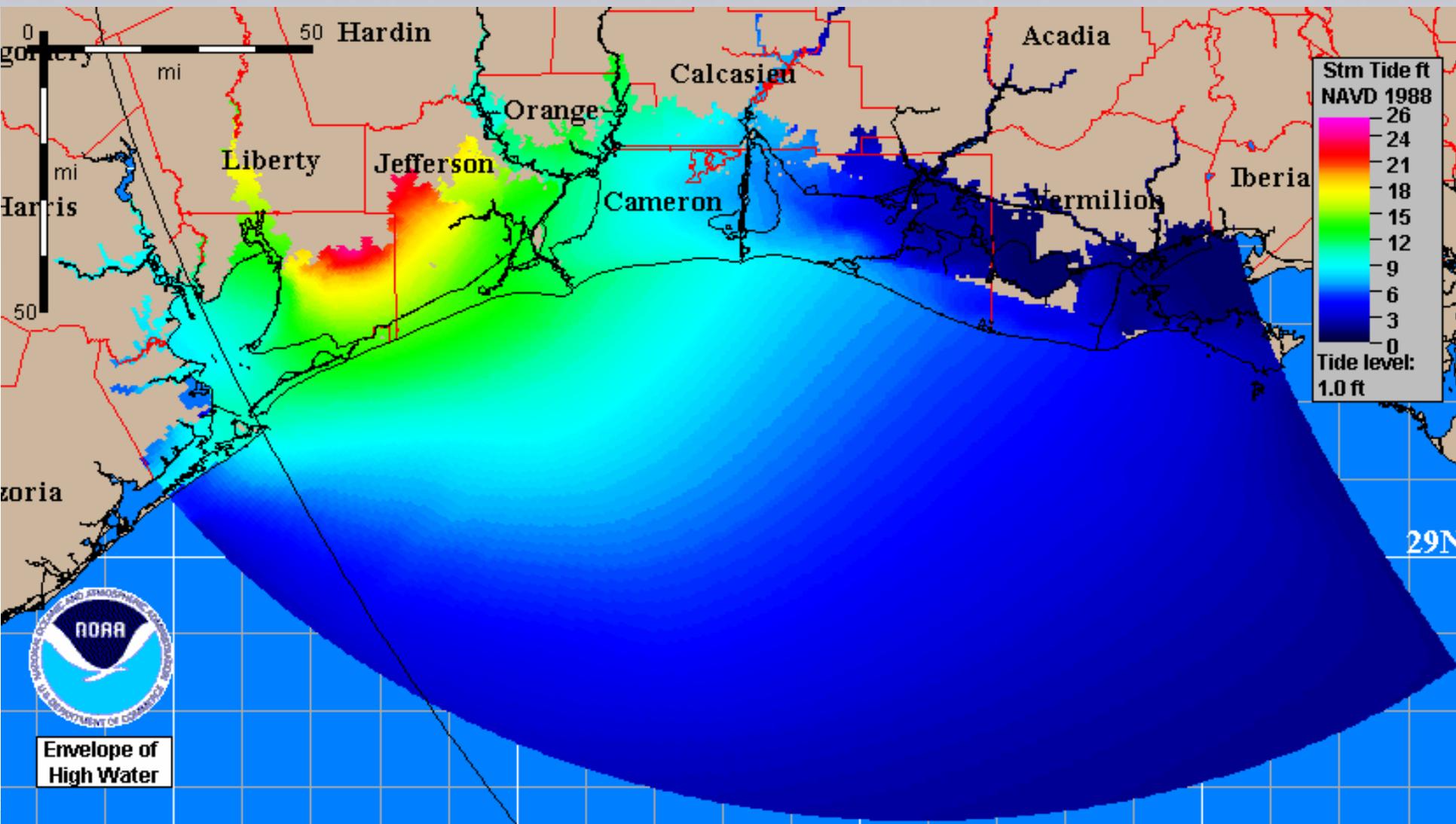
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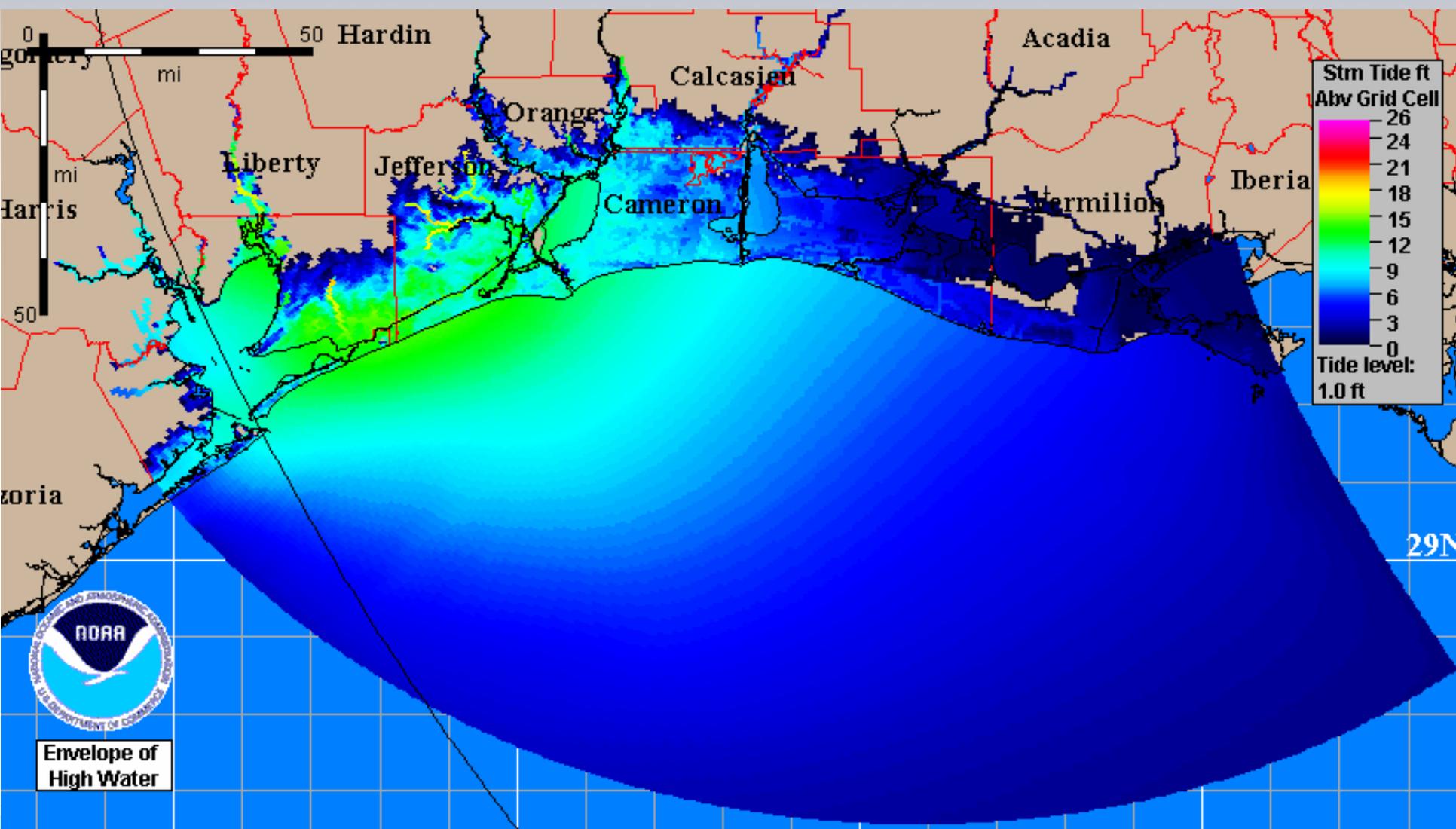


Appropriate Protective Action

Height Above Reference Level



Height Above Ground Level (Inundation)



New NHC Surge Statement



•Old Statement:

•Storm surge flooding of 2 to 4 feet above normal tide levels can be expected along the west coast of Florida in areas of onshore flow south of Venice and in Florida Bay. Storm surge should begin to decrease along the east coast of Florida.

•New Statement:

•STORM SURGE WILL RAISE WATER LEVELS BY AS MUCH AS 4 FEET **ABOVE GROUND LEVEL** ALONG THE WEST COAST OF FLORIDA IN AREAS OF ONSHORE FLOW SOUTH OF VENICE AND IN FLORIDA BAY ... WITH LARGE AND DANGEROUS BATTERING WAVES ... **THE SURGE COULD PENETRATE AS FAR INLAND AS ABOUT 10 MILES FROM THE SHORE** WITH DEPTH GENERALLY DECREASING AS THE WATER MOVES INLAND. STORM SURGE SHOULD BEGIN TO DECREASE ALONG THE EAST COAST OF FLORIDA.



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Personalizing the Message



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http://www.nhc.noaa.gov/ssurge/risk/index.shtml?gm

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Show Data for:

Feet Above Ground Level

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30+

National Weather Service - Since 1870

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Relative Depth = 30.02 feet

Slow Motion

When you pause the player you can use these buttons to control slow motion playback. Click here for more info.

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Actionable Information: Storm Surge Warning



- Why consider a storm surge warning?
 - Current criteria for TC watches and warnings is wind-based
 - Significant coastal flooding can occur well outside the extent of current wind-based TC watches/warnings
 - Example: Ike along central Gulf coast
 - Customer feedback indicates significant confusion and need for actionable information
 - WMO has recommended improved surge warning systems
 - Federal partners have requested improved storm surge information and warning message

Questions or Comments?



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