



# **Unit 4: Making Informed Decisions**

# Unit Objectives



## Unit Objectives

**At the end of Unit 4, participants will be able to:**

- Identify the components of the Hurricane Evacuation Study (HES).
- Explain clearance times and their use.
- Identify the capabilities of HURREVAC.
- Apply NHP products and services for planning and operational purposes.

# What Have We Learned Today?



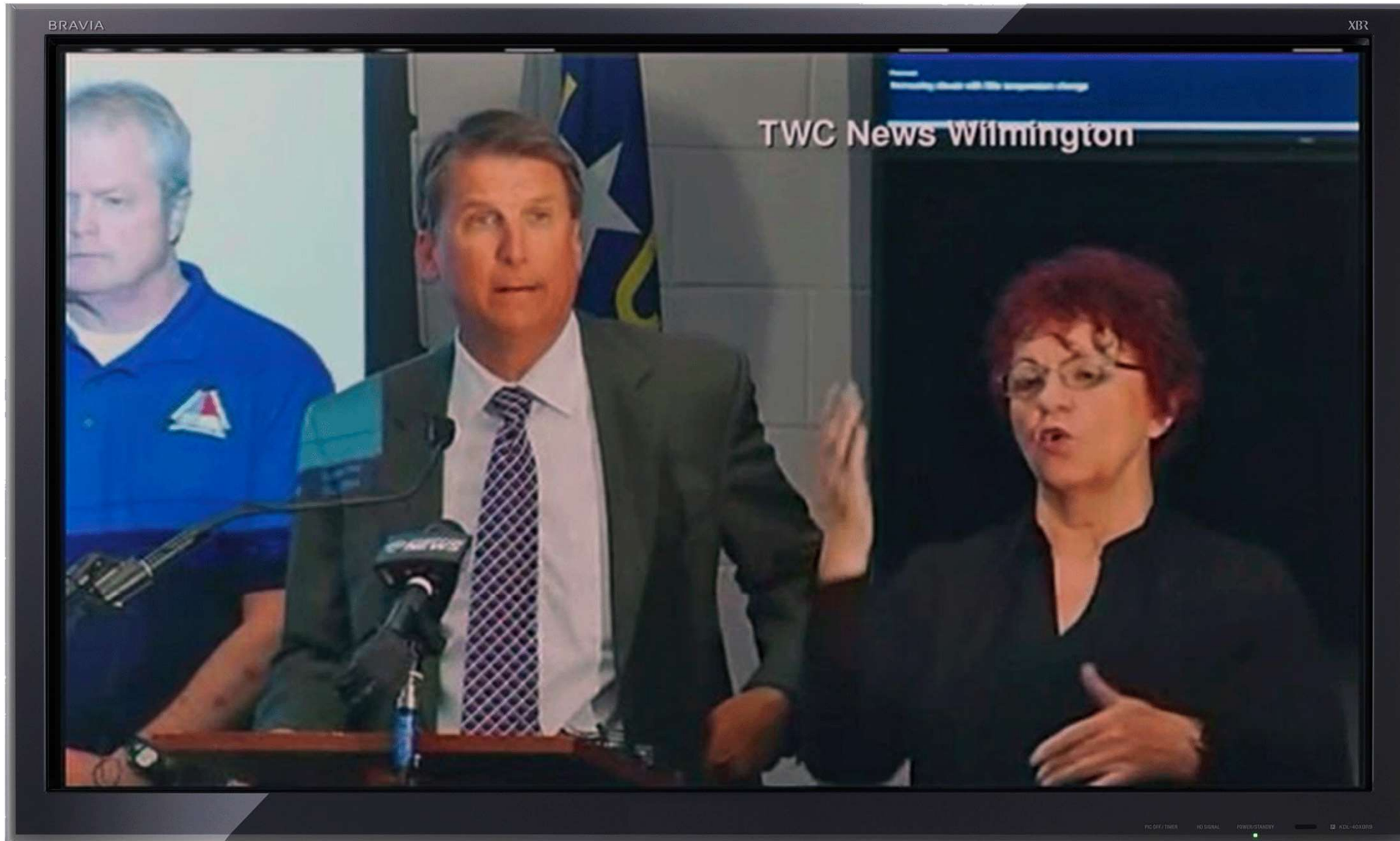
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# What Are Best Practices?



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# It's Not the Plan. It's the Process.



- **Step 1**  
Form a Collaborative Planning Team.
- **Step 2**  
Understand the Situation.
- **Step 3**  
Determine Goals and Objectives.
- **Step 4**  
Plan Development.
- **Step 5**  
Plan Preparation, Review & Approval.
- **Step 6**  
Plan Implementation & Maintenance.




# Better Information – HES



The cover of the 'North Carolina Hurricane Evacuation Study' report features a collage of four images: a triangular logo with 'EMERGENCY MANAGEMENT NORTH CAROLINA' and a state flag, a satellite image of a hurricane, a road with cars, and a building with a sign that says 'Good 2000 2000'. Below the images is the FEMA logo and the text 'Prepared by: National Planning Center of Expertise For Coastal Storm Risk Management, National Hurricane Program Office, North Atlantic Division, Baltimore District and U.S. Army Corps of Engineers, Wilmington District'. A vertical black bar on the right side contains the text 'North Carolina Hurricane Evacuation Study Technical Data Report Final Report – October 2016'.

**North Carolina Hurricane Evacuation Study  
Technical Data Report  
Final Report – October 2016**



The cover of the 'Massachusetts Hurricane Evacuation Study' report features a satellite image of a hurricane over the Atlantic Ocean. Below the image is the title 'Massachusetts Hurricane Evacuation Study' and the subtitle 'Technical Data Report'. The date 'May 2016' is centered below the subtitle. At the bottom, there are three logos: the US Army Corps of Engineers New England District logo on the left, the FEMA logo in the center, and the FEMA logo on the right.

**Massachusetts  
Hurricane  
Evacuation Study**  
Technical Data Report  
May 2016

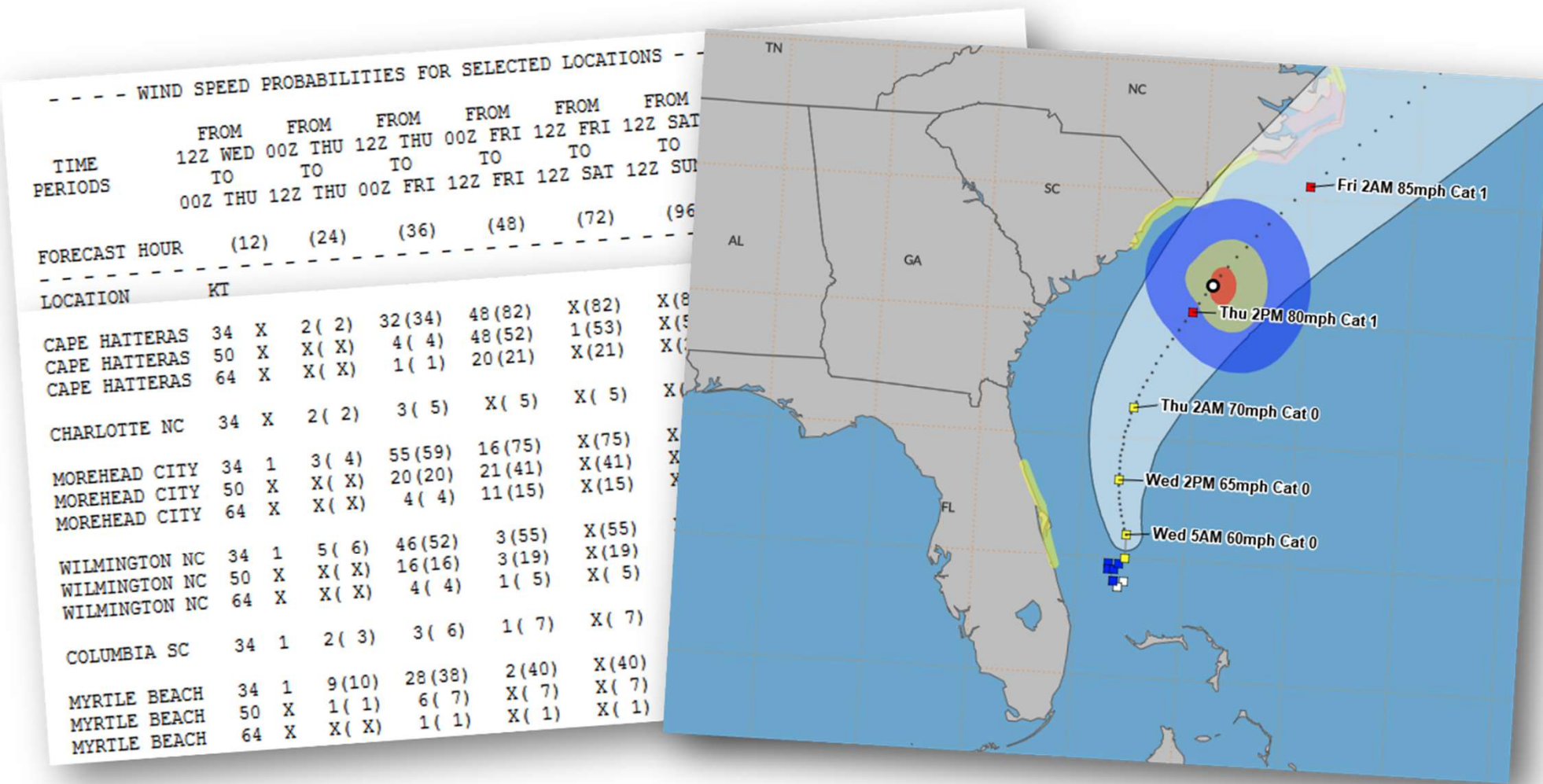
US Army Corps of Engineers  
New England District

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# Right Tools, Time, and Reason



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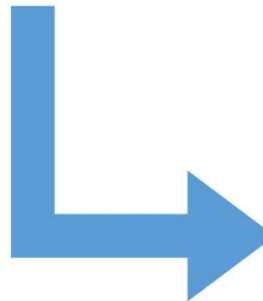
# The Process: Study. Plan. Execute.



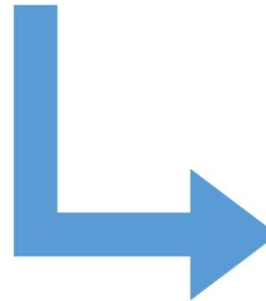
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- Identify Hazards
- Determine Vulnerability
- Evacuation Timing



- Inform Hazards and Risk
- Develop Timelines
- Identify Triggers



- Monitor Threat
- Assess Risk
- Take Action



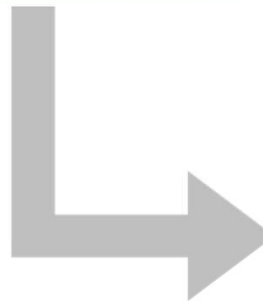
# The Process: Study



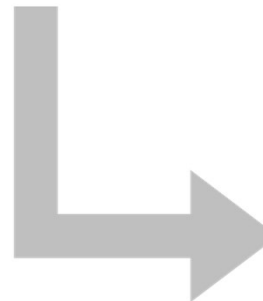
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- Identify Hazards
- Determine Vulnerability
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- Inform Hazards and Risk
- Develop Timelines
- Identify Triggers



- Monitor Threat
- Assess Risk
- Take Action

# What Is Useful Information?



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“ We're not that much smarter than we used to be, even though we have *much more* information.

...that means the real skill now is learning how to pick out the *useful* information...”

The Signal and the Noise  
- Nate Silver

# How Do the Hazards Affect You?



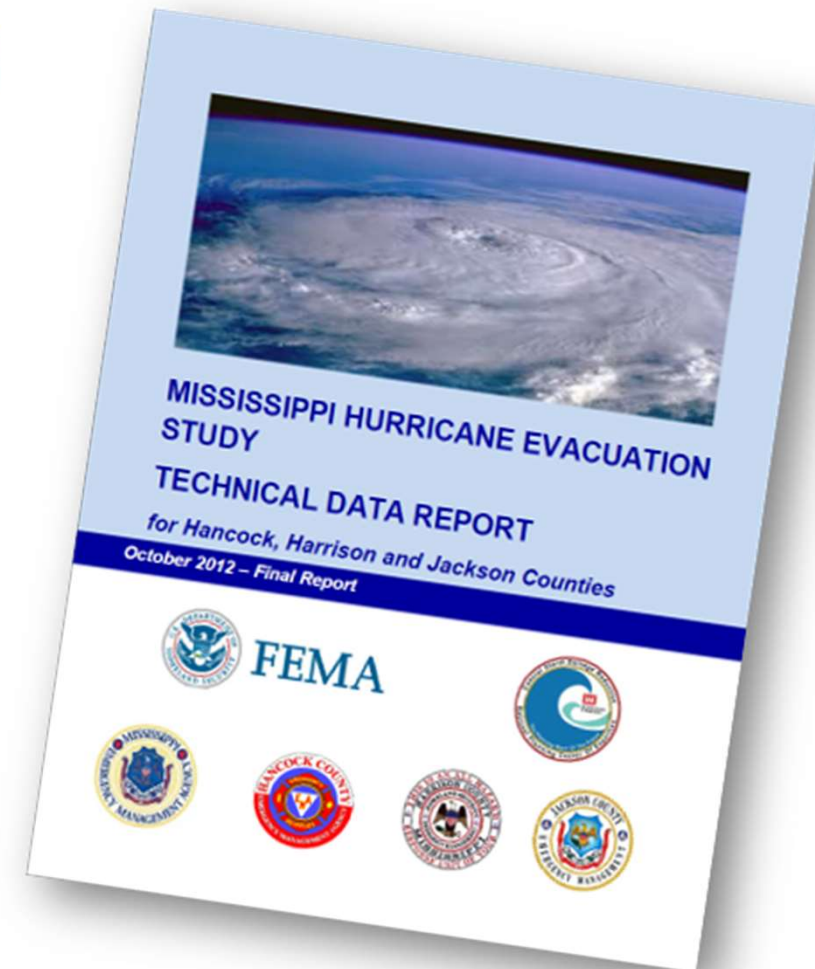
## Resources

- **Hurricane Evacuation Study (HES)**
- **THIRA** *Threat and Hazard Identification and Risk Assessment*
- **Flood Risk Maps**
- **Hazus Modeling**
- **Historical Incidents**
- **Local Knowledge**



## Evacuation Study Components

- **Hazard Analysis**  
*What will be wet and what stays dry?*
- **Vulnerability Analysis**  
*Who/what will be affected in your community?*
- **Behavioral Analysis**  
*What is the Public thinking?*
- **Shelter Analysis**  
*What are your shelter needs?*
- **Transportation Analysis**  
*How long does it take to evacuate?*



# Frequently Asked Questions 1



## FAQs

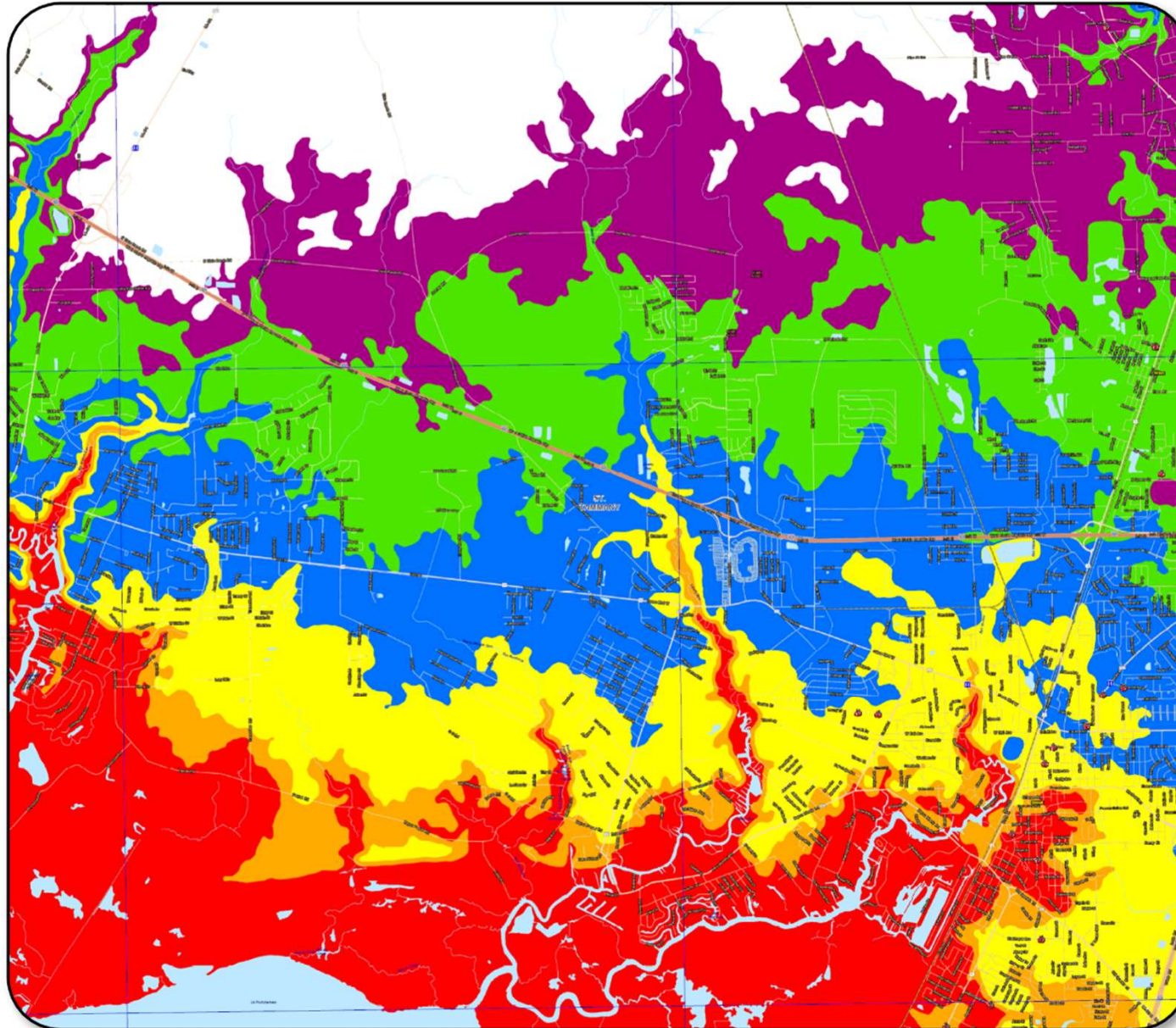
- What will be wet? Dry?
- How high will the water get?
- How far inland?

- **Hazard Analysis**

# What's Wet and What's Dry?



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### AREAS OF POSSIBLE FLOODING

- Tropical Storms and Category 1, 2, 3, 4, and 5 Hurricanes
- Category 1, 2, 3, 4, and 5 Hurricanes
- Category 2, 3, 4, and 5 Hurricanes
- Category 3, 4, and 5 Hurricanes
- Category 4 and 5 Hurricanes
- Category 5 Hurricanes

PANEL 8

### NATIONAL HURRICANE PROGRAM STORM TIDE FLOOD RISK AREAS

MAP ATLAS FOR:  
*St. Tammany Parish,  
Louisiana*

JUNE 2015

PANEL LOCATOR  
DIAGRAM



\*PANEL NOT PRINTED



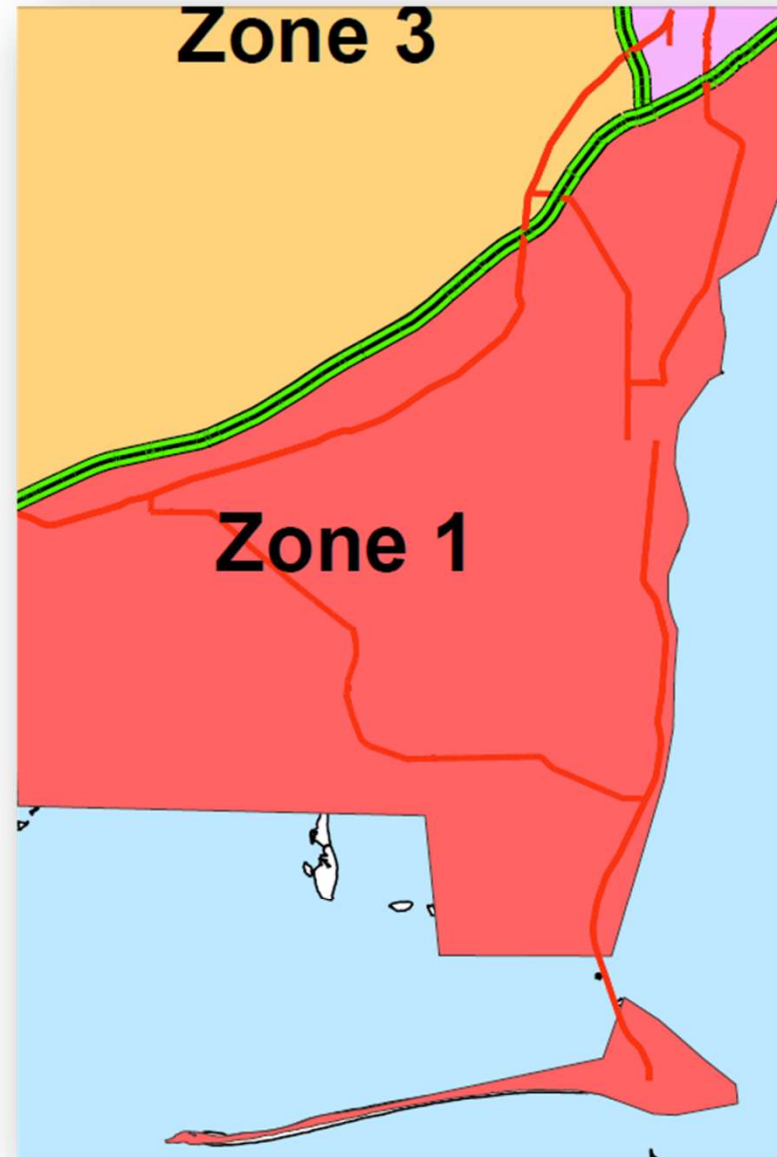
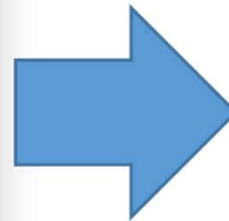
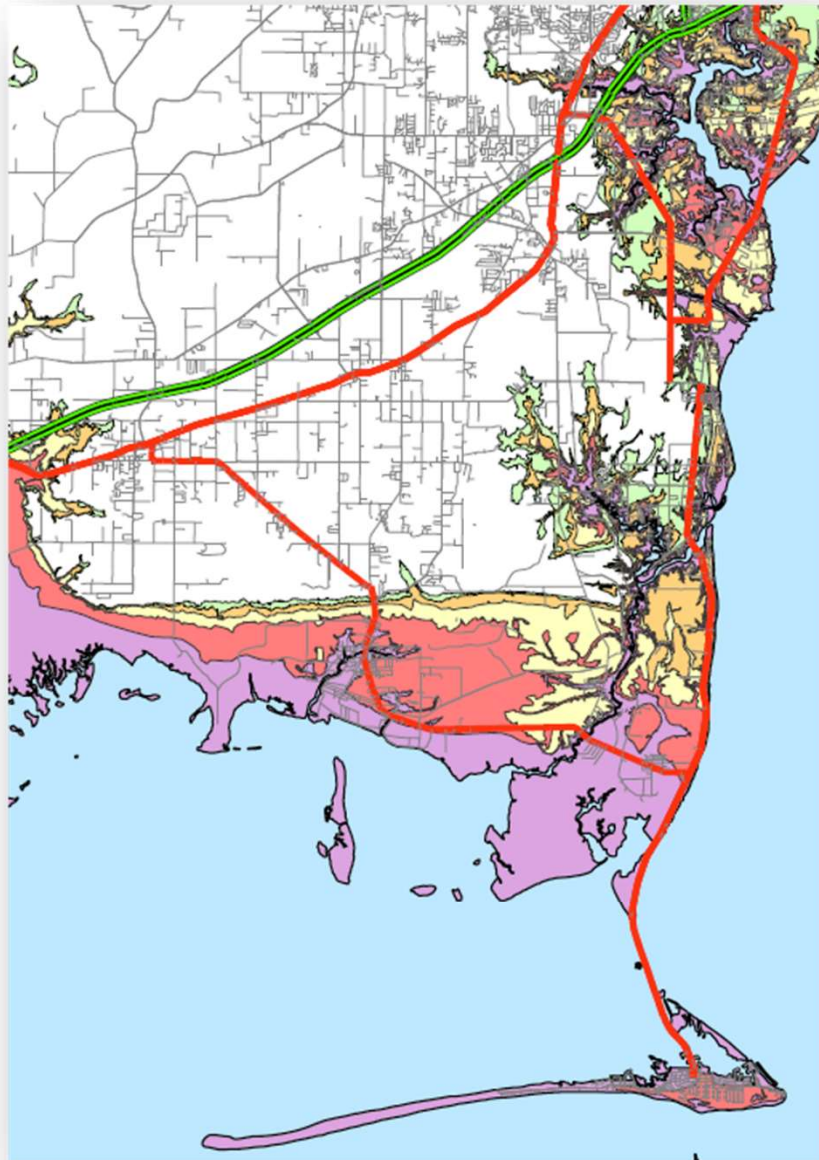
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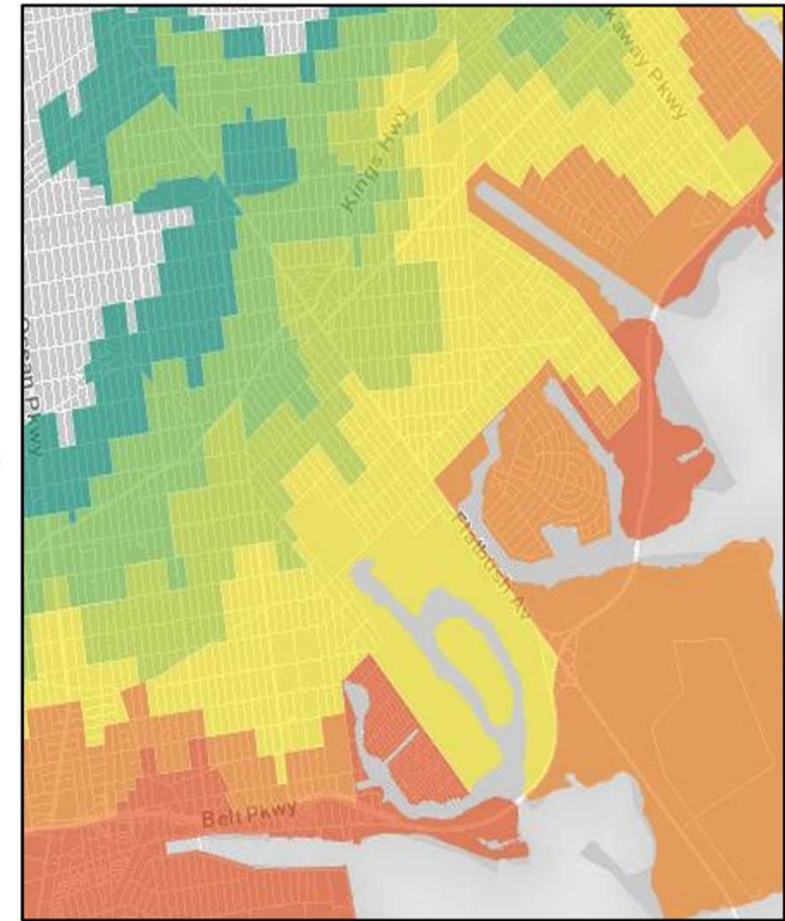
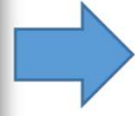
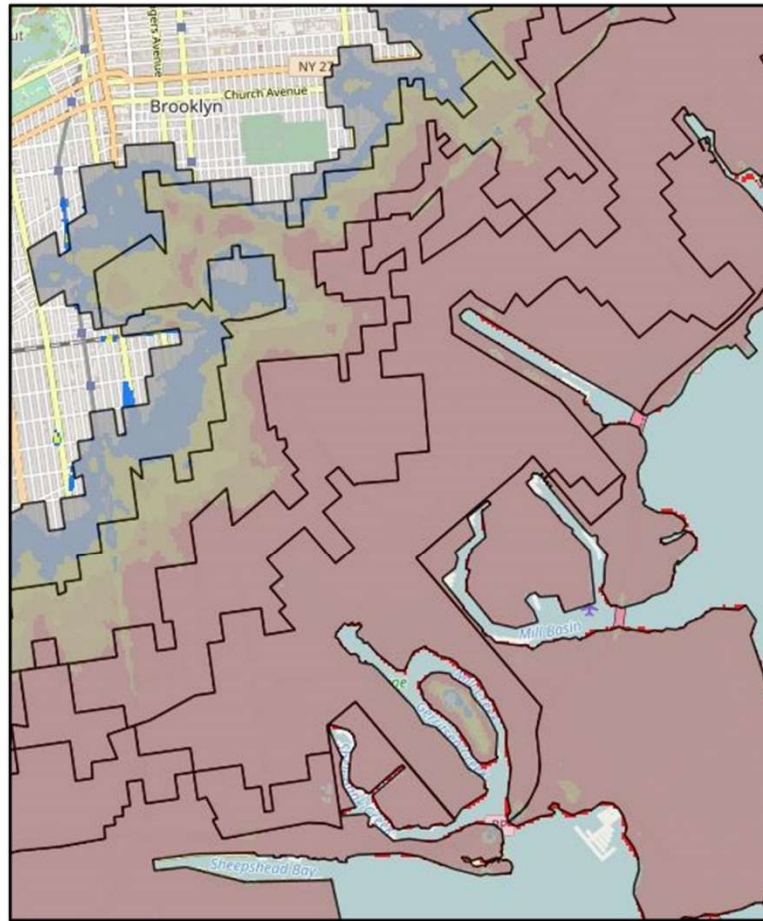
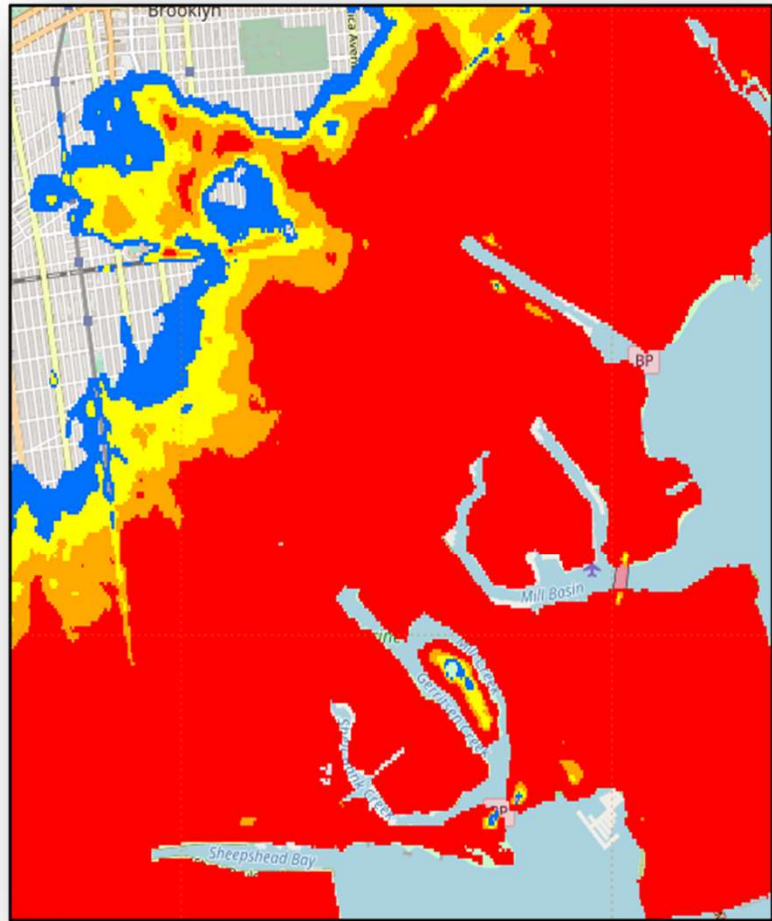
# Building Evacuation Zones



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# Building Evacuation Zones 2





# Storm Surge Heights by Direction

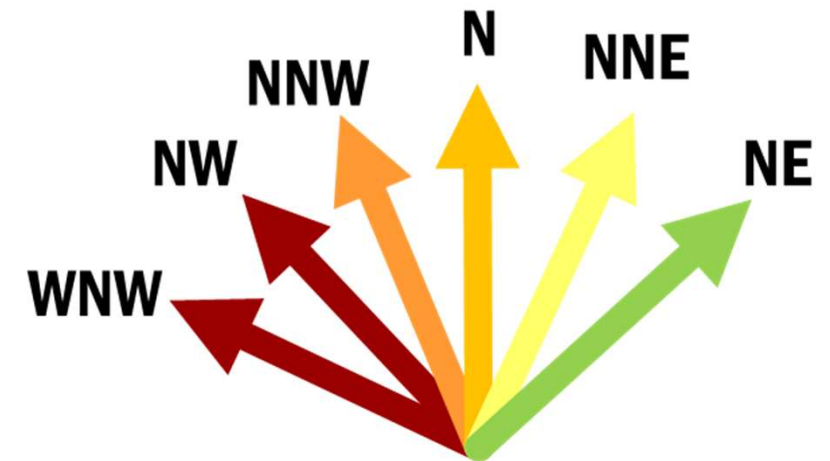


## Storm Surge Heights

- **Directional MEOW Atlas**

*The direction of approach can be as important as the storm intensity*

	WNW	NW	NNW	N	NNE	NE
Category 1	12.6	12.1	10.7	8.8	6.6	5
Category 2	20.9	20	20.1	16.5	11.4	8.1
Category 3	26.6	27.6	27.4	23.4	17	11.3
Category 4	32.4	33.9	33.9	30.6	21.7	14.6



# NYC Evacuation Zones



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**Hurricane evacuation zones**

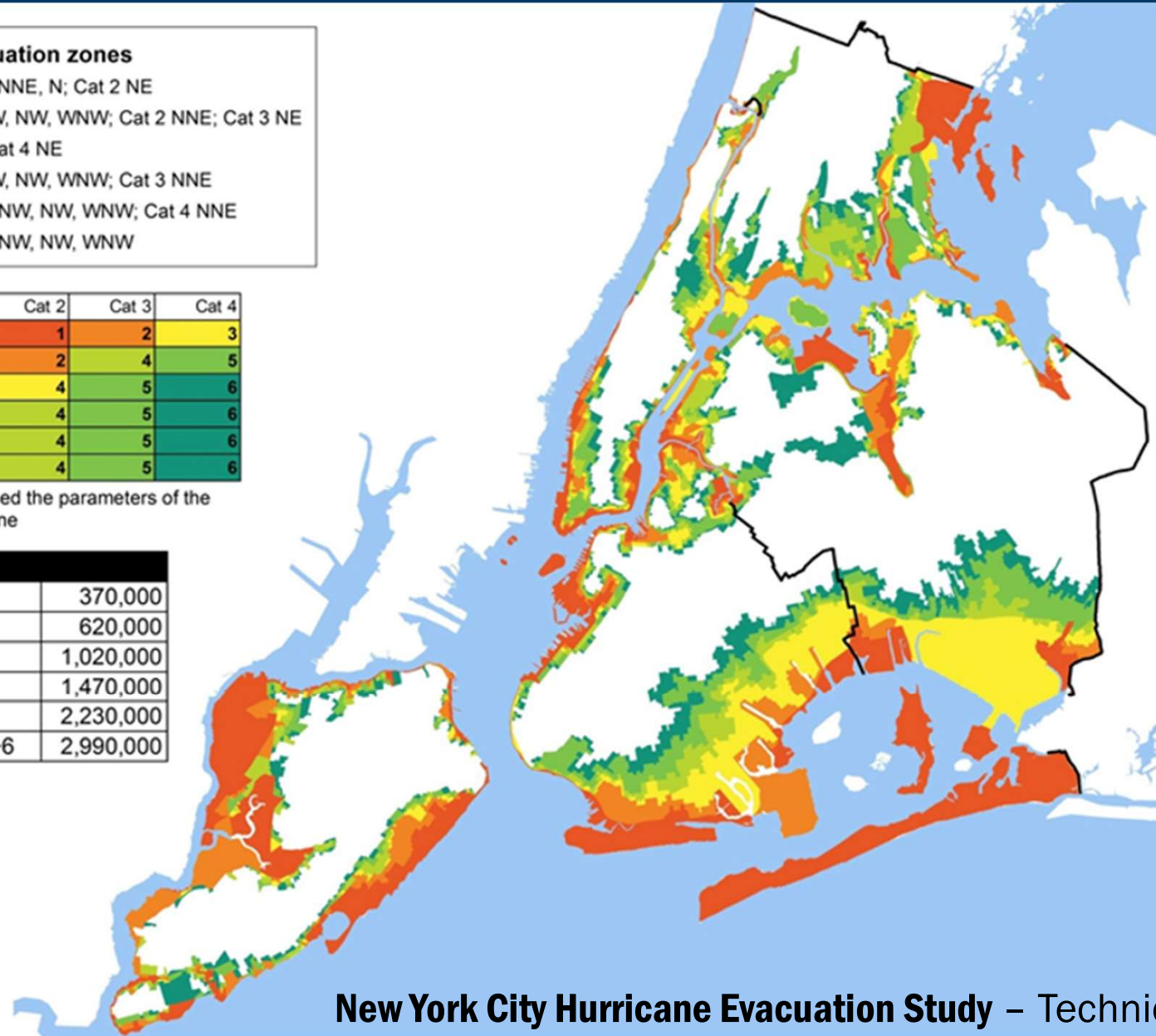
1	- Cat 1 NE, NNE, N; Cat 2 NE
2	- Cat 1 NNW, NW, WNW; Cat 2 NNE; Cat 3 NE
3	- Cat 2 N; Cat 4 NE
4	- Cat 2 NNW, NW, WNW; Cat 3 NNE
5	- Cat 3 N, NNW, NW, WNW; Cat 4 NNE
6	- Cat 4 N, NNW, NW, WNW

	Cat 1	Cat 2	Cat 3	Cat 4
NE	1	1	2	3
NNE	1	2	4	5
N	1	4	5	6
NNW	2	4	5	6
NW	2	4	5	6
WNW	2	4	5	6

\* For storms that exceed the parameters of the model, go up one zone

**2010 Population**

Zone 1	370,000
Zone 1+2	620,000
Zone 1+2+3	1,020,000
Zone 1+2+3+4	1,470,000
Zone 1+2+3+4+5	2,230,000
Zone 1+2+3+4+5+6	2,990,000



# Frequently Asked Questions 2



## FAQs

- Who will be affected?
- What critical facilities are at risk?

- **Vulnerability Analysis**

# Who's at Risk from Storm Surge?



## Hancock County, MS

County Surge Area	Permanent Residential Structures	Non-Permanent Residential Structures	Total Residential Structures	Commercial Structures	Industrial Structures	Tourist Structures
Category 1	2,281	0	2,281	89	0	1
Category 2	5,007	253	5,330	209	4	2
Category 3	9,059	338	9,397	520	7	9
Category 4	9,480	380	9,860	525	7	9
Category 5	10,020	437	10,457	544	7	9
Non-Surge Area	5,518	682	6,200	99	0	1

## Hancock County, MS

Table 3-7: Vulnerable Structures by Storm Surge Area  
Mississippi Hurricane Evacuation Study – Technical Data Report – 2012

# What Facilities Are at Risk?



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## Hancock County, MS

Facility Type	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5	None
Casino	2	-	-	-	-	-
Dam	-	-	-	3	-	19
EOC	-	-	-	-	1	-
Fire	3	2	4	1	1	4
Hazmat	-	4	-	-	-	1
Hospital	-	-	1	-	-	-
Hotels	2	2	5	-	-	1
Police	-	-	4	-	-	-
School	1	3	6	1	-	1
Senior Center	-	-	1	-	-	-
Shelter	-	-	-	-	-	5
<b>TOTAL</b>	<b>7</b>	<b>12</b>	<b>25</b>	<b>6</b>	<b>2</b>	<b>32</b>

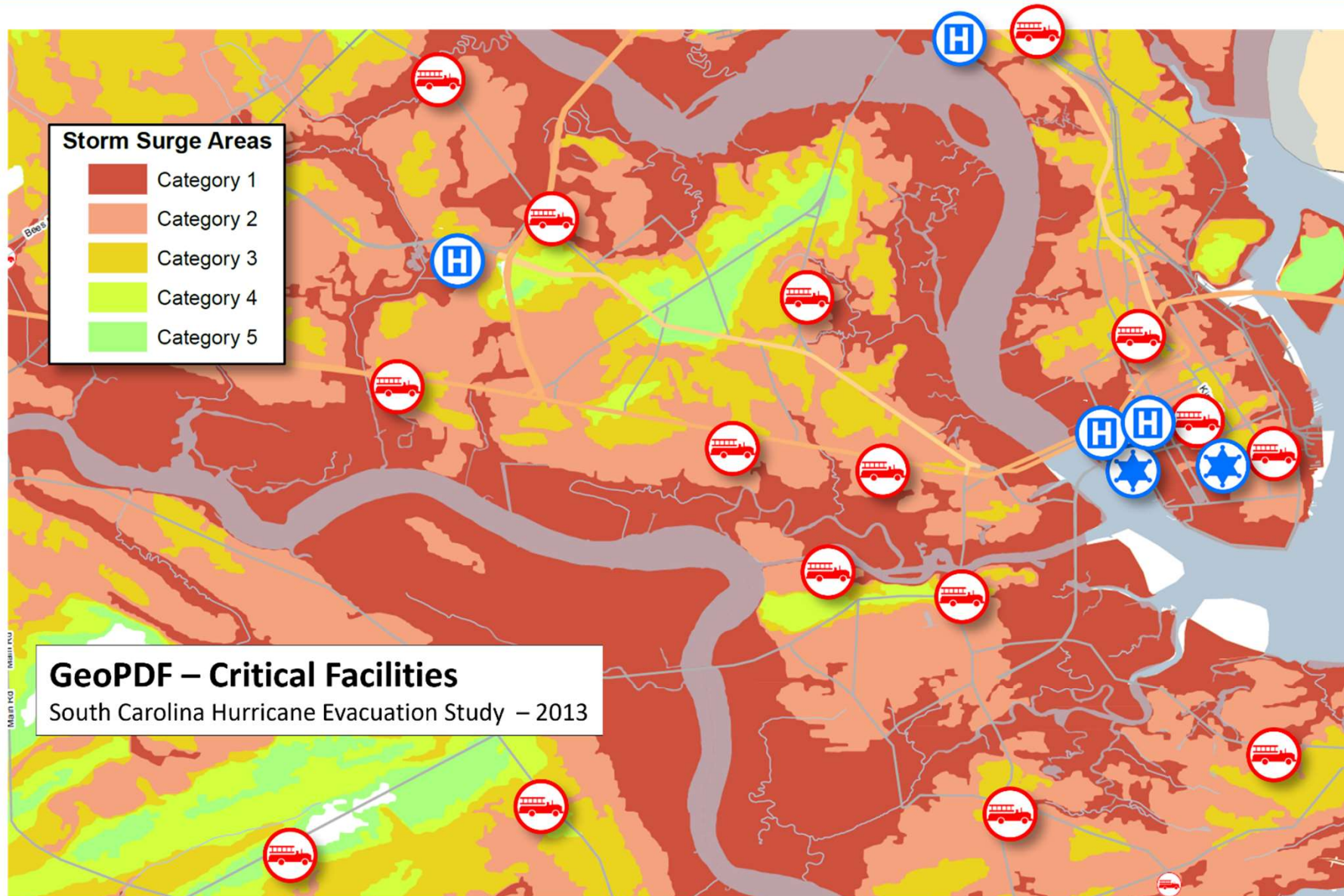
Table 3-9: Critical Facilities Summary Table

Mississippi Hurricane Evacuation Study – Technical Data Report – 2012

# What Facilities Are at Risk (GIS)?



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## FAQs

- Will the public evacuate?
- Where will they go? How? When?
- Do they understand the threat?

- **Behavioral Analysis**

# What Are People Thinking?



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## Survey Results

- **Serious under-concern about storm surge**
- **Evacuation intent often overstated**
- **Evacuation intent highest for:**
  - Major hurricanes
  - Mandatory/Ordered evacuations
  - Households with children
  - People with recent real hurricane experience
- **Often get 'False Experience' effect**



# Will the Public Evacuate?

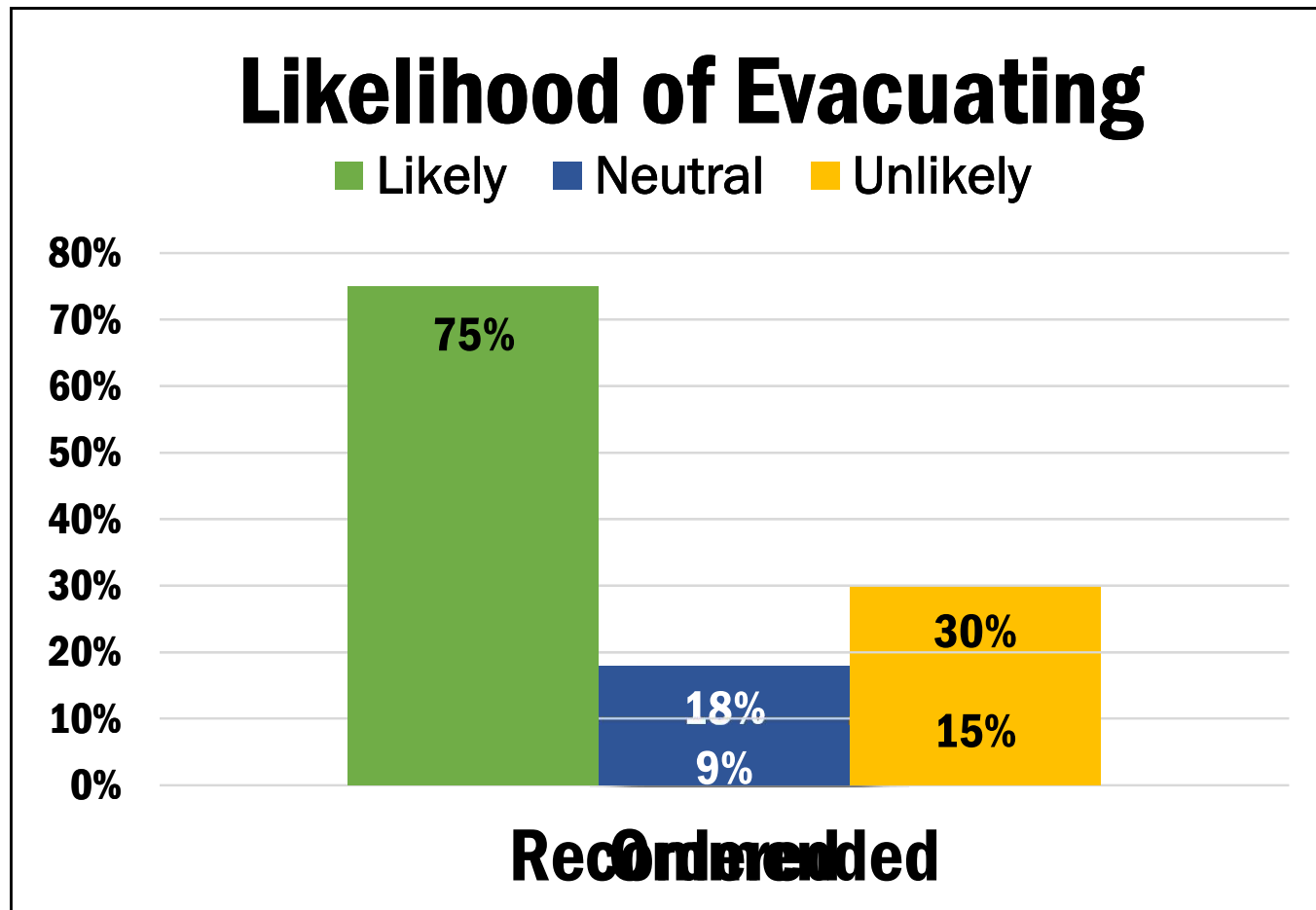
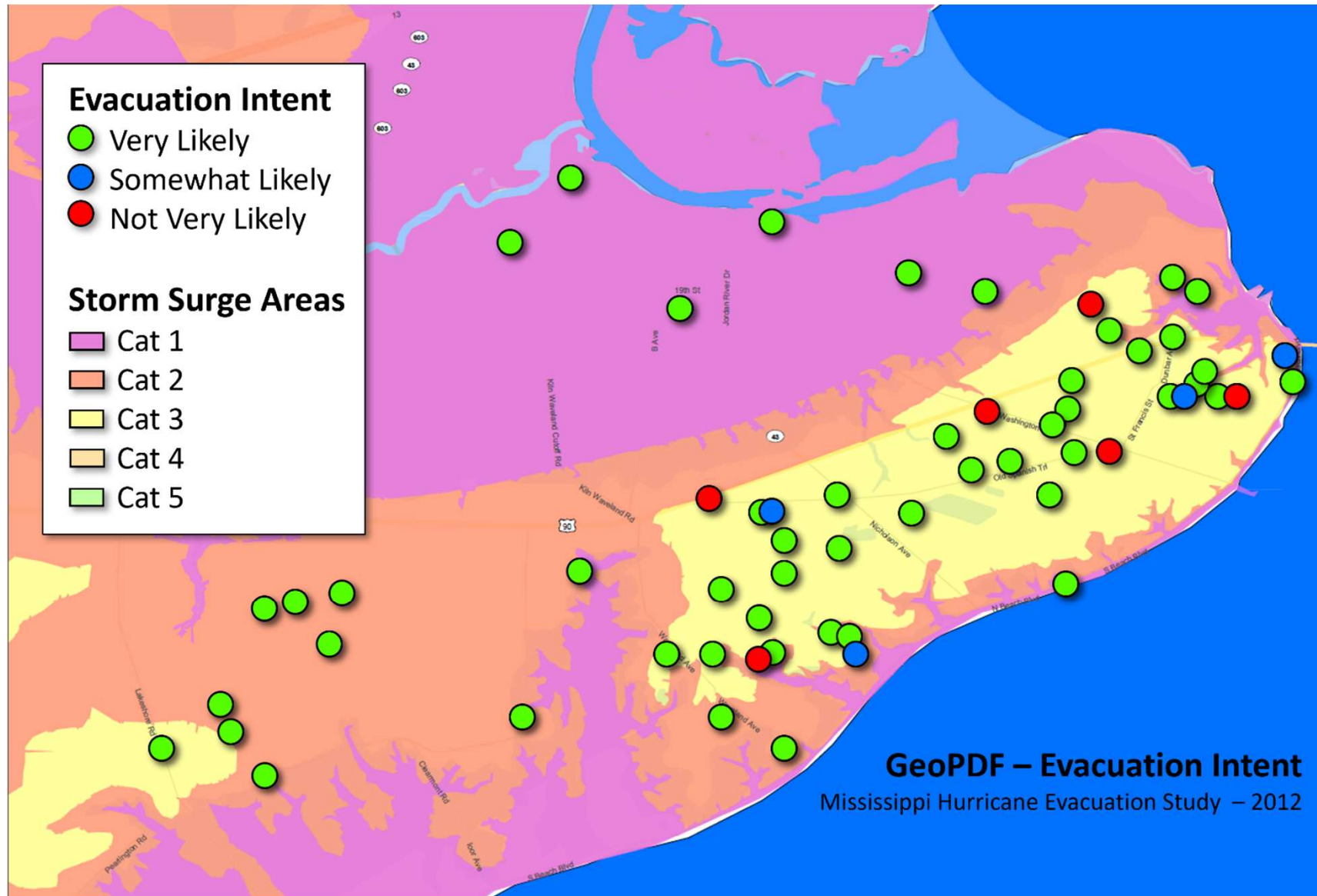


Figure 4-7: Cat 1-2 Hurricane and Likelihood of Leaving if Recommended or Ordered  
South Carolina Hurricane Evacuation Study – Technical Data Report – 2013

# Where Should I Focus My Outreach?



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## Why Do People Evacuate?

- **They understand their vulnerability/risk**
- **They were told to evacuate**

# Frequently Asked Questions 4



## FAQs

- Who will seek public shelter?
- How many shelter spaces are needed?
- In county? Out-of-county?

- **Shelter Analysis**



## Shelter Analysis Results

- **Shelter Locations** with respect to Evacuation Zones and Storm Surge flood risk areas
- **Potential Demand**
- **Identification of Deficits**
- **Shelter Usage Rates** for planning purposes
  - 3% to 8% (Coastal)
  - 10% (Inland)

# What's Available?



## Baldwin County, AL

Evacuation Scenario	Evacuating Population LOW OCCUPANCY	Evacuating Population HIGH OCCUPANCY	Shelter Demand LOW OCCUPANCY	Shelter Demand HIGH OCCUPANCY	Sheltering Capacity	Surplus/ Deficit LOW OCCUPANCY	Surplus/ Deficit HIGH OCCUPANCY
<b>Category 1</b>	60,660	101,821	1,576	1,990	8,239	6,663	6,249
<b>Category 2</b>	103,871	151,069	2,909	3,384	7,469	4,560	4,085
<b>Category 3</b>	113,773	162,005	3,567	4,052	7,469	3,902	3,417
<b>Category 4</b>	184,748	234,032	8,528	9,025	2,818	<b>-5,710</b>	<b>-6,207</b>
<b>Category 5</b>	211,125	260,502	10,898	11,295	0	<b>-10,898</b>	<b>-11,395</b>

Table 5-4: Evacuating Population and Public Sheltering Demand – Baldwin County

Alabama Hurricane Evacuation Study – Technical Data Report – 2012

# Resources for Evacuating Populations



**Table 6: Population Seeking Shelter and Capacity in Zone 1**

Puerto Rico Hurricane Evacuation Study – Shelter Analysis Report – 2015

Shelter Demand	Potential Evacuees	Regular Capacity	Emergency Capacity	Assessment of Capacity
		7,953 Additional Needed	15,906 Additional Needed	
1%	1,533	0	0	Regular Shelter Capacity Can Support Demand
2%	3,065	0	0	Regular Shelter Capacity Can Support Demand
3%	4,598	0	0	Regular Shelter Capacity Can Support Demand
4%	6,131	0	0	Regular Shelter Capacity Can Support Demand
5%	7,633	0	0	Regular Shelter Capacity Can Support Demand
6%	9,196	1,243	0	Emergency Shelter Capacity Can Support Demand
7%	10,728	2,775	0	Emergency Shelter Capacity Can Support Demand
8%	12,261	4,308	0	Emergency Shelter Capacity Can Support Demand
9%	13,794	5,841	0	Emergency Shelter Capacity Can Support Demand
10%	15,326	7,373	0	Emergency Shelter Capacity Can Support Demand
13%	19,924	11,971	4,018	Over Capacity
15%	22,990	15,037	7,084	Over Capacity
20%	30,653	22,700	14,747	Over Capacity

## FAQs

- Where will traffic back up?
- What is the road capacity?
- How long will it take to evacuate?

- **Transportation Analysis**



# How Long Will It Take to Evacuate?



## Traffic Model Inputs

- **Demographics**
- **Behavioral Assumptions**
- **Evacuation Routes**
- **Roadway Capacities**
- **Travel Destinations**
- **Evacuation Scenarios**



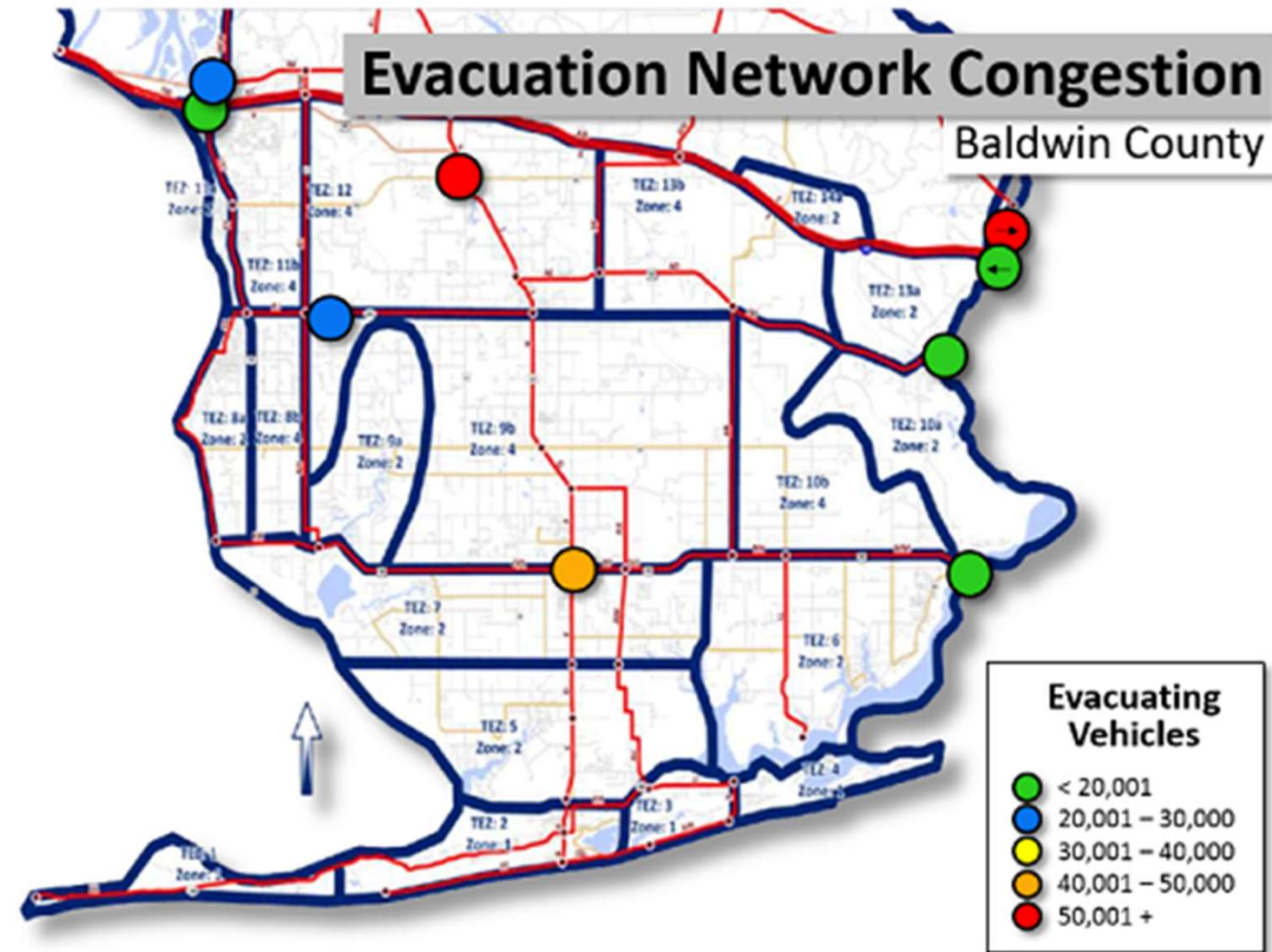
# Where Will the Traffic Problems Be?



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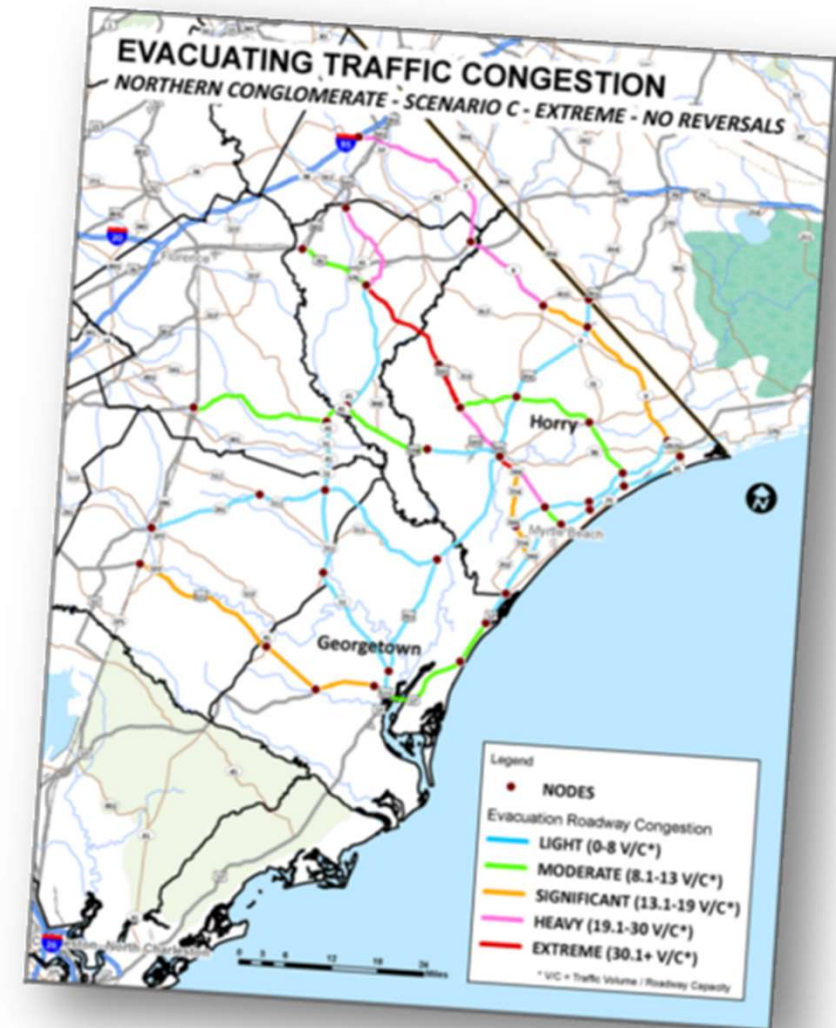
## Transportation Analysis

- **Traffic Patterns**
  - Bottlenecks
  - Evacuating Vehicles
- **Clearance Times**
  - Response Rate
  - Seasonal Population
  - Evacuation Scenarios  
*one-way, multi-state, etc.*

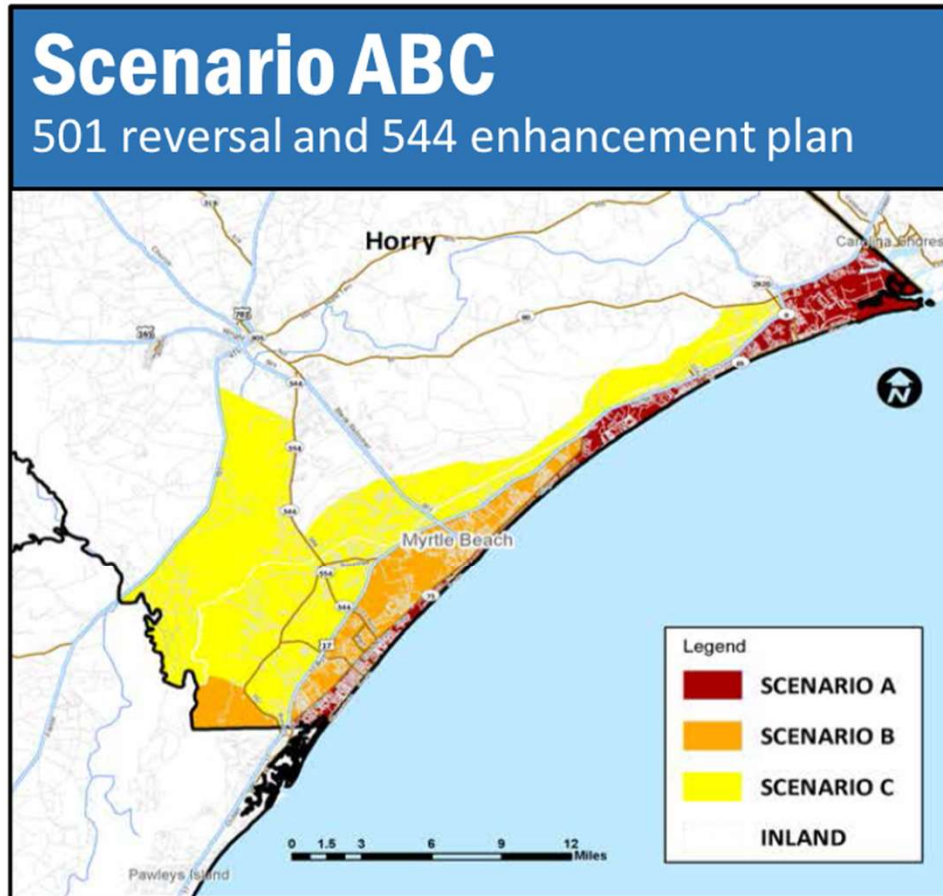


## Clearance Times

- **Time for the evacuating population to reach a point of safety**
  - First evacuating vehicle enters the road network
  - Last vehicle reaches an assumed point of safety
  - Includes travel time and waiting in congestion
  - Doesn't relate to any one particular vehicle
  - Driven by bottlenecks



# How Long Should Evacuation Take?



Horry County, SC

Scenario ABC (501 Reversal and 544 enhancement plan)

Response	Low Occupancy	Med Occupancy	High Occupancy	Extreme Occupancy
<b>SLOW</b>	22	26	29	31
<b>MEDIUM</b>	20	24	27	29
<b>FAST</b>	19	23	26	28
<b>IMMEDIATE</b>	18	22	25	27

**Table 6-44: Evacuation Clearance Times – Scenario ABC**

South Carolina Hurricane Evacuation Study – Technical Data Report – 2013

**Figure 6-6: Evacuation Zones**

South Carolina Hurricane Evacuation Study – Technical Data Report – 2013

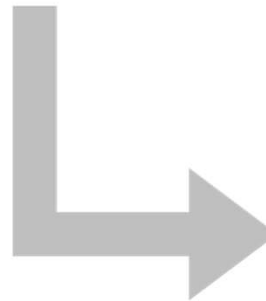
# The Process: Plan



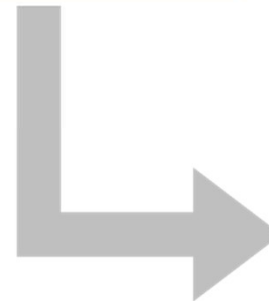
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- Identify Hazards
- Determine Vulnerability
- Evacuation Timing



- **Inform Hazards and Risk**
- **Develop Timelines**
- **Identify Triggers**



- Monitor Threat
- Assess Risk
- Take Action

# Trust the Process

- **Step 1**  
Form a Collaborative Planning Team.
- **Step 2**  
Understand the Situation.
- **Step 3**  
Determine Goals and Objectives.
- **Step 4**  
Plan Development.
- **Step 5**  
Plan Preparation, Review & Approval.
- **Step 6**  
Plan Implementation & Maintenance.



## FAQs

- What forces us to react?
- What is acceptable risk?
- What assumptions can I make?

- **Identify Hazard Triggers**

# What Forces You to Act?



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## Lane Reversal Decision Factors

<b>Decision Factor</b>	<b>Indicator</b>
The storm's current/projected intensity and the public perception of the threat to their safety.	<b>Category 3 or greater storm</b> portrayed through the media as a significant threat will probably require the use of lane reversal.
Tourism occupancy: High tourist occupancy greatly increases evacuating population and thereby increases traffic congestion.	<b>For a Category 1 or 2 storms,</b> monitor traffic flow and have lane reversal ready.  <b>A Category 3 or greater storm</b> will indicate the need for reversal.  (Note: Beaufort County <u>requires</u> Highway 278 reversal during tourist season at 85% tourist occupancy)

## South Carolina Lane Reversal Factors

South Carolina Hurricane Plan 2015



# Storm Category vs. Evac Actions



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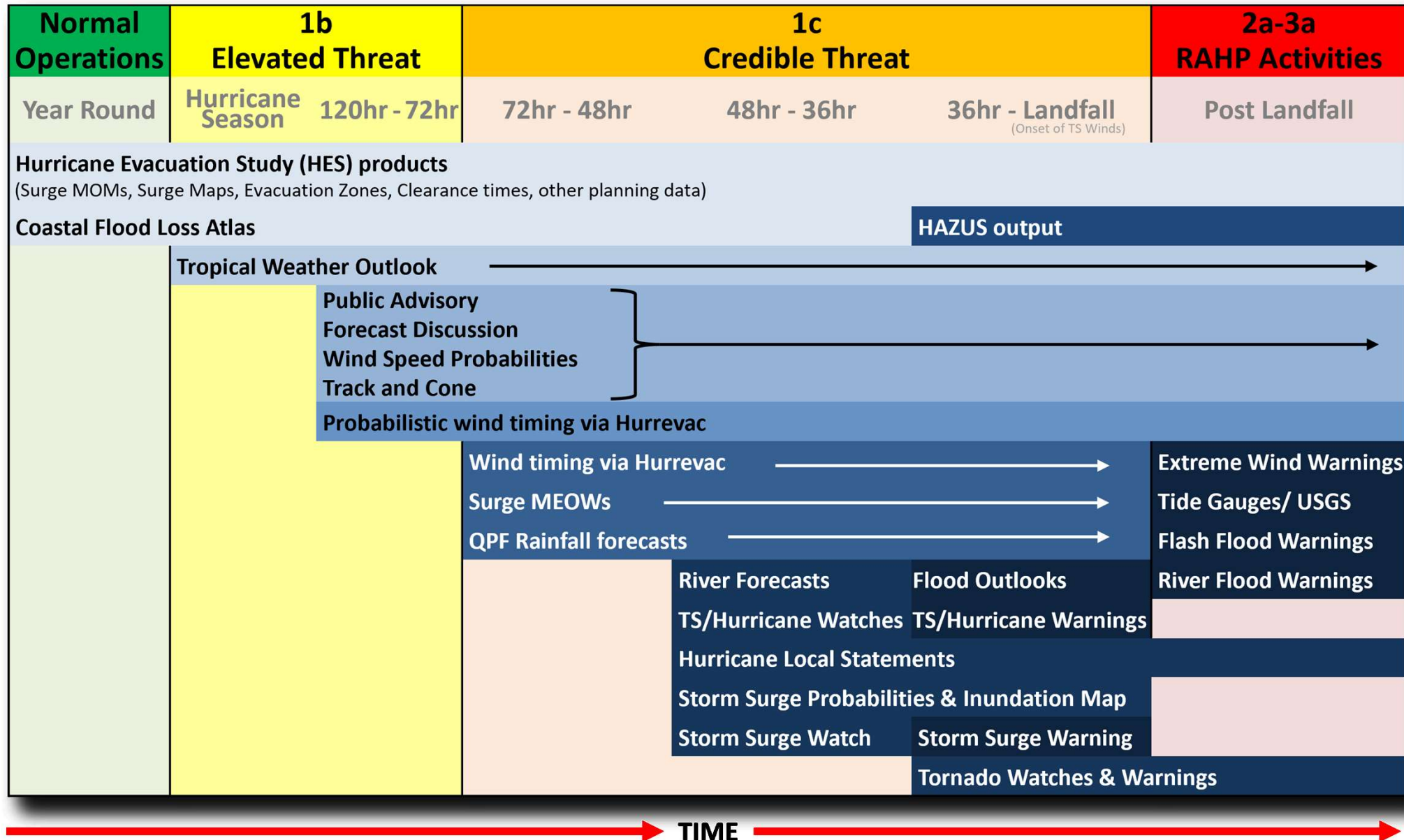
Storm Category	Tropical Storm Force Wind Arrival	EARLY South & East of Abercom/US-204	MANDATORY Islands & Low-lying Areas	MANDATORY South & East of Abercom/US-204	RECOMMENDED South & East of Abercom/US-204	MANDATORY East of I-95	MANDATORY Entire County	MANDATORY Entire County	Evacuation Actions
Cat 5									30+48NH
Cat 4								30+48NH	
Cat 3							30+48NH		
Cat 2						24+30NH			
Cat 1 Direct					24+30NH				
Cat 1 Parallel to Coast				18+24NH					
Tropical Storm Direct			18+24NH						
Tropical Storm Parallel Coast Arrival Tropical Storm		12							
Islands and Low-lying Area Early Evacuations are 6 to 12 hours prior to Mandatory Evacuations Hours for Evacuation + Added Hours for Nursing Home (NH) and Special Needs Evacuations									

Chatham County Evacuation Guidelines (Not Current)

# When is Key Info Available?



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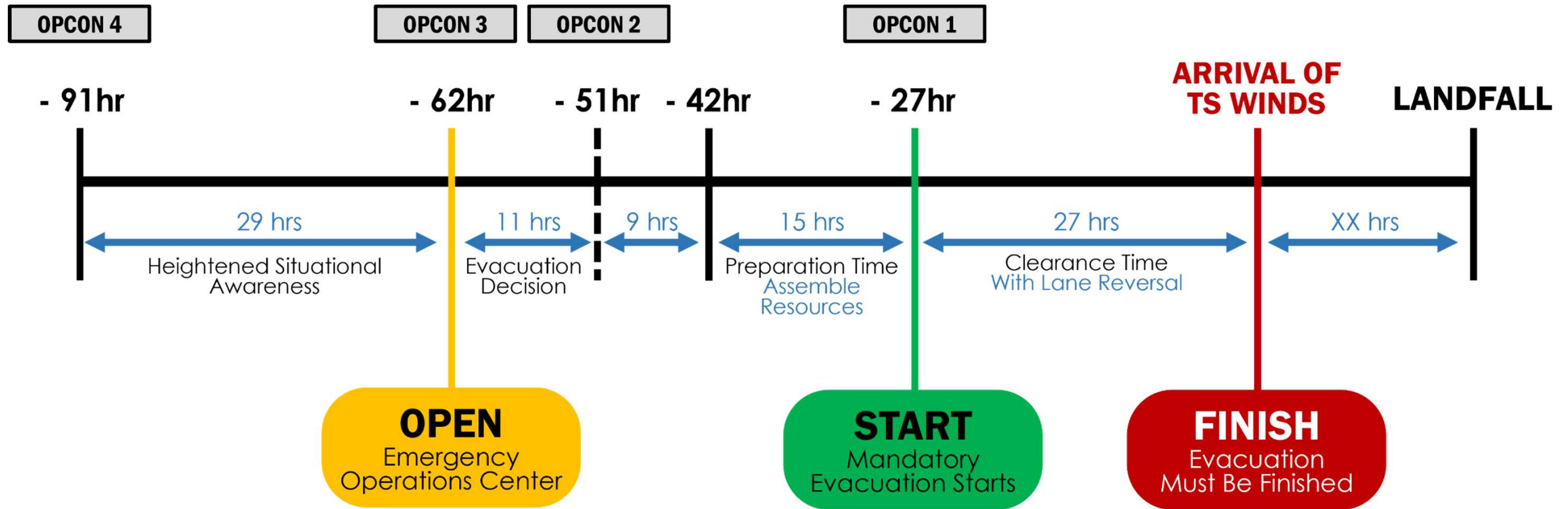


## FAQs

- When do we open shelters?
- When do we need to deploy?
- How do we stay synchronized?

- **Decision Timelines**

# Evacuation Scenario Decision Timeline



Horry County Evacuation Timeline for ABC Scenario

# Hurricane Readiness Checklist



Hurricane Preparedness – prior to June 1	PRIORITY LEVEL	PERSONNEL RESPONSIBLE	STATUS OF TASK	DATE/TIME COMPLETED
<b>Hurricane Planning</b>				
• Update local hurricane operation, evacuation plans and resource files				
• Revise Standard Operating Procedures (SOPs)				
• Review local emergency management ordinances and update				
• Test HURREVAC and/or other hurricane tracking software				
• Review Stafford Act Policies with State Emergency Management				
• Determine evacuation decision making authority w/ line of succession				
<b>Emergency Operations Center (EOC)</b>				
• Replenish supplies and check equipment				
• Test communication lines				
• Update activation plans and train staff				
• Update HURREVAC to latest version				

# Hurricane Readiness Checklist 2

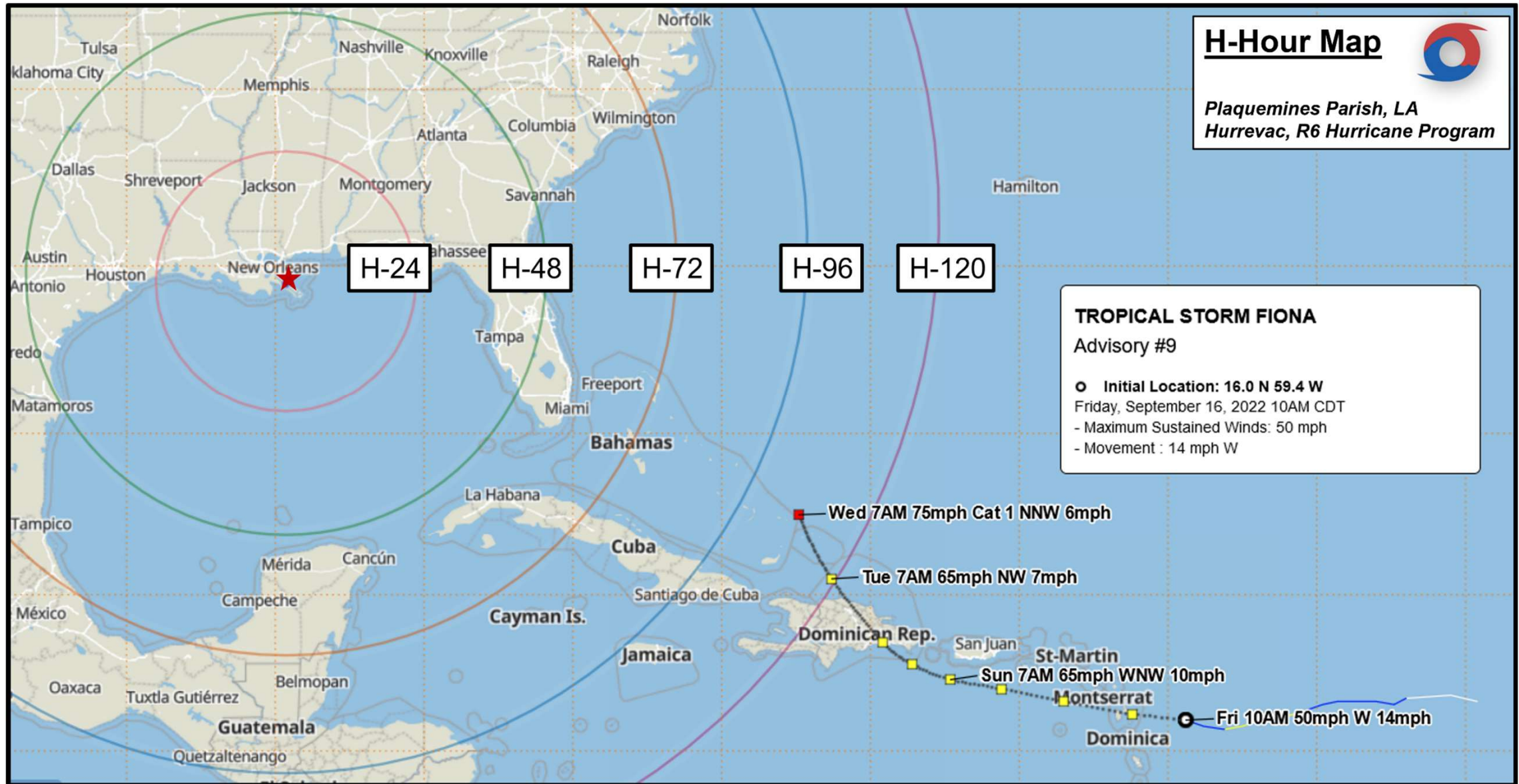


Storm Impacts Imminent (~36 hours) Hurricane Watches and Warnings Issued	PRIORITY LEVEL	PERSONNEL RESPONSIBLE	STATUS OF TASK	DATE/TIME COMPLETED
<b>Storm Watch</b>				
<ul style="list-style-type: none"> <li>• Conference calls with NOAA local WFO/RFC/SPC</li> </ul>				
<ul style="list-style-type: none"> <li>• Continue to monitor HURREVAC and other systems</li> </ul>				
<ul style="list-style-type: none"> <li>• Monitor storm track and provide local government officials updates</li> </ul>				
<ul style="list-style-type: none"> <li>• Anticipate the possible arrival of rainfall and tornados</li> </ul>				
<ul style="list-style-type: none"> <li>• Monitor river stages and rainfall forecast</li> </ul>				
<b>Emergency Operations Center (EOC)</b>				
<ul style="list-style-type: none"> <li>• Activate EOC (partial or full based on clearance times and threat)</li> </ul>				
<ul style="list-style-type: none"> <li>• Request primary ESF support agencies provide EOC briefings</li> </ul>				
<ul style="list-style-type: none"> <li>• Complete and distribute EOC situation reports, as applicable</li> </ul>				
<ul style="list-style-type: none"> <li>• Prepare EOC facility- Mitigate for Winds, Water, etc.</li> </ul>				

# Time-Based Planning Assumptions



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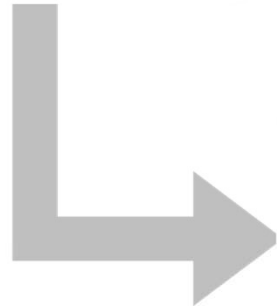
# The Process: Execute



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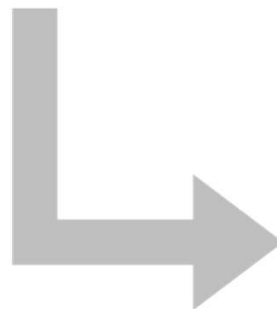
Study

- Identify Hazards
- Determine Vulnerability
- Evacuation Timing



Plan

- Inform Hazards and Risk
- Develop Timelines
- Identify Triggers



Execute

- **Monitor Threat**
- **Assess Risk**
- **Take Action**



# Frequently Asked Questions 8



## FAQs

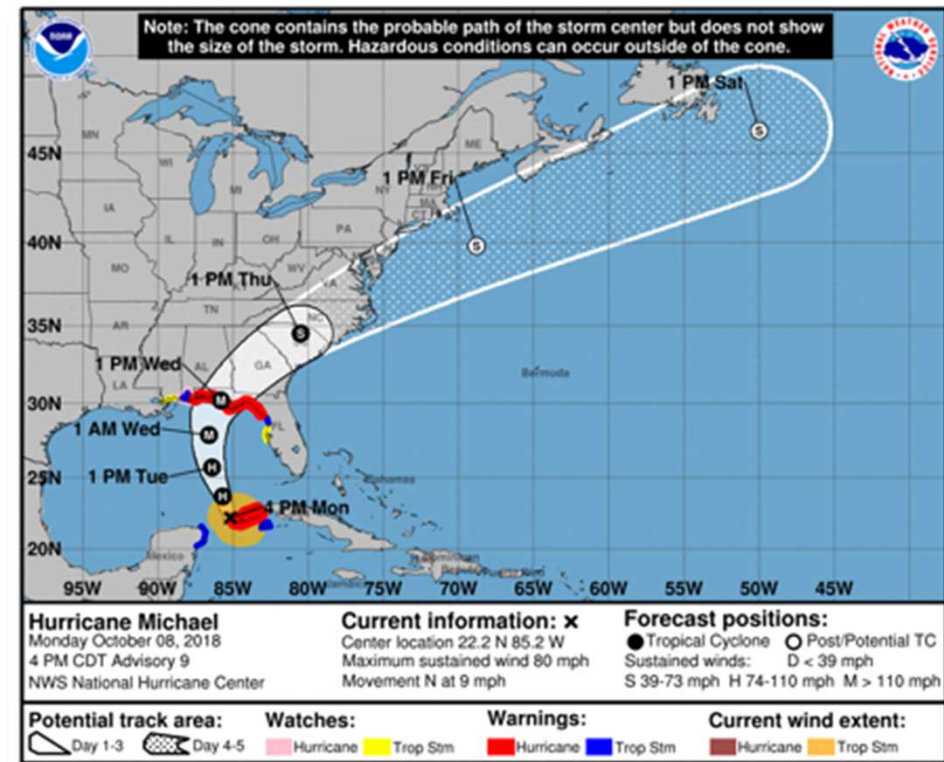
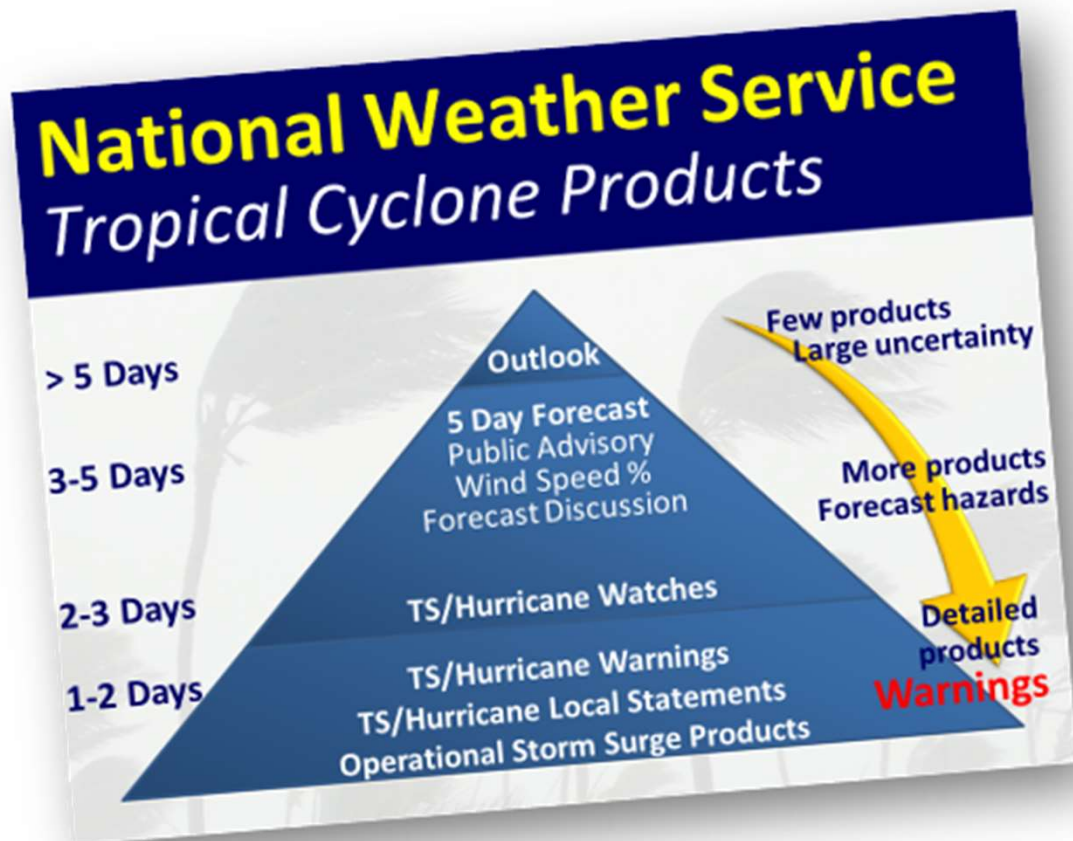
- What's the forecast?
- A threat to my community?
- When are hazards expected?

- **NHC Forecasts**

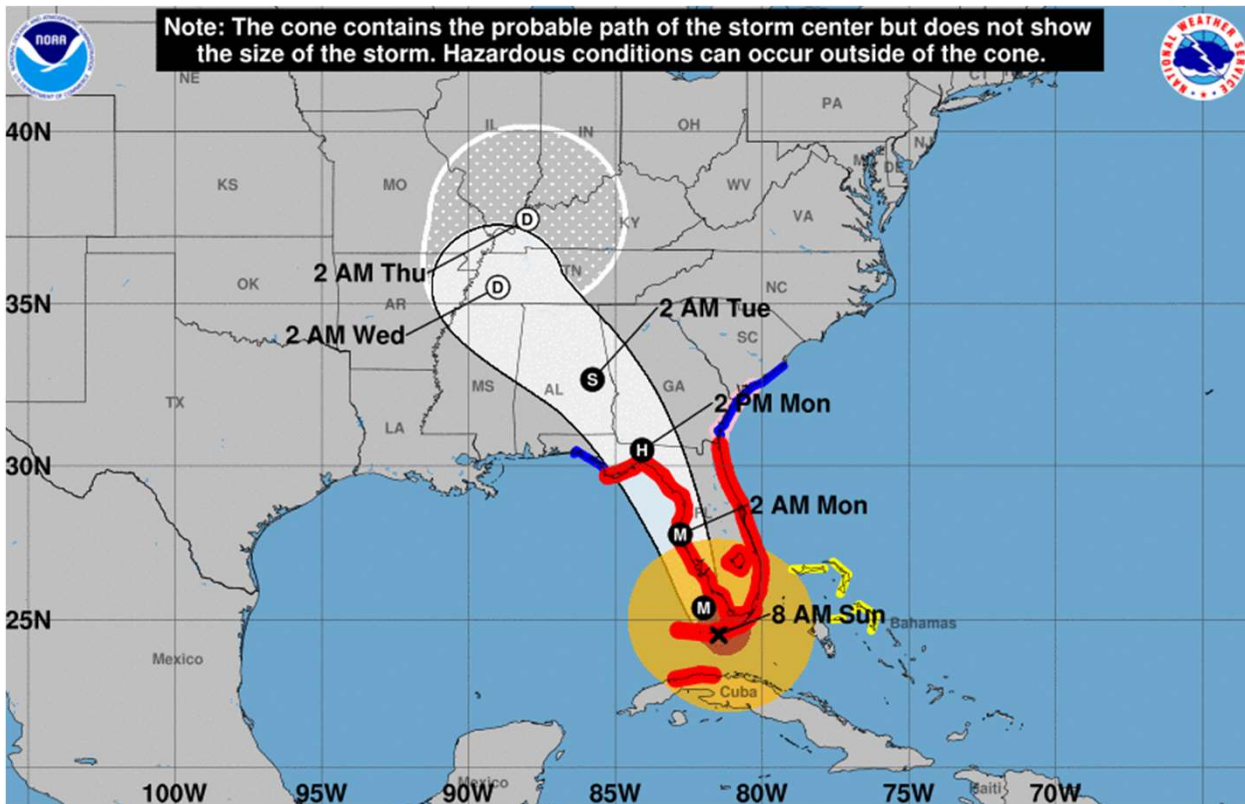
# What NHC Forecasts?



FEMA



# Storm Characteristics



# Where Is the Storm Going?

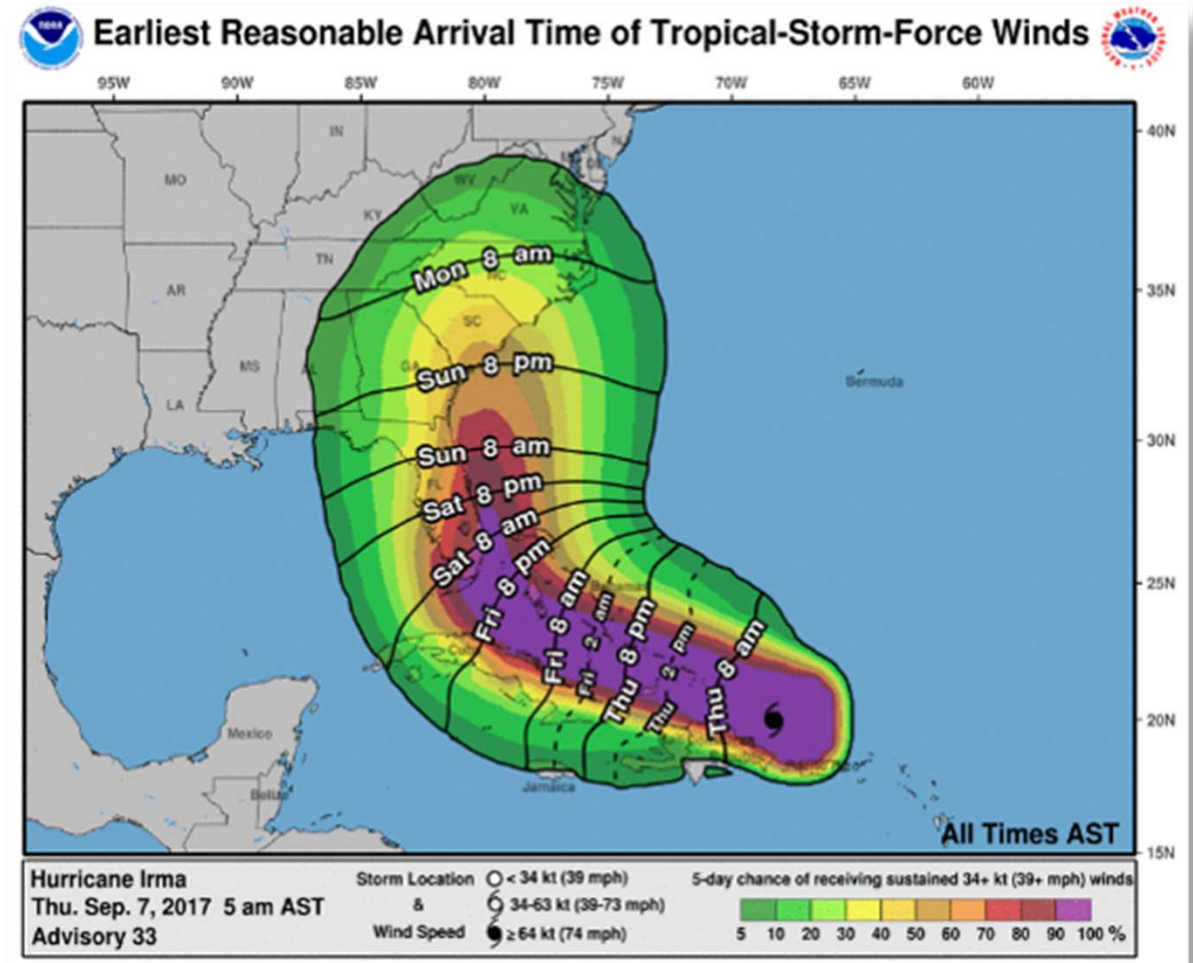


**NATIONAL HURRICANE CENTER**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

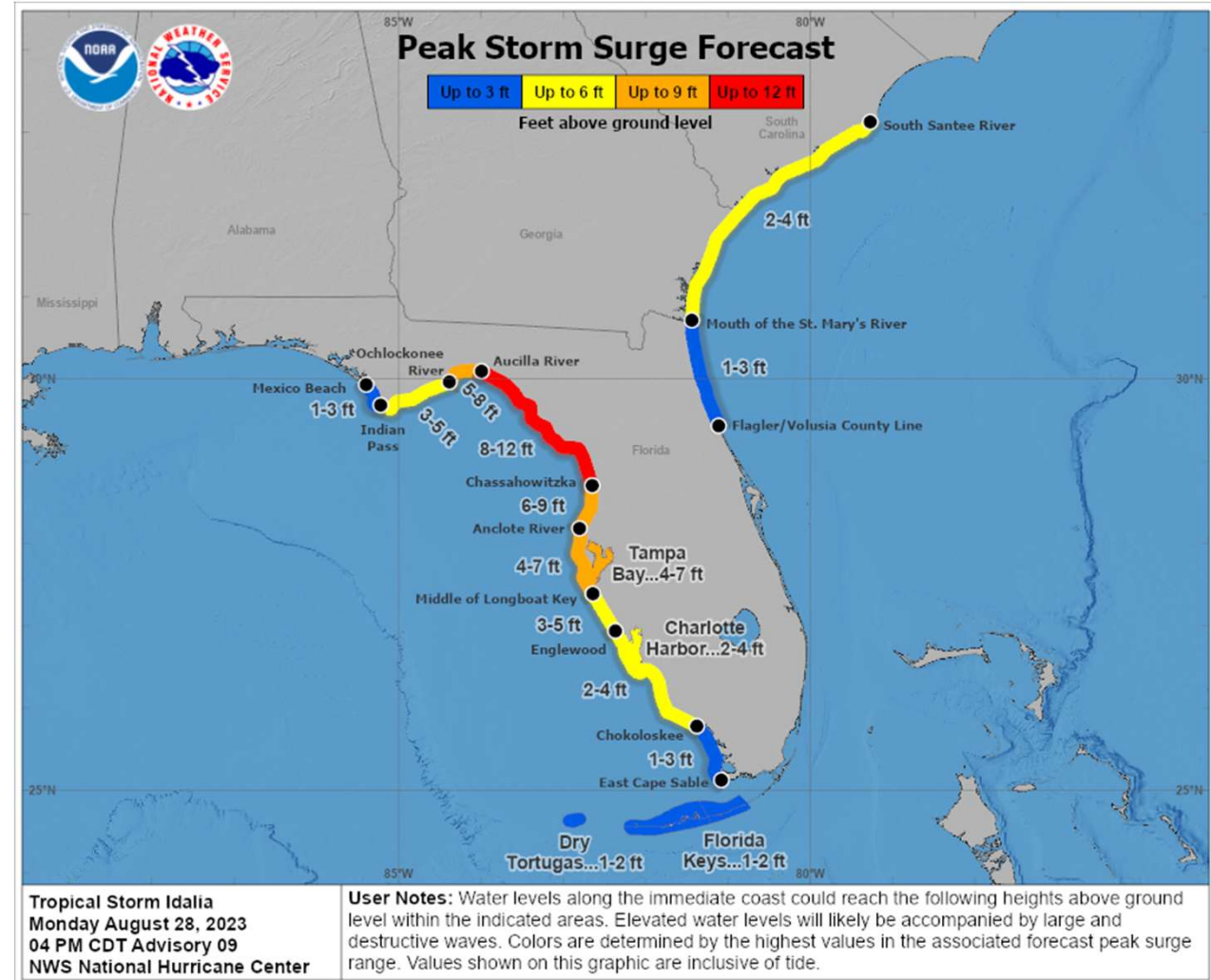
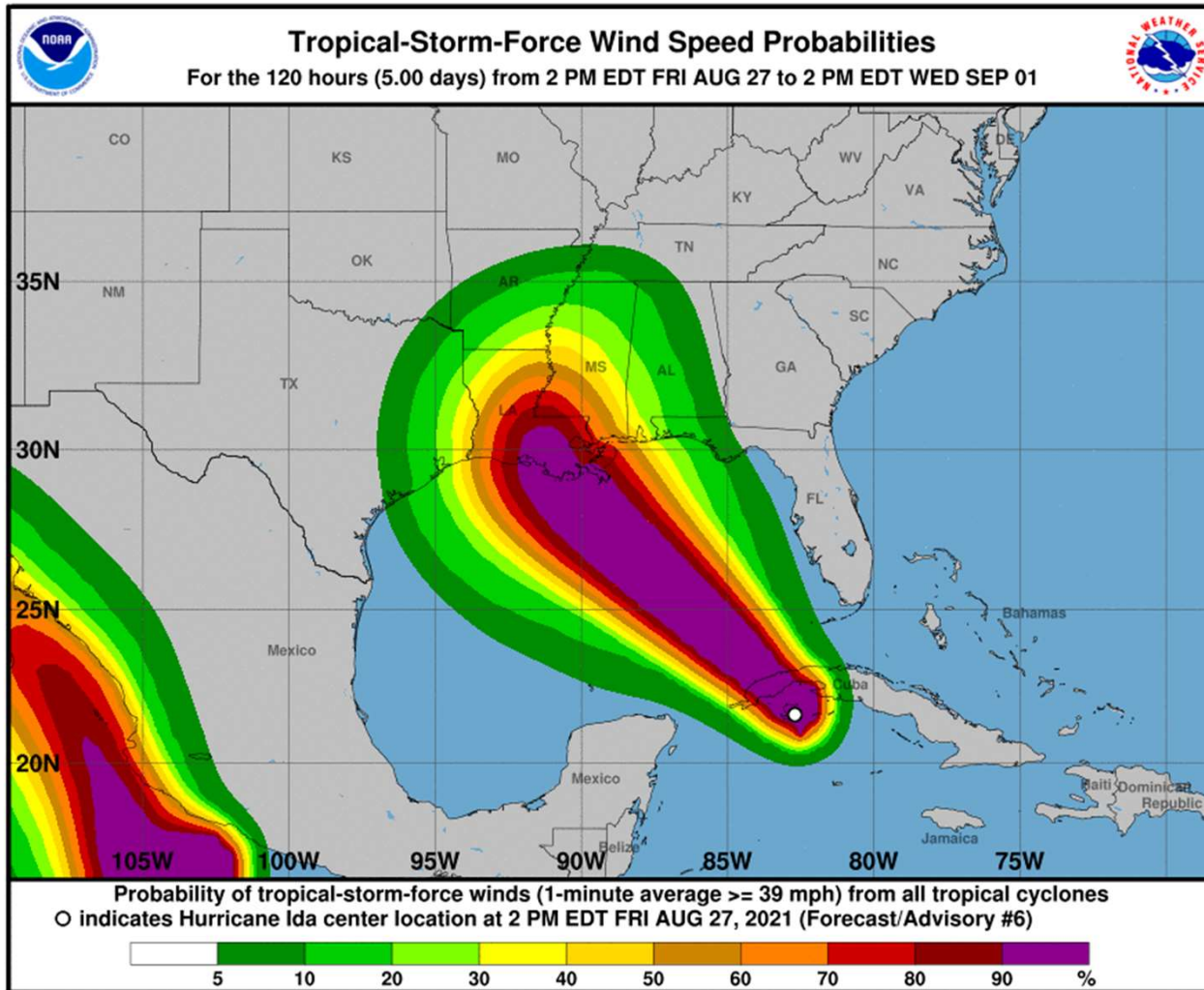
TROPICAL STORM ISAAC WIND SPEED PROBABILITIES NUMBER 21  
 NWS NATIONAL HURRICANE CENTER MIAMI FL AL092012  
 0900 UTC SUN AUG 26 2012

--- WIND SPEED PROBABILITIES FOR SELECTED LOCATIONS ---

TIME PERIODS	FROM 12Z WED TO 00Z THU	FROM 00Z THU TO 12Z THU	FROM 12Z THU TO 00Z FRI	FROM 00Z FRI TO 12Z FRI	FROM 12Z FRI TO 12Z SAT	FROM 12Z SAT TO 12Z SUN	FROM 12Z SUN TO 12Z MON
FORECAST HOUR	(12)	(24)	(36)	(48)	(72)	(96)	(120)
LOCATION	KT						
PANAMA CITY FL 34	X	3 ( 3)	22 (25)	30 (55)	16 (71)	2 (73)	1 (74)
PANAMA CITY FL 50	X	X ( X)	1 ( 1)	13 (14)	15 (29)	2 (31)	1 (32)
PANAMA CITY FL 64	X	X ( X)	X ( X)	3 ( 3)	6 ( 9)	2 (11)	1 (12)
PENSACOLA FL 34	X	X ( X)	10 (10)	32 (42)	31 (73)	5 (78)	X (78)
PENSACOLA FL 50	X	X ( X)	X ( X)	6 ( 6)	28 (34)	5 (39)	1 (40)
PENSACOLA FL 64	X	X ( X)	X ( X)	1 ( 1)	14 (15)	3 (18)	X (18)
MOBILE AL 34	X	X ( X)	5 ( 5)	24 (29)	35 (64)	8 (72)	1 (73)
MOBILE AL 50	X	X ( X)	X ( X)	3 ( 3)	22 (25)	8 (33)	1 (34)
MOBILE AL 64	X	X ( X)	X ( X)	1 ( 1)	8 ( 9)	4 (13)	1 (14)



# Evaluate the Storm Threat



# Frequently Asked Questions 9



## FAQs

- What is the forecast?
- Evacuation start times?

- **HURREVAC**

**Do you have a HURREVAC account?**

- A. Yes, and I use it regularly.
- B. Yes, but I am unfamiliar with how to use it.
- C. I just registered for an account.
- D. I do not have an account.

## HURREVAC

- **Hurricane tracking and decision support tool**
  - Uses NHC forecast data
  - Calculates evacuation start times
- **A resource for EMs during evacuations**
  - Common forecast picture
- **Reports**
  - Wind timing
  - Evacuation timing
  - Storm summary





## HURREVAC

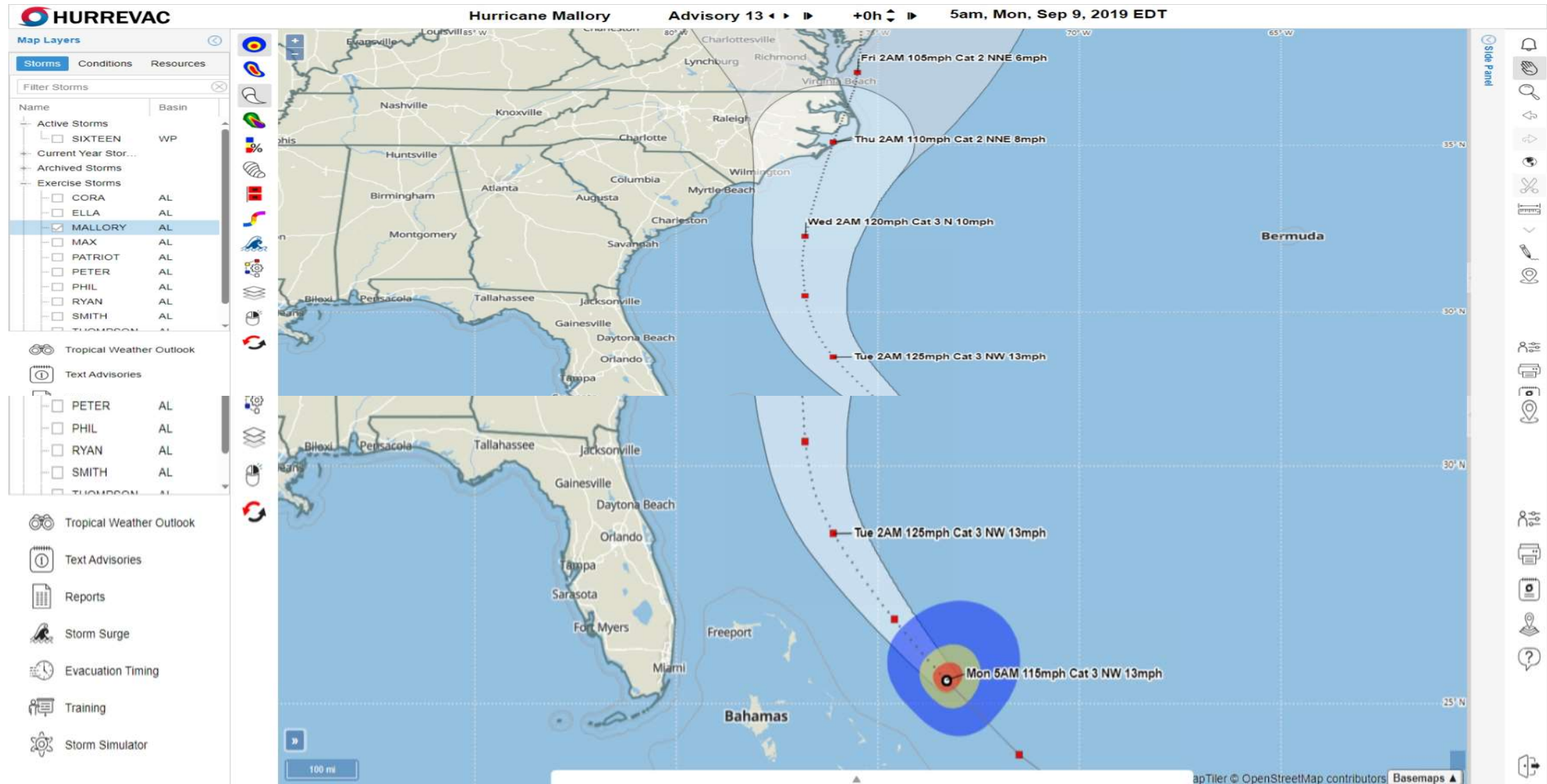
- **Web-based**
  - No downloads or software to install
  - Use your computer, tablet, or phone
  - Access your profile/preferences anywhere
- **SLOSH Display**
  - MOMs & MEOWs
  - MEOW mixer
- **Register online**
  - <https://register.HURREVAC.com/>



# Forecast Track



FEMA

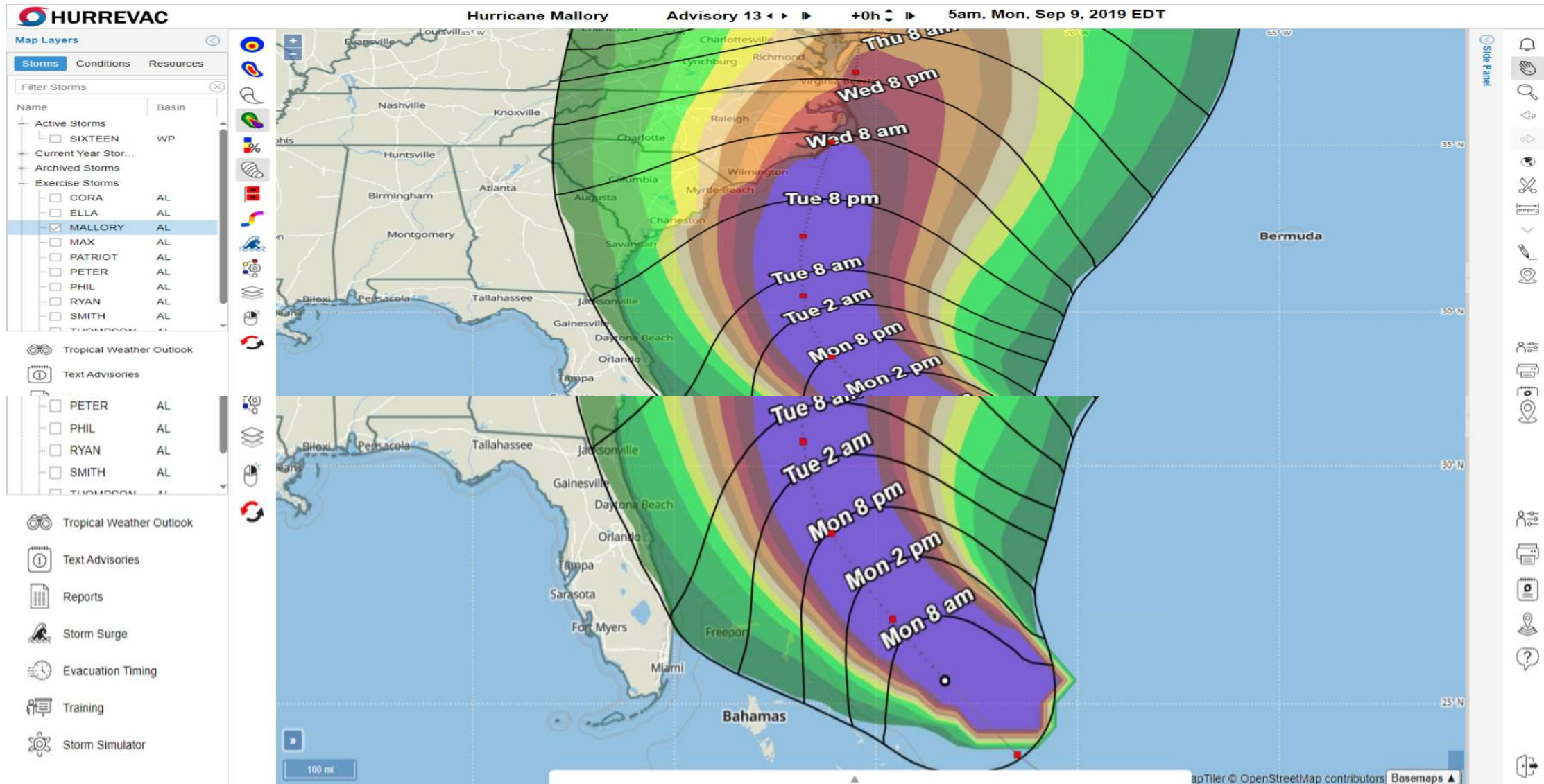




# Wind Threat - Time of Arrival



FEMA



# Wind Timing – Report

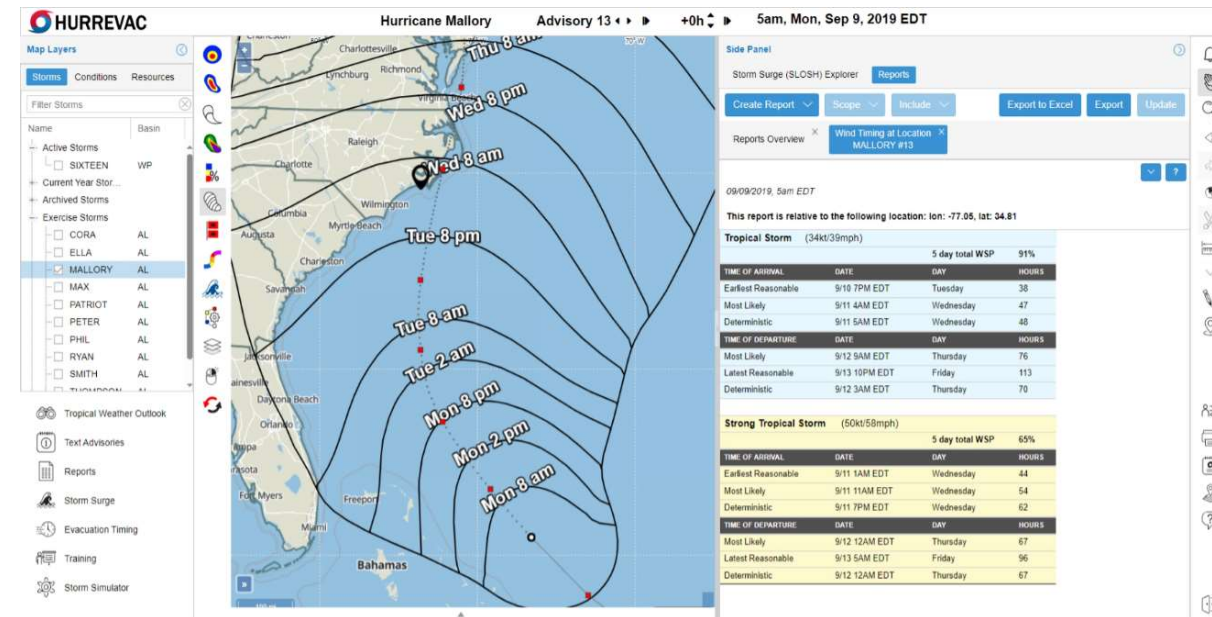


Reports Overview × **Wind Timing at Location** ×  
**MALLORY #13**

09/09/2019, 5am EDT

This report is relative to the following location: lon: -77.05, lat: 34.81

Tropical Storm (34kt/39mph)			
		5 day total WSP	91%
TIME OF ARRIVAL	DATE	DAY	HOURS
Earliest Reasonable	9/10 7PM EDT	Tuesday	38
Most Likely	9/11 4AM EDT	Wednesday	47
Deterministic	9/11 5AM EDT	Wednesday	48
TIME OF DEPARTURE	DATE	DAY	HOURS
Most Likely	9/12 9AM EDT	Thursday	76
Latest Reasonable	9/13 10PM EDT	Friday	113
Deterministic	9/12 3AM EDT	Thursday	70



# Wind Timing – All Affected Areas

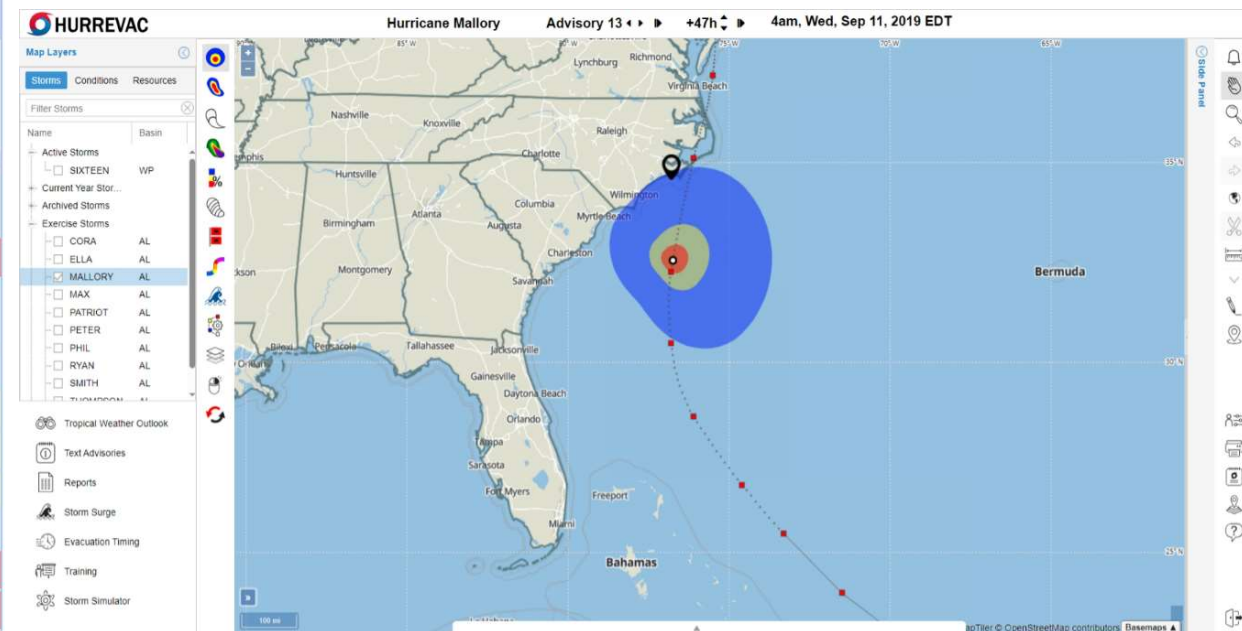


## Wind Timing MALLORY #13

The purpose of the wind timing table is to show when specific wind thresholds are expected to be exceeded at a particular location.

### Displaying data in NC for: Counties

State	County	34kt Start	50kt Start	64kt Start	64kt End	50kt End	34kt End
NC	Carteret	09/11 3am	09/11 1pm	09/11 5pm	09/12 3am	09/12 3am	09/12 3am
NC	New Hanover	09/11 3am					09/12 3am
NC	Brunswick	09/11 3am					09/12 3am
NC	Onslow	09/11 4am	09/11 6pm			09/11 10pm	09/12 3am
NC	Jones	09/11 5am	09/11 7pm			09/12 12am	09/12 3am
NC	Craven	09/11 5am	09/11 5pm			09/12 3am	09/12 3am
NC	Pender	09/11 5am					09/12 3am
NC	Hyde	09/11 6am	09/11 4pm	09/11 9pm	09/12 3am	09/12 3am	09/12 3am
NC	Dare	09/11 6am	09/11 5pm	09/11 11pm	09/12 3am	09/12 3am	09/12 3am
NC	Pamlico	09/11 6am	09/11 6pm	09/12 12am	09/12 3am	09/12 3am	09/12 3am
NC	Beaufort	09/11 7am	09/11 8pm			09/12 3am	09/12 3am
NC	Duplin	09/11 8am					09/12 3am



# Evacuation Start Times



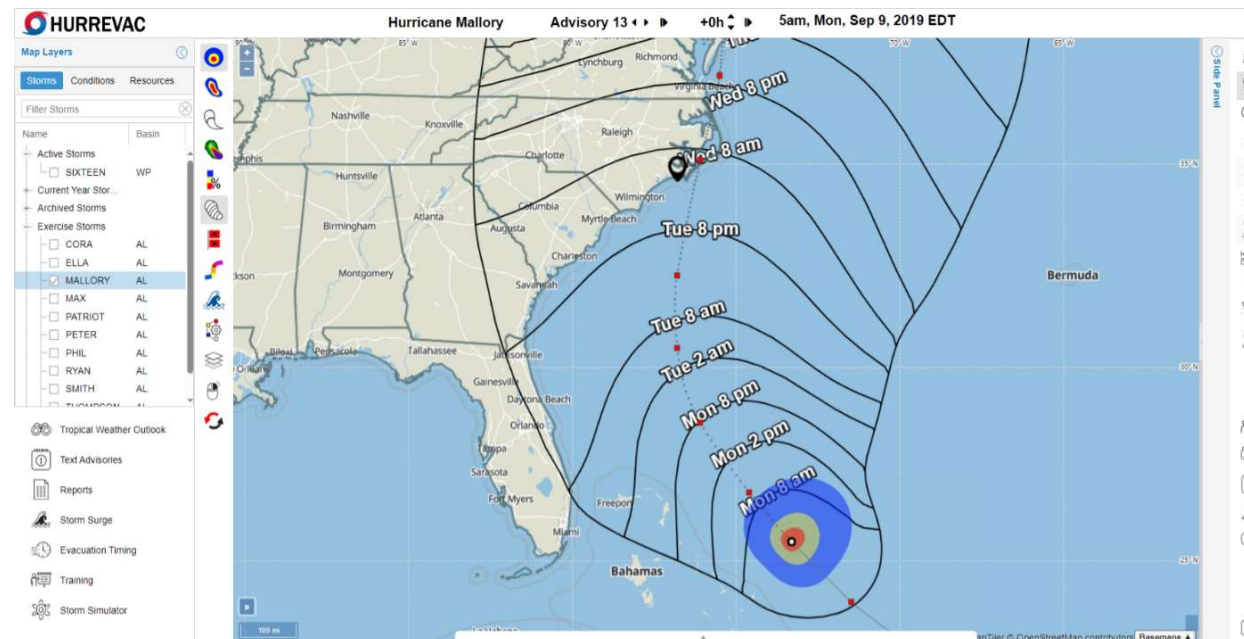
### Evacuation Timing MALLORY #13

09/09/2019, 5:00 am

The purpose of the evacuations timing table is to show, for each location, when the onset of tropical-storm-force winds is expected and provide the earliest and latest times for making evacuation decisions based on the range of evacuation scenarios and settings that the user has selected.

**This report uses your saved Evacuation Scenarios and Timeline actions.**

State	County	Scenario	Earliest-Reasonable TS Onset Time	Most-Likely TS Onset Time	Clearance Time	Earliest Evac Start Time	Latest Evac Start Time	TS WSP (%)
NC	Carteret	B/Slow/Worst/County	Tue 07 PM	Wed 04 AM	39 hrs	Mon 04 AM	Mon 01 PM	93
NC	Carteret	B/Mod/Med SP/County	Tue 07 PM	Wed 04 AM	35 hrs	Mon 08 AM	Mon 05 PM	93
NC	Carteret	B/Fast/High SP/County	Tue 07 PM	Wed 04 AM	34 hrs	Mon 09 AM	Mon 06 PM	93
NC	Carteret	B/Imm/Low SP/County	Tue 07 PM	Wed 04 AM	30 hrs	Mon 01 PM	Mon 10 PM	93



# Calculating Evacuation Start Time

## HAZARDS

**Storm Forecast**



**Arrival Time of Tropical-Storm Winds**



## PLANNING SCENARIOS

**HES Data**

(Hurricane Evacuation Study)  
Pre-Determined Evacuation Zones and Scenarios



**Clearance Time Scenario**



## EVACUATION

**Evacuation Start Time**





# Calculating Evacuation Start Time 2

## HAZARDS

**Storm Forecast**



**Arrival Time of Tropical-Storm Winds**

**47 Hours**

## PLANNING SCENARIOS

**HES Data**

(Hurricane Evacuation Study)  
Pre-Determined Evacuation Zones and Scenarios



**CATEGORY 3**

**Clearance Time Scenario**



**39 Hours**

## EVACUATION

**Evacuation Start Time**

**8 Hours**



# Evacuation Scenarios



FEMA

Evacuation Scenarios | Timeline Actions | Timing Arcs

State:  County:

HURREVAC makes recommendations for evacuation start times based on how long it takes to evacuate a vulnerable population ahead of the arrival of tropical-storm-force winds (34kt/39mph). To utilize this capability of the program, you must first select one or more evacuation scenarios from a region's Hurricane Evacuation Study. Refer to the Study's technical data report, or ask your state's Hurricane Program Manager for guidance on making selections appropriate to a particular storm situation.

[Technical Data Report](#)

**Total Evacuation hours: 39**

Scenario:

Response:

Seasonal Population:

Scope of Reported Time:

# Evacuation Start Times (cont.)



## Evacuation Timing MALLORY #13

09/09/2019, 5:00 am

The purpose of the evacuations timing table is to show, for each location, when the onset of tropical-storm-force winds is expected and provide the earliest and latest times for making evacuation decisions based on the range of evacuation scenarios and settings that the user has selected.

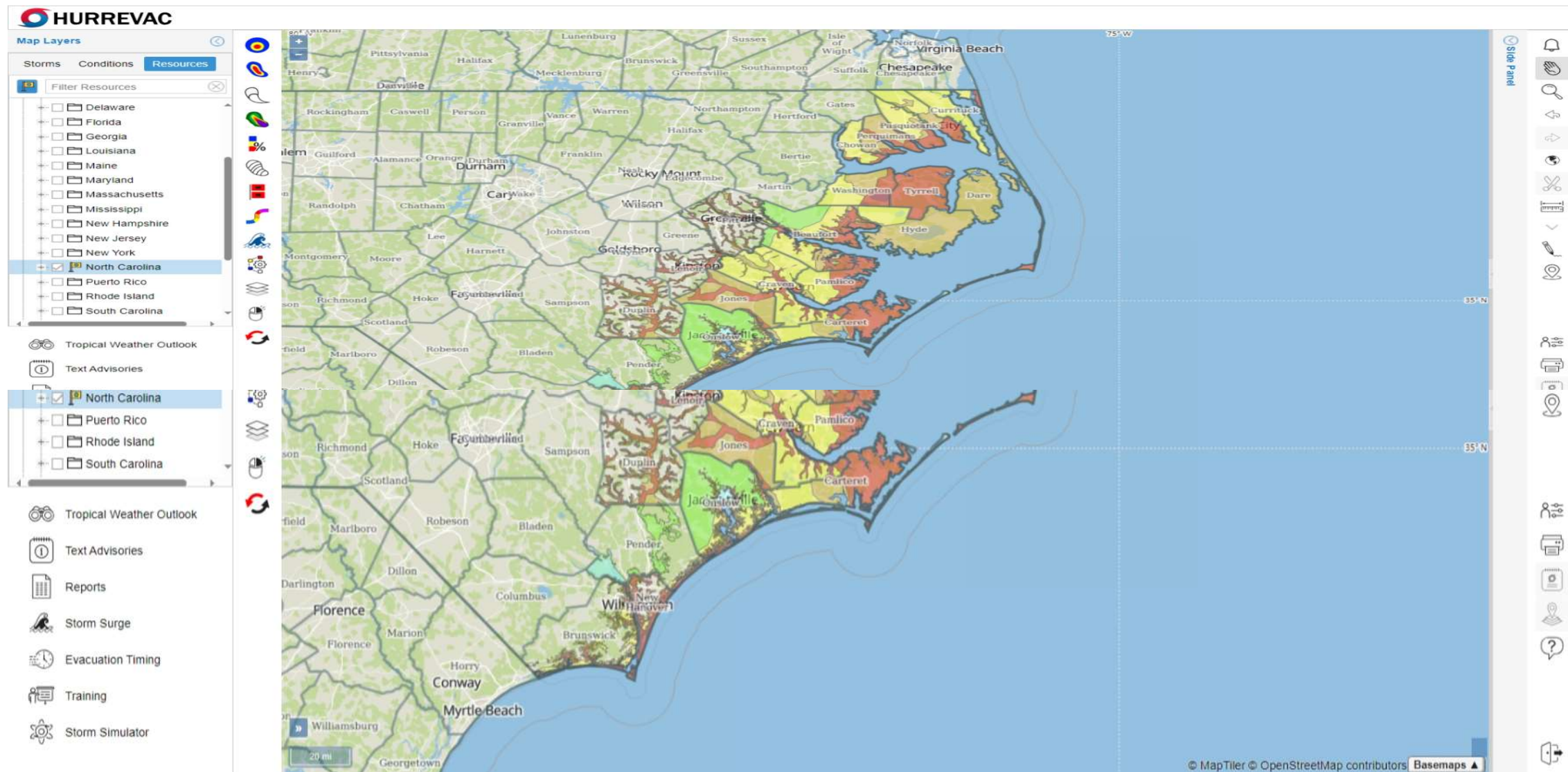
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State	County	Scenario	Earliest-Reasonable TS Onset Time	Most-Likely TS Onset Time	Clearance Time	Earliest Evac Start Time	Latest Evac Start Time	TS WSP (%)
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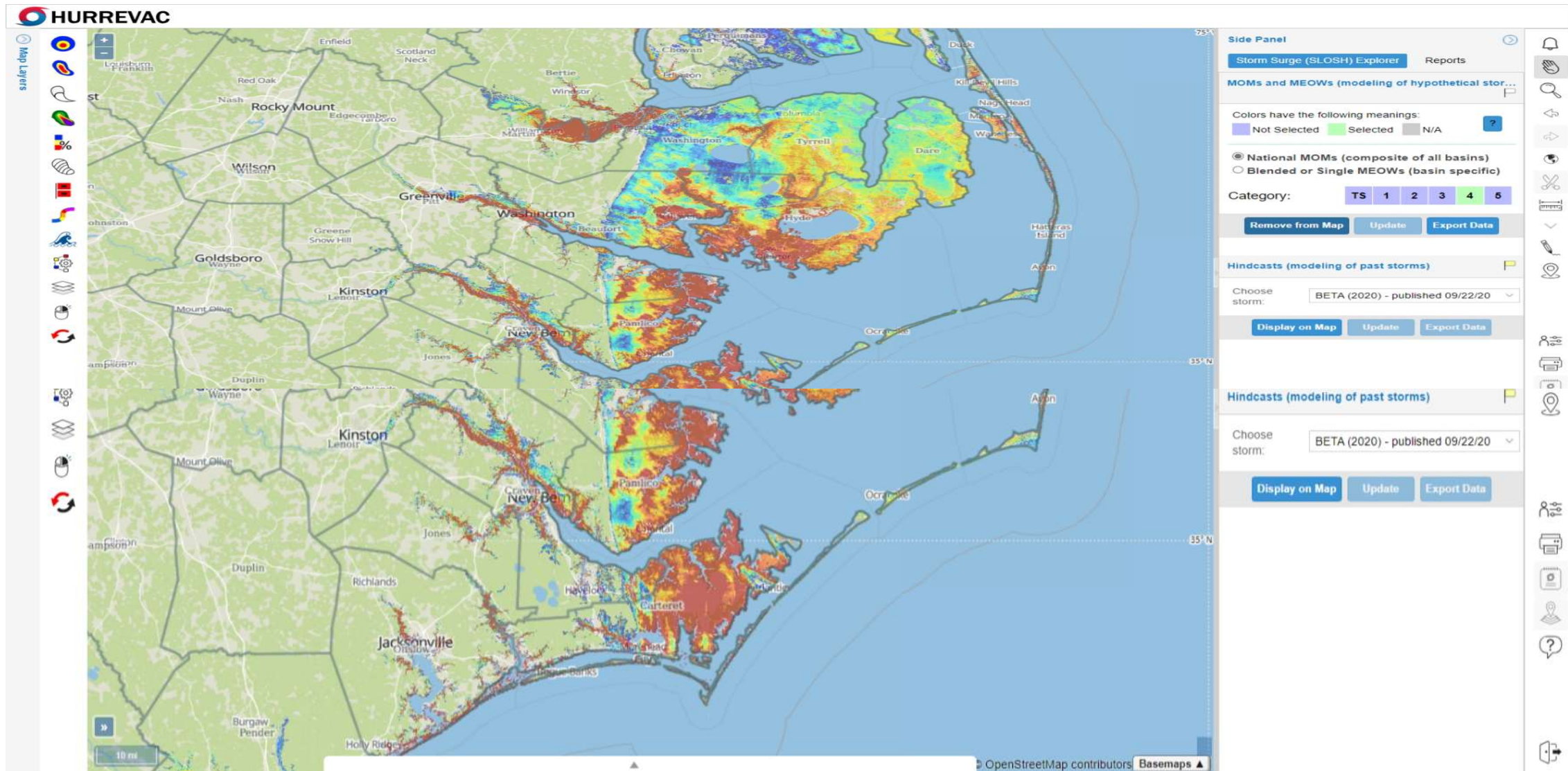
# Evacuation Zones



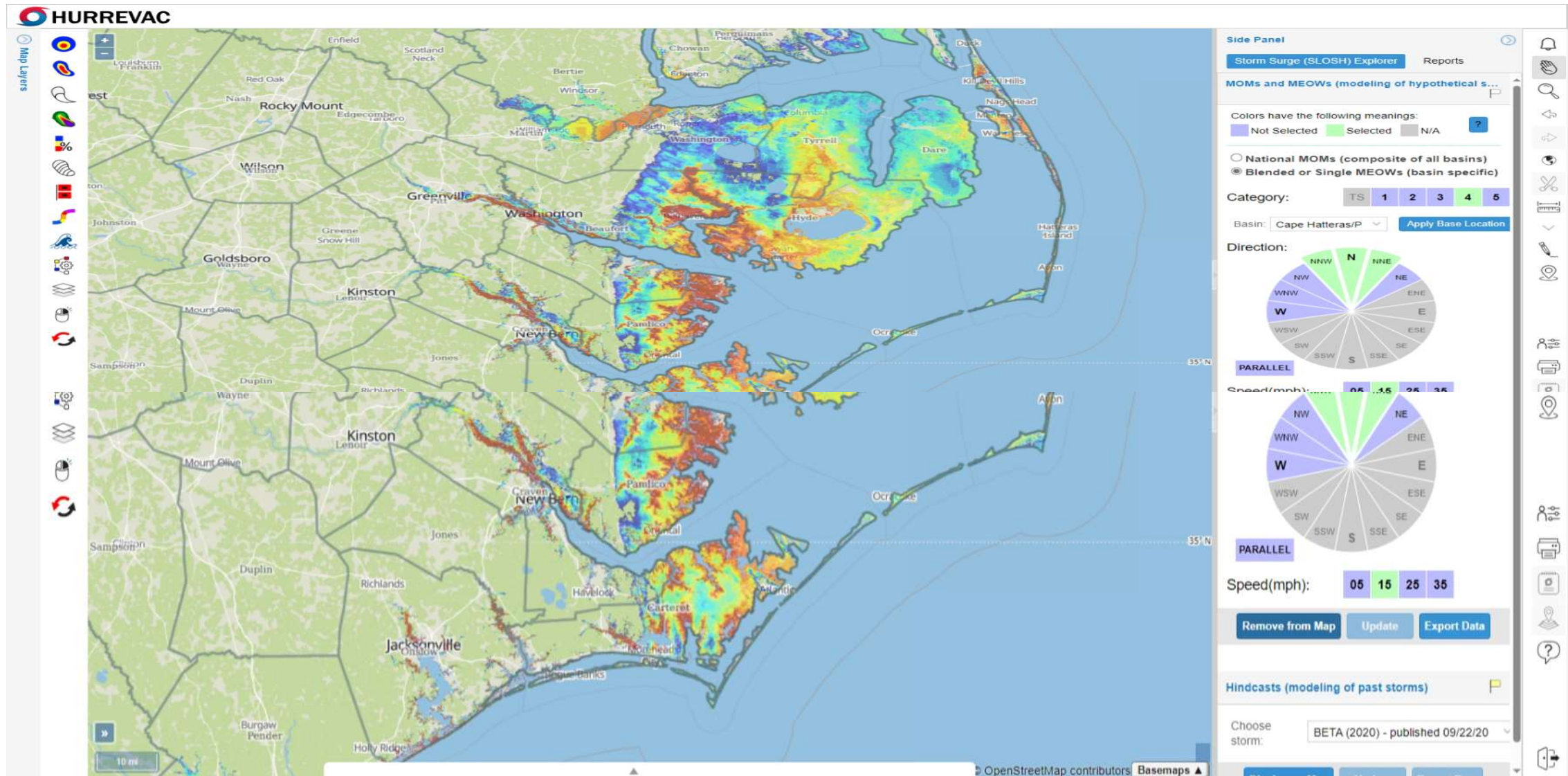
FEMA



# Surge Threat – SLOSH MOMs



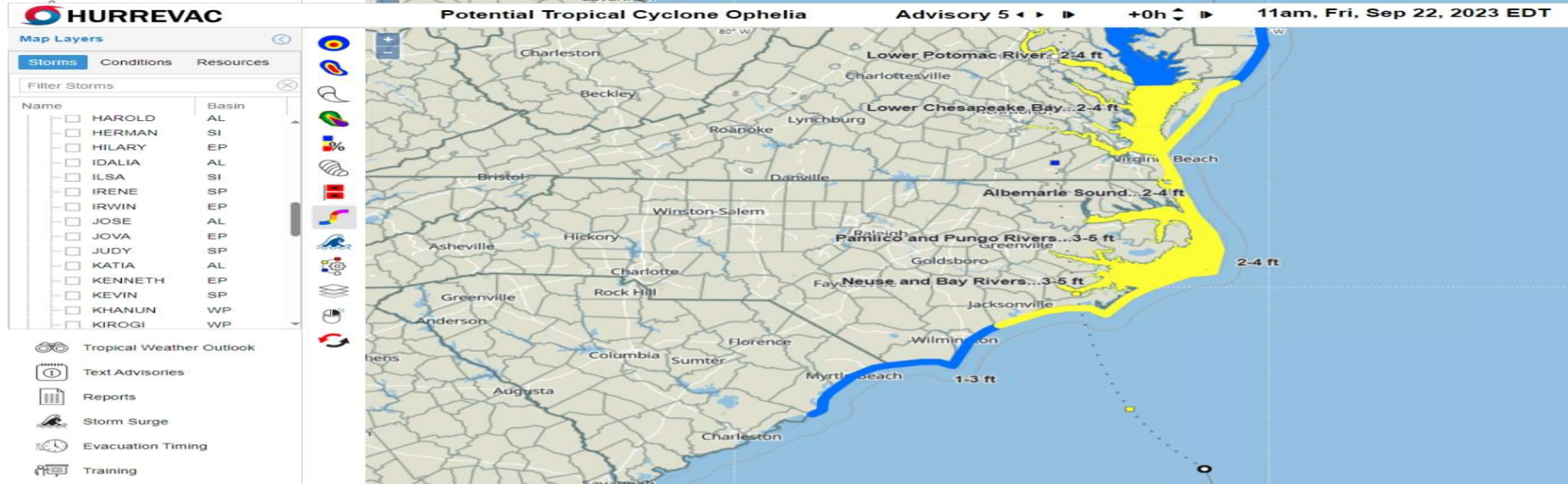
# Surge Threat – SLOSH MEOWs



# Surge Threat – Peak Storm Surge



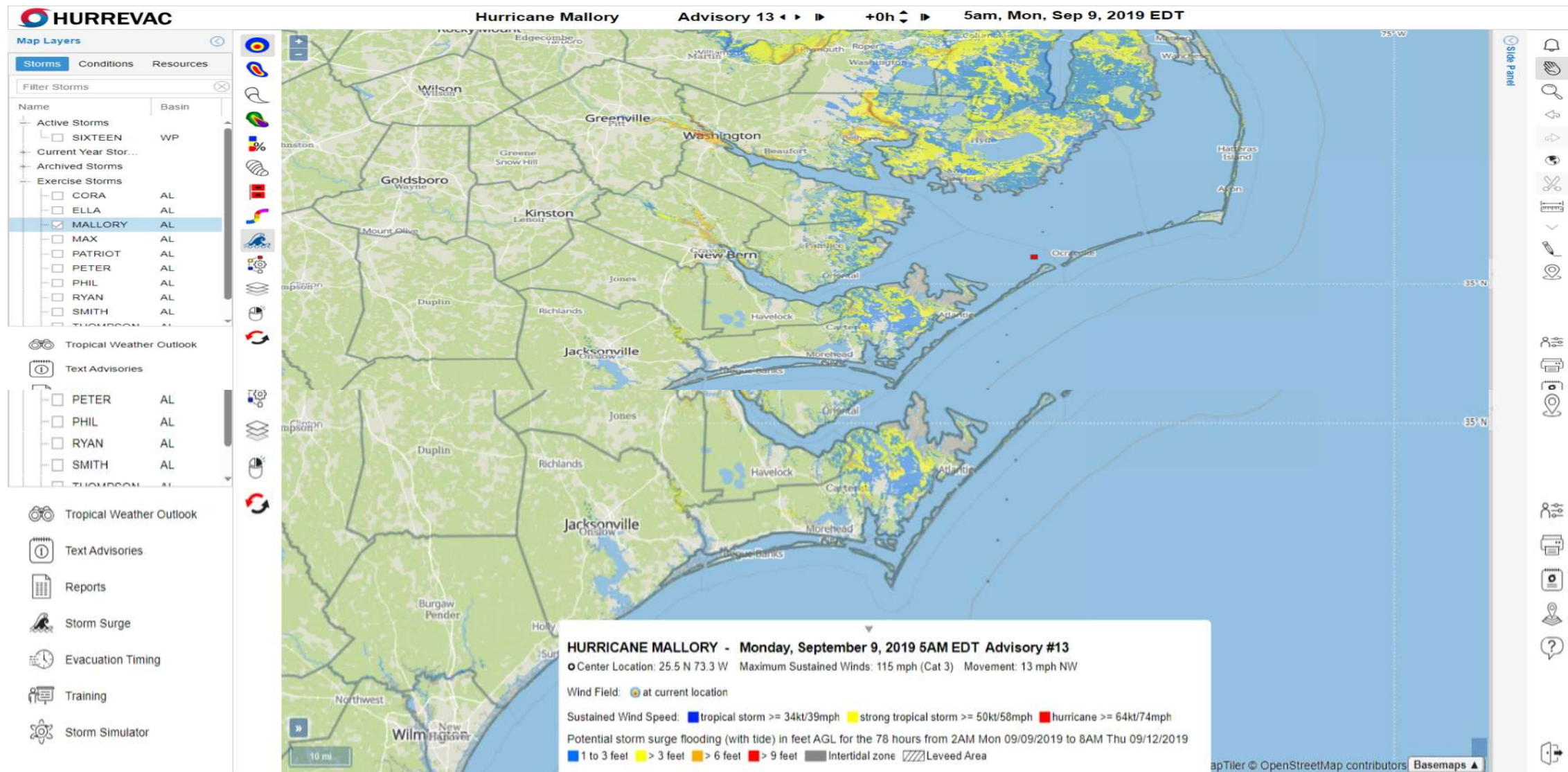
FEMA



# Surge Threat – Potential Inundation



FEMA





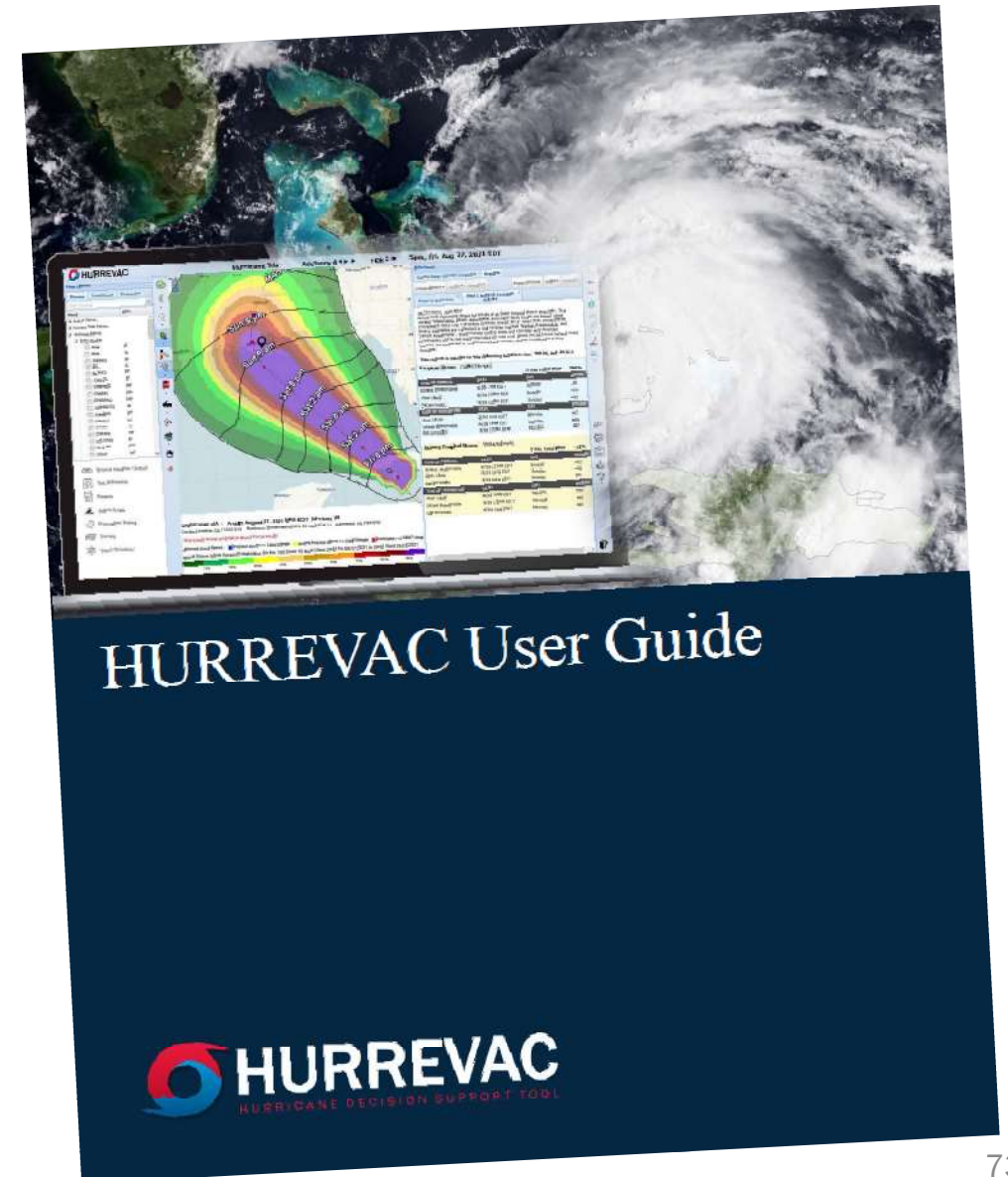
# HURREVAC Account Registration



FEMA

## Registration

- <https://register.hurrevac.com/>



# Frequently Asked Questions 10



## FAQs

- Confidence? Contingencies?
- What is the forecast/evacuation timing?
- Can we get a briefing?

- **Hurricane Liaison Team**

## HLT Background

- **Initial idea arose in the early 1990s**
- **Proven during response to the 1995 Hurricane Season**
  - Erin and Opal
- **Formalized in 1996**
  - Request from Governor of Florida to FEMA and NHC Director
- **Full-time positions at NHC**



# Mission



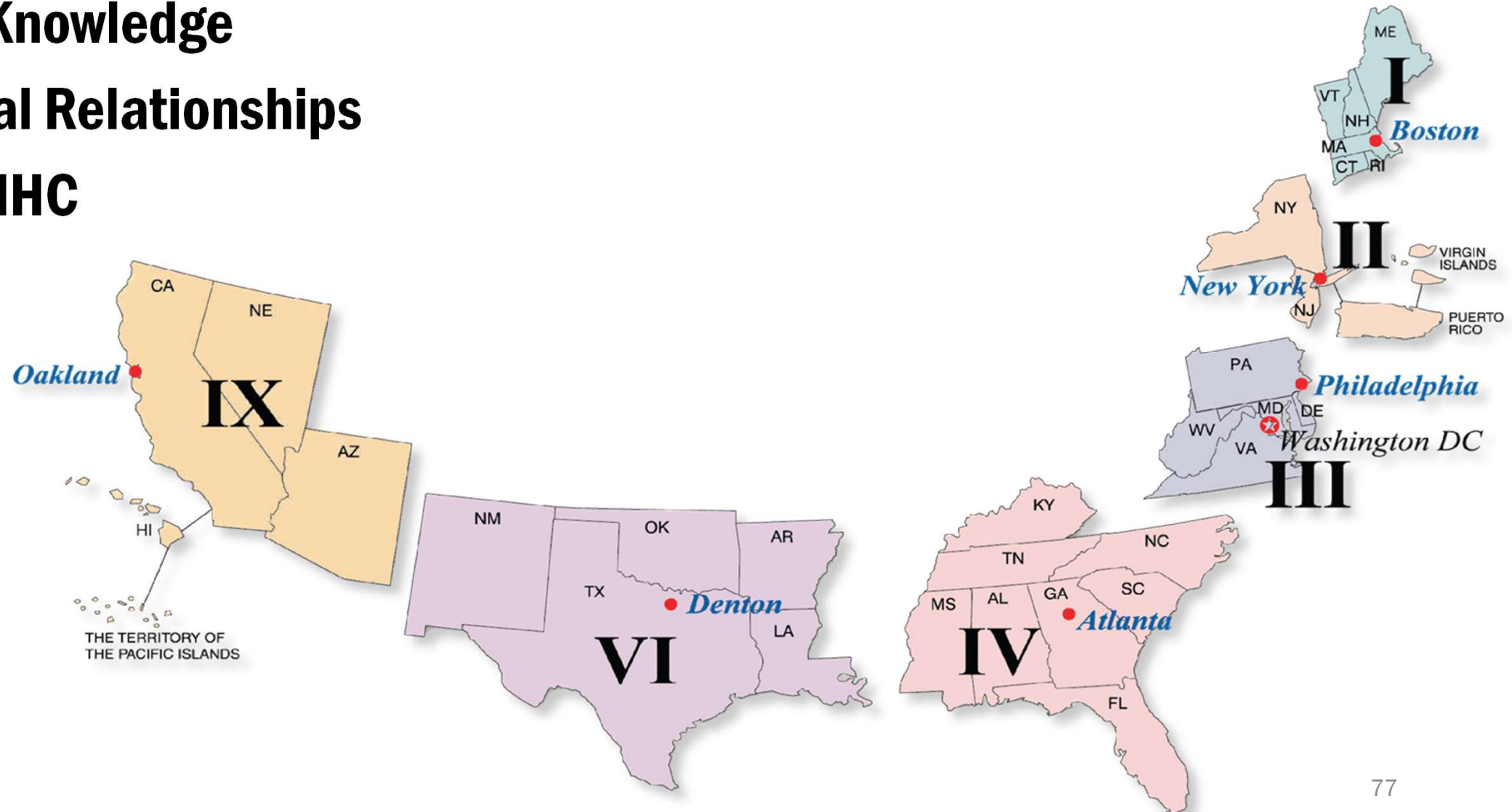
“The Hurricane Liaison Team’s mission is to **improve our Nation’s capability to respond to hurricanes through the rapid exchange of critical information** between the National Hurricane Center and Federal, State, Local, Tribal and Territorial Emergency Managers.”



# Regional Program Managers



- **Technical Knowledge**
- **State/Local Relationships**
- **Deploy to NHC**



## HLT Responsibilities

- **Real-time interpretation, assessment, and guidance**
  - Apply NHC forecasts with Regional, State, and local response evacuation plans
- **Forum for EMs to ask questions**
  - Reinforce decisions
  - Assist with the use of NHC forecasts and predictive modeling
- **Provide NHC visibility on EM protective actions**
  - Improve messaging





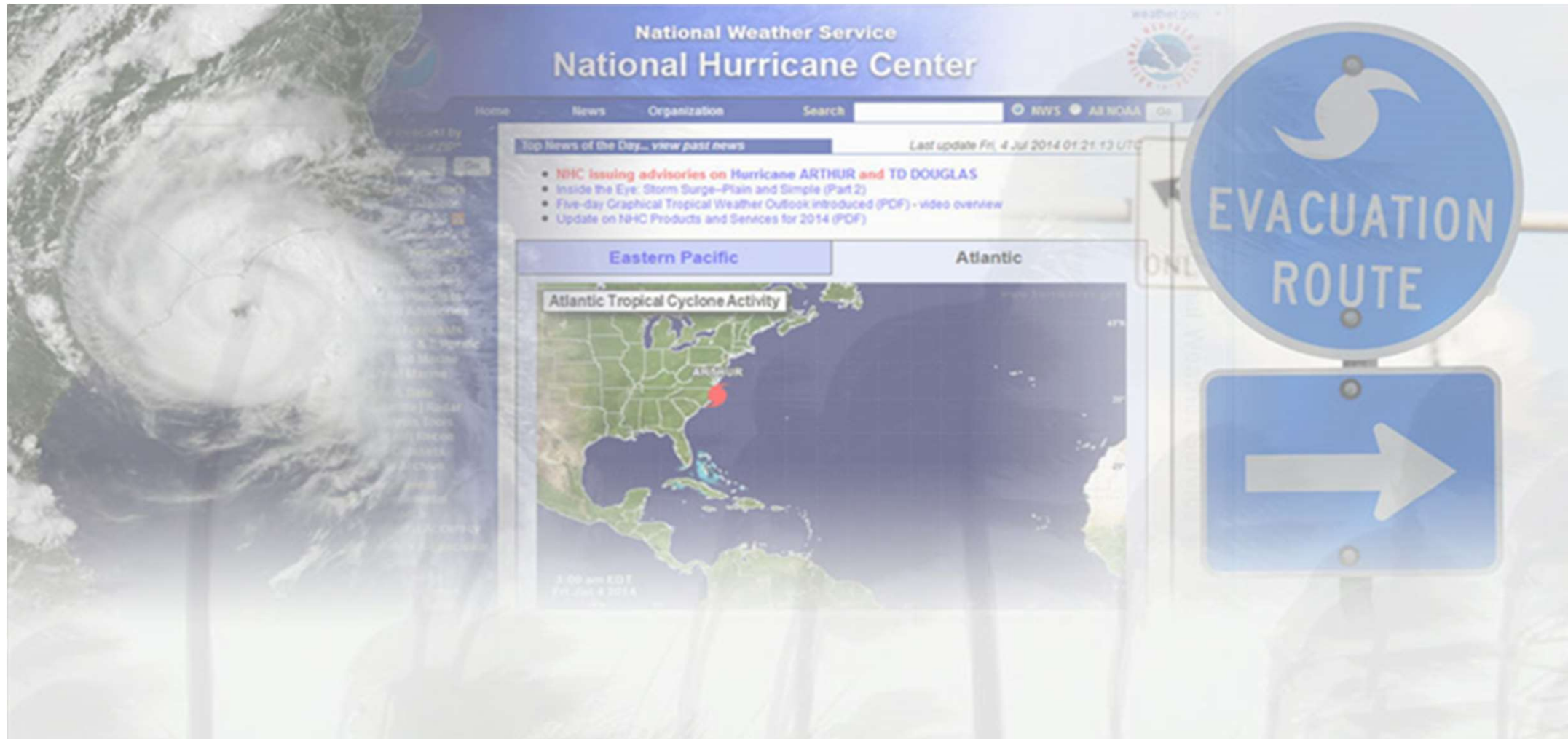
## Unit Review

- **Identify the components of the Hurricane Evacuation Study (HES).**
- **Explain clearance times and their use.**
- **Identify the capabilities of HURREVAC.**
- **Apply NHP products and services for planning and operational purposes.**

# Questions/Comments



FEMA







## Course Review

- **Unit 1: Explain the hurricane life cycle, climatology, and associated hazards to coastal communities.**
  
- **Unit 2: Describe when NHC products are available for tropical cyclone events and how to use them to determine threats from an approaching storm.**



## Course Review

- **Unit 3: Explain the uncertainties of NHC forecasts that must be considered in emergency management decision making.**
  - **Describe the storm surge threat and how to assess potential impacts.**
- **Unit 4: Explain the components of Hurricane Evacuation Studies (HES) and how they can inform planning for hurricanes.**
  - **Identify the resources available for evacuation planning and response and how to use them.**

# EMI Evaluation Form



**USE NO. 2 PENCIL OR BLUE-BLACK PEN**  
**WRITE HEAVY, DARK MARKS**  
**DO NOT COMPLETELY TO CHANGE**  
**SAMPLE**

**NATIONAL EMERGENCY TRAINING CENTER**  
**EMERGENCY MANAGEMENT INSTITUTE**  
**FEMA**

**COURSE EVALUATION FORM**

**PARTICIPANT PROFILE**

**COURSE TITLE**  
**LOCATION (CITY/STATE)**  
**COURSE MANAGER**

**1. SEX** Male  Female

**2. AGE** Under 21  21-30  31-40  41-50  51-60  Over 61

**3. LOCATION OF YOUR WORK ORGANIZATION** Under 25  25-50  51-100  101-500  Over 500

**4. INDICATE THE TYPE OF ORGANIZATION IN WHICH YOU HAVE AN EMERGENCY MANAGEMENT ROLE.**

<b>GOVERNMENT</b>	<b>PRIVATE SECTOR</b>	<b>VOLUNTARY SERVICE</b>
Federal <input type="checkbox"/>	Business <input type="checkbox"/>	Red Cross <input type="checkbox"/>
State <input type="checkbox"/>	Industry <input type="checkbox"/>	Church Organization <input type="checkbox"/>
County <input type="checkbox"/>	Other <input type="checkbox"/>	Scouts <input type="checkbox"/>
City/Town <input type="checkbox"/>		RACES <input type="checkbox"/>
Special District <input type="checkbox"/>		Cap <input type="checkbox"/>
Other <input type="checkbox"/>		Other <input type="checkbox"/>

**5. IF YOU WORK IN A LOCAL GOVERNMENT INDICATE THE SIZE OF THE POPULATION IN WHICH YOU SERVICE**

Less than 40,000 <input type="checkbox"/>	40,001 - 200,000 <input type="checkbox"/>	200,001 - 500,000 <input type="checkbox"/>	More than 500,000 <input type="checkbox"/>
Council, Board or Commission Member <input type="checkbox"/>	Chief Executive/Administrator <input type="checkbox"/>	Emergency Management <input type="checkbox"/>	Fire Service <input type="checkbox"/>
Law Enforcement <input type="checkbox"/>	Public Works/Utilities <input type="checkbox"/>	Electrical Official <input type="checkbox"/>	Appointed Executive <input type="checkbox"/>
Department Head <input type="checkbox"/>	Supervisor <input type="checkbox"/>	Training Specialist <input type="checkbox"/>	Other <input type="checkbox"/>

**6. YEARS OF EXPERIENCE IN EMERGENCY MANAGEMENT:** Less than 1  1-5  6-10  11-15  16-20  Over 20

**7. YEARS OF FORMAL EDUCATION:** Less than 12  13-14  15-16  17-18  Over 18

**8. INDICATE YOUR PRIMARY EMERGENCY MANAGEMENT ROLE.**

Rescue <input type="checkbox"/>	Shelter/Evacuation <input type="checkbox"/>	Radiological <input type="checkbox"/>	Medical <input type="checkbox"/>	Other <input type="checkbox"/>
---------------------------------	---	---------------------------------------	----------------------------------	--------------------------------

**9. YEARS OF FORMAL EDUCATION:** Less than 12  13-14  15-16  17-18  Over 18

**SHADE IN THE RESPONSE CLOSEST TO YOUR OPINION (SPACE PROVIDED ON NEXT PAGE FOR DISAGREEMENT)**

	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
<b>10. PRINTED MATERIAL WERE:</b> a. well organized b. complete c. readable (print size)					
<b>11. AUDIO-VISUAL MATERIALS WERE:</b> a. suited to the course b. good quality c. in appropriate number					
<b>12. INSTRUCTION:</b> a. materials were related to class needs b. subject was thoroughly covered c. participation was encouraged d. course expectations, requirements and objectives were made clear					
<b>13. CLASSROOM:</b> a. well ventilated b. included a manageable number of students c. well equipped for the course					
<b>14. COURSE:</b> a. used a variety of instructional methods b. was a reasonable length c. was worth recommending to others					
<b>15. MY KNOWLEDGE OF THE SUBJECT:</b> a. increased after completing this course b. was already adequate before I took the course					

- Please complete
- Rate topics and instructors from Scale of 1 (lowest) - 5 (highest)
- Write in comments to improve the training!