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UNIT FOUR
Making Better Decisions

MAKING BETTER DECISIONS

What have we learned today?

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MAKING BETTER DECISIONS

What are best practices?

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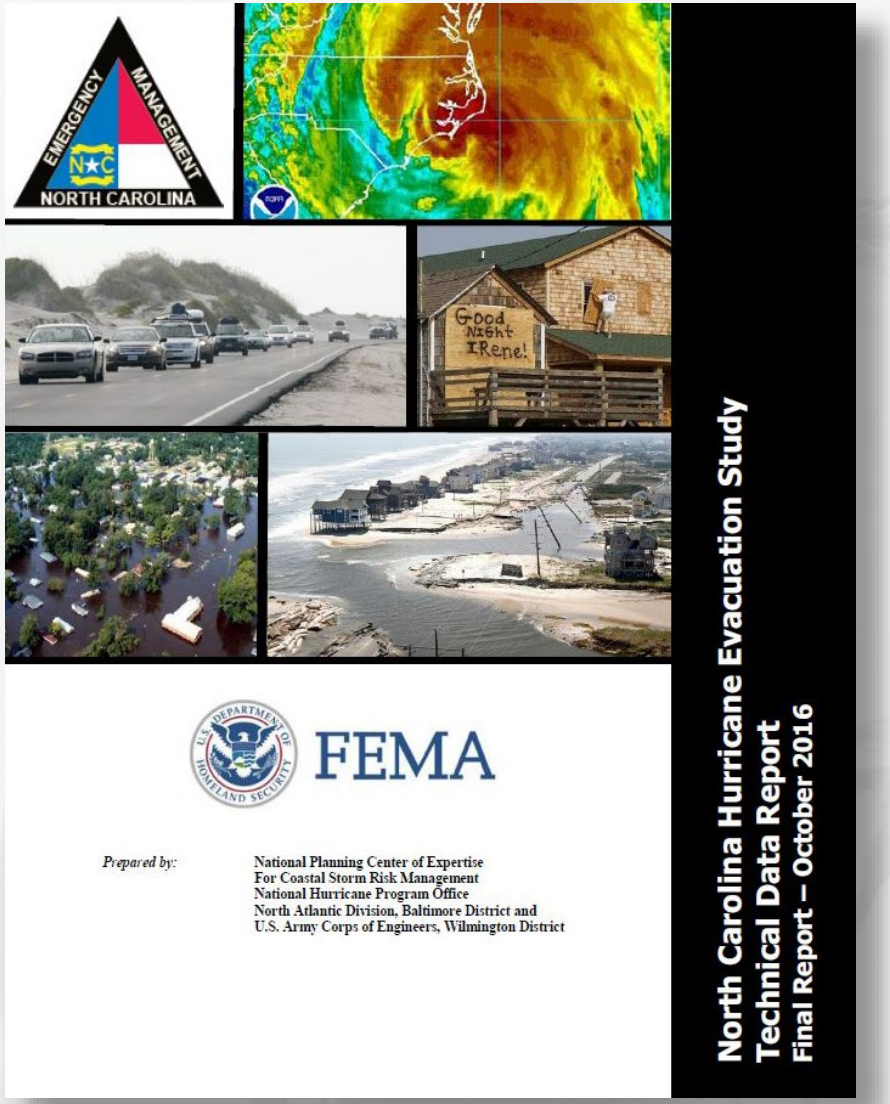
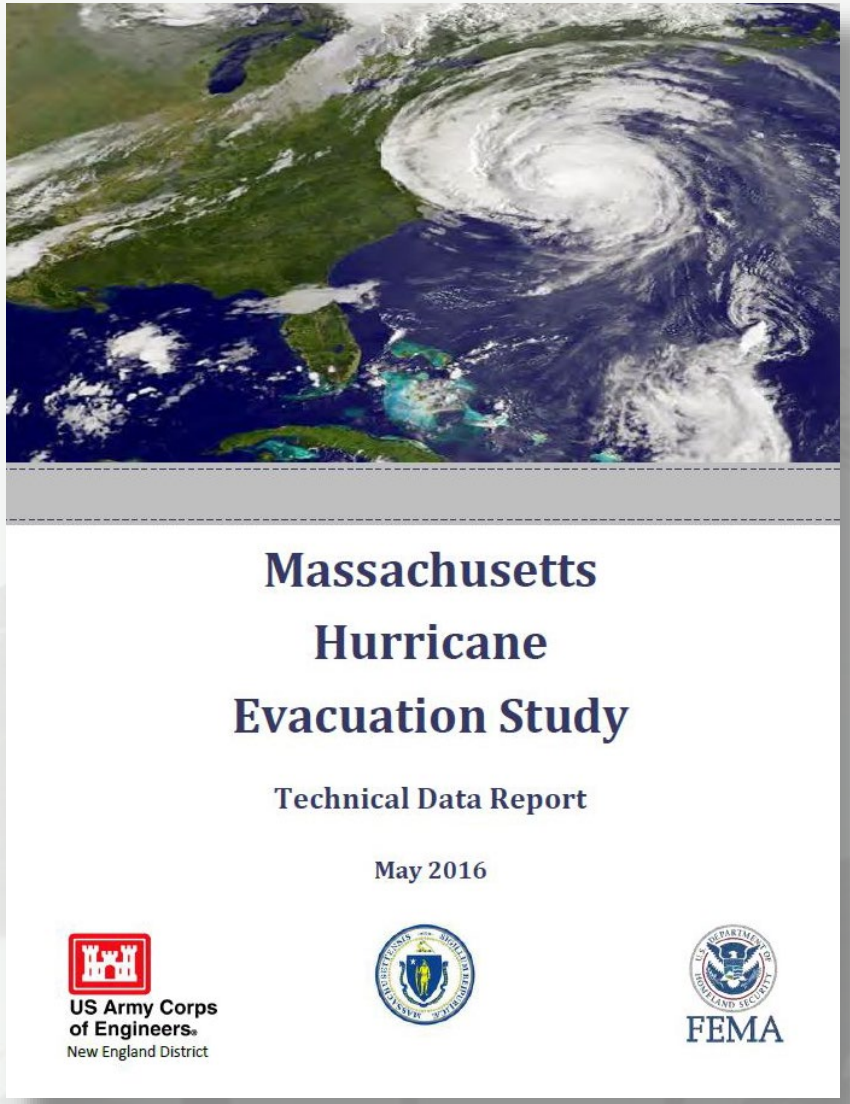
BETTER INFORMATION
Locally Informed Data and Analyses





INFORMED PLANS

It's not the Plan, it's the Process.

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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

INFORMED DECISIONS

Right Tools. Right Time. Right Reason.

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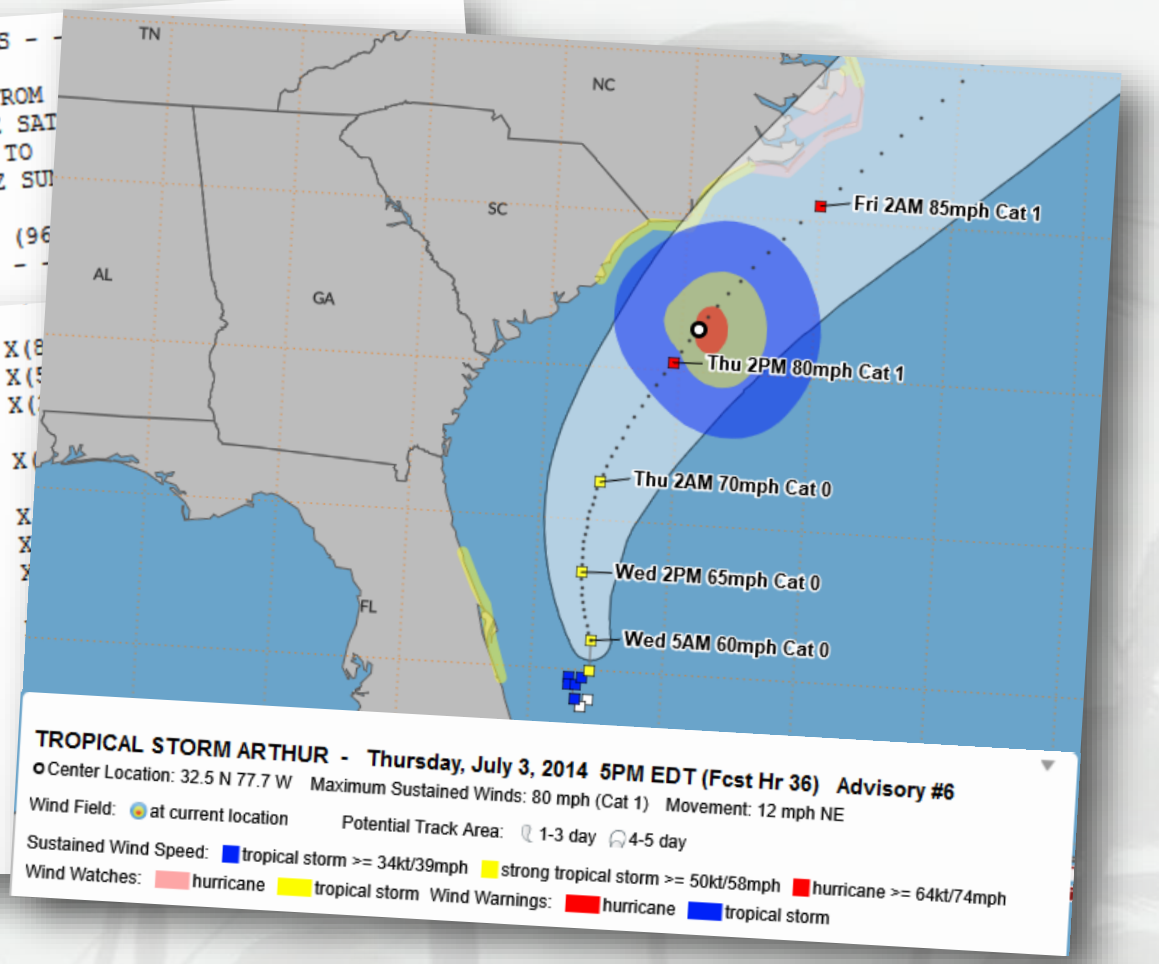
- - - - WIND SPEED PROBABILITIES FOR SELECTED LOCATIONS - -

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
FORECAST HOUR		(12)	(24)	(36)	(48)	(72)	(96
LOCATION	KT						
CAPE HATTERAS	34 X	2(2)	32(34)	48(82)	X(82)	X(8
CAPE HATTERAS	50 X	X(X)	4(4)	48(52)	1(53)	X(5
CAPE HATTERAS	64 X	X(X)	1(1)	20(21)	X(21)	X(
CHARLOTTE NC	34 X	2(2)	3(5)	X(5)	X(5)	X
MOREHEAD CITY	34 1	3(4)	55(59)	16(75)	X(75)	X
MOREHEAD CITY	50 X	X(X)	20(20)	21(41)	X(41)	X
MOREHEAD CITY	64 X	X(X)	4(4)	11(15)	X(15)	X
WILMINGTON NC	34 1	5(6)	46(52)	3(55)	X(55)	
WILMINGTON NC	50 X	X(X)	16(16)	3(19)	X(19)	
WILMINGTON NC	64 X	X(X)	4(4)	1(5)	X(5)	
COLUMBIA SC	34 1	2(3)	3(6)	1(7)	X(7)	
MYRTLE BEACH	34 1	9(10)	28(38)	2(40)	X(40)	
MYRTLE BEACH	50 X	1(1)	6(7)	X(7)	X(7)	
MYRTLE BEACH	64 X	X(X)	1(1)	X(1)	X(1)	



MAKING BETTER DECISIONS

Study. Plan. Execute.

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MAKING BETTER DECISIONS

Study. Plan. 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

BETTER INFORMATION
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

BETTER INFORMATION
How do the hazards affect you?

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RESOURCES

- **Hurricane Evacuation Study**
- **THIRA** *Threat and Hazard Identification and Risk Assessment*
- Flood Risk Maps
- HAZUS Modeling
- Historical events
- **Local Knowledge**

BETTER INFORMATION
Hurricane Evacuation Study

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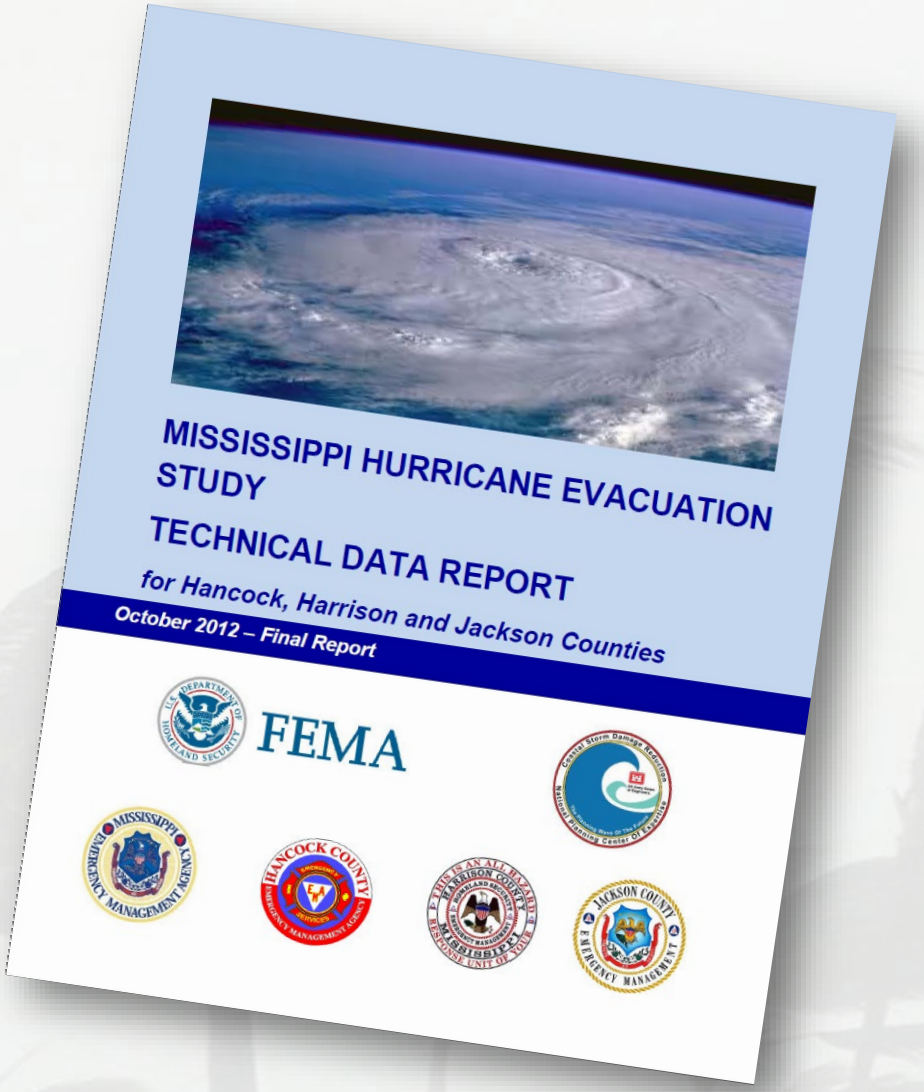
HES COMPONENTS

- **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**
  Where is traffic going to back up?



FAQs

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

- **Hazard Analysis**

HAZARD ANALYSIS

SLOSH. GIS Mapping. Surge Maps.

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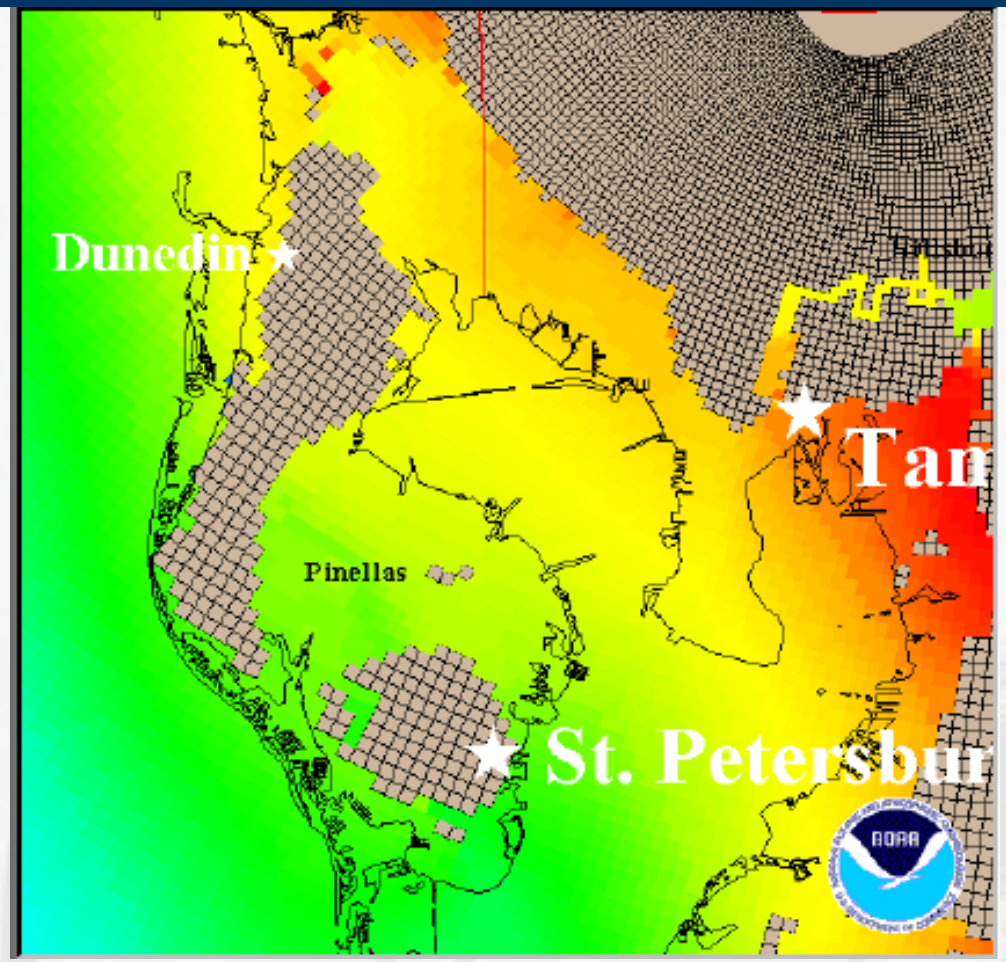

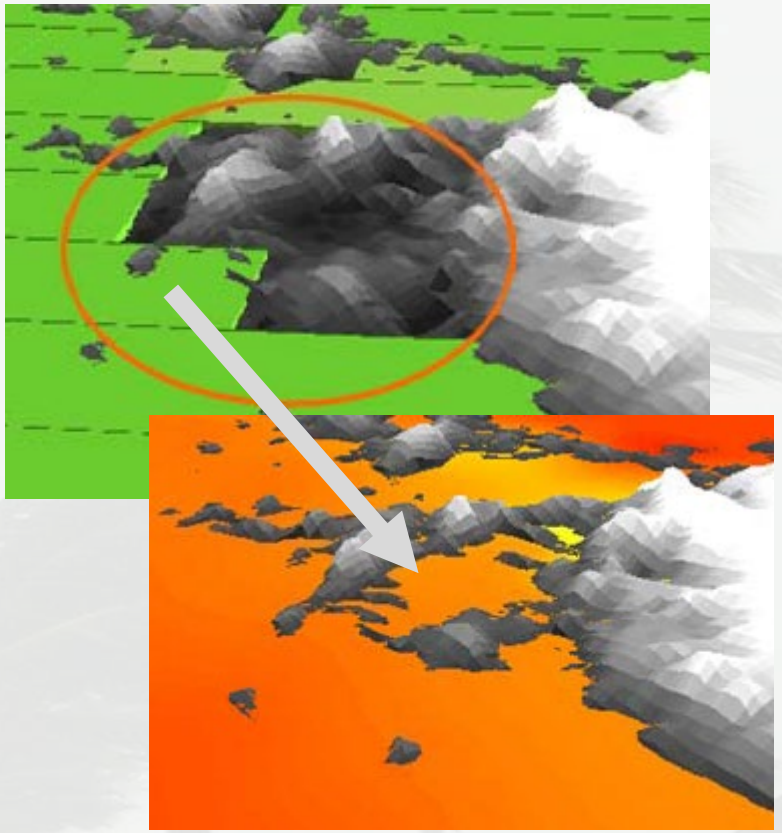

SLOSH Output by category, overlaid on a Digital Elevation Model

HAZARD ANALYSIS
What's wet and what's dry?

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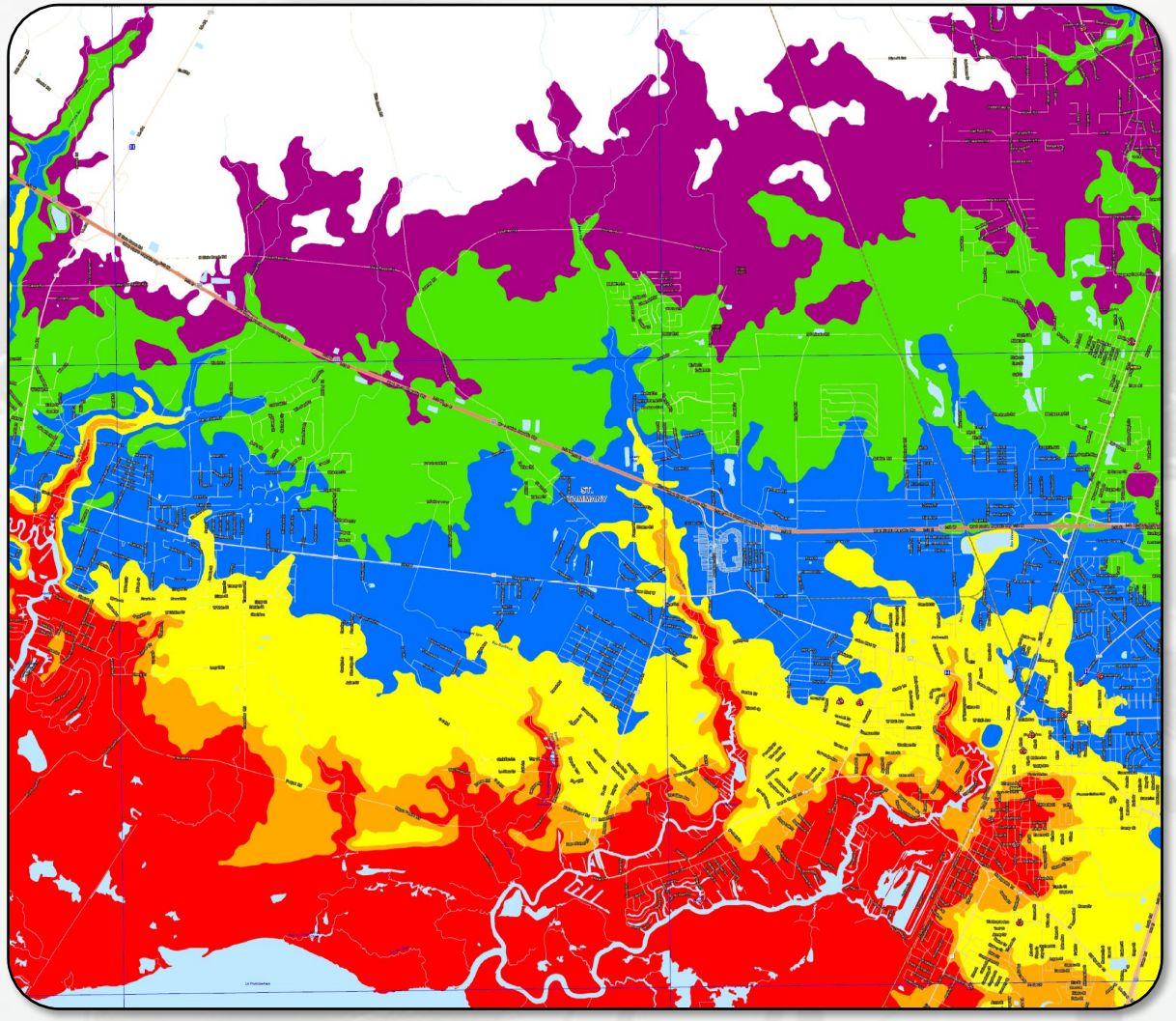


AREAS OF POSSIBLE FLOODING

- 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

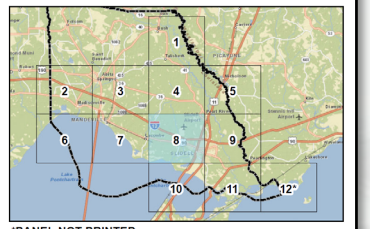
PANEL 8

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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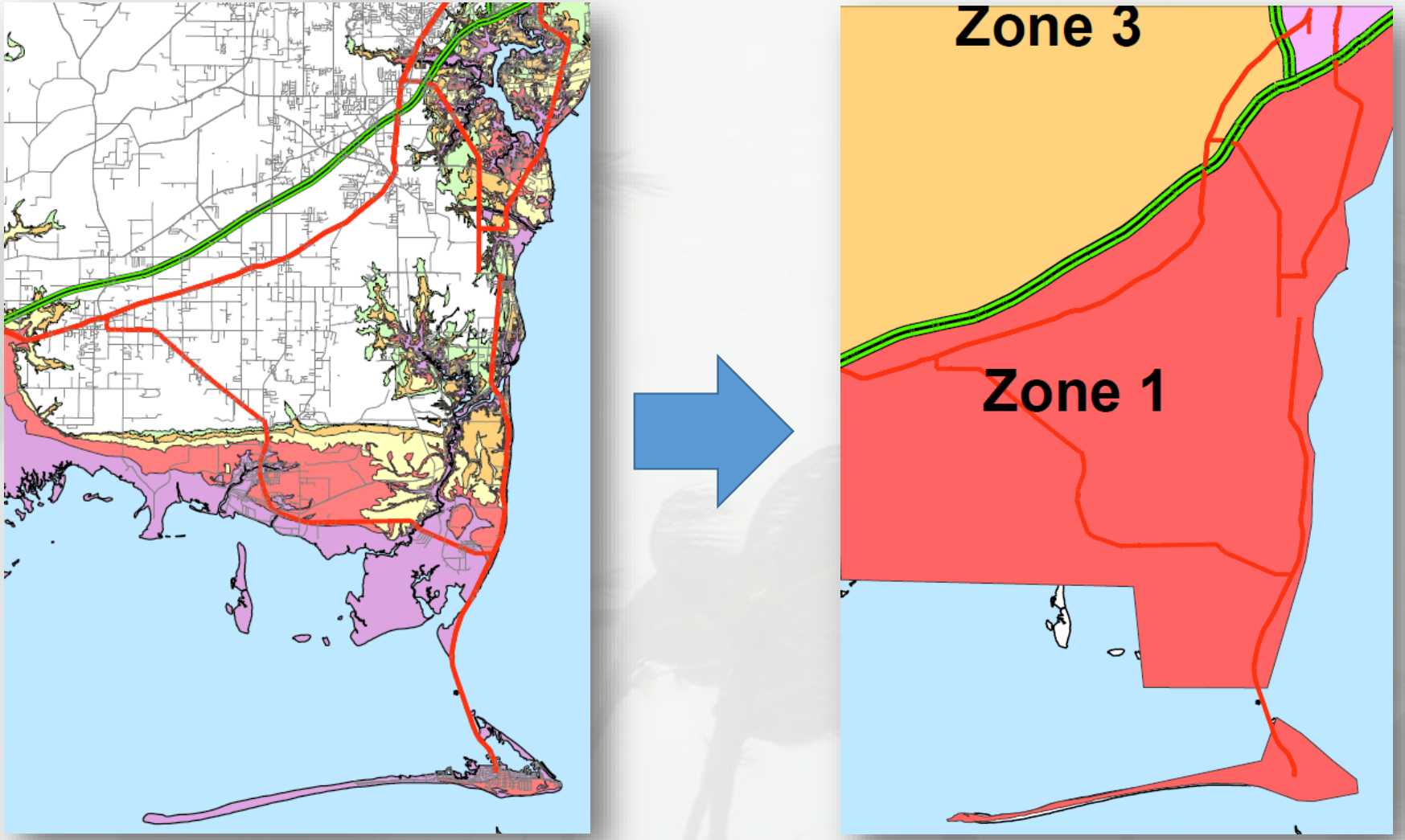
NOAA

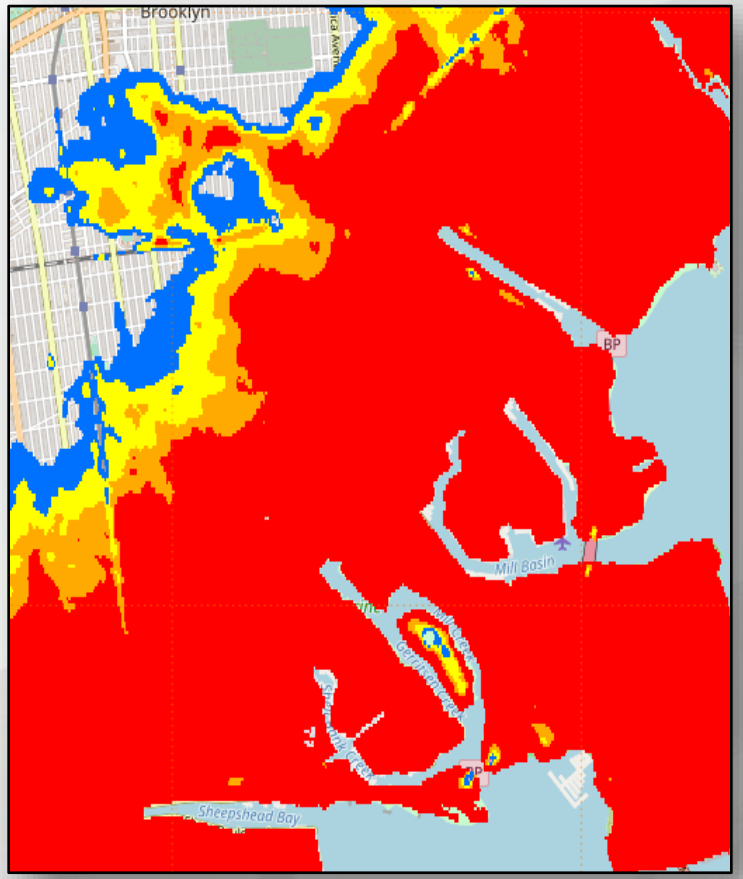
HAZARD ANALYSIS
Building evacuation zones

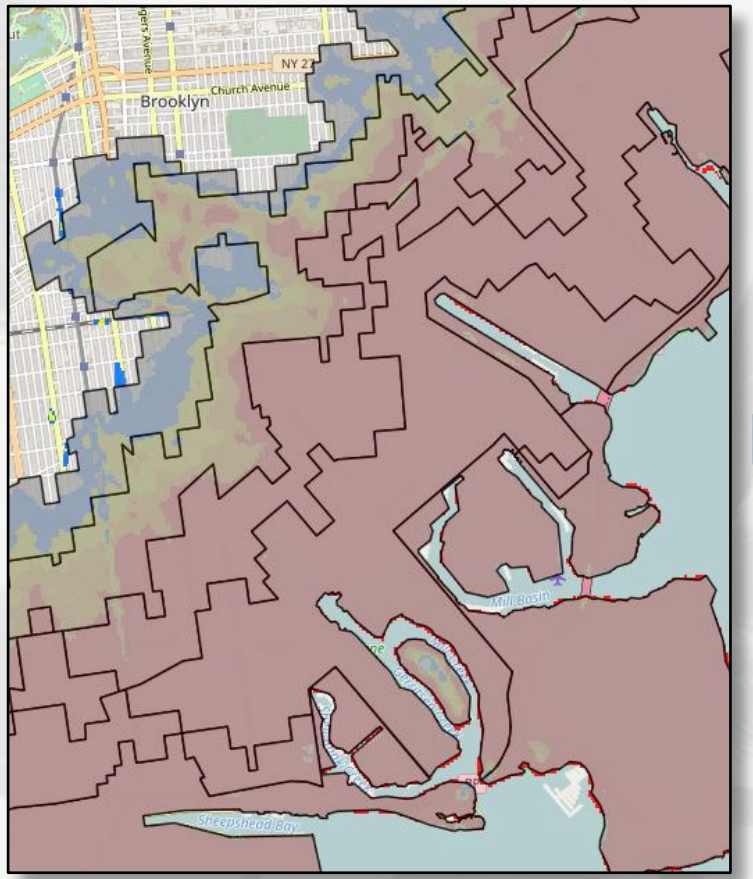


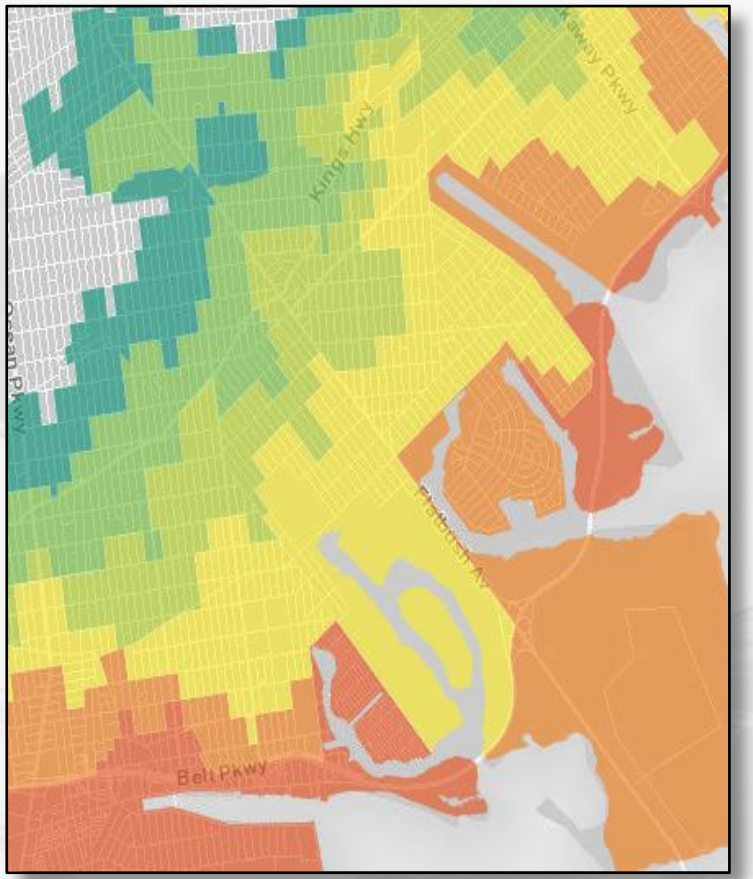
HAZARD ANALYSIS

Building evacuation zones with MOMs

FEMA



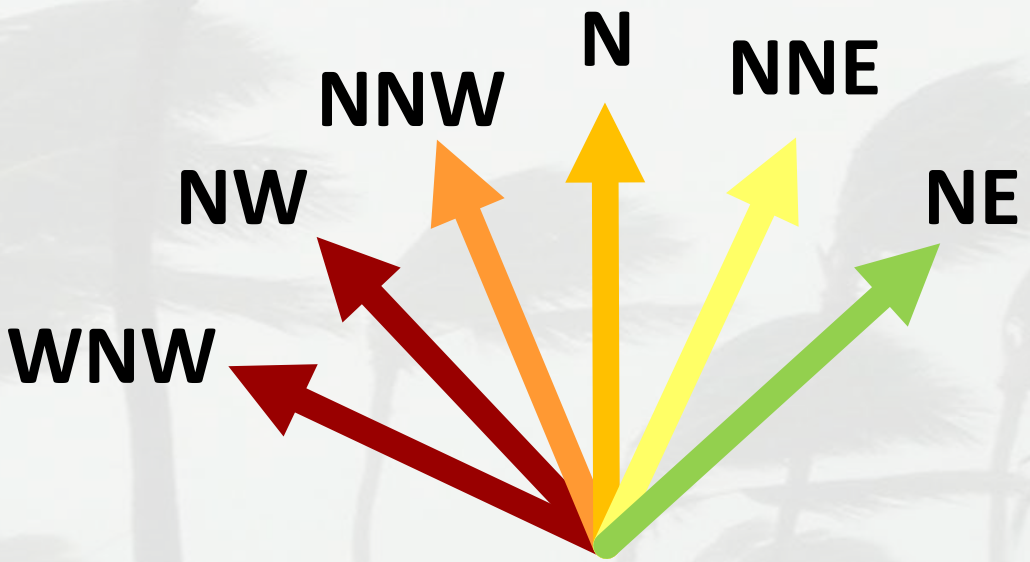




Zone 1 Zone 2 Zone 3
Zone 4 Zone 5 Zone 6

HAZARD ANALYSIS
NYC Surge heights by bearing (MEOWS)

	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



HAZARD ANALYSIS
NYC evacuation zones

FEMA

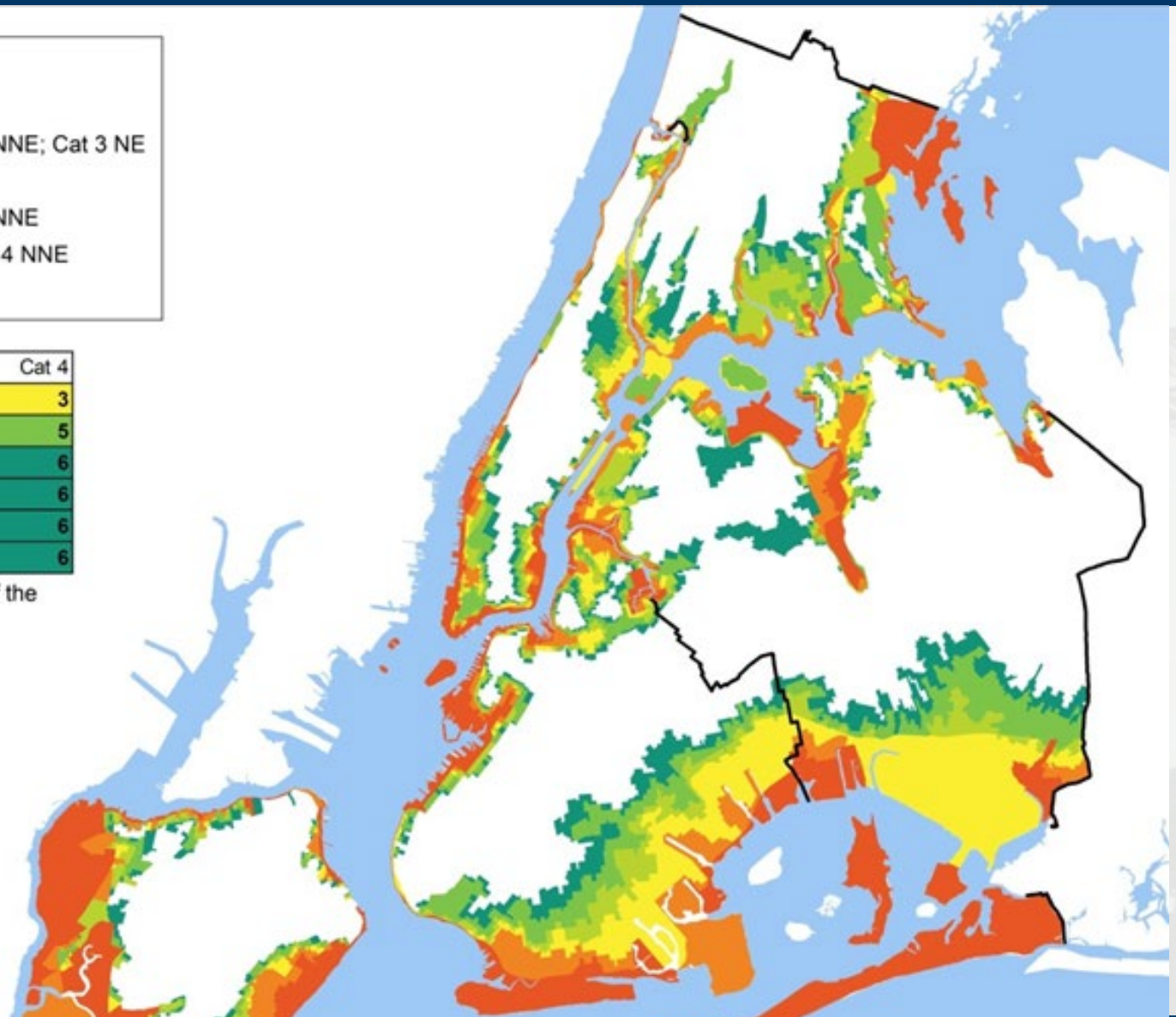
Hurricane evacuation zones

- 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



FAQs

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

- **Vulnerability Analysis**

VULNERABILITY ANALYSIS
Who's at risk from storm surge?

FEMA

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

Table 3-7: Vulnerable Structures by Storm Surge Area

Mississippi Hurricane Evacuation Study – Technical Data Report – 2012

VULNERABILITY ANALYSIS
What facilities are at risk?

FEMA

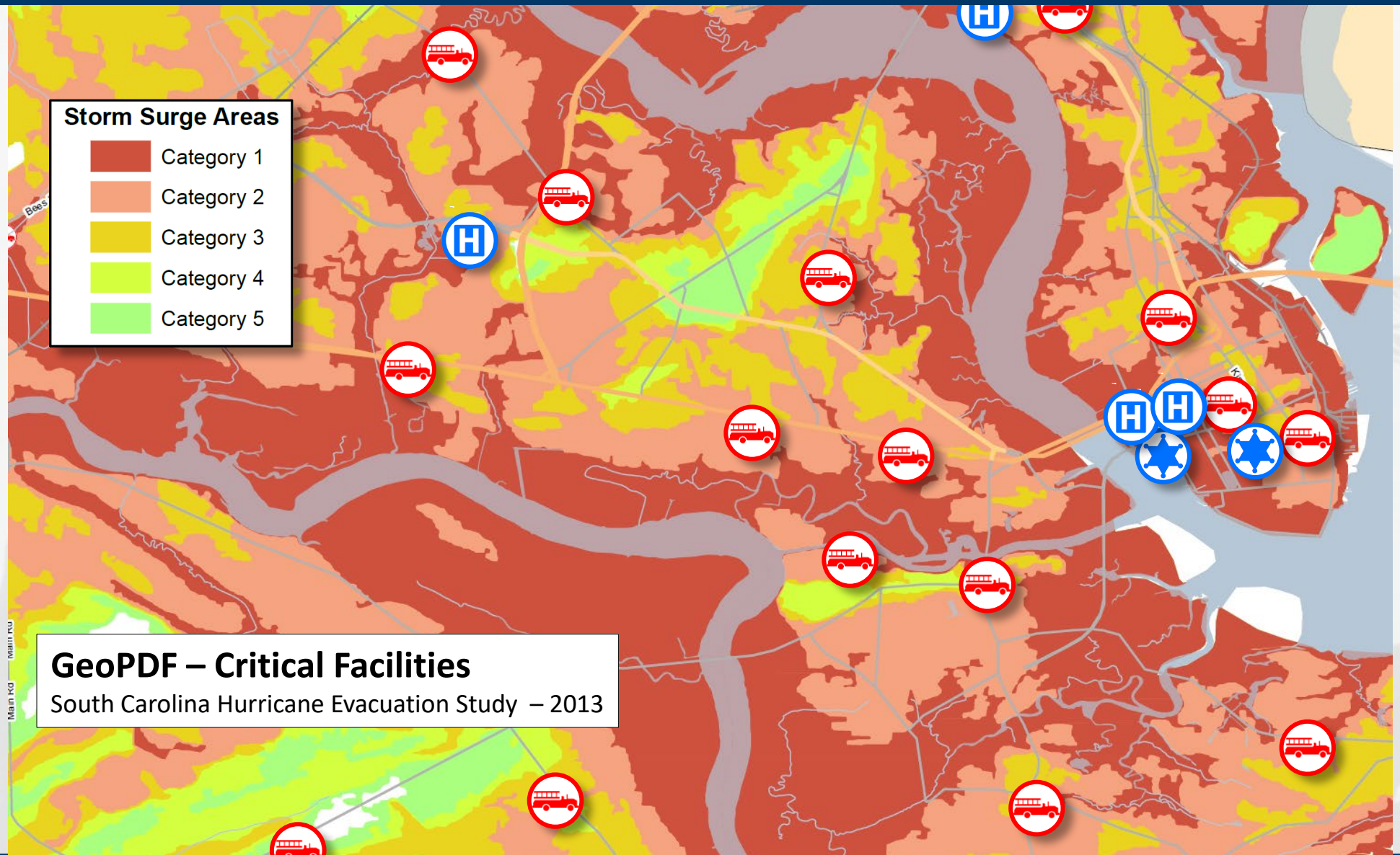
Hancock County, MS						
Facility Type	**Cat 1**	**Cat 2**	**Cat 3**	**Cat 4**	**Cat 5**	**None**
Casino	**2**	-	-	-	-	-
Dam	-	-	-	**3**	-	**19**
EOC	-	-	-	-	**1**	-
Fire	**3**	**2**	**4**	**1**	**1**	**4**
Hazmat	-	**4**	-	-	-	**1**
Hospital	-	-	**1**	-	-	-
Hotels	**2**	**2**	**5**	-	-	**1**
Police	-	-	**4**	-	-	-
School	**1**	**3**	**6**	**1**	-	**1**
Senior Center	-	-	**1**	-	-	-
Shelter	-	-	-	-	-	**5**
TOTAL	**7**	**12**	**25**	**6**	**2**	**32**

Table 3-9: Critical Facilities Summary Table

Mississippi Hurricane Evacuation Study – Technical Data Report – 2012

VULNERABILITY ANALYSIS
What facilities are at risk (GIS)?

FEMA



FAQs

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

- **Behavioral Analysis**

BEHAVIORAL ANALYSIS
What are people thinking?

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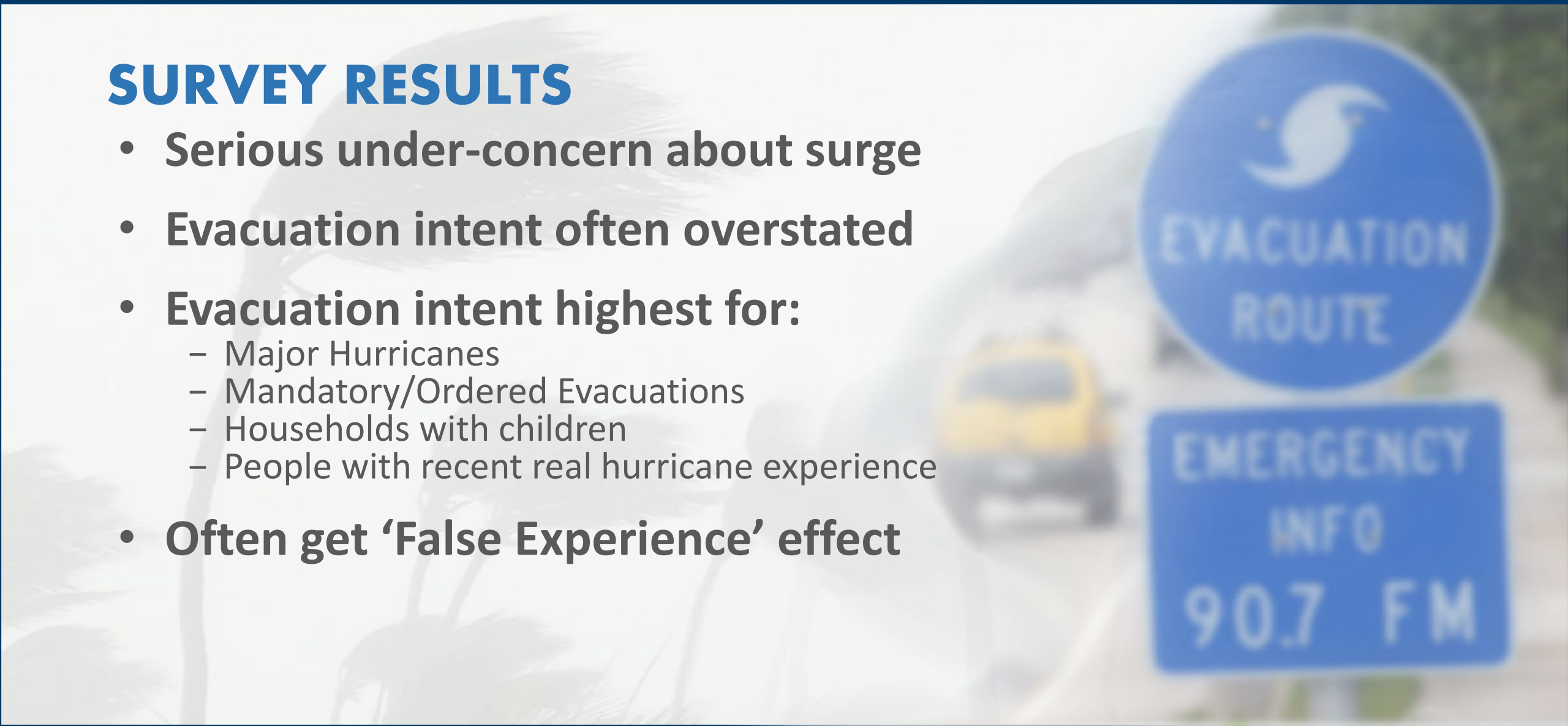
SURVEY RESULTS

- Serious under-concern about 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



BEHAVIORAL ANALYSIS
Will the Public evacuate?

FEMA

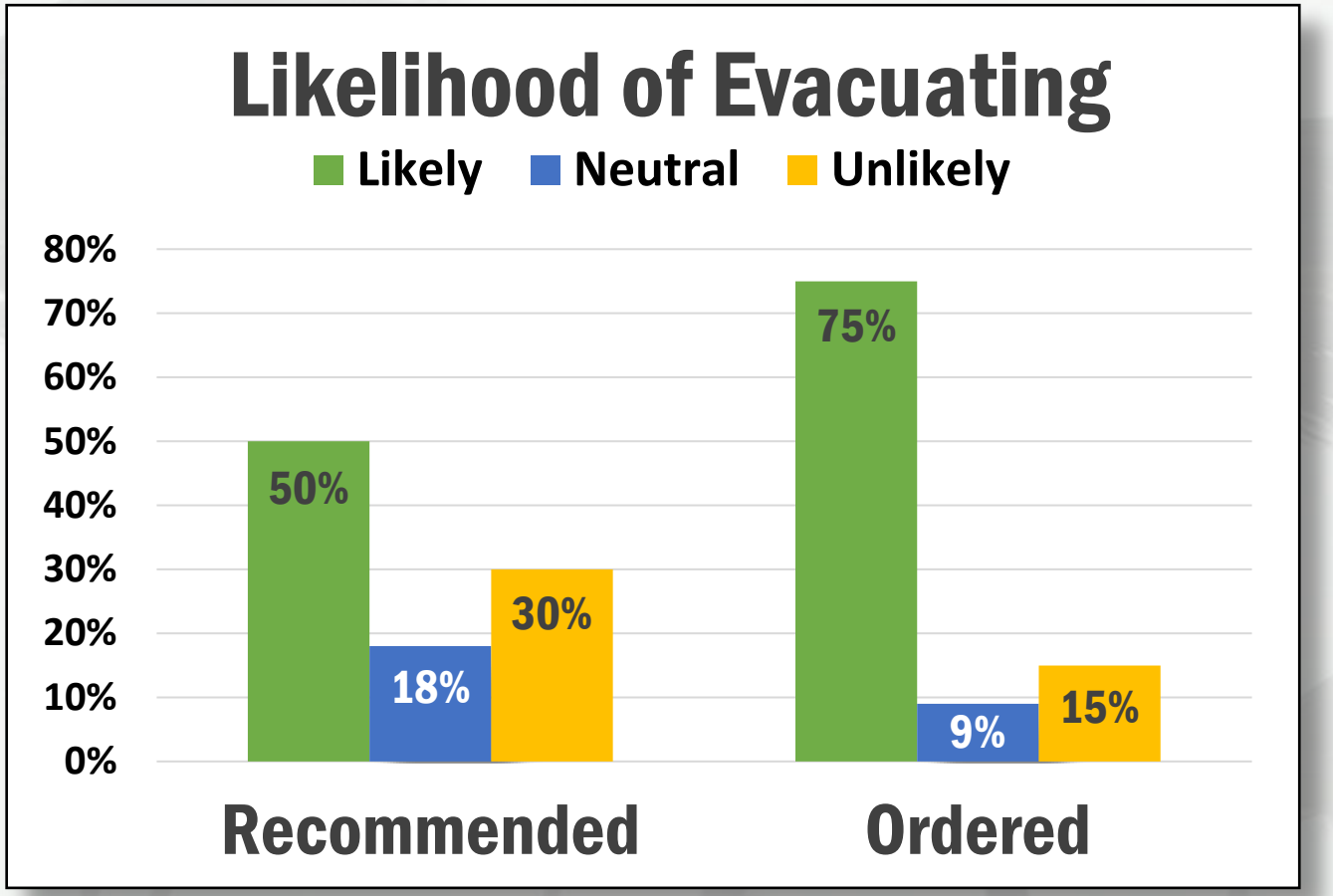


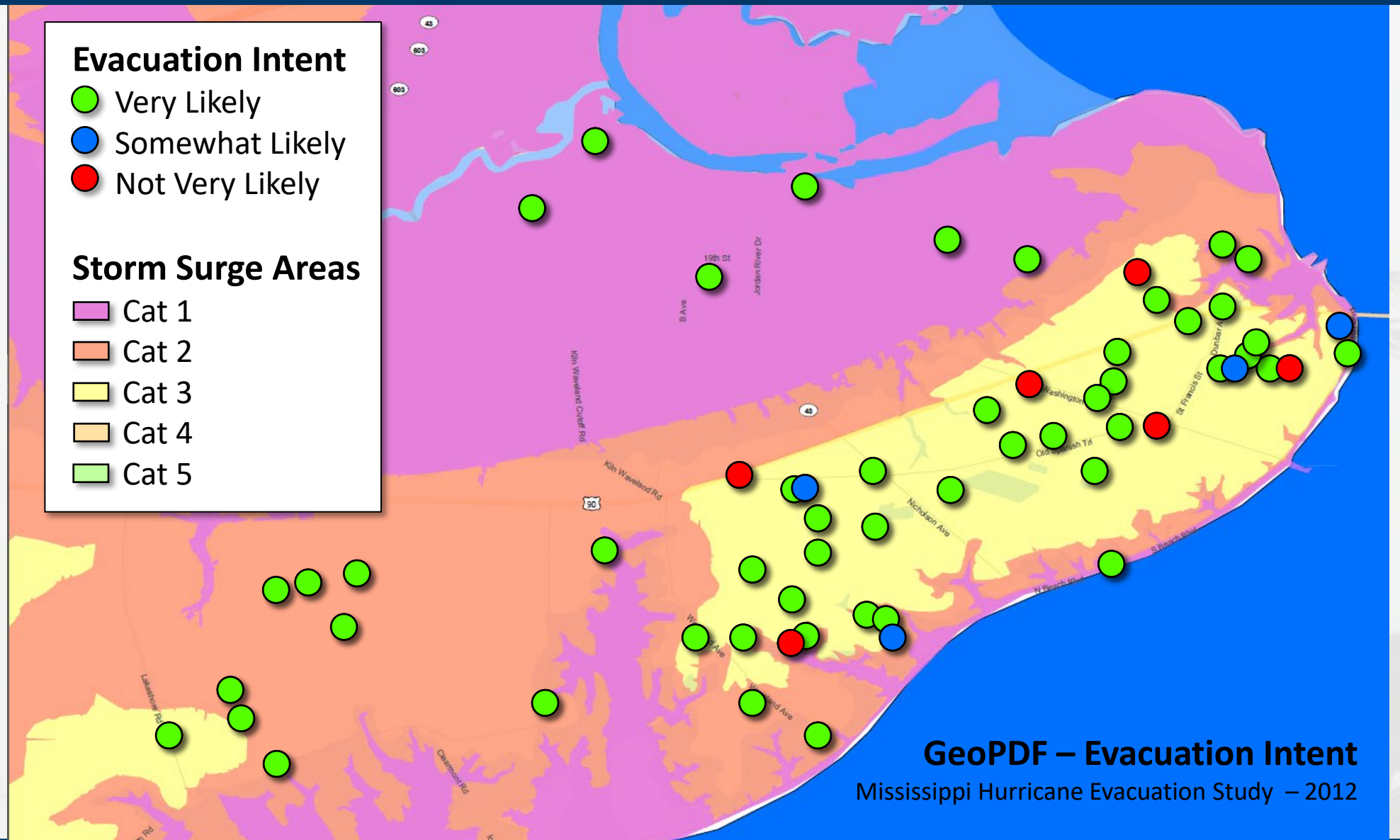
Figure 4-7: Cat 1-2 Hurricane and Likelihood of Leaving if Recommended or Ordered

South Carolina Hurricane Evacuation Study – Technical Data Report – 2013

BEHAVIORAL ANALYSIS

Where should I focus my outreach?

FEMA



BEHAVIORAL ANALYSIS
Bottom Line

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WHY DO PEOPLE EVACUATE?

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

FAQs

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

- **Shelter Analysis**

SHELTER ANALYSIS

- **Shelter Locations**, with respect to Evacuation Zones and Storm Surge flood risk areas
- **Potential Demand**
- **Identification of Deficits**

Shelter usage rates (planning purposes)

- 3-8% Coastal
- 10% Inland

SHELTER ANALYSIS
How many shelter spaces are needed?

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Baldwin County, AL							
Evacuation Scenario	Total Evacuating People		Public Shelter Demand		Sheltering Capacity	Surplus/Deficit	
	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy		Low Occupancy	High Occupancy
Category 1	60,660	101,821	1,576	1,990	8,239	6,663	6,249
Category 2	103,871	151,069	2,909	3,384	7,469	4,560	4,085
Category 3	113,773	162,005	3,567	4,052	7,469	3,902	3,417
Category 4	184,748	234,032	8,528	9,025	2,818	**-5,710**	**-6,207**
Category 5	211,125	260,502	10,898	11,295	0	**-10,898**	**-11,395**

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

Alabama Hurricane Evacuation Study – Technical Data Report – 2012

SHELTER ANALYSIS
Resources for evacuating populations

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

Table 6: Population Seeking Shelter and Capacity in Zone 1

Puerto Rico Hurricane Evacuation Study – Shelter Analysis Report – 2015

FAQs

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

- **Transportation Analysis**

TRANSPORTATION ANALYSIS

How long will it take to evacuate?

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TRAFFIC MODEL INPUTS

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

TRANSPORTATION ANALYSIS
Where will the traffic problems be?

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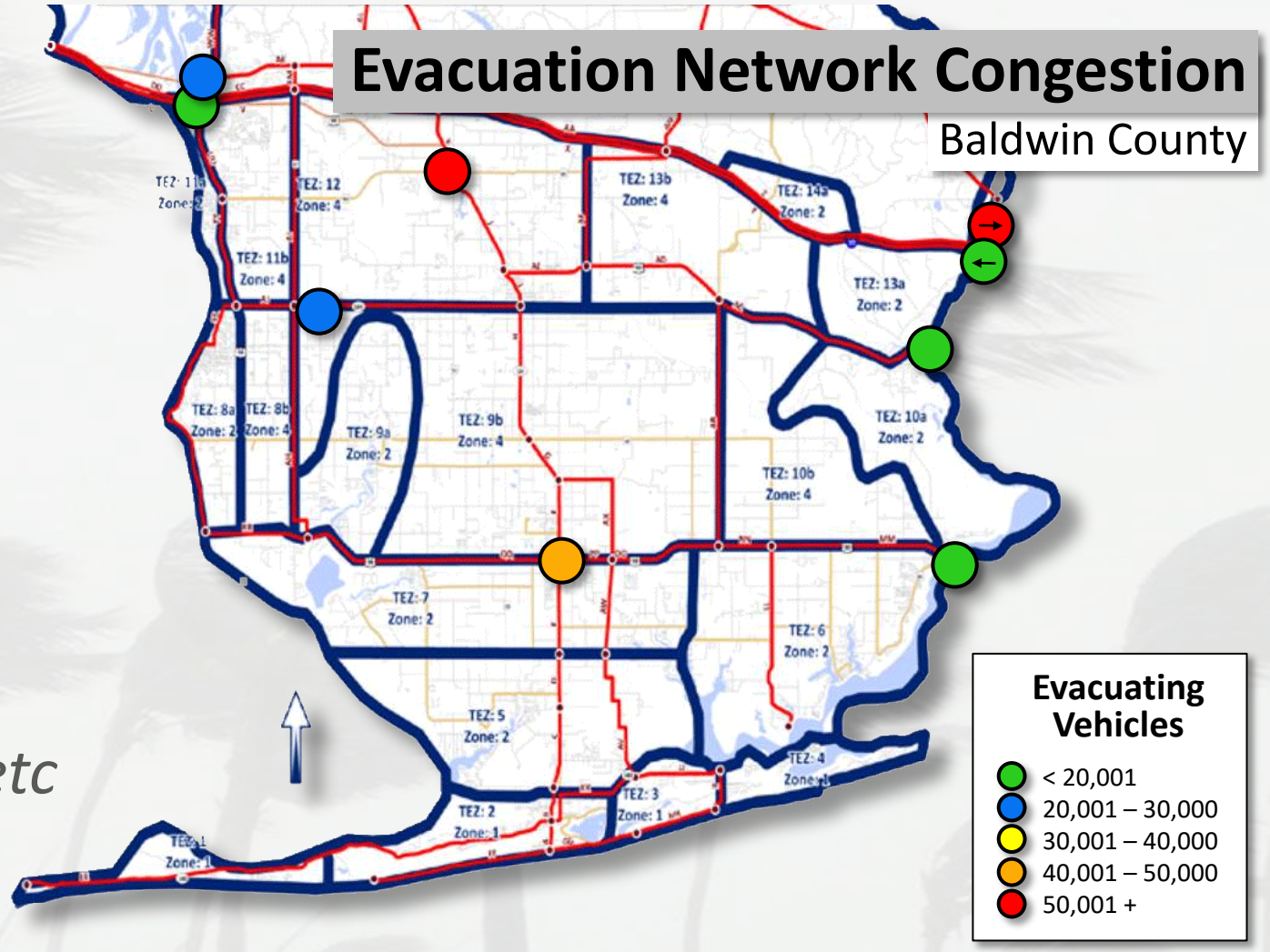
TRANSPORTATION ANALYSIS

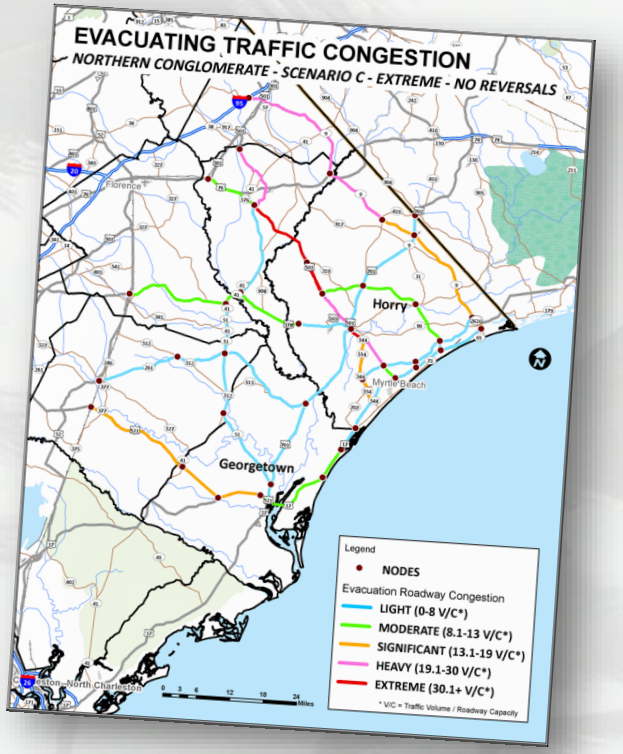
- **Traffic Patterns**
  - Bottle Necks
  - Evacuating Vehicles
- **Clearance Times**
  - Response Rate
  - Seasonal Population
  - Evacuation Scenarios
    one-way, multi-state, etc



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



CLEARANCE TIMES
Evacuation should take how long?

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Scenario ABC
501 reversal and 544 enhancement plan

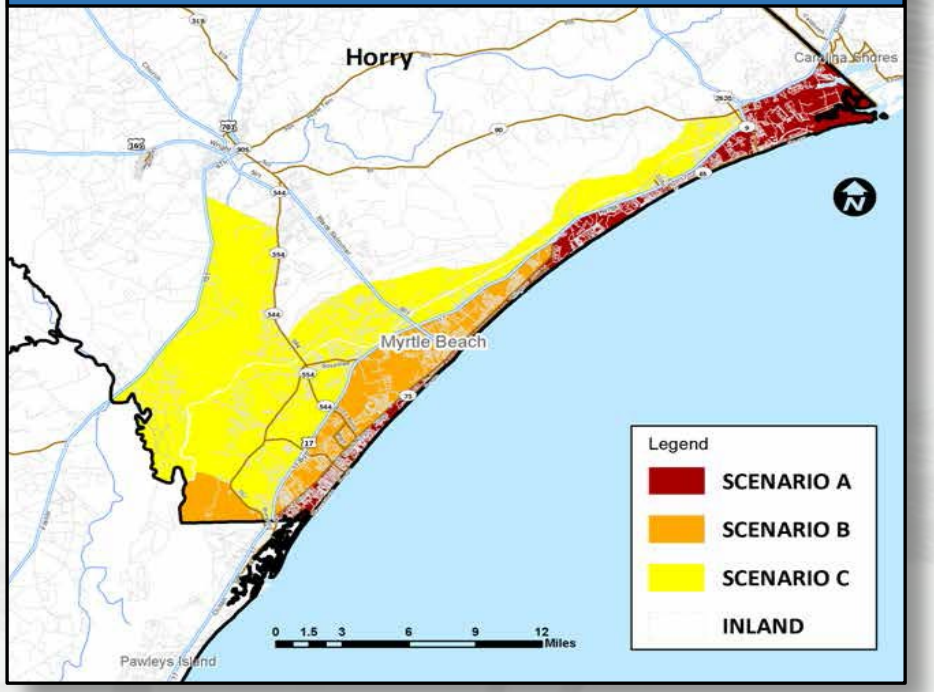

Figure 6-6: Evacuation Zones
South Carolina Hurricane Evacuation Study – Technical Data Report – 2013

Horry County, SC
Scenario ABC (501 reversal and 544 enhancement plan)

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

Table 6-44: Evacuation Clearance Times – Scenario ABC
South Carolina Hurricane Evacuation Study – Technical Data Report – 2013

MAKING BETTER DECISIONS

Study. Plan. Execute.

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INFORMED PLANS

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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**

INFORMED PLANS
What forces you to act?

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Lane Reversal Decision Factors	
Decision Factor	**Indicator**
The storm's current/projected intensity and the public perception of the threat to their safety.	Category 3 or greater storm 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.	For a Category 1 or 2 storms, monitor traffic flow and have lane reversal ready. A Category 3 or greater storm will indicate the need for reversal. (Note: Beaufort County requires Highway 278 reversal during tourist season at 85% tourist occupancy)

South Carolina Lane Reversal Factors

South Carolina Hurricane Plan 2015

INFORMED PLANS
Storm Category vs. Evacuation Actions

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Storm Category	Tropical Storm Force Wind Arrival	RECOMMENDED South & East of Abercom/US-204	EARLY South & East of Abercom/US-204	MANDATORY Islands & Low-lying Areas	MANDATORY South & East of Abercom/US-204	MANDATORY Islands & Low-lying Areas	MANDATORY South & East of Abercom/US-204	RECOMMENDED Remainder of County	MANDATORY East of I-95	MANDATORY Entire County	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			12									
Arrival Tropical Storm												

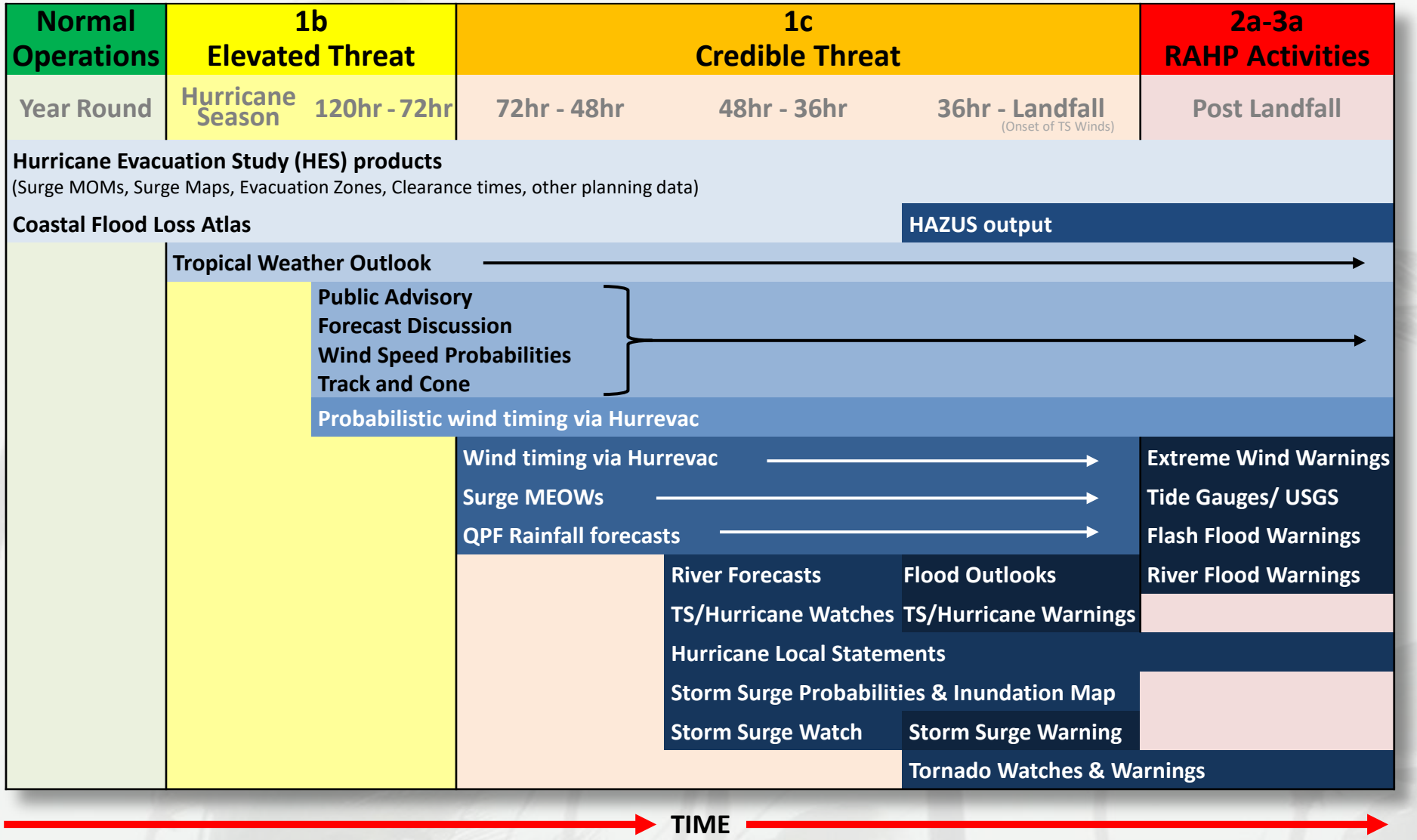
Islands and Low-lying Area Early Evacuations are 6 to 12 hours prior to Mandatory Evacuations
Hours for Evacuation + Added Hours for Nursing Home (NH) and Special Needs Evacuations

Chatham County Evacuation Guidelines (Not Current)

NWS PRODUCT TIMELINES

When is key information available?

FEMA



NWS PRODUCT TIMELINES

When is key information available?

FEMA

Normal Operations	1b Elevated Threat		1c Credible Threat			2a-3a RAHP Activities
Year Round	Hurricane Season	120hr - 72hr	72hr - 48hr	48hr - 36hr	36hr - Landfall (Onset of TS Winds)	Post Landfall

TIME

NWS PRODUCT TIMELINES
When is key information available?

FEMA

Normal Operations	1b Elevated Threat		1c Credible Threat			2a-3a RAHP Activities
Year Round	Hurricane Season	120hr - 72hr	72hr - 48hr	48hr - 36hr	36hr - Landfall (Onset of TS Winds)	Post Landfall
Hurricane Evacuation Study (HES) products (Surge MOMs, Surge Maps, Evacuation Zones, Clearance times, other planning data)						
Coastal Flood Loss Atlas					**HAZUS output**	

TIME

NWS PRODUCT TIMELINES

When is key information available?

FEMA

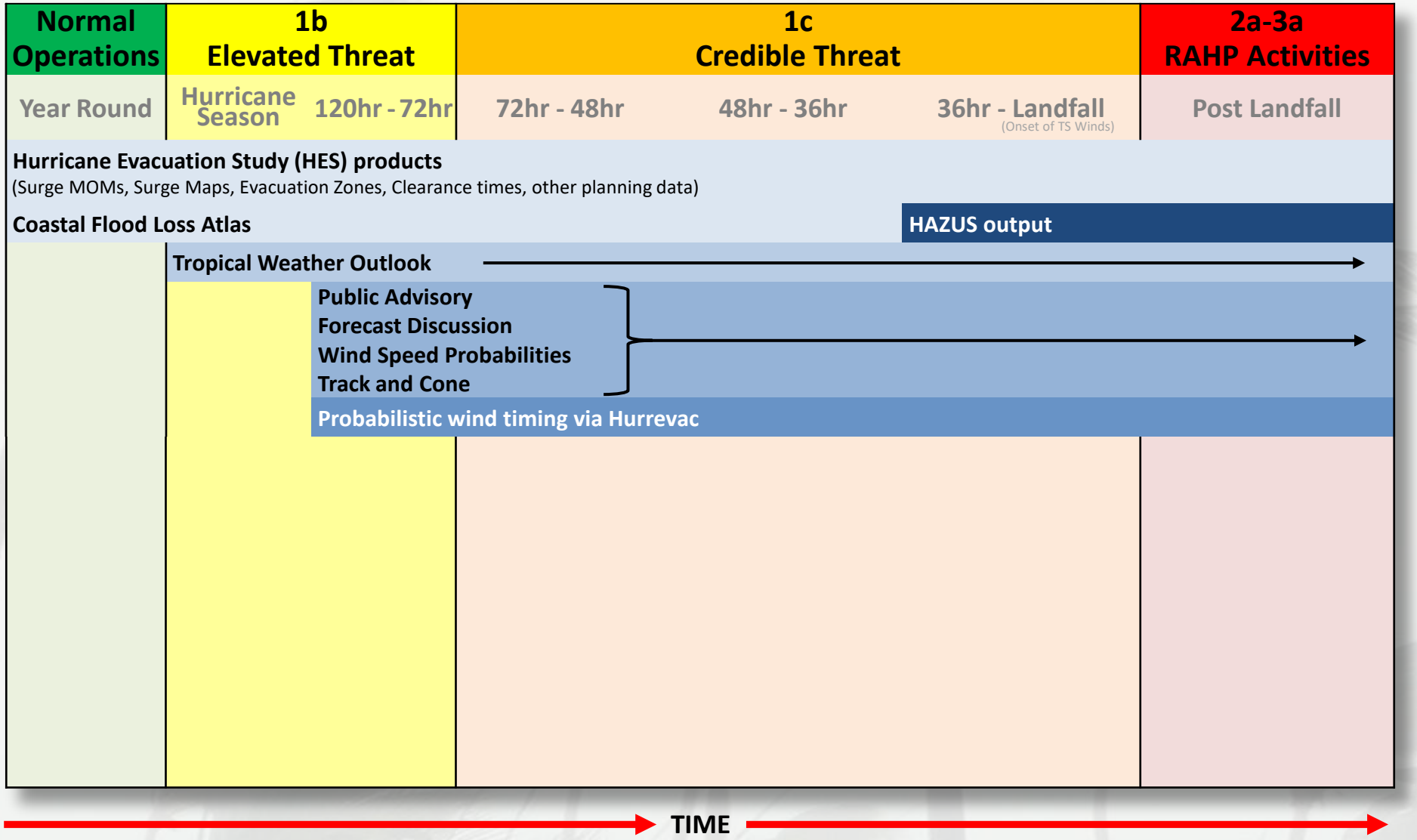
Normal Operations	1b Elevated Threat	1c Credible Threat			2a-3a RAHP Activities
Year Round	Hurricane Season 120hr - 72hr	72hr - 48hr	48hr - 36hr	36hr - Landfall (Onset of TS Winds)	Post Landfall
Hurricane Evacuation Study (HES) products (Surge MOMs, Surge Maps, Evacuation Zones, Clearance times, other planning data)					
Coastal Flood Loss Atlas				**HAZUS output**	
	Tropical Weather Outlook →				

TIME

NWS PRODUCT TIMELINES

When is key information available?

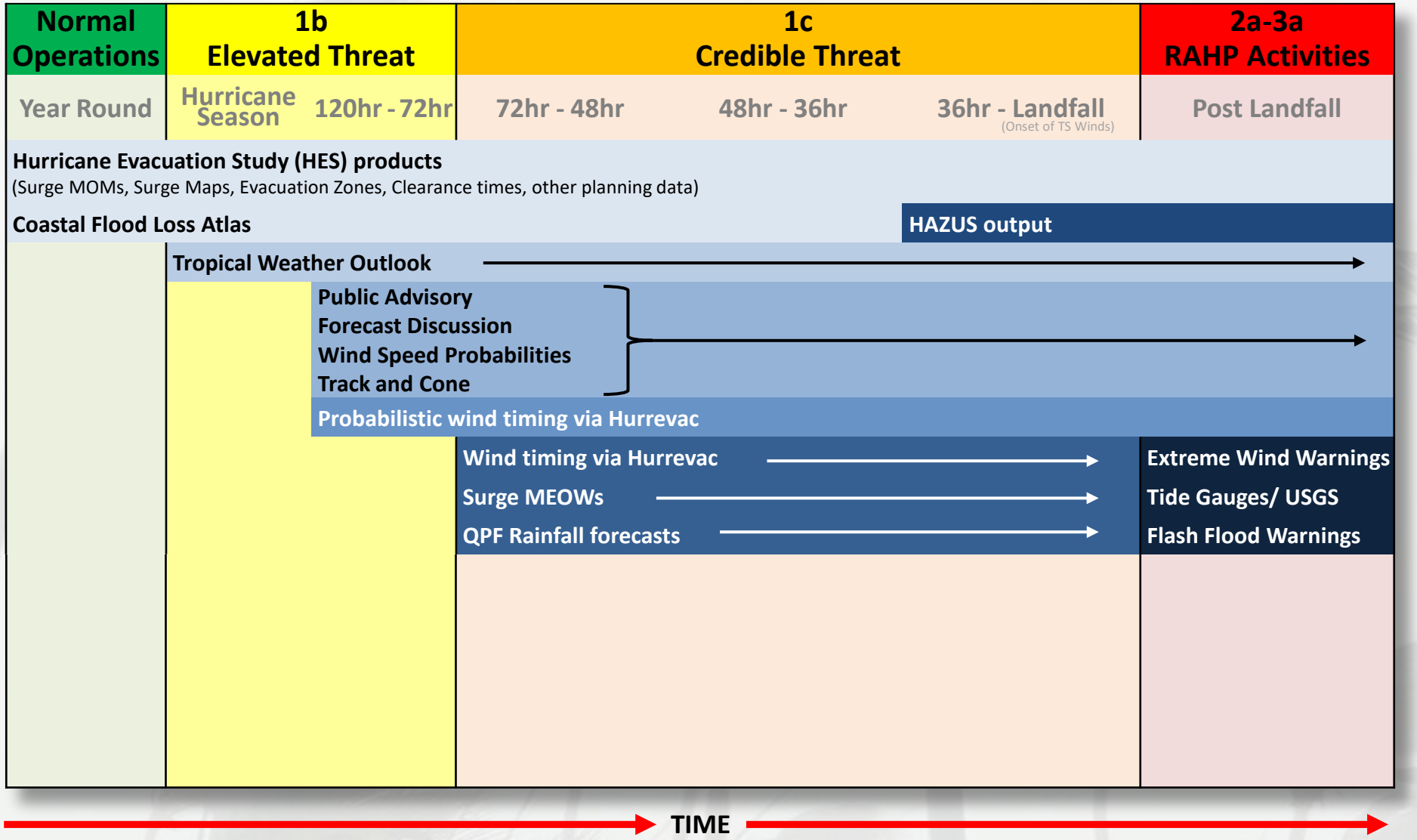
FEMA



NWS PRODUCT TIMELINES

When is key information available?

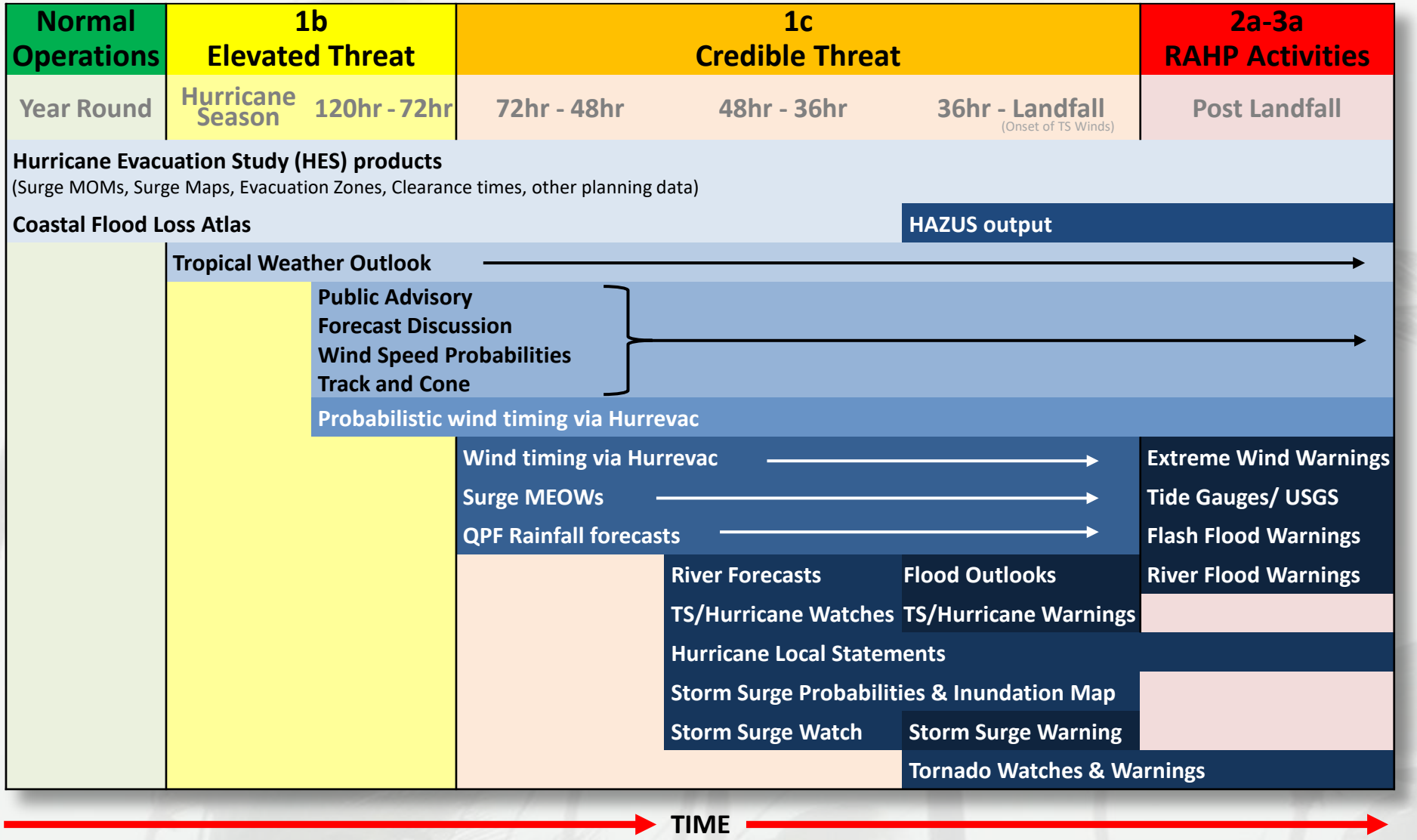
FEMA



NWS PRODUCT TIMELINES

When is key information available?

FEMA



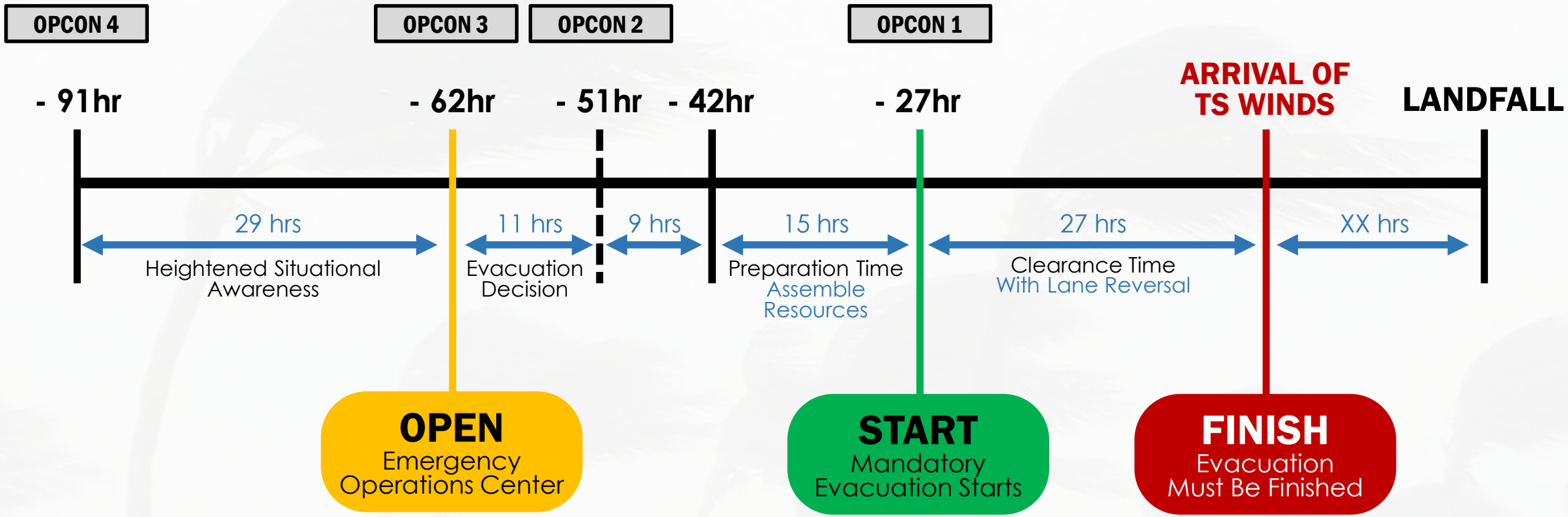
FAQs

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

- **Decision Timelines**

DECISION TIMELINES

Evacuation scenario decision timeline



Horry County Evacuation Timeline for ABC Scenario

DECISION TIMELINES
Readiness Checklist

FEMA

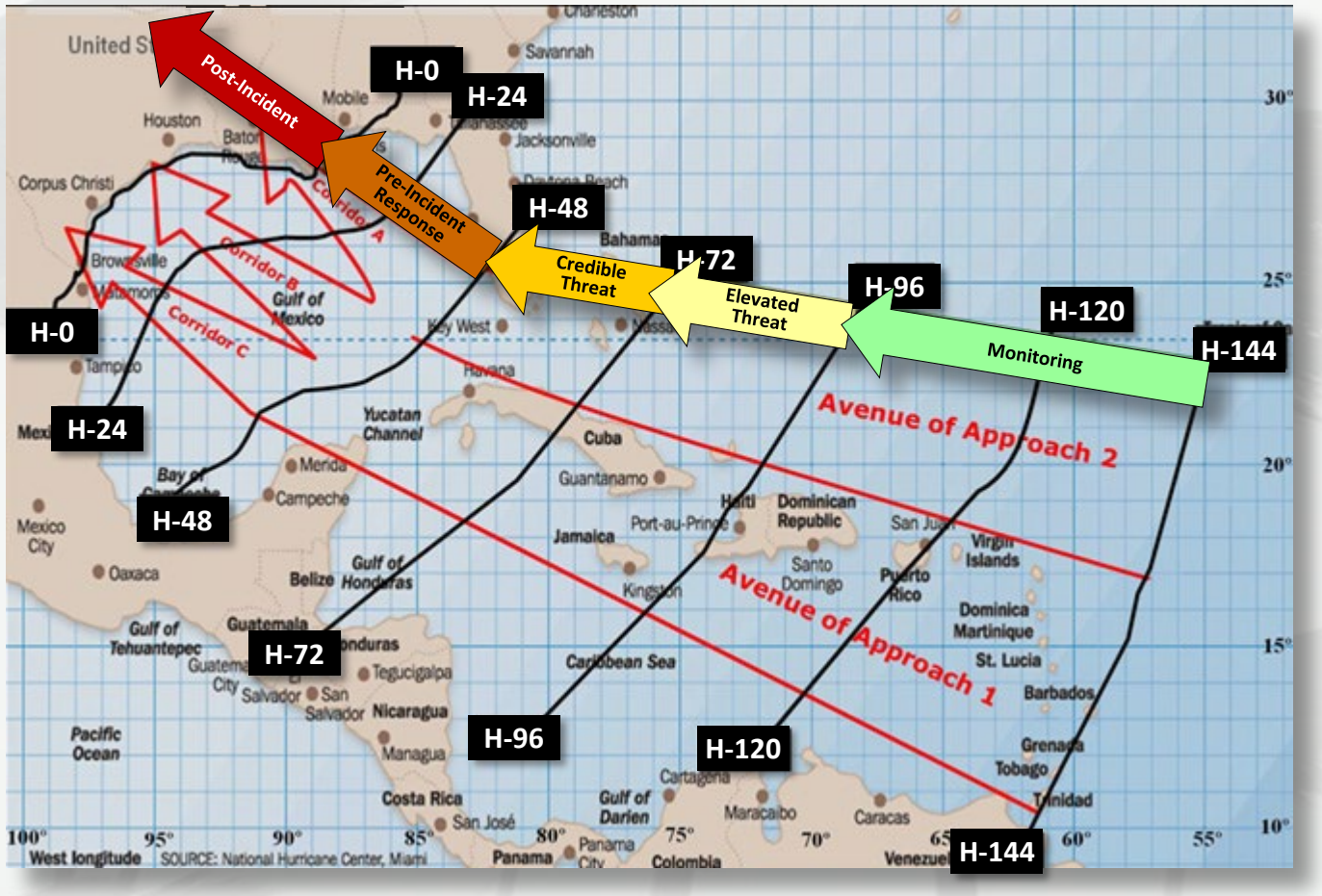
Hurricane Readiness Checklist				
Hurricane preparedness - prior to June 1	PRIORITY LEVEL	PERSONNEL RESPONSIBLE	STATUS OF TASK	DATE/TIME COMPLETED
Hurricane Planning				
• Update local hurricane operation, evacuation plans and resource lists				
• Revise Standard Operating Procedures (SOPs)				
• Review local emergency management ordinances and update				
• Test Hurrevac and/or other hurricane tracking software				
• Review Stafford Act Policies with State Emergency Management				
• Mitigate Vulnerable Critical Facilities				
• Solidify and review mutual aid agreements				
• Determine evacuation decision making authority w/ line of succession				
Emergency Operations Center (EOC)				
• Replenish supplies and check equipment				
• Test communication lines				
• Update activation plans and train staff				
• Update HURREVAC to latest version				

DECISION TIMELINES
Readiness Checklist

FEMA

Hurricane Readiness Checklist				
Storm Impacts Imminent (~36 hours) Hurricane Watches and Warnings Issued	PRIORITY LEVEL	PERSONNEL RESPONSIBLE	STATUS OF TASK	DATE/TIME COMPLETED
Storm Watch				
• Conference calls with NOAA local WFO/RFC/SPC				
• Continue to monitor HURREVAC and other systems				
• Monitor storm track and provide local government officials updates				
• Anticipate the possible arrival of rainfall and tornados				
• Monitor river stages and rainfall forecast				
Emergency Operations Center (EOC)				
• Activate EOC (partial or full based on clearance times and threat)				
• Request primary ESF support agencies provide EOC briefings				
• Complete and distribute EOC situation reports, as applicable				
• Prepare EOC facility- Mitigate for Winds, Water, etc.				

DECISION TIMELINES
Scenario-based Operational Levels



FEMA RVI Hurricane Plan

MAKING BETTER DECISIONS

Study. Plan. Execute.

FEMA

Study

- Identify Hazards
- Determine Vulnerability
- Evacuation Timing

Plan

- Inform Hazards and Risk
- Develop Timelines
- Identify Triggers

Execute

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

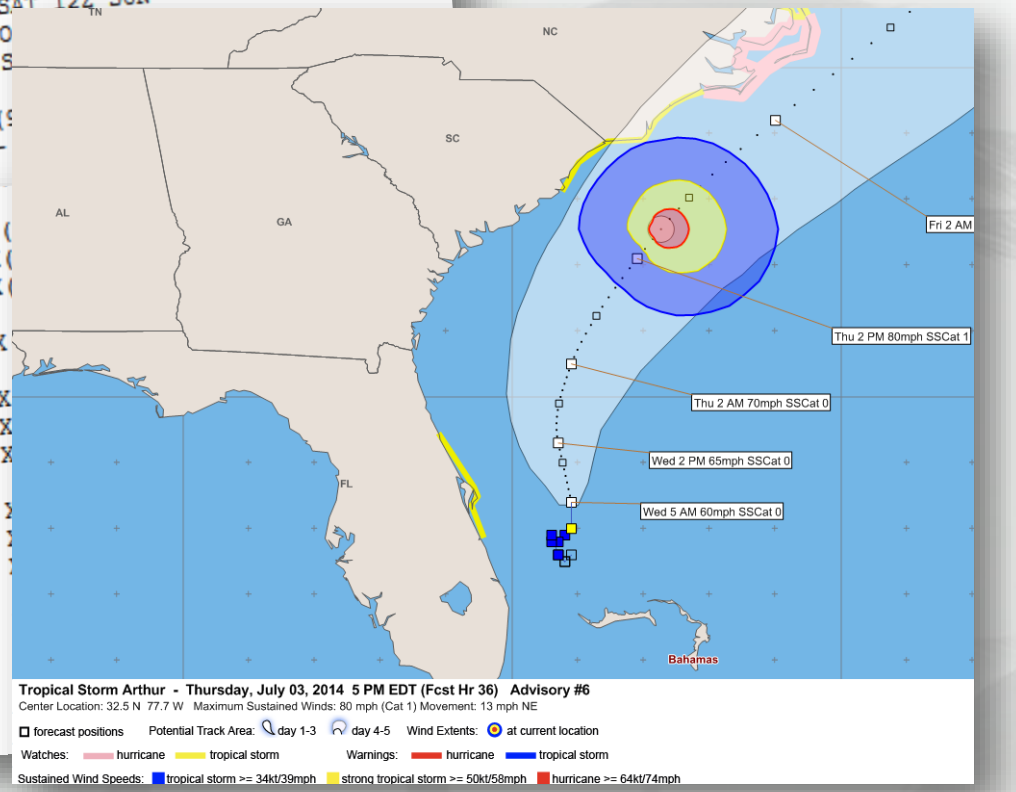
INFORMED DECISIONS

There is a storm. Analyze. Respond.

FEMA

- - - - 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
FORECAST HOUR		(12)	(24)	(36)	(48)	(72)	(
LOCATION	KT						
CAPE HATTERAS	34	X	2(2)	32(34)	48(82)	X(82)	X(
CAPE HATTERAS	50	X	X(X)	4(4)	48(52)	1(53)	X(
CAPE HATTERAS	64	X	X(X)	1(1)	20(21)	X(21)	X(
CHARLOTTE NC	34	X	2(2)	3(5)	X(5)	X(5)	X
MOREHEAD CITY	34	1	3(4)	55(59)	16(75)	X(75)	X
MOREHEAD CITY	50	X	X(X)	20(20)	21(41)	X(41)	X
MOREHEAD CITY	64	X	X(X)	4(4)	11(15)	X(15)	X
WILMINGTON NC	34	1	5(6)	46(52)	3(55)	X(55)	X
WILMINGTON NC	50	X	X(X)	16(16)	3(19)	X(19)	X
WILMINGTON NC	64	X	X(X)	4(4)	1(5)	X(5)	X
COLUMBIA SC	34	1	2(3)	3(6)	1(7)	X(7)	
MYRTLE BEACH	34	1	9(10)	28(38)	2(40)	X(40)	
MYRTLE BEACH	50	X	1(1)	6(7)	X(7)	X(7)	
MYRTLE BEACH	64	X	X(X)	1(1)	X(1)	X(1)	



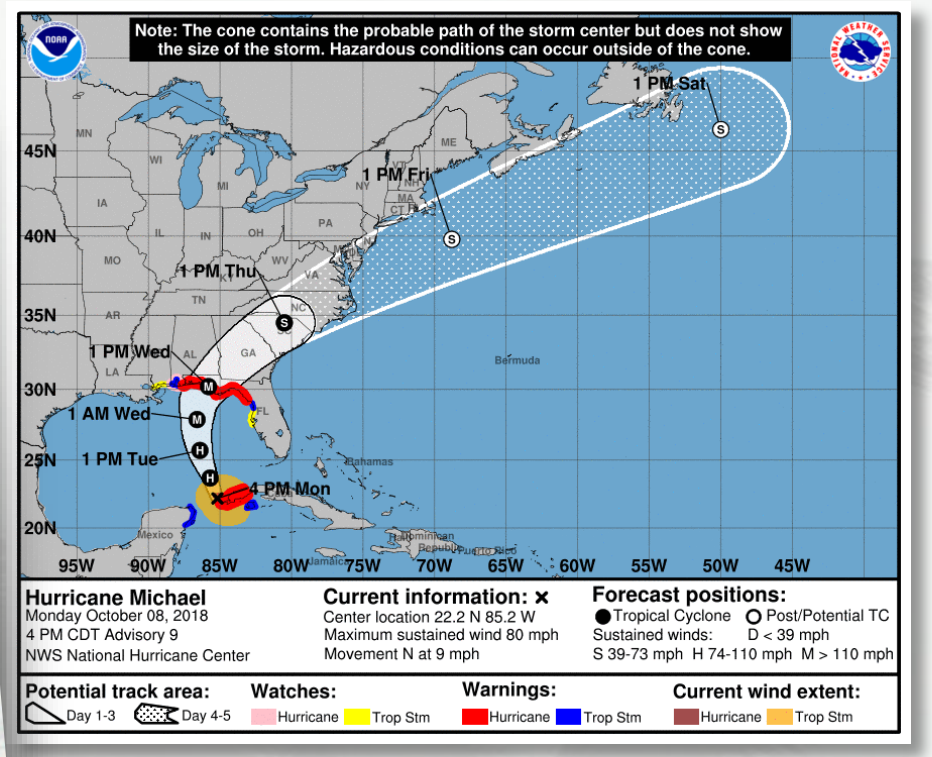
FAQs

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

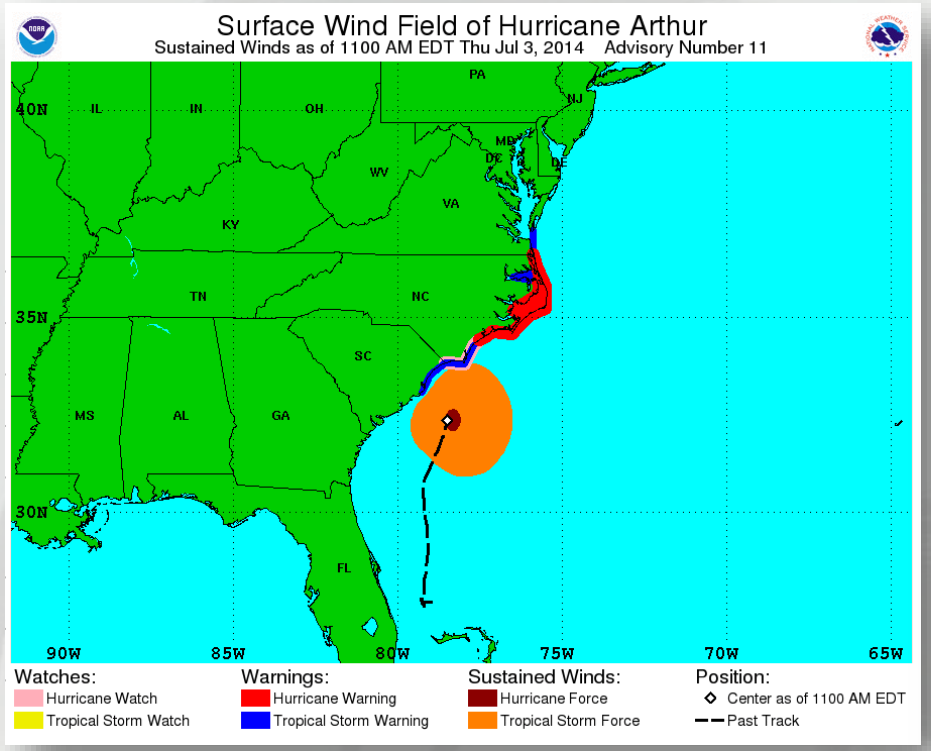
- **NHC Forecasts**

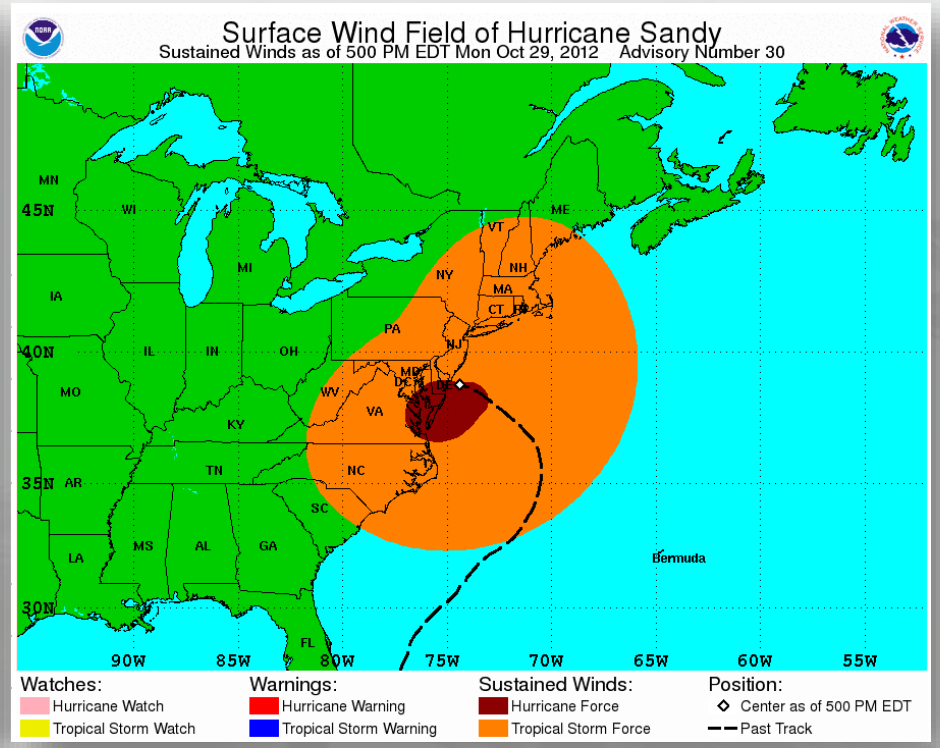
NHC FORECASTS
Where is the storm going?

FEMA



NHC FORECASTS
What are the storm characteristics?





NHC FORECASTS
Where is the storm going?

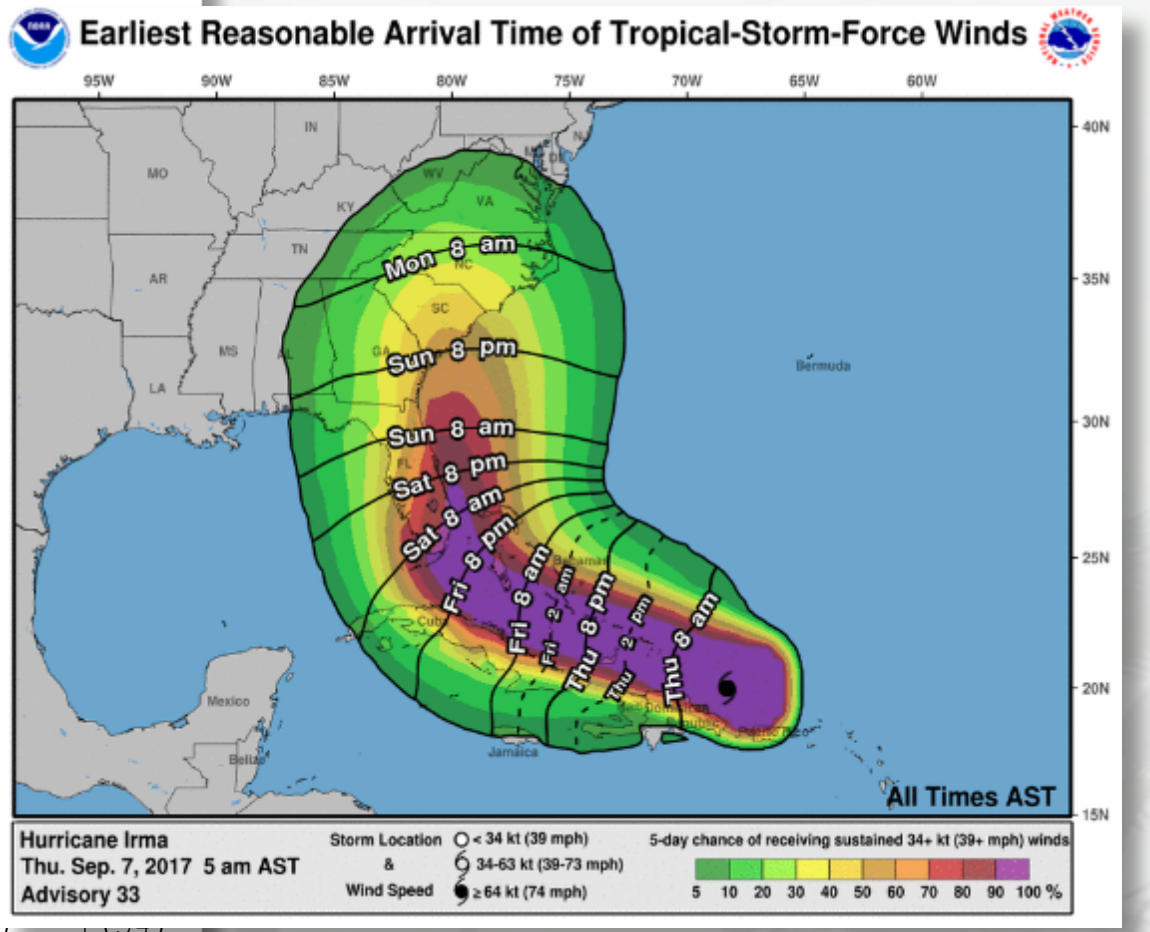
FEMA

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

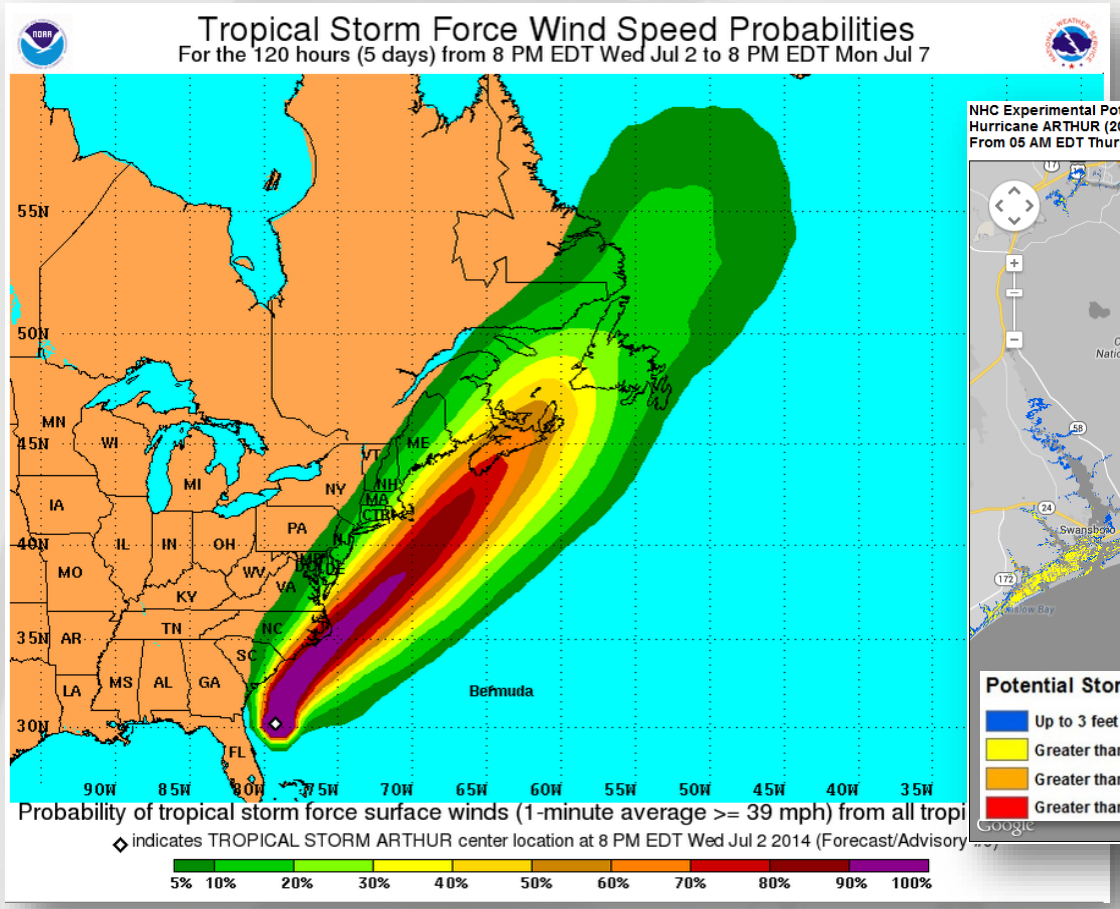
TIME PERIODS	FROM 12Z WED TO 00Z THU	FROM 00Z THU TO 12Z THU	FROM 12Z THU TO 00Z FRI	FROM 00Z FRI TO 12Z FRI	FROM 12Z FRI TO 12Z SAT	FROM 12Z SA TO 12Z SU
FORECAST HOUR	(12)	(24)	(36)	(48)	(72)	(96
LOCATION KT						
PANAMA CITY FL 34	X 3(3)	22(25)	30(55)	16(71)	2(73	
PANAMA CITY FL 50	X X(X)	1(1)	13(14)	15(29)	2(31	
PANAMA CITY FL 64	X X(X)	X(X)	3(3)	6(9)	2(11	
PENSACOLA FL 34	X X(X)	10(10)	32(42)	31(73)	5(78	
PENSACOLA FL 50	X X(X)	X(X)	6(6)	28(34)	5(39	
PENSACOLA FL 64	X X(X)	X(X)	1(1)	14(15)	3(18	
MOBILE AL 34	X X(X)	5(5)	24(29)	35(64)	8(72	
MOBILE AL 50	X X(X)	X(X)	3(3)	22(25)	8(33)	
MOBILE AL 64	X X(X)	X(X)	1(1)	8(9)	4(13)	1(14)
GULFPORT MS 34	X X(X)	3(3)	21(24)	34(58)	10(68)	1(69)

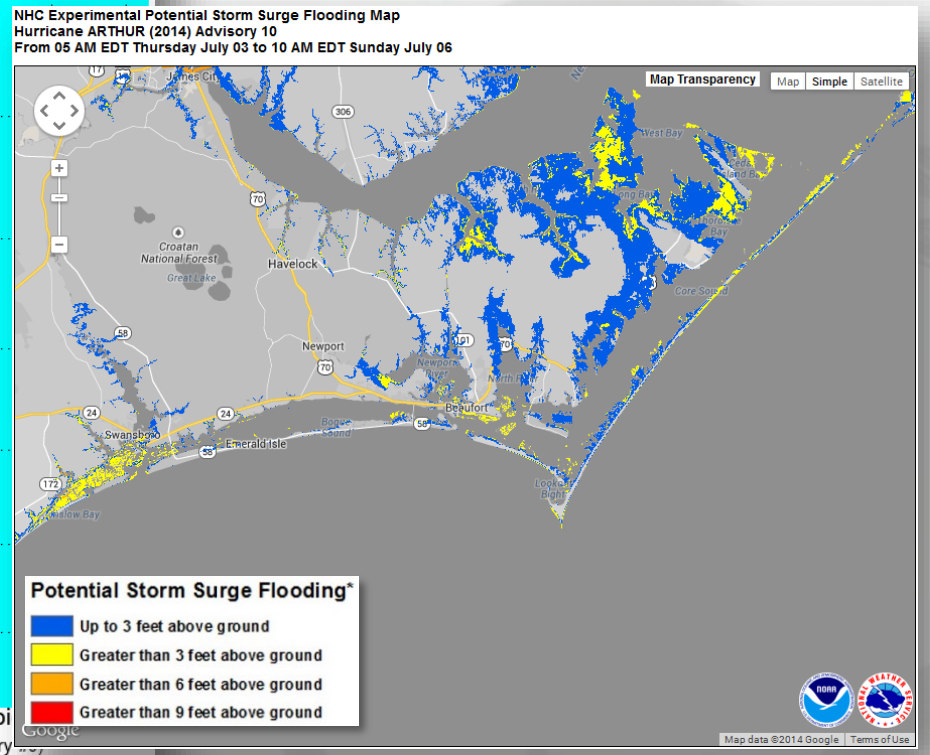


NHC FORECASTS

Evaluate the storm threat.

FEMA





FAQs

- What is the forecast?
- Evacuation start times?

- **Hurrevac**

POLL QUESTION

Do you have a Hurrevac account?

A. Yes, and I use it regularly.

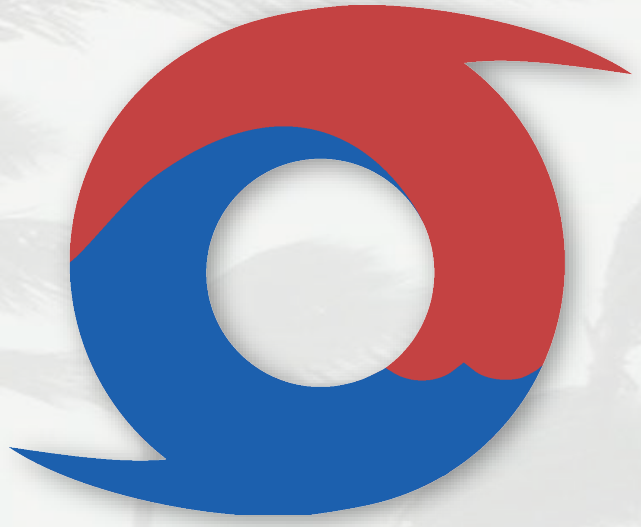
B. Yes, but I am unfamiliar with how to use it.

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

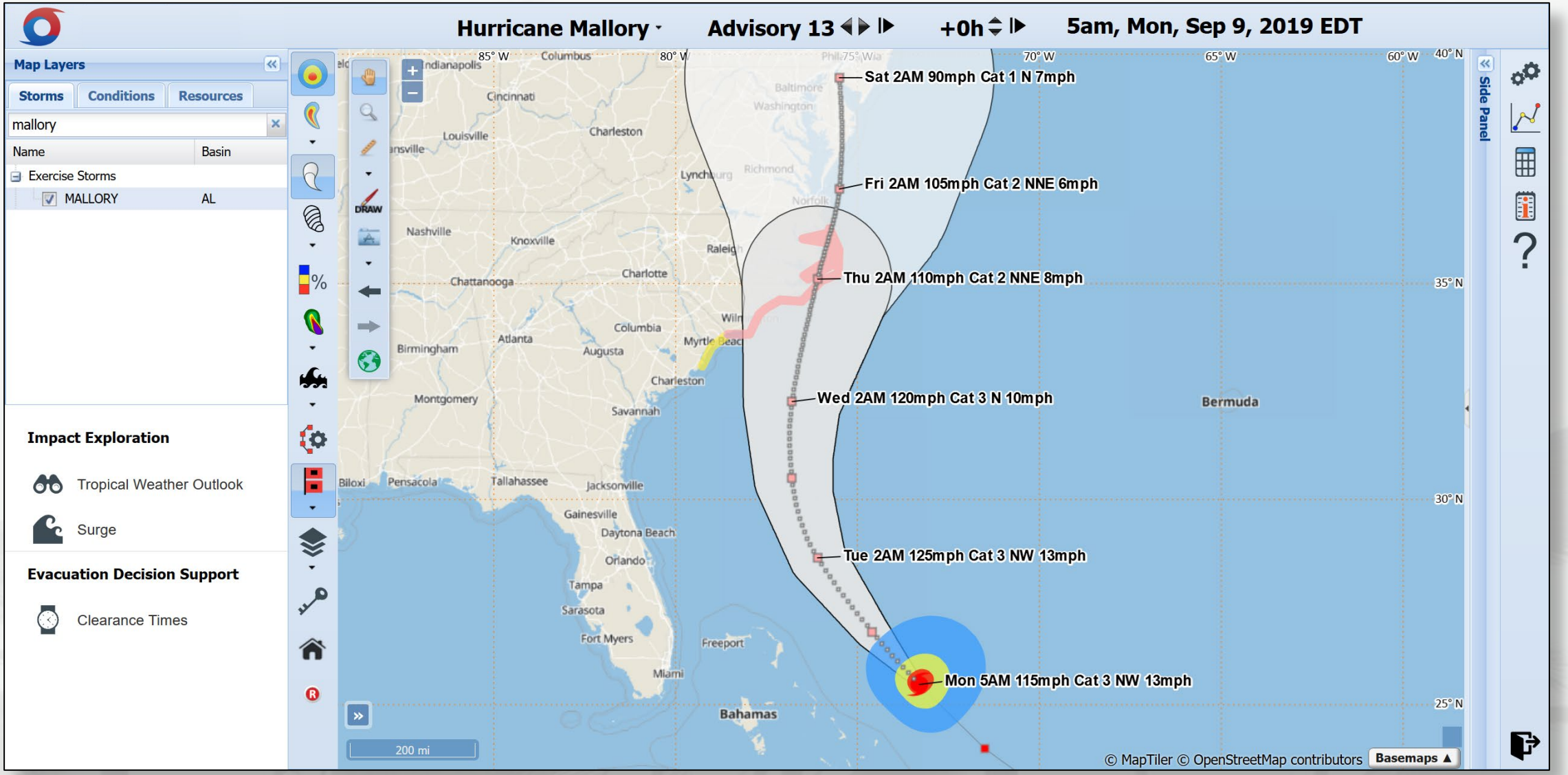
- **Web based**
  - No downloads or software to install
  - Use your computer, tablet or phone
  - Access your profile/preferences anywhere
- **SLOSH Display**
  - MOMs & MEOWs
  - MEOW mixer
- **Register online**

  https://register.hurrevac.com/

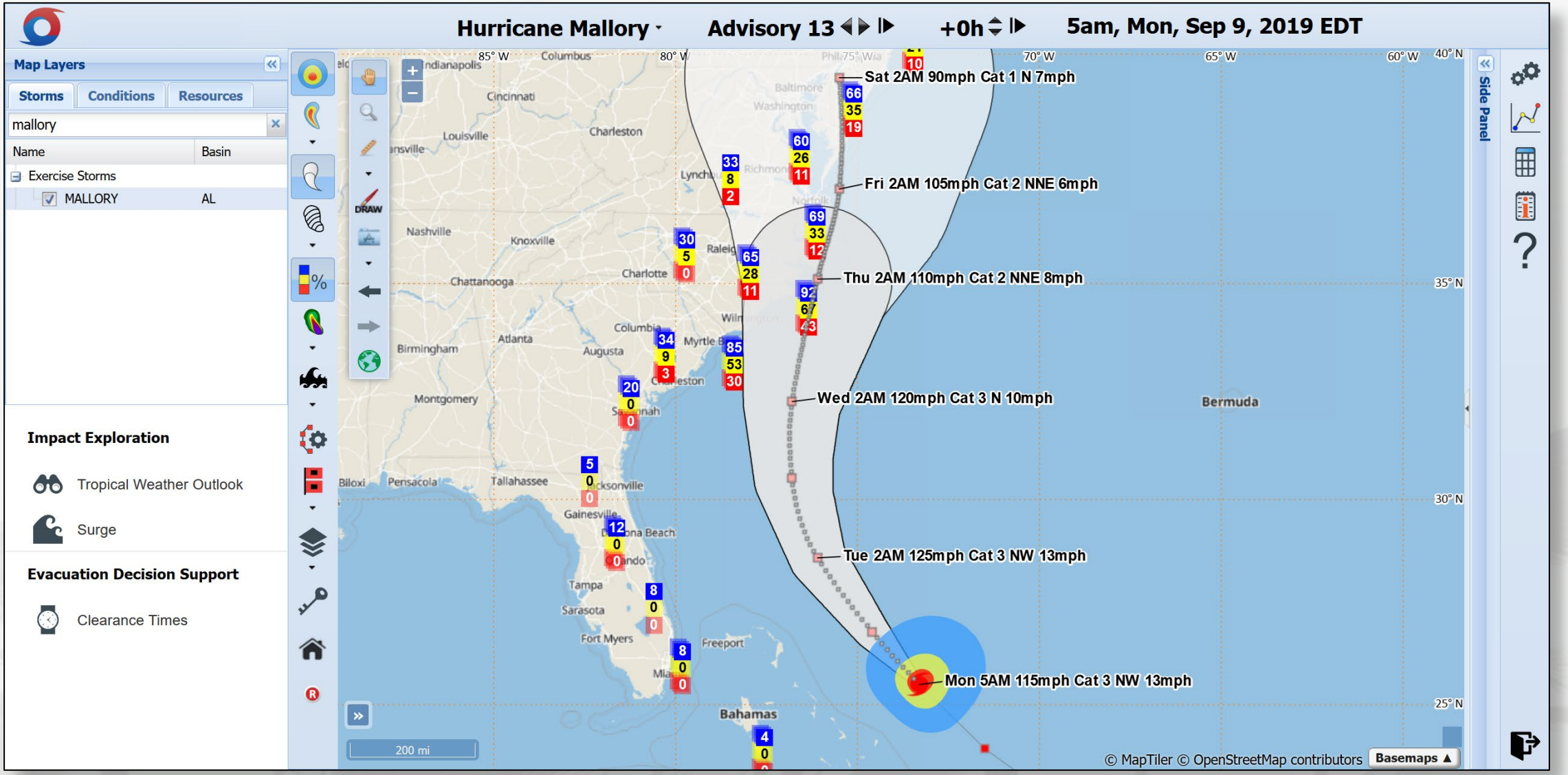
HURREVAC

Forecast track. Watches/Warnings. Size.

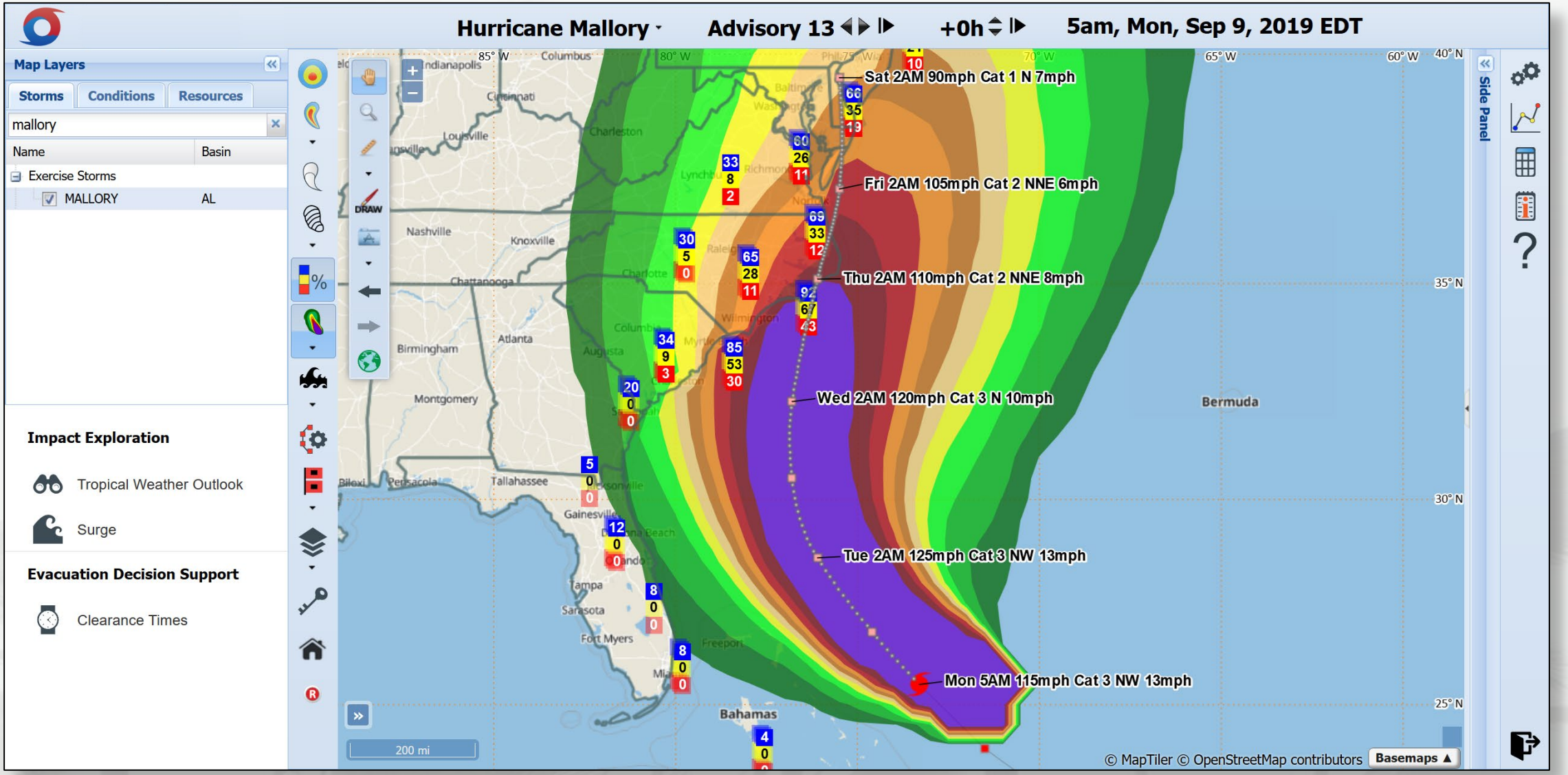
FEMA



HURREVAC
Wind threat – Wind Speed Probabilities

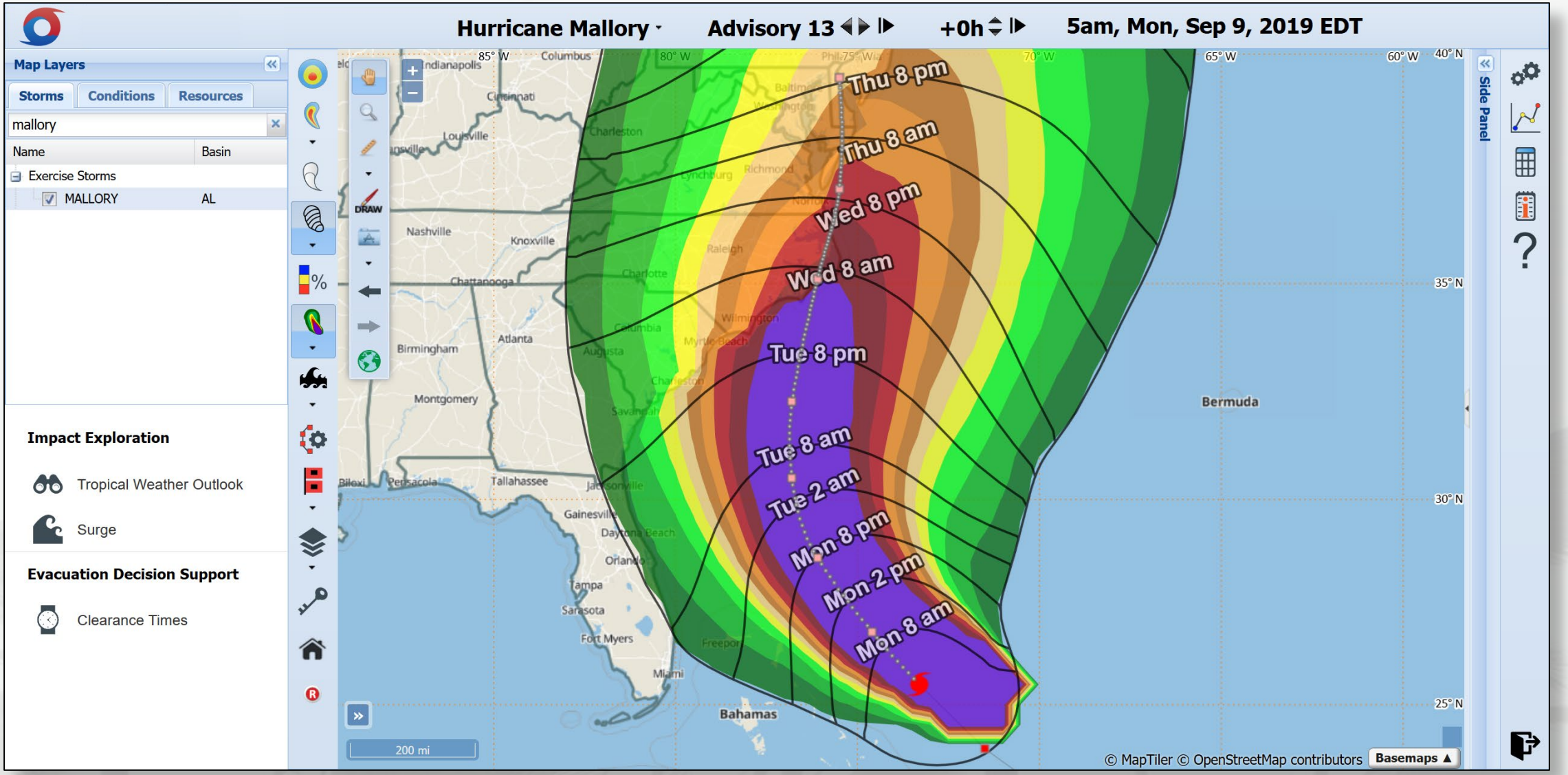


HURREVAC
Wind threat – Wind Speed Probabilities

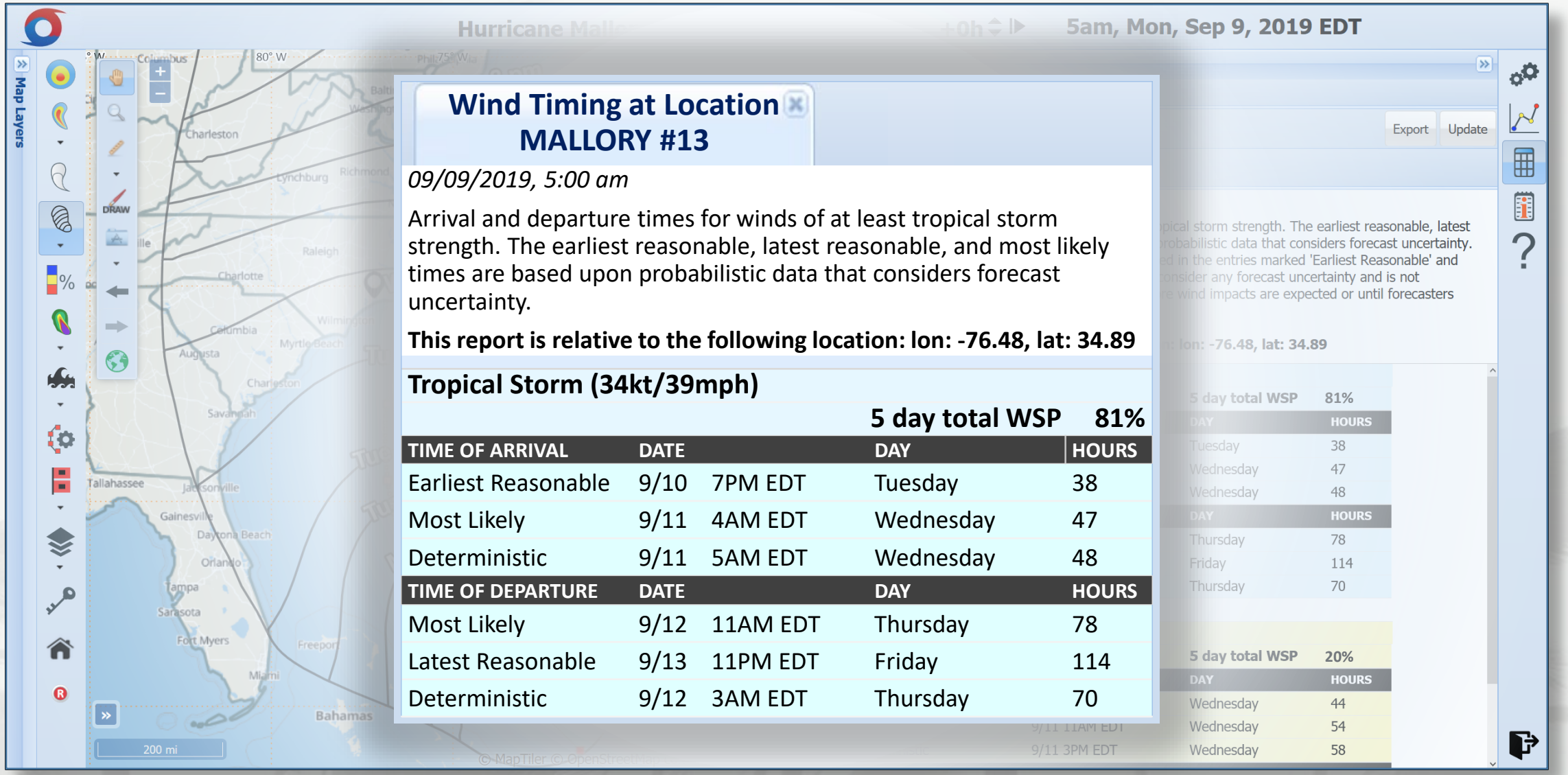


HURREVAC
Wind threat – Time of Arrival

FEMA

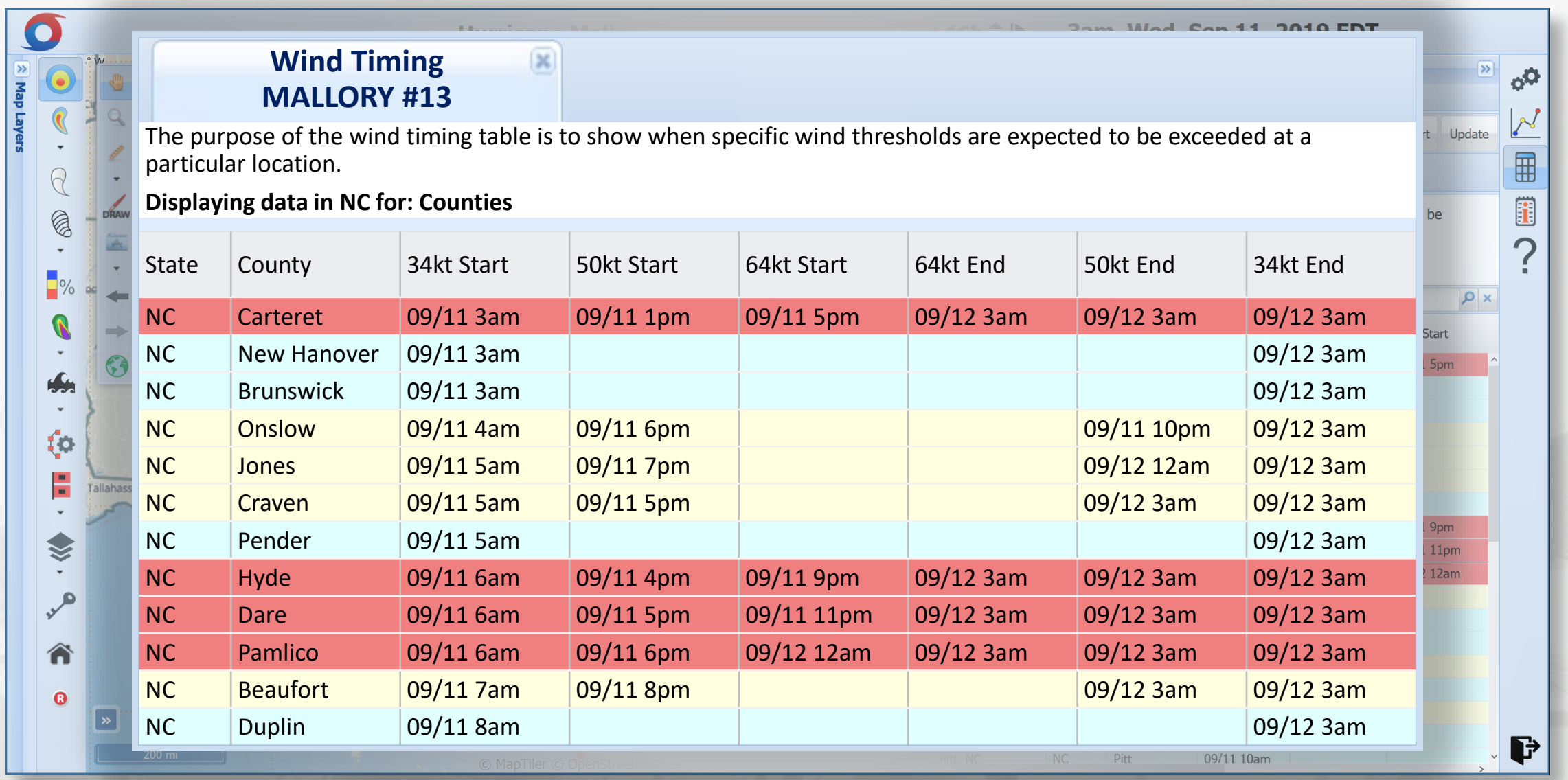


HURREVAC
Wind Timing – Single Location



HURREVAC
Wind Timing – All Affected Areas

FEMA



Wind Timing
MALLORY #13

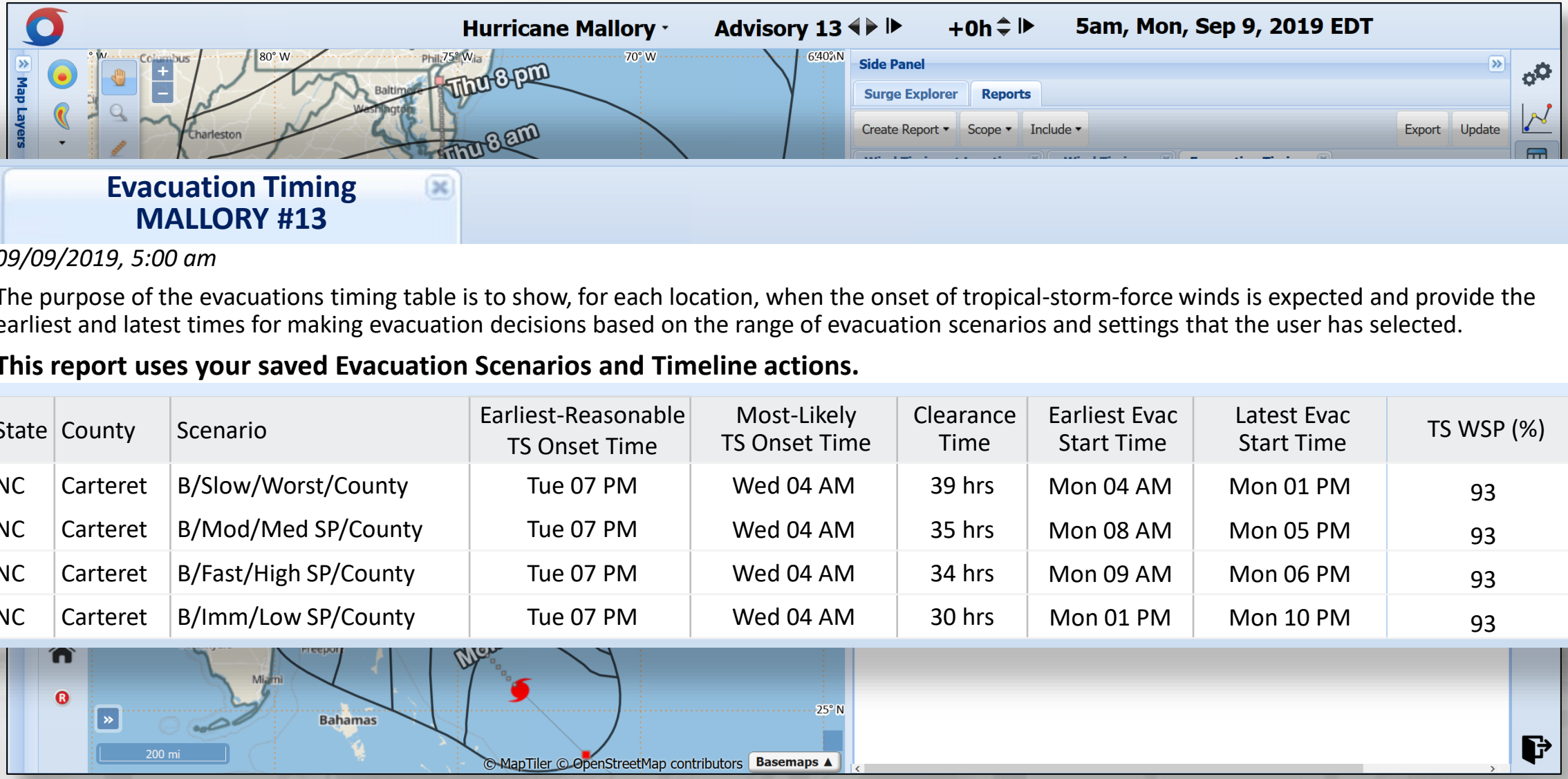
The purpose of the wind timing table is to show when specific wind thresholds are expected to be exceeded at a particular location.

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

HURREVAC
Evacuation Start Times

FEMA



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.

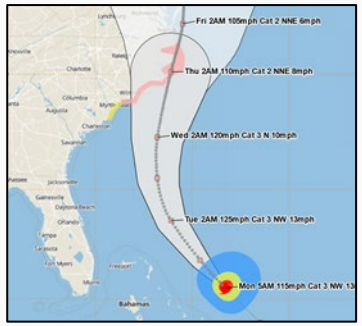
This report uses your saved Evacuation Scenarios and Timeline actions.

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

HURREVAC
Calculating evacuation start time

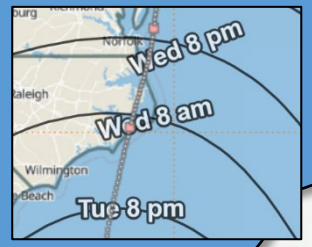
FEMA

Storm Forecast



HES Data
Pre-determined Evacuation Zones and Scenarios

Arrival Time of TS Winds



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Clearance Time

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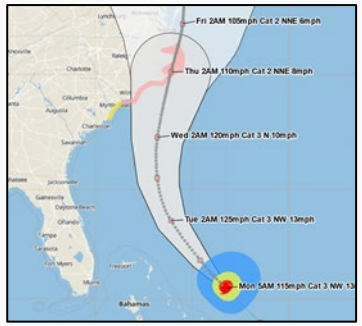
Evacuation Start Time

HURREVAC
Calculating evacuation start time

FEMA

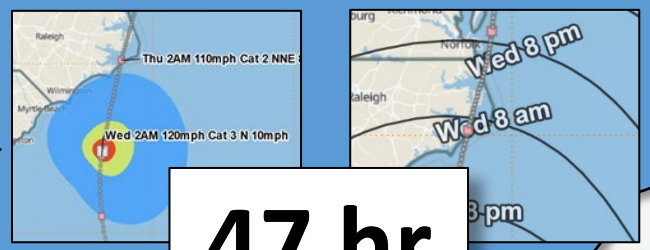
Storm Forecast



HES Data
Pre
Eva es
and

Cat 3

Arrival Time of TS Winds



47 hr

\-

Clearance Time

39 hr

=

Evacuation Start Time

8 hr

HURREVAC
Evacuation Scenarios

FEMA

Evacuation Scenarios | Timeline Actions | Timing Arcs

State: North Carolina County: Carteret Use Base Location

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: Scenario B

Response: Slow (9 hour) response

Seasonal Population: Worst-case number of evacuees from seasonal population

Scope of Reported Time: Time to evacuate the county

Scenario already saved

HURREVAC
Evacuation Start Times

FEMA

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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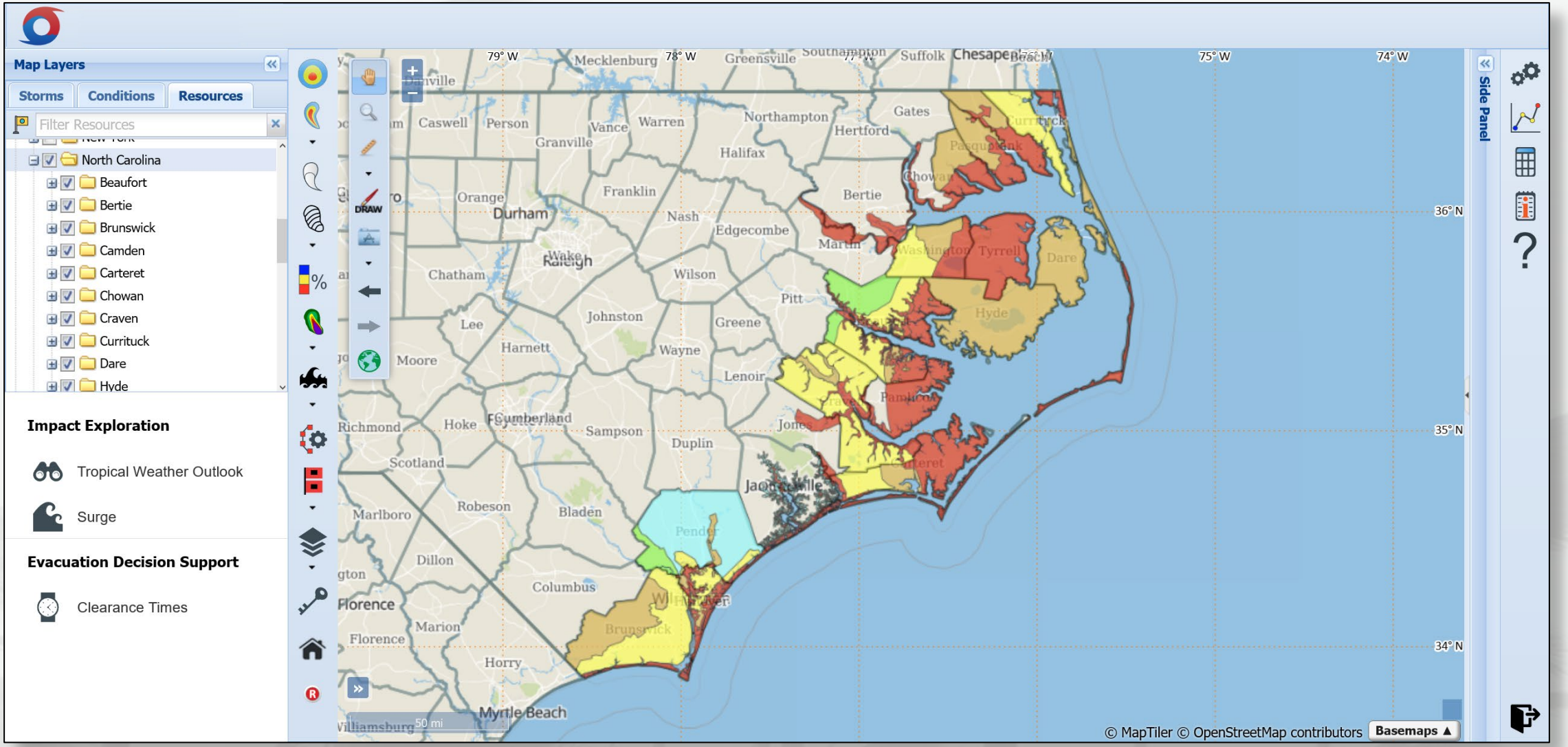
NC	Carteret	B/Fast/High SP/County	Tue 07 PM	Wed 04 AM	34 hrs	Mon 09 AM	Mon 06 PM	93
NC	Carteret	B/Imm/Low SP/County	Tue 07 PM	Wed 04 AM	30 hrs	Mon 01 PM	Mon 10 PM	93

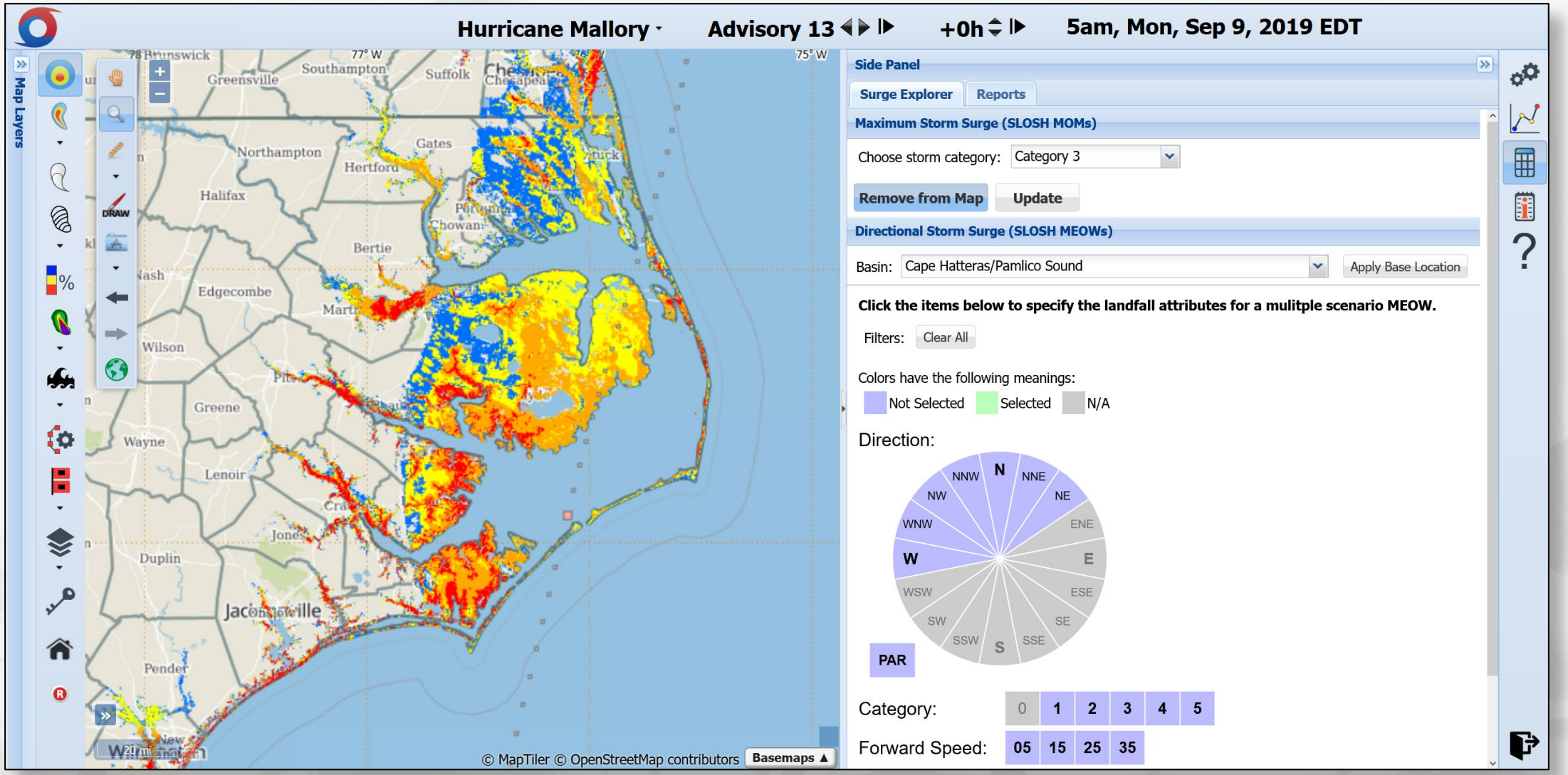
HURREVAC
Evacuation Zones

FEMA



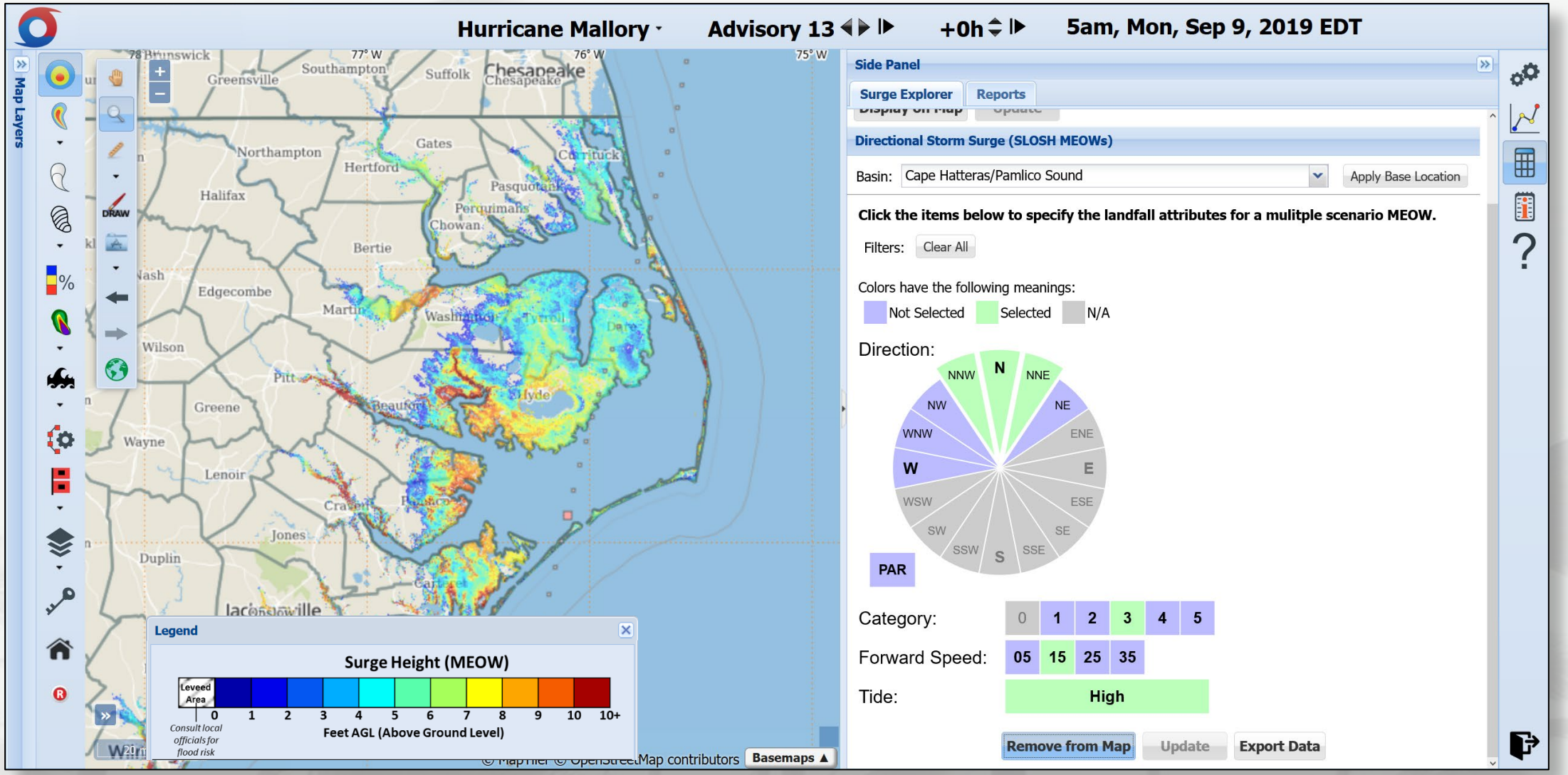
HURREVAC
Surge Threat – SLOSH MOMs

FEMA



HURREVAC
Surge Threat – SLOSH MEOWs

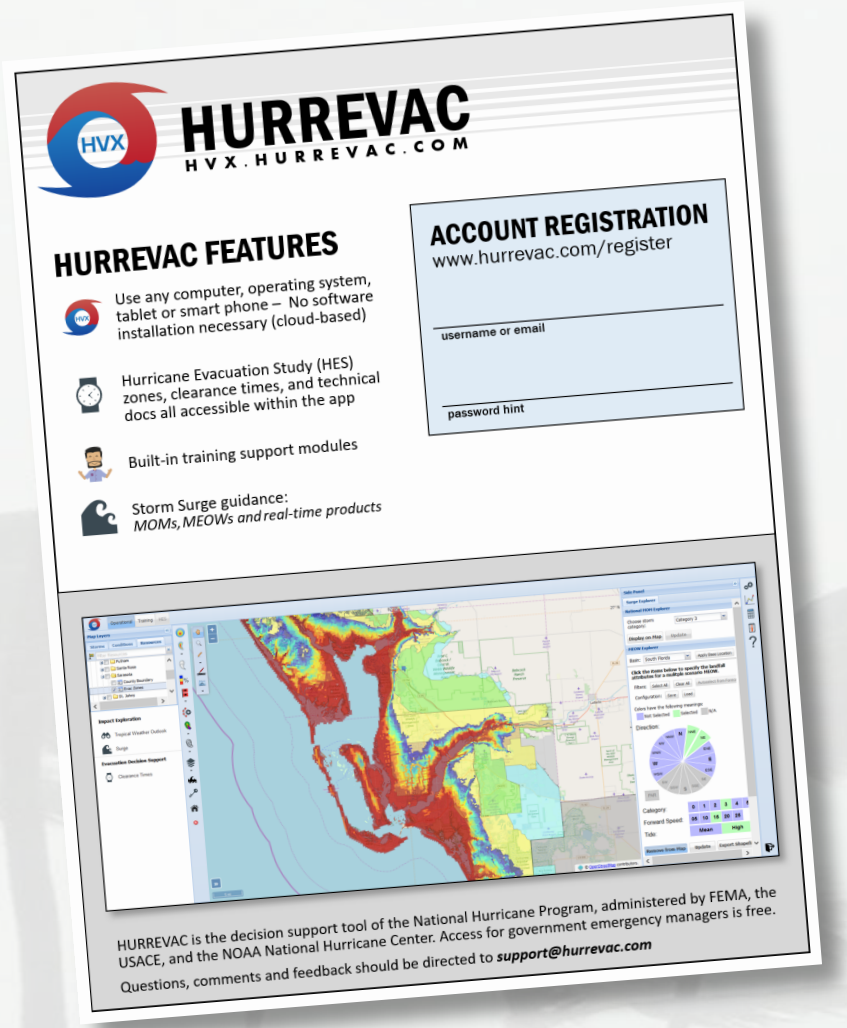
FEMA



HURREVAC
Account Registration

FEMA

REGISTRATION
https://register.hurrevac.com/



HURRICANE READINESS
L0311

FEMA

Questions/Comments?

FAQs

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

- **Hurricane Liaison Team**

HURRICANE LIAISON TEAM
Overview

FEMA

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

HLT Deployment (circa 1998) – pictured Kent Baxter (R6), Bill Massey (R4), Bruce Swiren (R2), Eric Gentry (Florida), Tim Putprush (IT) and Rhonda Orndoff (IT)

FEMA

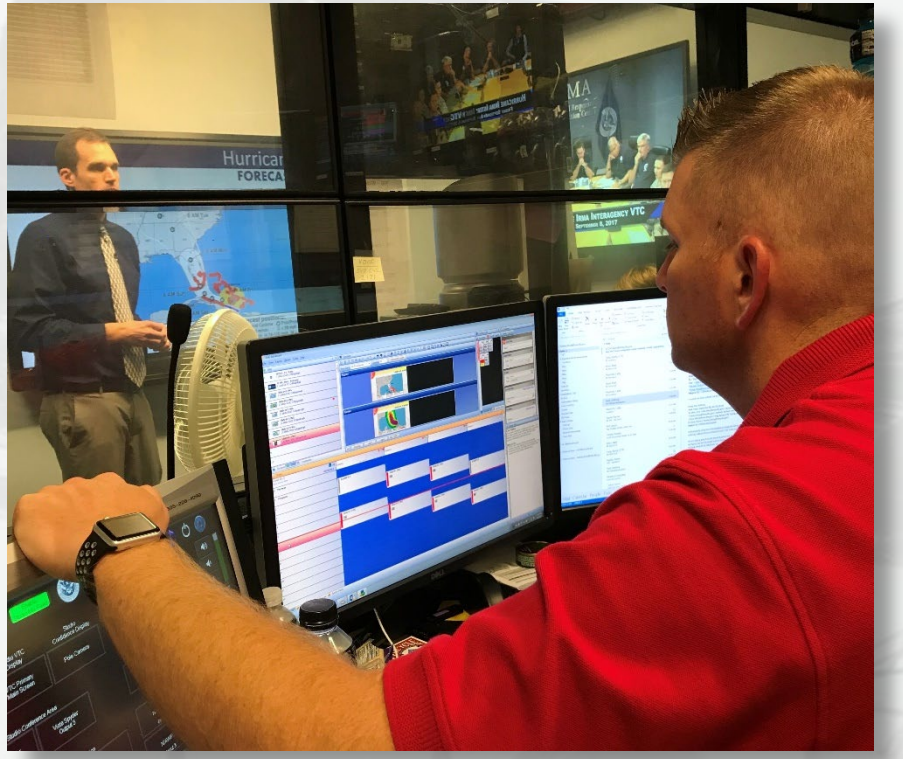
MISSION

"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."

FEMA

RAPID COMMUNICATIONS

- **Partnership between the NWS and FEMA**
  - FEMA Hurricane Program Managers
  - FEMA Reservists
  - NWS meteorologists and hydrologist



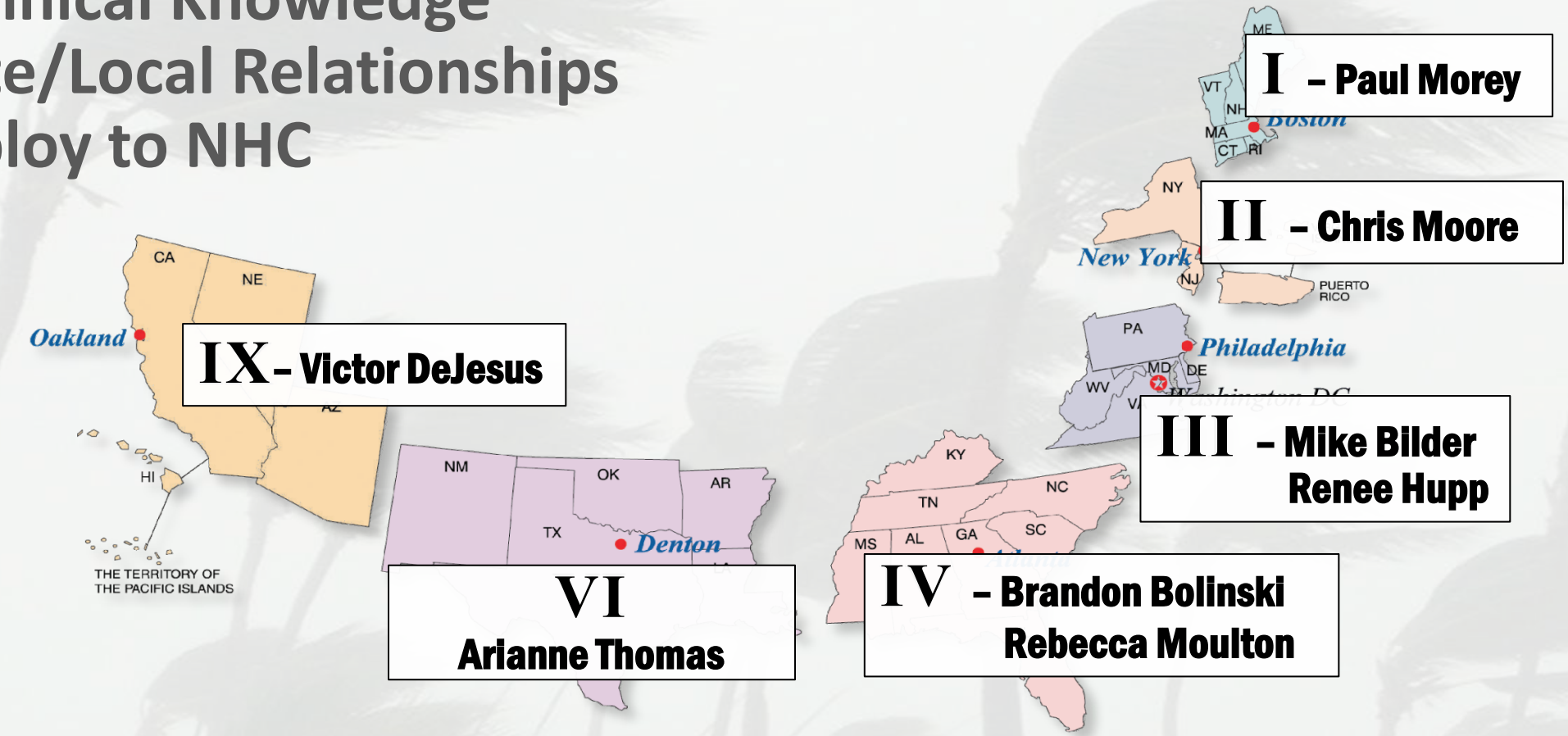
HURRICANE LIAISON TEAM

Regional Hurricane Program Manager (HPM)

FEMA

REGIONAL HPM

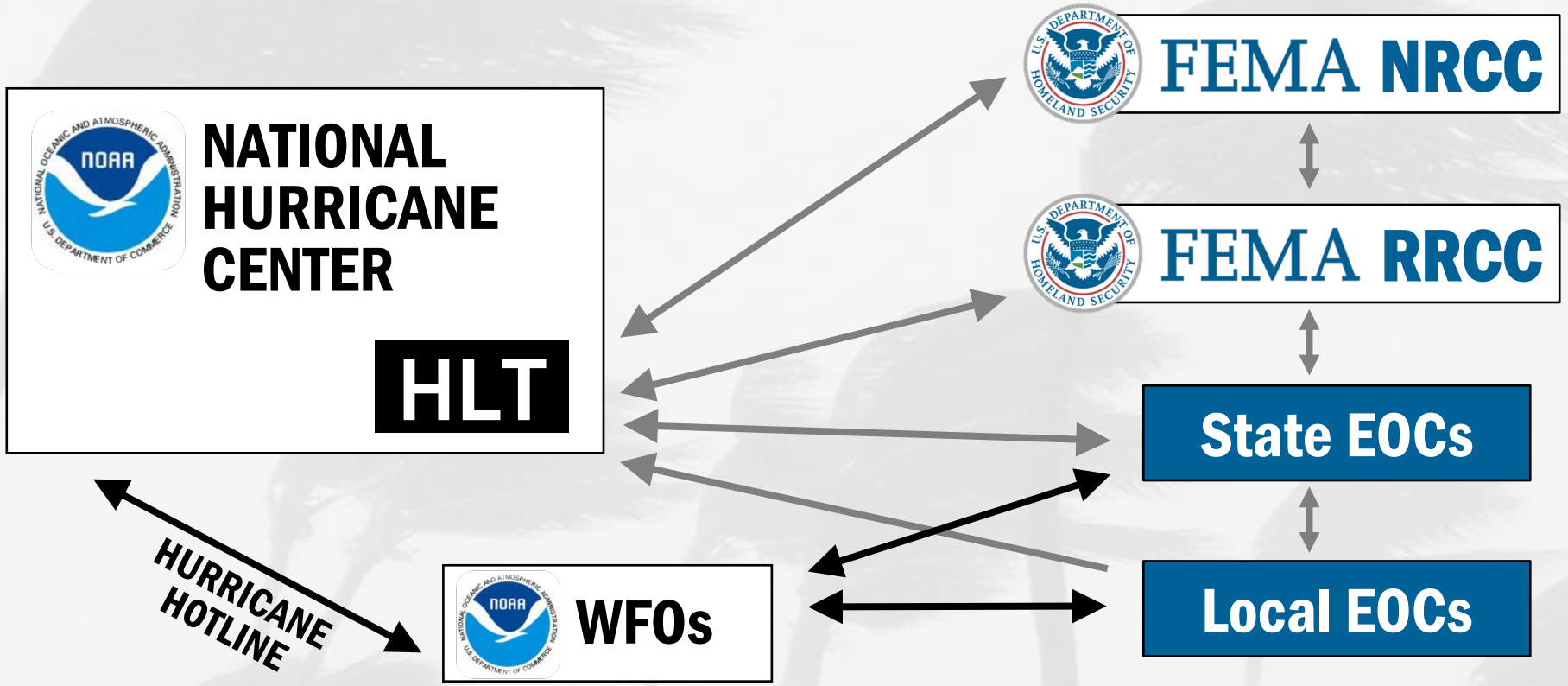
- Technical Knowledge
- State/Local Relationships
- Deploy to NHC



HURRICANE LIAISON TEAM
Communication Flowchart

FEMA

COMMUNICATION FLOWCHART



HURRICANE LIAISON TEAM
Overview

FEMA

RESPONSIBILITIES

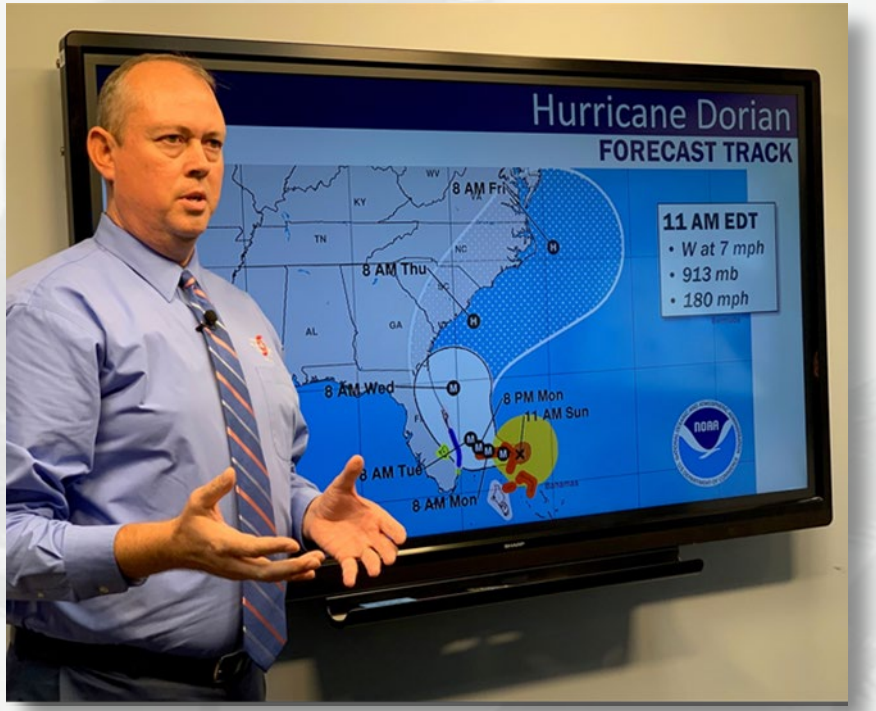
- **Real-time interpretation, assessment and guidance;**
  - Apply NHC forecasts with Regional, State and local response evacuation plans
- **Forum for EMs to ask questions,**
  - Reinforce decisions;
  - Assist with use of NHC forecasts and predictive modeling
- **Provide NHC visibility on State and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

HURRICANE LIAISON TEAM
Overview

FEMA

RESPONSIBILITIES

- **Facilitate two-way communications**
  - Between the NHC and EMs
  - Common forecast picture
  - Relay EM issues to improve NWS/NHC messaging
- **Video/Teleconferences**
  - NHC/NWS
  - FEMA and other Federal Agencies
  - Emergency Operations Centers (EOCs)



HURRICANE LIAISON TEAM

Recent Storm Examples

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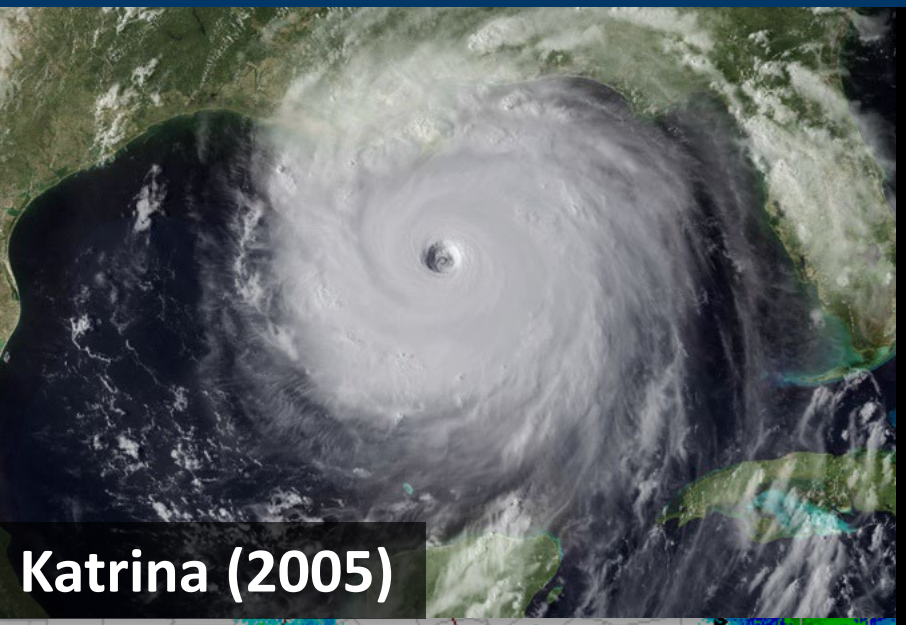
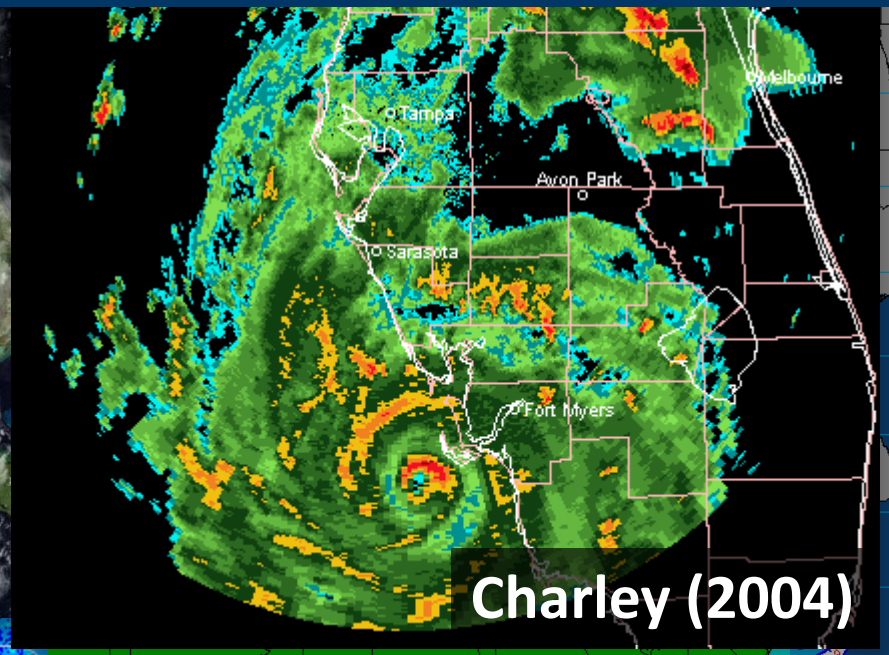
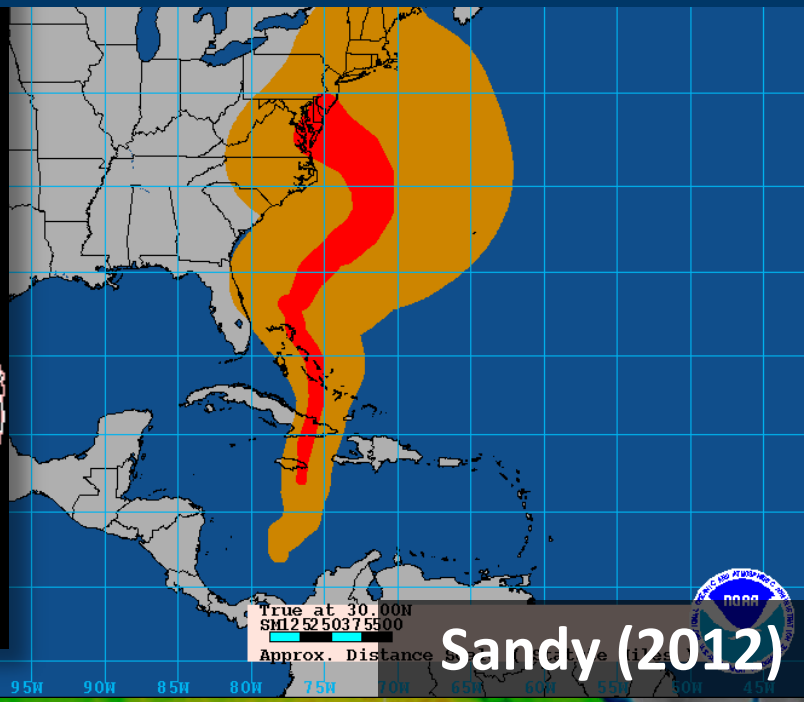


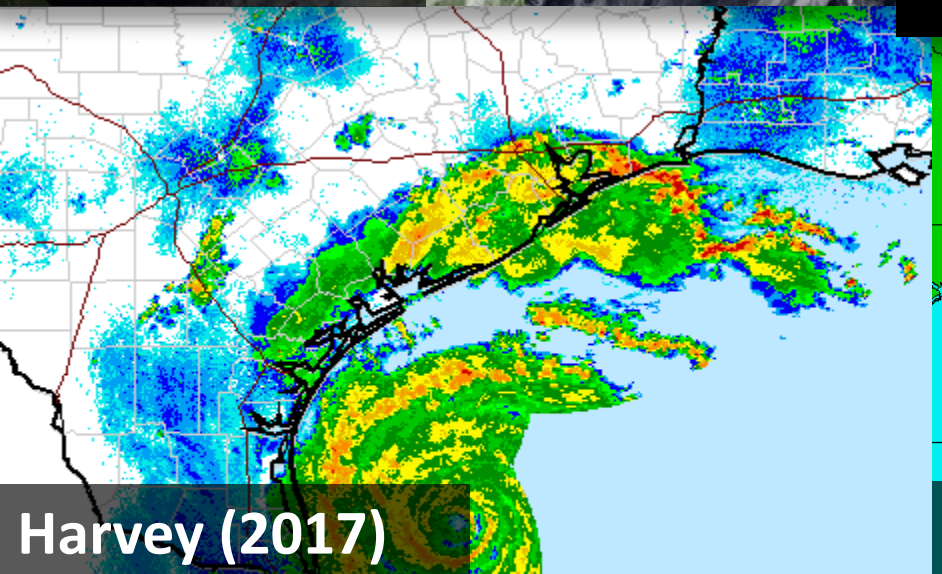
Katrina (2005)



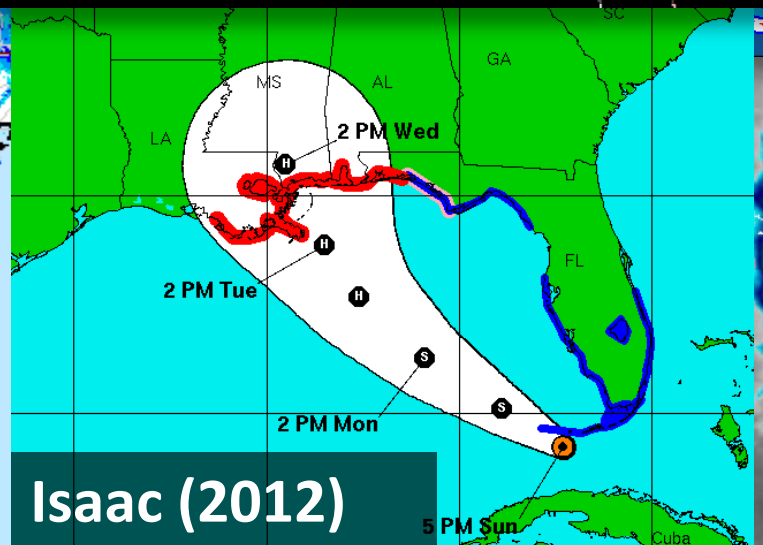
Charley (2004)



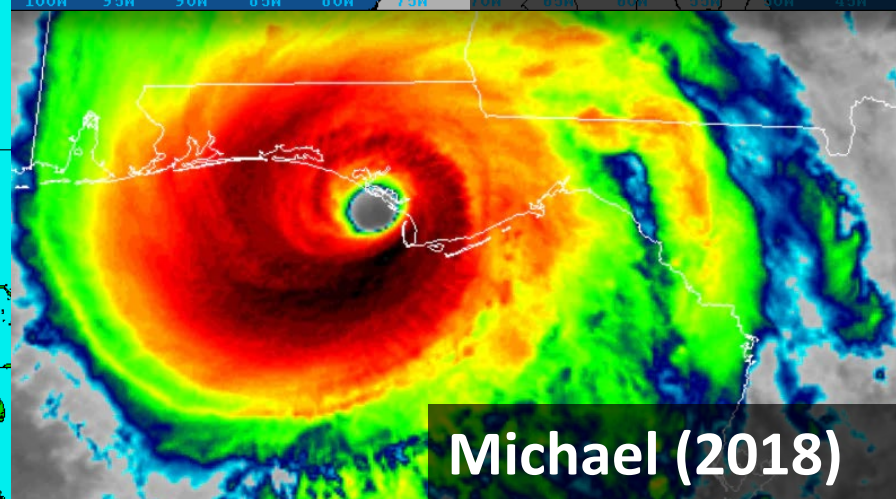
Sandy (2012)



Harvey (2017)



Isaac (2012)



Michael (2018)

HURRICANE READINESS
L0311

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Questions/Comments?