



Hurricane Readiness in Complex Situations

Part 1: Preparing for Complexity - Hurricane Readiness in the Era of Rapid Intensification and Extreme Multi-Hazard Storms

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Complex Tropical Situations

Major Hurricanes Intersecting with Society

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Training Session 19



EXTREME TROPICAL HAZARDS

CASCADING EVENTS & MEGA-CRISES



CASCADING IMPACTS:



THREAT TO PUBLIC SAFETY & VULNERABLE POPULATIONS



COMPOUND AND MULTI-HAZARD IMPACTS IN A HURRICANE EVENT

Multiple hazards. Interconnected impacts. Increasing risk.



1 WIND AND STORM SURGE	2 WIND AND INLAND FLOODING	3 EXTREME RAINFALL AND RIVER FLOODING	4 EMBEDDED TROPICAL TORNADOES	5 INFRASTRUCTURE FAILURE	6 LONG DURATION DISPLACEMENT
<ul style="list-style-type: none"> Destructive winds Storm surge inundation Coastal erosion 	<ul style="list-style-type: none"> Damaging winds inland Barrier failure and overtopping Flash flooding in low areas 	<ul style="list-style-type: none"> Extreme rainfall totals River rises and overflow Prolonged, widespread flooding 	<ul style="list-style-type: none"> Tornadoes embedded in bands Localized severe wind damage Additional threat, day or night 	<ul style="list-style-type: none"> Power outages Transportation disruption Water, sewer, and communications failure 	<ul style="list-style-type: none"> Homes uninhabitable Displacement for weeks to months Disrupted livelihoods and services

WHY IT MATTERS

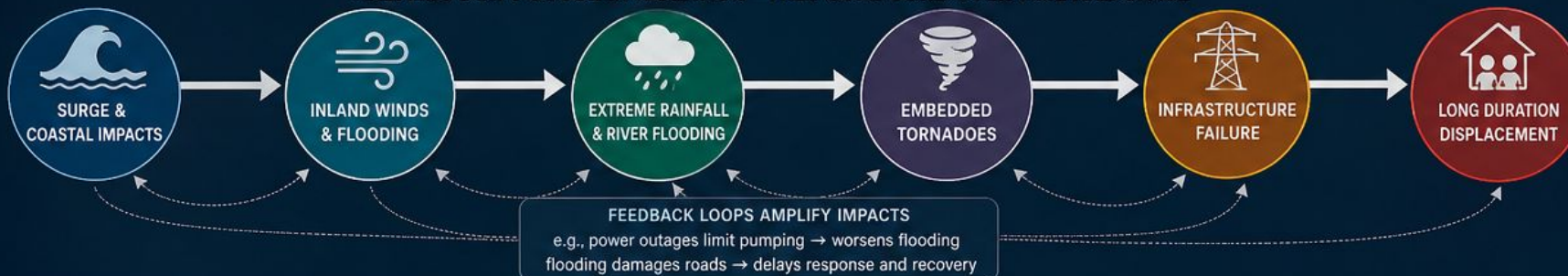
- Hazards overlap in time and space.
- Impacts cascade and reinforce each other.
- Recovery takes time—often weeks to months.
- Whole community resilience is suffering and recovery speeds are slow.

Emergency management and public communication must address compound risk, not single-hazard forecasting.

EXAMPLE SCENARIO

A major hurricane makes landfall with devastating winds and storm surge. Heavy rainfall causes rivers to flood for days. Tornadoes move through overnight. Power is out for weeks. Roads are closed. Clean water is limited. Thousands of people are displaced and recovery takes months.

HAZARDS DON'T OCCUR IN ISOLATION—THEY COMPOUND OVER TIME AND SPACE



WIDESPREAD AND CASCADING IMPACTS ACROSS COMMUNITIES

<h3>PEOPLE & HEALTH</h3> <ul style="list-style-type: none"> Injury and loss of life Displacement and sheltering Stress and mental health impacts 	<h3>HOUSING</h3> <ul style="list-style-type: none"> Structural damage Flooded homes Uninhabitable conditions 	<h3>ECONOMY</h3> <ul style="list-style-type: none"> Business interruption Job loss Long-term economic recovery 	<h3>TRANSPORTATION</h3> <ul style="list-style-type: none"> Road and bridge damage Airport and port disruption Limited access for response 	<h3>WATER & SANITATION</h3> <ul style="list-style-type: none"> Treatment plant damage Contamination Service disruptions 	<h3>ENERGY & COMMUNICATIONS</h3> <ul style="list-style-type: none"> Power outages Communication loss Service interruptions 	<h3>ENVIRONMENT</h3> <ul style="list-style-type: none"> Habitat damage Water quality impacts Debris and pollution
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RAPIDLY INTENSIFYING CATEGORY 5 HURRICANE

HURRICANES CAN INTENSIFY DRAMATICALLY IN 24 TO 48 HOURS.



RAPID INTENSIFICATION IS A DEADLY THREAT

INTENSITY CAN CHANGE DRAMATICALLY IN A SHORT TIME.



RAPID INTENSITY CHANGE SHORTENS EVACUATION AND SHELTER DECISION TIMELINE

Waiting too long can leave you with too little time—or no time to get to safety.

DECISION TIME SHRINKS FAST

48 HOURS OUT



May seem like plenty of time.

24 HOURS OUT



Conditions deteriorate quickly.

12 HOURS OR LESS



Evacuation options may be gone.

DON'T WAIT FOR CERTAINTY. ACT ON THE RISK.

CATEGORY 5 LEVEL WIND DAMAGE PRODUCES WIDESPREAD STRUCTURAL FAILURE

ROOFS LOST



WALL FAILURE



BUILDINGS COLLAPSE



COMPLETE DEVASTATION



Risk communication must prepare the public for worse than expected outcomes when rapid intensification occurs.

CATASTROPHIC IMPACTS AT CATEGORY 5 LEVEL



EXTREME WINDS 160+ MPH

- Catastrophic wind damage to homes, businesses, and infrastructure
- Debris becomes deadly missiles



LIFE-THREATENING STORM SURGE

- Devastating surge flooding far inland
- Coastal communities overwhelmed



HEAVY RAINS & FLASH FLOODING

- Catastrophic rainfall leads to flash flooding and landslides
- Roads impassable, rescue delayed



HUMAN IMPACT

- Injuries and fatalities
- Displacement for weeks or months
- Critical services disrupted
- Communities may take months to recover

PROLONGED POWER OUTAGES AND HOSPITAL & LIFELINE DISRUPTIONS



PROLONGED POWER OUTAGES

- Widespread grid failure
- Outages can last for days to weeks
- No power means no water, fuel, or refrigeration



HOSPITAL DISRUPTIONS

- Backup power can fail or run low on fuel
- Delays in critical care and surgeries
- Patient evacuations may be necessary



WATER & SEWER DISRUPTIONS

- Treatment plants damaged or flooded
- Loss of clean water
- Sewage backups and contamination risks



COMMUNICATION BREAKDOWNS

- Cell towers and internet down
- Emergency services overloaded
- Hard to call for help or get information



RAPID INTENSIFICATION CAN BE DEADLY.

Plan early. Evacuate early. Save lives.



KNOW YOUR ZONE. MAKE A PLAN. TAKE ACTION.

When a storm intensifies fast, time is the difference.



DON'T WAIT FOR A CAT 5 TO ACT.

Be ready before it's too late.

EXTREME WIND, AND STRUCTURAL VULNERABILITY IN A HURRICANE EVENT

Stronger winds expose weaknesses. Vulnerable structures fail.
Wind damage triggers cascading failures.

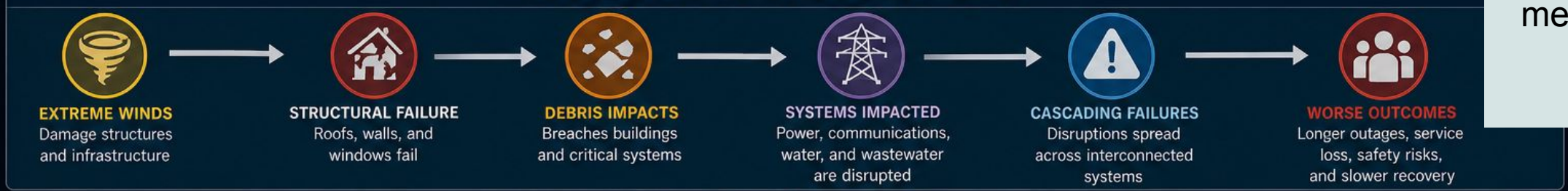


WIND IMPACTS BY STRUCTURE TYPE

MOBILE HOMES	OLDER OR UNFORTIFIED STRUCTURES	LIGHT COMMERCIAL BUILDINGS	WAREHOUSES AND INDUSTRIAL STRUCTURES	EXTREME WINDS CAN:
 <p>Extremely vulnerable. High winds can destroy or displace mobile homes completely.</p>	 <p>Lack of modern codes, roof-to-wall connections, and reinforcement leads to roof loss, wall failure, and collapse.</p>	 <p>Roof failure, broken windows, and wall collapse. Signage and facades fail, creating hazards and debris.</p>	 <p>Large roof spans and wall panels vulnerable to wind uplift and failure. Severe interior damage and content loss.</p>	

Wind vulnerability is a social and structural risk, not just a meteorological one.

WIND DAMAGE TRIGGERS CASCADING FAILURES



IMPACTS TO CRITICAL LIFELINES

 <p>POWER SYSTEMS</p> <ul style="list-style-type: none"> Downed lines and poles Substation damage Prolonged outages 	 <p>COMMUNICATIONS</p> <ul style="list-style-type: none"> Tower damage and collapse Fiber cuts and signal loss Outages and limited service 	 <p>WATER SYSTEMS</p> <ul style="list-style-type: none"> Treatment plant damage Pump station outages Loss of pressure and supply 	 <p>WASTEWATER SYSTEMS</p> <ul style="list-style-type: none"> Pump station failures Collection system damage Overflows and contamination risks
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BUILD STRONGER. PREPARE SMARTER. RECOVER FASTER.

Stronger construction, updated codes, and resilient infrastructure save lives and reduce long-term impacts.



VULNERABILITY TODAY = DISASTER TOMORROW

Strengthen structures. Protect lifelines. Build resilience.

HURRICANE STORM SURGE

HOW COASTAL INUNDATION HAPPENS

Storm surge is an abnormal rise of water pushed onshore by a hurricane's winds. It is the leading cause of hurricane fatalities and damage.

NORMAL CONDITIONS

- 1 Normal sea level
- 2 Beach/dunes
- 3 Coastal land

1

2

3

STORM SURGE
Extra water pushed onshore by hurricane winds



DURING HURRICANE

- 1 Astronomical tide (regular high tide)
- 2 Storm surge
- 3 Wave run-up
- 4 Coastal inundation (water moves inland)

2

3

4

1

WATER MOVES INLAND



Storm surge remains the primary cause of hurricane fatalities in many coastal events.

Surge combines with waves and tide to produce:
(1) rapid building inundation
(2) road and evacuation route loss
(3) shelter isolation

Surge impacts often overlap with high wind damage, creating life-threatening compound exposure.

KEY TAKEAWAY

Storm surge can add several feet (or more) of water on top of normal tides, causing coastal flooding far inland from the shoreline.

STORM SURGE CAN VARY GREATLY

Surge height depends on:



REMEMBER

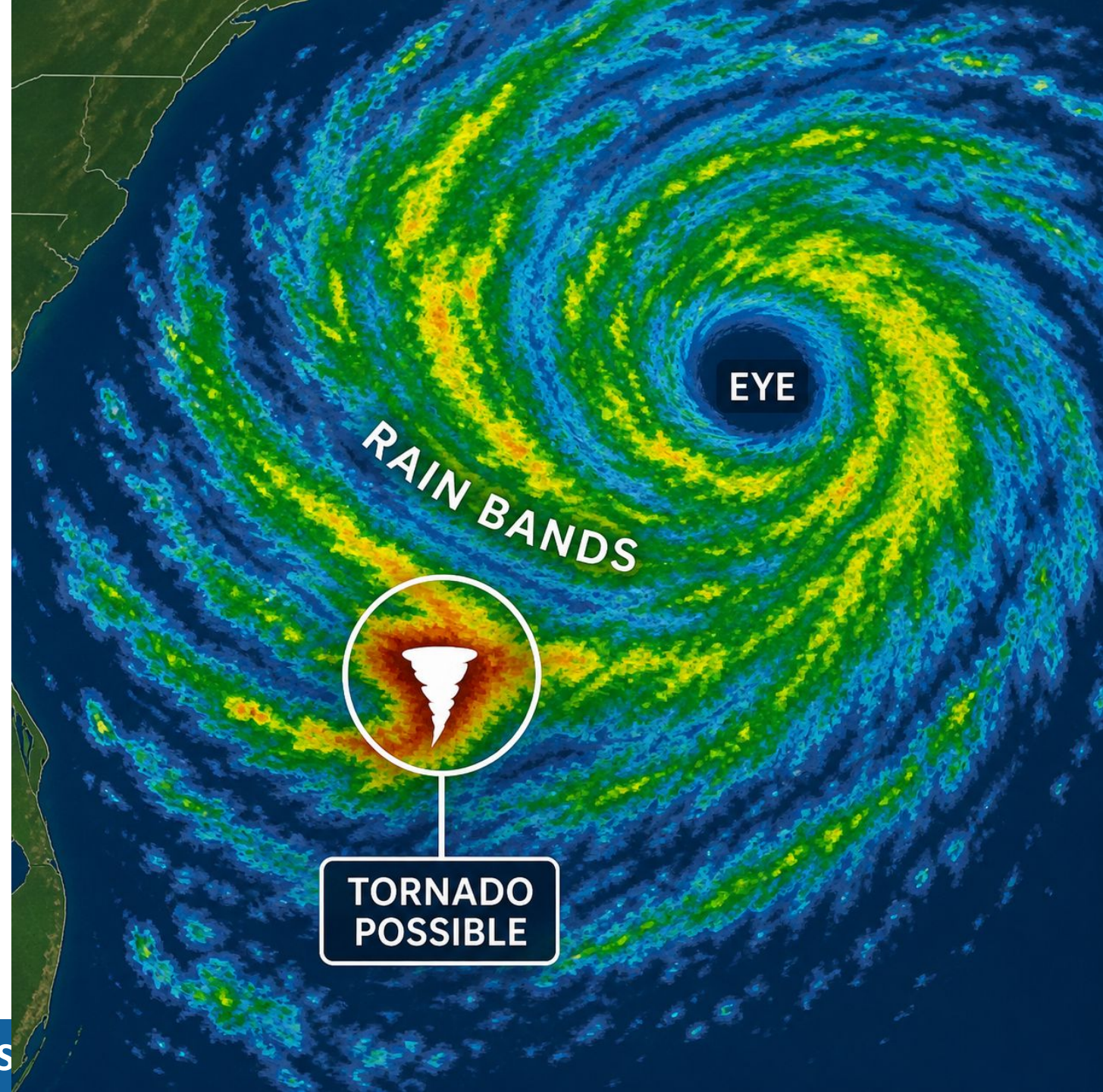
 You don't have to be near the eye of the storm to experience dangerous storm surge.

Tropical Tornadoes & Embedded Severe Storms

Rainbands frequently produce brief but damaging tornadoes localized extreme wind damage

Occur far from the center and often after landfall.

Tornado risk during hurricanes complicates warning and shelter messaging.



High Rainfall Rates & River Flooding

Slow-moving or moisture-rich hurricanes produce:

- (1) extreme short-duration rainfall
- (2) flash flooding
- (3) prolonged river flooding

Transportation, medical access, and supply chains are disrupted for days to weeks.

Flood impacts often exceed wind losses and drive long-term recovery needs.



Far-Inland Impacts

Major hurricane impacts extend well inland:

- (1) flash flooding
- (2) landslides
- (3) infrastructure isolation

Events such as Hurricane Helene–type impacts in Western North Carolina illustrate how interior and mountainous regions experience hurricane disasters without coastal exposure.

Inland communities frequently underestimate hurricane risk.



Vulnerable Populations

High-risk populations include:

- (1) older adults
- (2) medically fragile individuals
- (3) people with mobility or sensory limitations
- (4) low-income and manufactured-housing residents



Vulnerable Populations & Sheltering Needs

Compound events create shelter challenges:

- (1) power-dependent medical devices
- (2) transportation barriers
- (3) longer shelter durations due to flooding and infrastructure failure

Shelter planning must account for simultaneous hazards and extended displacement.



Societal Intersection

Infrastructure vulnerability

Housing inequity and building standards

Access to transportation and medical care

Warning comprehension and trust

Duration of displacement and recovery

Modern hurricanes are not single-hazard disasters—they are compound social and environmental crises.

HURRICANES ARE COMPOUND DISASTERS, NOT SINGLE HAZARDS

Hurricane Helene (2024) and Hurricane Ian (2022) show how one storm can trigger multiple, cascading environmental and social impacts.



THE COMPOUND EFFECT

These hazards interact and compound one another—creating greater impacts than any single hazard alone.



KEY TAKEAWAY

Building resilience means preparing for multiple, cascading impacts—not just the storm itself.



STRONGER TOGETHER: Prepared communities reduce risk, save lives, and recover faster.

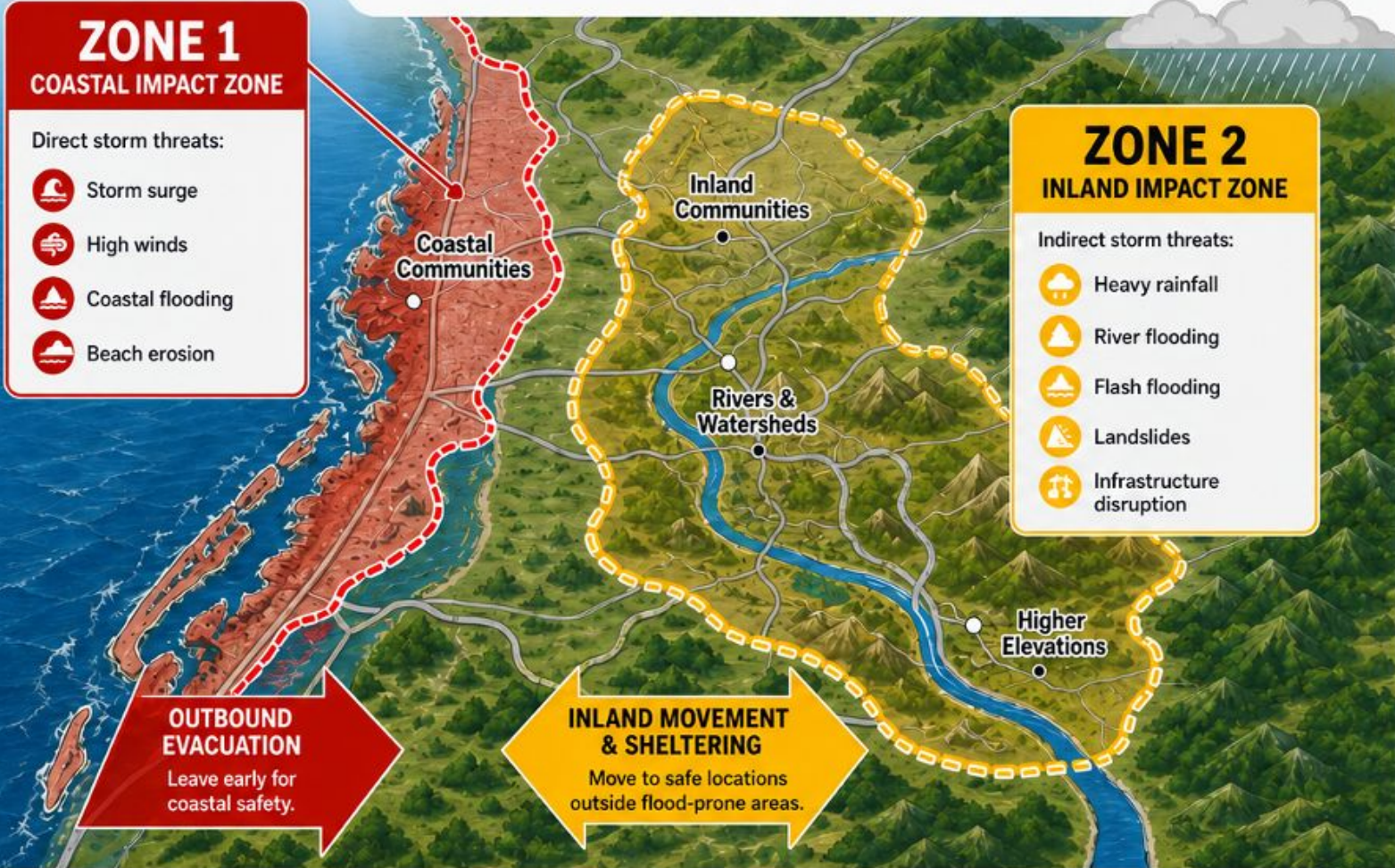




DUAL-ZONE EVACUATION PLANNING

Two Zones. One Plan. More Time. More Safety.

Hurricanes impact both the coast and far inland. Dual-zone evacuation planning ensures more time to prepare and more lives protected.



WHY DUAL-ZONE PLANNING?

- MORE TIME**
Coastal residents leave early. Inland residents act based on rainfall and flood forecasts.
- MORE SAFETY**
Reduces congestion, supports efficient sheltering, and saves more lives.
- BETTER PREPARED COMMUNITIES**
Helps emergency services focus resources where and when they are needed most.

HOW IT WORKS

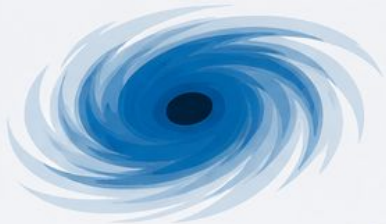
- ZONE 1 EVACUATES FIRST**
Coastal areas evacuate before the storm to avoid surge and wind.
- MONITOR & COMMUNICATE**
Track rainfall, river levels, and forecasts for inland impacts.
- ZONE 2 TAKES ACTION**
Inland communities evacuate or shelter when flooding threats increase.
- RETURN SAFELY**
Return home only when it is safe.

BE PREPARED IN BOTH ZONES

- Know your zone and risks.
- Sign up for local alerts.
- Make a go-kit and family plan.
- Know your evacuation routes.
- Help neighbors, especially those with special needs.

Two zones. One community.
A stronger, safer tomorrow.

PLAN AHEAD. STAY INFORMED. STAY SAFE.



KNOWLEDGE SAVES LIVES

Informed People. Safer Communities.



Hurricanes are complex and impacts can be far-reaching. Public knowledge and education empower people to understand the risks, make the best protective action decisions, and save lives.

UNDERSTAND THE COMPLEXITY

Hurricanes are more than wind.



Impacts can occur hours or days apart, coast and far inland. One size does not fit all.

KNOWLEDGE EMPOWERS ACTION

When people know...

- ✓ The risks in their area
- ✓ What to expect and when
- ✓ How to prepare
- ✓ Where to go for reliable information

They are more likely to:



Informed actions today protect lives, reduce suffering, and speed recovery.

THE POWER OF KNOWLEDGE A PATH TO BETTER DECISIONS



STAY INFORMED. STAY FLEXIBLE.

Conditions can change. Continue to monitor updates and be ready to adjust your plans.



TRUSTED INFORMATION SAVES LIVES

Use multiple reliable sources.



National Weather Service
weather.gov



FEMA
fema.gov



Local Emergency Management
alerts, websites, social media



Local News & Official Alerts
TV, radio, text alerts



Avoid rumors and unverified information. Check before you share.

EDUCATED COMMUNITIES ARE RESILIENT COMMUNITIES



Community education builds awareness.

Families make plans and practice them.

Neighbors help each other prepare.

Stronger together—before, during, and after.



Knowledge today. Protection tomorrow. Be informed. Be prepared. Be safe.

YOU HAVE THE POWER.



Learn the Risks
Know what could happen.



Plan Ahead
Make a plan and build a kit.



Stay Aware
Monitor forecasts and alerts.



Take Action
Act early and follow official guidance.

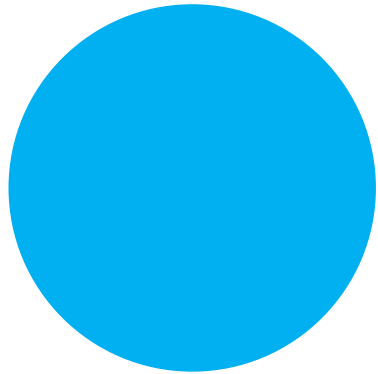
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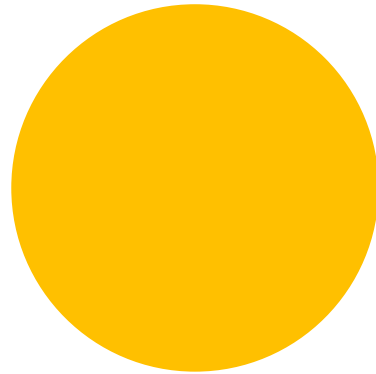
SAFER YOU. SAFER COMMUNITY. STRONGER TOGETHER.



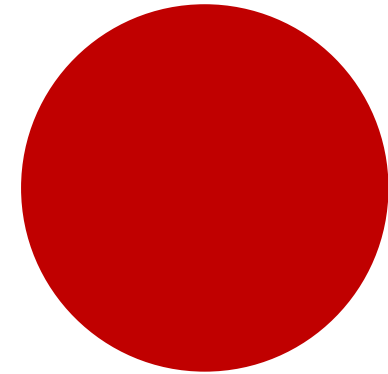
QUESTIONS?



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Complex Tropical Situations

Major Hurricanes Intersecting with Society

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Training Session 19



Rapid Intensification and Compressed Timelines

*Responding Effectively and
Appropriately to Increasing Threats*

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Tropical Cyclones are never just coastal events

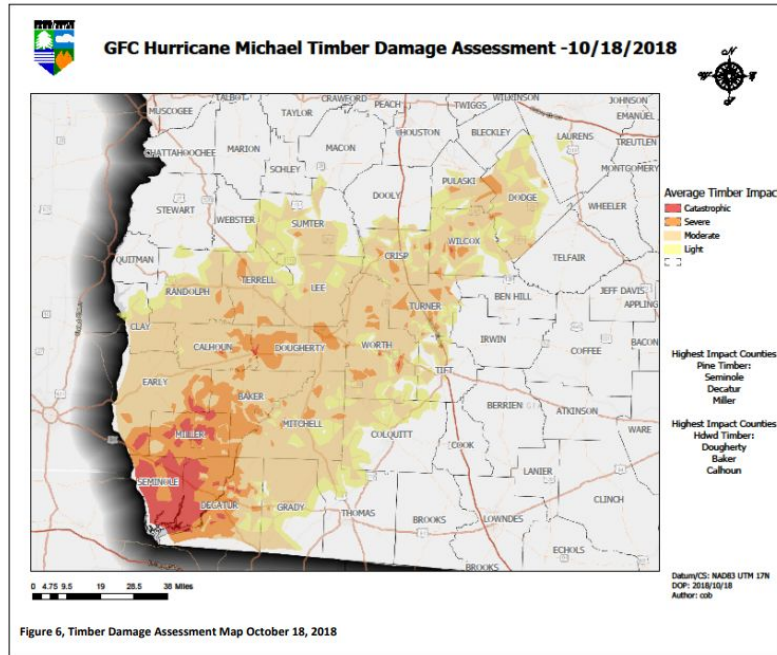
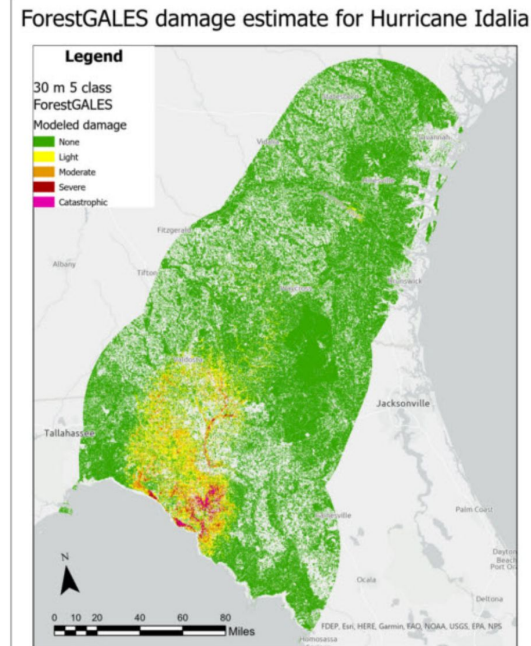
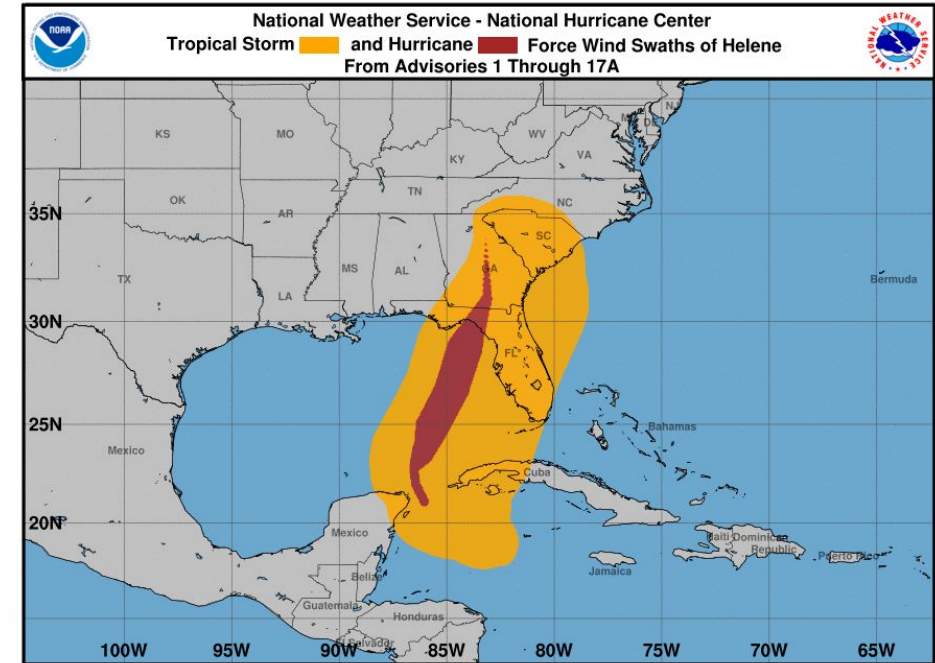


Figure 6, Timber Damage Assessment Map October 18, 2018

Hurricane Michael
(2018)



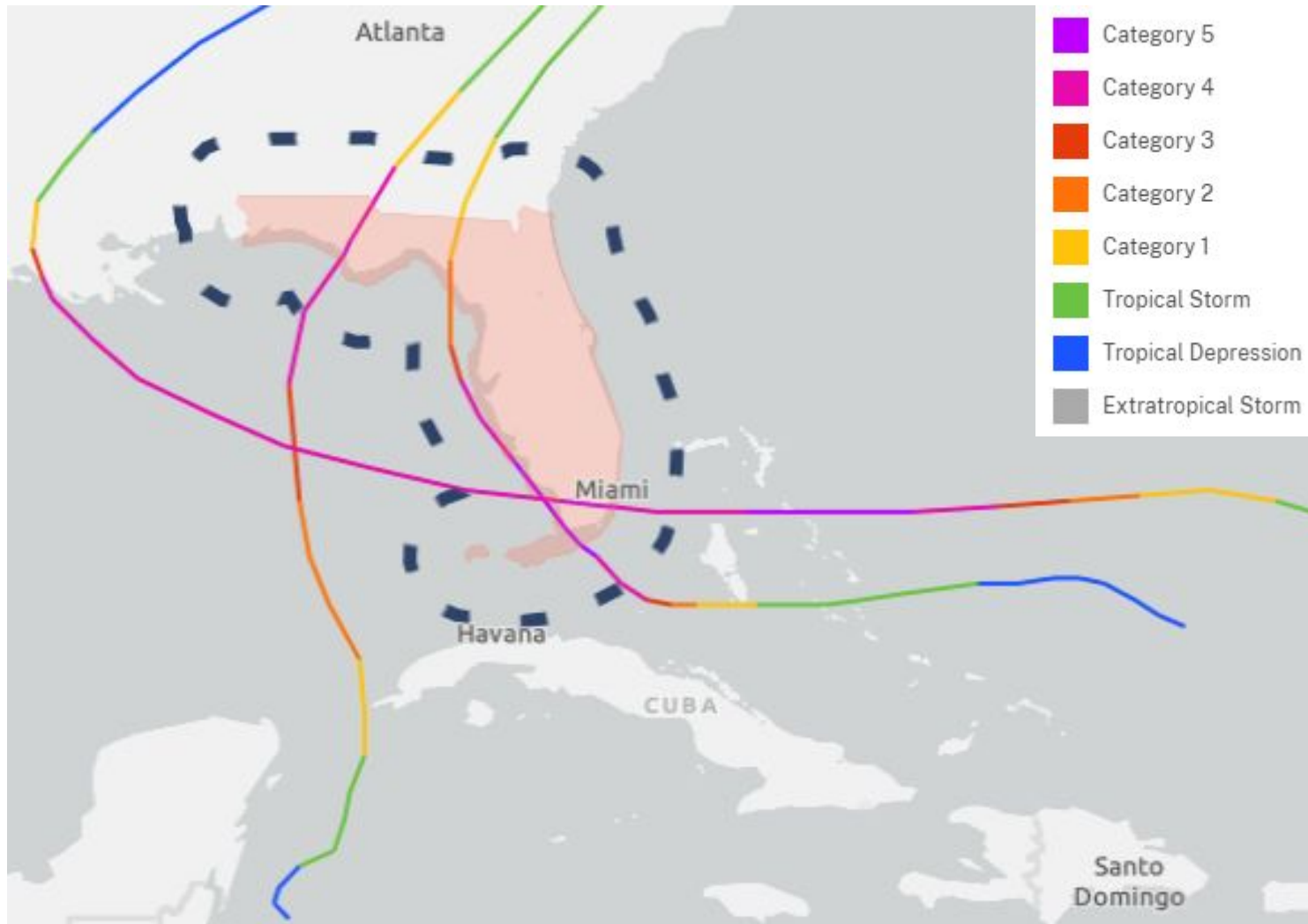
Hurricane Idalia
(2023)



Hurricane Helene (2024)

Note: No part of Florida is more than 75 miles from the Gulf or Atlantic

Rapid Intensification



- Three category five hurricanes have made landfall in Florida.
- They share one important thing in common
- Were all tropical storms 48-60 hours before landfall as a category 5 hurricane.

Rapid Intensification - Defined/Concerns



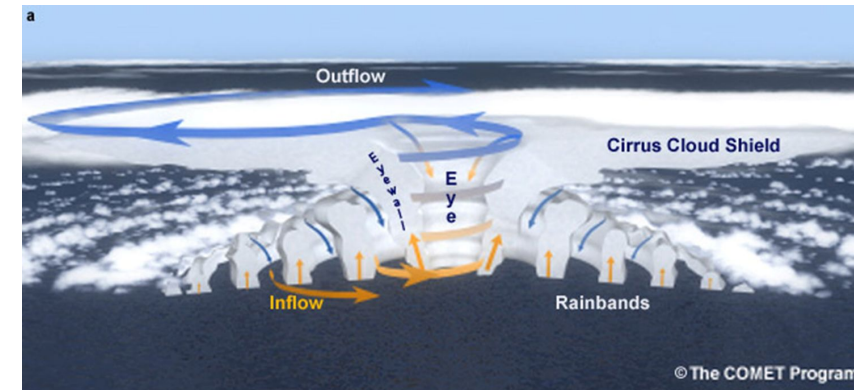
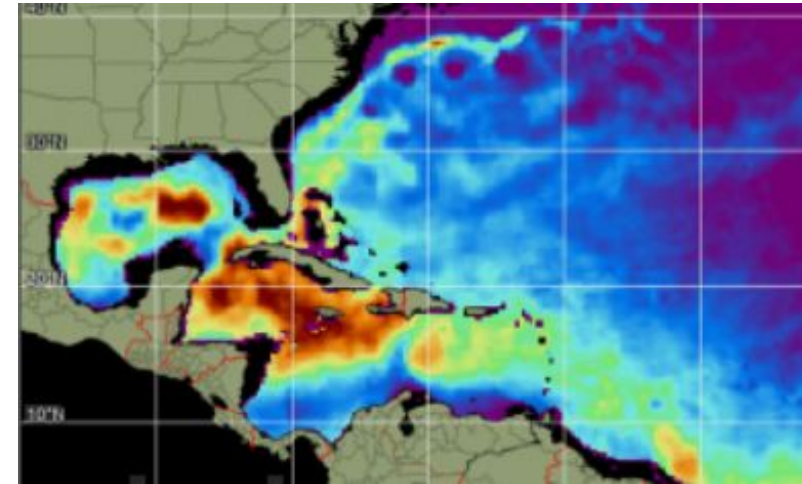
- Rapid intensification (RI) is defined as an increase in wind speed of at least 35 mph within 24 hours.
- RI is difficult to forecast.
- Sometimes just preparing for one category higher may not be enough if rapid intensification is possible. Why?

Starting Intensity	Assumed Minimum RI in 24 hours
65 mph (Tropical Storm)	100 mph (Cat 2 Hurricane)
80 mph (Cat 1 Hurricane)	115 mph (Cat 3 Hurricane)
100 mph (Cat 2 Hurricane)	135 mph (Cat 4 Hurricane)
125 mph (Cat 3 Hurricane)	160 mph (Cat 5 Hurricane)

Rapid Intensification - Causes



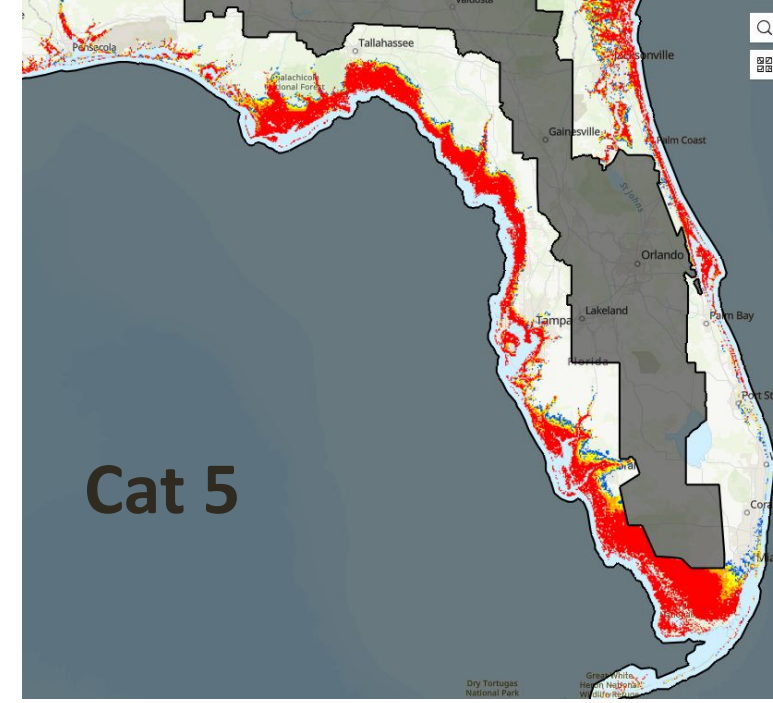
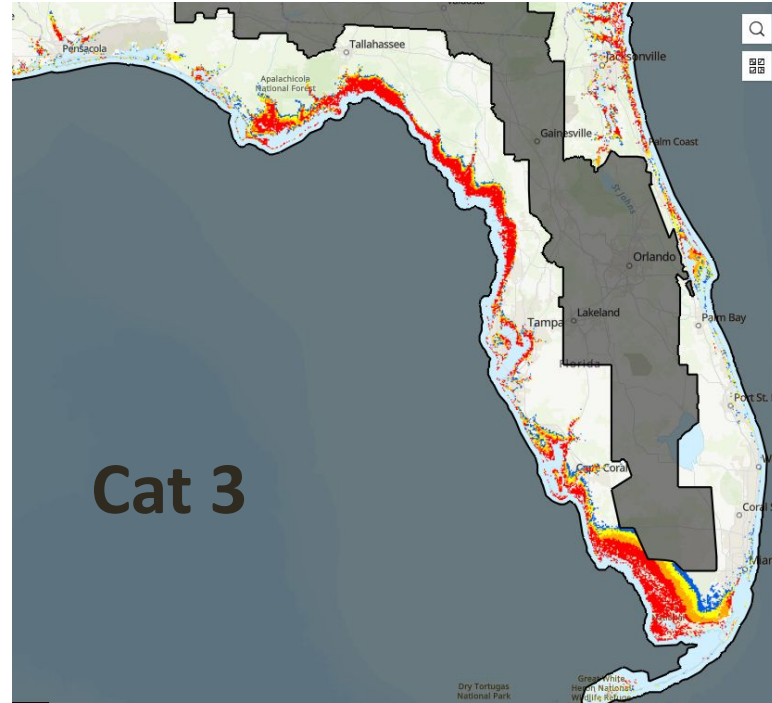
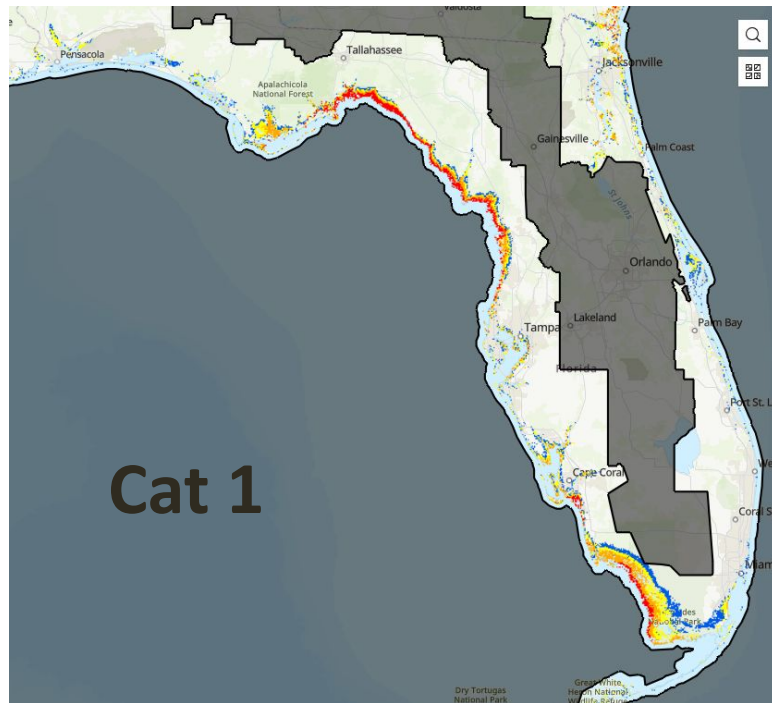
- Favorable conditions to strengthen tropical cyclones are required for RI
 - Very warm/deep sea surface temperatures
 - Low shear and established outflow
 - Very moist air mass
- Structural changes in the storm are needed too.
 - Complete eyewall formation
 - Intense thunderstorms around the eye.
- These increase probability of RI occurring.
 - Model guidance can explicitly predict RI
 - Provide a likelihood of occurrence based on all factors





Rapid Intensification - Concerns

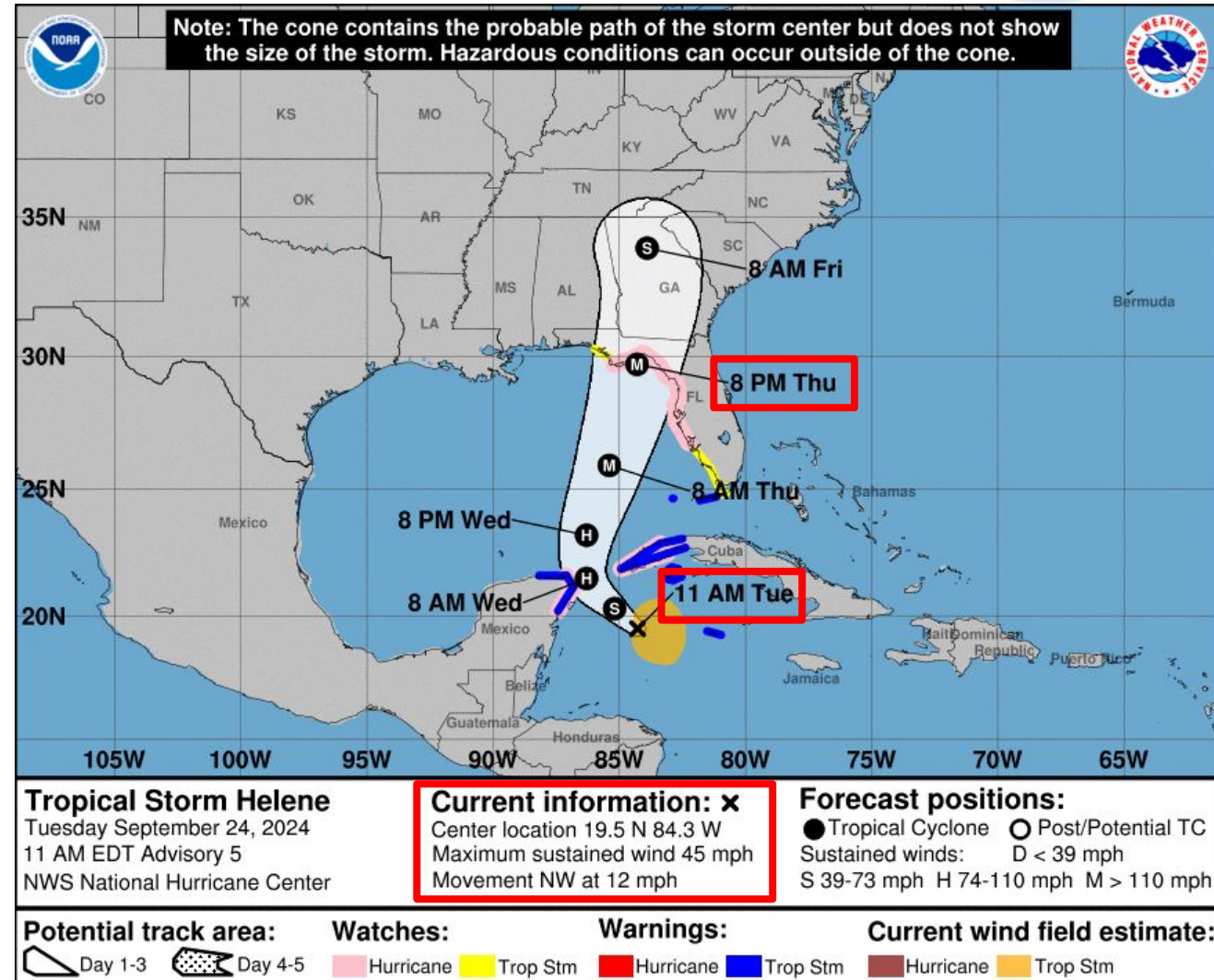
- But the concerns don't just end with the wind.
- Wind speed is a component of storm surge potential.
- Evacuation zones can change as the intensity forecast changes
- If a 2 category increase 24 hours occurred, do you have enough time?





Communication Challenges

- Just the previous year, Hurricane Idalia impacted the Florida Big Bend, but even so, people still said: “I survived Idalia, so why do I need to leave?”
- The biggest challenge was convincing people Helene was an even greater surge threat than Idalia.
- Helene would also be accelerating with time.

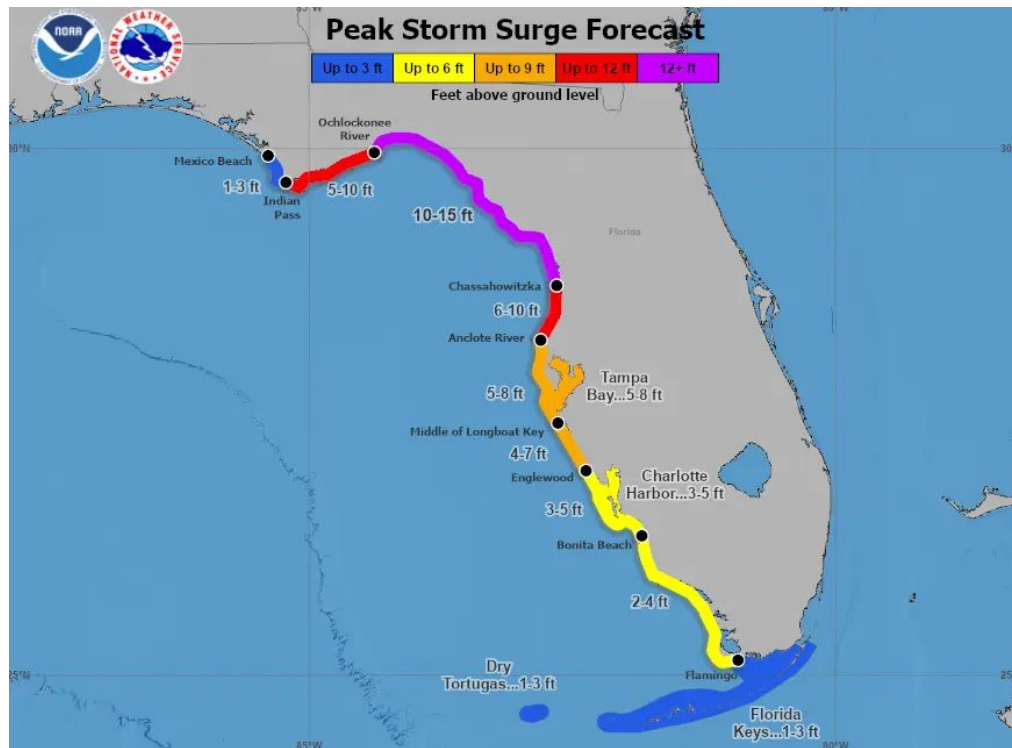




Effective Communication - Surge

- “My house made it last time.”
- “Idalia was as bad as it can get and we were still safe.”

How do you convince someone to listen? This video clip goes to above 9 ft. The forecast was up to 15 ft at this point.

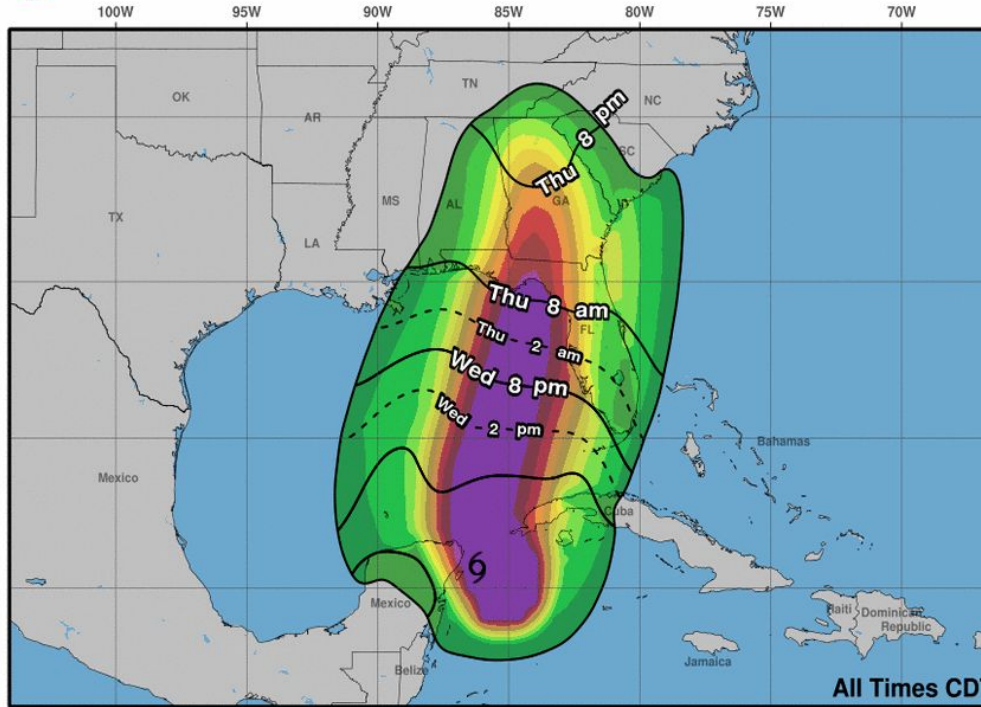




12-36 hours before TS Winds Arrive

Helene is **STILL** a tropical storm!

Earliest Reasonable Arrival Time of Tropical-Storm-Force Winds



Tropical Storm Helene
 Wed. Sep. 25, 2024 4 am CDT
 Advisory 8

Storm Location & Wind Speed
 ○ < 34 kt (39 mph)
 ○ 34-63 kt (39-73 mph)
 ● ≥ 64 kt (74 mph)

5-day chance of receiving sustained 34+ kt (39+ mph) winds
 5 10 20 30 40 50 60 70 80 90 100

All Times CDT

Potential Storm Surge Impacts



KNOW YOUR EVACUATION ZONE
<https://www.floridadisaster.org/knowyourzone/>



- Structural damage to buildings, with many washed away.
- Nearshore escape routes / roads washed out or severely flooded.
- Flood control systems / barriers may become stressed.
- Severe to extreme beach erosion & dune loss
- Major/massive damage to marinas, docks, and piers.
- Many to numerous small craft broken away from moorings, some left onshore and stranded.

More Details: weather.gov/srh/tropical?office=tae



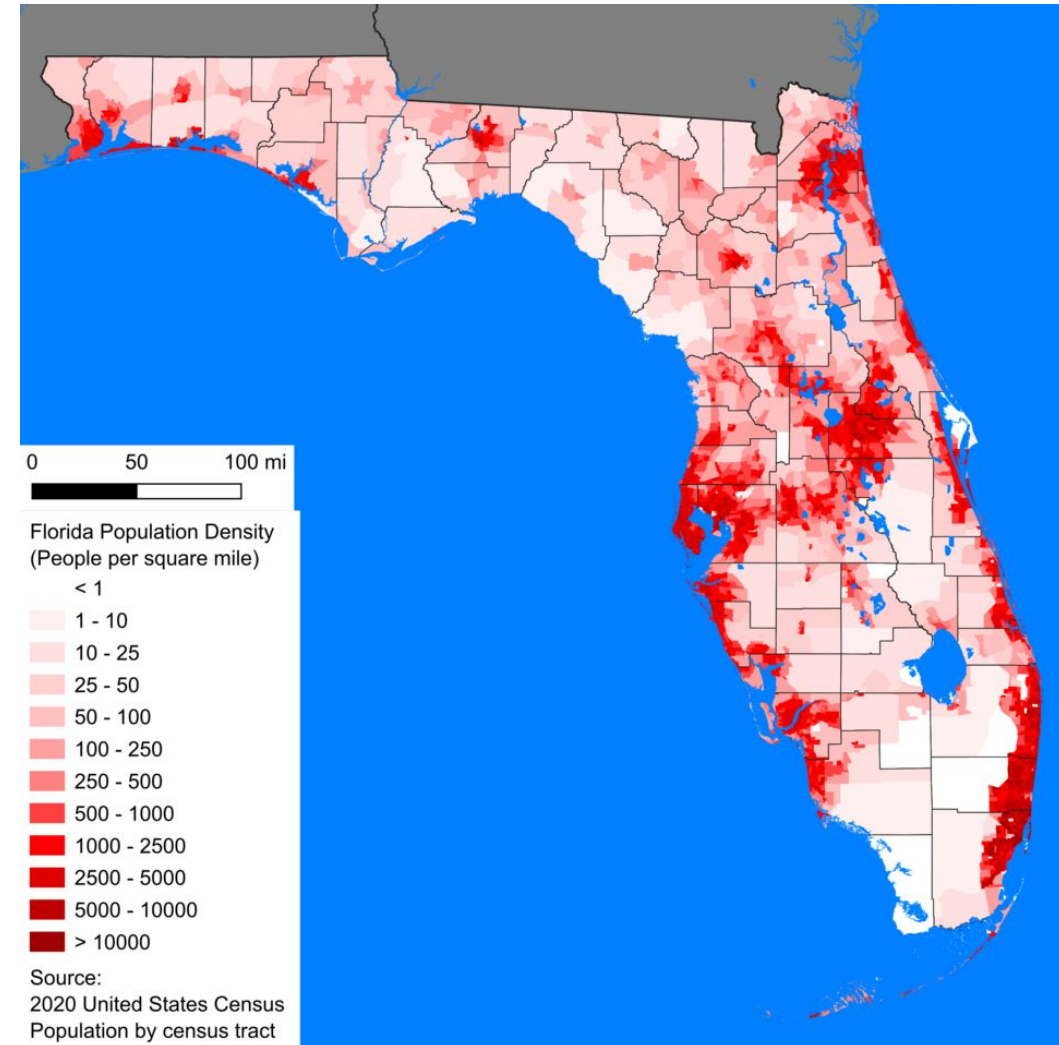
Weather Forecast Office
 Tallahassee Florida

Updated: September 25, 2024 5AM ET



The area affected

- The Florida Big Bend is not especially dense in population, but life threatening surge was expected along much of Florida's west coast, in more densely populated areas.
- It's important to not just focus on the landfall area. Even the surge forecast well before landfall showed 5-7 ft AGL near Sarasota/Tampa.





Thursday was “our last chance”

- During Helene, I was deployed to the State of Florida EOC.
- External communications to the public thus far were:
 - A WEA for Hurricane Warnings
 - A WEA for Storm Surge Warnings
 - Continued Messaging from NWS and Media
- Even so, evacuation compliance was slow, an AlertFlorida message was coordinated for several high-impact counties to go out at 2 pm:
“Severe storm surge expected. Emergency Management urges you to evacuate!”
- Did this make a difference?
 - Two individuals in Taylor County specifically mentioned this additional message as finally convincing them it was time to leave.

And by 2 pm Thursday



BULLETIN

Hurricane Helene Intermediate Advisory Number 13A
NWS National Hurricane Center Miami FL AL092024
100 PM CDT Thu Sep 26 2024

...HELENE ALMOST A MAJOR HURRICANE WITH ADDITIONAL STRENGTHENING
FORECAST BEFORE LANDFALL IN THE FLORIDA BIG BEND...
...PREPARATIONS TO PROTECT LIFE AND PROPERTY SHOULD BE RUSHED TO
COMPLETION...

SUMMARY OF 100 PM CDT...1800 UTC...INFORMATION

LOCATION...26.4N 85.0W
ABOUT 195 MI...315 KM SW OF TAMPA FLORIDA
ABOUT 230 MI...365 KM S OF APALACHICOLA FLORIDA
MAXIMUM SUSTAINED WINDS...110 MPH...175 KM/H
PRESENT MOVEMENT...NNE OR 25 DEGREES AT 16 MPH...26 KM/H
MINIMUM CENTRAL PRESSURE...959 MB...28.32 INCHES

Hurricane Helene Tropical Cyclone Update
NWS National Hurricane Center Miami FL AL092024
225 PM EDT Thu Sep 26 2024

...AIR FORCE HURRICANE HUNTERS FIND HELENE A MAJOR HURRICANE...

The Air Force Hurricane Hunters found that the maximum sustained winds have increased to near 120 mph (195 km/h). This makes Helene a dangerous category 3 major hurricane. Additional strengthening is expected before Helene makes landfall in the Florida Big Bend this evening.

SUMMARY OF 225 PM EDT...1825 UTC...INFORMATION

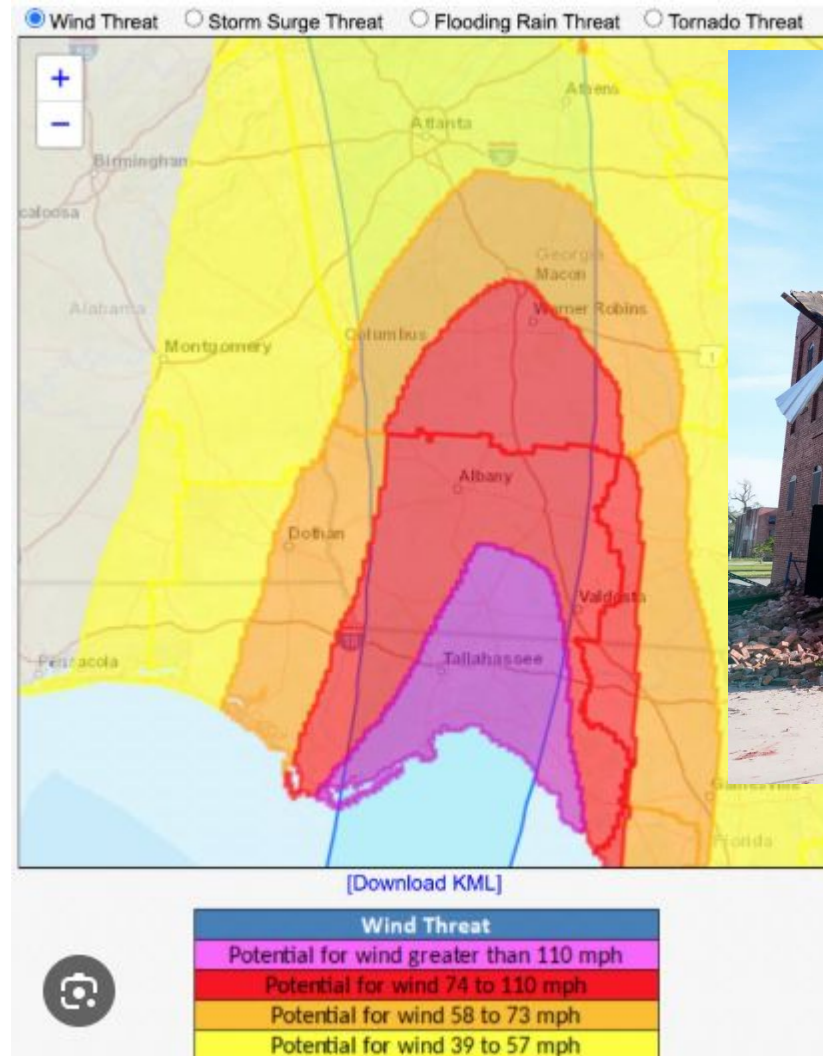
LOCATION...26.7N 84.9W
ABOUT 170 MI...280 KM WSW OF TAMPA FLORIDA
ABOUT 205 MI...335 KM S OF APALACHICOLA FLORIDA
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PRESENT MOVEMENT...NNE OR 25 DEGREES AT 16 MPH...26 KM/H
MINIMUM CENTRAL PRESSURE...959 MB...28.32 INCHES

**Tuesday at 11 am, 45 mph tropical storm and just over 51
hours later, 120 mph category 3 hurricane.**



Wind Impacts

- It wasn't all about surge.
- Helene's fast forward speed and RI meant hurricane force winds spread well inland.



Significant structural damage in Valdosta, GA



Helene - An Extreme Situation and how do we respond the next time?

- Helene wasn't just about:
 - Historic Storm Surge
 - Extensive Destructive Winds
 - Historic Flooding
- Helene showed us something we've seen many times already - tropical systems can rapidly intensify, resulting in an exponential increase in wind and surge impacts.
- What do we do with the next event?





Helene - An Extreme Situation and how do we respond the next time?

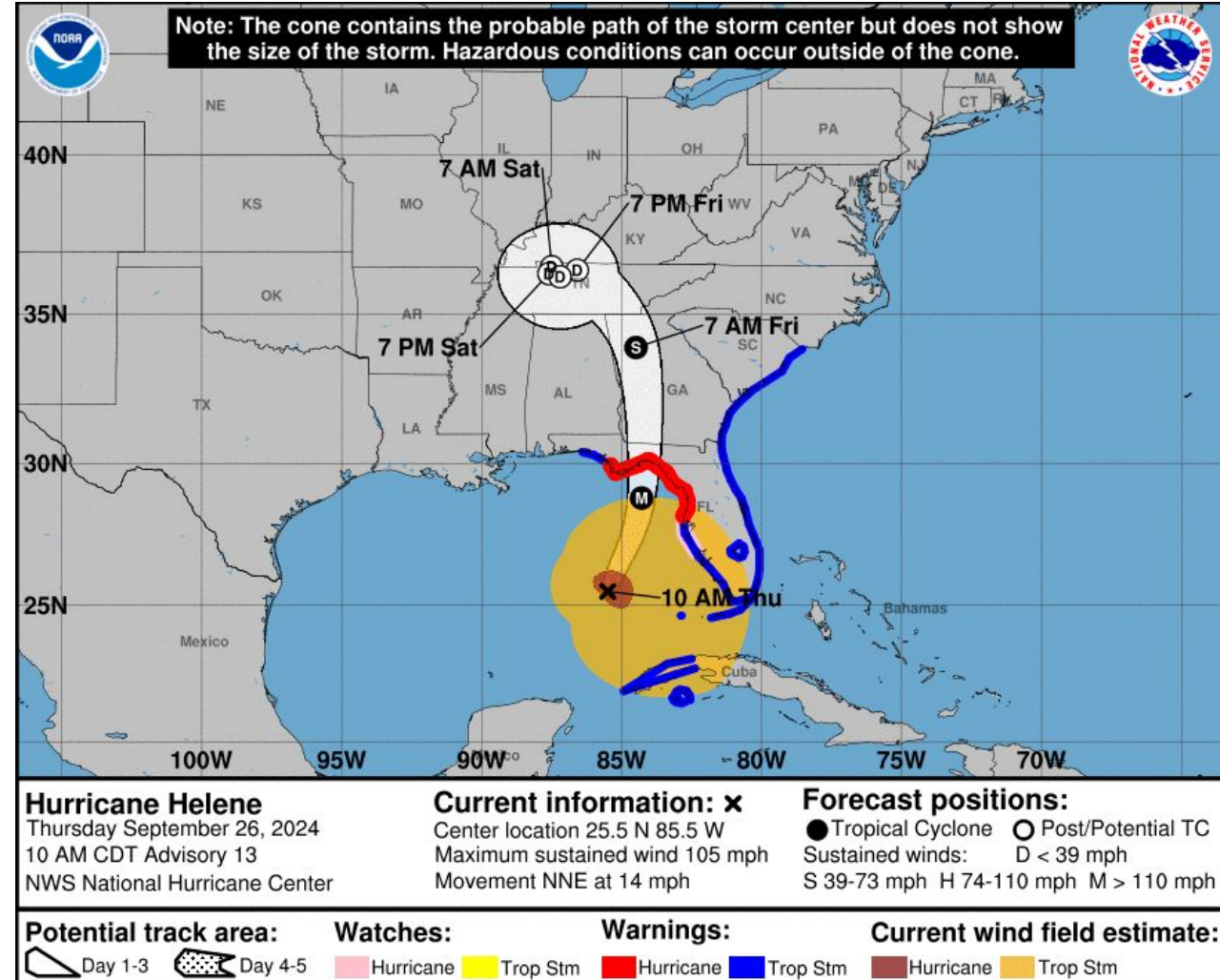
- Helene is a storm that reminds us that some common tips, like plan for 1 category higher won't always work.
- It takes aggressive messaging to compel action, even when we know some people will never leave.
- Life threatening surge doesn't just occur near the landfall point. The vast majority of surge deaths in Helene were in West Central Florida.





Final Thoughts

- Helene was “that storm” for me.
- 23 years in this job, and going to work Thursday, I felt I was leaving my home as it was for the last time.
- I have surveyed many storm surge events, but I have never encountered an event that was beyond reach of my 16.4 ft surge pole.
- We’ve must ensure we communicate RI potential clearly, because we’ll see it again!





Rapid Intensification and Compressed Timelines

Responding Effectively and Appropriately to Increasing Threats

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GOVERNOR'S
HURRICANE CONFERENCE®

Multi-Hazard Storms

*When Threats Collide: Managing
Simultaneous Hazards*

Will Ulrich
Warning Coordination Meteorologist
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Training Session 19





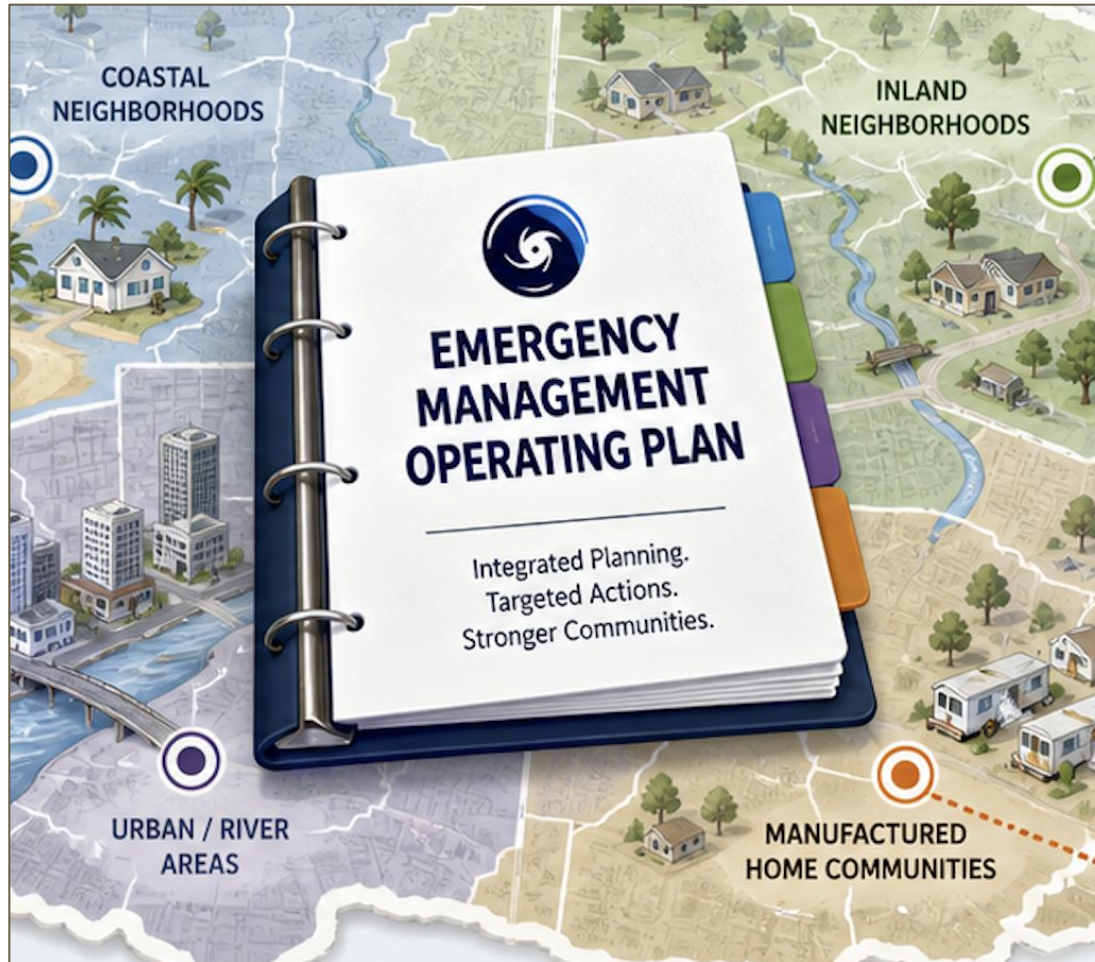
One Storm, Many Hazards



- The most dangerous storms in Florida aren't defined by one hazard - they're defined by multiple hazards hitting different areas at once.
- State vs. Local response looks different



Local Response



- Emergency operating plans often organize actions by individual hazards
- Jurisdictions often include coastal evacuation zones, inland flood-prone neighborhoods, river communities, mobile homes, and urban areas.

The Challenge: Hurricane impacts rarely occur one at a time and in one location.



Protective Actions



Storm Surge

Primary evacuation driver for coastal and low-lying surge areas.



Extreme Wind

Shelter-in-place or safer shelter concern, especially for mobile & manufactured homes, older structures, and vulnerable facilities.



Freshwater Flooding

Heavy rainfall, poor drainage, urban flooding, and delayed river responses.



Tornadoes

Fast-moving, short-fuse, high-impact threat with shelter-in-place or safer shelter concern for vulnerable communities

The Challenge: multi-hazard storms can create conflicting safety guidance in both **time** and **space**! The right action for one hazard may become unsafe as another hazard emerges.

Supporting Community Decision Makers



Tropical Briefing: Major Hurricane Milton

October 7, 2024 5:45 PM

Onset of Hazardous Winds - Tropical Storm Force

→ There still remains some uncertainty in the exact track and timing of the system. Stay tuned for adjustments!

Tropical Briefing: Major Hurricane Milton

October 9, 2024 11:45 AM

Latest Hazards Assessment

County	Earliest Reasonable Time of Arrival (If they were to occur)	Most Likely Time of Arrival (If they were to occur)	Tropical Storm Force Wind Speed Probabilities (for locations within the county)
INLAND			
Lake	Late Wednesday Morning	Wednesday Evening	80 - 85% (increasing)
Seminole	Late Wednesday Morning	Wednesday Evening	75 - 80% (increasing)
Orange	Late Wednesday Morning	Wednesday Evening	80 - 85% (increasing)
Osceola	Late Wednesday Morning	Wednesday Evening	70 - 80% (increasing)
Okeechobee	Wednesday Morning	Wednesday Evening	55 - 65% (steady)
Volusia	Early Wednesday Afternoon	Wednesday Evening	70 - 80% (increasing)
Brevard	Early Wednesday Afternoon	Wednesday Evening	75 - 85% (increasing)
Indian River	Late Wednesday Morning	Wednesday Evening	60 - 70% (steady)
St. Lucie	Wednesday Morning	Wednesday Evening	50 - 60% (steady)
Martin	Wednesday Morning	Wednesday Evening	45 - 55% (steady)

* The tropical cyclone surface wind speed probabilities provide location-specific probabilities of sustained (1-minute average) surface wind speeds of at least 34 kt (39 mph, tropical storm force).

Tropical Briefing: Major Hurricane Milton

October 7, 2024 5:45 PM

St. Johns River at Deland, Sanford and Geneva

→ Based on the latest rainfall forecasts, the St. Johns River is likely to experience rises later this week; however, the extent of these rises will be dependent on the distribution of rainfall over the coming days and the eventual track of Milton.

Overview

- Damaging hurricane conditions across a large part of east central Florida, with strong tropical storm conditions in Martin County.
- Flooding rain threat - in the form of urban, street, flash, and river flooding - is high to extreme for locations along and north of Milton's center track (with particular concern in the vicinity of the Interstate 4 corridor).
- Tornadoes are increasingly likely before and during Milton's trek across the peninsula, especially in outer rainbands. The threat will increase ahead of Milton as today unfolds.
- Coastal impacts, in the form of significant beach and dune erosion, along with coastal storm surge of 3 to 5 feet along portions of Brevard and Volusia counties.

Overall Forecast Confidence

...WHAT...WHERE...WHEN...HOW MUCH...HOW LONG...HOW SURE...



Hurricane Preparedness

STRENGTHEN YOUR HOME

There's a lot you can do around your home to help protect it from hurricane winds. Before hurricane season, trim trees on your property and get approved window coverings. Ahead of storms, collect loose outdoor items, secure all doors on your property, and find a safe location for your vehicle.

- Cover windows
- Trim trees
- Secure all doors
- Secure loose outdoor items
- Move vehicle to a safe location

weather.gov/hurricane

Tornado WATCH

Effective Until 9:00 PM EDT

Osceola, Okeechobee, Indian River, St. Lucie & Martin Counties

Brief tornadoes may impact evacuation or preparedness efforts today!

Potential Hazards: [Icons for tornado, wind, rain, etc.]

- The tornado threat is expected to build northward through the afternoon & evening, so the watch is likely to be expanded.
- Have multiple ways to receive weather alerts!

WEATHER FORECAST OFFICE
Melbourne, Florida

Updated: October 9, 2024

Storm Surge WATCH

East Central Florida

Volusia & Brevard County Coasts

WITHIN 48 HOURS...
2-4 ft of water inundation above normal high tide POSSIBLE along the coast in the watch area

- Efforts to protect life and property from flooding should be underway. Preparations should be complete by Tuesday night.
- Heed evacuations if ordered by local officials.
- Stay informed: weather.gov/melbourne

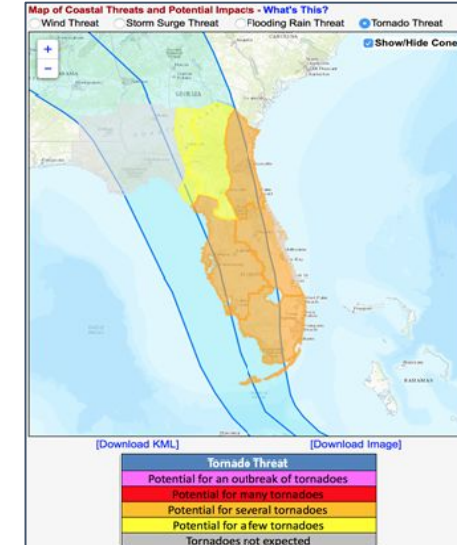
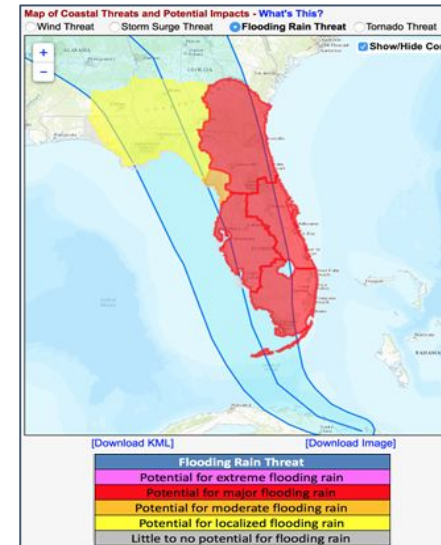
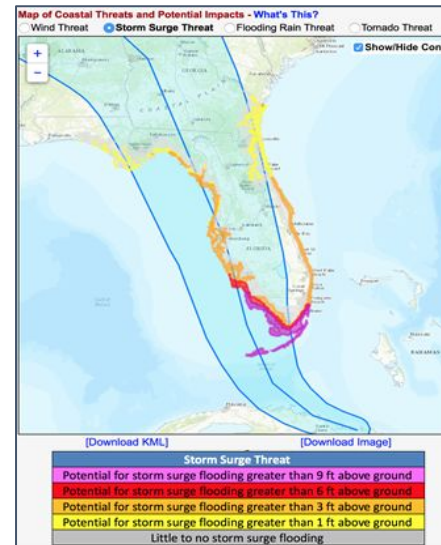
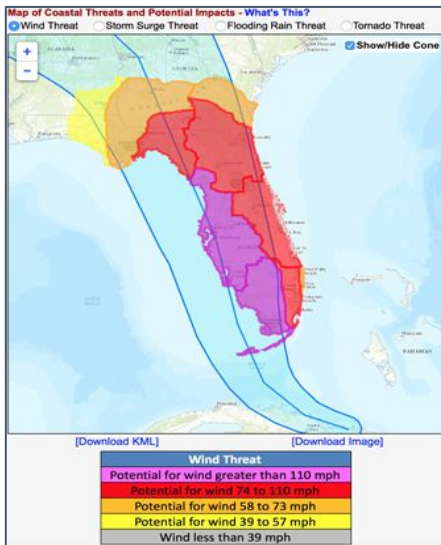
WEATHER FORECAST OFFICE
Melbourne, Florida

Updated: 11 PM Oct 7, 2024

...WHAT AM I SUPPOSED TO DO ABOUT IT...

Hurricane Threats and Impacts

because they



- Hurricane Threats and Impacts graphics are an easy way to determine individual community risk
- HTI translates the full NHC and WFO forecast package while *incorporating uncertainty* into hazard-specific, location-specific potential impacts



Hurricane Threats and Impacts

Map of Coastal Threats and Potential Impacts - What's This?

Wind Threat Storm Surge Threat Flooding Rain Threat Tornado Threat

Show/Hide Cone

For: Coastal Palm Beach County

...HURRICANE WARNING REMAINS IN EFFECT...
...STORM SURGE WARNING REMAINS IN EFFECT...

*** LOCATIONS AFFECTED**

- West Palm Beach
- Boca Raton
- Juno Beach
- Jupiter

*** WIND**

- LATEST LOCAL FORECAST: Equivalent Tropical Storm force wind
- Peak Wind Forecast: 45-55 mph with gusts to 75 mph
- Window for Tropical Storm force winds: early Sunday morning until Monday afternoon

- EMERGENCY PLANS SHOULD INCLUDE A REASONABLE THREAT AS DEPICTED ON THE LEFT.

*** FOR MORE INFORMATION:**

- <http://www.weather.gov/mfl>
- www.co-palm-beach.fl.us
- For storm information call 2-1-1

Threat Level - Potential for wind 58 to 73 mph

Potential for Significant Impact:

*Some damage to roofing and siding materials, along with damage to porches, awnings, carports, and sheds. A few buildings experiencing window, door, and garage door failures. Mobile homes damaged, especially if unanchored. Unsecured lightweight objects become dangerous projectiles.

[Download KML] [Download Image]

Wind Threat

- Potential for wind greater than 110 mph
- Potential for wind 74 to 110 mph
- Potential for wind 58 to 73 mph
- Potential for wind 39 to 57 mph
- Wind less than 39 mph

WHAT should I be concerned about?

WHERE will it happen?

HOW MUCH is likely to occur?

WHEN should I expect it?

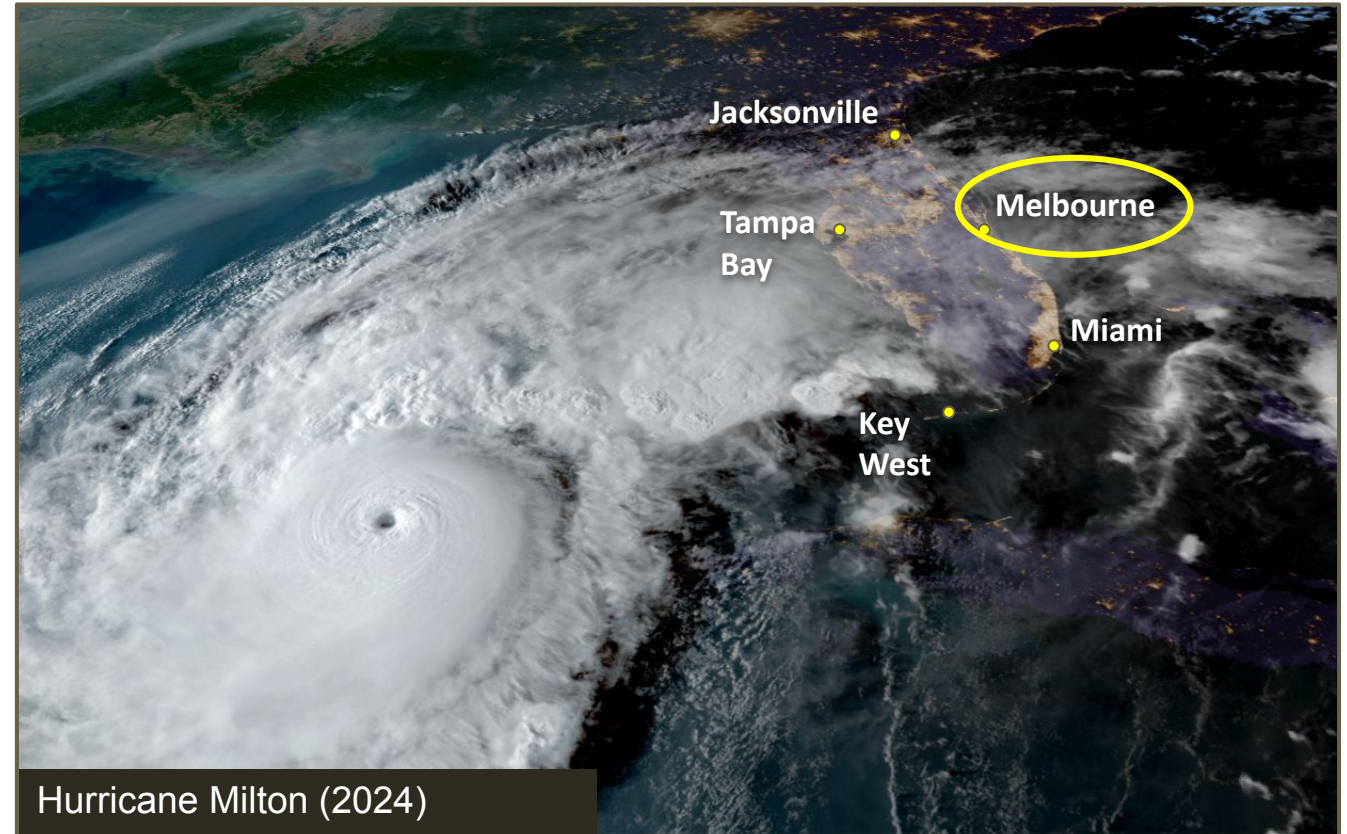
WHAT should I prepare for?

Impact Statements customized for the local area (i.e., topography, land use, infrastructure, etc.)

Hazard-Based Threat Scale incorporates a "safety margin" relative to the uncertainty in the forecast



Milton: What's The Local Risk?



All Hurricane Emergencies are Local!



Milton: Melbourne's Risk

Flooding Rainfall Potential

Threat

- extreme
- high
- rate
- localized
- little/none

Flooding from extreme rain may prompt...

- Numerous evacuations
- Numerous rescues
- Rivers & streams may overwhelmingly overflow.
- Flood control systems may become stressed.
- Flooding can enter numerous structures.
- Very dangerous driving conditions.
- Numerous roads/bridges closed, some weakened/washed out.

More Details: weather.gov/mlb/hti

WEATHER FORECAST OFFICE
Melbourne Florida

Updated: October 9, 2024

Tornado Threat

Threat

- outbreak
- many
- several
- few
- little/none

Several to many tornadoes can hinder emergency plans during tropical events.

Many places may experience...

- Tornado damage, with isolated immense destruction
- Power & communications failures

Examples of potential damage:

- Roof and wall failures of sturdy buildings. Some buildings may be leveled.
- Mobile homes obliterated
- Large trees snapped or twisted
- Vehicles & small boats tossed or destroyed

More Details: weather.gov/mlb/hti

WEATHER FORECAST OFFICE
Melbourne Florida

Updated: October 9, 2024

- HTI indicated a high risk of flooding rainfall, along with a risk of many tornadoes the morning of October 9, 2024.
- This indicated the potential for flash flood warnings occurring at the same time as tornado warnings.



Multi-Hazard Conflicting Messaging



Call-to-Action

“Move to higher ground immediately! Stay away from flooded roads.”



Call-to-Action

“Take cover now! Move to an interior room on the lowest floor of a sturdy building.”

Tornadoes During Flooding



NWS Melbourne @NWSMelbourne · Sep 9

Tornado Warning for Brevard County! Find ready cover now! Move quickly to the lowest interior, dry location in a safe shelter.



WEATHER FORECAST OFFICE

Melbourne Florida

When A Tornado Warning Is Issued During Flooding...



Consider which threat poses the most danger in the moment & react accordingly



Ideally, find the lowest interior, dry location in a safe shelter



Don't take shelter in a low-lying ditch during flooding situations



Remember, mobile homes are not safe shelters during a tornado.

National Weathe... ⌵ ⚙️ ✎

- ☰ Unreads
- 🗨️ Threads
- 🔗 Huddles
- 🔍 Recap
- 📁 Directories

99+

📌 Priority

- # cws-jacksonville
- 🔒 southern-region-roc
- # wfo-melbourne-fl

📁 Files

wfo-melbourne-fl

🗨️ Messages 📄 Canvas 📁 Files 📁 Bookmarks 📁 Local Forecast Info 📁 National Forecast Info 📁 Other Slack Channels 📌 Pins +

favorable. Life-threatening flooding remains forecast along I-4. **October 9th, 2024** 📅 (and gusts) arrive tonight.

As the tornado threat ramps up today, we are encouraging folks to have multiple methods to receive warnings and to act quickly if a tornado warning is issued.

6 files 📄 | 📄 Download all

Major Hurricane MILTON

5 AM EDT

Do not focus on the forecast track! Hazardous conditions will unfold through the day. Preparations should be complete this morning!

- The tornado threat will increase quickly this afternoon as rain bands reach the area.
- No changes to Watches or Warnings.

IMPACTS >>>

Have multiple ways to get warnings

weather.gov

📱 INTERNET 📺 LOCAL TV AND RADIO 📻 NOAA WEATHER RADIO

High Rainfall Potential

Localize Moderate High Extreme

🌧️ Flooding from extreme rain prompt...

- Numerous evacuations
- Numerous rescues
- Rivers & streams may overwhelmingly overflow.
- Flood control systems may be stressed.
- Flooding can enter numerous structures.

4:46 PM **NWS - Melbourne - David Sharp** A MAIN MESSAGE: Within your home or shelter, know where the safest place is during a tornado warning. More so, know where your safest place is when a tornado warning and (flash) flood warning are in effect for your location at the same time. The safest room may not be the same.

More

- 👤 Team
- 🔒 wfo-melbourne-fl-amu
- 🔒 wfo-melbourne-fl-commte...
- 🔒 wfo-melbourne-fl-scitechteam
- ☰ Backup Offices
- # wfo-san-juan-pr 1
- # wfo-corpus-christi-tx
- # wfo-tampa-fl
- ☰ Florida Offices
- # wfo-key-west-fl 2
- # wfo... Unread mentions

39 to 57 mph 58 to 73 mph 74 to 120 mph

👉 structural damage to sturdy buildings

- Mobile homes severely damaged or destroyed.
- Many large trees snapped or uprooted.
- Debris makes some roads impassable.
- Several bridges, causeways, access routes impassable.

Large areas with power and communications outages.

More Details: weather.gov/mlb/ht

A few tornadoes Several tornadoes Many tornadoes

Numerous tornadoes can hinder emergency plans during tropical events.

Many places may experience...

- Tornado damage, with isolated immense destruction
- Power & communications failures

Examples of potential damage:

- Roof and wall failures of sturdy buildings; buildings may be leveled.
- Mobile homes obliterated
- Trees snapped or twisted
- Small boats tossed or destroyed

More Details: weather.gov/mlb/ht

1+R 3+R

- Damage to several buildings, especially near the coast.
- Sections of (mainly vulnerable) near roads weakened or washed out.
- Major beach erosion
- Heavy surf breaching dunes

Moderate damage to:

- Marinas
- Docks & piers

More Details: weather.gov/mlb/ht

🔍 📄 📁 📌 📄 Latest messages

A MAIN MESSAGE FOR TODAY: If you are vulnerable to high winds and flood waters, the time to protect your life and move to a safe shelter is now! You may need to seek shelter twice tonight - once for flooding and once for tornadoes. Conditions will deteriorate and become hazardous as today unfolds.

+ Aa 😊 @ 📄 📄 📄

➤ ⌵

Shift + Return to add a new line



Conflicting Timing Messaging

Hurricane Evacuation Message

“Evacuation orders are in effect. Leave as soon as possible if you are in a mandatory evacuation zone.”



Tornado Warning Call-to-Action

“Take cover now! Move to an interior room on the lowest floor of a sturdy building.”



Tornadoes During Evacuations

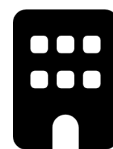
Find Safe Shelter



When A Tornado Warning Is Issued During An Evacuation...



Pull to the side of the road and turn your emergency flashers ON



Get to a safe building. Sheds, storage facilities, & overpasses are not safe



As a last resort, get down in your car & cover your head, or abandon your car & seek shelter in a low-lying area



WEATHER FORECAST OFFICE

Melbourne  Florida

weather.gov/safety/tornado

Tornadoes While Preparing For Tropical Systems

Have Multiple Ways To Receive Warnings!



When A Tornado Warning Is Issued During Preparations...



Stop what you are doing



Find safe shelter. Remember, mobile homes are not safe options to shelter from a tornado



Move indoors immediately



Have multiple ways to receive warnings while outside or away from home!



WEATHER FORECAST OFFICE

Melbourne  Florida

weather.gov/safety/tornado

Tornadoes During Tropical Events

You're Already Sheltering. Now what?



NWS Melbourne @NWSMelbourne · Sep 9

Tornado Warning for northern Brevard County! Take additional cover now! Move quickly to the safest place within your shelter!



When A Tornado Warning Is Issued For Your Area...



Move quickly to the safest place inside your shelter



Consider setting up supplies like flashlights, pillows, and pet leashes beforehand



Protect your head and neck



Have multiple ways to receive warnings, even if you lose power!



WEATHER FORECAST OFFICE

Melbourne  Florida

weather.gov/safety/tornado

Tornadoes During Recovery Efforts

Have Ways To Receive Warnings Without Power!



NWS Melbourne @NWSMelbourne · Sep 9

Tornado Warning for Seminole County! Find ready cover now! Move quickly to a safe/sturdy place. Protect your head and body.

Tornadoes Can Occur Even After The Main Effects Of A Tropical System

When A *Tornado Warning* Is Issued During Cleanup Efforts...



Stop what you are doing



Move indoors immediately. Consider whether your shelter remains safe after the storm



Continue to have multiple ways to receive warnings, even without power or cell phone service



WEATHER FORECAST OFFICE

Melbourne  Florida

weather.gov/safety/tornado



GOVERNOR'S
HURRICANE CONFERENCE®

Multi-Hazard Storms

*When Threats Collide: Managing
Simultaneous Hazards*

Will Ulrich
Warning Coordination Meteorologist
National Weather Service, Melbourne, FL
william.ulrich@noaa.gov

Training Session 19





GOVERNOR'S
HURRICANE CONFERENCE®

The Value of Integrated Warning Teams (IWTs)

Dr. Laura Myers, University of Alabama
laura.myers@ua.edu

Angie Enyedi, NWS Jacksonville
angela.enyedi@noaa.gov



Integrated Warning Teams (IWTs)



- Collaborative Meetings between NWS & Partners
- Partners included Emergency Management, Broadcast Media, Academia, Schools, Forestry, Healthcare, other Local/State/Fed Agencies
- Frequency, duration & location vary





IWT Goals

1. Facilitate open, constructive communication between partner agencies to improve coordination & communication during high impact weather events.
2. Build relationships.
3. Gain insights, perspectives & share lessons learned.
4. Explore how can we support each other to collectively reach our shared goal of providing for public safety.



Hurricane
Literacy



Coordinated
Messaging



Resource
Sharing



Trusted Sources



**Cutting through
the noise**



**Reducing fear and
panic**



**Keeping people
connected**



**Explain the
science and create
trust**

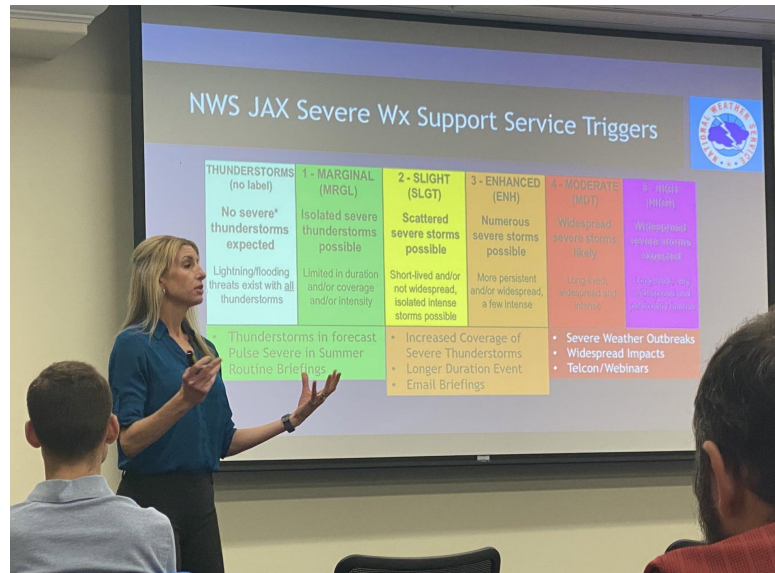
Diverse Partners, Collaborative Setting



**Welcome to the Winter 2025
Integrated Warning Team Meeting!**



Information Sharing



Muscle Memory

Practice	Practice together
Debrief	Debrief together
Support	Support each other
Educate	Educate each other
Understand	Understand each other

Hurricane Literacy



- **Seasonal Review & Lessons Learned**
- **Product review, potential utility, upcoming changes**
- **Exercises!**

Event Recaps & Lessons Learned

- Event Review & Local Impacts
- Threat messaging
What worked well?
What can be improved?
- Review graphics, briefing content, briefing cadence, briefing times, social media messaging
- How can we serve better next time?

Wind Impacts - Helene



Structure Collapse
Jasper, FL



Plane Flipped Lake City, FL



Damaged Poultry
Houses Coffee County



Widespread Downed Trees
Douglas, GA

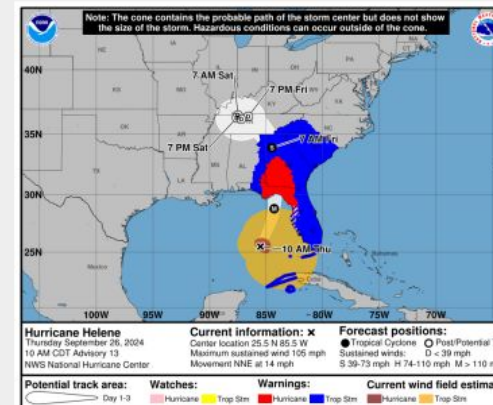


AFTER HELENE
HOME DAMAGED IN COFFEE COUNTY
DOUGLAS



Situation Overview

Hurricane Helene



NOTE: Do not focus on the exact track.
Impacts can occur well outside the area enclosed by the cone.

Last updated: 9/26/2024 11:18 AM

- Aircraft recon indicate Helene is close to major hurricane status
- The system will ACCELERATE to the north-northeast making landfall somewhere between Keaton Beach and Carrabelle (Franklin County)
- **THIS ACCELERATING SYSTEM WILL BRING HURRICANE CONDITIONS WELL INLAND AND DANGEROUSLY CLOSE TO OUR AOR**

National Weather Service - Jacksonville, FL

Event Recaps & Learned

2025 JAX IWT Panel Discussion Takeaway:

NWS offices post weather guidance on

What to do NOW

US National Weather Service Jacksonville Florida
September 25, 2024

Tropical Storm Helene 8AM Advisory Update (9/25):
All of NE FL & SE GA now under a Hurricane or Tropical Storm Warning. Preparations should be complete, local impacts will begin this evening and last through Friday.

Local Impacts:

- Tropical Storm to Hurricane force winds.
- The highest rainfall amounts will focus along the I-75 corridor and inland SE GA with widespread 3-6" and local amounts of 8-10", Flood Watch for all of NE FL & SE GA.
- Several tornadoes possible, beginning tonight through Thursday night.
- Storm surge is generally expected to be 1-3 feet. Locally higher amounts of around 4 feet are likely from the Buckman Bridge to Mayport in Jacksonville and along the southeast GA coast.

Hurricane & Tropical Storm Warnings

Key Messages

- Flood Watch in effect for the entire area
- Hurricane Warning in effect for Suwannee Valley & portions of inland SE GA
- Tropical Storm Warning in effect for rest of NE FL & SE GA
- Worst conditions expected on Thursday and Thursday Night

Impacts

- Hurricane force winds expected in the Suwannee Valley and portions of inland southeast GA
- Tropical storm force winds expected for rest of NE FL and SE GA
- Significant rainfall and potential for flash flooding
- Minor to Moderate Flooding around times of High Tide along the Atlantic Coast and within the St Johns River

Timing

- Local Impacts Wednesday Night through Friday Morning



Know Where to Go

When Sheltering from a Tornado



- Have multiple ways to get warnings: www.weather.gov
- Internet
- Local TV and Radio
- Outdoor sirens
- Wireless emergency alerts and weather apps
- From your family, friends, and neighbors
- NWS weather radio

Finalize Preparedness Today

Southeast Georgia & Northeast Florida

Key Messages

- Winter precipitation impacts begin late today and continues through Wednesday morning
- Finalize preparations today, be ready to shelter by this evening
- Nightly freezes & dangerous wind chills through Thursday

Finalize Preparations

- Finish stocking supplies (home and vehicles)
- Prepare for heating alternatives if power is lost.
- Plan to shelter in place & not travel due to ice impacts late tonight into Wednesday morning.

<https://www.ready.gov/winter-weather>

Be careful with heat sources

Candles and space heaters are a fire risk. Also stay warm by bundling up and keeping doors closed, placing towels in cracks.

Practice portable generator safety

Use outdoors, at least 20 feet away from doors/windows/garages to avoid carbon monoxide poisoning. Follow instructions on proper use.

Check on neighbors

Once your family is safe, check on your neighbors and the vulnerable to make sure they are OK.

4:56 / 5:00 Recording Screen 2 Stop Sharing Pause Stop

NATIONAL WEATHER SERVICE JACKSONVILLE

Messaging Communication Scenarios



Use an actual or hypothetical event.

Inject the messaging to participants in the timeline of the event.

Have them identify what they would do with that messaging.

What are the most important components of that messaging to their role?

What do they need in that messaging to perform their role better?

Exercises & Tabletops

- Severe Weather – Wind, Tornado & Hail
- HazMat
- Wildfire
- Tropical Cyclone
- Winter Weather
- Tsunami



March 4th, 2024

5:18 AM **NWS - Jacksonville - Angie Enyedi** Good morning, just a reminder that this channel will be used today for the Integrated Warning Team & Scenario exercise. Weather Intel that is posted in this channel between 10 am and 1 pm today is for an EXERCISE ONLY. (edited)

10:28 AM **NWS - Jacksonville - Angie Enyedi** Our exercise is beginning shortly...

0900 - Convective Outlook & Timing

Good morning partners, it's going to be a dynamic 24 hours with severe storm potential this afternoon trailed by a dangerously cold air mass tonight. Below are graphics highlighting the Enhanced Risk of Severe Storms (level 3 out of 5) across our entire area. There is also increased confidence of damaging wind gusts from severe thunderstorms today, with gusts over 70 mph in the stronger storms. The timing of severe storms is expected this afternoon into the early evening, with late afternoon and evening storms impacting metro areas of Jacksonville to Gainesville, and approaching the I-95 corridor. Could be a dangerous commute for many.

3 files | Download all



10:36 AM **PW - JEA, JAX, FL - Matthew Wiita** Our team is going to win!!!!



11:00 AM **NWS - Jacksonville - Angie Enyedi** 1100 - Tornado Watch #2

A tornado watch has been issued to include the remainder of SE GA and NE FL through 6 pm. The watch for inland SE GA and the Suwannee River Valley remains in effect through 2 pm. Now is the time for those in the watch area to know where to quickly shelter should a tornado form. Please note that these severe storms will approach the I-95 corridor and metro areas during the afternoon and evening commute.

3 files | Download all



Coordinated Messaging



- The power of trusted sources saying the same thing, at the same time □ **Firehose Messaging**
- IWTs provide a roundtable, seminar format for open, honest discussion between partners



Risk and Crisis Communication



**Risk communication:
Outreach education by trusted sources**

Risk awareness
Risk perceptions



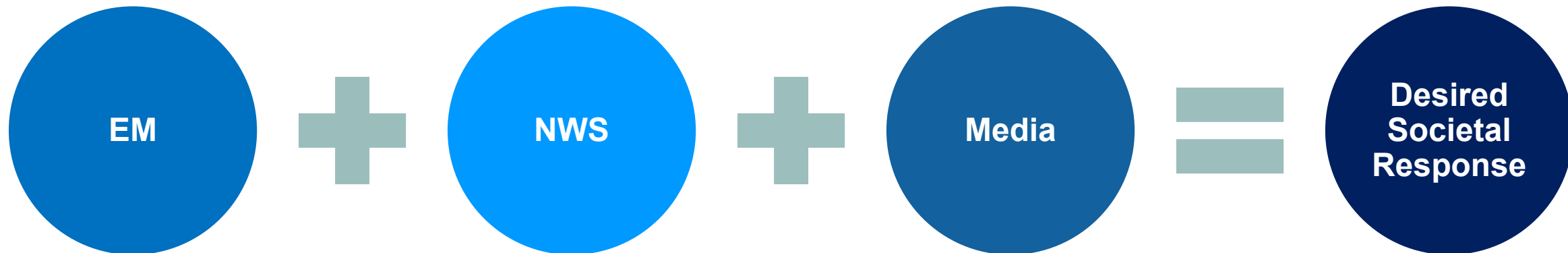
**Crisis communication:
Muscle memory**

Trusted sources have already done their work
Partners and public know what to do



Coordinated & Targeted Messaging

- Choosing BIG words to message BIG threats, when appropriate
- Relevant place names, common reference locations
- Vulnerable populations & geographic locations
- The power of unified threat messaging



Coordinated Messaging



- Trusted relationships built including at IWTs
- Demonstrate tools - NWSChat
- EM + NWS + Media = Coordinated Message

5:06 AM **NWS - Jacksonville - Angie Enyedi** Good morning partners, no significant changes to local tropical headlines at 5 am. Main update was to extend the Storm Surge Watch southward to include Crescent Lake. The entire St. Johns River basin from Mayport to Lake George & Crescent Lake is in the Storm Surge Watch with inundation potential of 2-4 ft.

5:41 AM **EM - Flagler Co, FL - Jonathan Lord** Angie, regarding Crescent Lake - can you please provide a reference to Ian / Nicole flood levels? Greater, the same, or less than what we say in xxxx storm. Thx

5:47 AM **NWS - Jacksonville - Angie Enyedi** @EM - Flagler Co, FL - Jonathan Lord We are comfortable with messaging "If you flooded during Irma, Ian or Nicole, you are at risk of flooding during Milton"

Flagler Co, FL - Jonathan Lord Another consideration is the "TOTAL WATER" footprint in the county (surge + rain)

Jacksonville - Angie Enyedi 6 am 10/8/24 Update
Milton (JUST under Cat 5 strength) is tracking eastward, just north of the Yucatan coast... There has been little forecast track change with the powerful hurricane... to make landfall near the central FL west coast overnight Wednesday night. Milton... increasing hazards to our area, especially on Wednesday through Thursday Morning.
Complete storm preparations TODAY
Storm Surge Watch NE FL & SE GA coasts, ICWW & St. Johns River
Flood Watch most of NE FL & coastal SE GA
Trees, powerlines, power outages, mobile home & structure damage possible

October 8th, 2024

12:12 AM **NWS - Jacksonville - Angie Enyedi** No changes to 11 pm NHC Advisory package for NE FL or SE GA Tropical Headlines. Here's a map of the current tropical WIND watches/warnings

We are messaging for folks to finish prep... ride out the storm Wednesday.

2 files | Download all

Storm & Tropical Storm Wind Threat
Hurricane Milton

4:44 AM **NWS Jacksonville FL [WxBot]** APP

“If you flooded during Irma, Ian or Nicole you are at risk of flooding from Milton.”

Messaging & Education



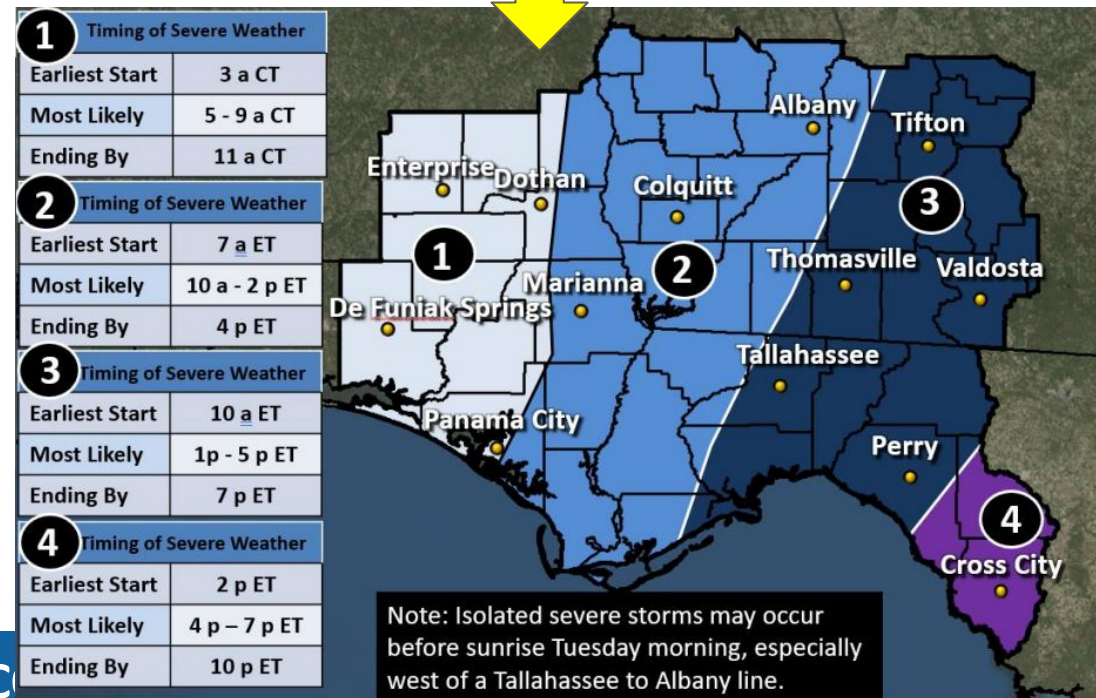
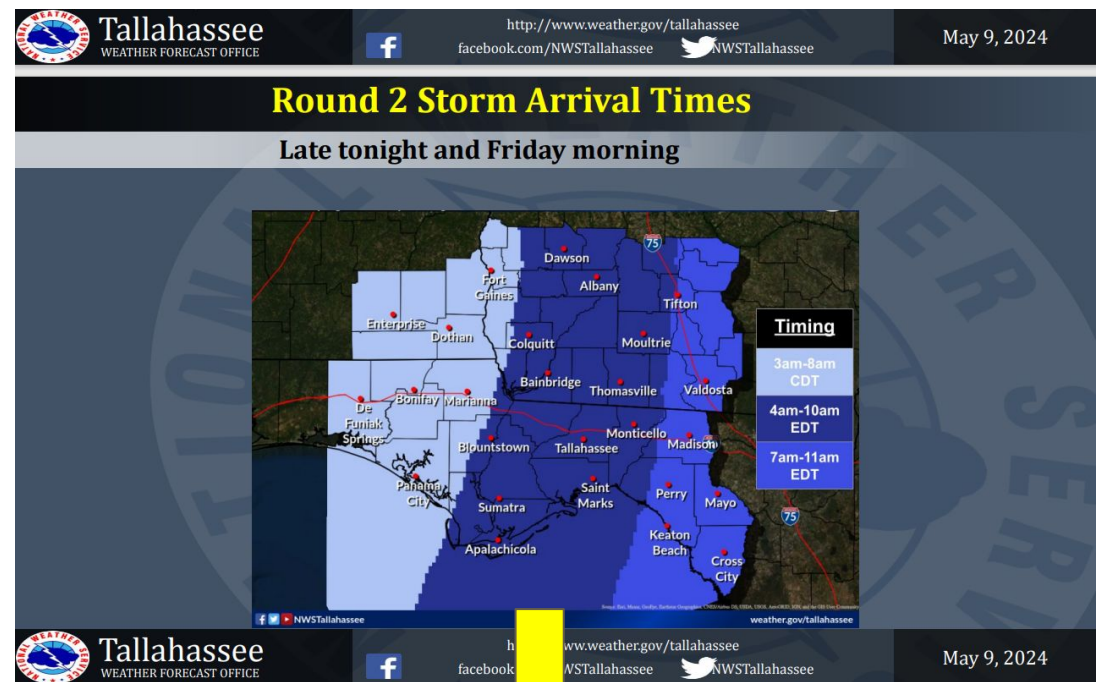
Education

NWS Tallahassee Public School IWT

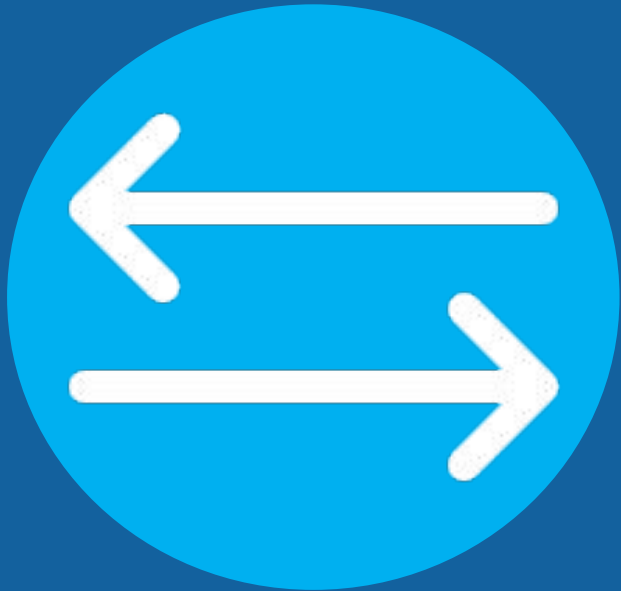
Messaging Challenges =

Training Opportunity & NWS Product Refinement

- Leon County school district safety officials now call NWS regularly
- New timing graphic developed
- Annual Training for School Safety Officials



Resource Sharing



- **Share available resources between agencies Messaging from the same “Sheet of Music”**
- **Demonstrate new Tools & Applications**




Resource Sharing

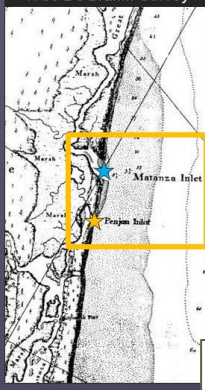


Education

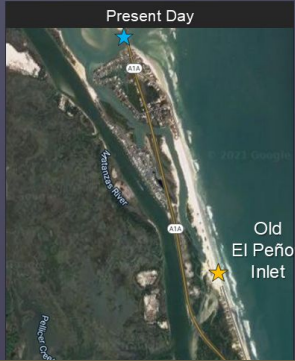
NWS Jacksonville Evolving Coastline




1765 De Brahm Survey




Present Day



September 6, 2014



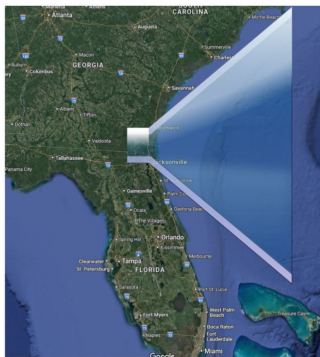
October 13, 2016



Old El Peñon Inlet

Local Geography

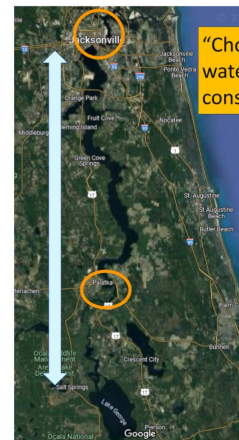
Coastal "Catchers Mitt" & Inland Funnel



Elevated trapped water will travel north to south with high tides in river-seiche effect

Called "Reverse Flow" event by SJRWMD

St. Johns "Bathtub" Tidal Seiche & "Choke Points"



"Choke Points" where water flow becomes constricted & overflows

Product

Wind Products & Utility

Forecast Track & Cone



- Track forecast of storm center (historically center in cone ~ 2/3 of the cone)
- Only displays coastal tropical storm & hurricane watches/warnings
- Does not convey all potential wind threat areas or TC impact areas
- Use with TC wind field → helps message TC impacts occur outside of cone
- Generalize geographical areas threatened by TC → Take focus off the cone
- NHC for specific TC: <https://www.nhc.noaa.gov/cyclones/>
- NHC Product info: <https://www.nhc.noaa.gov/aboutnhcgraphics.shtml>

Wind Speed Probabilities



- Location specific chance of tropical storm, 58 mph & hurricane-force winds
- Cumulative chance over the next 5 days
- Accounts for uncertainties in track, intensity, and size
- Not an areal representation - valid for specific locations only
- Shows locations w/elevated TC wind risk (despite track forecast oriented away from location)
- Trend monitoring tool for specific locations
- NHC for specific TC: <https://www.nhc.noaa.gov/cyclones/>

Time of Arrival (TOA) of Tropical-Storm-Force Winds



- Arrival time frames of TC wind onset
- Earliest Reasonable TOA: Large safety margin, use when low confidence
Ex "TS force winds could arrive as early as..."
- Most-likely TOA: Transition to as onset time nears & confidence increases
Ex "TS force winds will likely arrive sometime ... " and "Preparations should be completed by..."
- NHC for specific TC: <https://www.nhc.noaa.gov/cyclones/>

Hurricane Threats & Impacts Graphics & Forecast



- Go-To for localized impacts & preparedness
- HTI graphics of TC threats & potential impact thresholds
- Location-specific TC hazard forecast *plus* a reasonable safety margin
- Messages extent to which preparations should be made
- Graphic is NOT forecast wind swath/image
- HTI Graphics: <https://weather.gov/srh/tropical/?office=xxx>
<https://www.weather.gov/srh/tropical/>
Replace xxx with your local NWS office ID:
Georgia: FFC, GSP, CAE, CHS, TAE, JAX
Florida: MOB, TAE, JAX, TBW, MLB, MFL, KEY



Training & Resource Request

Products & Services

- [NWS JAX Met Watch \(Met Watch Job Sheet\)](#)
- [Local Probabilistic Forecast Graphics \(Job Sheet\)](#)
Downscaled, county level forecast graphics
- [Regional Probabilistic Forecast Graphics \(Job Sheet\)](#)
Graphics of SE Georgia & NE Florida
- [Atlas Precipitation Frequency Analysis \(Job Sheet\)](#)
- [Graphical Hazardous Weather Outlook](#)
- [NWS Jacksonville Weather Alert Criteria](#)

Resources with Job Sheets

EM Lunch & Learns

- **June 2026** - Tropical
- [April 2026](#) - Drought, Fire Weather & Severe Weather
- [December 2025](#) - Cold Weather Products
- [September 2025](#) - Hydro Products
- [April 2025](#) - Fire Weather & Climate Tools

**Pre-Season Mini-Virtual
Training Sessions for EM**

2 to 3 each Month

[NWSJAX_DSS](#)



Expanding & Nurturing Partnerships

- EM Quarterly Lunch-&-Learns
- Seasonal Weather Readiness Campaigns
- Office Visits
- School Official Training
- Other IWT initiated projects?
- Audience IWT experience?





GOVERNOR'S
HURRICANE CONFERENCE®

The Value of Integrated Warning Teams (IWTs)

Dr. Laura Myers, University of Alabama
laura.myers@ua.edu

Angie Enyedi, NWS Jacksonville
angela.enyedi@noaa.gov



Training Session 19



Hurricane Readiness in Complex Situations

Part 1: Preparing for Complexity - Hurricane Readiness in the Era of Rapid Intensification and Extreme Multi-Hazard Storms

Laura Myers, PhD, University of Alabama
Angie Enyedi, NWS Jacksonville
Robert Garcia, NWS Miami
Kelly Godsey, NWS Tallahassee
Will Ulrich, NWS Melbourne

Training Session 19

