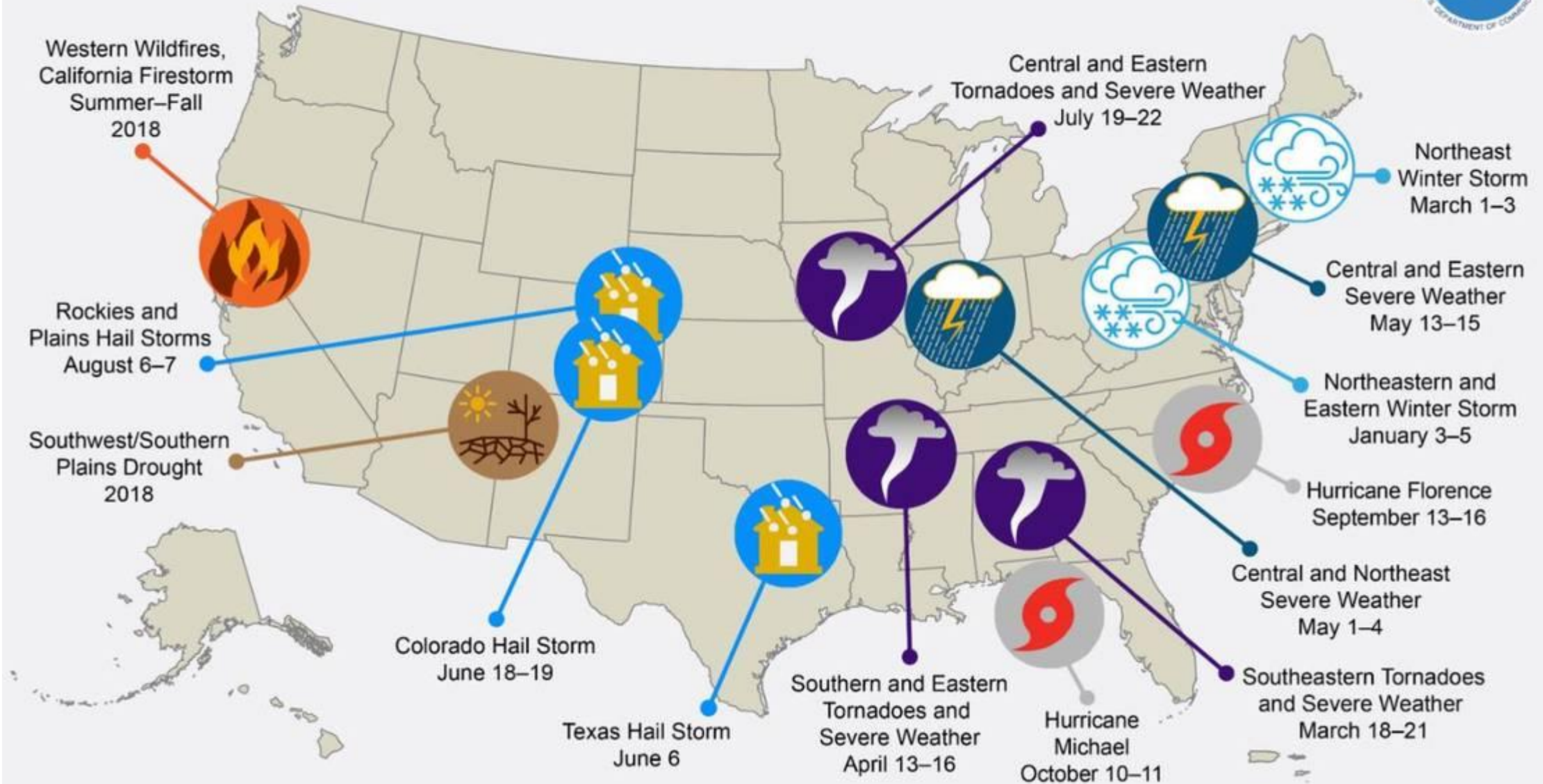




**Case Studies: Highlights from the Port Industry**  
**AAPA Emergency Preparation, Response & Recovery Seminar**  
**Plan like the next storm is right around the corner**

# U.S. 2018 Billion-Dollar Weather and Climate Disasters



*This map denotes the approximate location for each of the 14 separate billion-dollar weather and climate disasters that impacted the United States during 2018.*



## North Carolina Tropical Cyclone Statistics (1851 - 2016)

<b>Statistic</b>	<b>Direct Landfalling Storms in NC</b>	<b>Non-landfalling Storms Affecting NC Within 150 Miles</b>	<b>Total Storms Affecting NC</b>
<b>Number of Storms</b>	83	289	372
<b>Percentage of Storms</b>	4.54%	15.81%	20.35%
<b>Average Years Between Storms</b>	2.00	0.57	0.45
<b>Average Storms Per Year</b>	0.50	1.74	2.24



## Storms impacting North Carolina 2014 – 2019

-2014	Arthur	Category 2
-2015	Ana	Tropical Storm
-2016	Colin	Post-Tropical Cyclone
-2016	Hermine	Tropical Storm
-2016	Matthew	Category 1
-2018	Florence	Category 1 (began as Cat 4)
-2018	Michael	Tropical Storm (began as Cat 5)
-2019	Dorian	Category 1 (began as Cat 5)



# **HURRICANE FLORENCE BY THE NUMBERS**

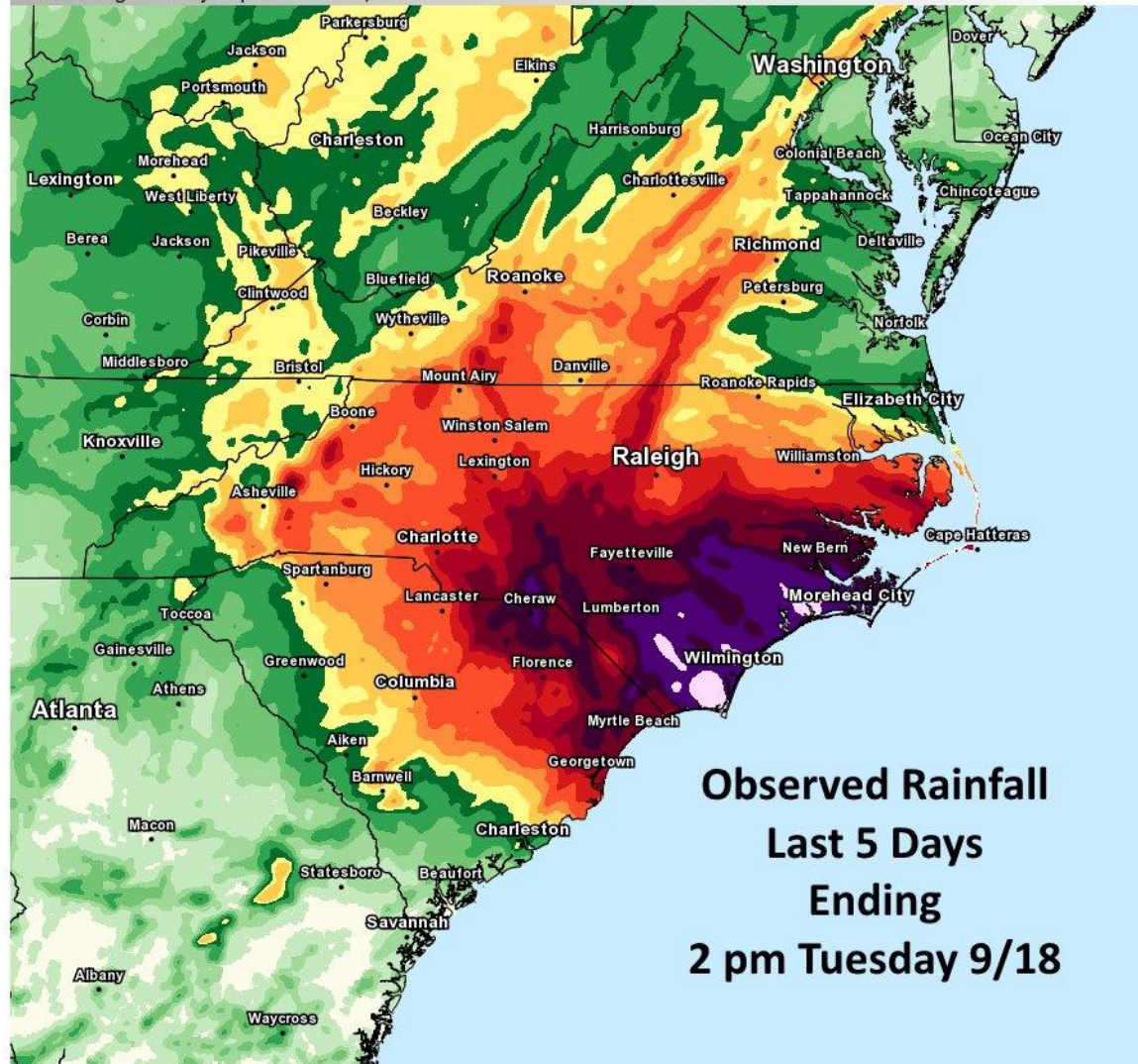
- Storm made landfall on September 17th, 07:15 am**
- Before the storm made landfall Wilmington recorded more rain than any other single weather event in city history also contributing to the wettest year in history of Wilmington (previous record set in 1877)**
- 90% of New Hanover County without power**
- Wilmington was an island, only accessible by boat or plane**
- Unreliable cell phone coverage, overloaded wireless network**
- Cape Fear River crested at 61.4 ft, 35.4 ft above flood stage**

## Observed Precipitation



Valid Ending Tuesday September 18th, 2018 at 2 PM EDT

- Up to 0.1 inch
- 0.1 to 0.25 inches
- 0.25 to 0.5 inches
- 0.5 to 1.0 inches
- 1.0 to 1.5 inches
- 1.5 to 2.0 inches
- 2.0 to 3.0 inches
- 3.0 to 4.0 inches
- 4.0 to 6.0 inches
- 6.0 to 8.0 inches
- 8.0 to 10.0 inches
- 10.0 to 15.0 inches
- 15.0 to 20.0 inches
- 20.0 to 30.0 inches
- 30.0 to 50.0 inches



**Observed Rainfall  
Last 5 Days  
Ending  
2 pm Tuesday 9/18**

Graphic Created  
September 18th, 2018  
2:11 PM EDT

I-40 after Hurricane Florence (main east-west route into Wilmington, North Carolina)



Photo Credit: Newsobserver.com



I-95 after Hurricane Florence (main north-south corridor on east coast)



Photo Credit: North Carolina Department of Transportation

NC 421 Following Hurricane Florence near New Hanover and Pender County line



Photo Credit: Wilmingtonbiz.com







# DORIAN'S HISTORY

AUG. 24-SEPT. 7, 2019

DEPRESSION T.S. HURRICANE CAT. 3+

SEPT. 6: MAKES LANDFALL AT CAPE HATTERAS, NC

SEPT. 7: MAKES LANDFALL AT NOVA SCOTIA, CANADA

SEPT. 3: BEGINS TO MOVE AGAIN AFTER STALLING

AUG. 30: BECOMES A CAT. 3

SEPT. 1: PEAK INTENSITY AS CAT. 5 WITH 185-MPH WINDS

AUG. 27: MAKES LANDFALL ON ST. LUCIA AS A TROPICAL STORM

AUG. 28: BECOMES A HURRICANE NEAR ST. THOMAS

AUG. 24: T.D. 5 FORMS

HURRICANE DORIAN (photo credit: The Weather Channel)

AUG. 24: BECOMES TROPICAL STORM DORIAN



## Storm preparations in advance of named storms

Throughout hurricane season (June 1st – November 30th)

- general housekeeping
- keeping fuel in vehicles at  $\frac{3}{4}$  full (best practice)
- home emergency preparedness kit
  - food, fuel, emergency comms plan, generator



## Preparation:

- Hurricane Plan (useful, up-to-date, accessible)
- Hurricane Exercise (exercise all or part of your plan every year)
- Designation of Essential Employees (who will respond?)
- Communications (satellite communications, phone, data, rent vs. buy equipment)
- Know your employees, partners and stakeholders (know their capabilities and what they can bring)
- Insurance (business interruption, coverage, deductibles)





## Response:

- During the event (who is on your port?)

- Safety is paramount (at all levels of your plan)

- Initial Damage Assessment

(Port Police Dept, port damage assessment team)

- Can your employees safely get to work

(curfew, designated as part of emergency response effort)



## Response:

- What is the priority? (local, regional or national response)
- Florence (fuel, water, food, power restoration)
- EOCs (NC State EOC, USCG EOC)
- Warehouse storage capacity (supporting other agencies)
- Does your port have tenants, what role do they play?
- Communications with tenants (length of loss of power)



## Recovery:

- What is the priority? (state-wide efforts, commerce, jobs)
- Think about transportation infrastructure network (roads, rails, bridges, fuel)
- Coordination with port stakeholders (daily coordination calls)
- Think about incremental steps towards achieving overall goal
- Keep in mind what people are dealing with outside of work
- Internal coordination and communication (dedicated staff)



## **Post Storm Actions/Resuming operations**

Essential employees are integral to damage assessment to port facilities and key to the safe resumption of operations.

After passage of the storm the Coast Guard (CG) and Army Corps of Engineers (ACOE) are checking aids to navigation and conducting surveys of the main shipping channel.

These actions by CG and ACOE coincide with the damage checks being conducted by port employees. **(go to checklist on plan)**. Validate checklist or add an item/essential function that may be missing

If a State of Emergency and/or disaster declaration is made by Governor and Federal Government, there may be funding available from FEMA to help pay for damage related to the storm.

It is important to document what damage and expenses are related to hurricane response and recovery.



HURRICANE COMPARISONS APPLYING LESSONS LEARNED		
ITEMS	HURRICANE FLORENCE	HURRICANE DORIAN
PORT CONDITIONS	SIMULTANEOUS	12 HOUR (EARLY) OFFSET
SATELLITE PHONES	NO	YES (LEASED)
CONTAINER TIE DOWNS	NO	YES
BUSINESS INTERRUPTION	YES	YES (N/A)
EVACUATION	YES	NO



## Closing Comments:

Don't underestimate the resourcefulness of your team

- Interagency Mobile Command Post (Florence)
- Speed of preparing container yard (Dorian)
- Meals for port team (Florence)
- Container Recovery Team (Florence)

Communications and Information Sharing (early and often)

Make a conscious effort to become more resilient at every opportunity

- insurance
- grants
- capital improvements
- normal operations

If there are concerns before, during, or after a storm please share those concerns and respond to them