

# Overview and History of the Flood Inundation Mapping and Alert Network (FIMAN - <https://fiman.nc.gov/>)

March 25, 2020

Tom Langan, PE, CFM, North Carolina Division of Emergency Management

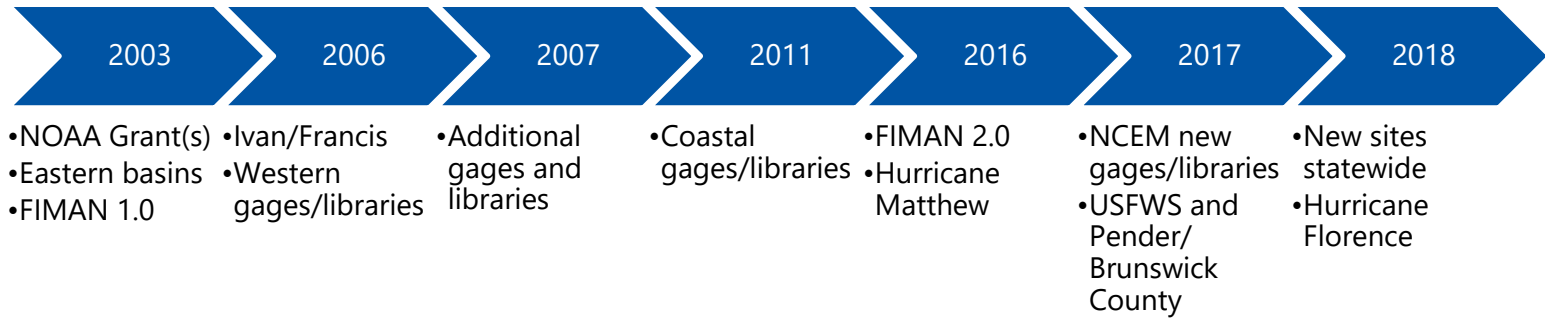
# NC Flood Warning Program Goals

- 24-hour Access to Real-time flood stream gage data and inundation mapping (current and forecast) – FIMAN
- Real-time Alerts
- Leverage vast investment in data from NCFMP
- Assist in risk-based decisions during and before disaster
- Prevent and reduce the loss of lives and property

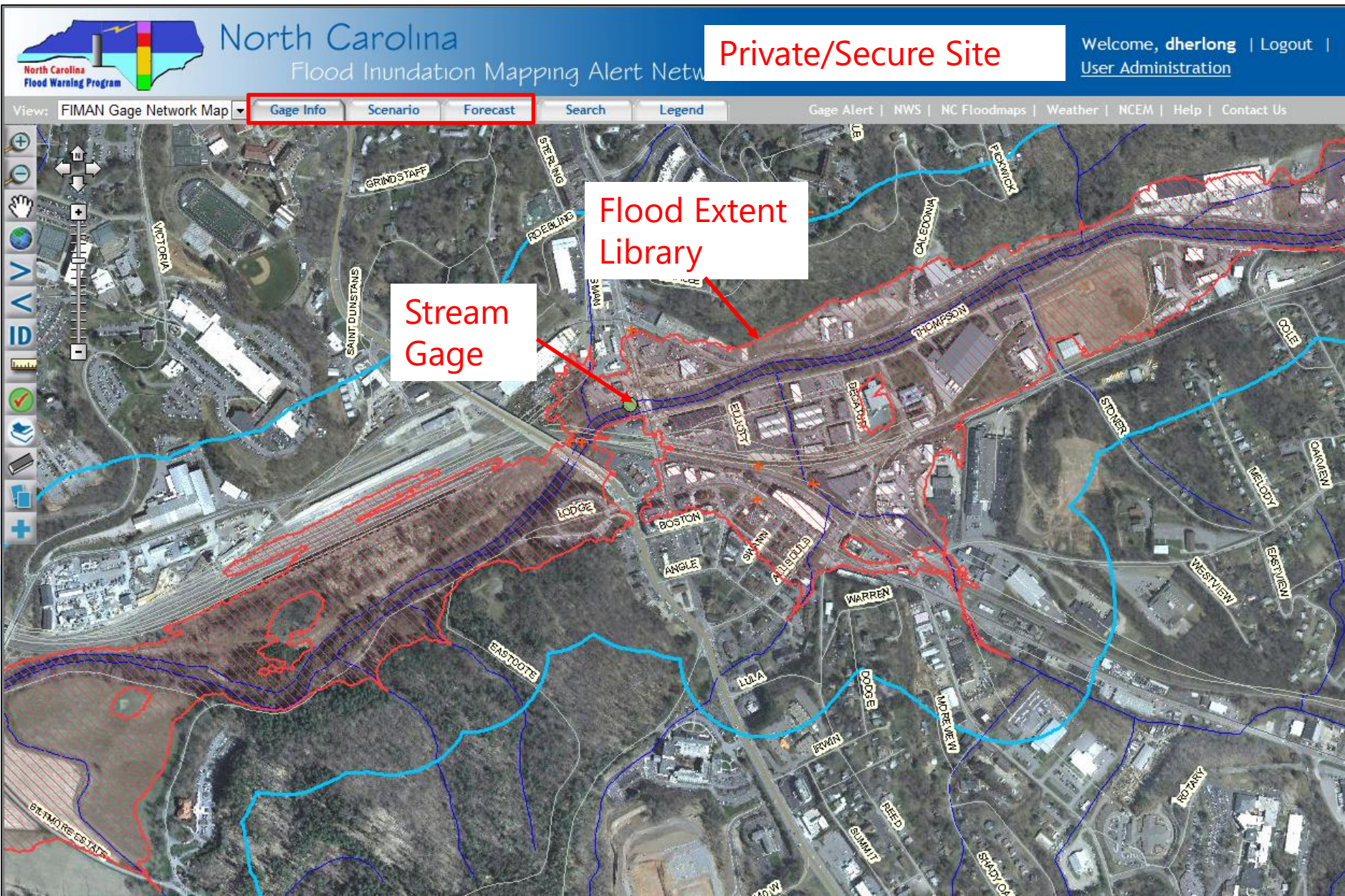
# The Genesis 1999... Hurricane Dennis followed by Floyd



# NC Flood Warning Program Timeline



# FIMAN 1.0



# FIMAN 2.0

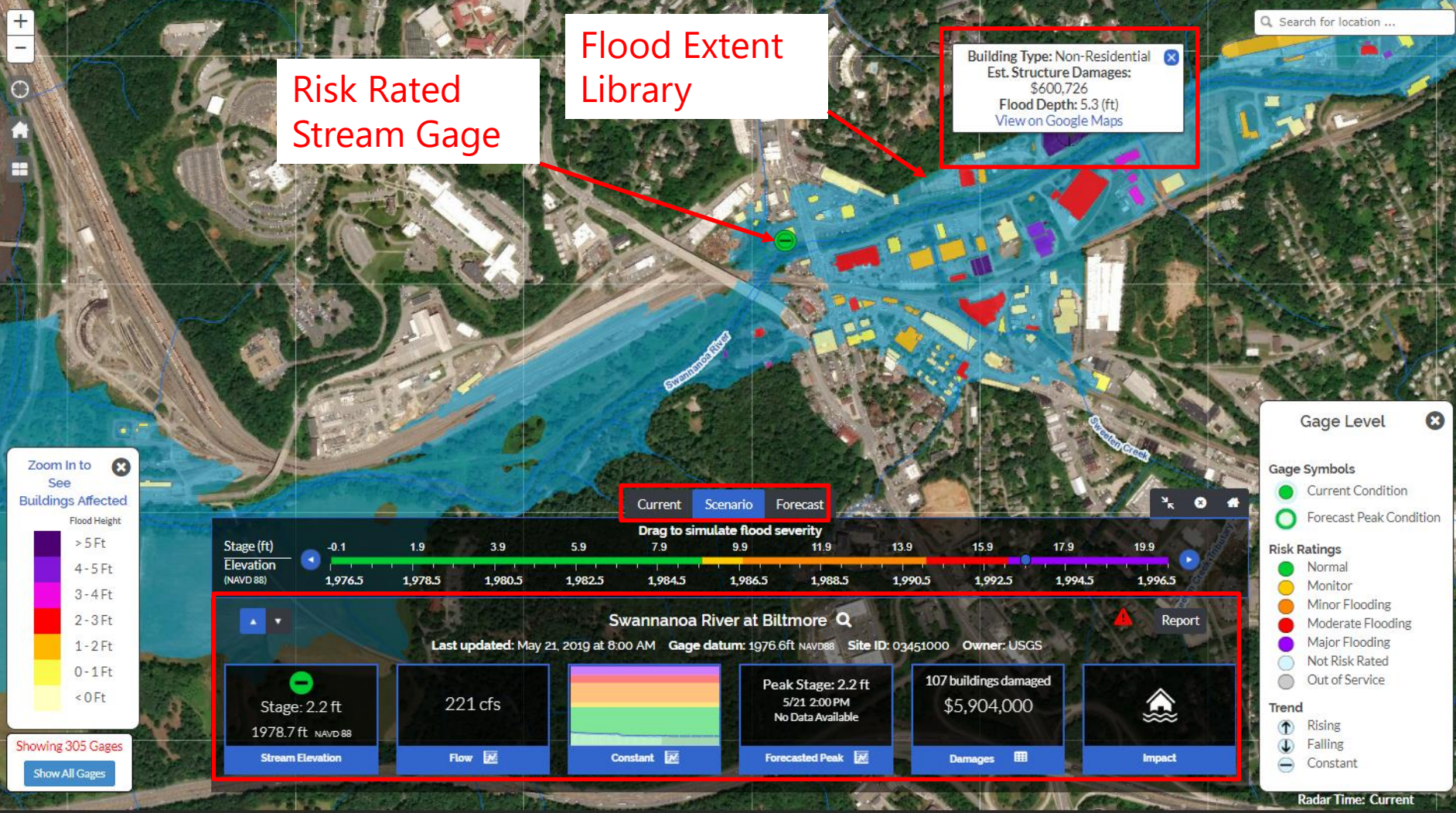


FIMAN Flood Inundation Mapping and Alert Network

Public Site

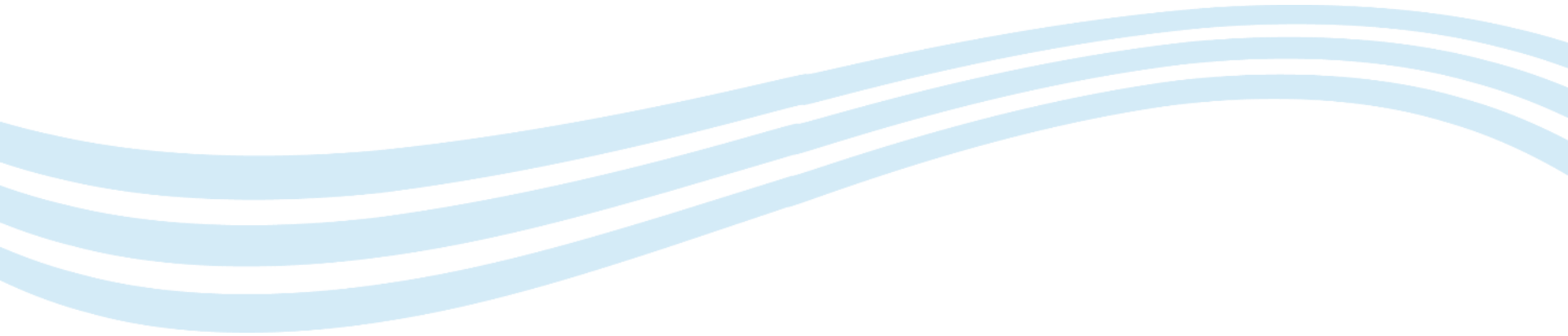
ABOUT MAP LOGIN

Search Gages Gages Summary Legend Building Legend Weather Radar

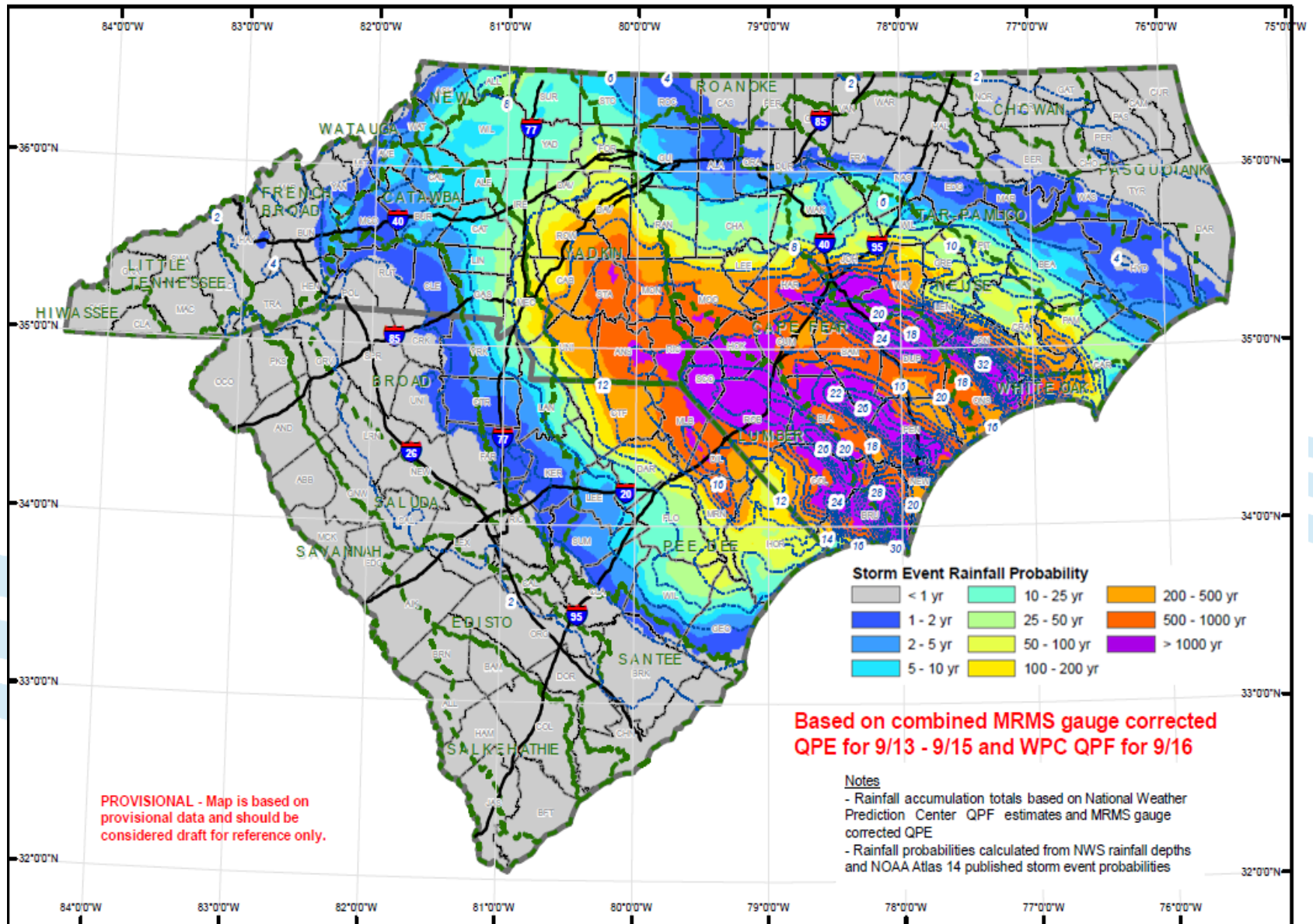


# **Hurricane Florence – September 2019**

## **FIMAN in Action**



# Rainfall Return Periods





# Hurricane Florence - Flood Brief for Senior EM staff and Governor

Hurricane Florence  
Statewide Flood Impact Briefing #17 as of 9/15/2018 5:11 AM

**Executive Summary of Current and Forecast Flooding Condition** (See attached flood brief for details)

**Current Flood Conditions**

- Major flooding occurring along the Trent R. at Pollockville.
  - Moderate flooding occurring along the Contentnea Creek at Hookerton, New River near Gum Branch, Pungo River at Belhaven - Vidant Health (Hospital), and Trent R. at Trenton at N. Weber St.
  - Minor flooding occurring along the Chicod Cr. at SR1760 near Simpson, Hominy Swamp at Forest Hills Rd near Wilson, Neuse River near Goldsboro, Pamlico River at Washington, Pamlico Sound at Cedar Island Ferry Terminal, Trent River near Trenton, and Wilmington - Cape Fear R. nr US 17/76.
  - Monitor level flooding occurring along the Cashie River in Windsor at S. King St, Chowan R. at Edenton Waterfront Park, Neuse River at Kinston, Pamlico Sound at Ocracoke - NCCAT Campus, Pamlico Sound at Oregon Inlet Marina, Pasquotank R. at Elizabeth City Mariners Wharf Park, Scuppernon R. at Columbia Town Hall, Swift Creek near Apex, Tar River at SR 1565 near Grimesland, and Valley River at Andrews.
- Current Impacts**
- Impacting buildings along the Hominy Swamp at Forest Hills Rd near Wilson, Pungo River at Belhaven - Vidant Health (Hospital), Wilmington - Cape Fear R. nr US 17/76, Pamlico Sound at Cedar Island Ferry Terminal, Trent R. at Pollockville, Trent R. at Trenton at N. Weber St, New River near Gum Branch, and Chicod Cr at SR1760 near Simpson.
  - Impacting roads along the Chicod Cr at SR1760 near Simpson, Contentnea Creek at Hookerton, and New River near Gum Branch.

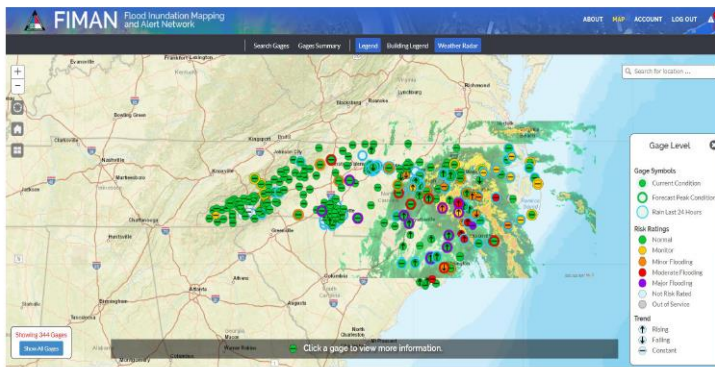
**Forecast Peak Flood Conditions**

- Reach major flood stage along the Cape Fear River at Lock #1 near Kelly on Tuesday (09/18 AM), Contentnea Creek at Hookerton on Monday (09/17 PM), NE Cape Fear River near Chippinaw on Wednesday (09/19 AM), Neuse River at Kinston on Wednesday (09/19 PM), Neuse River near Goldsboro on Sunday (09/16 PM), Northeast Cape Fear River near Burgaw on Tuesday (09/18 PM), Pungo River at Belhaven - Vidant Health (Hospital), Rocky River near Norwood on Monday (09/17 AM), S. Fork Catawba River near Lowell on Monday (09/17 AM), and Yadkin River at Yadkin College on Tuesday (09/18 PM).
- Reach moderate flood stage along the Bogue Sound at Beaufort, NC - Pivers Island on Saturday (09/15 PM), Deep River at Moncure on Monday (09/17 AM), Neuse River at Smithfield on Saturday (09/15 PM), Pasquotank R. at Elizabeth City Mariners Wharf Park, Wilmington - Cape Fear R. nr US 17/76 on Saturday (09/15 PM), and Yadkin River at Elkin on Monday (09/17 AM).
- Reach minor flood stage along the Broad River near Bolling Springs on Monday (09/17 AM), French Broad River at Blantyre on Saturday (09/15 AM), Neuse River near Clayton on Sunday (09/16 PM), Pamlico Sound at Cedar Island Ferry Terminal, Scuppernon R. at Columbia Town Hall, South Yadkin near Mocksville on Tuesday (09/18 AM), Swannanoa River at Bltmore on Monday (09/17 AM), Tar River at Greenville on Monday (09/17 PM), Tar River at Tarboro on Monday (09/17 AM), Wrightville Beach - Johnny Mercer Pier on Saturday (09/15 PM), and Yadkin River at Wilkesboro on Saturday (09/15 AM).
- Reach monitor level along the Atlantic Coast at Duck on Saturday (09/15 PM), Cashie River at SR1257 near Windsor on Sunday (09/16 AM), Fishing Creek near Enfield on Saturday (09/15 PM), French Broad River at Asheville on Monday (09/17 AM), French Broad River at Hot Springs on Monday (09/17 AM), French Broad River near Marshall on Monday (09/17 AM), Pamlico Sound at Cape Hatteras Coast Guard Station on Saturday (09/15 PM), and Pamlico Sound at Oregon Inlet Marina on Saturday (09/15 PM).

**Forecast Impacts**

- Buildings along the Bogue Sound at Beaufort, NC - Pivers Island, Neuse River at Kinston, Neuse River near Goldsboro, Pamlico Sound at Cedar Island Ferry Terminal, Pasquotank R. at Elizabeth City Mariners Wharf

FIMAN Current and Forecast Conditions - Hurricane Florence - 9/15/2018 5:11 AM



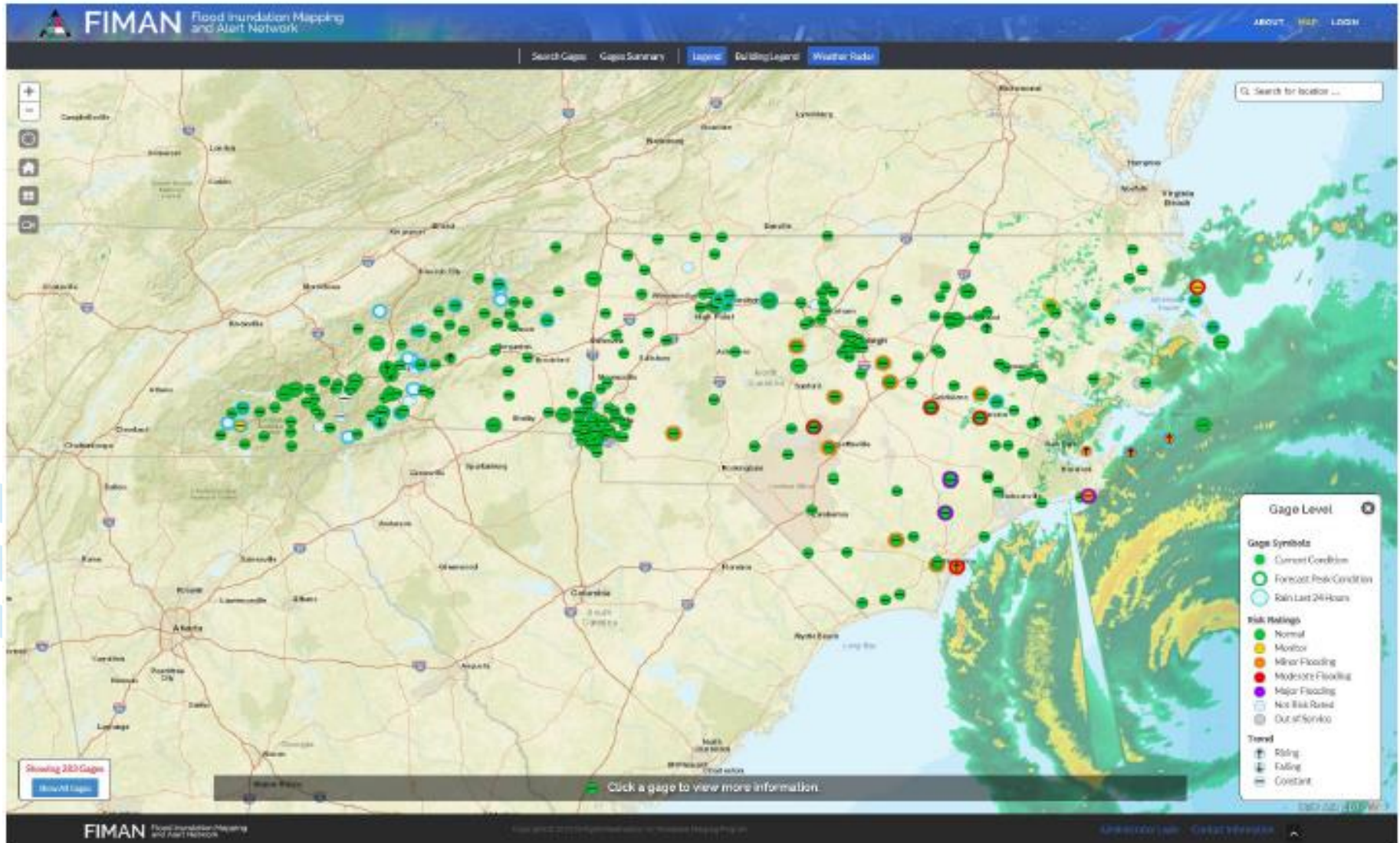
Statewide Flood Impact Briefing #17 as of 9/15/2018 5:11 AM

Branch	County	Gauge Name	Gage Type	Flood Risk			Flood Timing		Flood Stage (ft)		Buildings Damaged <sup>1</sup>		Building Damages <sup>2</sup>	
				Current	Forecast	Trend	Peak	Monitor/Normal	Current	Forecast	Current	Forecast	Current	Forecast
Eastern	Jones	Jones R. at Pollockville	Riverine	Major	Major	Constant			19.5					
Eastern	Gwene	Contentnea Creek at Hookerton	Riverine	Moderate	Major	Rising	Mon (09/17 PM)	TBD	17	15.4	2.4	57		5503,600
Eastern	Onslow	New River near Gum Branch	Riverine	Moderate		Rising			21.3			19		886,800
Eastern	Beaufort	Pungo River at Belhaven - Vidant Health (Hospital)	Coastal	Moderate	Major	Falling			3.6	5.3	1.7	1,698	2,362	53,409,900
Eastern	Jones	Trent R. at Trenton at N. Weber St.	Riverine	Moderate		Rising			20.7			13		519,400
Eastern	Brunswick	Wilmington - Cape Fear R. nr US 17/76	Coastal	Minor	Moderate	Falling	Sat (09/15 PM)	TBD	3.6	6	2.4	17	71	550,500
Eastern	Fitt	Chicod Cr. at SR1760 near Simpson	Riverine	Minor		Rising			13.7			40	118	546,600
Eastern	Wayne	Neuse River near Goldsboro	Riverine	Minor	Major	Rising	Sun (09/16 PM)	TBD	18.5	28.5	10			5783,400
Eastern	Beaufort	Pamlico River at Washington	Coastal	Minor		Constant			5.4					
Eastern	Carteret	Pamlico Sound at Cedar Island Ferry Terminal	Coastal	Minor	Minor	Constant			2.5	3	0.5	25	44	519,200
Eastern	Jones	Trent River near Trenton	Riverine	Minor		Rising			17.6					
Eastern	Tyrrell	Swannanoa R. at Columbia Town Hall	Coastal	Monitor	Minor	Constant			1.6	2.3	0.7		724	11,277,700
Eastern	Chowan	Chowan R. at Edenton Waterfront Park	Coastal	Monitor		Constant			2.1					
Eastern	Bertie	Cashie River in Windsor at S. King St	Riverine	Monitor		Constant			2.6					
Eastern	Lenoir	Neuse River at Kinston	Riverine	Monitor	Major	Rising	Wed (09/19 PM)	TBD	13.4	27.3	13.9		185	111,088,000
Eastern	Dare	Pamlico Sound at Ocracoke - NCCAT Campus	Coastal	Monitor	Monitor	Constant	Crested	Not Applicable	2.7	2.6	-0.1			
Eastern	Hyde	Pamlico Sound at Ocracoke - NCCAT Campus	Coastal	Monitor		Constant			2.3					
Eastern	Pasquotank	Pasquotank R. at Elizabeth City Mariners Wharf Park	Coastal	Monitor	Moderate	Constant			1.7	2.7	1	990		1,104,600
Eastern	Fitt	Tar River at SR 1565 near Grimesland	Riverine	Monitor		Falling			6.2					
Eastern	Dare	Wrightville Beach - Johnny Mercer Pier	Coastal	Monitor	Minor	Constant	Sat (09/15 PM)	Not Applicable	0.5	3	2.5			
Eastern	New Hanover	Wilmington - Cape Fear R. nr US 17/76	Coastal	Monitor	Minor	Constant	Sat (09/15 PM)	TBD	0.9	4.4	3.5			
Eastern	Carteret	Bogue Sound at Beaufort, NC - Pivers Island	Coastal	Monitor	Moderate	Constant	Sat (09/15 PM)	TBD	1.7	4	2.3	125		585,900
Eastern	Bertie	Cashie River at SR 1257 near Windsor	Riverine	Monitor		Constant	Tue (09/18 AM)	Not Applicable	17.2	29.2	12			
Eastern	Bertie	Cashie River at SR 1257 near Windsor	Riverine	Monitor	Monitor	Constant	Sun (09/16 AM)	Not Applicable	3.6	6.2	2.6			
Eastern	Pender	Northeast Cape Fear River near Burgaw	Riverine	Monitor	Major	Rising	Tue (09/18 PM)	Sat (09/15 AM)	6.9	25.8	18.9			
Eastern	Duplin	NE Cape Fear River near Chippinaw	Riverine	Monitor		Rising	Wed (09/19 AM)	TBD	11.6	26.3	14.7			
Eastern	Dare	Pamlico Sound at Cape Hatteras Coast Guard Station	Coastal	Monitor		Constant	Sat (09/15 PM)	Not Applicable	1.5	1.8	0.3			
Eastern	Fitt	Tar River at Greenville	Riverine	Monitor	Minor	Rising	Mon (09/17 PM)	Sun (09/16 AM)	11.3	15.2	3.9			
Central	Wilson	Swift Creek near Apex	Riverine	Monitor		Constant			5.6			7		10,000
Central	Watauga	Swift Creek near Apex	Riverine	Monitor		Rising			9.2					
Central	Lee	Deep River at Moncure	Riverine	Monitor	Moderate	Constant	Mon (09/17 AM)	Sun (09/16 AM)	2.1	14.7	12.6			
Central	Edgecombe	Fishing Creek near Enfield	Riverine	Monitor	Minor	Constant	Sat (09/15 PM)	Not Applicable	3.4	13.3	9.9			
Central	Johnston	Neuse River near Goldsboro	Riverine	Monitor	Minor	Constant	Sun (09/16 PM)	Mon (09/17 PM)	5.2	10.9	5.7			
Central	Johnston	Neuse River at Smithfield	Riverine	Monitor	Moderate	Rising	Sat (09/15 PM)	Sat (09/15 AM)	11.9	18.4	6.5			
Central	Davie	South Yadkin near Mocksville	Riverine	Monitor	Minor	Constant	Tue (09/18 AM)	Tue (09/16 PM)	2.2	20.6	18.4			
Central	Edgecombe	Tar River at Tarboro	Riverine	Monitor	Minor	Constant	Mon (09/17 AM)	Tue (09/16 AM)	1.6	19.3	15.7			
Central	Yadkin	Yadkin River at Elkin	Riverine	Monitor	Moderate	Constant	Mon (09/17 AM)	TBD	2.5	24	21.5			
Central	Dare	Yadkin River at Wilkesboro	Riverine	Monitor	Major	Constant	Tue (09/18 PM)	TBD	1.8	30.4	28.6			
Western	Cherokee	Valley River at Andrews	Riverine	Monitor		Constant			4.6					

<sup>1</sup> Buildings damaged reflects counts of buildings inside of the FIMAN inundation extent that may occur. Additional buildings may be shown (color) coded in the map indicating buildings inside the inundation extent that may not sustain structural damages due to elevated first floor elevations or site-specific conditions.  
<sup>2</sup> Buildings damages reflects the estimated structural damage costs (excluding contents and indirect damages) to buildings inside of the FIMAN inundation extent. Additional buildings may be shown (color) coded in the map indicating buildings inside the inundation extent that may not sustain structural damages due to elevated first floor elevations or site-specific conditions.

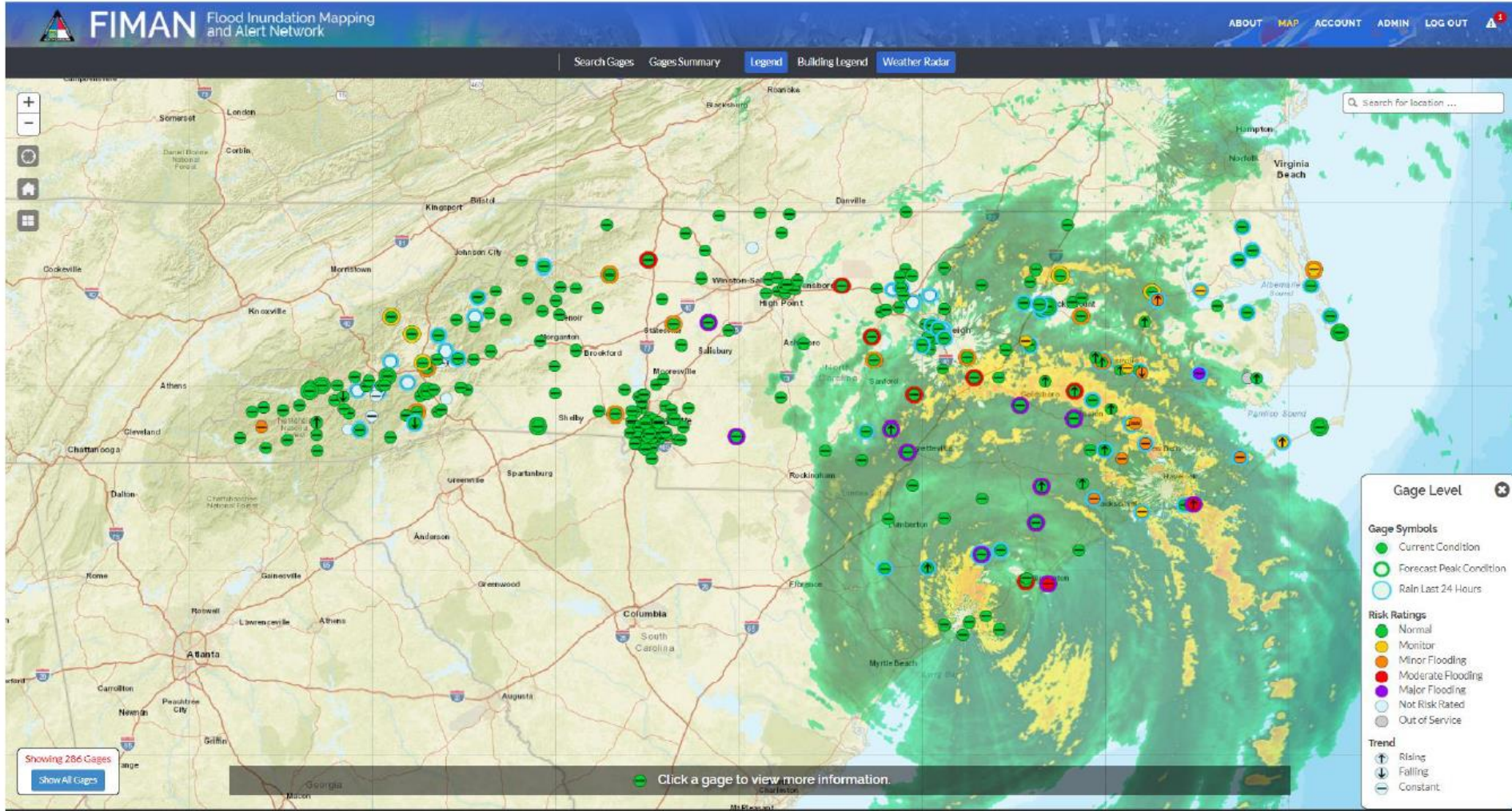
# 9/13/18: Florence Makes Landfall

FIMAN Current and Forecast Conditions - Hurricane Florence - 9/13/2018 11:40 AM



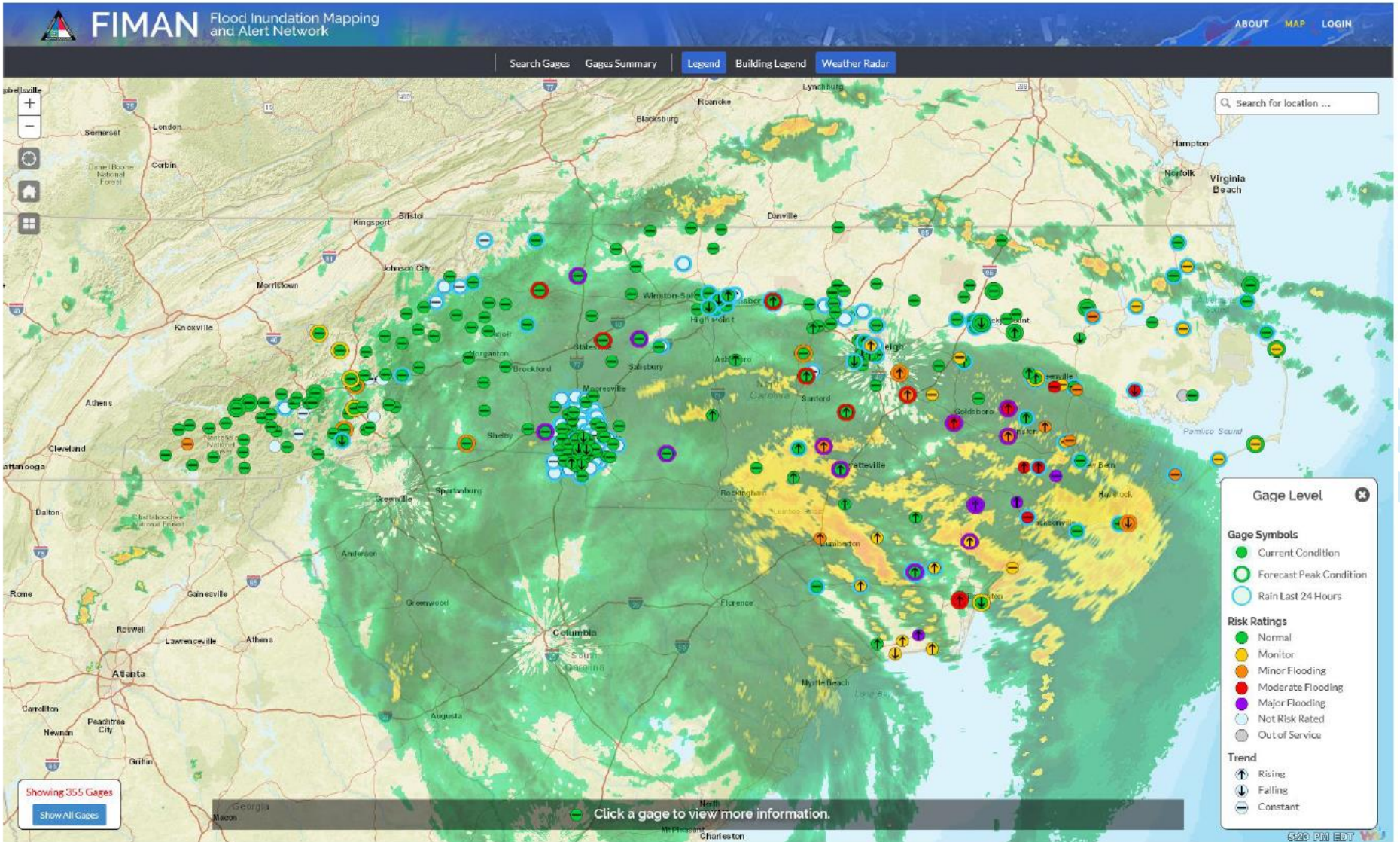
# 9/14/18: Rivers Rising with Forecasts

FIMAN Current and Forecast Conditions - Hurricane Florence - 9/14/2018 12:24 PM



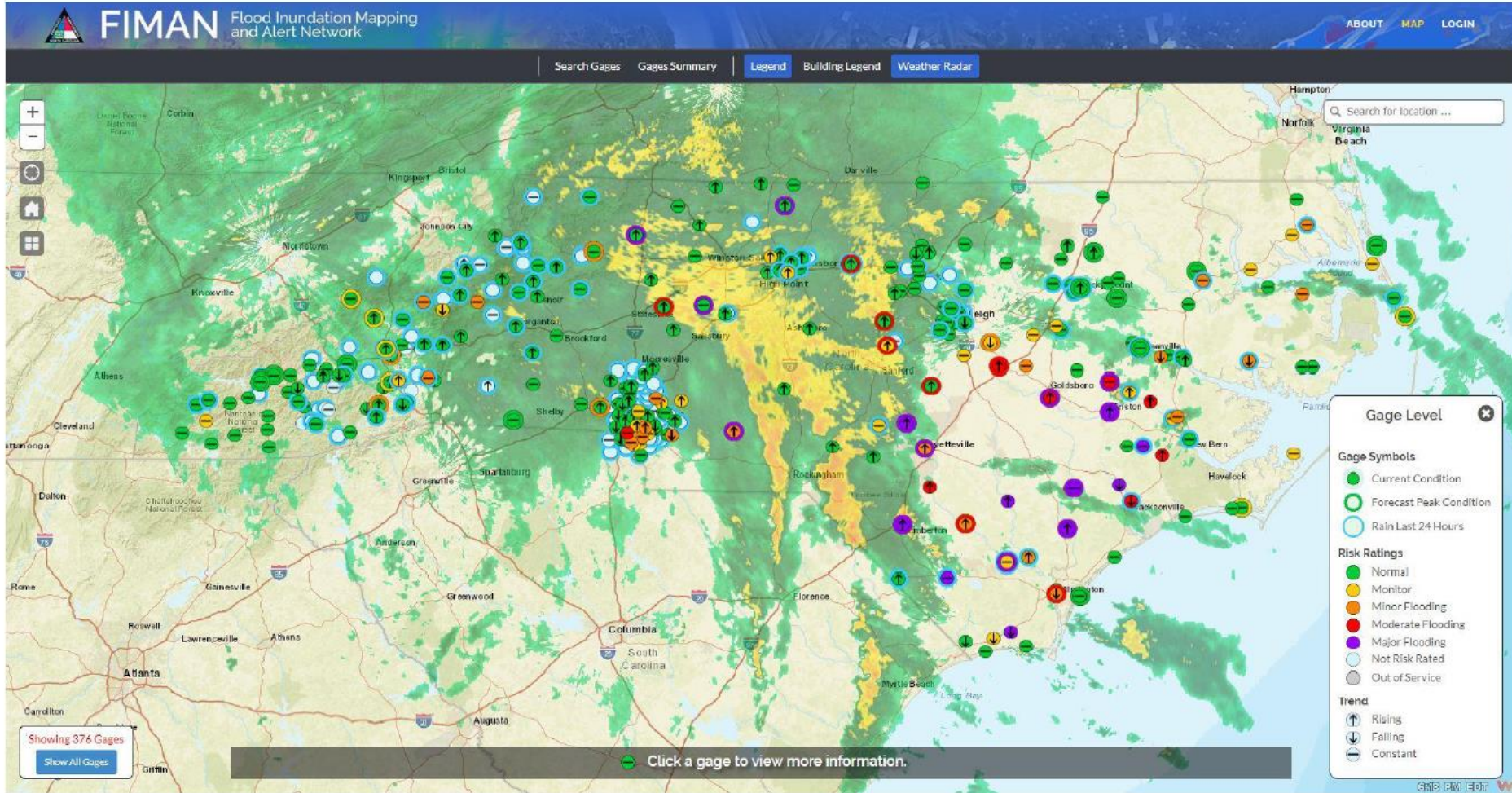
# 9/15/18

## FIMAN Current and Forecast Conditions - Hurricane Florence - 9/15/2018 5:21 PM



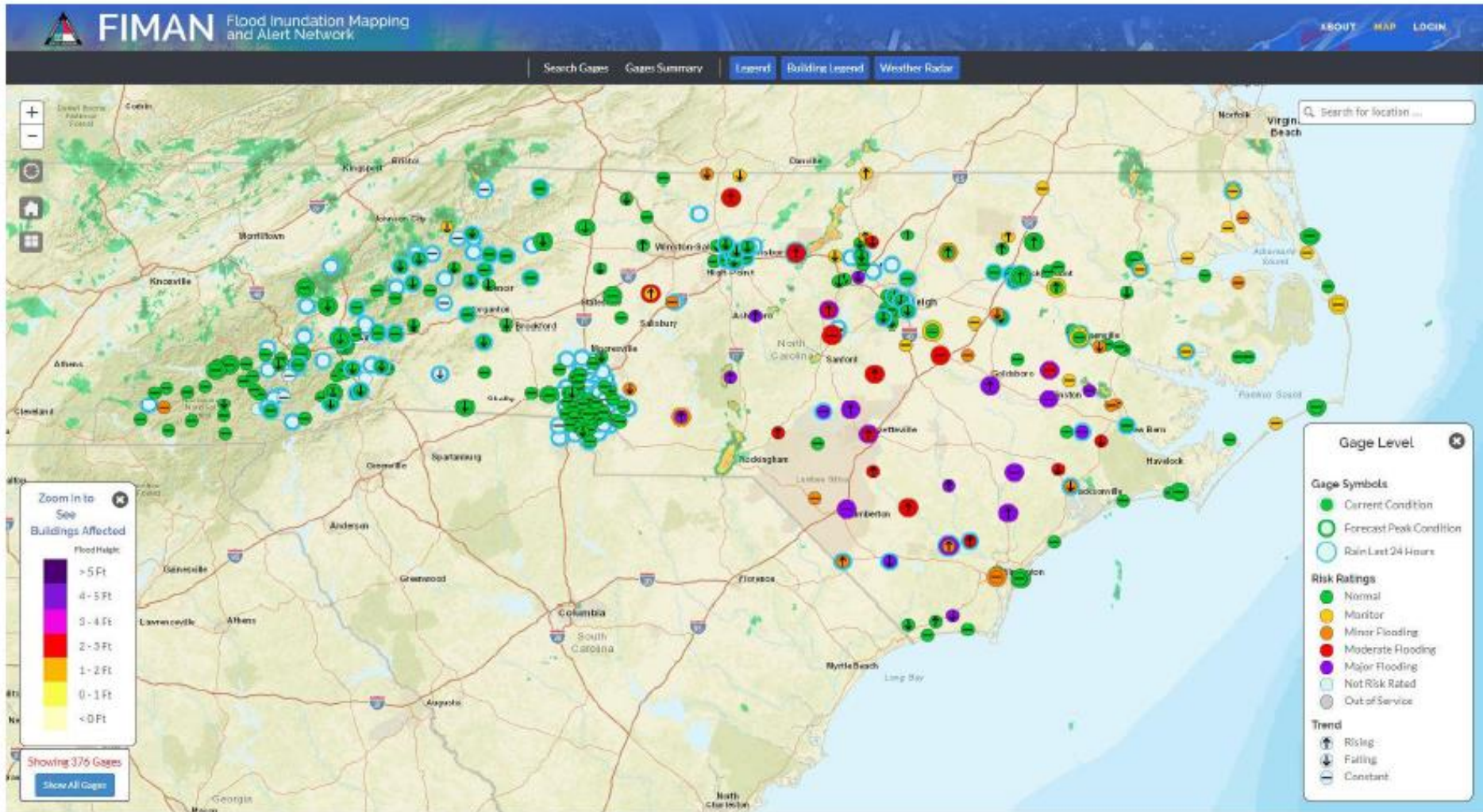
# 9/16/18

## FIMAN Current and Forecast Conditions - Hurricane Florence - 9/16/2018 6:36 PM



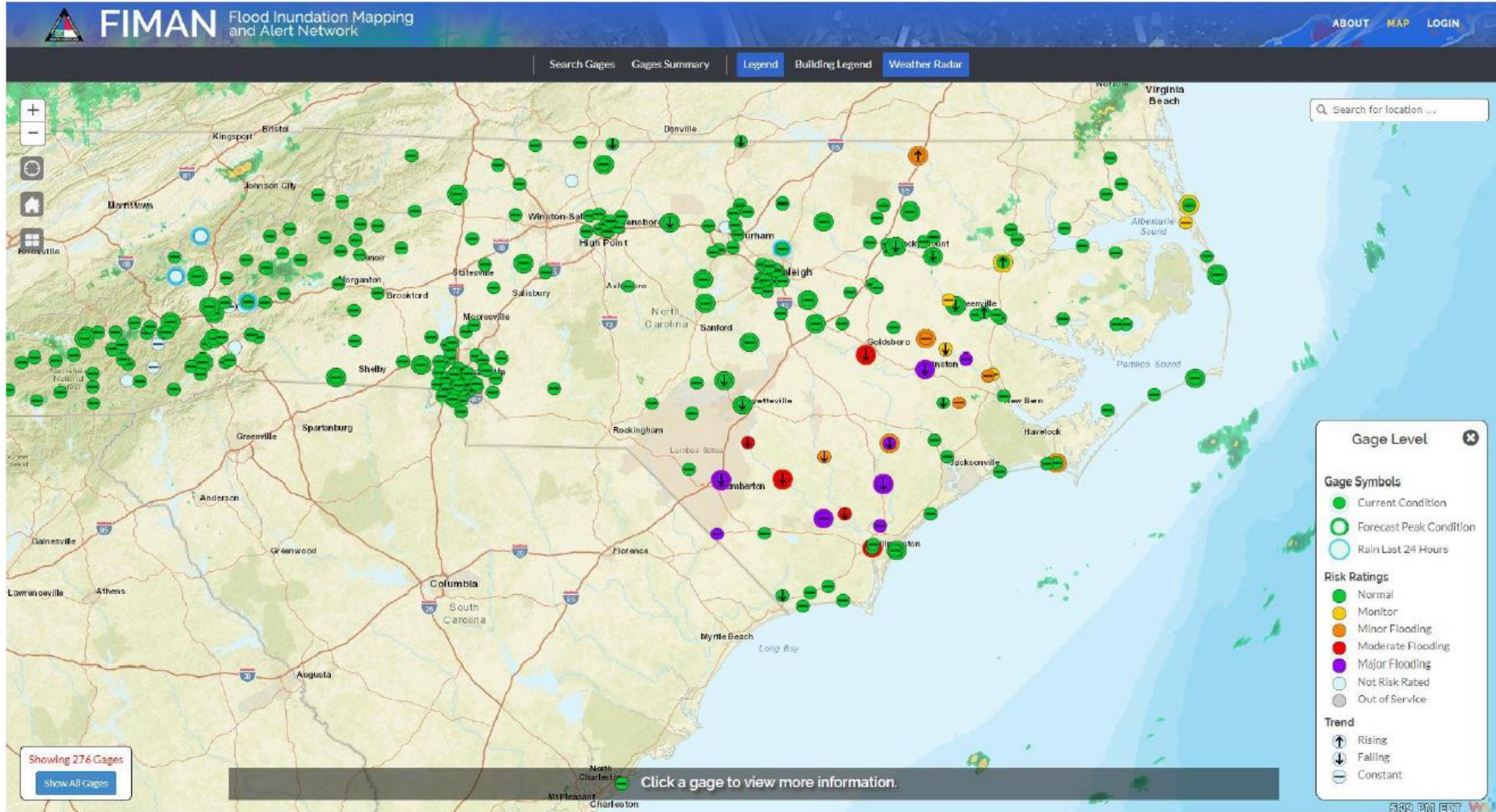
# 9/17/18

## FIMAN Current and Forecast Conditions - Hurricane Florence - 9/17/2018 4:31 PM



# 9/23/18

## FIMAN Current and Forecast Conditions - Hurricane Florence - 9/23/2018 5:43 PM



# 9/27/18

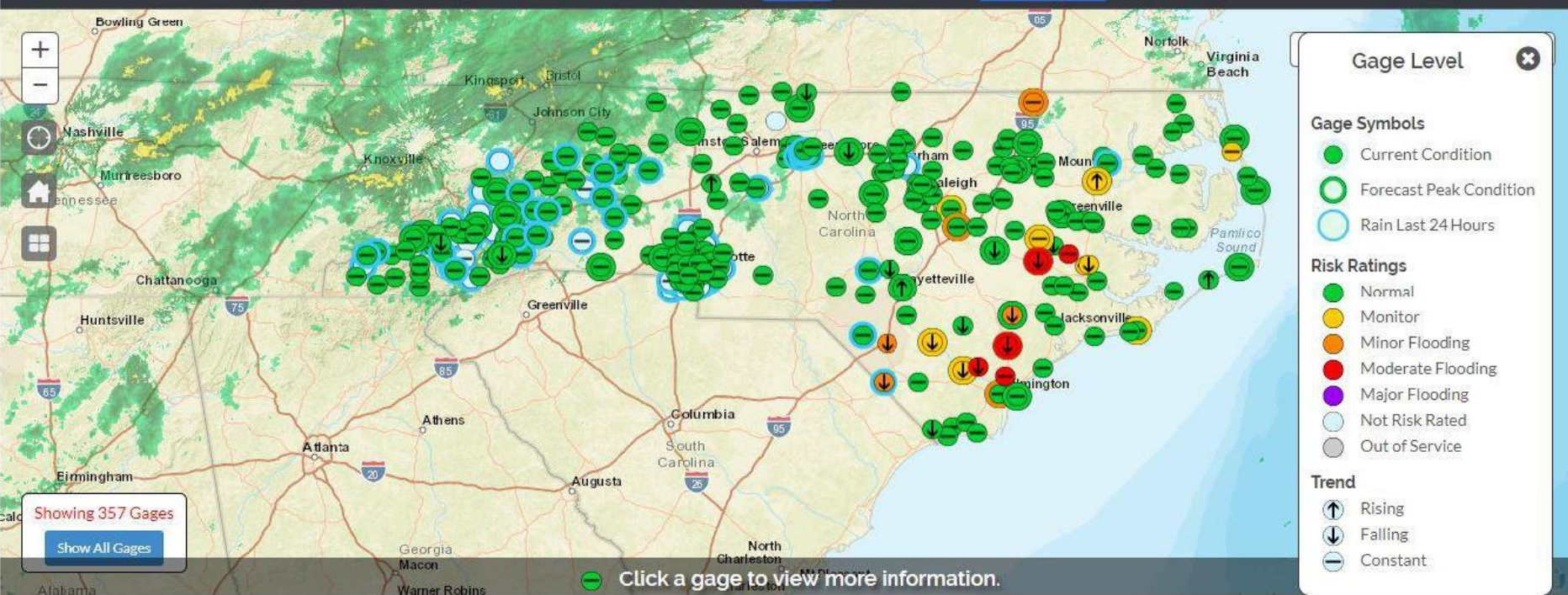
## FIMAN Current and Forecast Conditions - Hurricane Florence - 9/27/2018 8:32 AM



**FIMAN** Flood Inundation Mapping and Alert Network

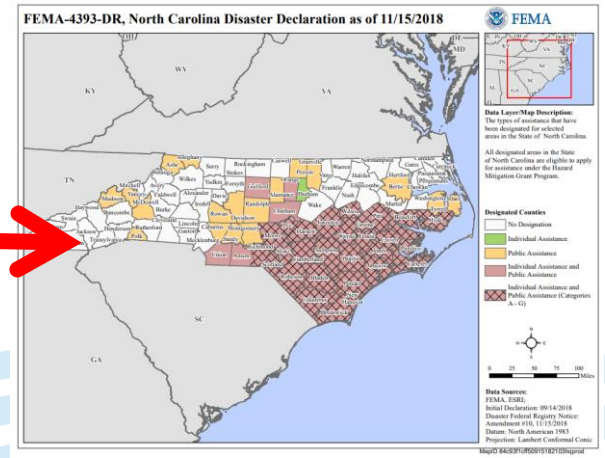
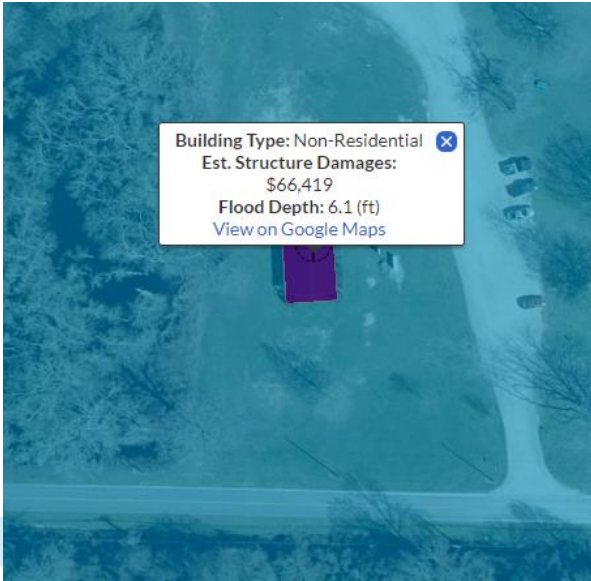
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# Support Federal Disaster Declaration



# Media Promoting Use of FIMAN

**Florence flooding: Monitoring potential flooding in your area with FIMAN**

Monday, September 17, 2018

RALEIGH, N.C. (WTVD) -- The aftermath of Florence has left many communities largely underwater.

Luckily, the NC Flood Inundation Mapping and Alert Network has created an amazing piece of software that allows users to hone in on a specific river in their area and see where the water is predicted to flood out to.

**RELATED: Florence flooding: Storm 'has never been more dangerous than it is right now'**

**As inland waters rise, state keeps wary eye on 167 high-risk dams**

Tags: Hurricane Florence, flooding

Posted September 15  
Updated September 16

**Track flooding in your neighborhood in real time**

Track flooding in your neighborhood in real-time

By: FOX 46 Web Staff

POSTED: SEP-12 2018 10:54PM EDT  
VIDEO POSTED: SEP-12 2018 10:13PM EDT

**Try Kraft Family Gravy Mozzarella & Parmesan Expertly Paired for pizza**

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Enter Your Address & Go!  
Quick Maps and Directions

Jim Cantore Retweeted

**Jen Carfagno** @JenCarfagno · 30m

See where North Carolina flooding is at a glance with flood inundation map. Arrows show is water levels at the location are going up or down. #Florence #Flooding #TurnAroundDontDown

**FIMAN** Flood Inundation Mapping and Alert Network

Search Gages Gages Summary Legend Building Legend Weather Radar

Showing 377 Gages  
Show All Gages

4 retweets, 14 likes

# State Disaster Recovery Act of 2018

- Install 22 new Riverine and 3 Coastal radar gages – generate inundation map libraries and risk calculations
- Extend inundation libraries and risk modeling for 20 existing gages
- Develop inundation libraries at 30 existing gages that currently do not have inundation libraries
- Install 3 riverine and 12 coastal ultrasonic low cost water level sensors at high risk bridges and culverts



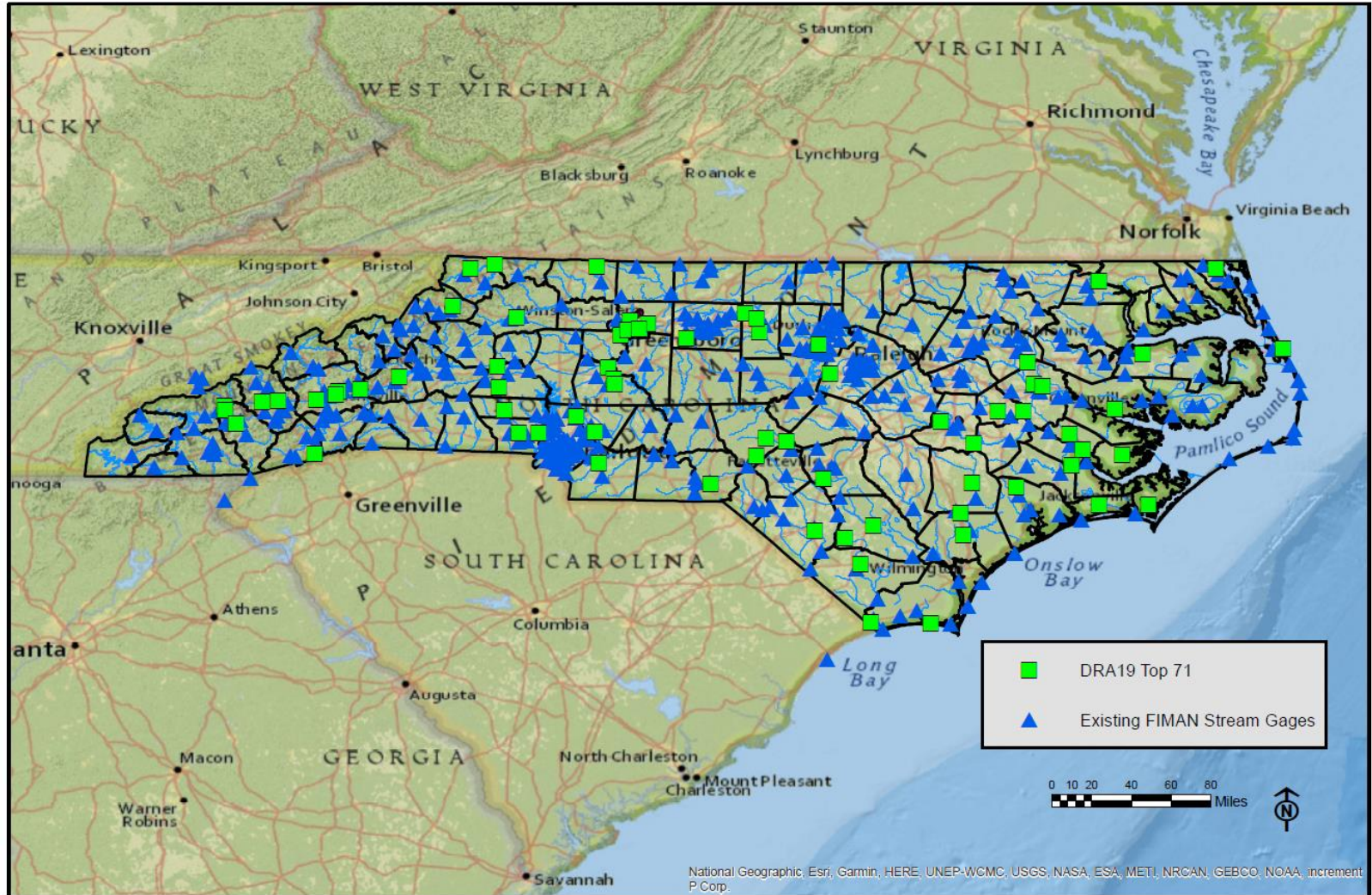
# Recent Funding

- NC Senate Bill 429
  - \$2,000,000 to purchase and install river gauges to improve flood mapping and real-time flood information



# New Stream Gauges

Existing and Proposed Riverine/Coastal Gages  
NC Disaster Recovery Act of 2019



# Existing Rainfall/Stream Gauge Upgrades

Existing and Proposed Riverine/Coastal Gauge Equipment Upgrades  
NC Disaster Recovery Act of 2019

