

FRANKENSTORM

Florence and its Flood-Producing Forerunners

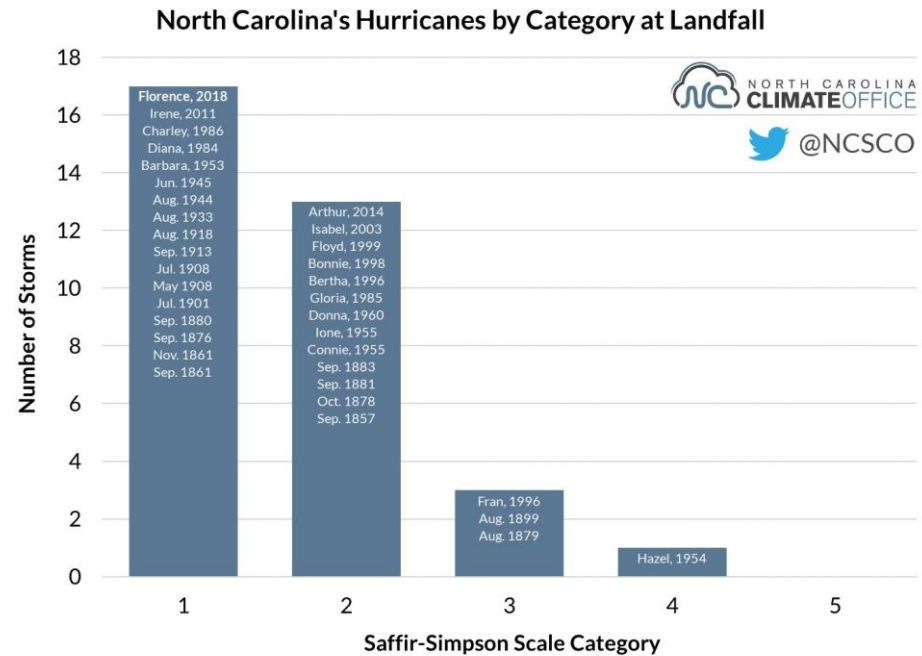
Corey Davis

Applied Climatologist

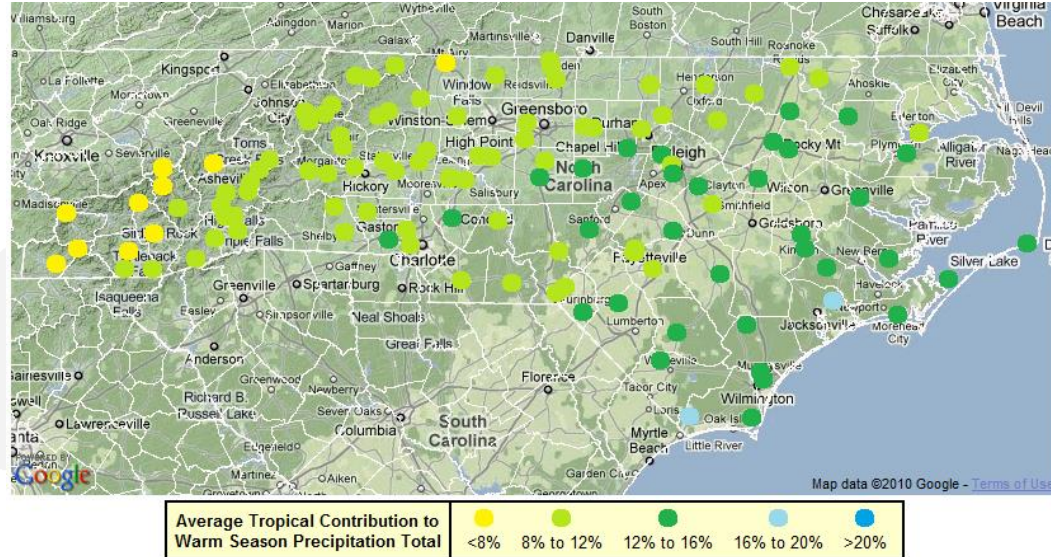
State Climate Office of North Carolina

Tropical Storm Climatology

- On average, **1.73 storms per year** within 150 miles of NC
- On average, a landfalling storm at the coast **every other year**
- Florence was the **34th storm** to make landfall as a hurricane in North Carolina since 1851



Tropical Precipitation



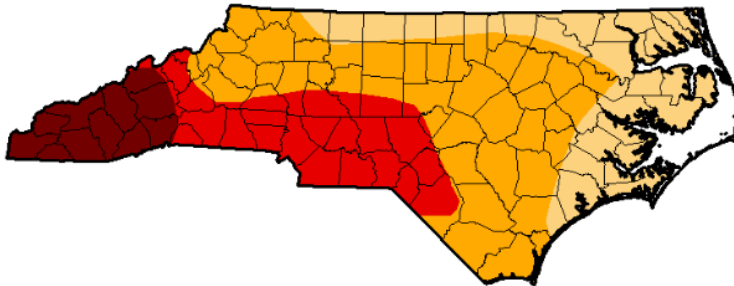
Region	Average Annual Tropical Precip. (1980 to 2009)	Percentage of Total Warm Season (Jun-Nov) Precip.
Mountains	2.7 inches	8.9%
Piedmont	2.9 inches	11.6%
Coastal Plain	4.1 inches	13.6%
Statewide	3.3 inches	11.5%

A Year Without Tropical Storms

Drought Classification

None D0 (Abnormally Dry) D1 (Moderate Drought) D2 (Severe Drought) D3 (Extreme Drought) D4 (Exceptional Drought)

August 28, 2007

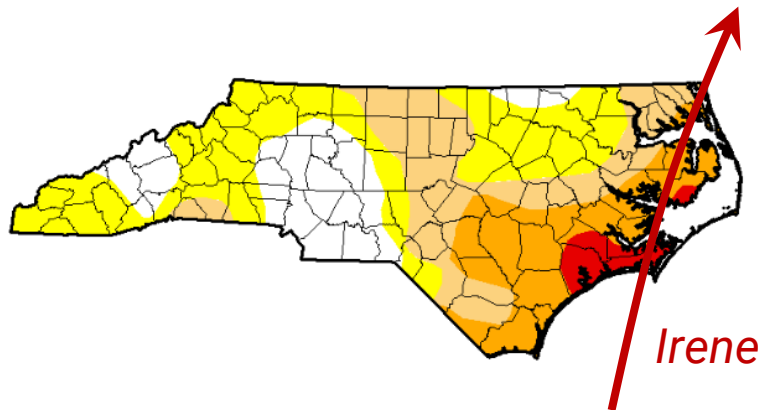


The Difference a Storm Can Make

Drought Classification

None D0 (Abnormally Dry) D1 (Moderate Drought) D2 (Severe Drought) D3 (Extreme Drought) D4 (Exceptional Drought)

August 23, 2011



When Rain Becomes a Flood

Causes of tropical-related inland flooding:

- Falls on **already saturated ground**



When Rain Becomes a Flood

Causes of tropical-related inland flooding:

- Falls on **already saturated ground**
- Pulls in **Atlantic or Gulf moisture**



When Rain Becomes a Flood

Causes of tropical-related inland flooding:

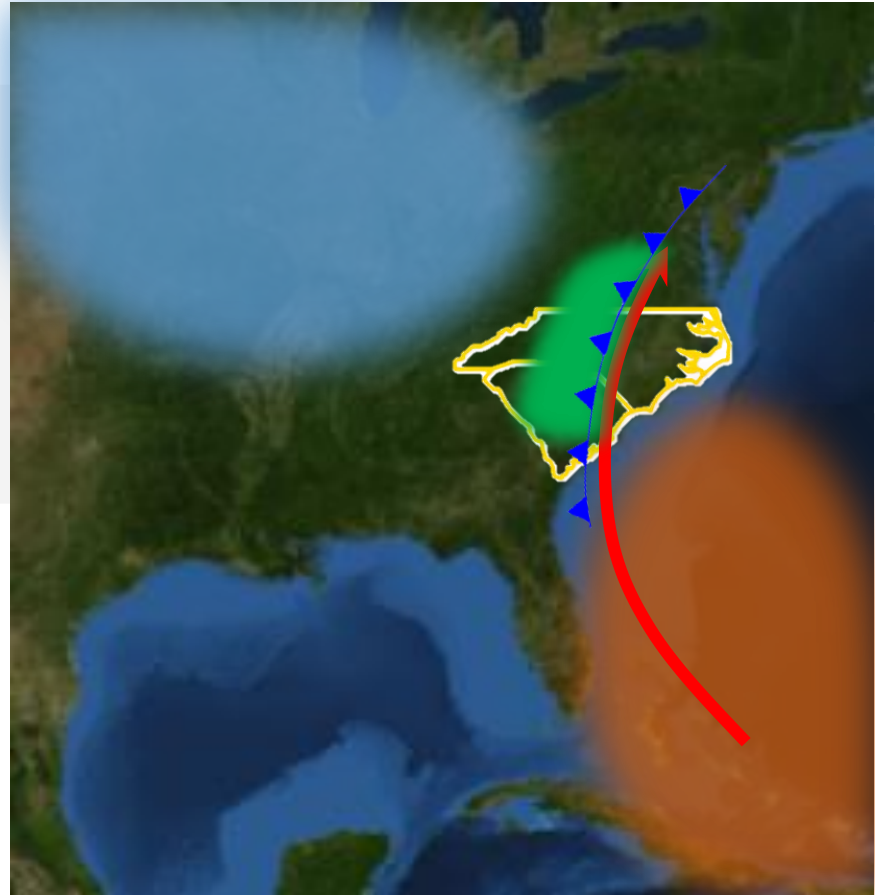
- Falls on **already saturated ground**
- Pulls in **Atlantic or Gulf moisture**
- A **slow-moving** storm



When Rain Becomes a Flood

Causes of tropical-related inland flooding:

- Falls on **already saturated ground**
- Pulls in **Atlantic or Gulf moisture**
- A **slow-moving** storm
- Enhancement by or transition to an **extra-tropical system**

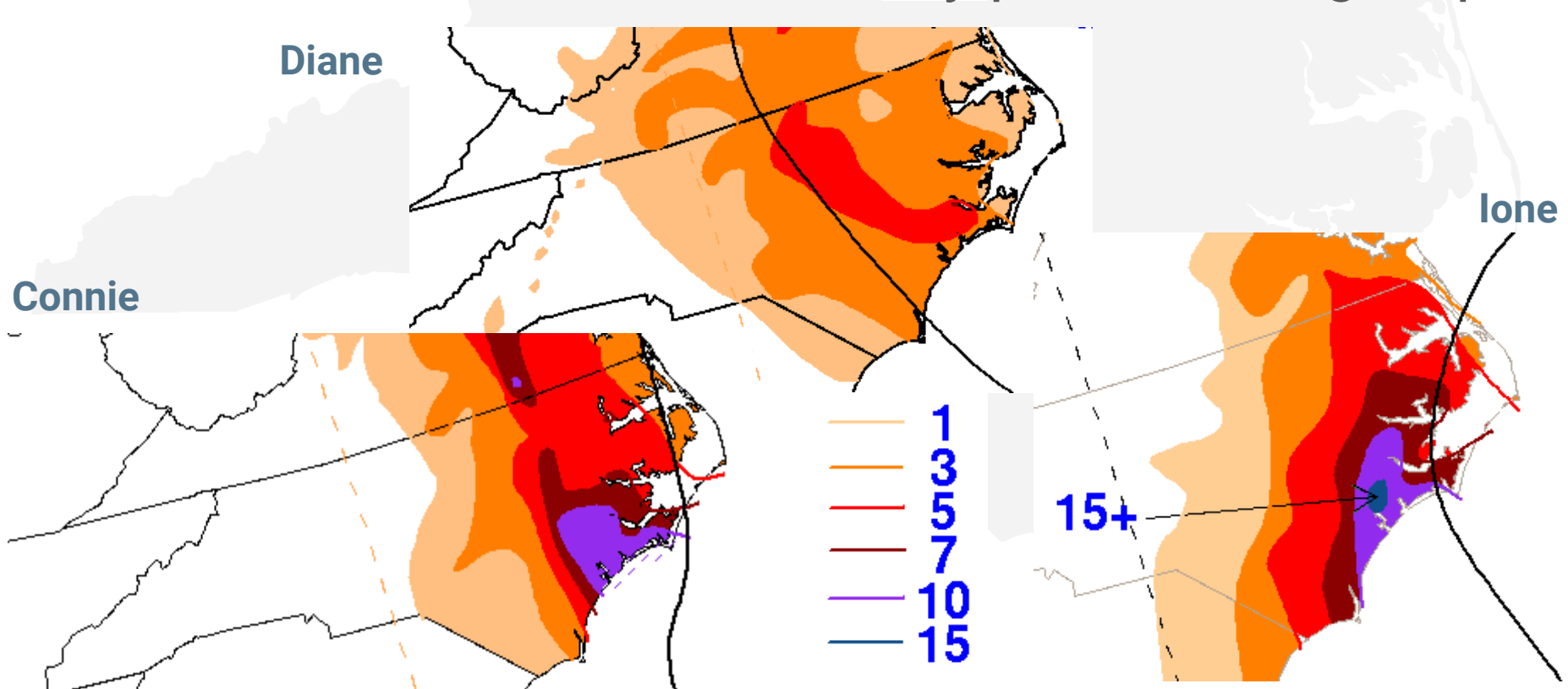


Summer of 1955

Wet ground
Trop. moisture
Slow-moving
Extra-tropical

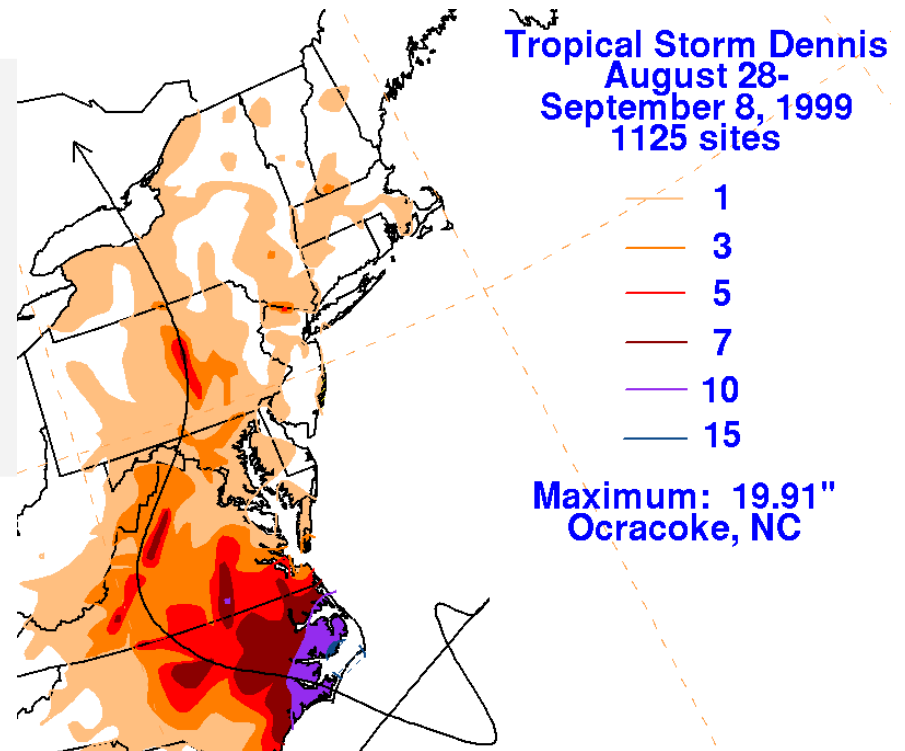


- Three storms hit within a 40-day period in Aug/Sep



Hurricane Floyd

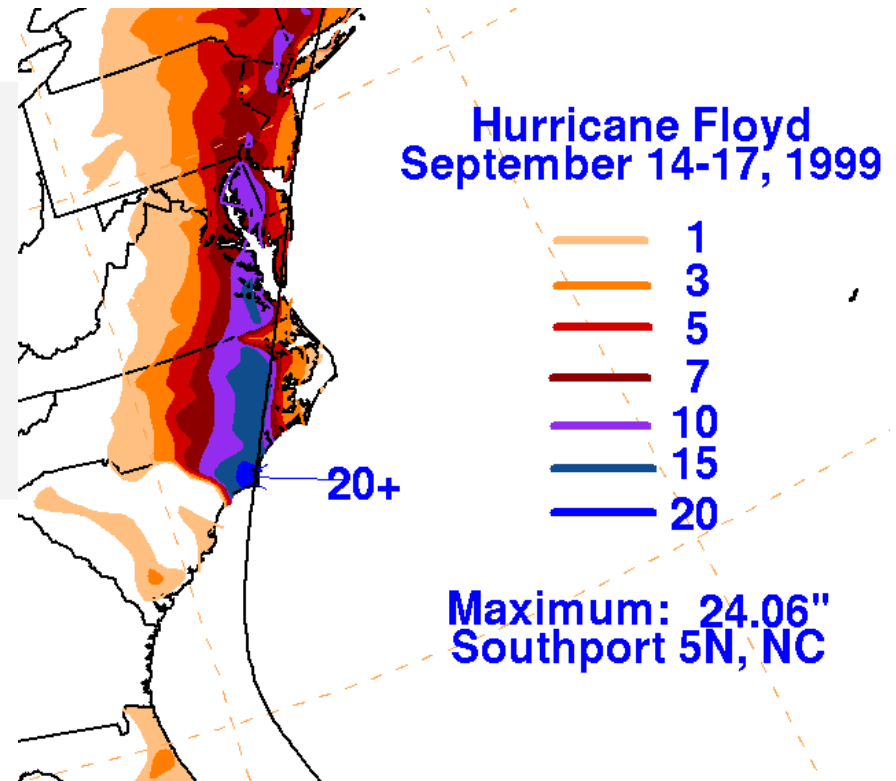
- Preceded by Dennis 11 days earlier



Hurricane Floyd

- Preceded by Dennis 11 days earlier
- Extreme rainfall in eastern North Carolina
 - 1-in-500 to 1-in-1000 year rain events
- Worst flooding along the Tar, Neuse, and Roanoke rivers

Wet ground
Trop. moisture
Slow-moving
Extra-tropical



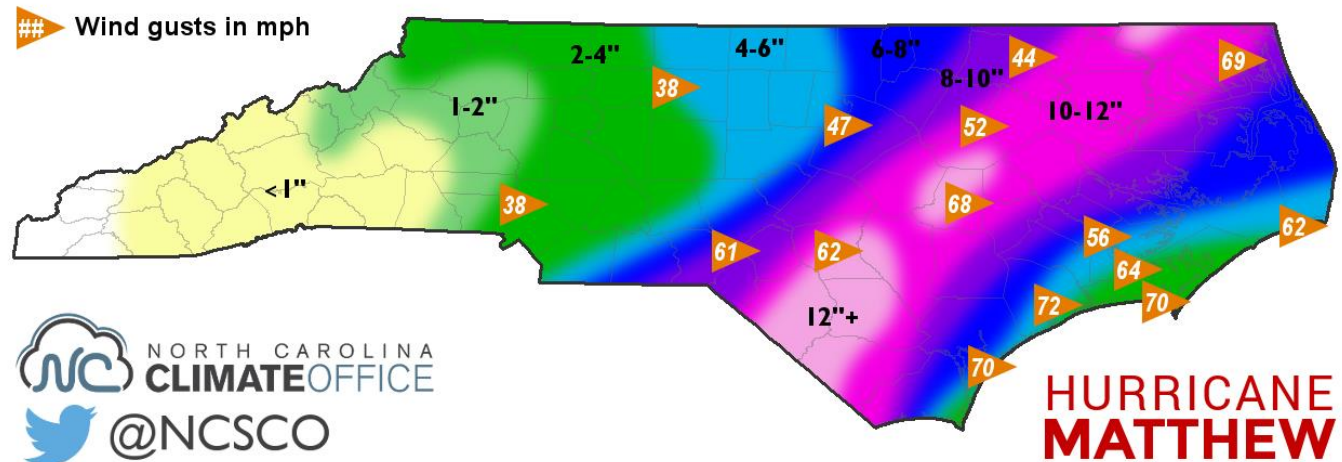
Hurricane Matthew

Wet ground
Trop. moisture
Slow-moving
Extra-tropical



- Preceded by Hermine, Julia, and locally heavy rain
- New record levels on the Neuse, Cape Fear, and Lumber rivers

Total Precipitation from October 7-9, 2016



Hurricane Florence

Wet ground
Trop. moisture
Slow-moving
Extra-tropical



- Lingered for 5 days in mid-September 2018
- Extreme rainfall totals across the southern coast of NC
- New record levels on the Cape Fear, Lumber, and Trent rivers

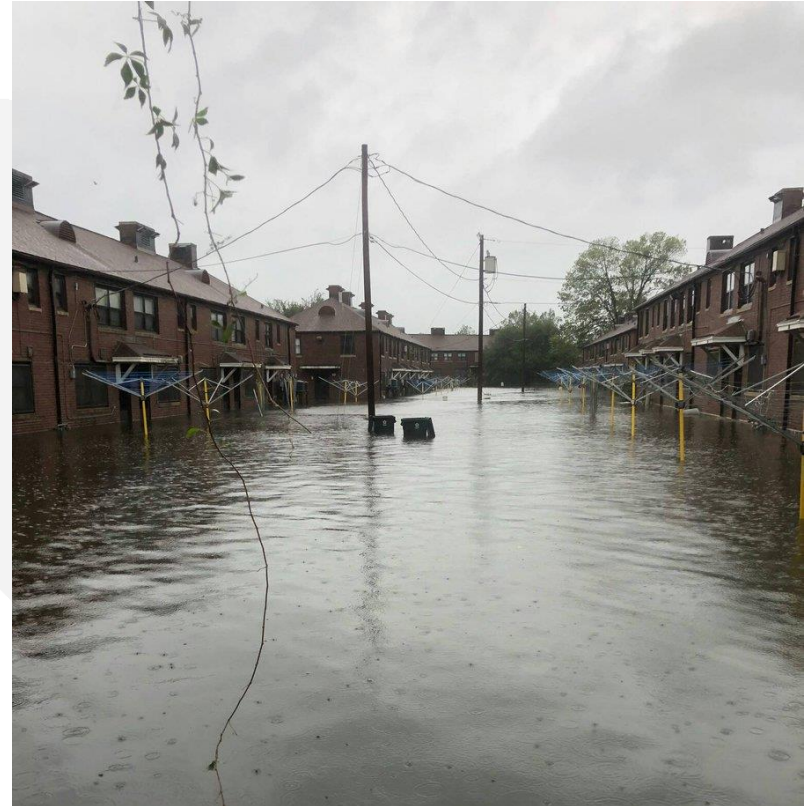
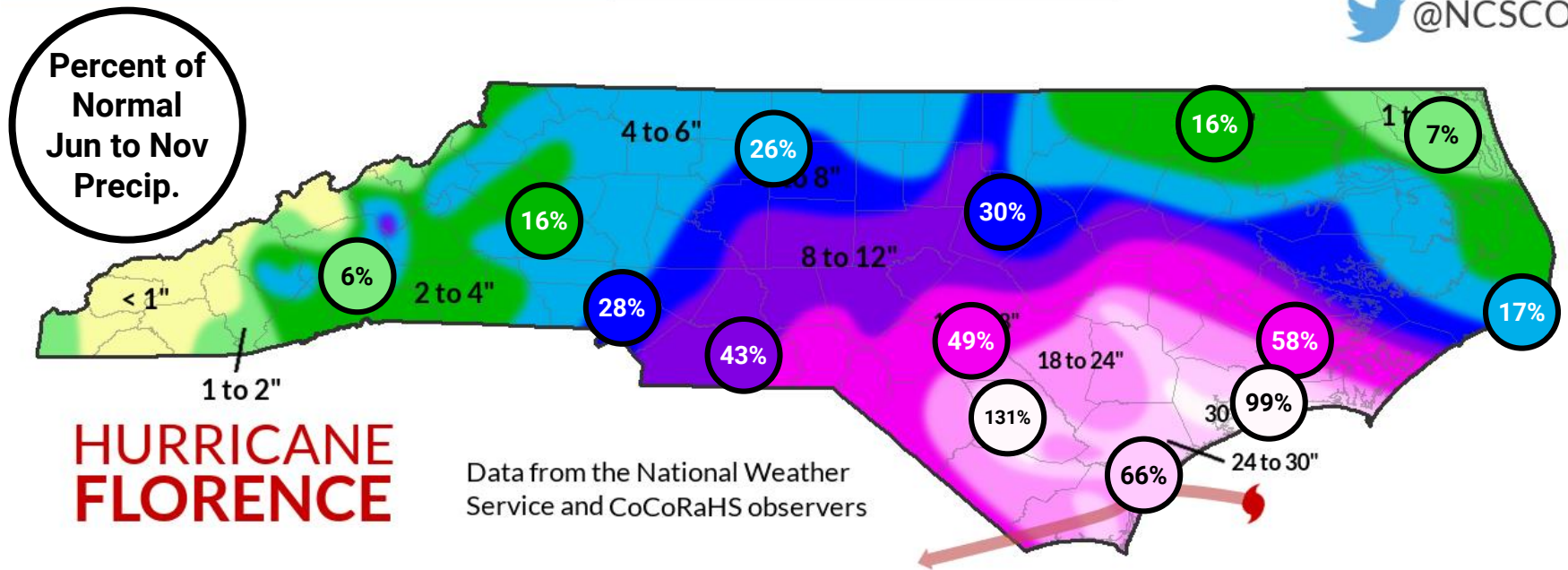


Photo from the City of New Bern

Florence Rainfall Totals

Total Precipitation (in.)

Sep. 13-17, 2018



Questions After Florence

- Which past storm does Florence most closely resemble?
- Was Florence a worst-case scenario for North Carolina?
- Have there been other historical periods with so many flooding hurricanes in such a short time?

Voices from Windsor



Voices from Windsor



“I’ve got people in my town who think they’re 1,200 years old.”

Photos from the Town of Windsor and the Roanoke-Chowan News Herald

Corey Davis

cndavis@ncsu.edu

919-513-1390

<https://climate.ncsu.edu/climateblog>