

climate change & North Carolina

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**NC STATE
UNIVERSITY**

North Carolina State University

Haywood floods of 2021 worse than '04

Haywood flooding described as the worst ever witnessed

By Vicki Hyatt vhyatt@themountaineer.com Aug 20, 2021 0



GET IN THE DRIVERS SEAT

AREA'S
LOWEST PRICES
ON NEW FORDS

CLICK TO TESTDRIVE

Taylor Ford

Large future climate changes for North Carolina if our current reliance on fossil fuels for energy continues

- Temperatures outside of what we've seen so far
- Disruptive sea level rise
- Increases in intensity and frequency of extreme rainfall
- More intense hurricanes
- Higher humidity levels



The North Carolina Climate Science Report, 2020

North Carolina has warmed about 1°F in the recent past

Year Range [?]
1901 ————— 2020

Variable Selection [?]
Average Temperature

Time Frame [?]
Annual

Trend Range [?]
Per Decade

Trend [?] - 0 +

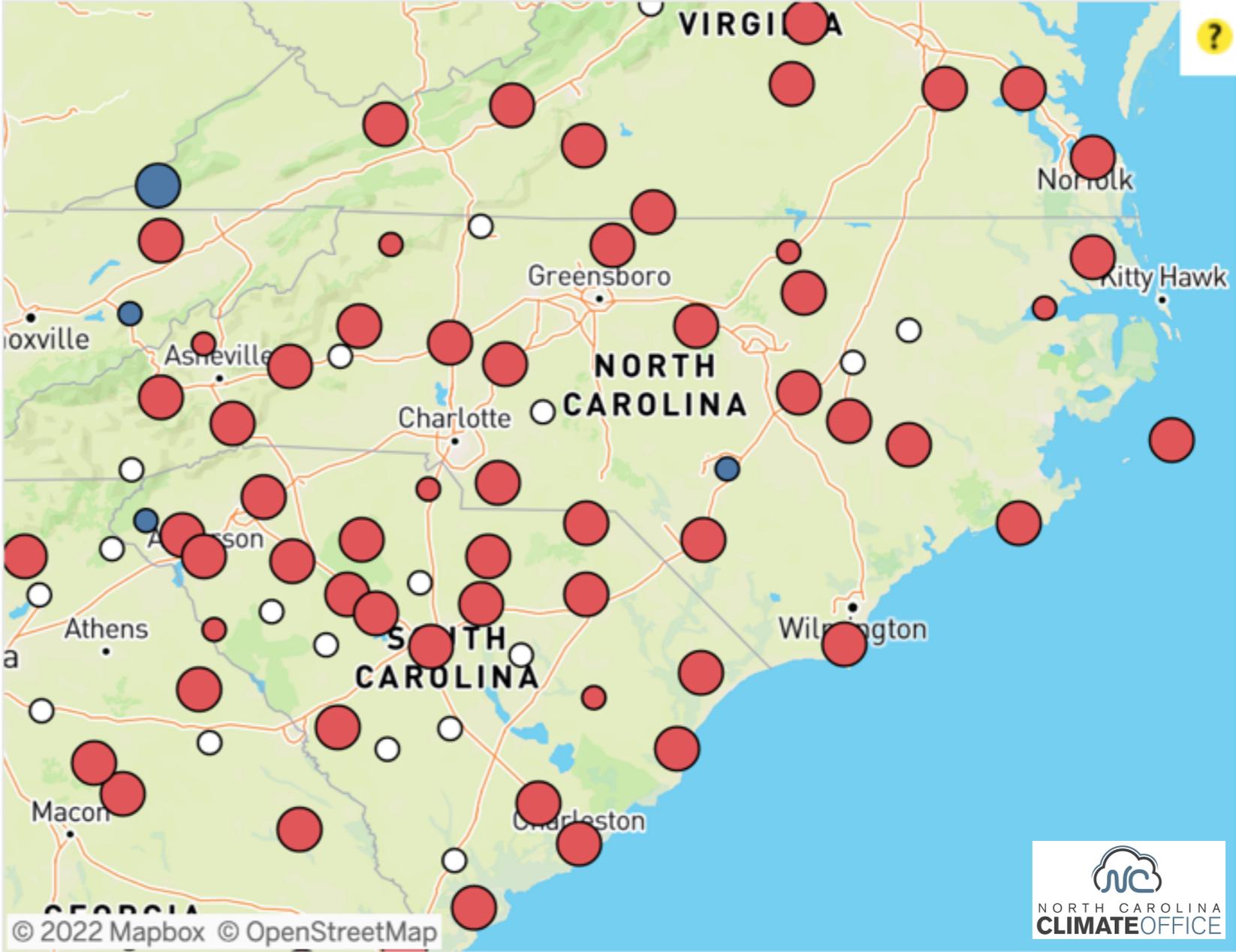
Significant (S) ● ○ ●

Not Significant (NS) ● ○ ●

Insufficient Data (I) ● ● ●

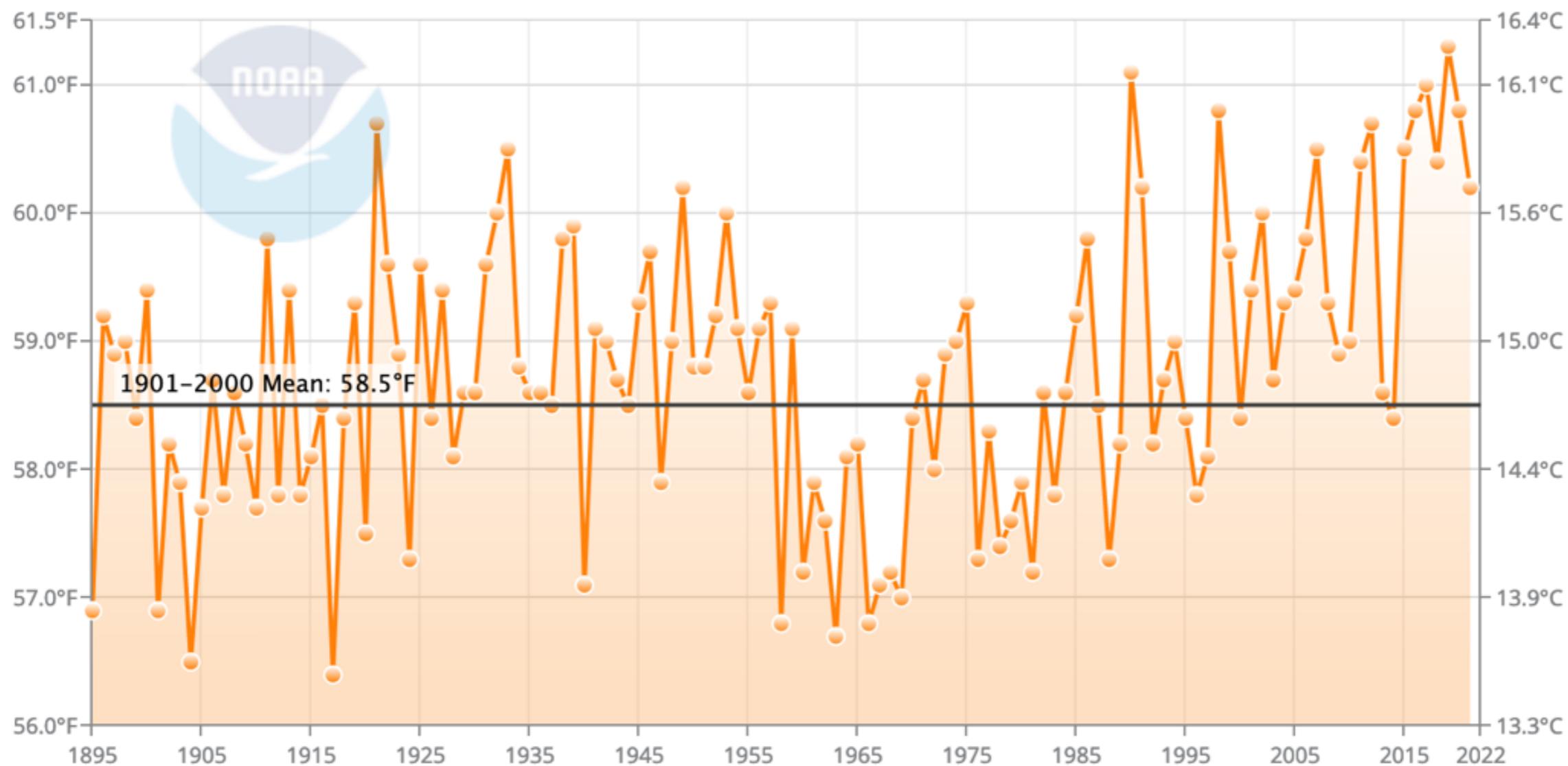
Add to Graph [?]

- None
- Average
- Statewide Average
- Trend Line

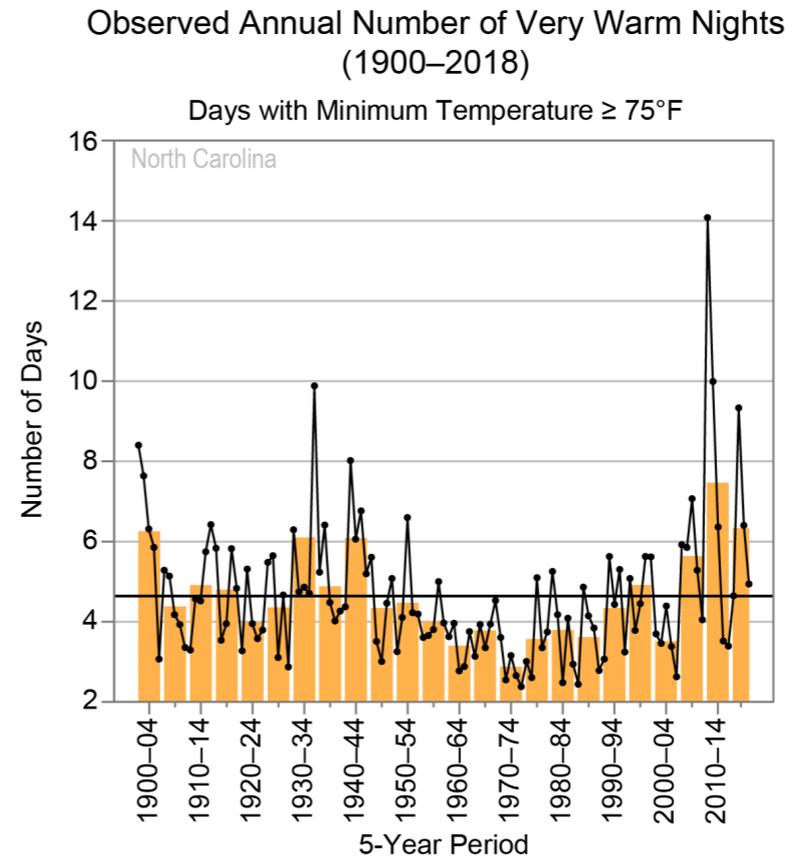
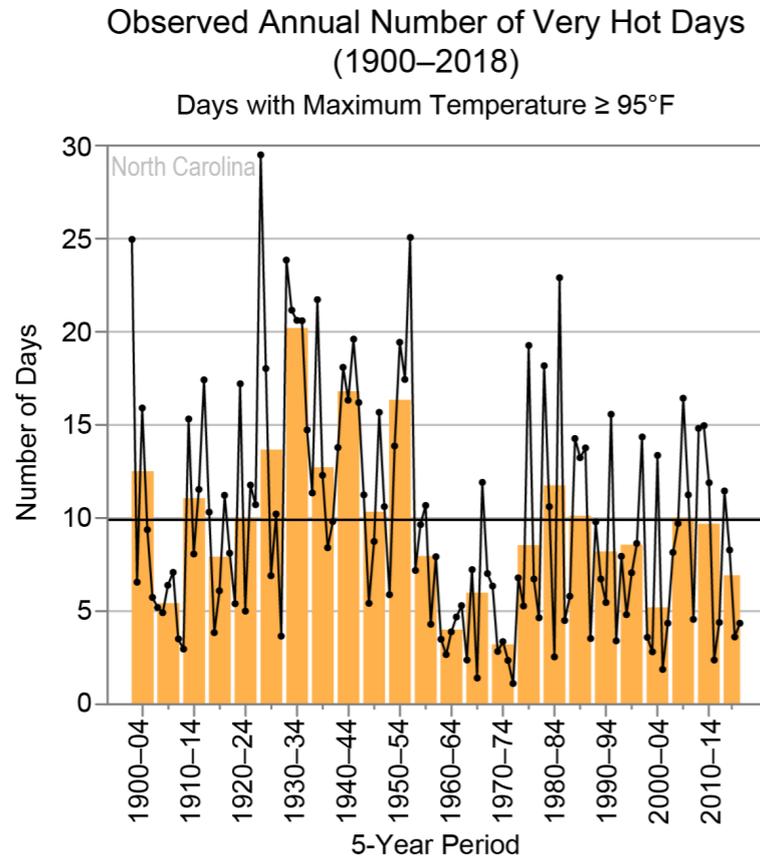


Only 1 year in the past 20 has been below the 20th century average

North Carolina Average Temperature
January-December

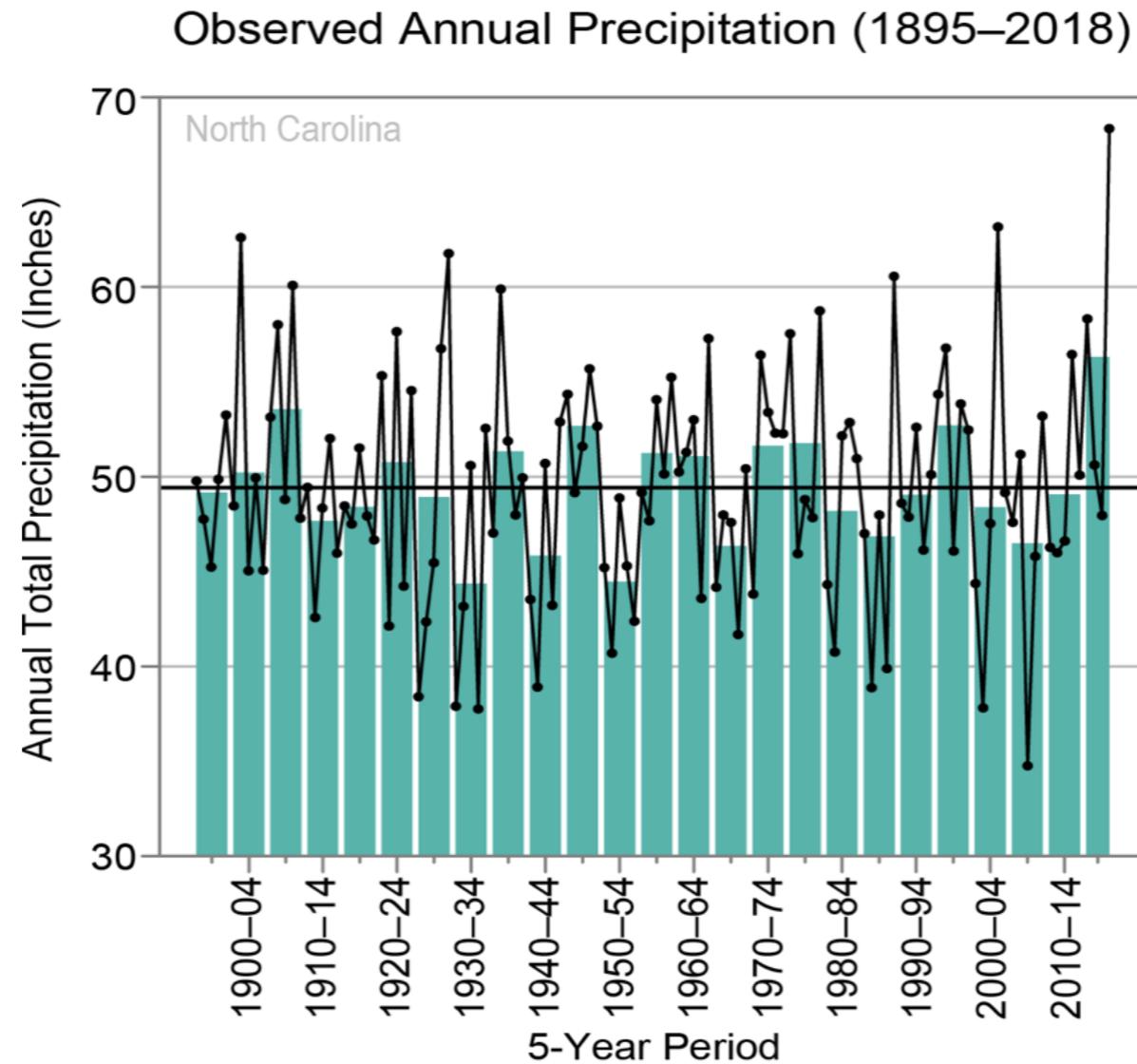


Nights, not days, have been getting hotter

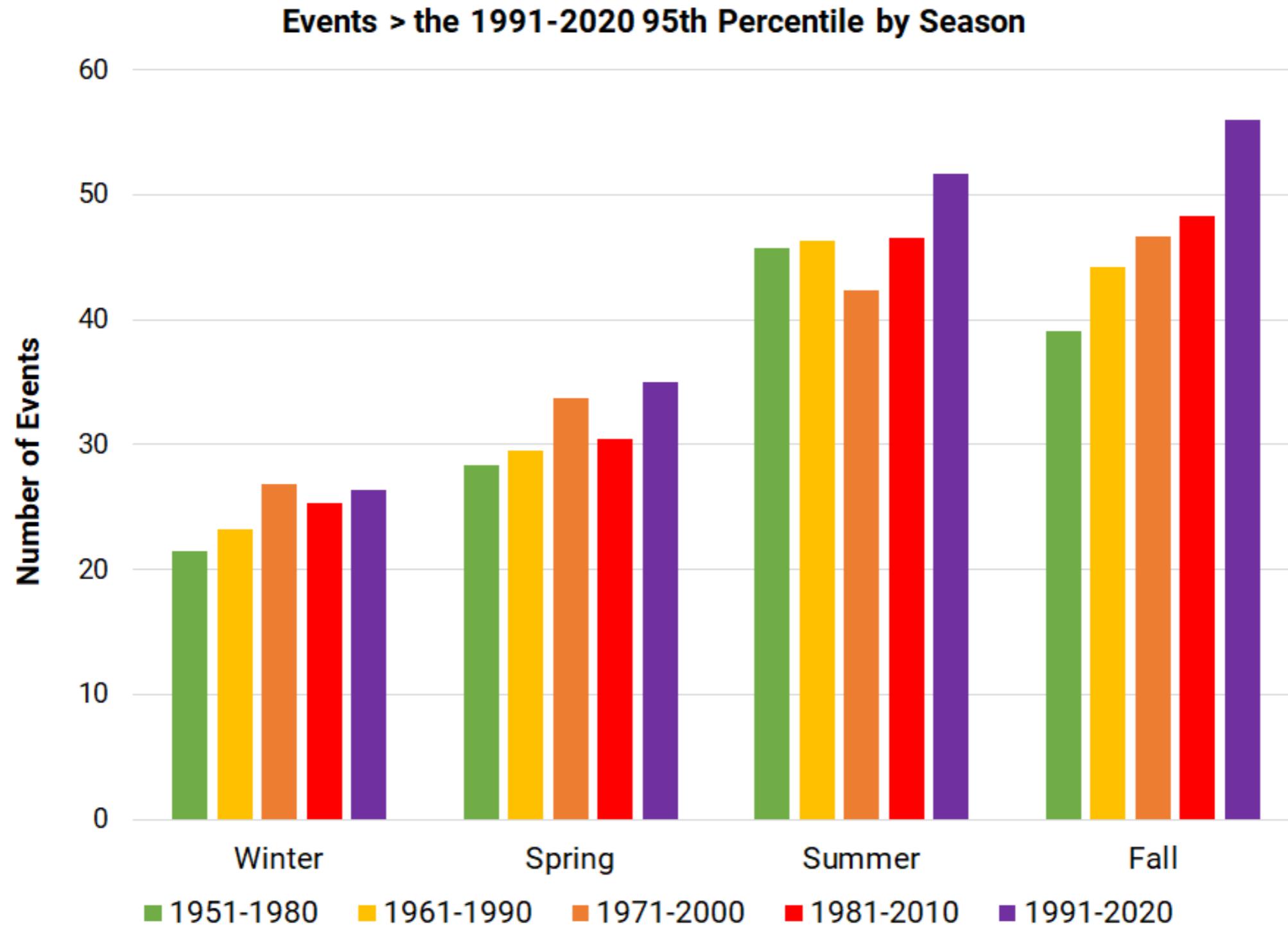


But in the future, both are projected to increase (along with increases in humidity, which presents a public health risk)

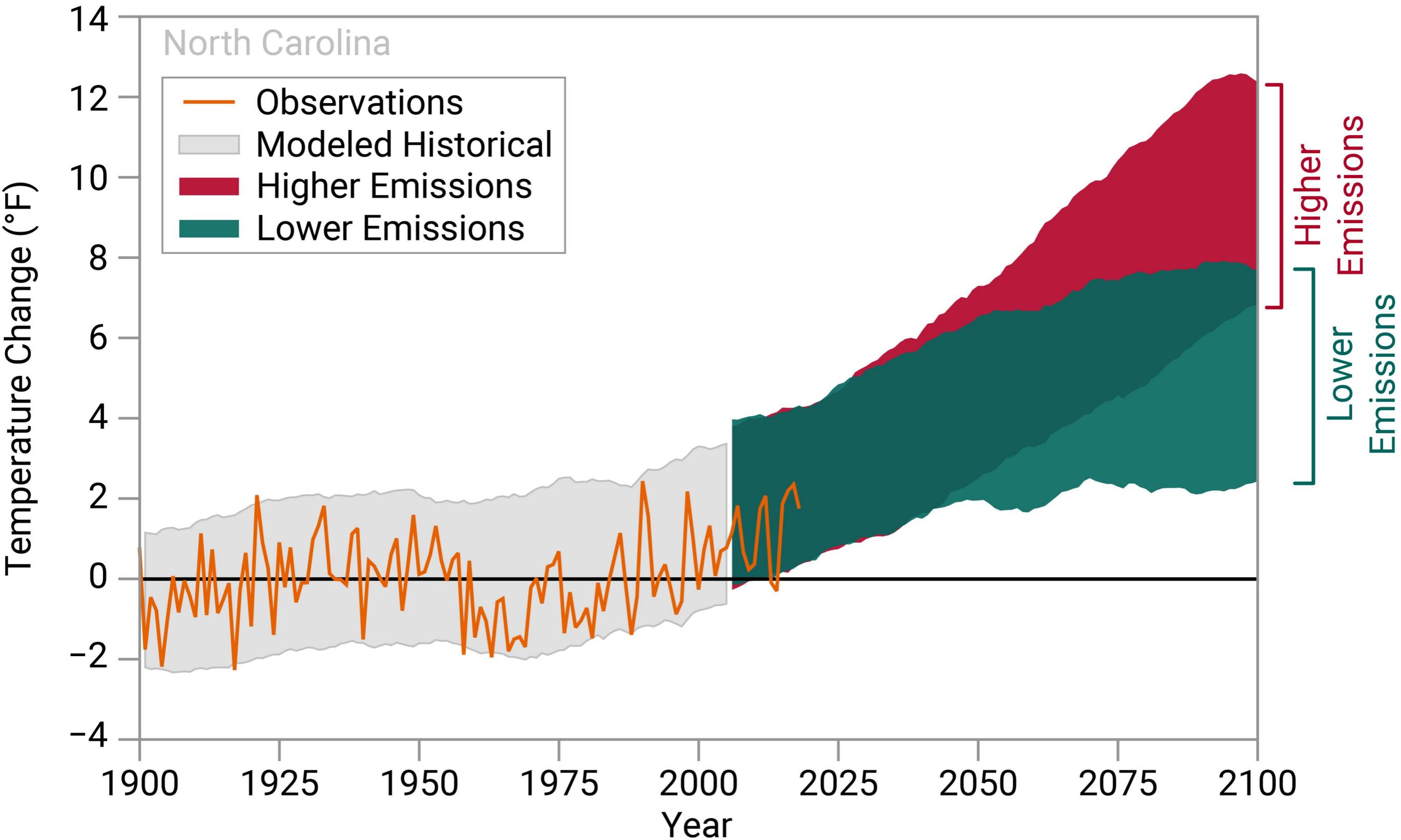
There is no trend in annual precipitation, but there is an upward trend in extremes



Extreme precipitation is increasing especially in **summer & fall**



Observed and Projected Temperature Change



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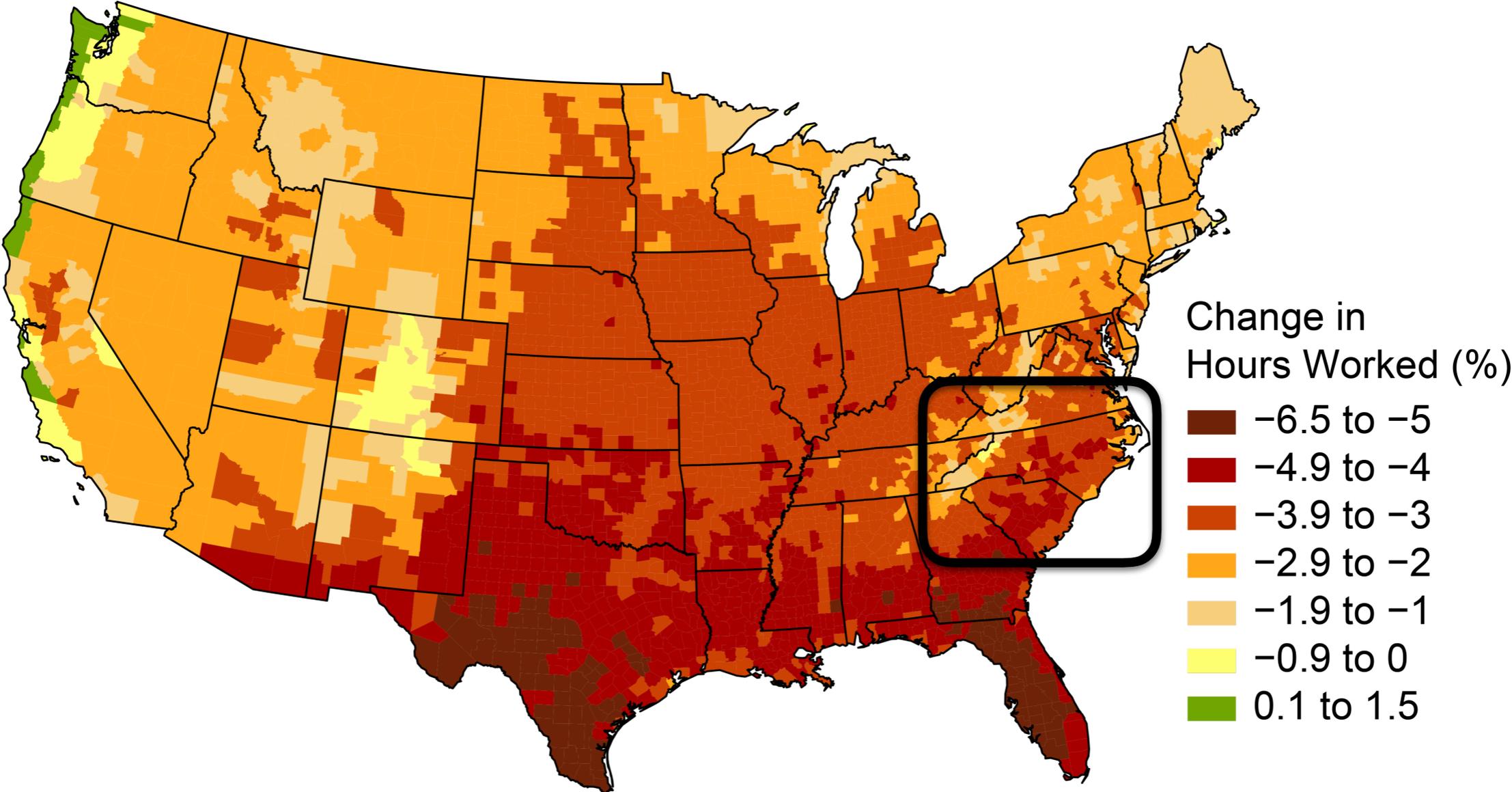
Climate change 'threat multiplier' means extra risk of heat illness in rural NC

BY ADAM WAGNER

UPDATED OCTOBER 25, 2020 6:35 AM



Outdoor laborers are most vulnerable to heat-related deaths

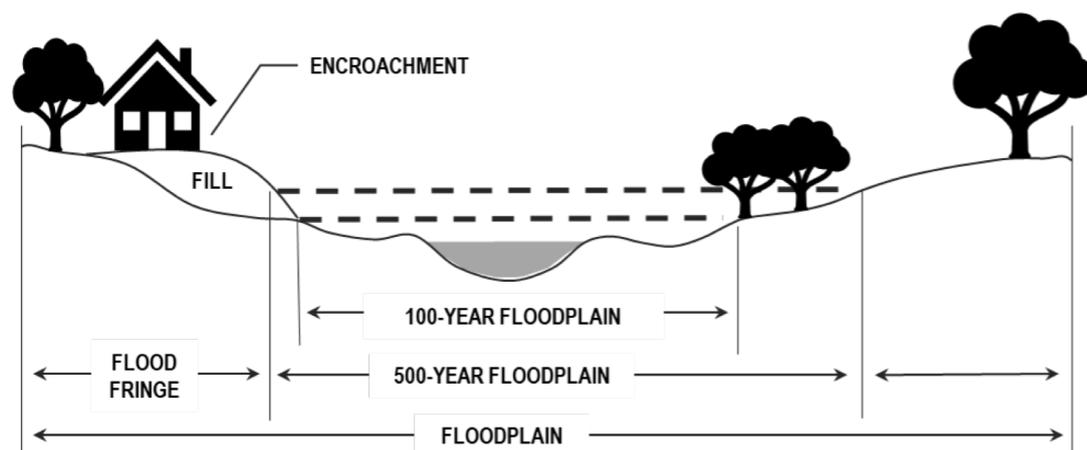


NCA 2018

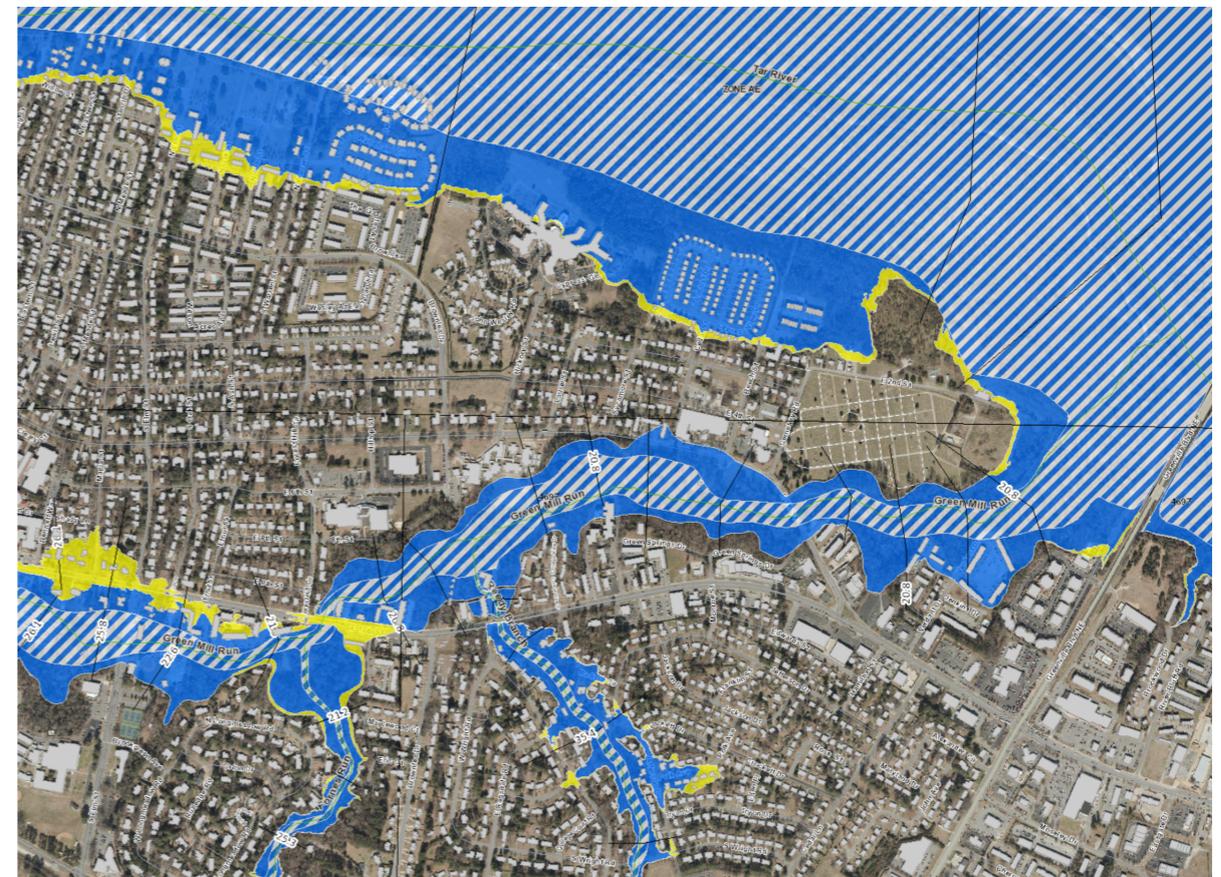
Change in hours worked by the end of the century in a fossil-fuel intensive world

The 100-year floodplain is the primary marker of risk and an important planning tool, but it is poorly understood by the public.

The area with >1% chance of being inundated by a **river** or **coastal flood** in any given year.



It is *not* the area that will only flood once in 100 years. In fact, a home in a floodplain has a **26% chance of flooding** during a 30-year mortgage.



The floodplain also doesn't represent flooding from other hazards.

Pluvial Flooding:



**Extreme
Precipitation**

**Storm Sewer or
Groundwater
Surcharge**

David Pfeiffer CC BY 2.0

Compound Flooding:



Storm Surge

**Extreme
Precipitation**

**Storm Sewer or
Groundwater
Surcharge**

Image credit: AP Photo/Steve Delaney

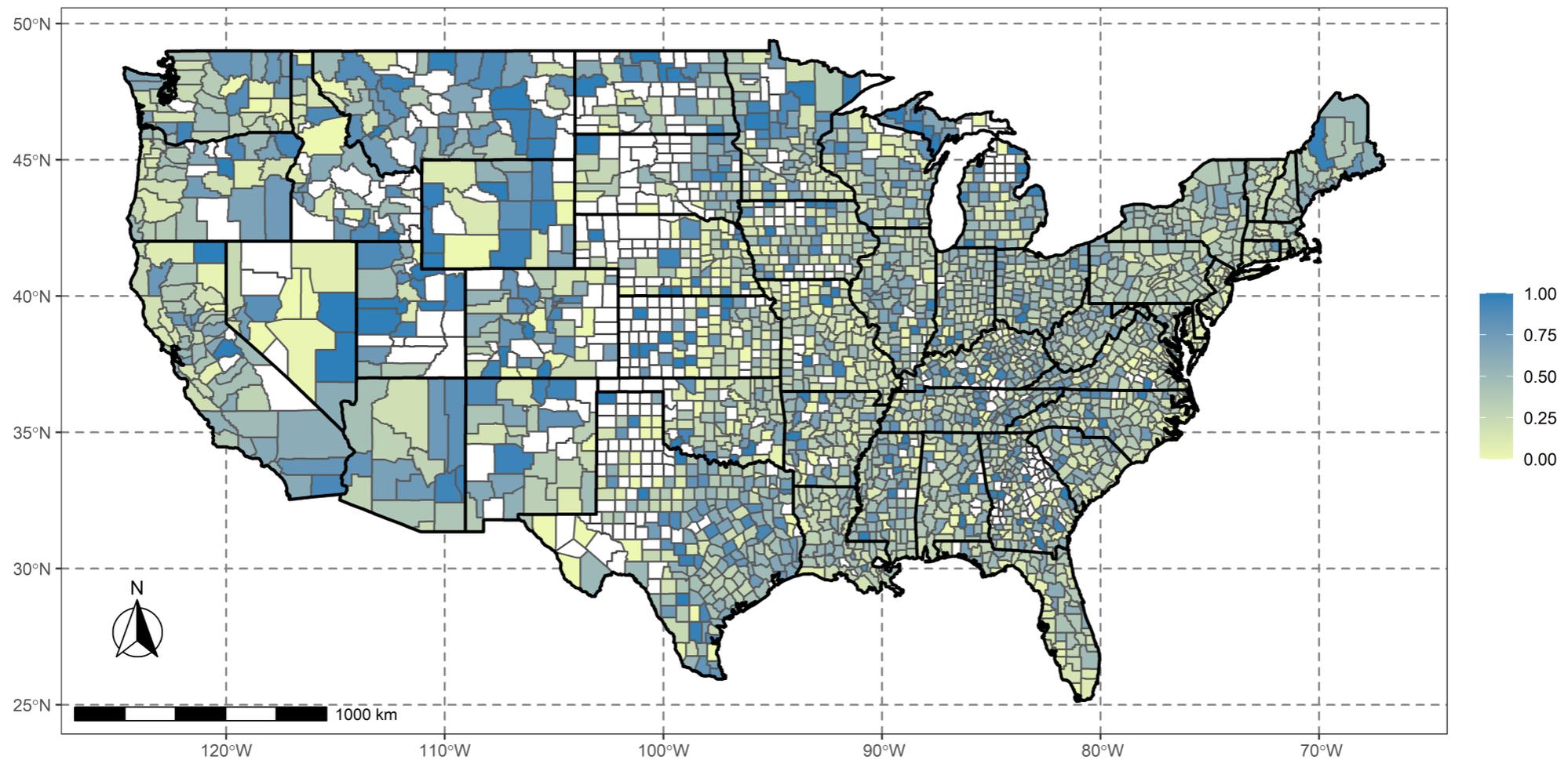
Inland Flood Wave

Flooding during Hurricane Florence in Englehard, NC looking towards Pamlico Sound



COLLEGE OF ARTS AND SCIENCES
Earth, Marine and Environmental Sciences

In fact, nationwide, 28% of historical flood damage has occurred outside of mapped floodplains.



A warmer atmosphere holds more water

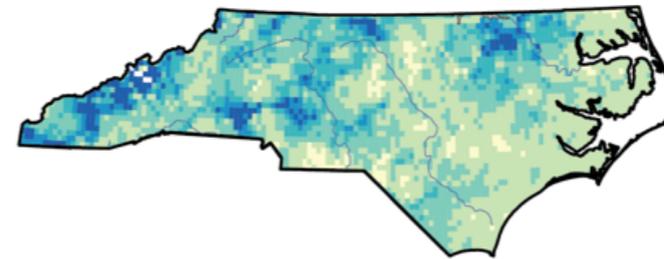
→ **Likely** that annual total precipitation for North Carolina will increase

→ **Virtually certain** that it will be more humid due to warming ocean and atmosphere

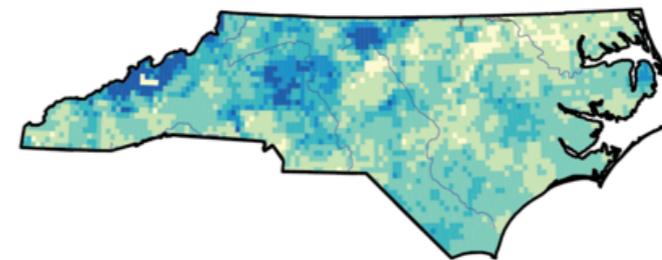
→ As a result, it is **very likely** that extreme precipitation frequency and intensity in NC will increase

Change in days with precipitation over 3”

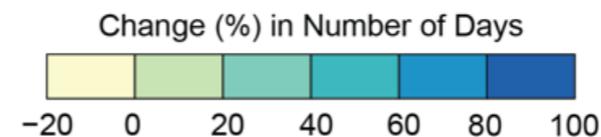
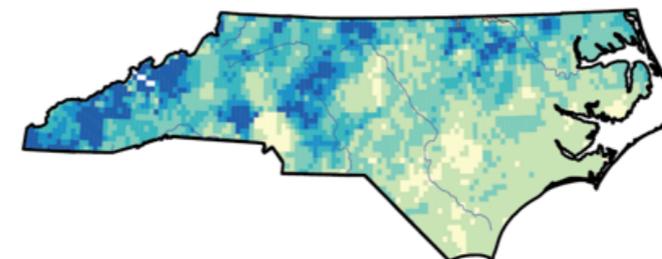
(a) Higher Scenario (RCP8.5), 2021–2040



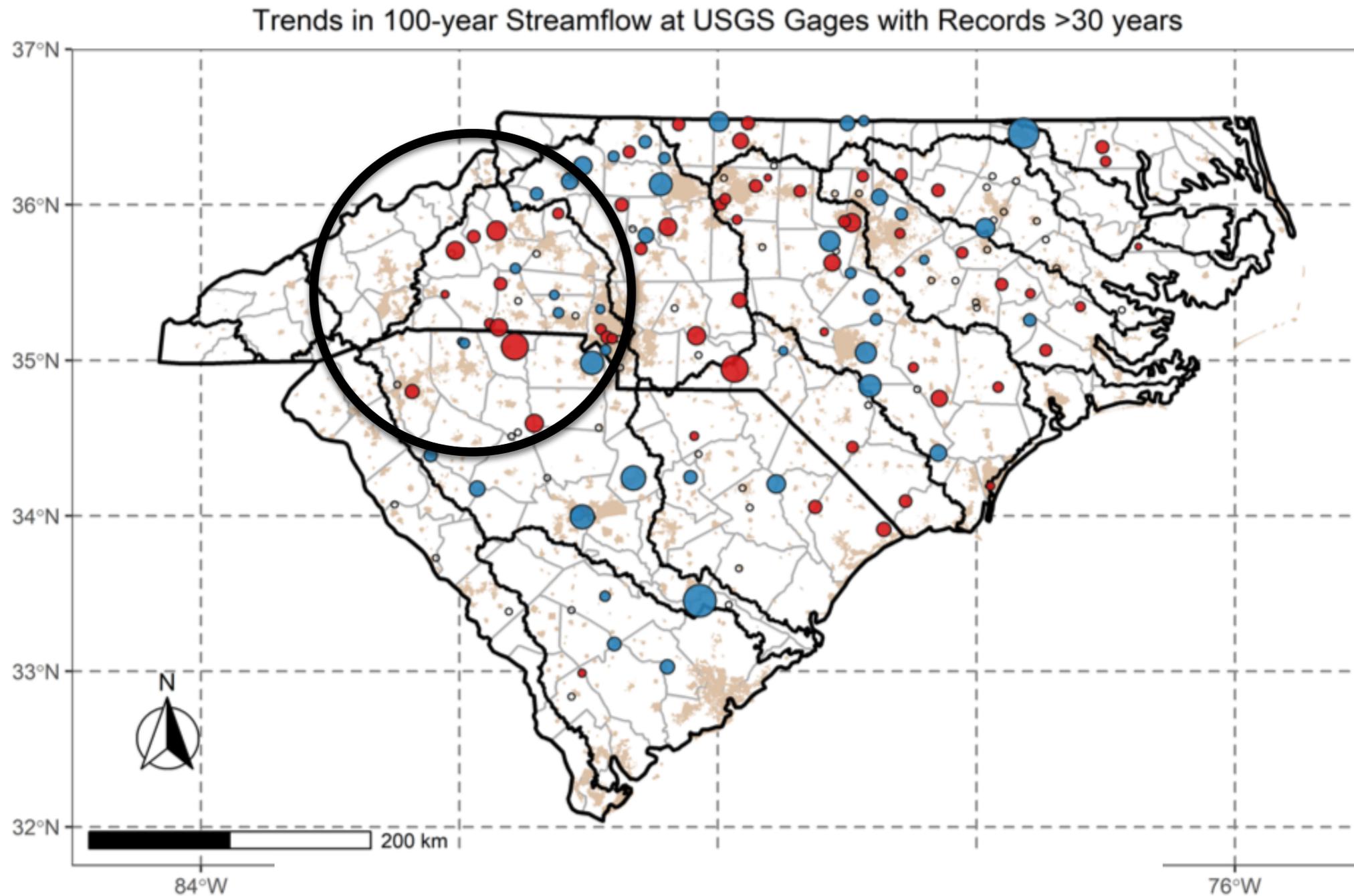
(b) Lower Scenario (RCP4.5), 2041–2060



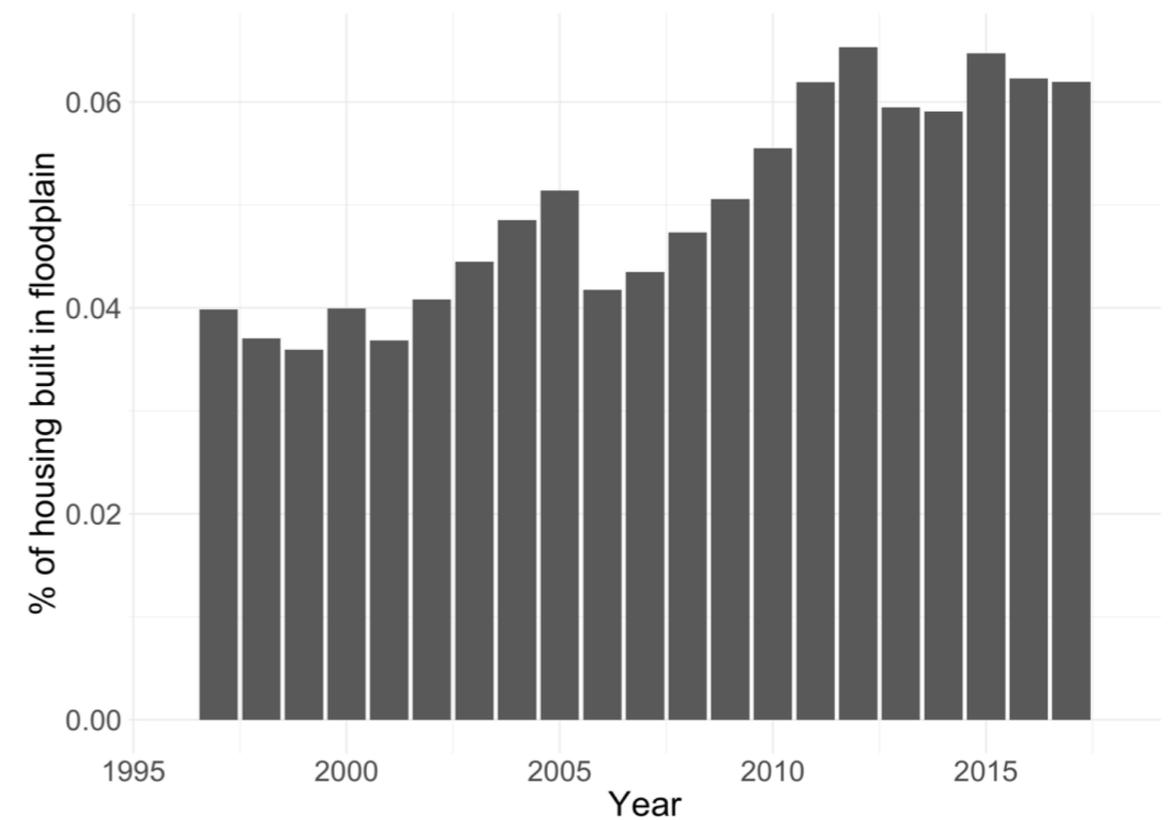
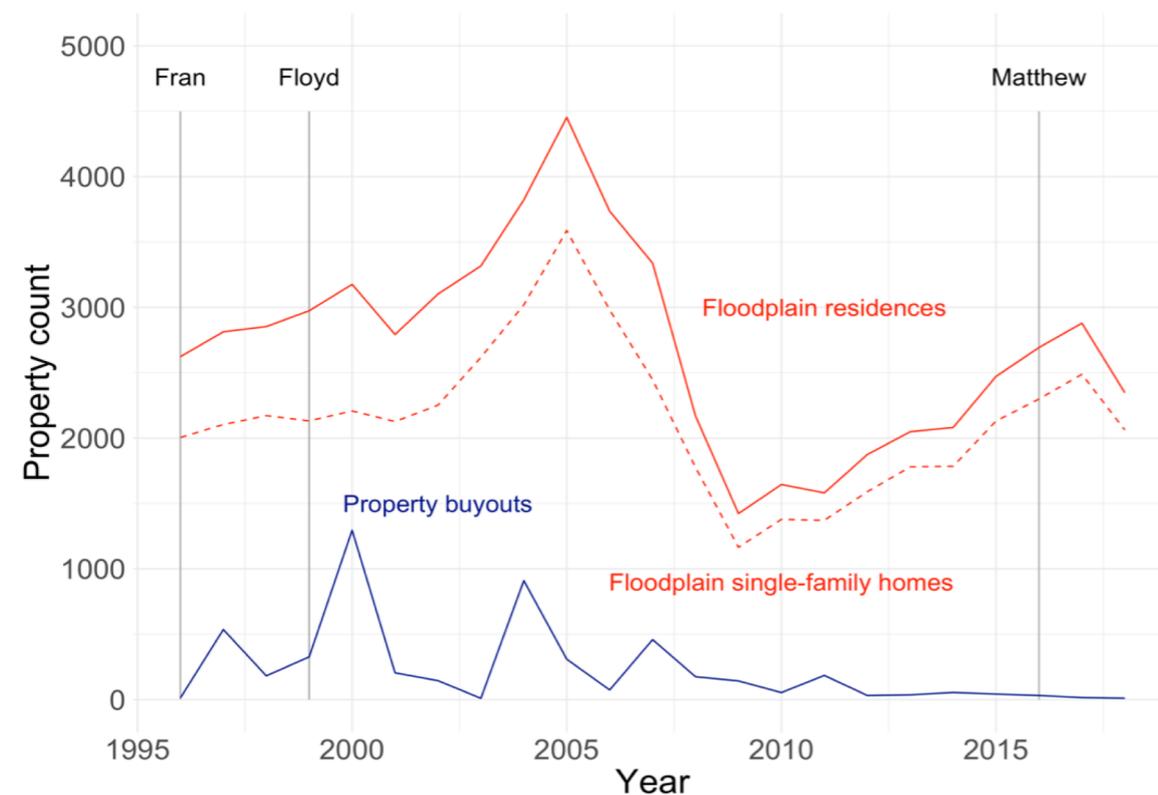
(c) Higher Scenario (RCP8.5), 2041–2060



Increasing flooding risk in western NC - but excessive damages occur outside the FEMA floodplain, too



Despite what we know, development inside of floodplain areas far exceeds the rate of mitigation across the State of North Carolina



Hino et al. *in prep.*



Elevated fire risk in western North Carolina in a changing climate



North Carolina has over 2 million homes in the wildland-urban interface, an increase of 61% from 1990-2010 (USFS)

Take-home messages

- **Climate change is here and now** in North Carolina
- Increased fire, flood, and heat risk in western North Carolina
- Largely an equity issue
- Climate change will impact the bottom line: hours of work lost due to unsafe conditions (e.g., excessive heat or flooded roads), or property damage
- Increased urbanization in the Southeast will enhance climate vulnerabilities, and rural communities face unique challenges with less adaptive capacity & increasing pressure from 2nd, 3rd, 4th homes

Thank you!

