

SC State Climatology Office Team



Hope Mizzell
South Carolina
State Climatologist



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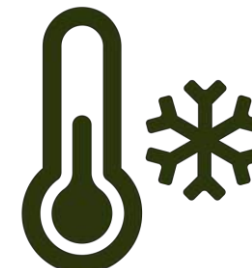
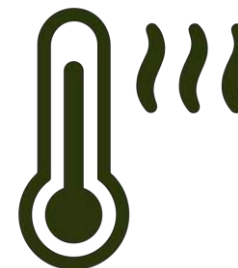
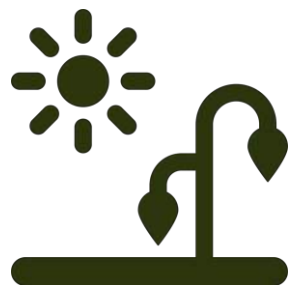


Water Resource
Climatologist

Frank Strait
Severe Weather
Liaison

What Is A State Climatology Office?

Promote climate and weather awareness and knowledge through the development and delivery of science-based climate services and tools on a local and state level.



Climate Office Responsibilities

1

Coordinate and collect weather observations for the purpose of climate monitoring

2

Summarize and disseminate weather and climate information

3

Perform climate and weather impact assessments

4

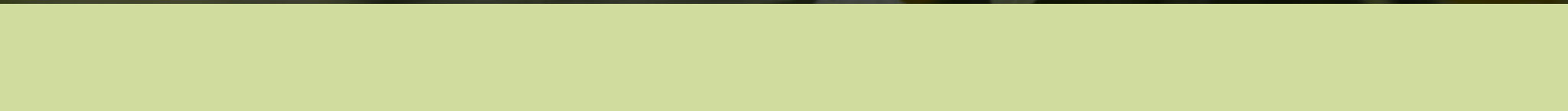
Demonstrate the value of climate information in the decision-making process

5

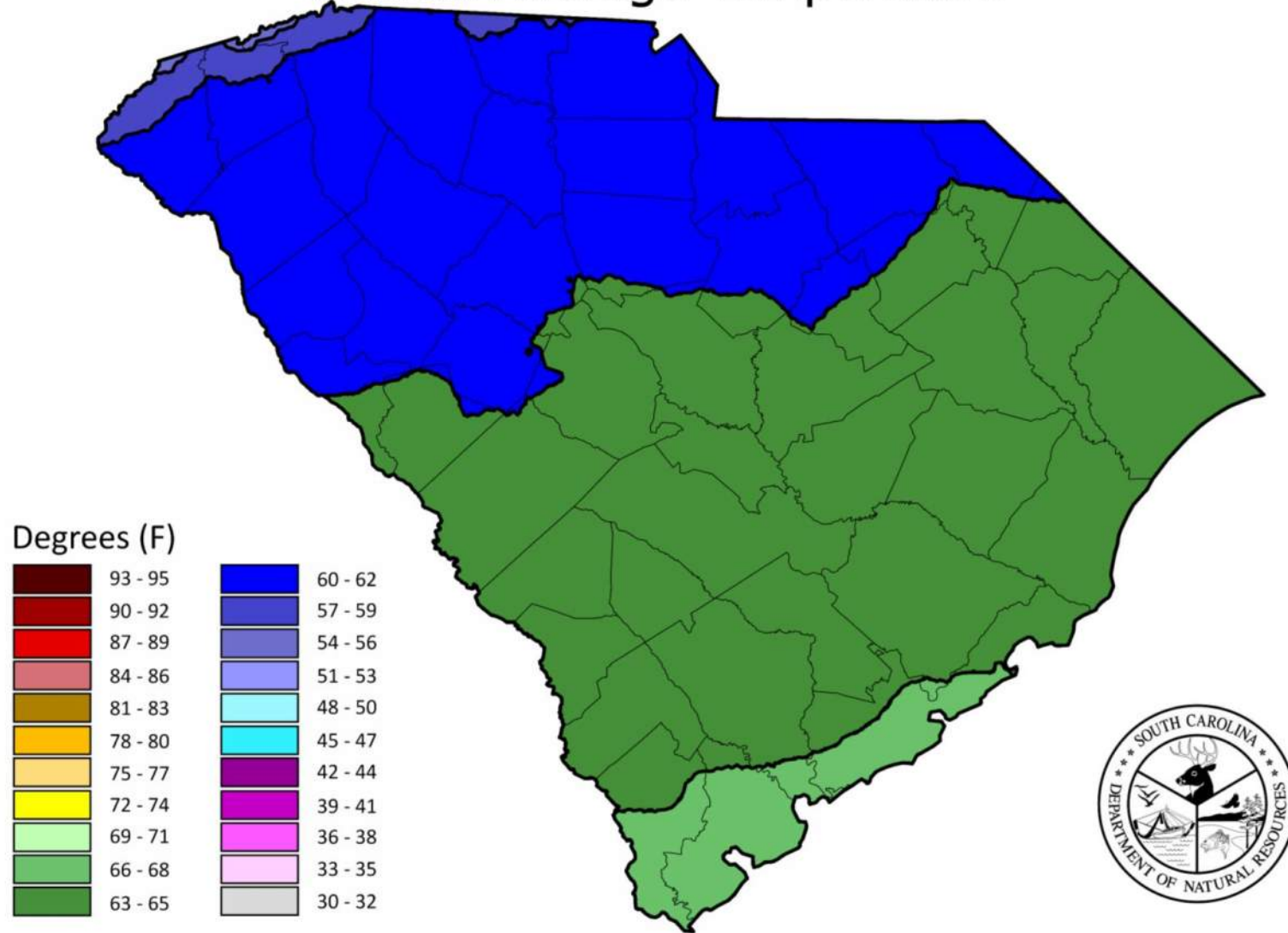
Conduct applied climate research



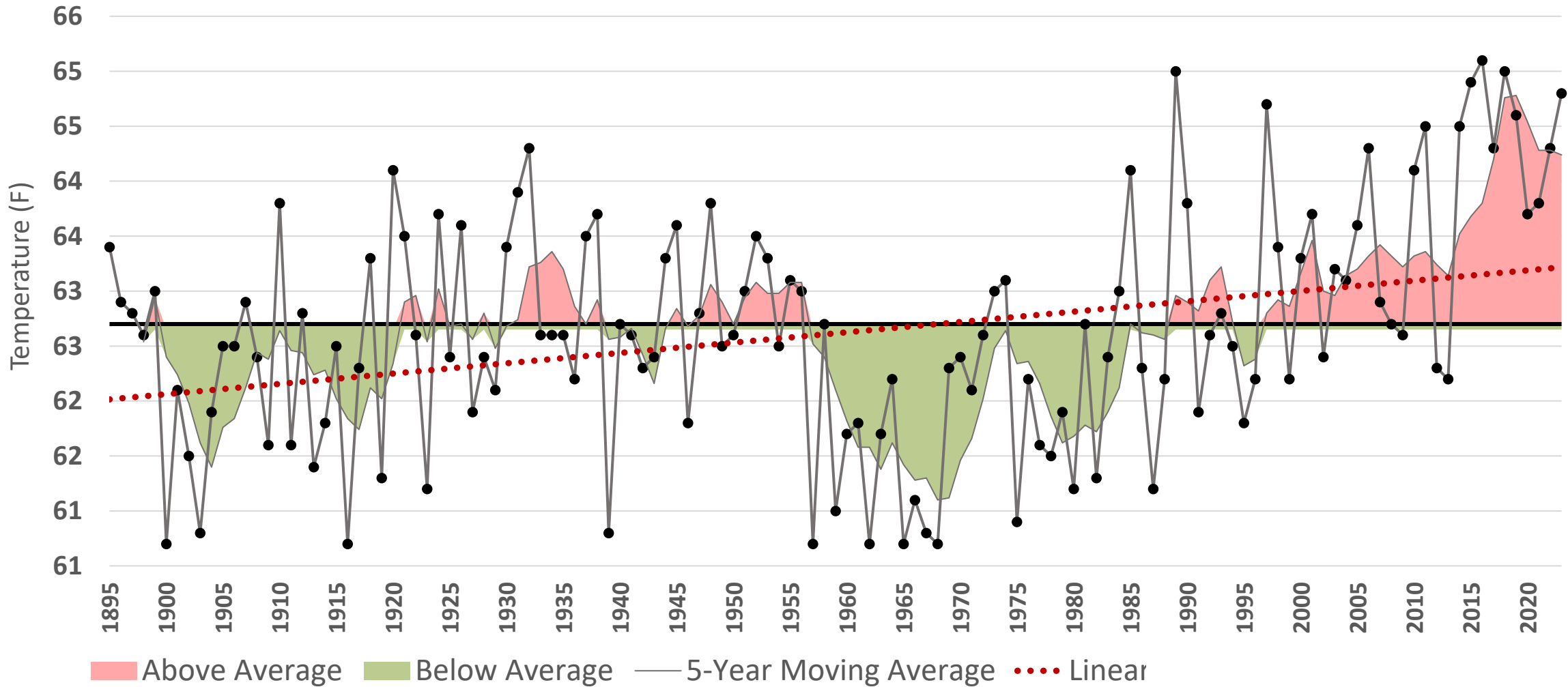
Temperatures



1991-2020 Climate Normals Annual Average Temperature

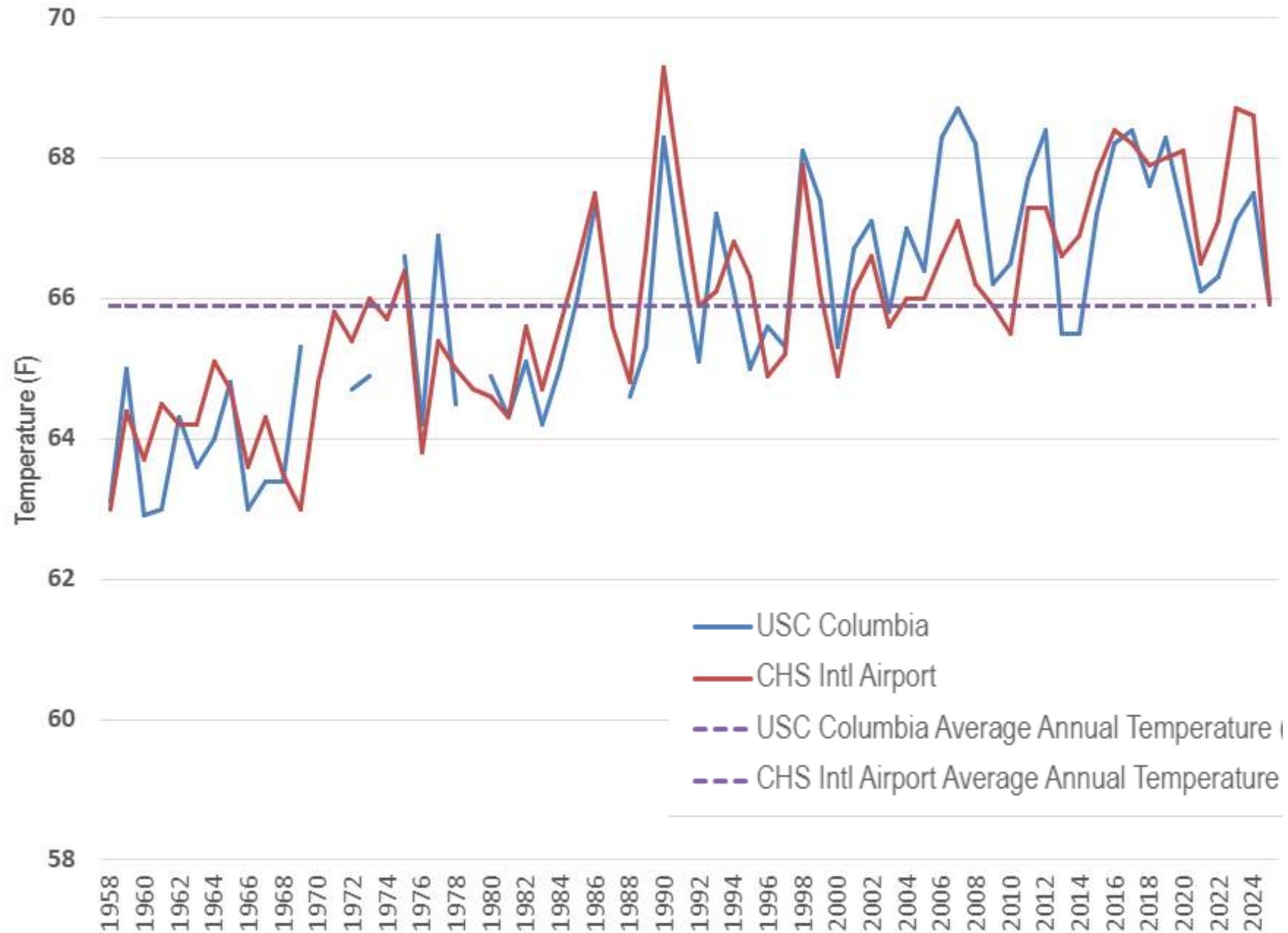


South Carolina Annual Average Temperature (1895-2024)

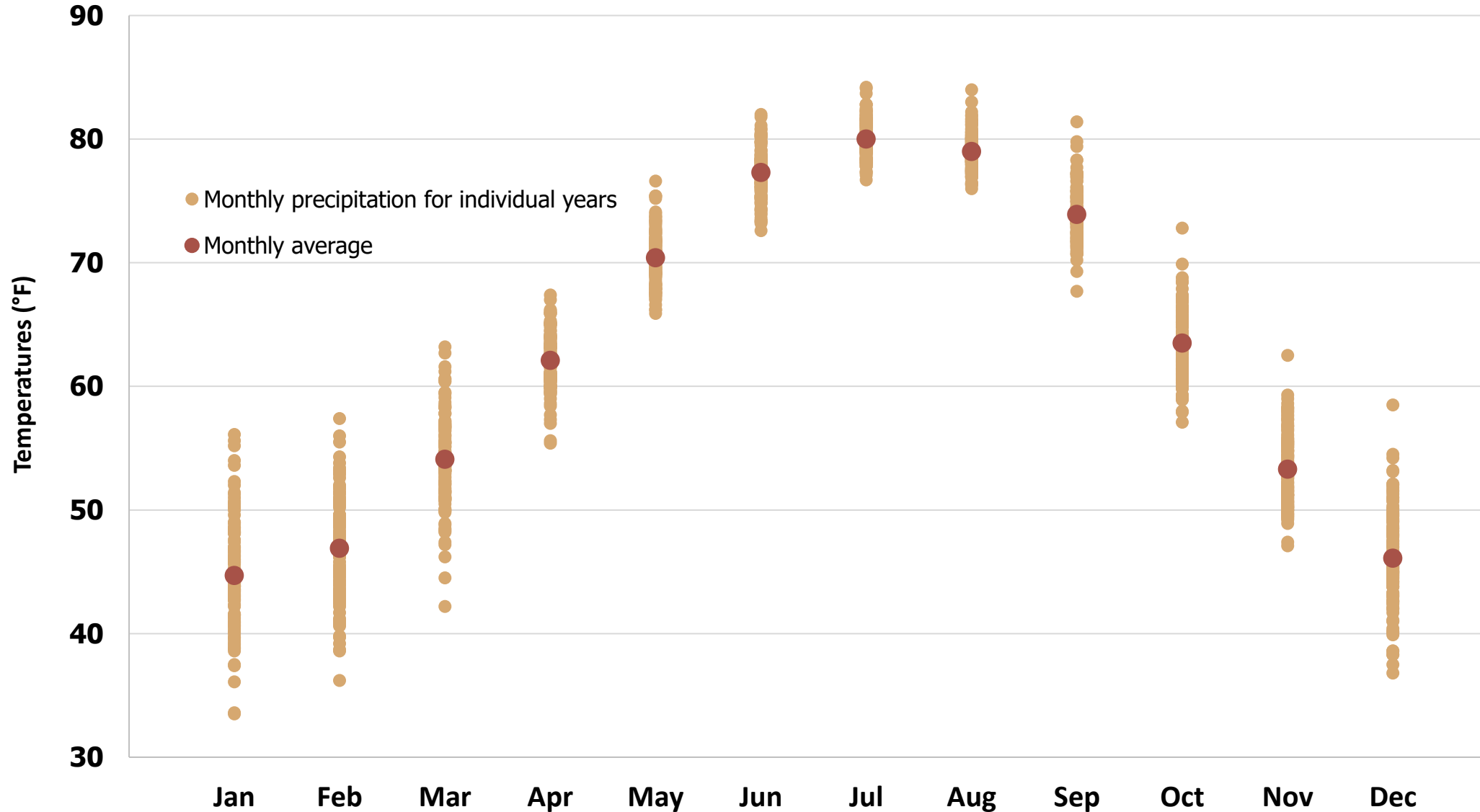


**SC has warmed one degree Fahrenheit over the past 120 years.
This is less than Earth as a whole, which has warmed nearly two degrees.**

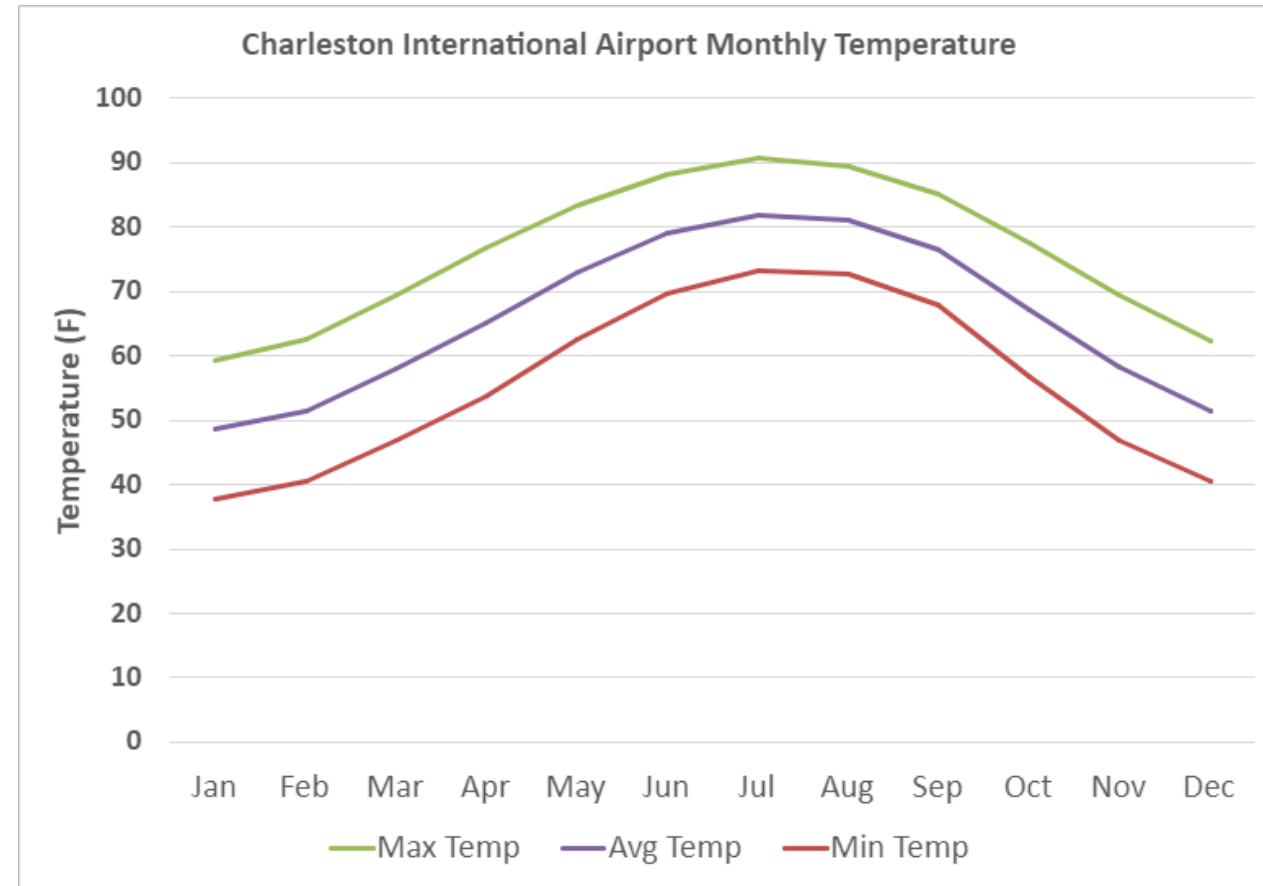
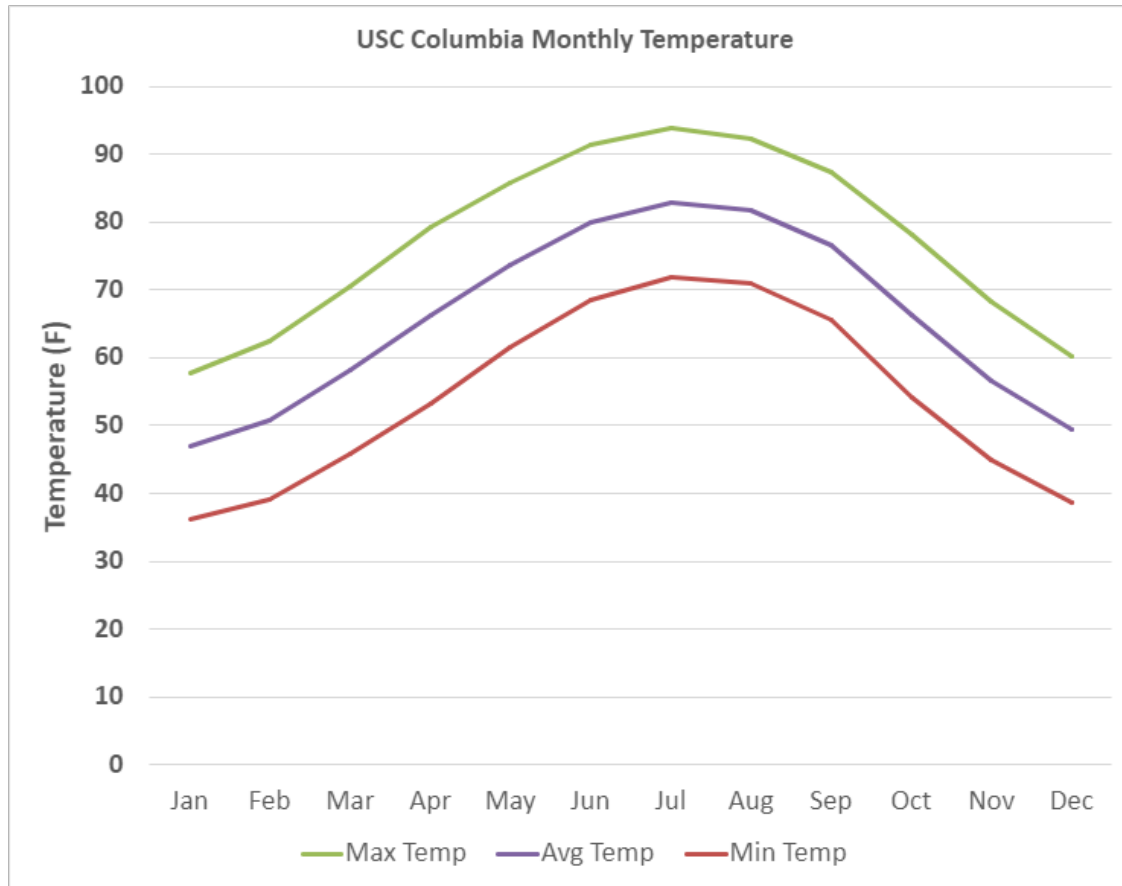
USC Columbia and Charleston Airport Annual Average Temperature (1958 – 2024)

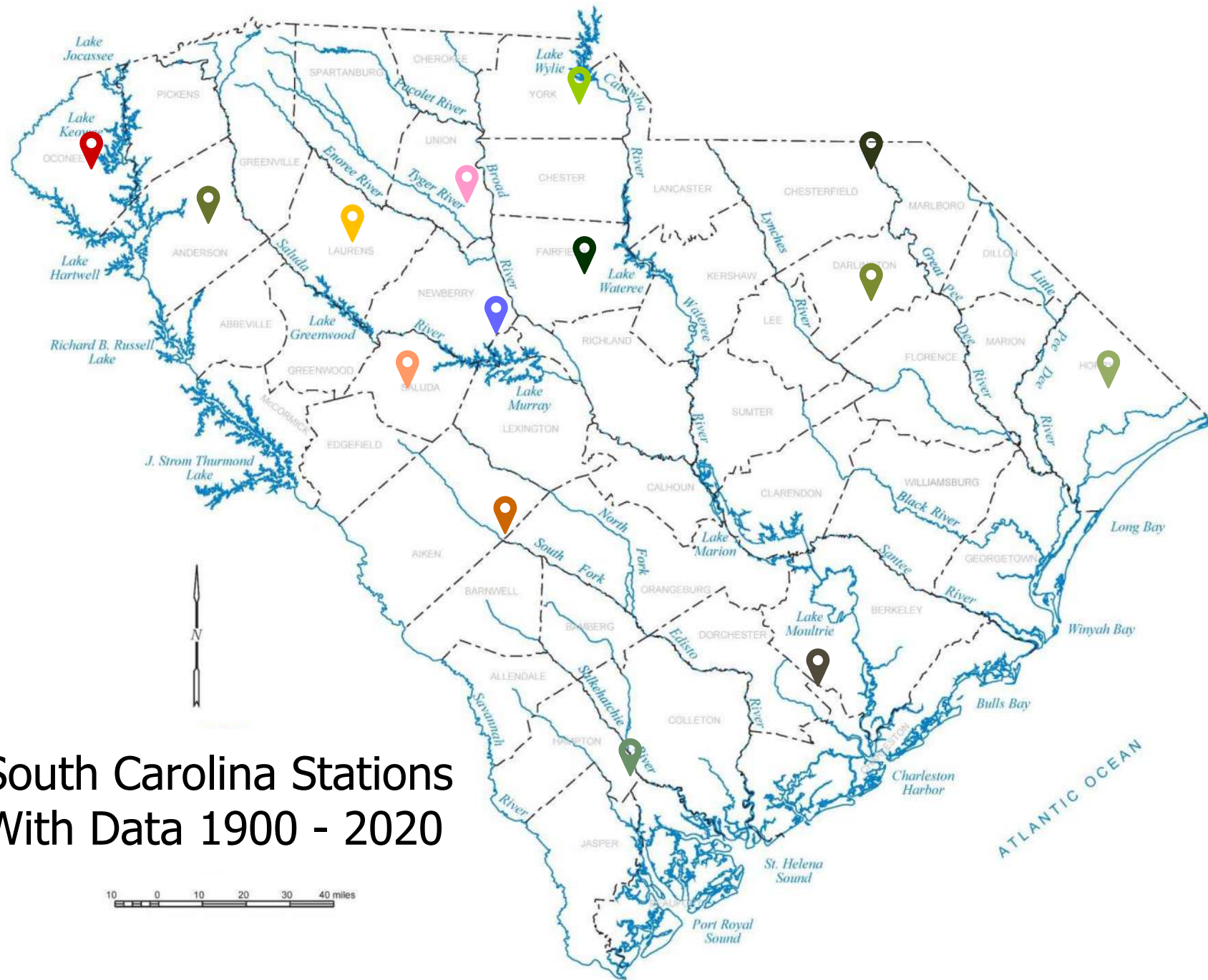


South Carolina Monthly Average Temperature (1895 – 2024)



Monthly Temperature Comparison USC Columbia and Charleston Airport

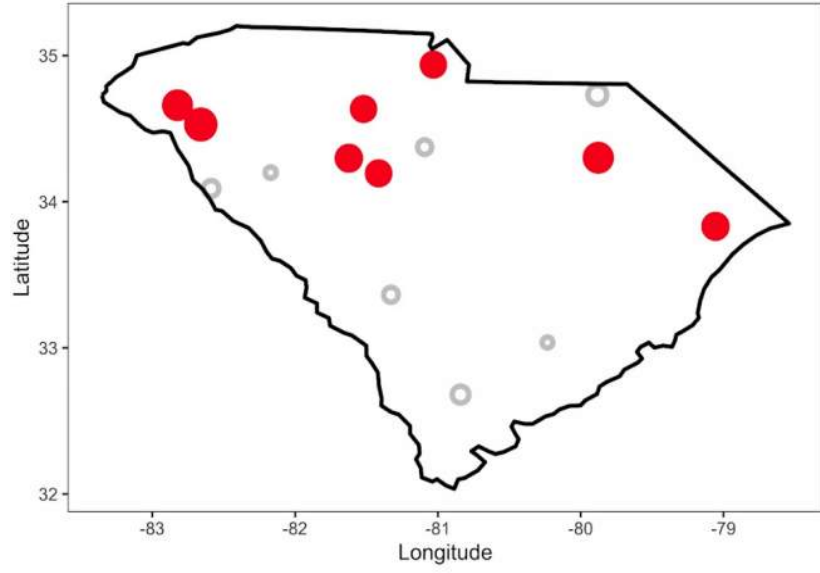




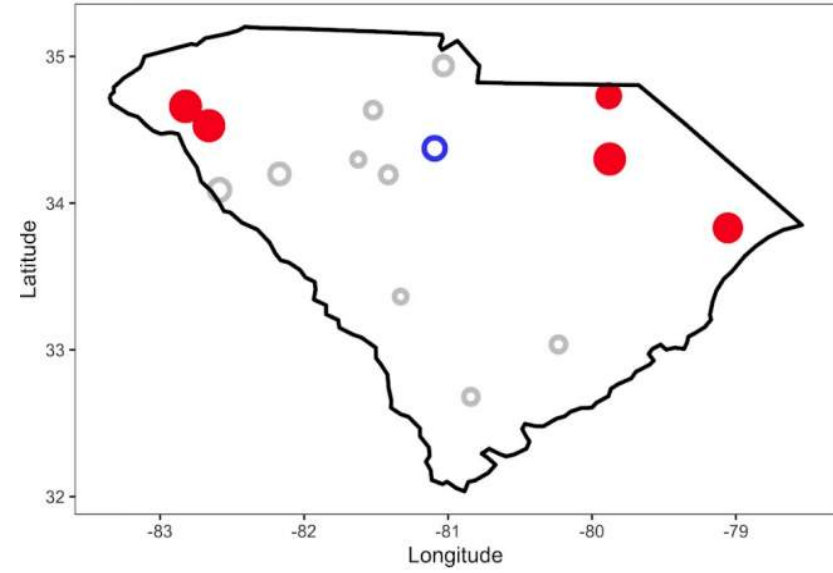
South Carolina Stations With Data 1900 - 2020

- 📍 Anderson
- 📍 Blackville
- 📍 Cheraw
- 📍 Conway
- 📍 Darlington
- 📍 Laurens
- 📍 Little Mountain
- 📍 Saluda
- 📍 Santuck
- 📍 Summerville
- 📍 Walhalla
- 📍 Winnsboro
- 📍 Winthrop University
- 📍 Yemassee

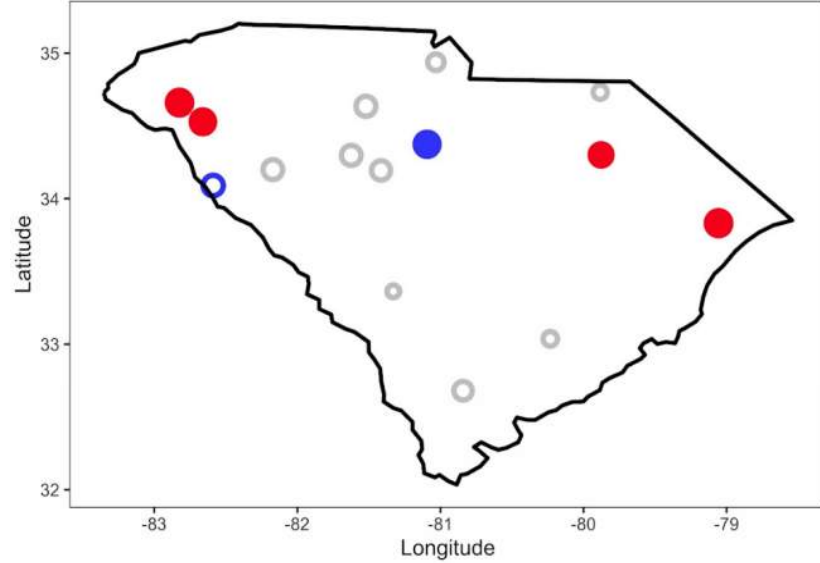
Trend of Maximum Temperature, Spring



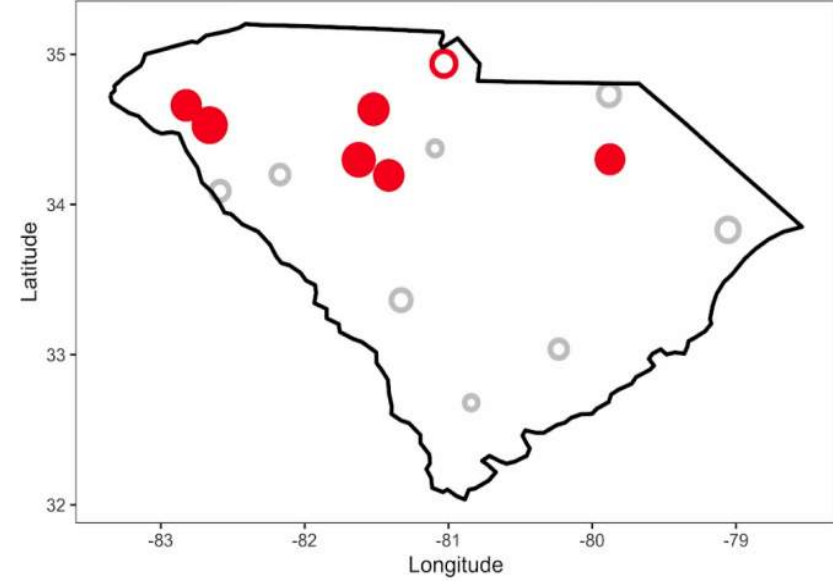
Trend of Maximum Temperature, Summer



Trend of Maximum Temperature, Fall



Trend of Maximum Temperature, Winter

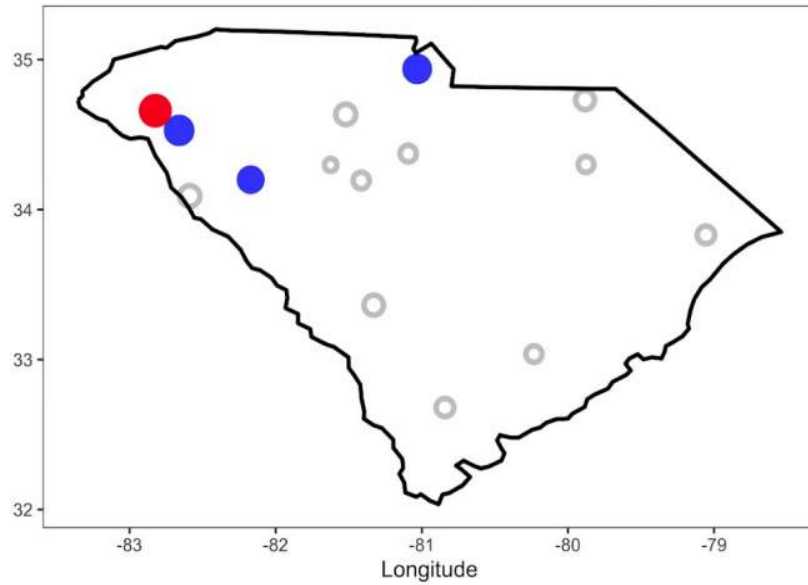


- Decrease
- Statistically-significant decrease

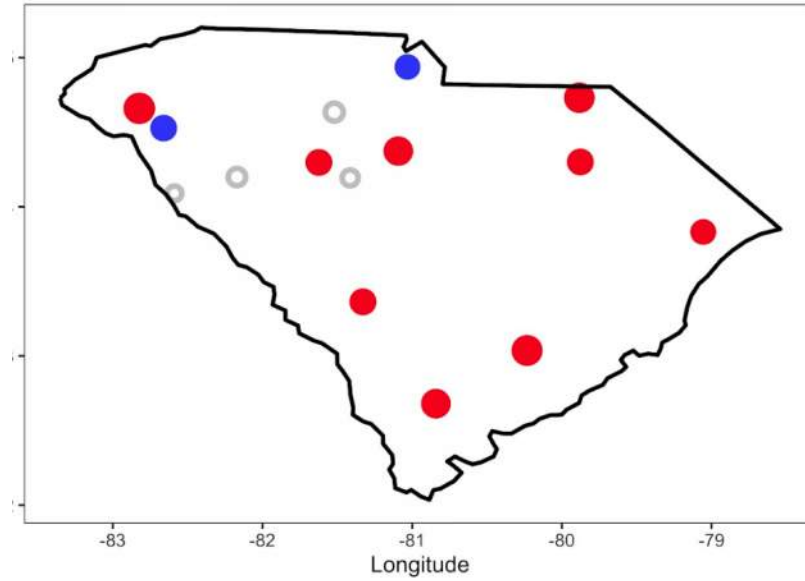
- Increase
- Statistically-significant increase



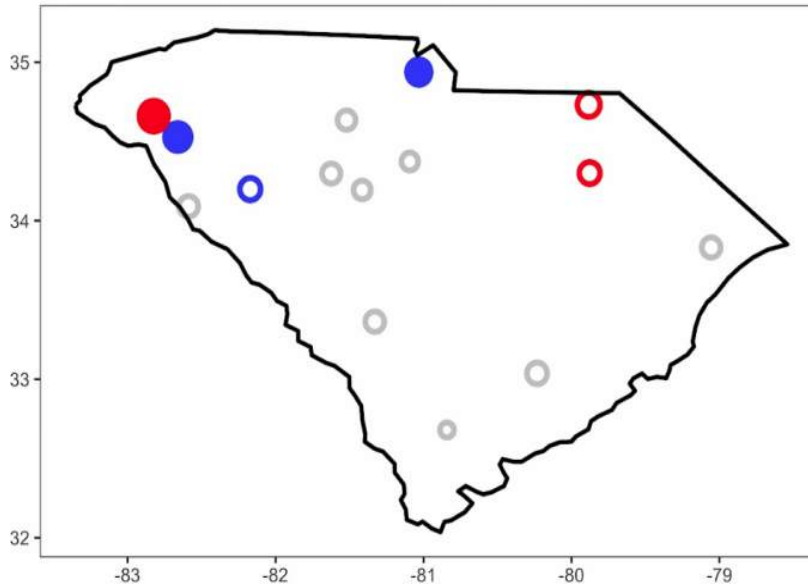
Trend of Minimum Temperature, Spring



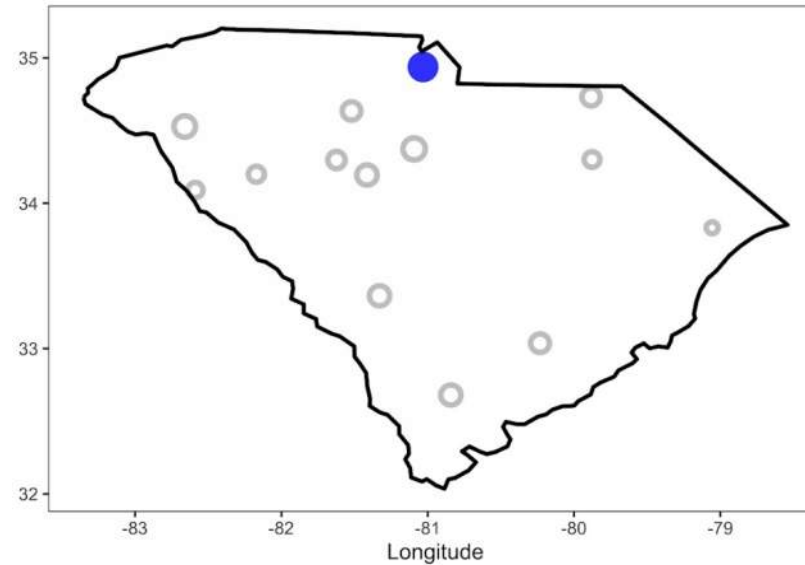
Trend of Minimum Temperature, Summer



Trend of Minimum Temperature, Fall



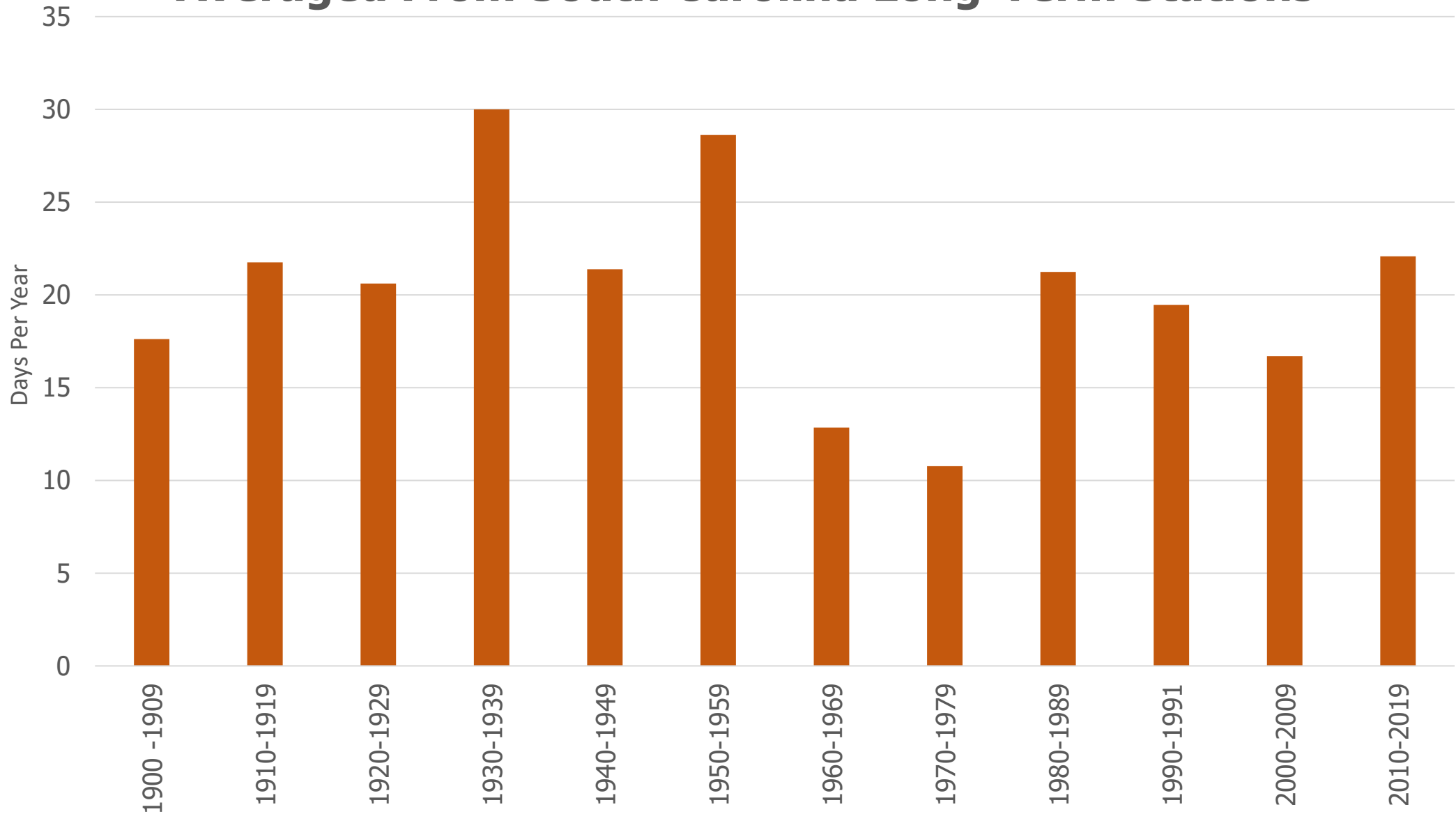
Trend of Minimum Temperature, Winter



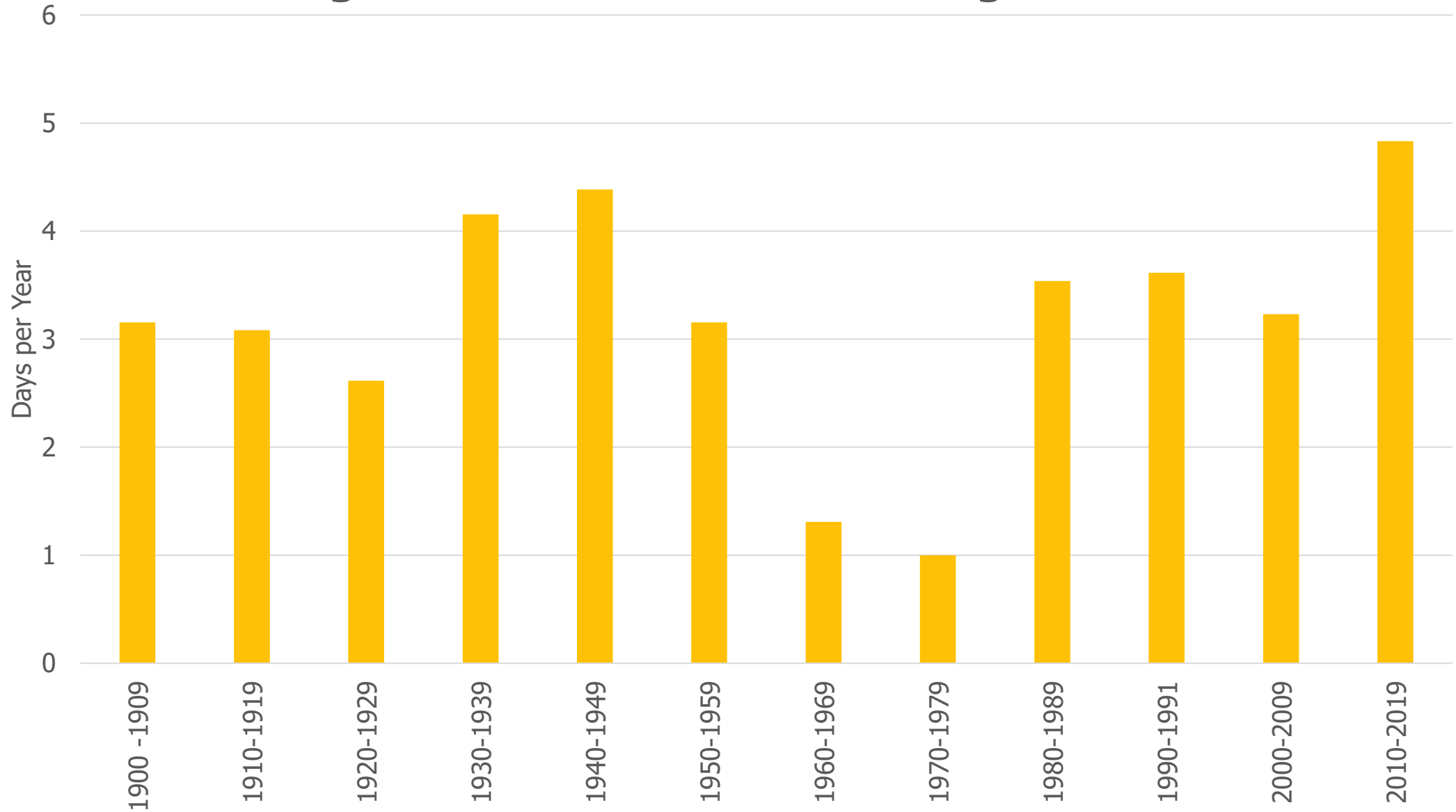
- Statistically-significant decrease
- Decrease

- Increase
- Statistically-significant increase

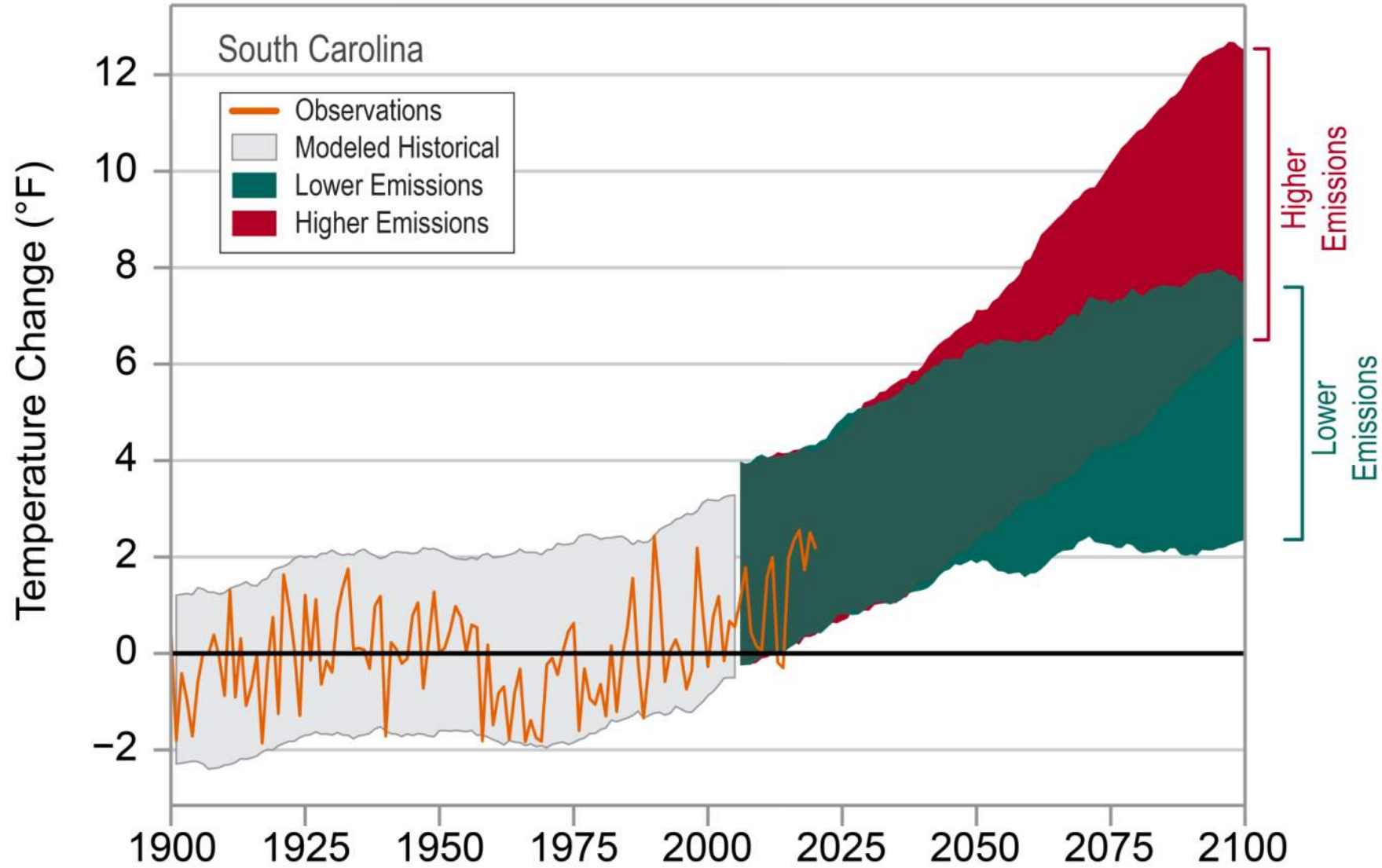
Number of Days Maximum Temperature Above 95°F Averaged From South Carolina Long-Term Stations

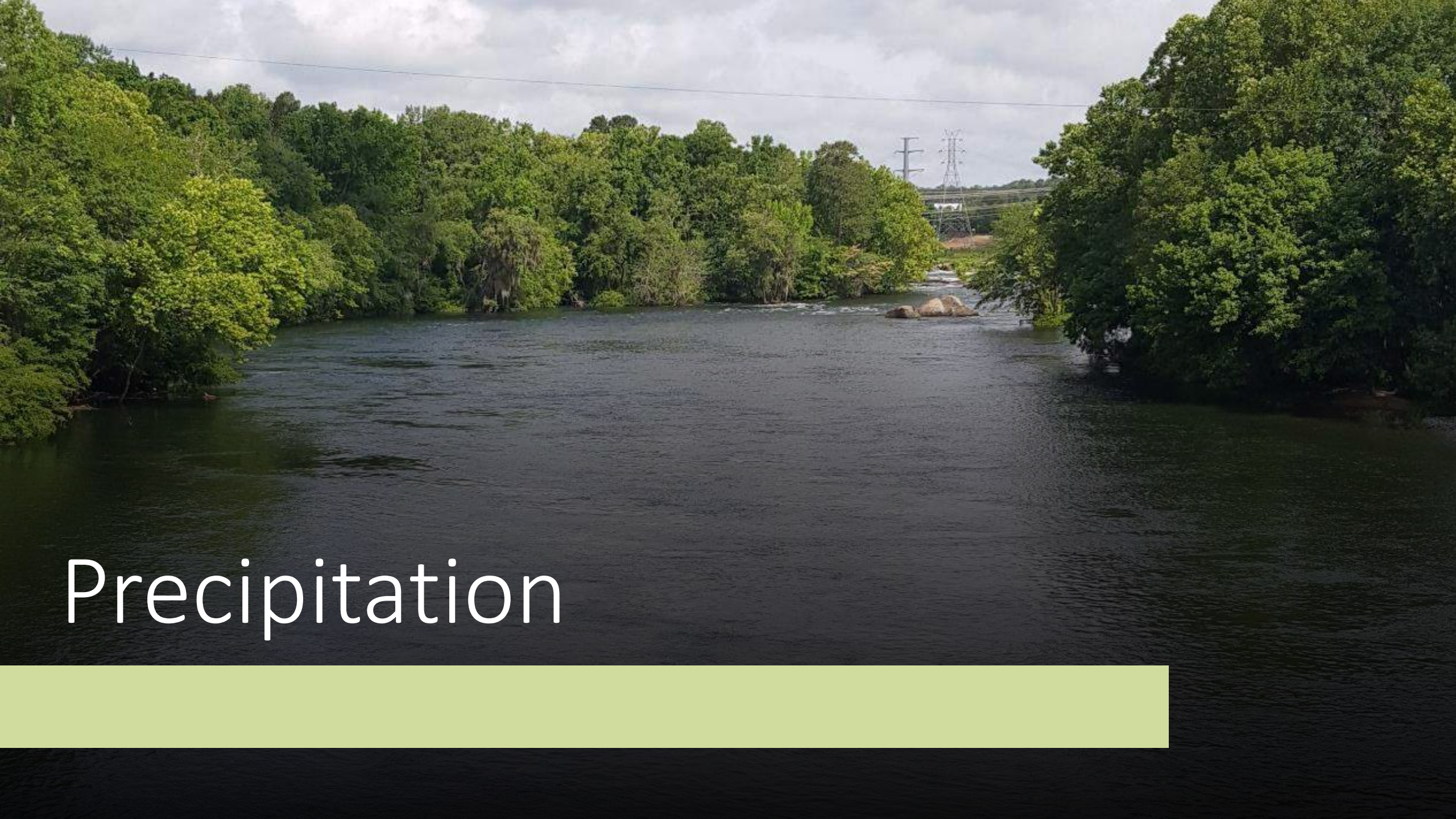


Number of Days Minimum Temperature Above 75°F Averaged From South Carolina Long-Term Stations

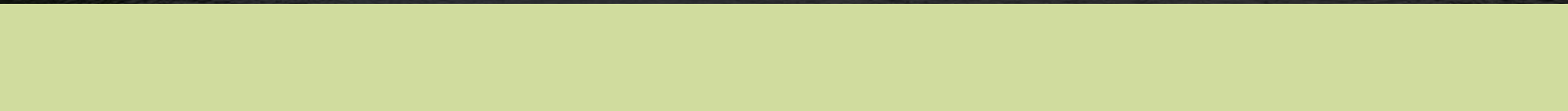


Observed and Projected Temperature Change

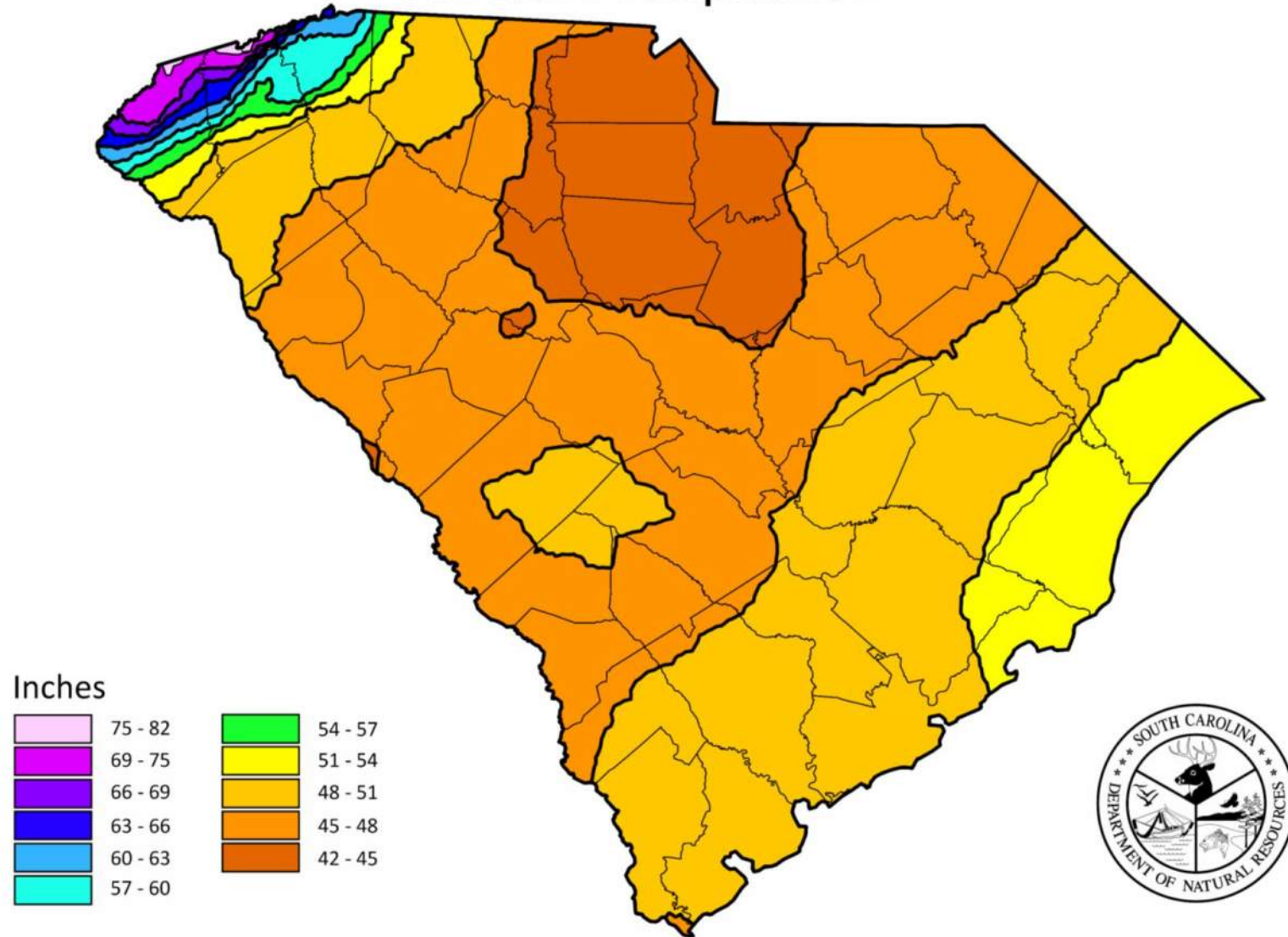




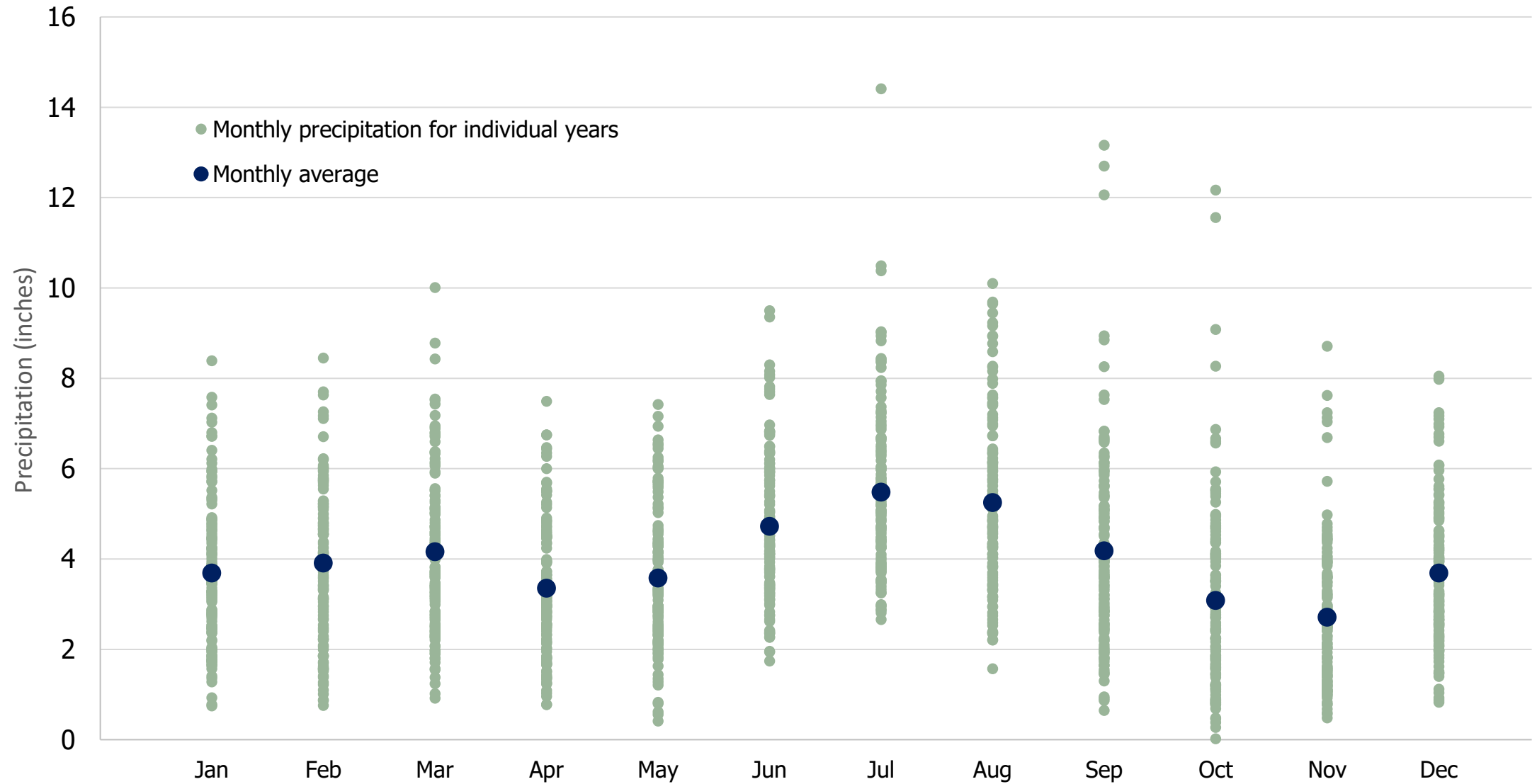
Precipitation



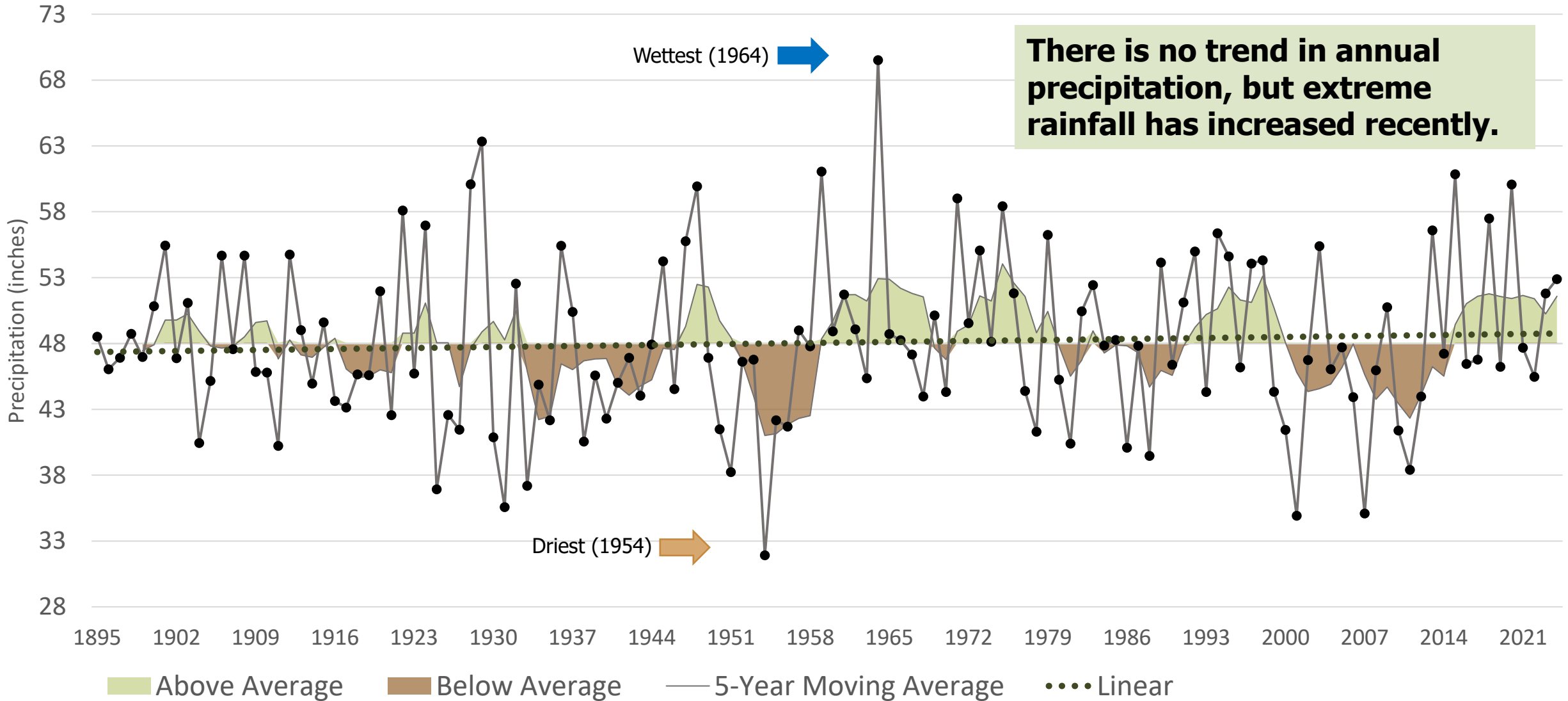
1991-2020 Climate Normals Annual Precipitation



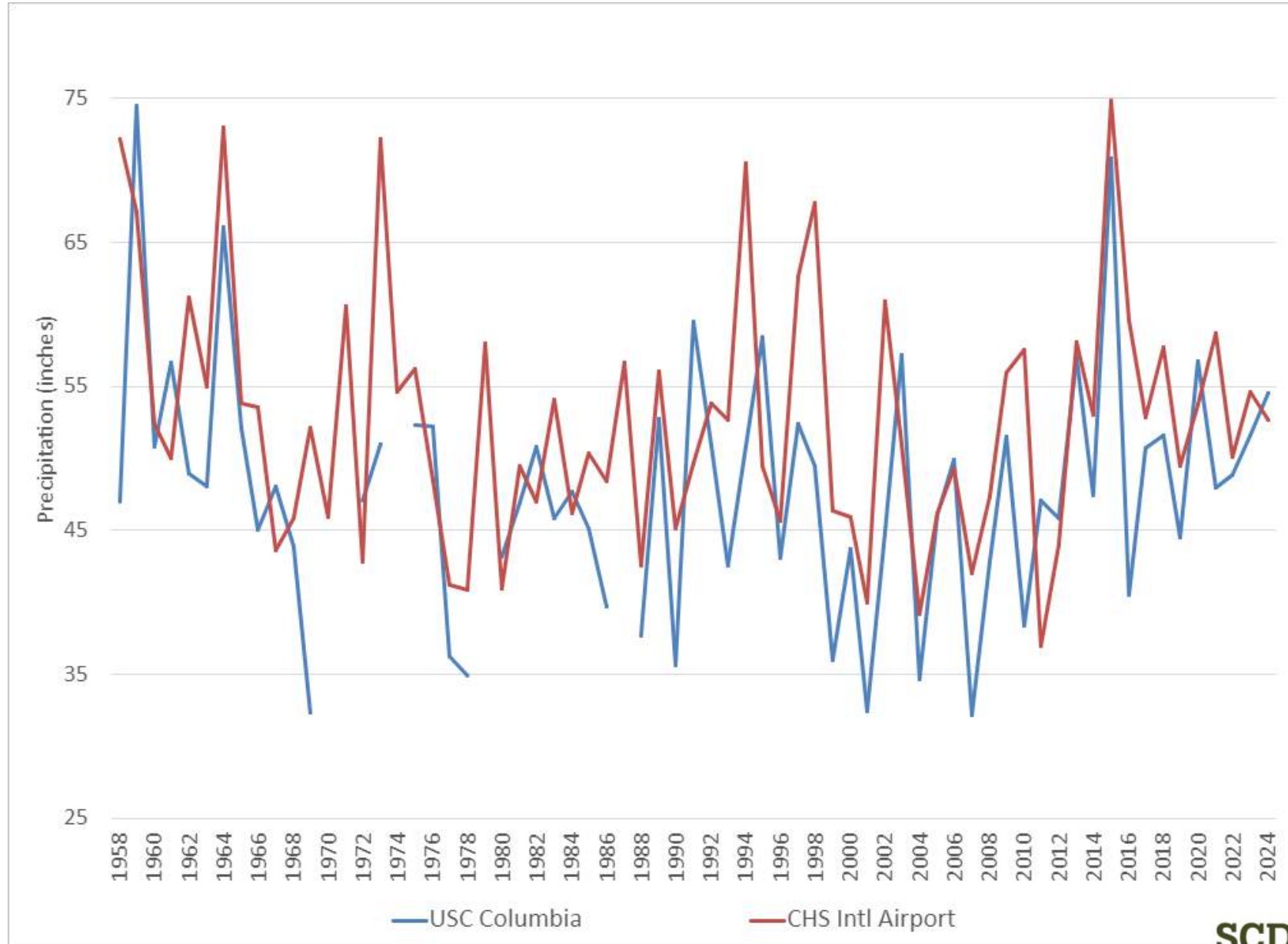
South Carolina Monthly Precipitation (1895 – 2024)



South Carolina Statewide Average Annual Precipitation (1895-2024)

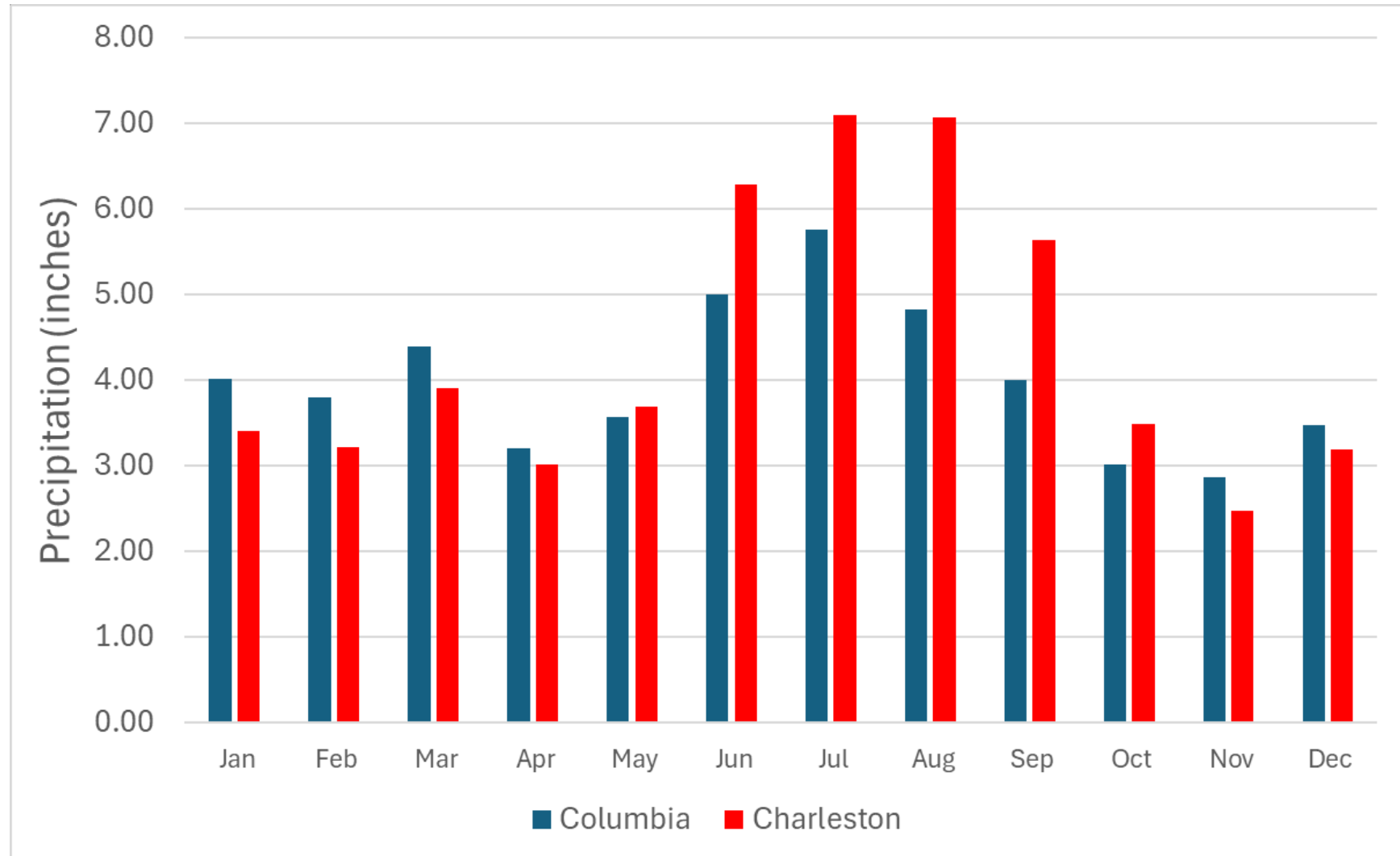


USC Columbia and Charleston Airport Annual Precipitation (1958 – 2024)



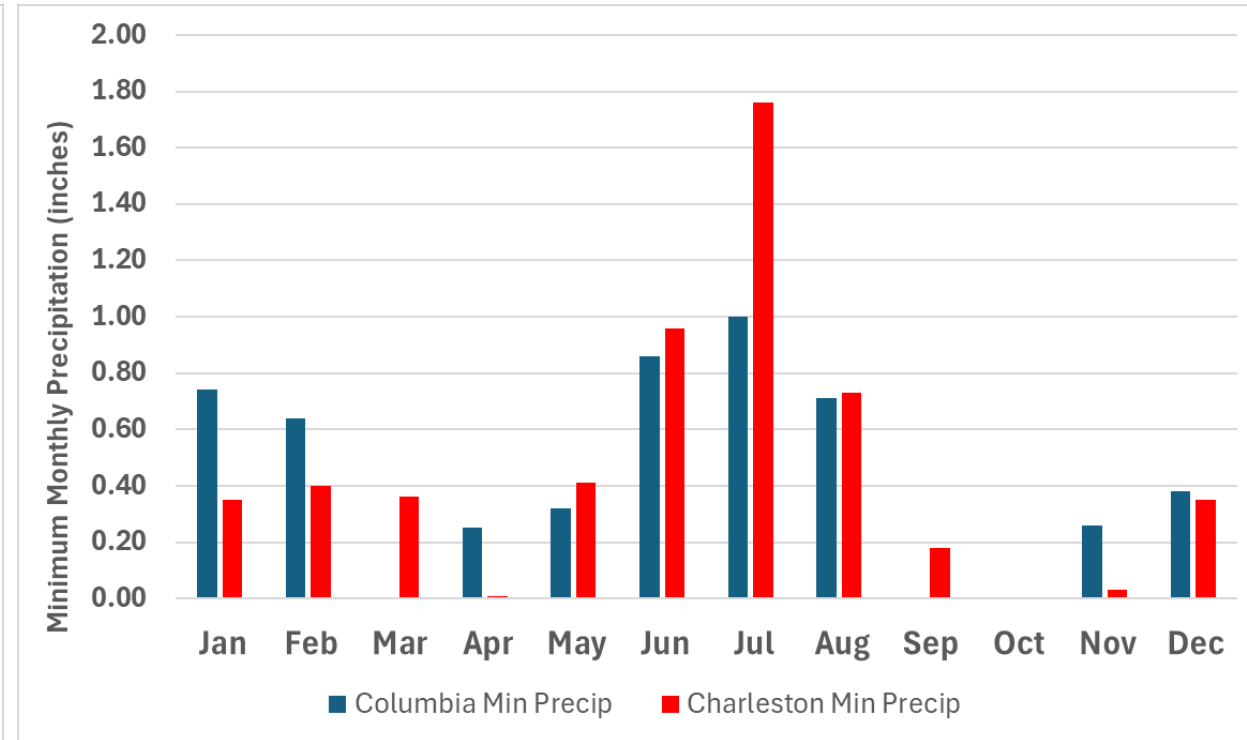
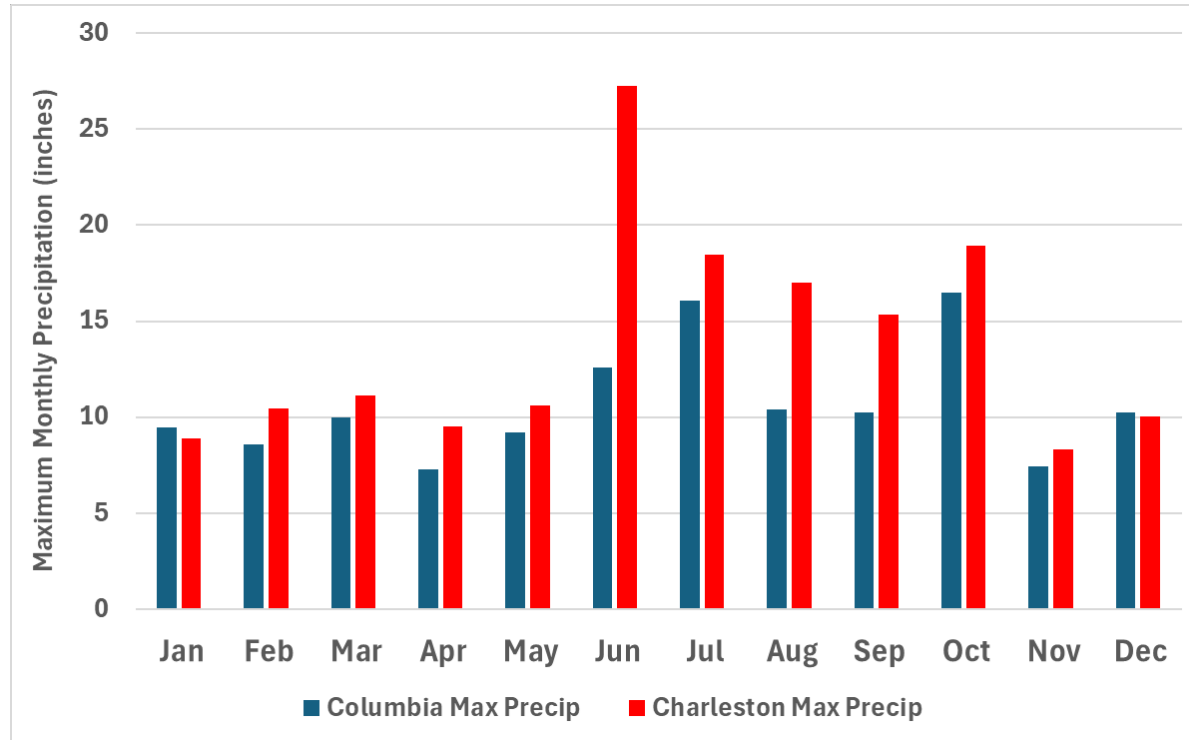
Average Monthly Precipitation Comparison: 1958 -2024

University of SC Columbia and Charleston Airport



Maximum and Minimum Monthly Precipitation Comparison: 1958 -2024

University of SC Columbia and Charleston Airport



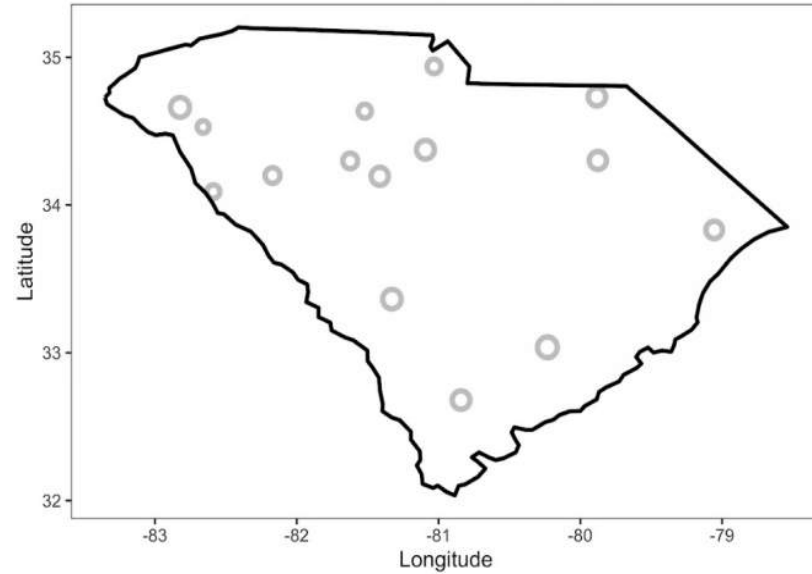
Five Driest Years for USC Columbia and Charleston Airport

	USC Columbia (1958 – 2024) Annual Average 47.10 inches		Charleston Airport (1938-2024) Annual Average 51.71 in	
Rank	Year	Precipitation (in)	Year	Precipitation (in)
1	2007	32.19	1954	30.31
2	1969	32.31	1951	34.06
3	2001	32.47	1955	36.11
4	2004	34.68	1942	36.99
5	1978	34.89	2011	37.01

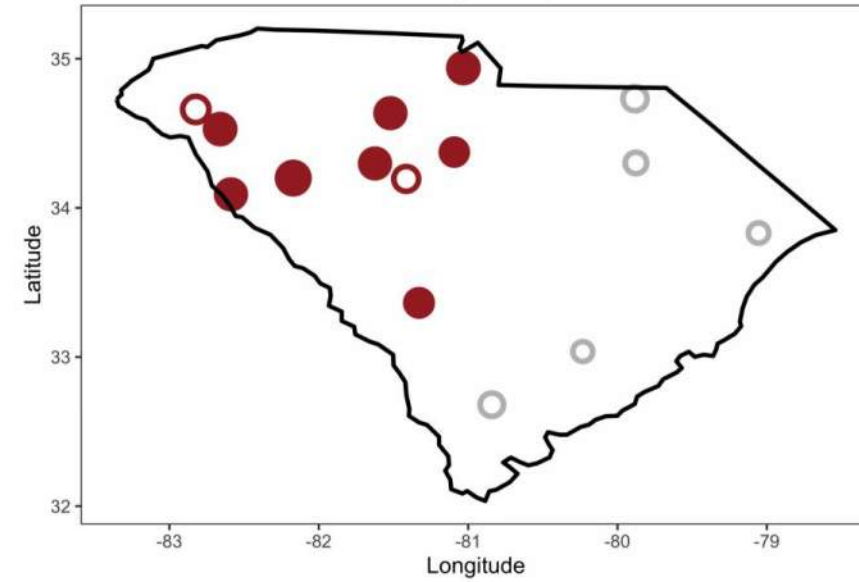
Five Wettest Years for USC Columbia and Charleston Airport

	USC Columbia (1958 – 2024) Annual Average 47.10 inches		Charleston Airport (1938-2024) Annual Average 51.71 in	
Rank	Year	Precipitation (in)	Year	Precipitation (in)
1	1959	74.49	2015	74.89
2	2015	70.85	1964	72.99
3	1964	66.03	1973	72.17
4	1991	59.52	1958	72.17
5	1995	58.40	1994	70.54

Trend of Precipitation, Spring



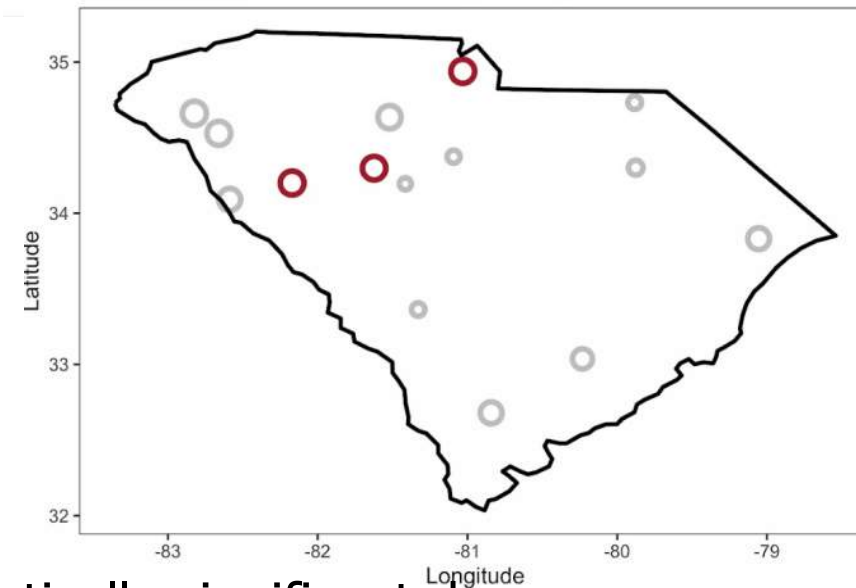
Trend of Precipitation, Summer



Trend of Precipitation, Fall



Trend of Precipitation, Winter



○ Decrease

○ Increase

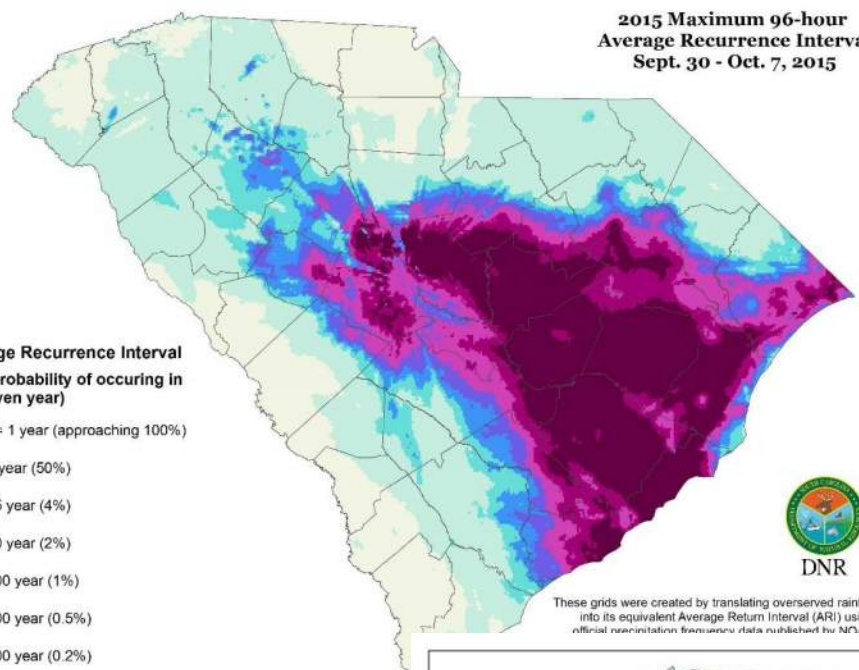
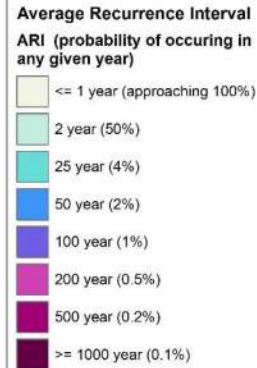
● Statistically-significant decrease



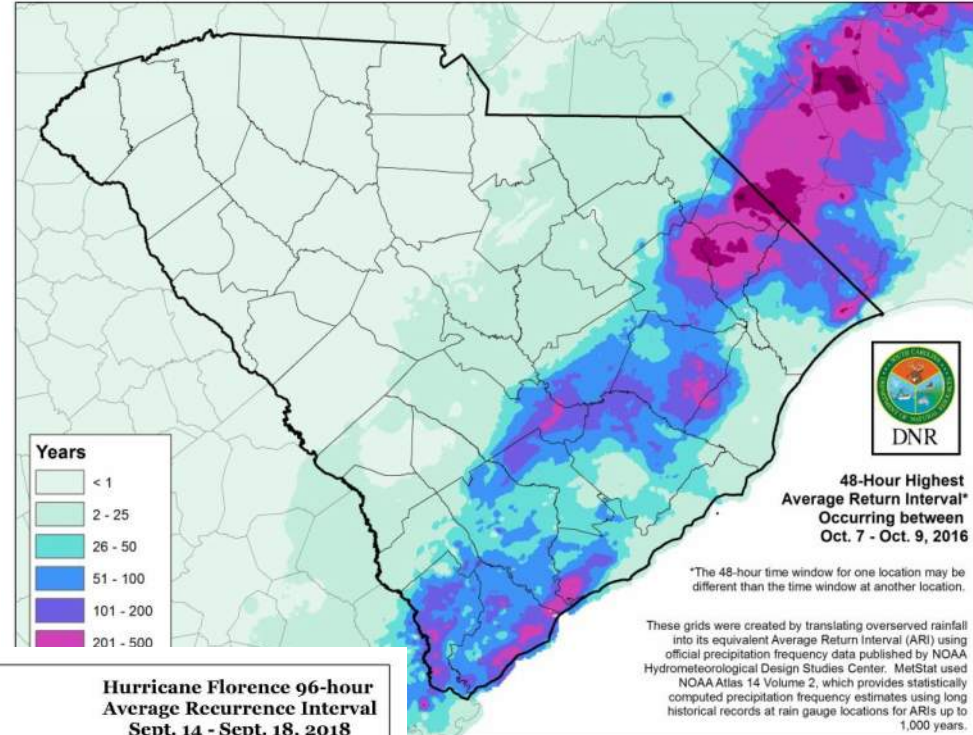
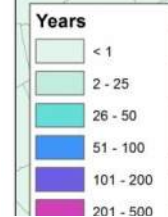
Extreme Rainfall



2015 Maximum 96-hour Average Recurrence Interval Sept. 30 - Oct. 7, 2015



These grids were created by translating overserved rainfall into its equivalent Average Return Interval (ARI) using official precipitation frequency data published by NOAA

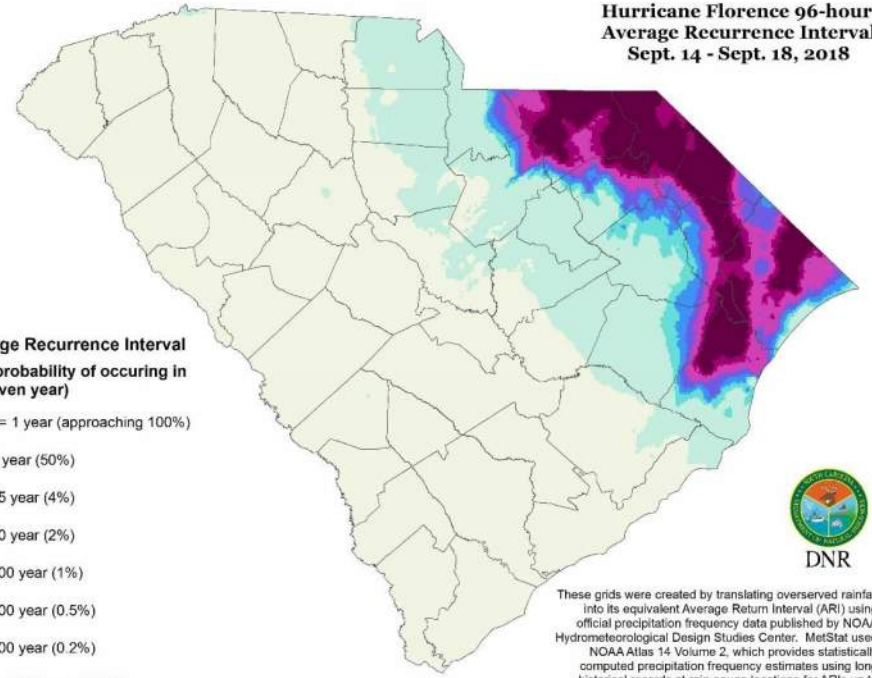


48-Hour Highest Average Return Interval* Occurring between Oct. 7 - Oct. 9, 2016

*The 48-hour time window for one location may be different than the time window at another location.

These grids were created by translating overserved rainfall into its equivalent Average Return Interval (ARI) using official precipitation frequency data published by NOAA Hydrometeorological Design Studies Center, MetStat used NOAA Atlas 14 Volume 2, which provides statistically computed precipitation frequency estimates using long historical records at rain gauge locations for ARI's up to 1,000 years.

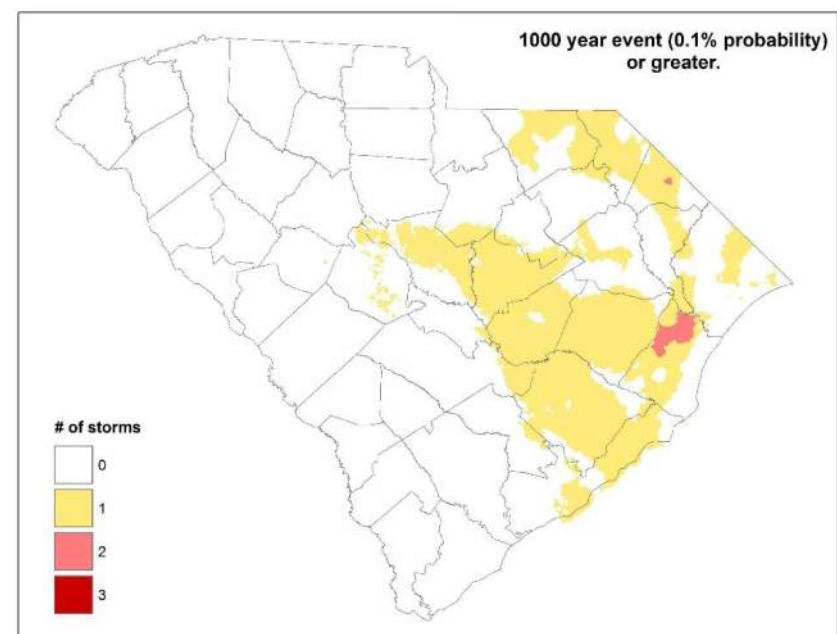
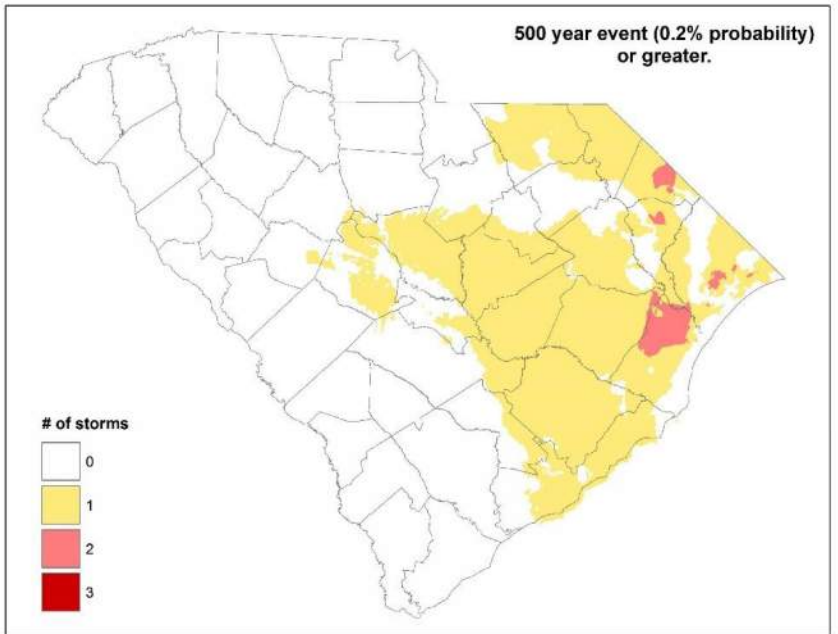
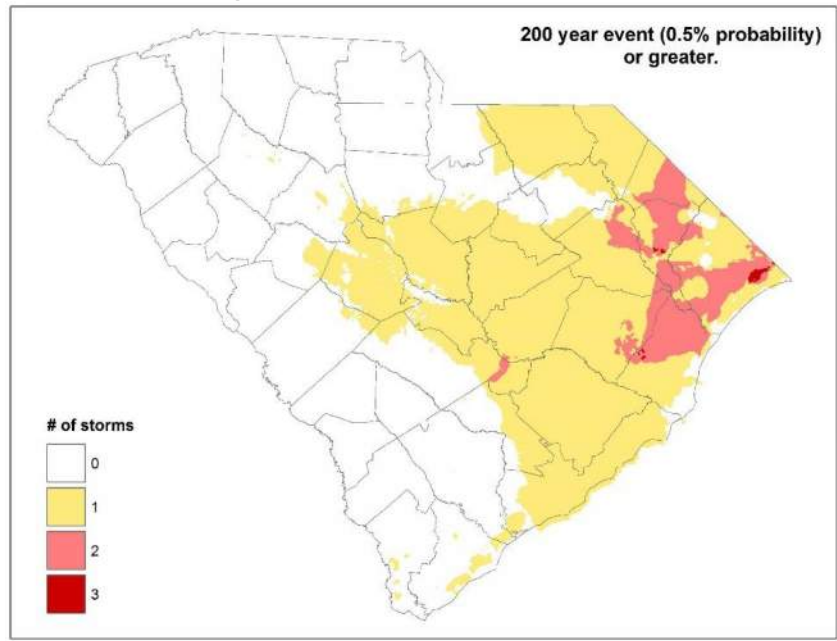
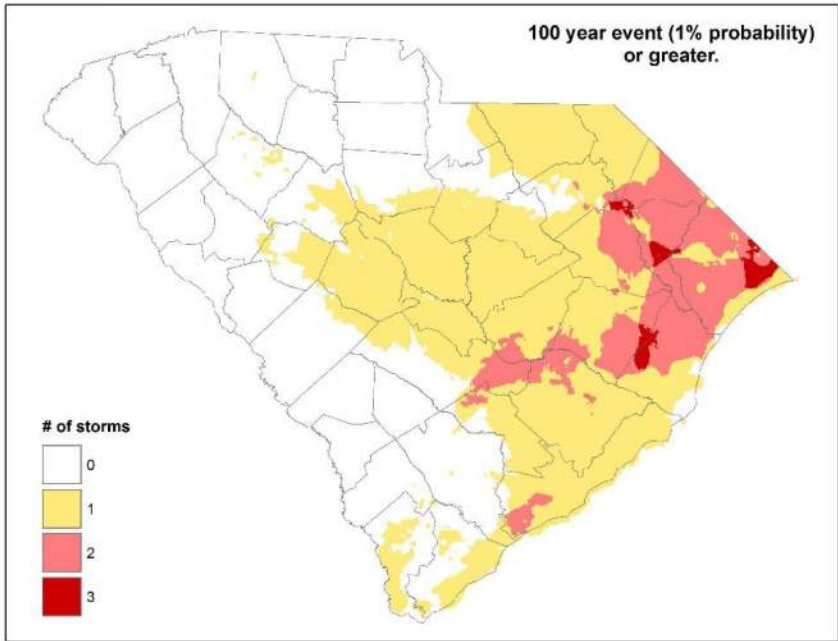
Hurricane Florence 96-hour Average Recurrence Interval Sept. 14 - Sept. 18, 2018



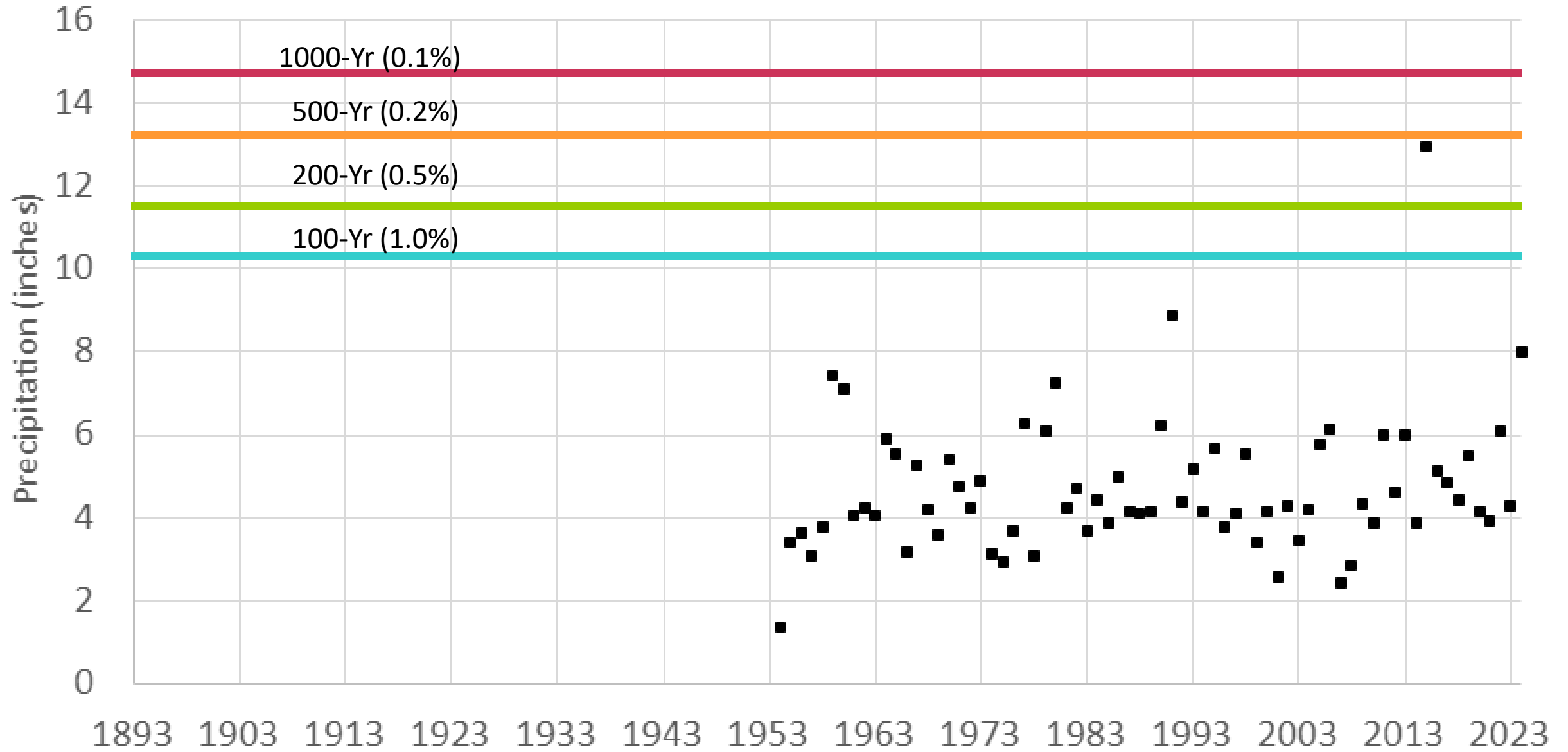
These grids were created by translating overserved rainfall into its equivalent Average Return Interval (ARI) using official precipitation frequency data published by NOAA Hydrometeorological Design Studies Center, MetStat used NOAA Atlas 14 Volume 2, which provides statistically computed precipitation frequency estimates using long historical records at rain gauge locations for ARI's up to 1,000 years.

Areas in purple met or exceeded the 500-year event, a probability of 0.2% happening each year

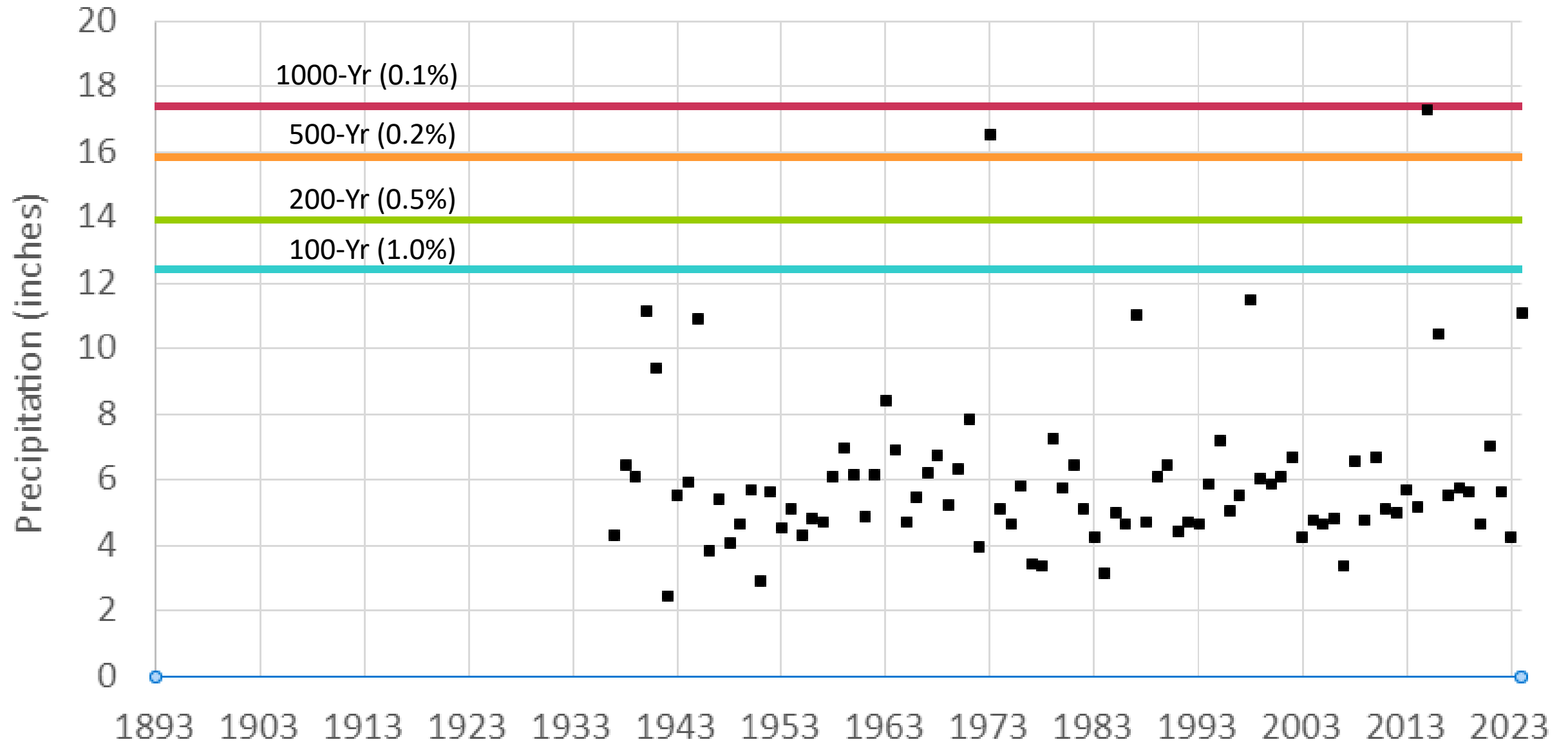
Areas impacted by one or more of the recent extreme storms (October 2015, Hurricane Matthew 2016, and Tropical Storm Florence 2018)



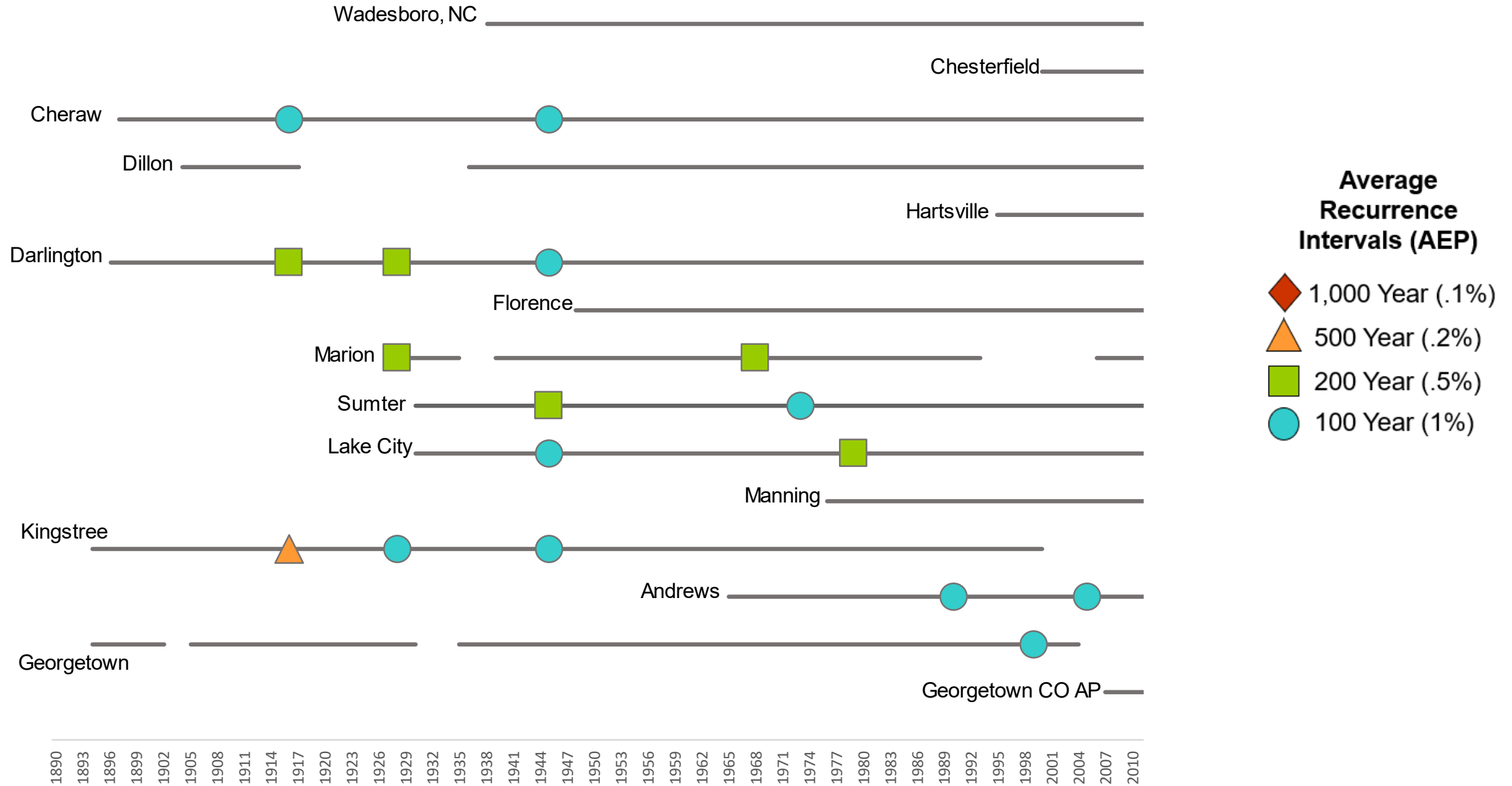
USC Columbia: 4-day Maximum Rainfall Totals



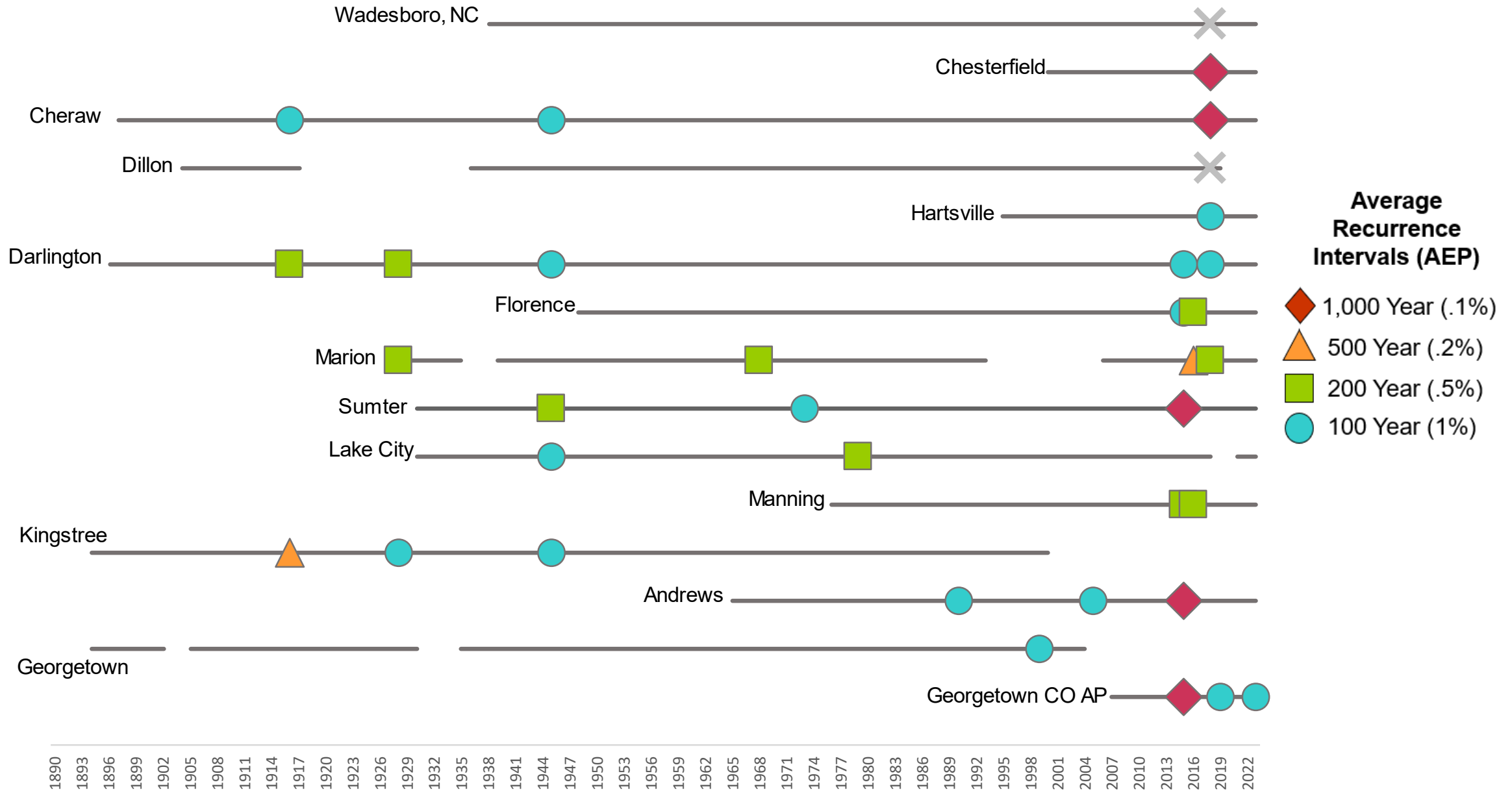
CHARLESTON INTL AP: 4-day Maximum Rainfall Totals



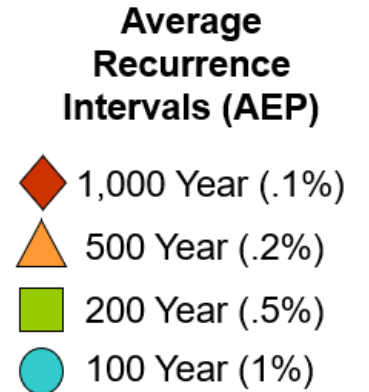
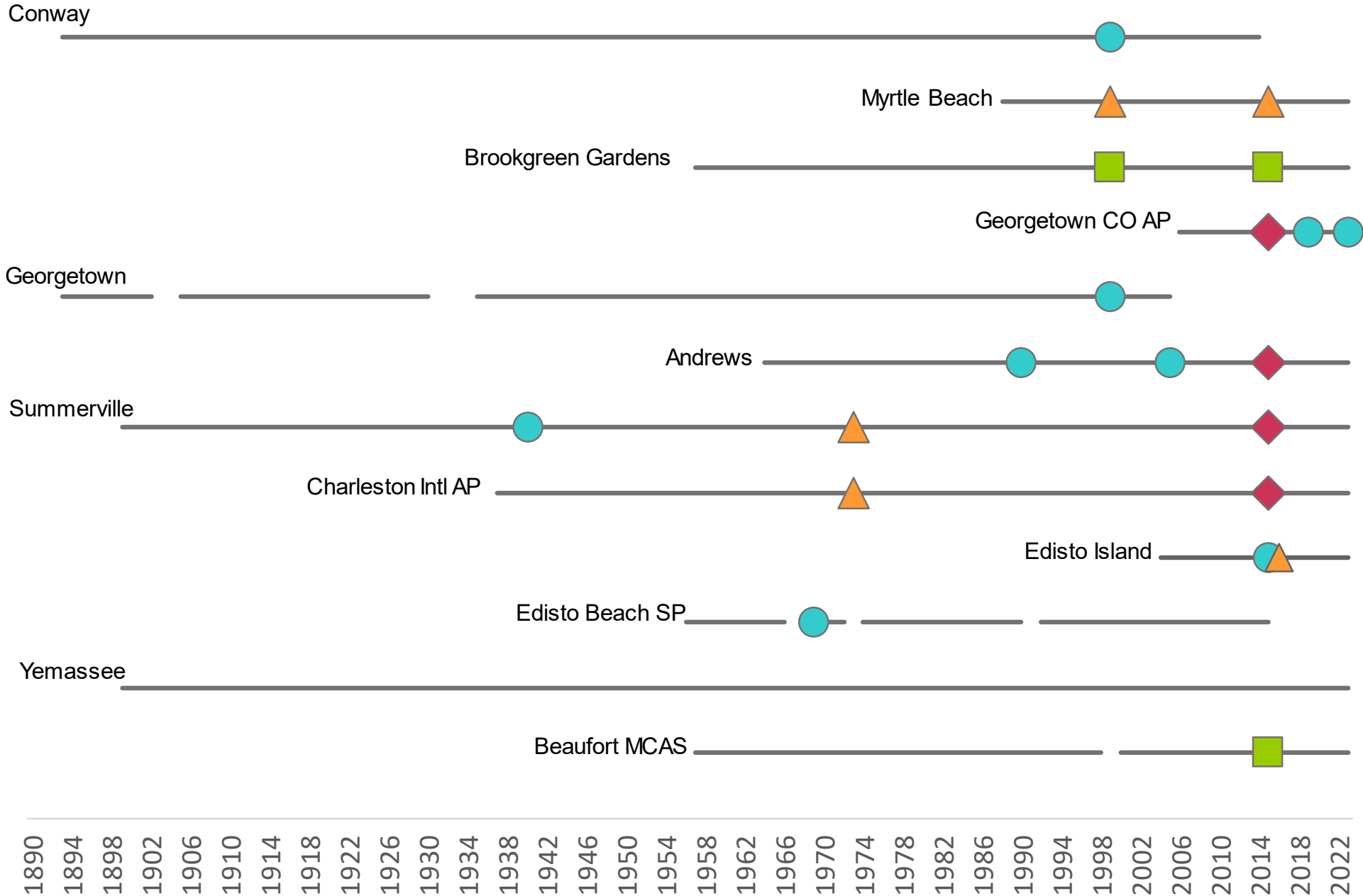
Timeline of 4-day Rainfall Totals for the Pee Dee (1893 – 2014)



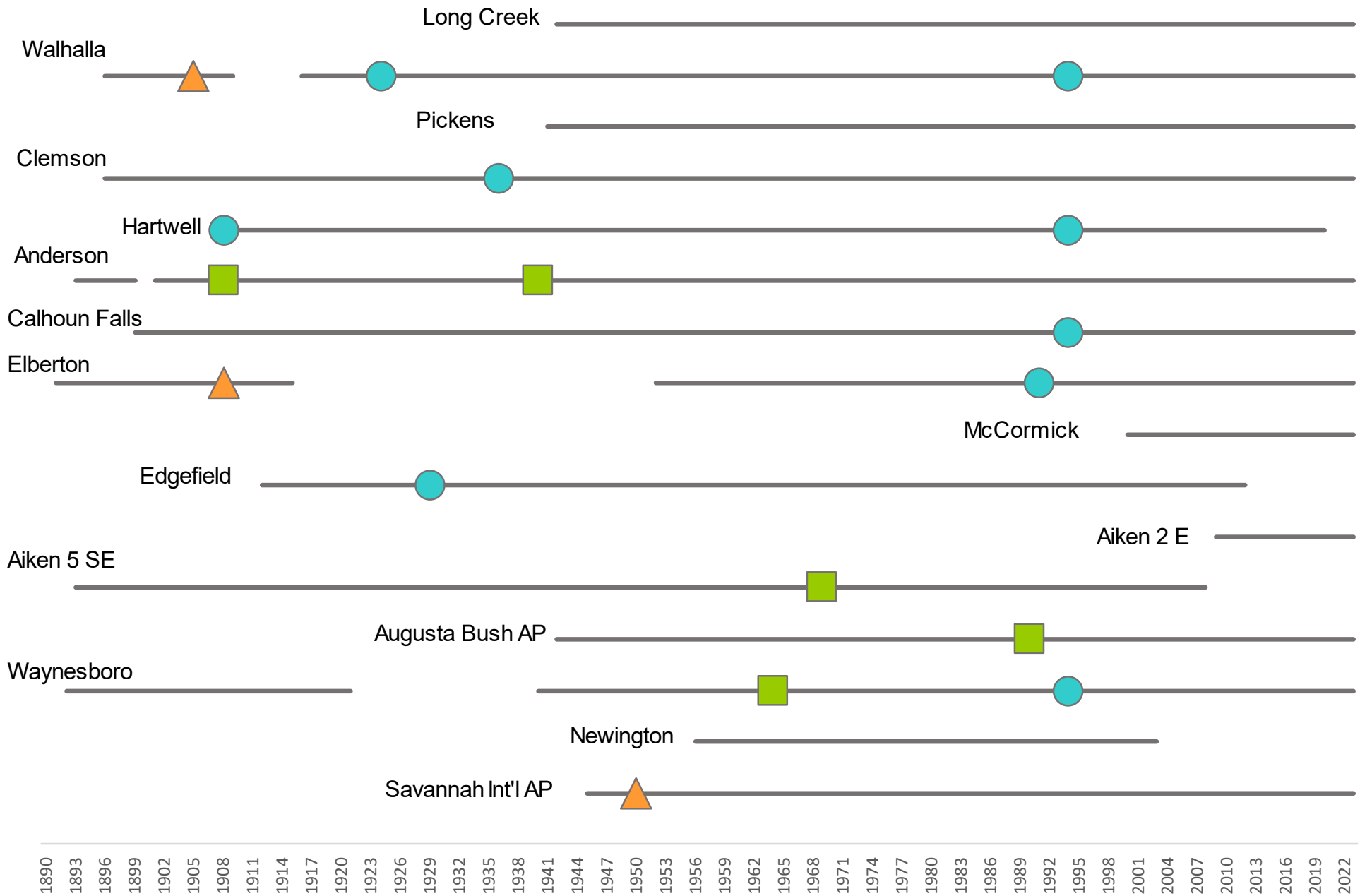
Timeline of 4-day Rainfall Totals for the Pee Dee (1893 – 2023)



Timeline of 4-day Rainfall Totals Along the Coast (1890 - 2023)



Timeline of 4-day Rainfall Totals for the Savannah (1893 – 2023)



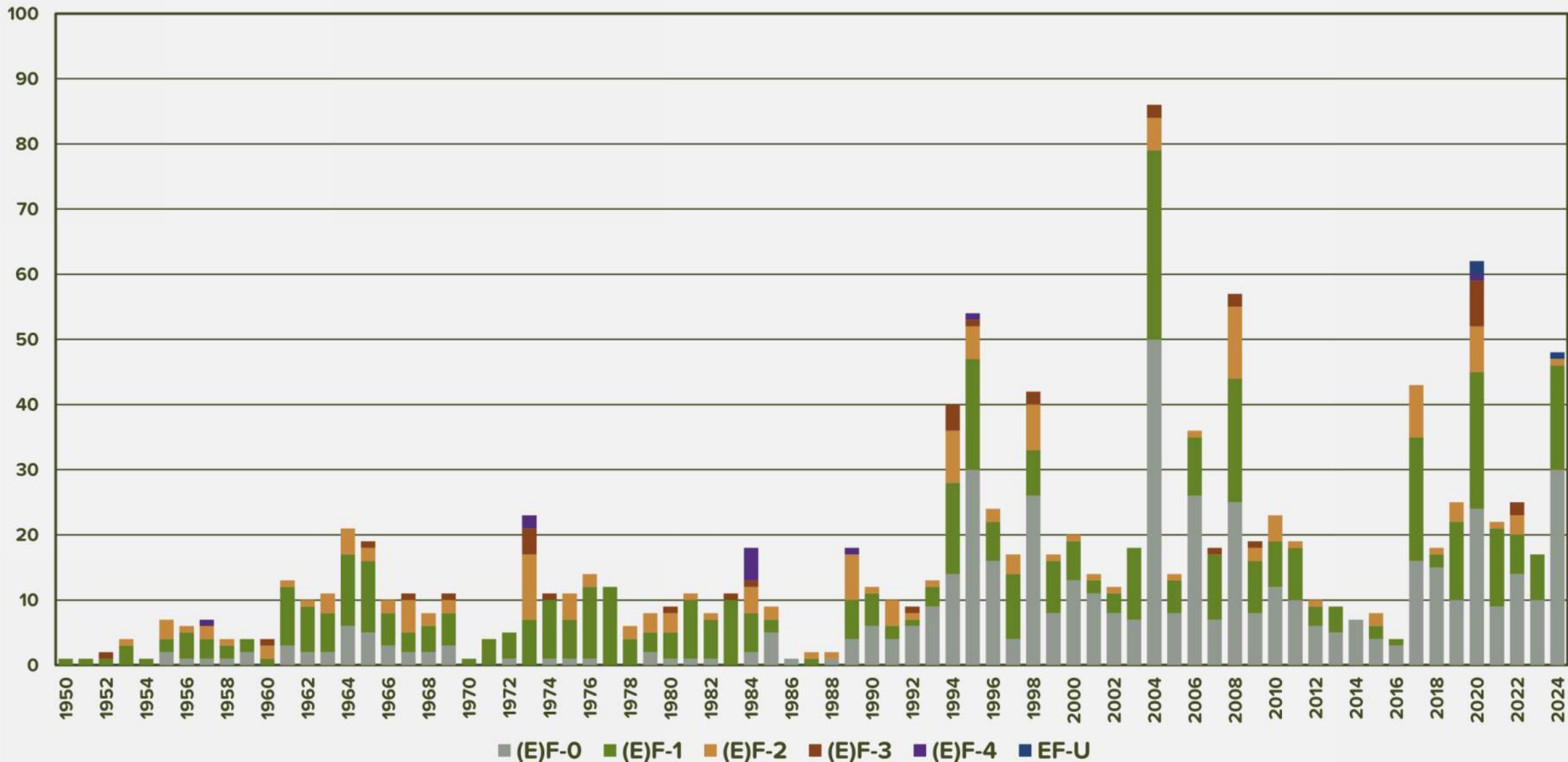
Average Recurrence Intervals (AEP)

-  1,000 Year (.1%)
-  500 Year (.2%)
-  200 Year (.5%)
-  100 Year (1%)



Tornadoes

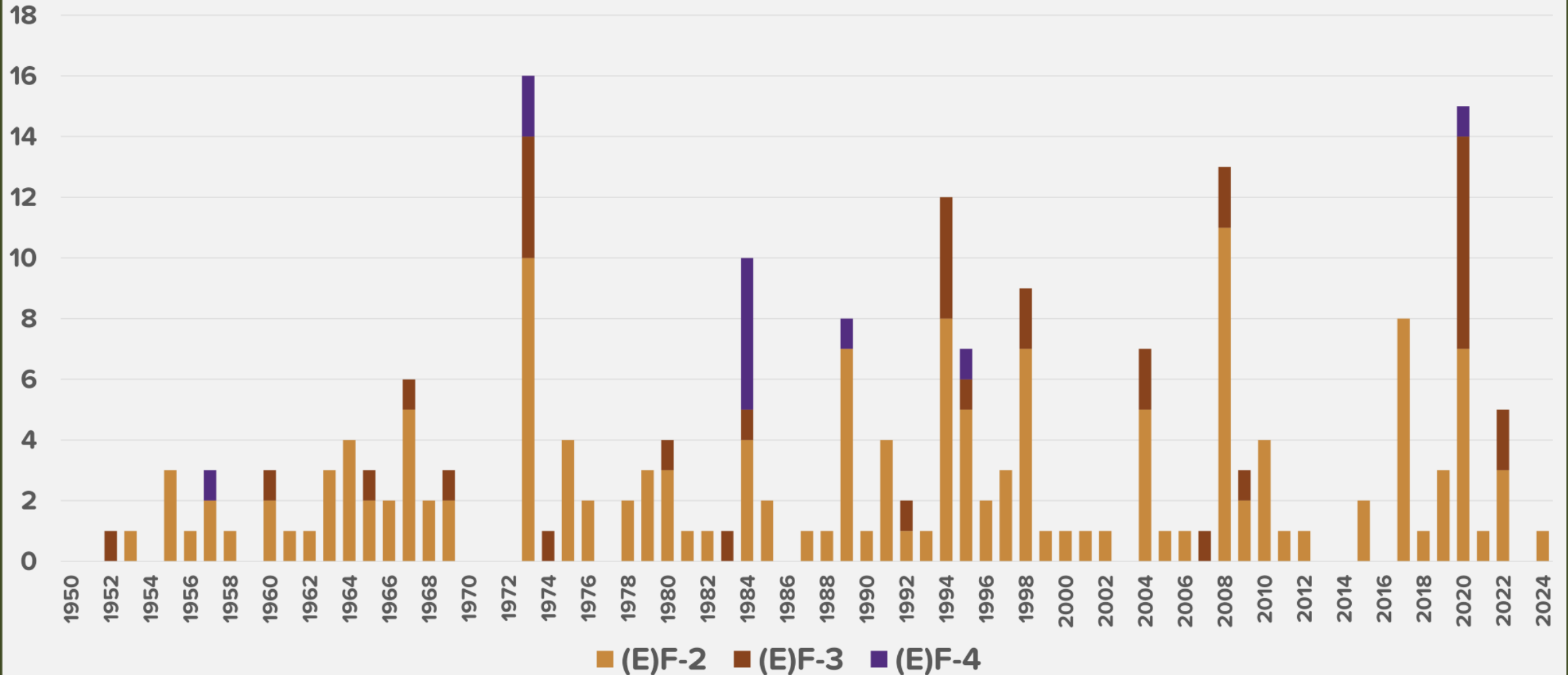
South Carolina Tornadoes By F/EF Scale Rating 1950-2024



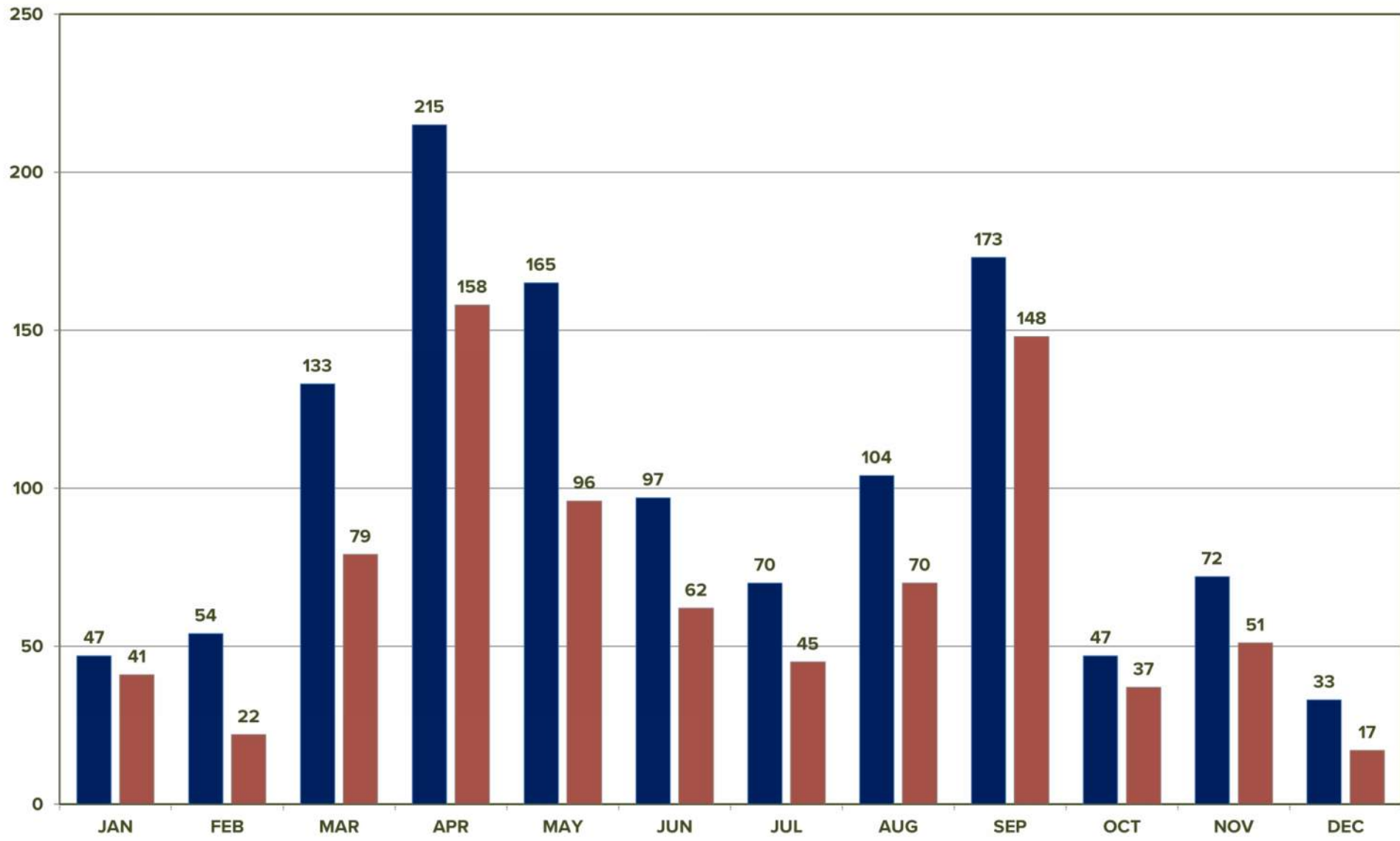
Significant Tornadoes in SC

(EF-2 or Higher)

1950-2024



South Carolina Tornadoes By Month



■ 1950-2024
■ 1994-2024

Tropical Cyclone Helene – Tornadoes

Tornadoes From Tropical Cyclones In SC

Rank	Tropical Cyclone	Dates	Tornado Count
1	Frances	September 6-7, 2004	46
2	Beryl	August 16, 1994	23
3	Helene	September 26-27, 2024	21 (preliminary)
4	Jeanne	September 27, 2004	17
5	Sally	September 17, 2020	12
6	Allison	June 12-13, 2001	10
	Fred	August 17, 2021	10
7	Fay	August 26, 2004	8
8	Nate	October 8, 2017	7
	Ivan	September 16, 2004	7
	Danny	July 23-24, 1997	7
9	Florence	September 16, 2018	6
	Cleo	August 29, 1964	6
(11)	Irma 2017, Elsa 2021, Alberto 2006, Bonnie 2004, Earl 1998, David 1979	-	5

Tropical Storms are part of South Carolina's Climatology and History.

Impacts are not limited to the coast.

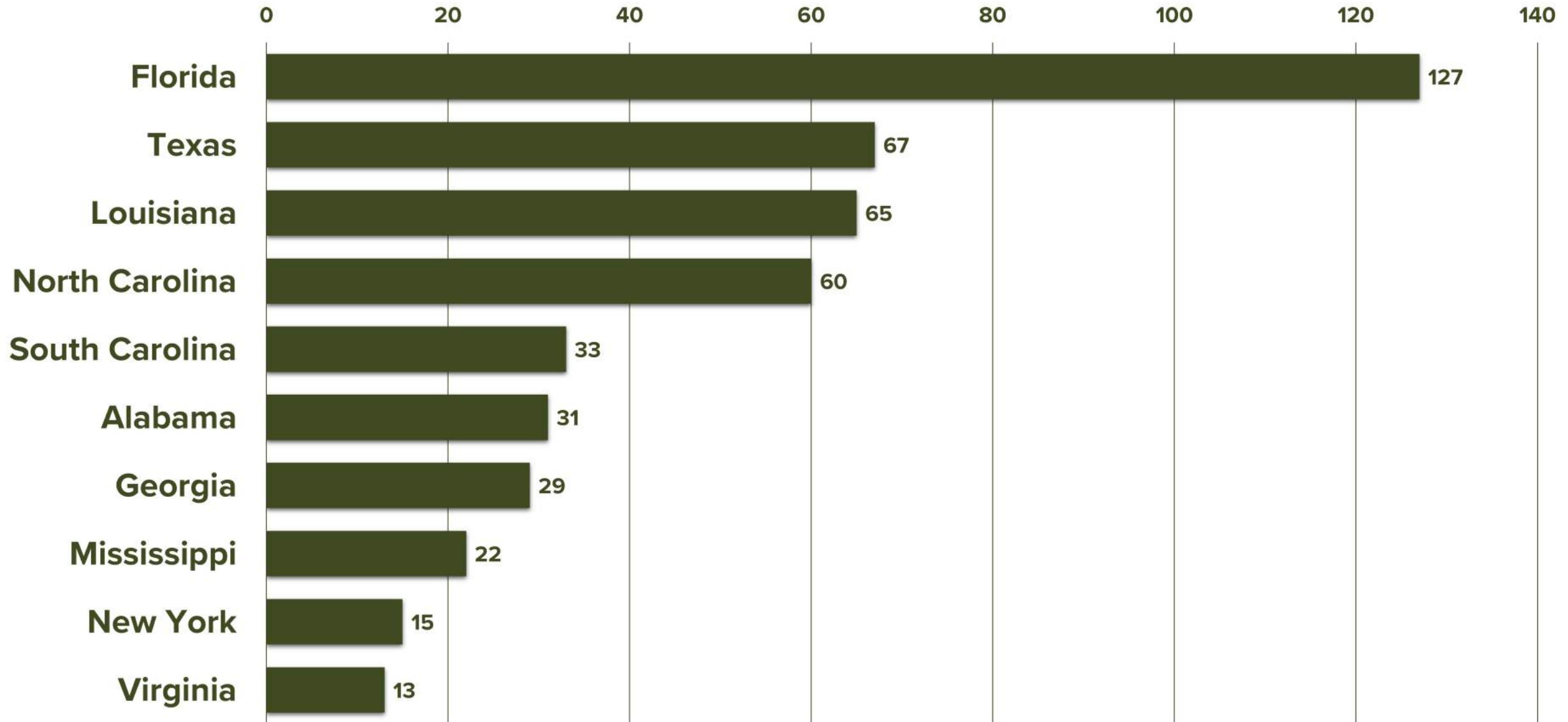
Inland portions of the state have been affected by:

- Heavy rains
- Flooding
- High winds
- Tornadoes



Hurricane Impacts Per State, 1851-2024

2024 Preliminary hurricane impacts assessment as judged by SCSCO:
Beryl (TX), Debby (FL), Francine (LA), and Helene (FL, GA)



Tracks Of Tropical Cyclones To Impact South Carolina



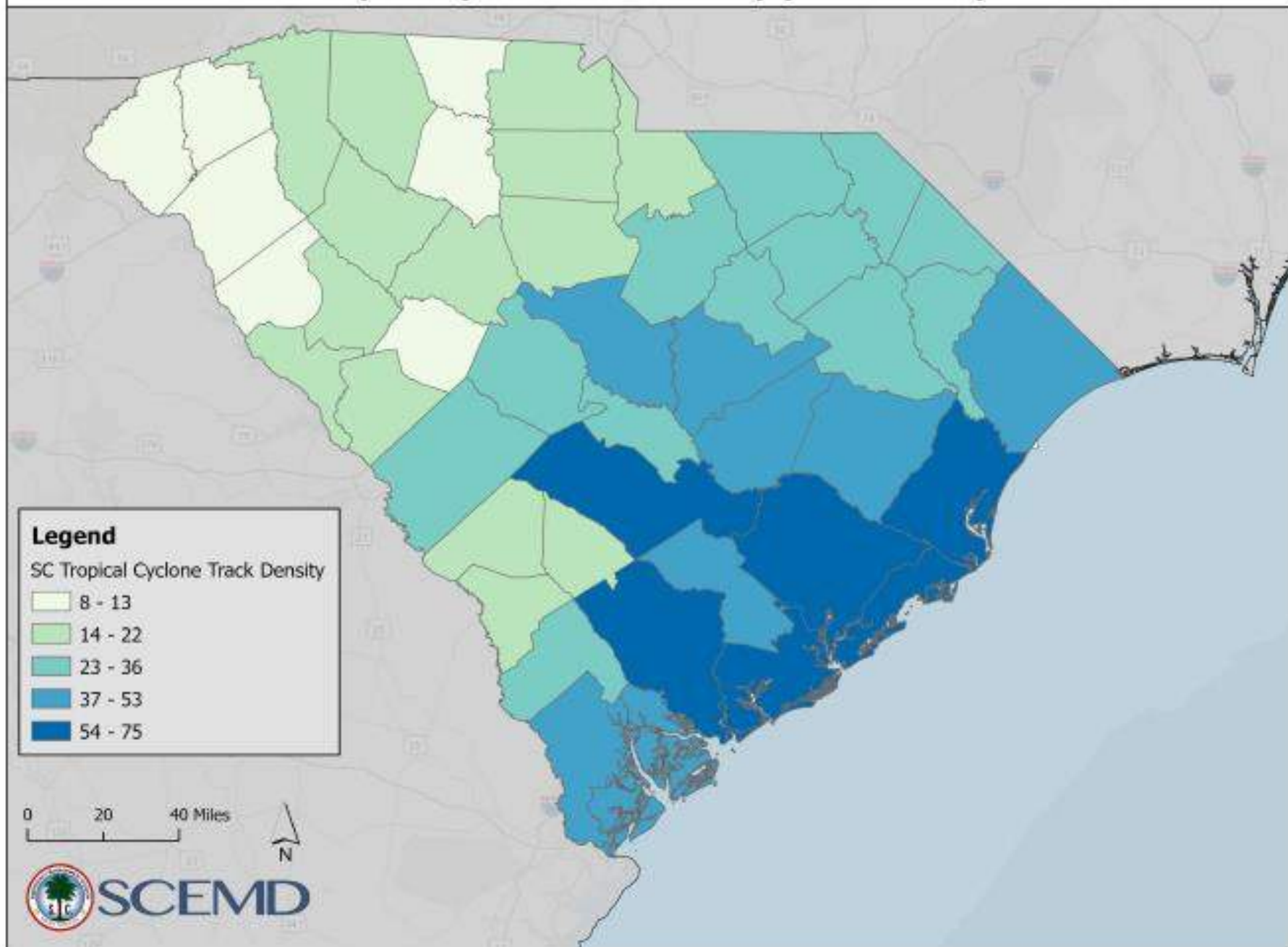
86%

CHANCE OF BEING
IMPACTED BY A TROPICAL
SYSTEM EACH YEAR

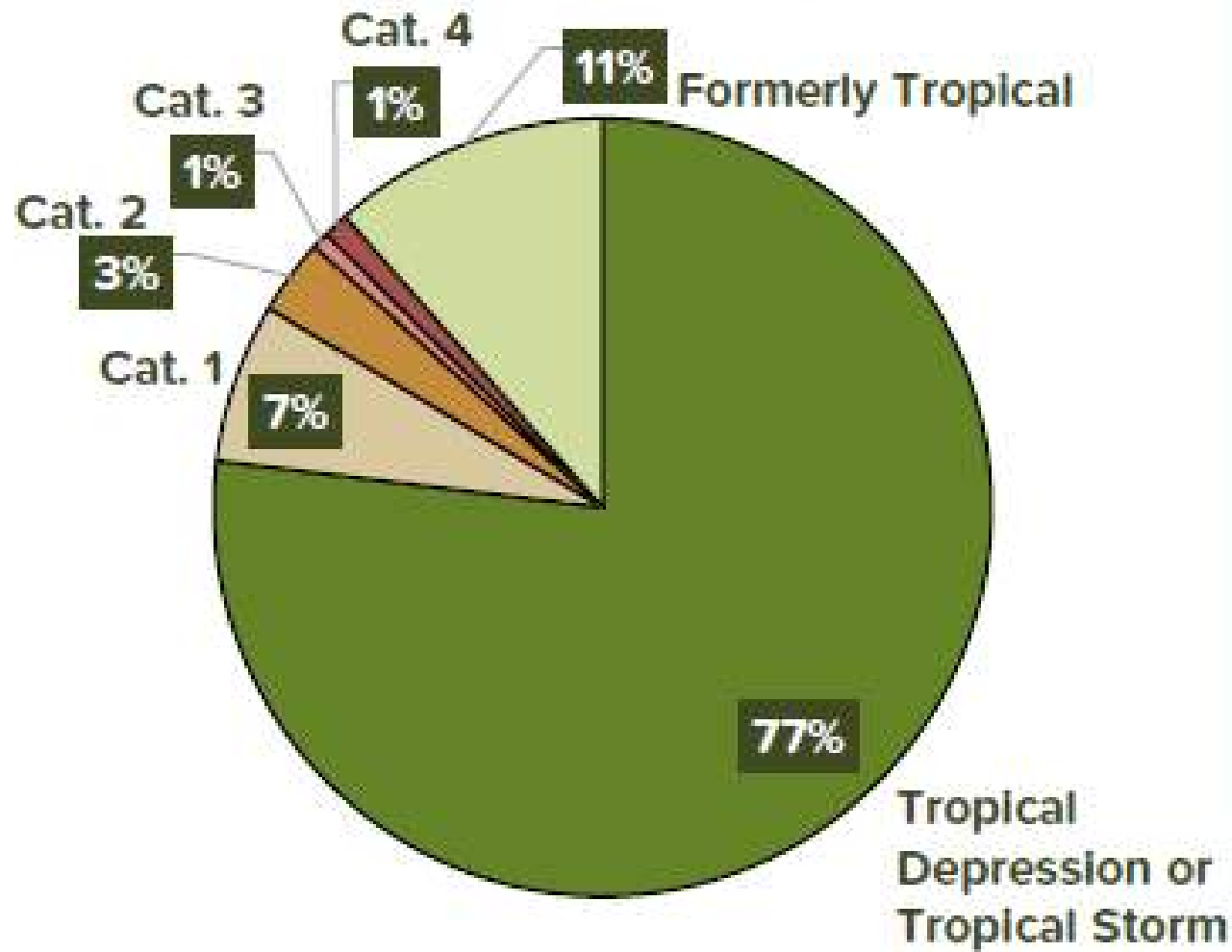
THE BREAKDOWN: (based on the 1851-2023 period of record)

- 286** TROPICAL OR FORMERLY TROPICAL CYCLONES HAVE IMPACTED SC
- 133** STORM CENTERS HAVE TRACKED THROUGH SC
- 44** TROPICAL CYCLONES HAVE MADE LANDFALL ALONG THE SC COAST
- 31** WERE CATEGORY 1 OR HIGHER WHILE IN SC
- 25** HURRICANES MADE LANDFALL ON THE SC COAST
- 5** MAJOR (CAT. 3+) HURRICANE IMPACTS
- 4** MAJOR (CAT. 3+) HURRICANE LANDFALLS

Tropical Cyclone Track Density (1851 - 2023)



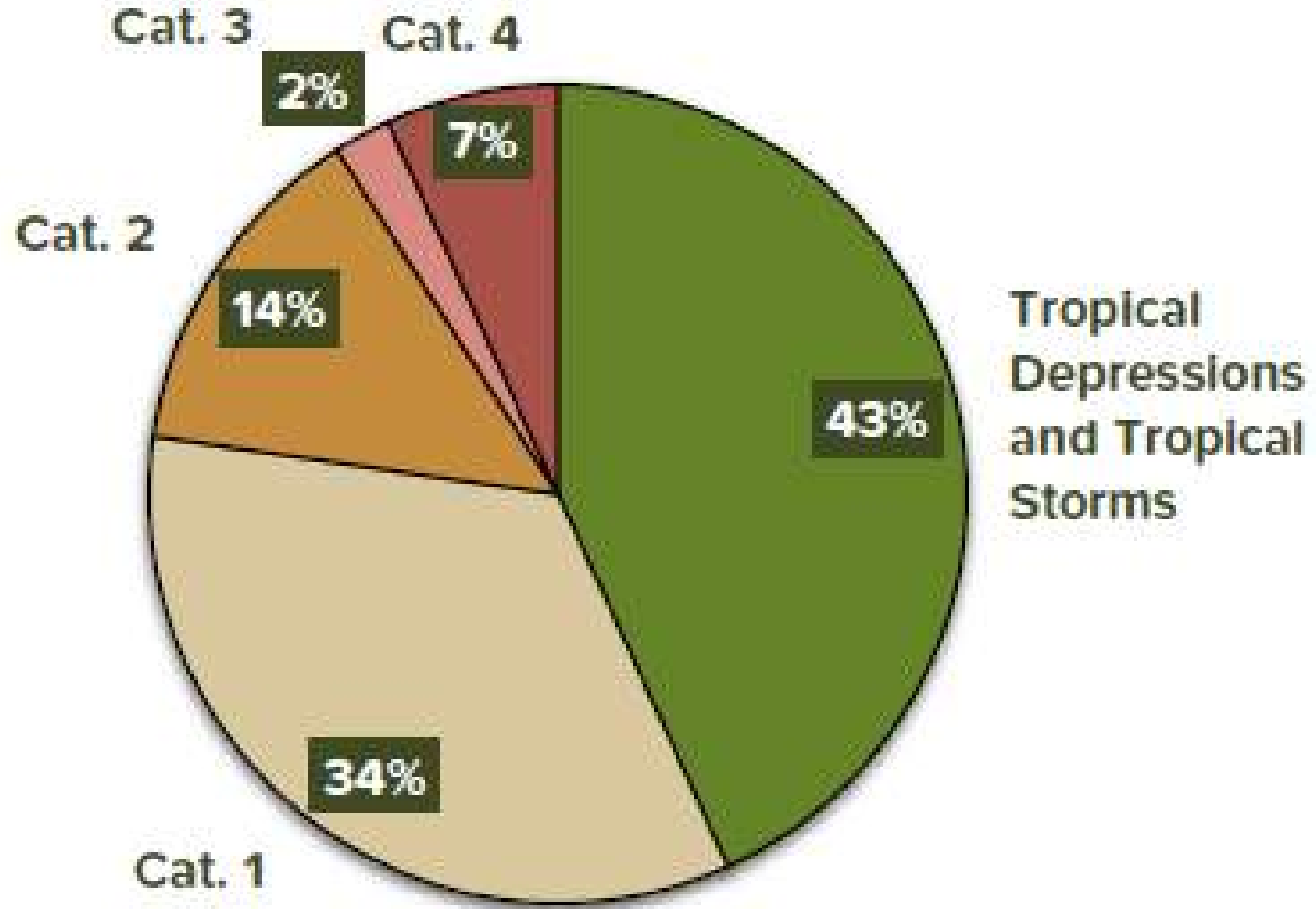
Tropical Cyclone Impact Category For South Carolina



Tropical Storms and Hurricanes That Had An Impact On South Carolina:

221	Tropical Depression or Tropical Storm
19	Category 1 Hurricane
9	Category 2 Hurricane
2	Category 3 Hurricane
3	Category 4 Hurricane
0	Category 5 Hurricane
33	Formerly Tropical

Tropical Cyclone Category at Landfall in South Carolina

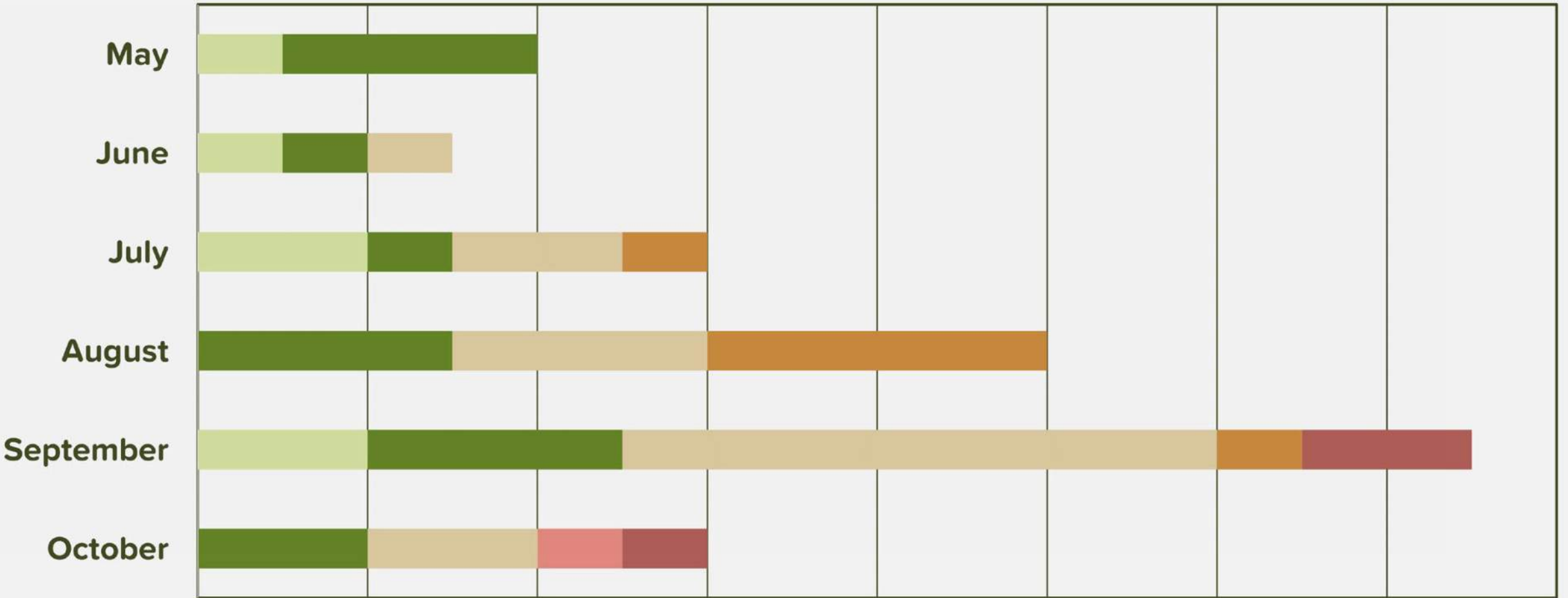


Landfalling Tropical Storms and Hurricanes in South Carolina, 1851-2023:

- 19** Tropical Depressions and Tropical Storms
- 15** Category 1
- 6** Category 2
- 1** Category 3
- 3** Category 4
- 0** Category 5

Category Breakdown of South Carolina Tropical Cyclone Landfalls by Month

0 2 4 6 8 10 12 14 16



■ Tropical Depression

■ Tropical Storm

■ Category 1

■ Category 2

■ Category 3

■ Category 4

Highest Rainfall Totals in South Carolina From Tropical Cyclones and their Remnants (1956 – 2024)

Rainfall Total	Tropical Cyclone	Dates	Location
23.68"	Florence	Sep 15 – 18, 2018	Loris 2.9 WSW
22.02"	Debby	Aug 5 – 9, 2024	Moncks Corner 6.6 SW
19.69"	Helene	Sep 26 – 29, 2024	Jocassee 8 WNW
17.45"	Beryl	Aug 13 – 18, 1994	Jocassee 8 WNW
16.92"	Matthew	Oct 7 – 8, 2016	Edisto Island Middleton
16.80"	Floyd	Sep 15 – 16, 1999	Myrtle Beach
15.21"	Dorian	Sep 5 – 6, 2019	Pawleys Island 5.6 NNE
15.13"	Jerry	Aug 23 – 28, 1995	Hilton Head
14.17"	Hermine	Sep 1 – 3, 2016	Georgetown 6.0 S
14.11"	TD #8	Aug 15 – 18, 1971	Sullivans Island
13.96"	Marco/Klaus	Oct 10 – 13, 1990	Pageland





Thank you

Hope: MizzellH@dnr.sc.gov 803-734-9568

