SC DEPARTMENT of ENVIRONMENTAL SERVICES

# Surface Water Resources of the Santee Basin

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Bureau of Water, South Carolina Department of Environmental Services

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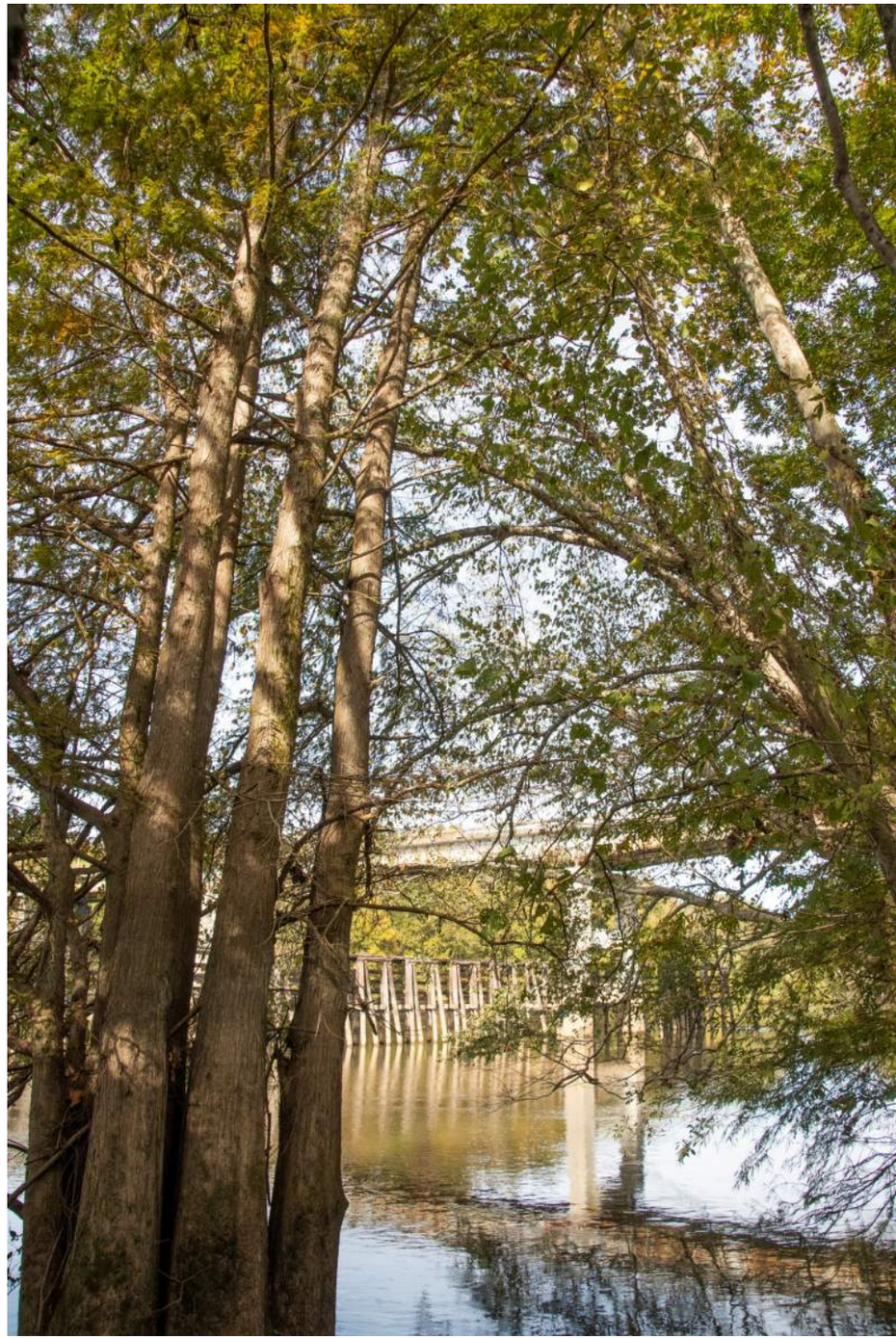
Santee River Basin Council

Meeting #3, Moncks Corner, SC

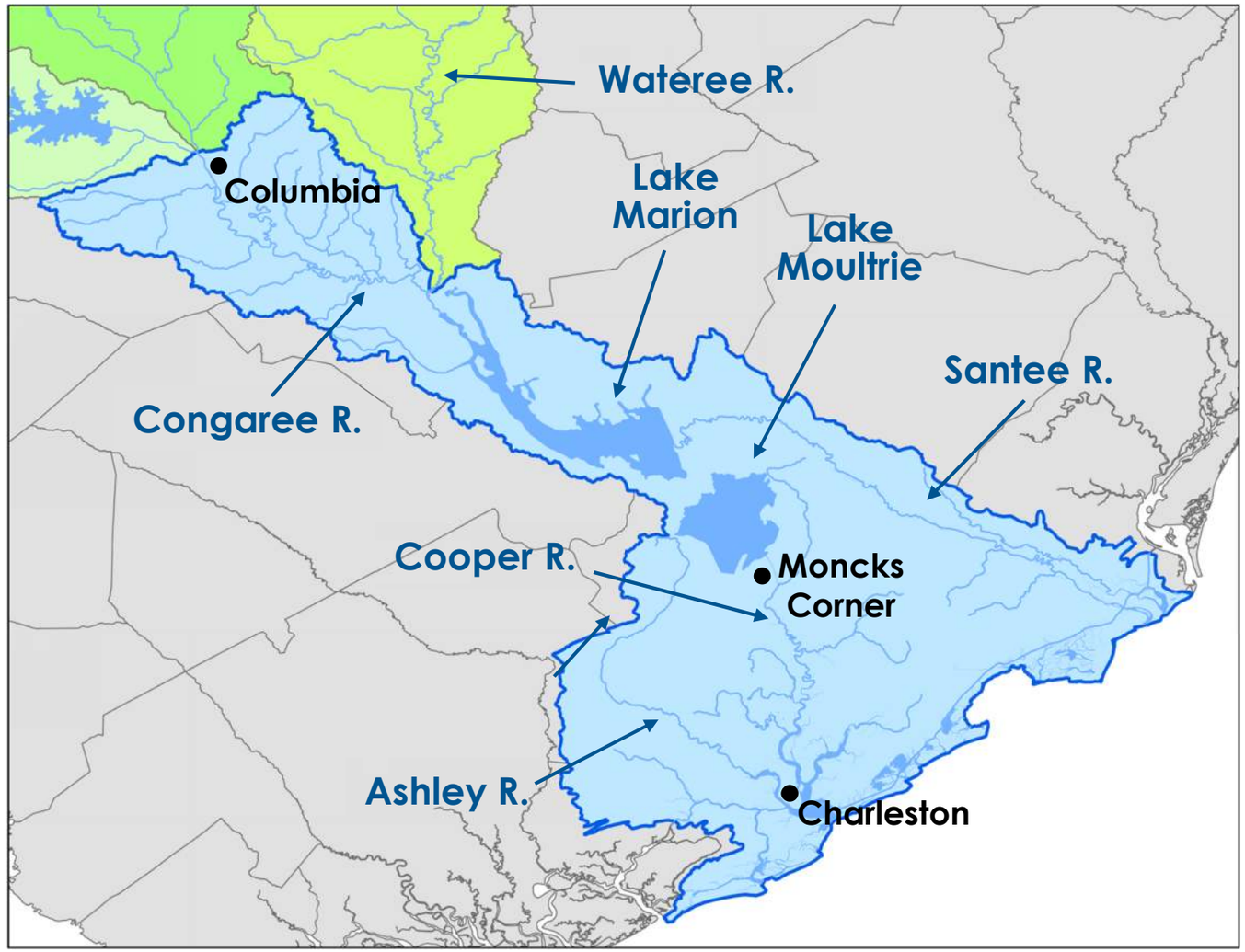


# Santee Basin Overview

- Headwaters in the mountains of SC and NC.
- 2nd largest basin in the Carolinas.
- Area = 17,145 sq. mi.
  - SC – 12,345 sq. mi. (72%)
  - NC – 4,800 sq. mi. (28%)
- Lower Santee planning basin downstream of 3 other major river basins.
  - Broad, Catawba, Saluda
- Significant regulation from reservoirs and hydroelectric projects operated by Duke, Dominion, Santee Cooper, and other smaller power companies.

# Lower Santee Basin Overview

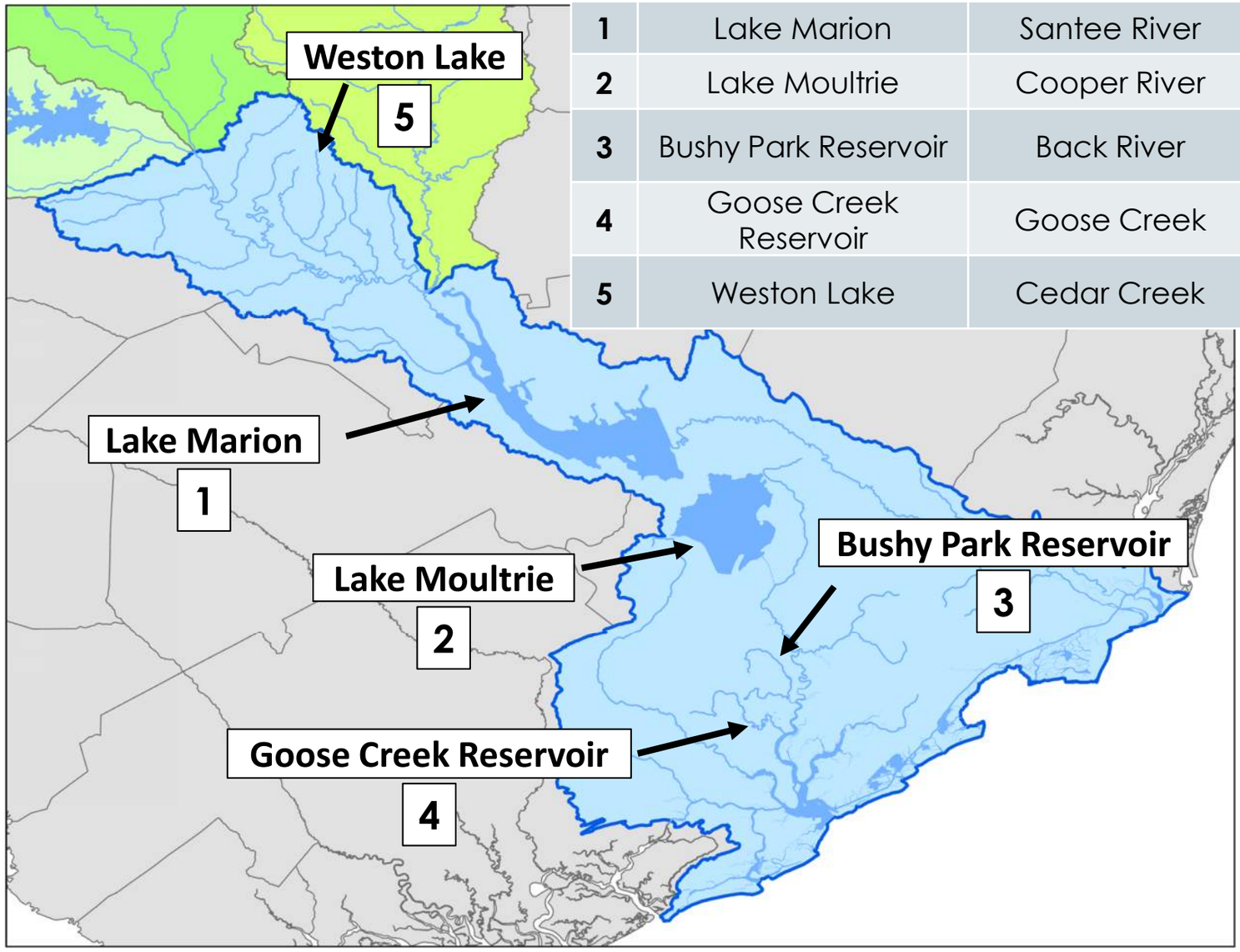
- Planning basin lies entirely in SC.
  - Includes Congaree, Cooper, and Ashley subbasins.
  - Area = 3,704 sq. mi.
- Major rivers include the Congaree, Santee, Cooper, and Ashley rivers.
- Most rivers and tributaries characterized by swampland with wide flood plains on major rivers.
- Includes two regionally important reservoirs – Lake Moultrie and Lake Marion.



# Physiographic Provinces

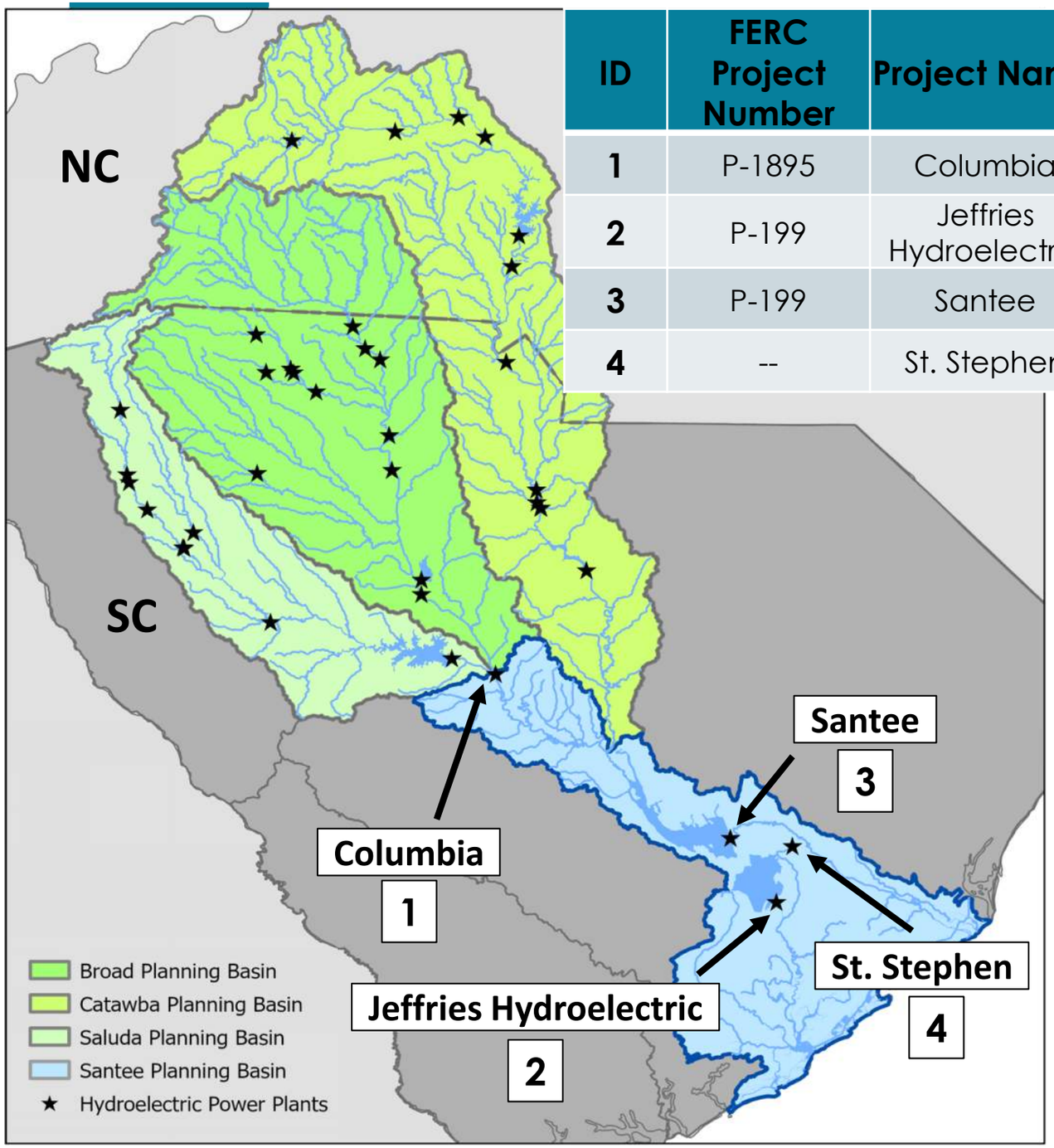
- Blue Ridge Mountains
  - Rugged terrain and streams have higher gradient.
- Piedmont
  - Elevation ranges from 1000 ft above MSL at foothills of Blue Ridge to 450 ft near the Fall Line.
  - Underlain by fractured crystalline rock.
  - Most overlying soil (saprolite) is made up of moderately to poorly permeable silty clay loams.
- Coastal Plain
  - Topographic relief is relatively lower.
  - Composed of sand, limestone, and clay beds with better infiltration capacity.
  - Large parts of the lower Coastal Plain river systems are swamplands and tidally influenced.

| ID | Name | Stream | Surface area (acres) | Storage capacity (acre-feet) | Operator |
|---|---|---|---|---|---|
| 1 | Lake Marion | Santee River | 110,600 | 1,400,000 | Santee Cooper |
| 2 | Lake Moultrie | Cooper River | 60,400 | 1,211,000 | Santee Cooper |
| 3 | Bushy Park Reservoir | Back River | 850 | 8,500 | Charleston Water System |
| 4 | Goose Creek Reservoir | Goose Creek | 600 | 4,800 | Charleston Water System |
| 5 | Weston Lake | Cedar Creek | 256 | 4,100 | U.S. Army |




# Santee Basin Reservoirs

- 5 Reservoirs greater than 200 acres.
- Used for hydroelectric power, water supply and recreation.



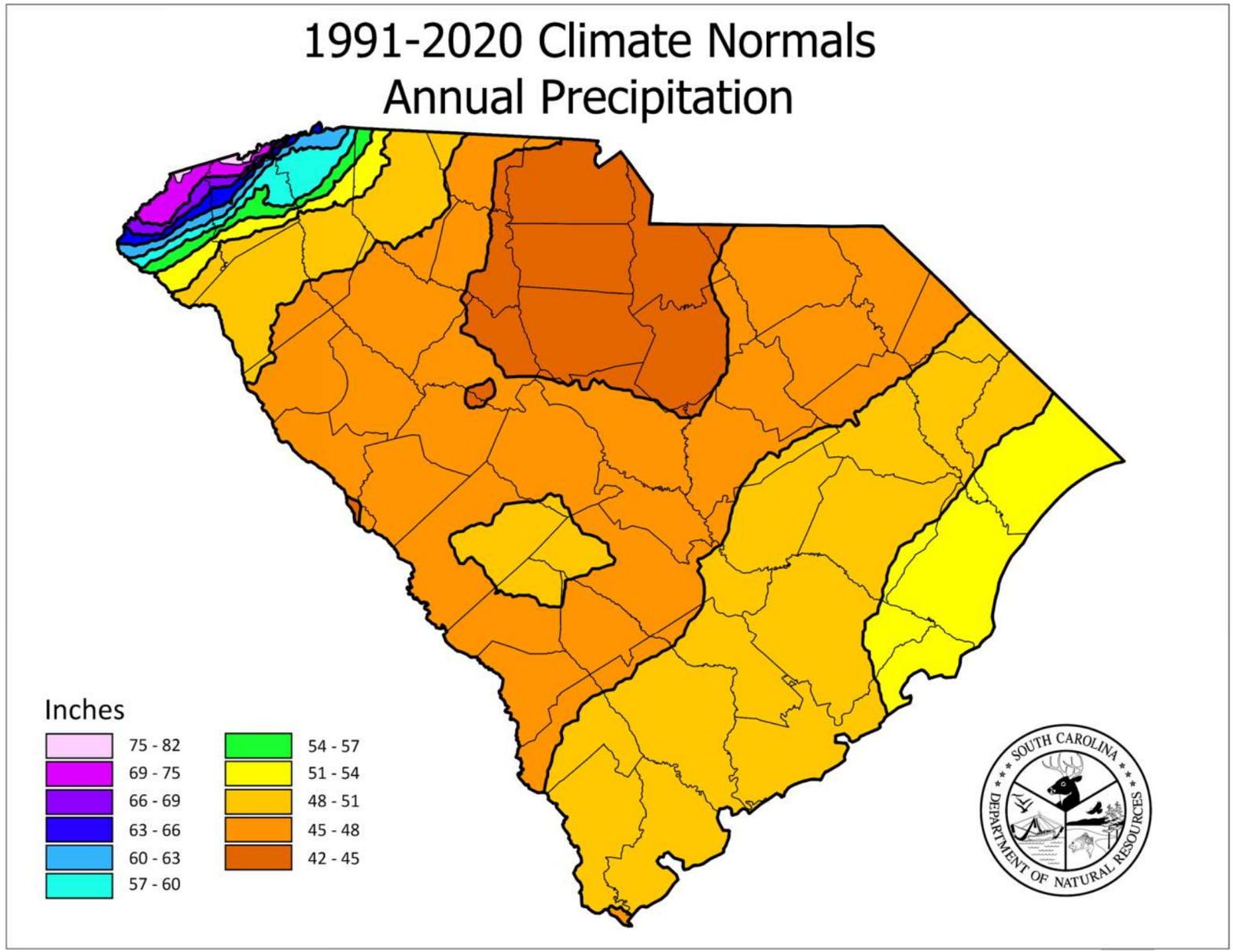

| ID | FERC Project Number | Project Name | Licensee | Issue Date | Expiration Date | Capacity (MW) |
|---|---|---|---|---|---|---|
| 1 | P-1895 | Columbia | City of Columbia | 5/30/2002 | 4/30/2042 | 10.6 |
| 2 | P-199 | Jeffries Hydroelectric | Santee Cooper | 1/20/2023 | 12/31/2071 | 132.5 |
| 3 | P-199 | Santee | Santee Cooper | 1/20/2023 | 12/31/2071 | 2.0 |
| 4 | -- | St. Stephen | USACE | -- | -- | 84 |

# Hydroelectric Projects

- Two projects licensed by the Federal Energy Regulatory Commission (FERC).
- St. Stephen is USACE owned and operated, so is not licensed by FERC.

# 1991-2020 Annual Rainfall-Climate Normal

- Average annual rainfall ranges from 45” to 54” in the basin.
- Higher rainfall near the coast from tropical events.



# Basin- Rainfall Patterns

Statewide – Average Annual Rainfall
and 5-year Running Average


77.9
67.9
57.9
47.9
37.9
27.9

Precipitation (inches)

Max: 69.3 in
1964

Min: 31.7 in
1954

Avg: 47.8 in

POR : 130 years

Wetter Periods
Drier Periods

1895 1920 1950 1980 2010 2025

SCIPP (www.southernclimate.org)

# Basin- Rainfall Patterns


Southern Climate Division – Average Annual Rainfall and 5-year Running Average

Max: 71.8 in 1964

Avg: 48.0 in

Min: 29.5 in 1931

POR : 130 years

Wetter Periods

Drier Periods

Precipitation (inches)

78.0
68.0
58.0
48.0
38.0
28.0

1895 1920 1950 1980 2010 2025

SCIPP (www.southernclimate.org)

# Basin- Rainfall Patterns


Central Climate Division – Average Annual Rainfall and 5-year Running Average

Max: 69.7 in 1964

Min: 26.8 in 1954

Avg: 46.4 in

POR : 130 years

Precipitation (inches)

74.4
64.4
56.4
46.4
36.4
26.4

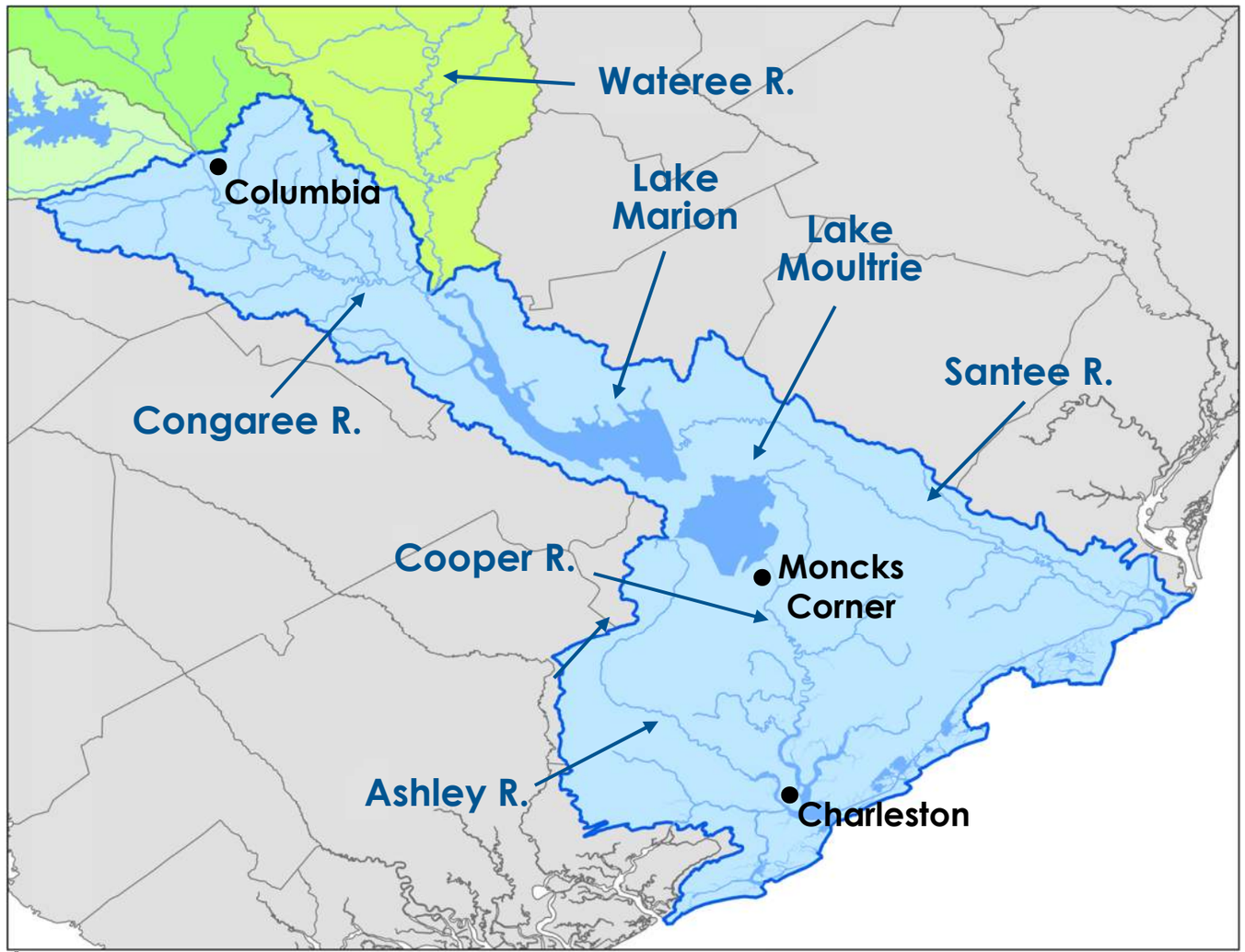
1895 1920 1950 1980 2010 2025

Wetter Periods
Drier Periods

SCIPP (www.southernclimate.org)

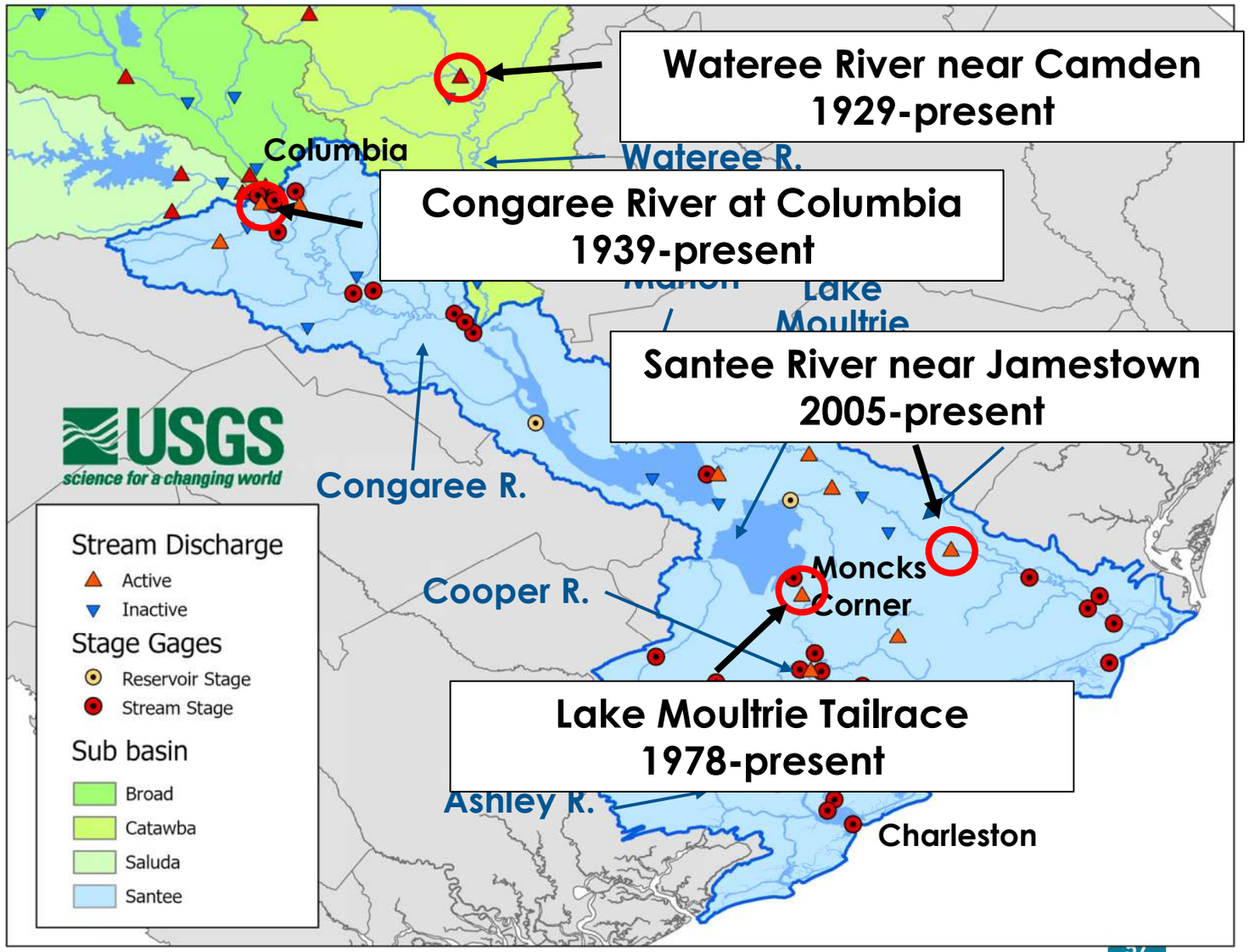
# Santee Streamflow

- Santee mainstem:
  - Flows are dependent on the three upstream basins and can be highly variable.
  - Regulated releases from lakes result in less variable flows than would occur naturally.
- Unregulated streams:
  - Well sustained flows in Upper Coastal Plain due to high baseflow.
  - Highly variable and poorly sustained flows in Lower Coastal Plain due to low baseflow.

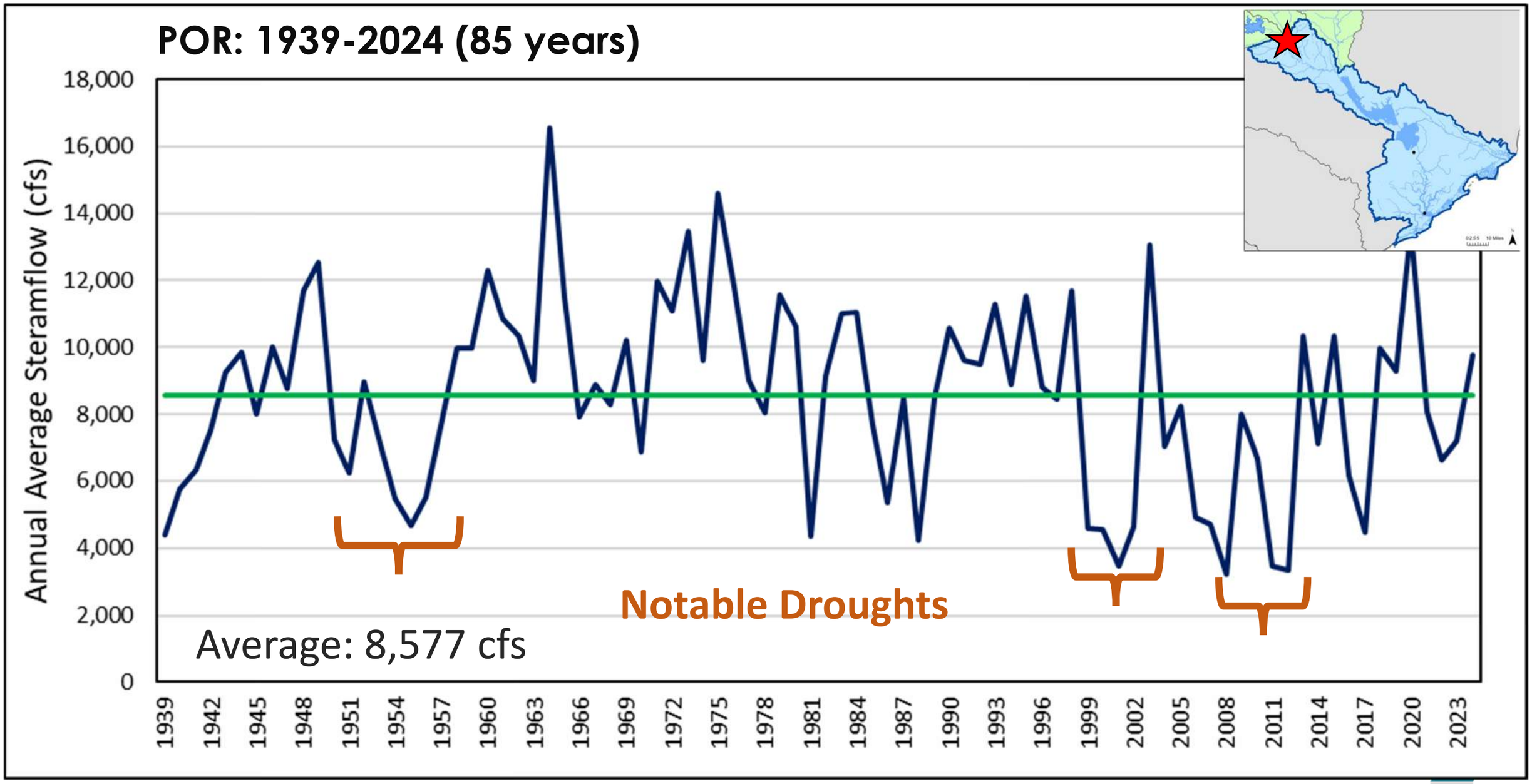


# Surface Water Monitoring Network

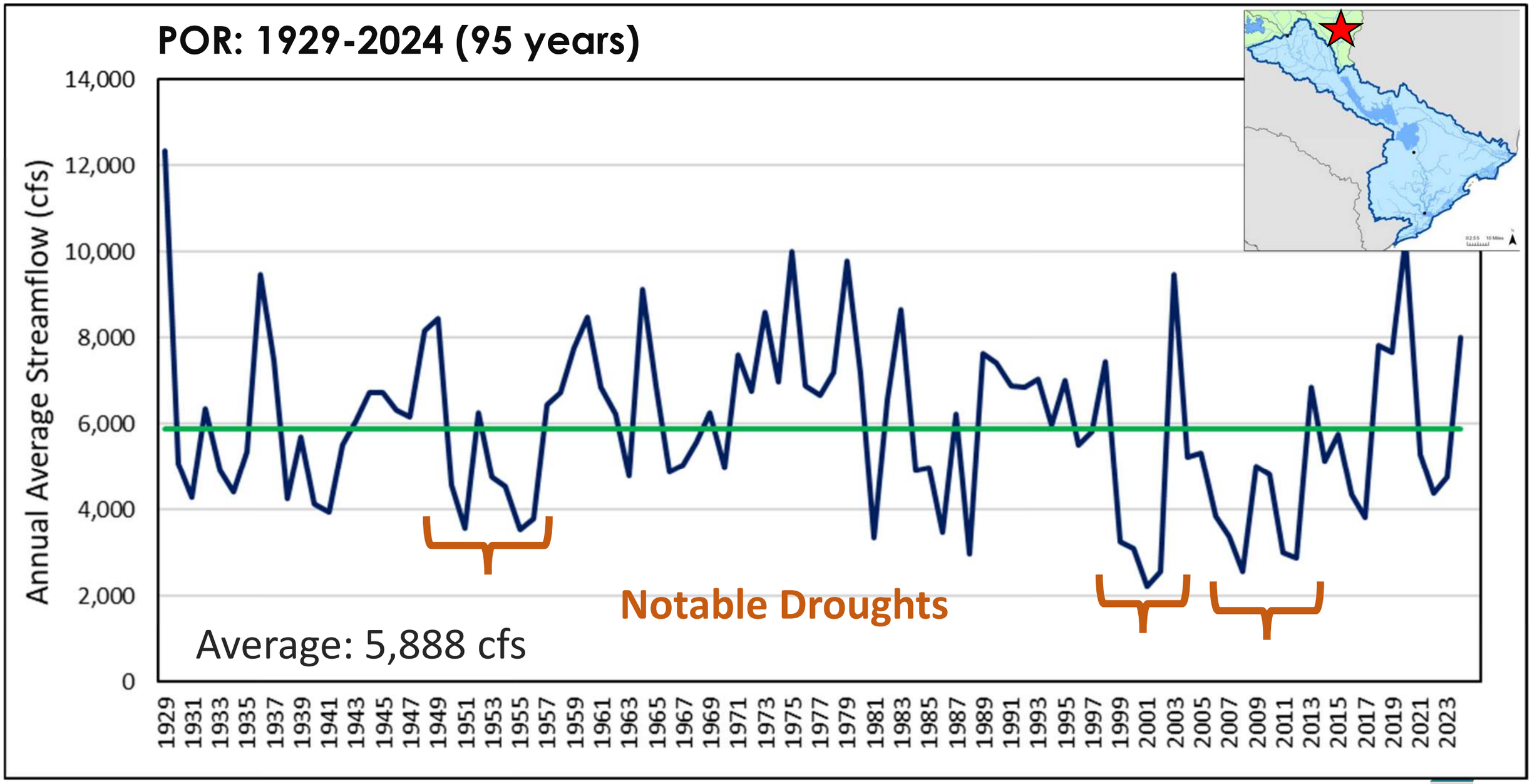
- 12 active USGS streamflow gaging sites.
  - Sites measure volumetric discharge (cfs – cubic feet per second) and stage.
- 39 additional USGS stage sites.
- Period of record extending back to 1939 in Santee Basin



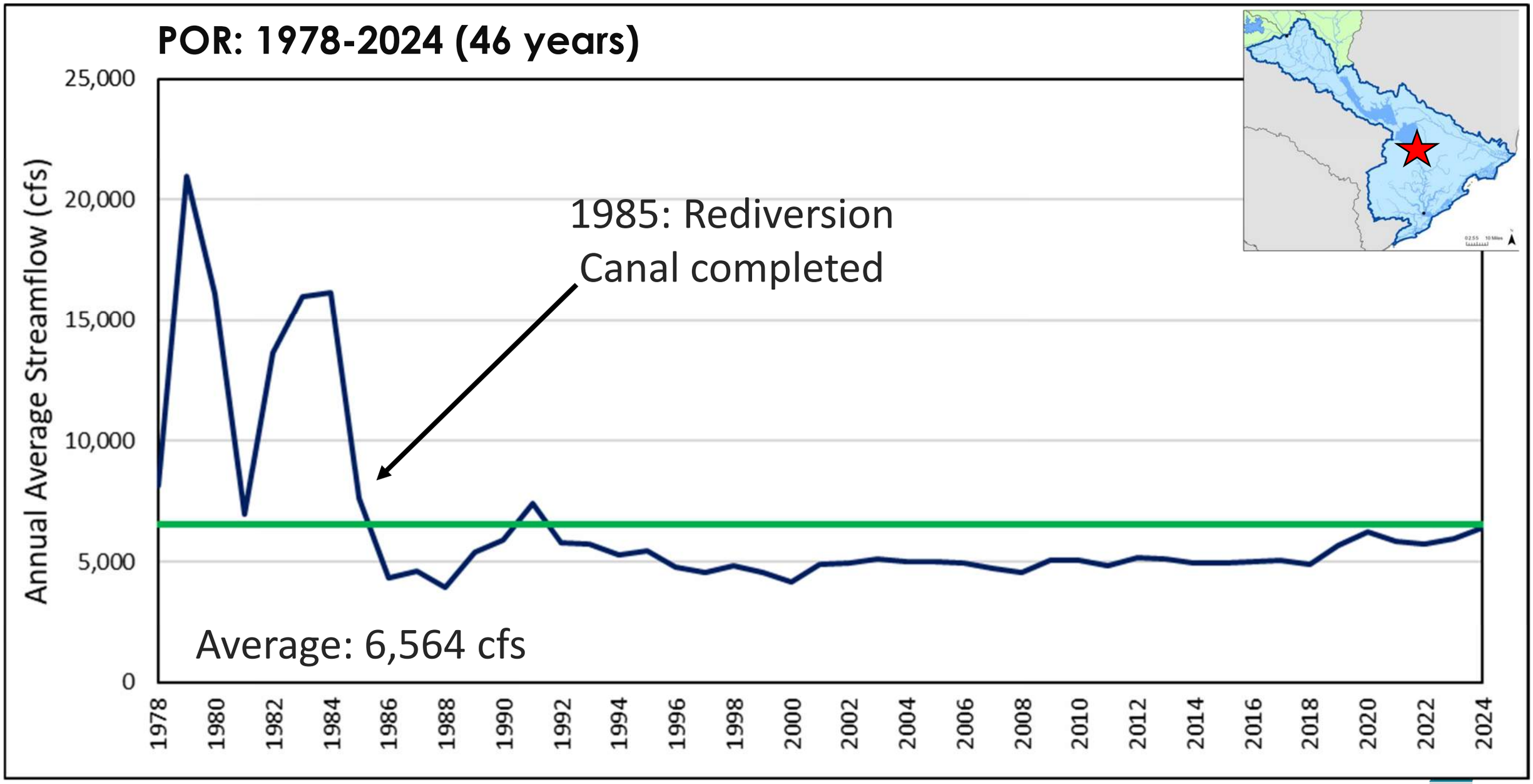
# Average Annual Flows – Congaree River at Columbia



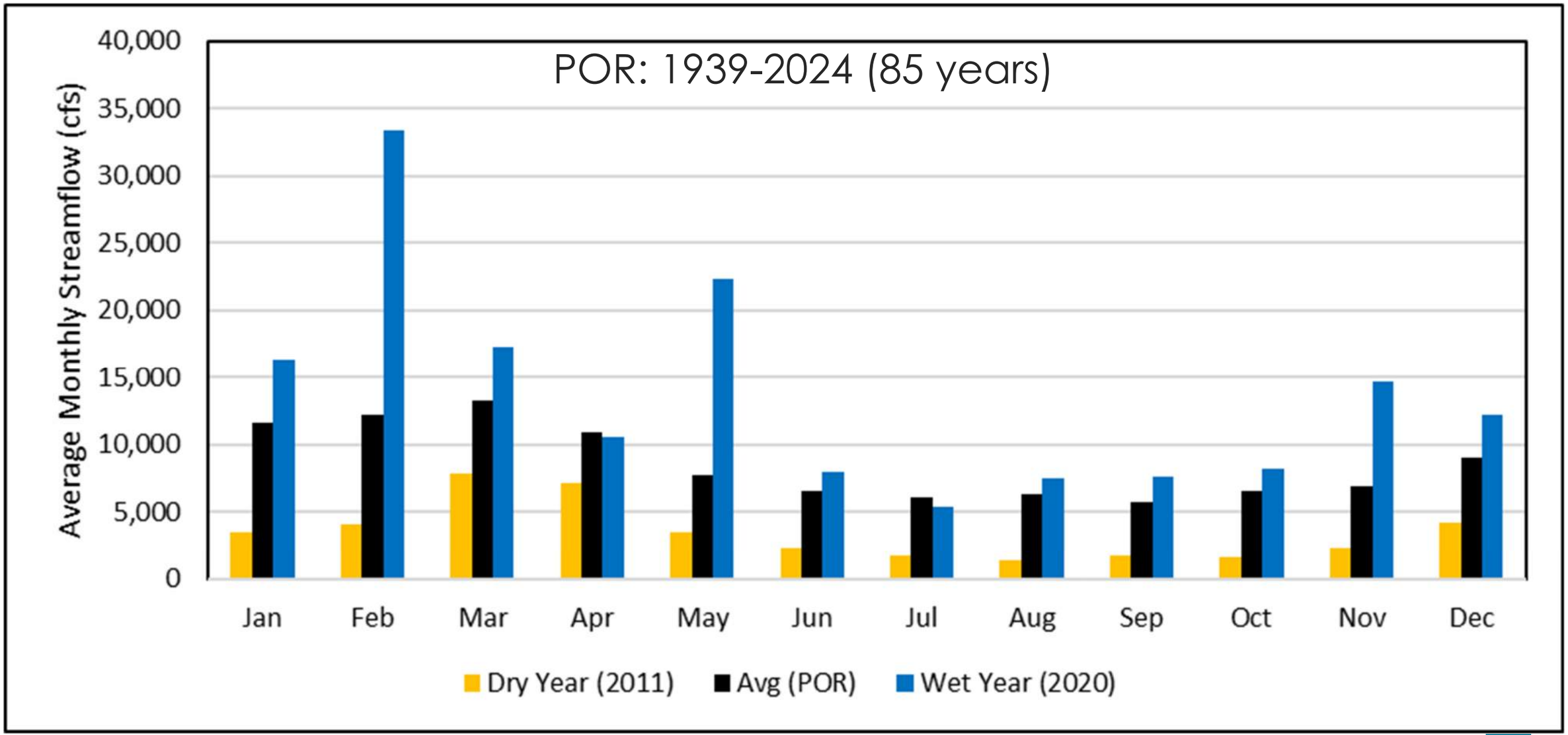
# Average Annual Flows – Wateree River nr Camden



# Average Annual Flows – Lake Moultrie Tailrace



# Average Monthly Flows- Congaree River



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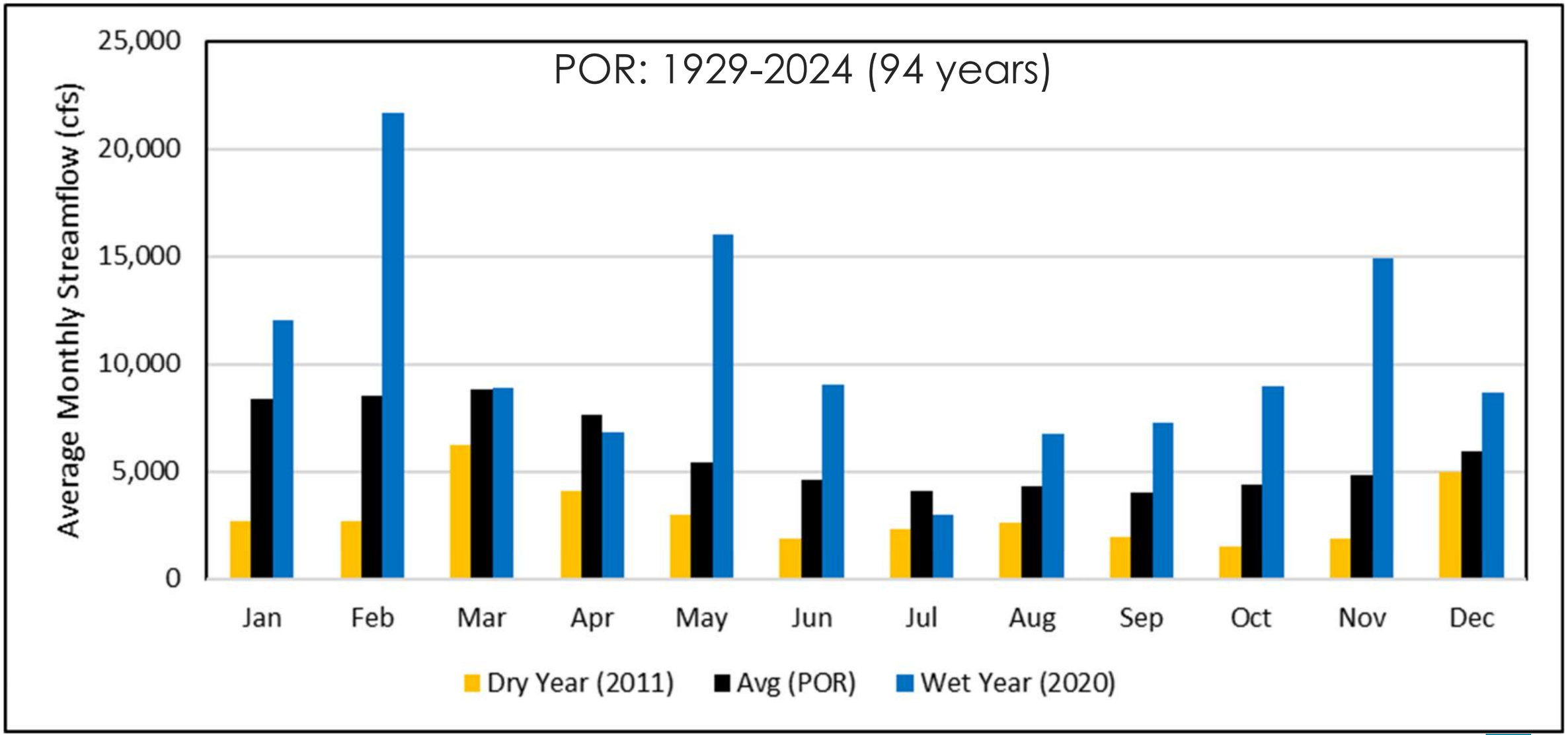
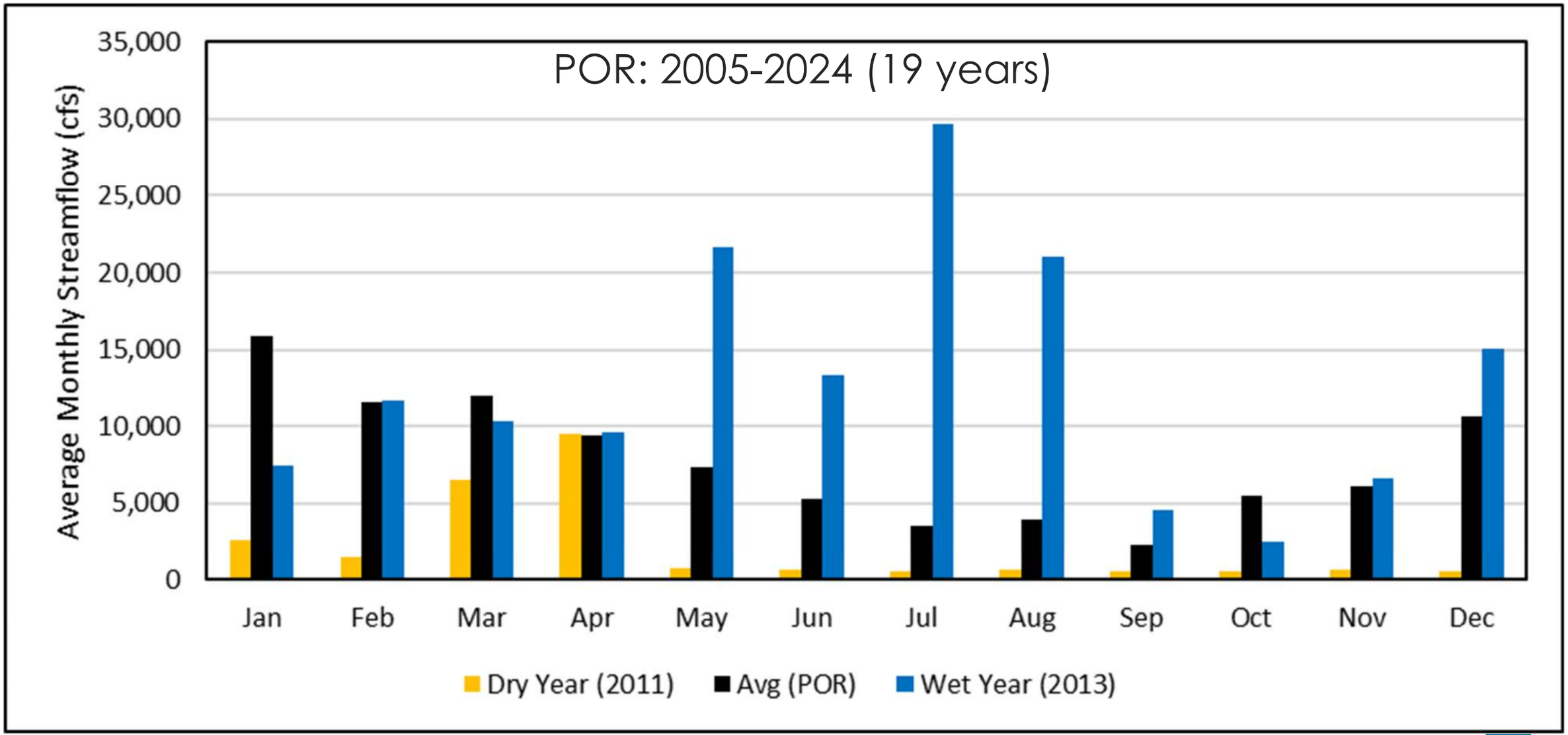
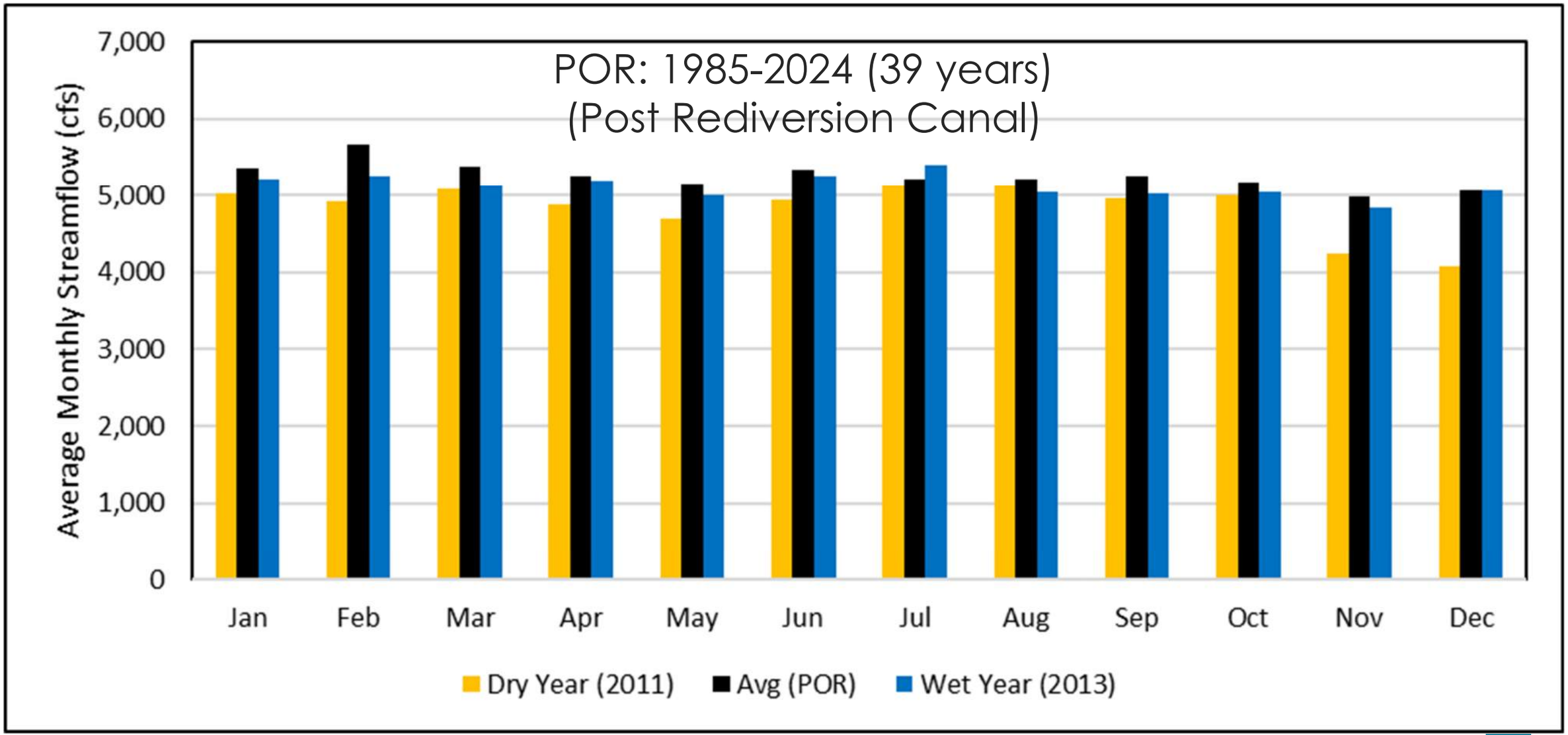


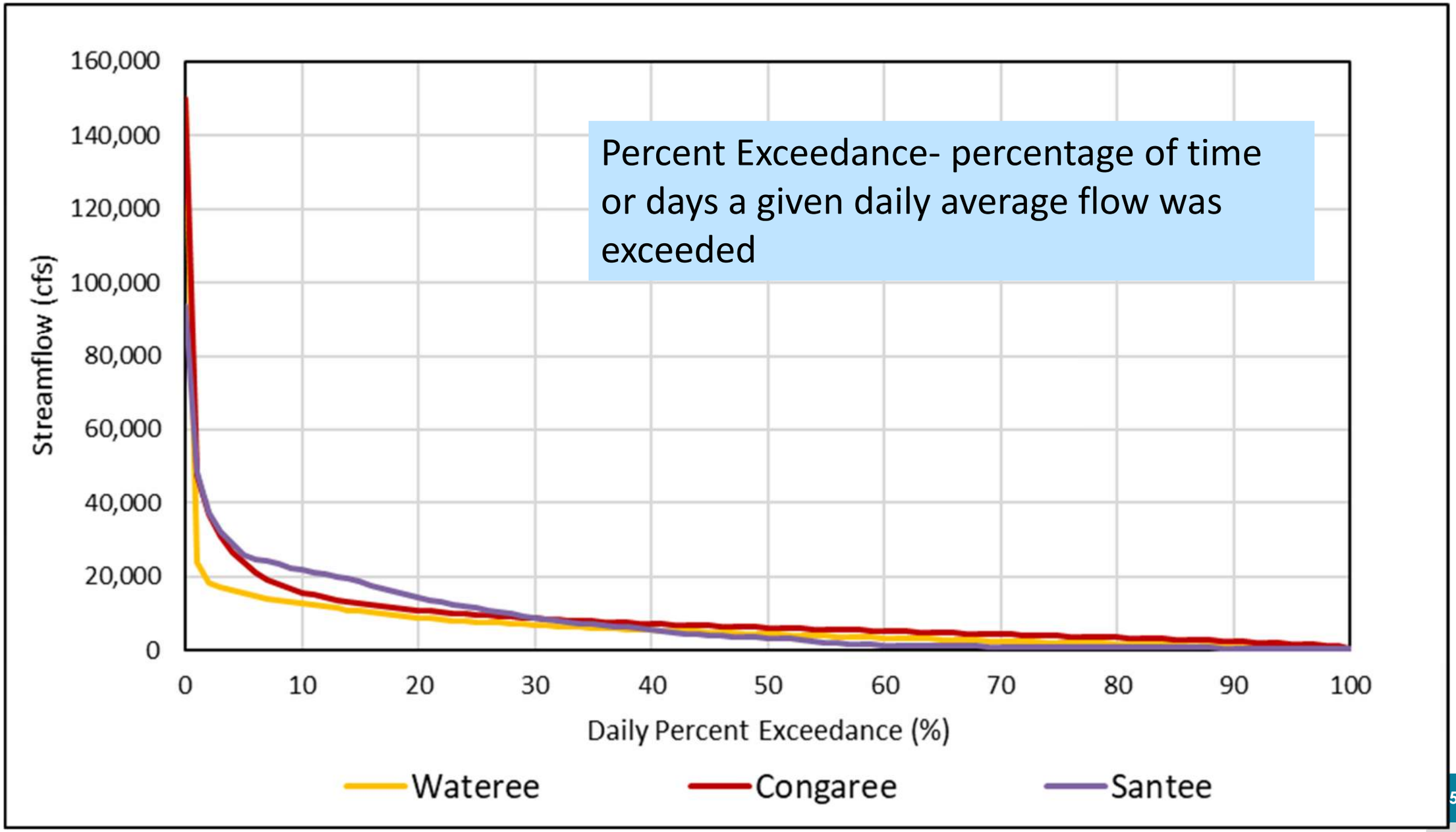
# Average Monthly Flows- Santee River



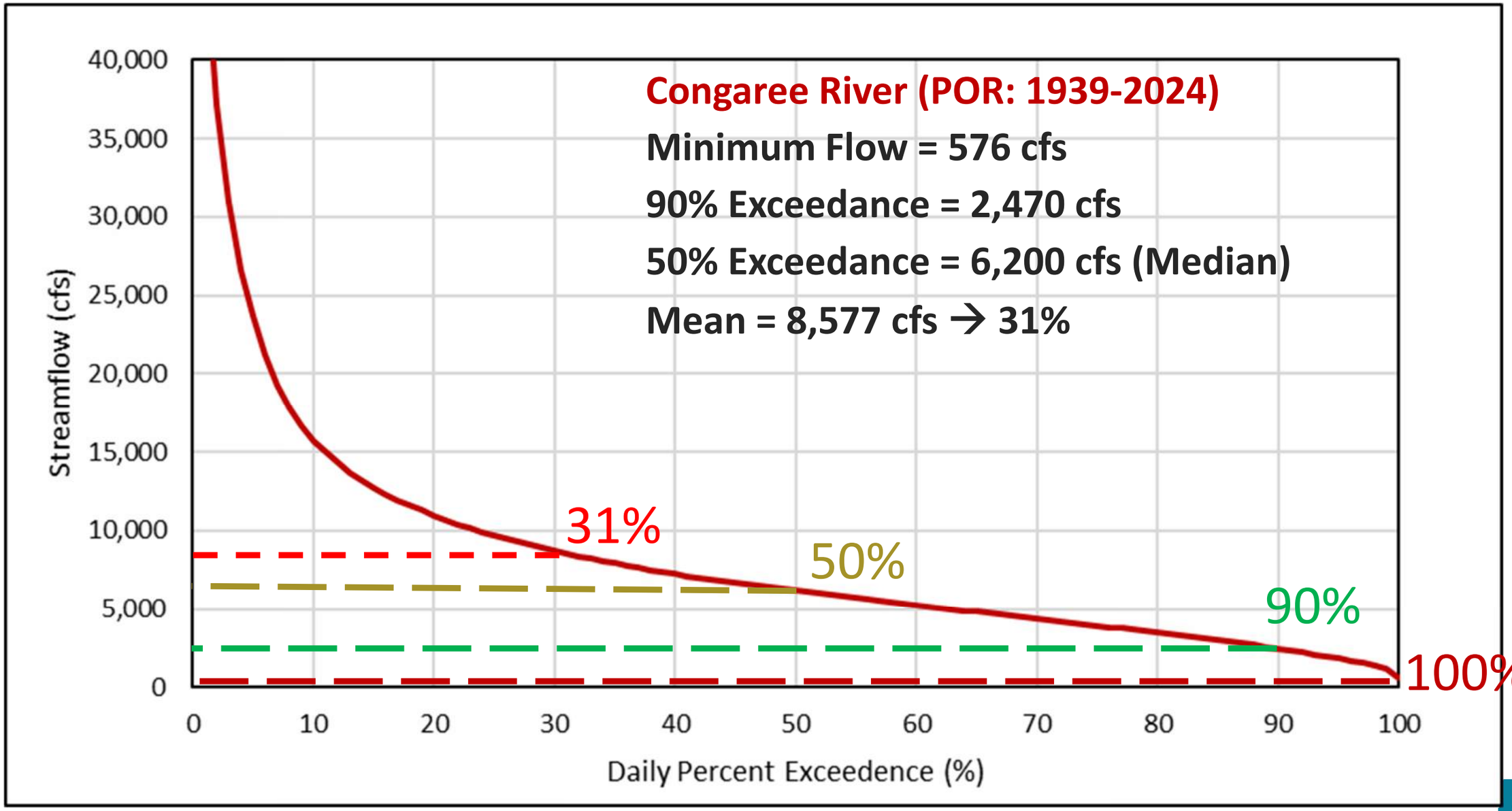
# Average Monthly Flows- Lake Moultrie Tailrace



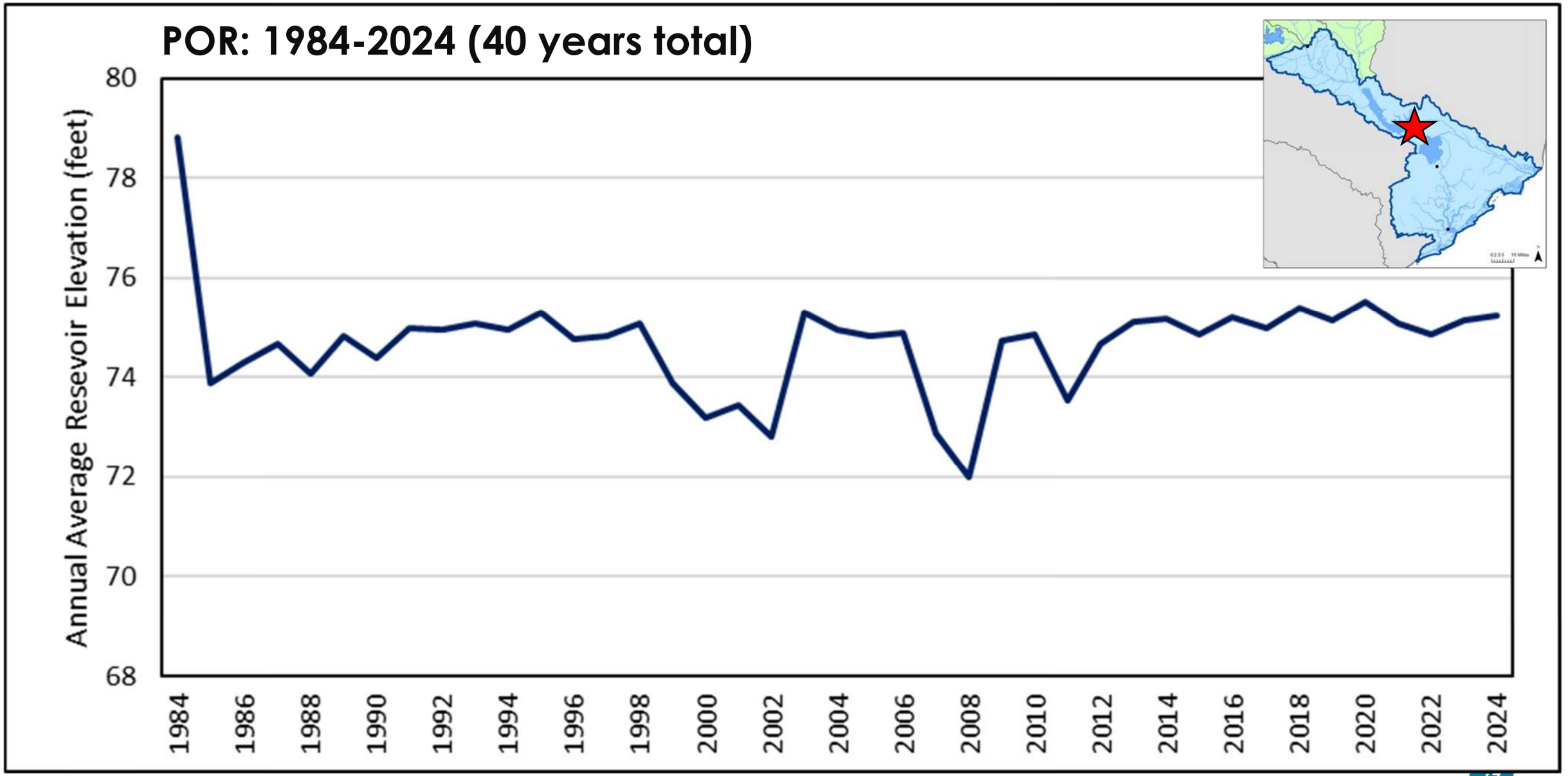
# Flow Duration Curve



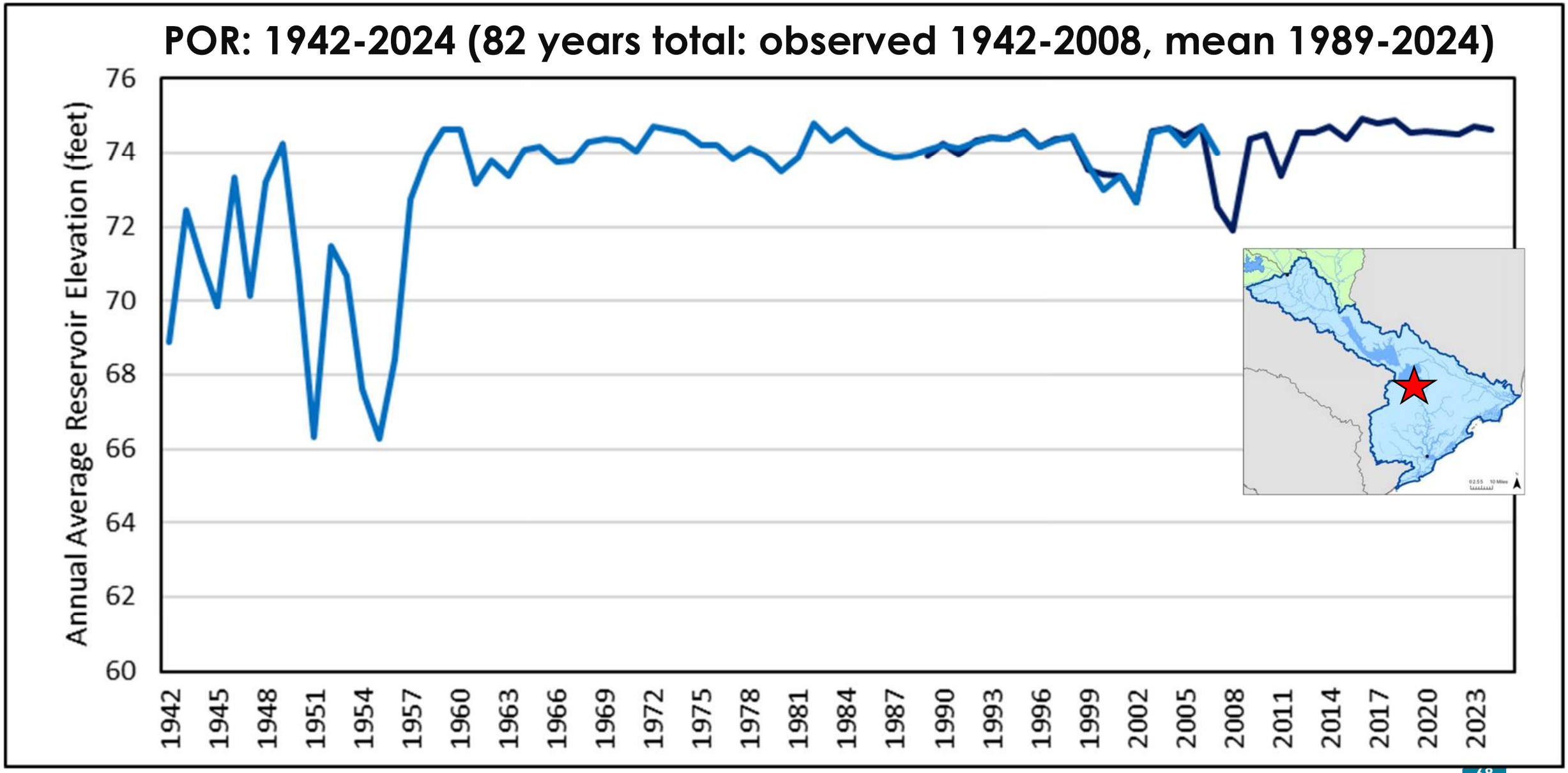
# Flow Duration Curve- Congaree



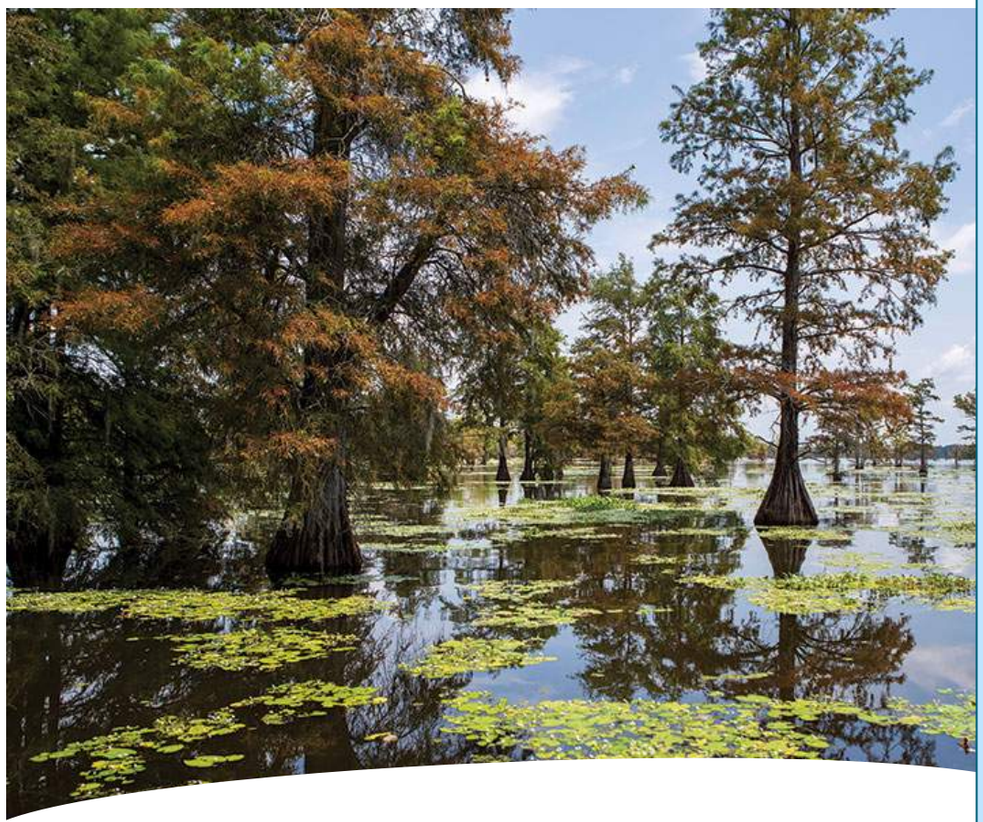
# Average Annual Elevation – Lake Marion nr Pineville



# Average Annual Elevation – Lake Moultrie nr Pinopolis



# Summary



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SC DES

**Flow in the Santee River is dependent on flows from the Saluda, Broad, and Wateree Rivers.**

**Flow in the Santee River is heavily regulated by large reservoirs, both in this basin and upstream.**

**Lakes Marion and Moultrie, and their releases to the Santee and Cooper Rivers, govern much of the basin's hydrology.**

**In the lower basin, flows in rivers and streams are tidally influenced.**