



Surface Water Resources of the Lower Savannah-Salkehatchie basin

Lower Savannah-Salkehatchie River Basin Council – Meeting #2, December 7th, 2023

Bull Durham Center, Estill, SC

Priyanka More

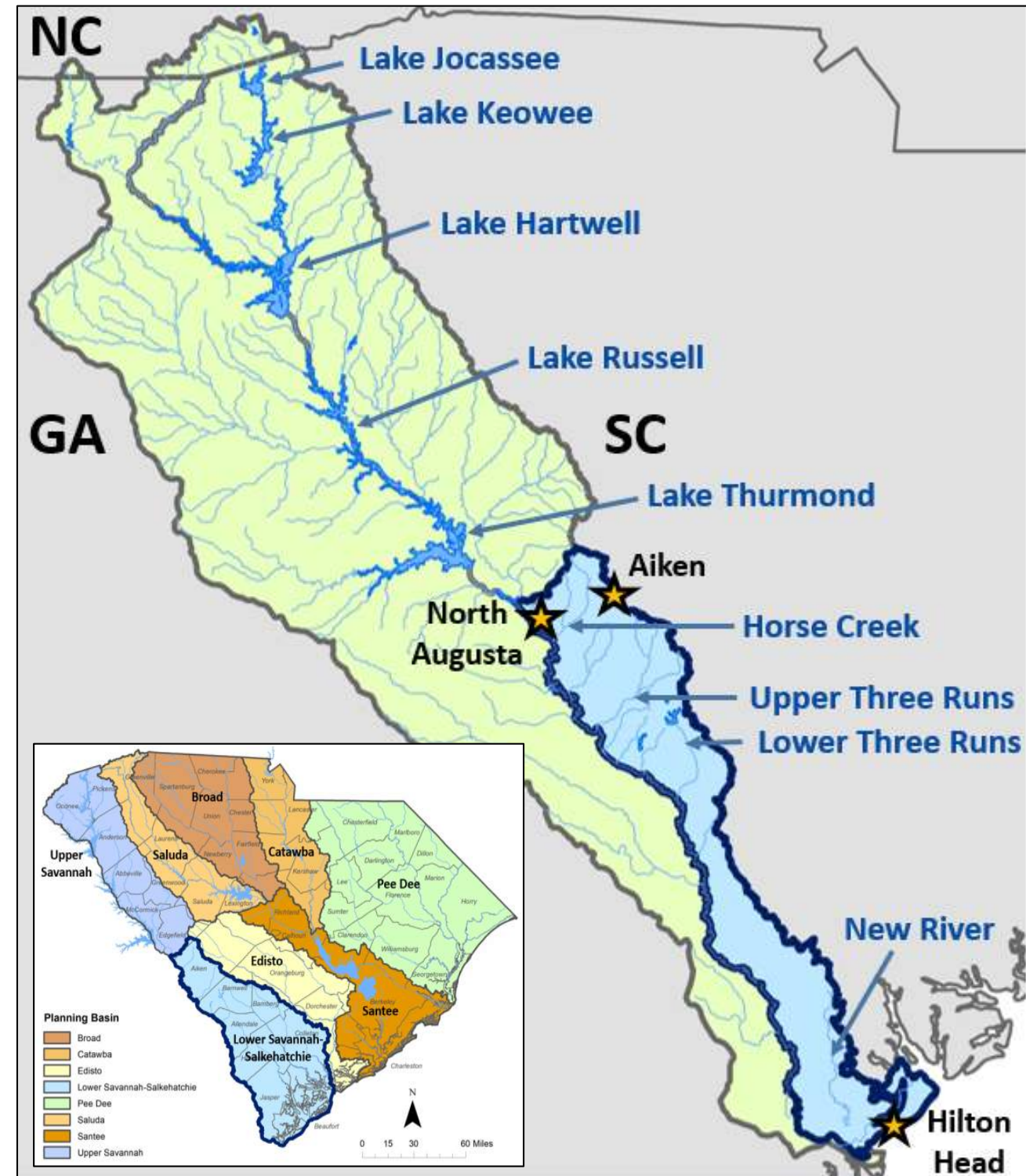
Hydrologist

SC Department of Natural Resources



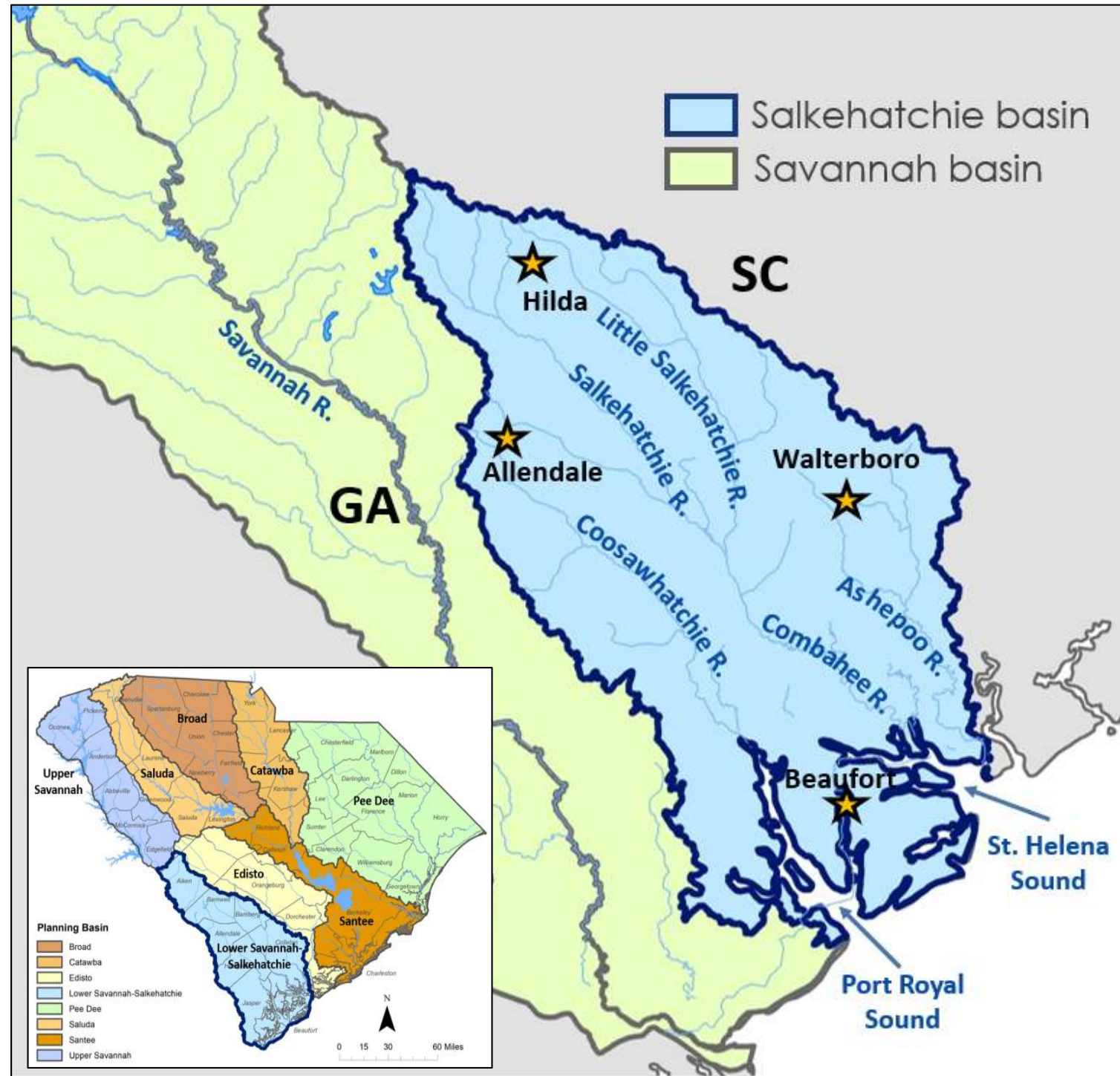
Savannah Basin Overview

- Length = 314 miles, with headwaters in the mountains of SC, GA, and NC.
- Spans 3 states – NC, GA, SC.
- Area = 10,971 sq. mi.
 - GA – 5,821 sq. mi. (53.1%)
 - SC – 4,979 sq. mi. (45.4%)
 - NC – 171 sq. mi. (1.6%)
- Upper basin dominated by reservoirs operated by Duke Energy and the U.S. Army Corps of Engineers.
- Lower Savannah Basin:
 - 1,759 sq. mi.
 - Outside of Savannah River Site, no major reservoirs.



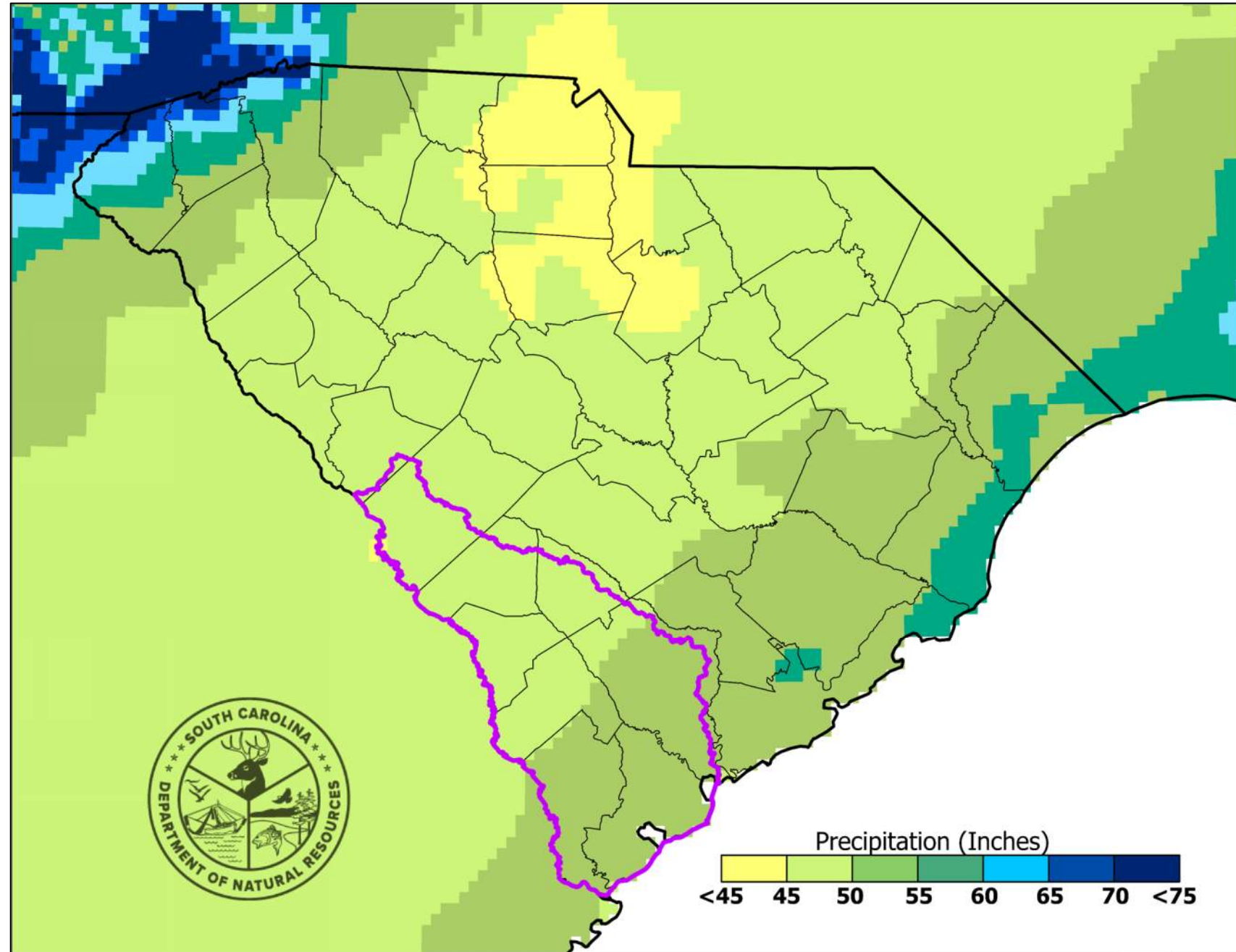
Salkehatchie Basin Overview

- Basin entirely lies in SC.
- Area = 2,725 sq. mi.
- Salkehatchie, Coosawhatchie, and Ashepoo are the major rivers draining the middle and lower Coastal Plain regions in the basin.
- No major reservoirs.
- Basin contains the most extensive estuarine water bodies in the State.



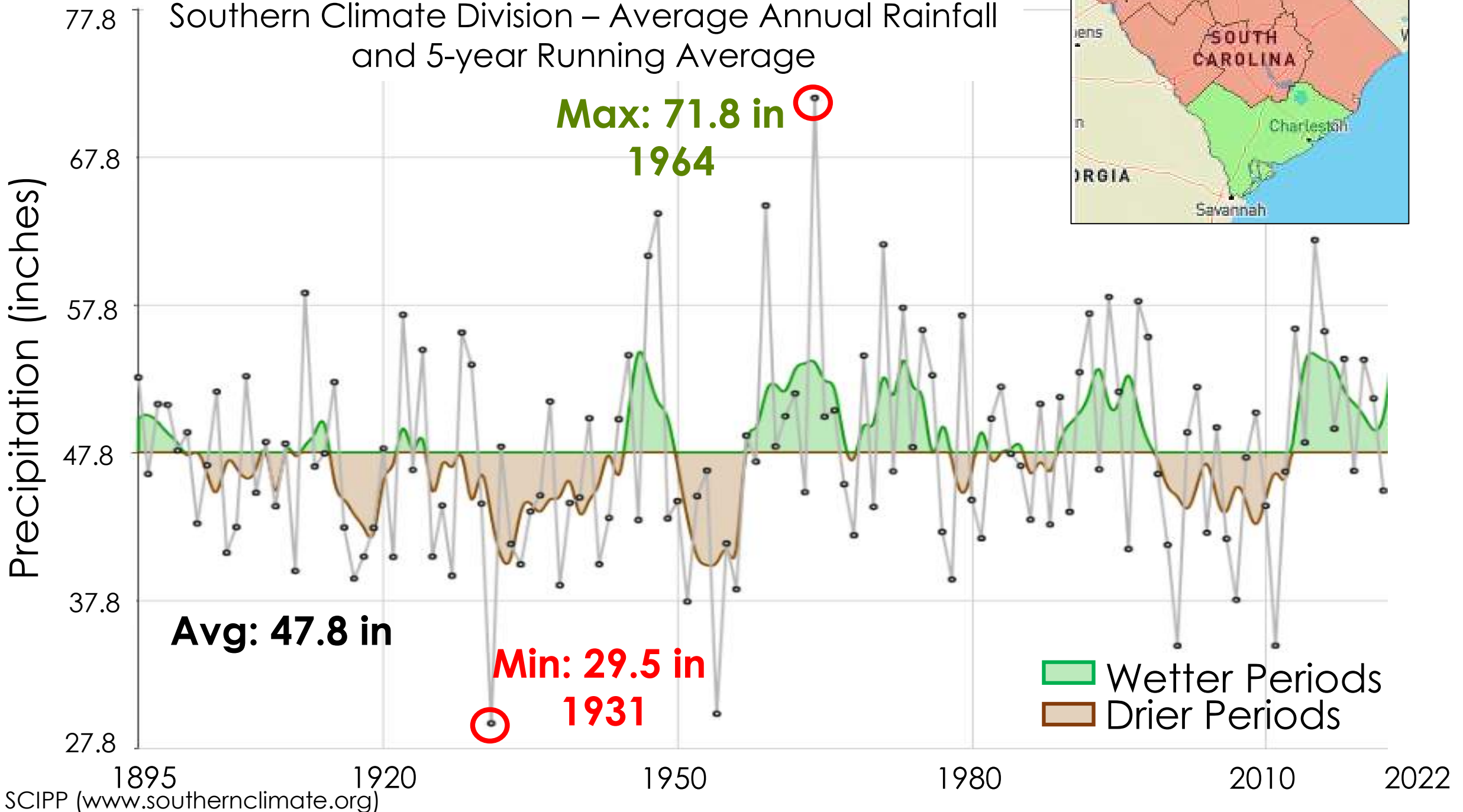
1991-2020 Annual Rainfall – Climate Normal

- Average annual rainfall ranges from 45" to 55" in the basin.
- Higher rainfall near the coast from tropical events.



Average Annual Rainfall 1895-2022

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



Max: 71.8 in
1964

Avg: 47.8 in

Min: 29.5 in
1931

Wetter Periods
Drier Periods

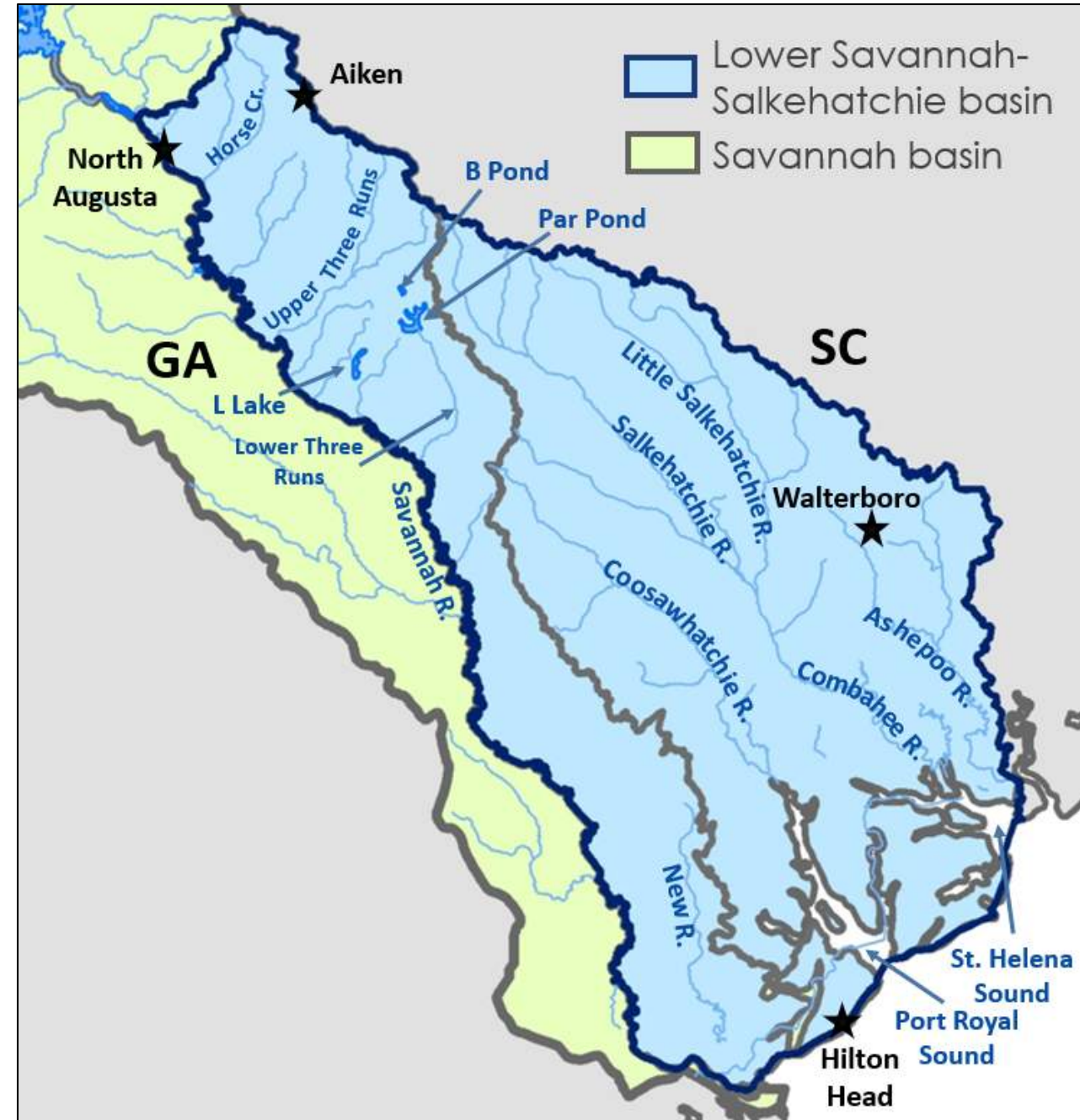
Physiographic Provinces

- 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.



Lower Savannah-Salkehatchie Streamflow

- Savannah mainstem:
 - Flows are regulated and reflect controlled discharges from upstream hydroelectric power facilities.
 - Regulation results in less variable flows than would occur naturally.
 - Higher and more well-sustained low flows.
- Unregulated streams:
 - Well sustained flows in Upper Coastal Plain due to higher baseflow.
 - Highly variable with less sustained low flows in Lower Coastal Plain due to lower baseflow.



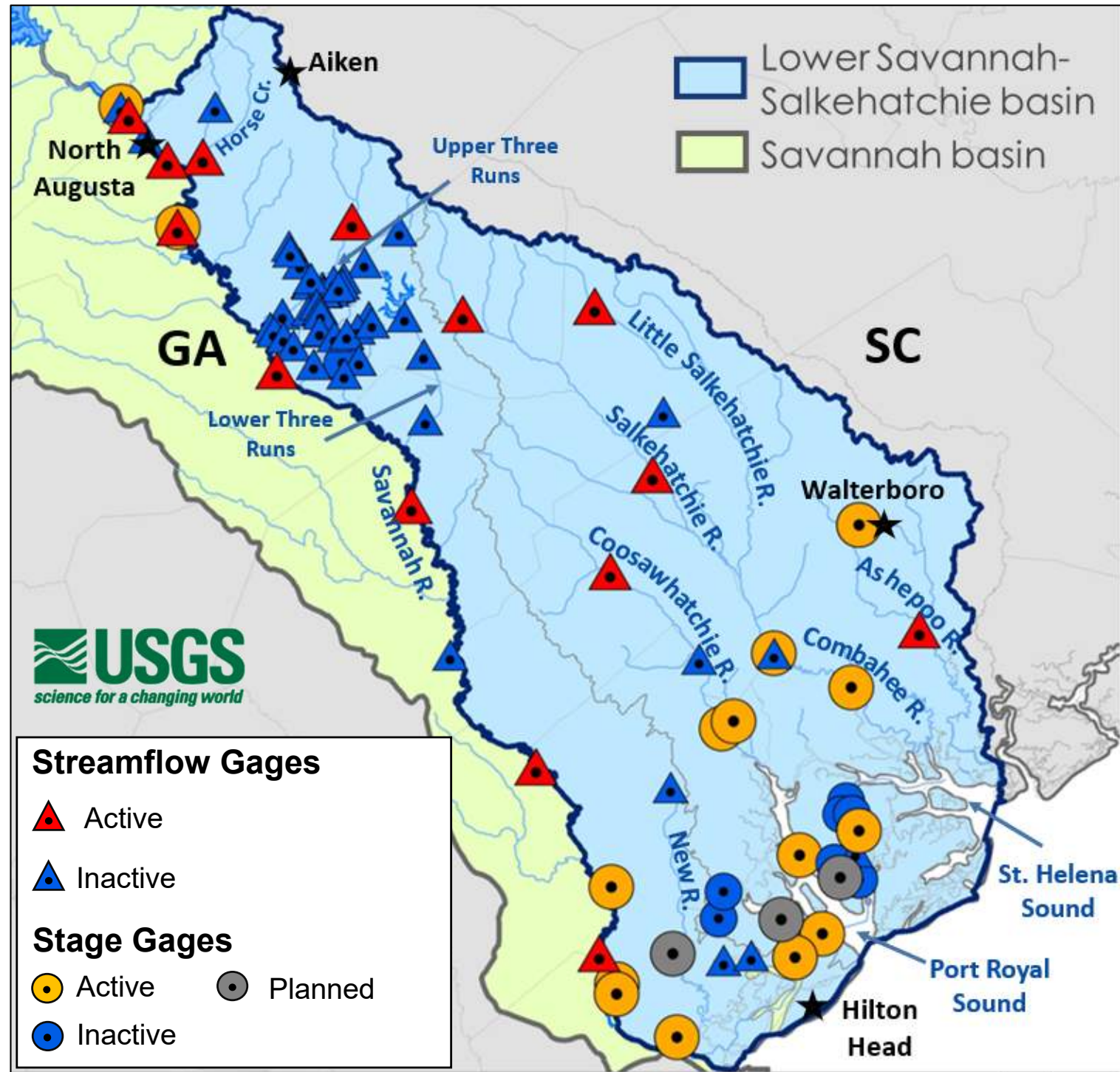
USACE Savannah River Drought Management Plan

- The Savannah River Basin Drought Contingency Plan was developed to address the operation of the three USACE impoundments on the Savannah River during droughts.
- During droughts, releases from Lake Thurmond are altered in accordance with the plan, thereby affecting water availability in the Lower Savannah basin.

Trigger Level	Time of Year	Drought Response
1	Jan 1 - Dec 31	IF BR index >10%, Target 4200 cfs (weekly average) release at Thurmond Dam
		IF BR index <10%, Target 4000 cfs (weekly average) release at Thurmond Dam
2	Feb 1 - Oct 31	IF BR index >10%, Target 4000 cfs (weekly average) release at Thurmond Dam
	Nov 1 - Jan 31	IF BR index <10%, Target 3800 cfs (daily average) release at Thurmond Dam
3	Feb 1 - Oct 31	Target 3600 cfs (daily average) release at Thurmond Dam
	Nov 1 - Jan 31	Target 3800 cfs (daily average) release at Thurmond Dam
	(Feb 1 - Feb 28) w/NMFS approval	Target 3100 cfs (daily average) release at Thurmond Dam
4	Feb 1 - Oct 31	Target 3600 cfs (daily average) release at Thurmond Dam
	Nov 1 - Jan 31	Target 3600 cfs (daily average) release at Thurmond Dam
	(Feb 1 - Feb 28) w/NMFS approval	Target 3100 cfs (daily average) release at Thurmond Dam

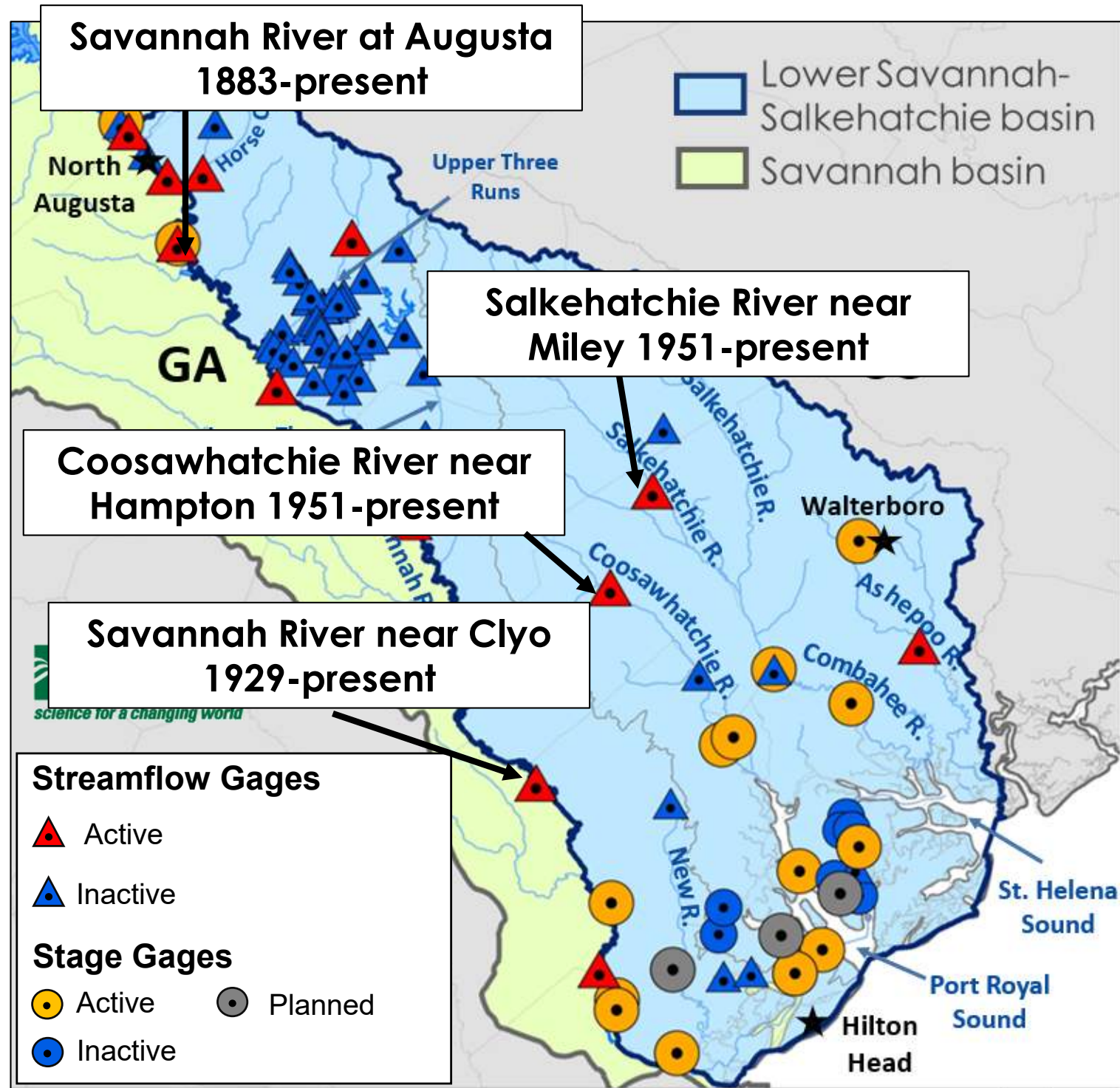
Surface Water Monitoring Network

- 14 active USGS streamflow gaging sites.
 - Sites measure volumetric discharge (cfs – cubic feet per second) and stage.
- 15 additional USGS stage sites.
- Period of record extends back to 1880's for a Savannah mainstem site and 1950's for Salkehatchie planning basin sites.



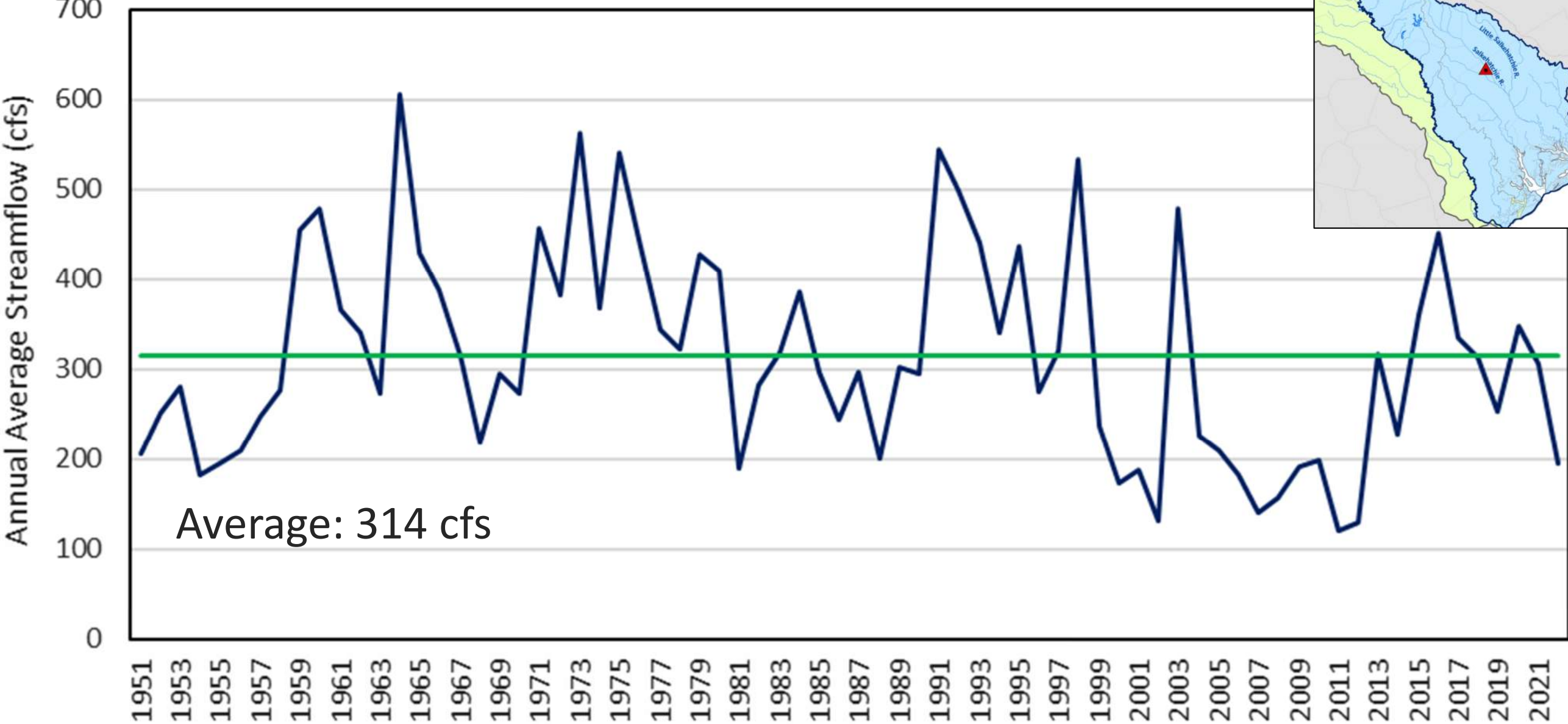
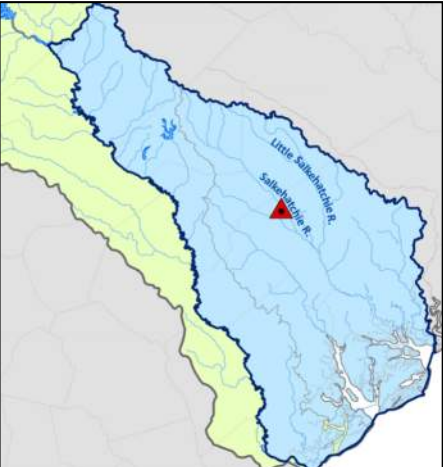
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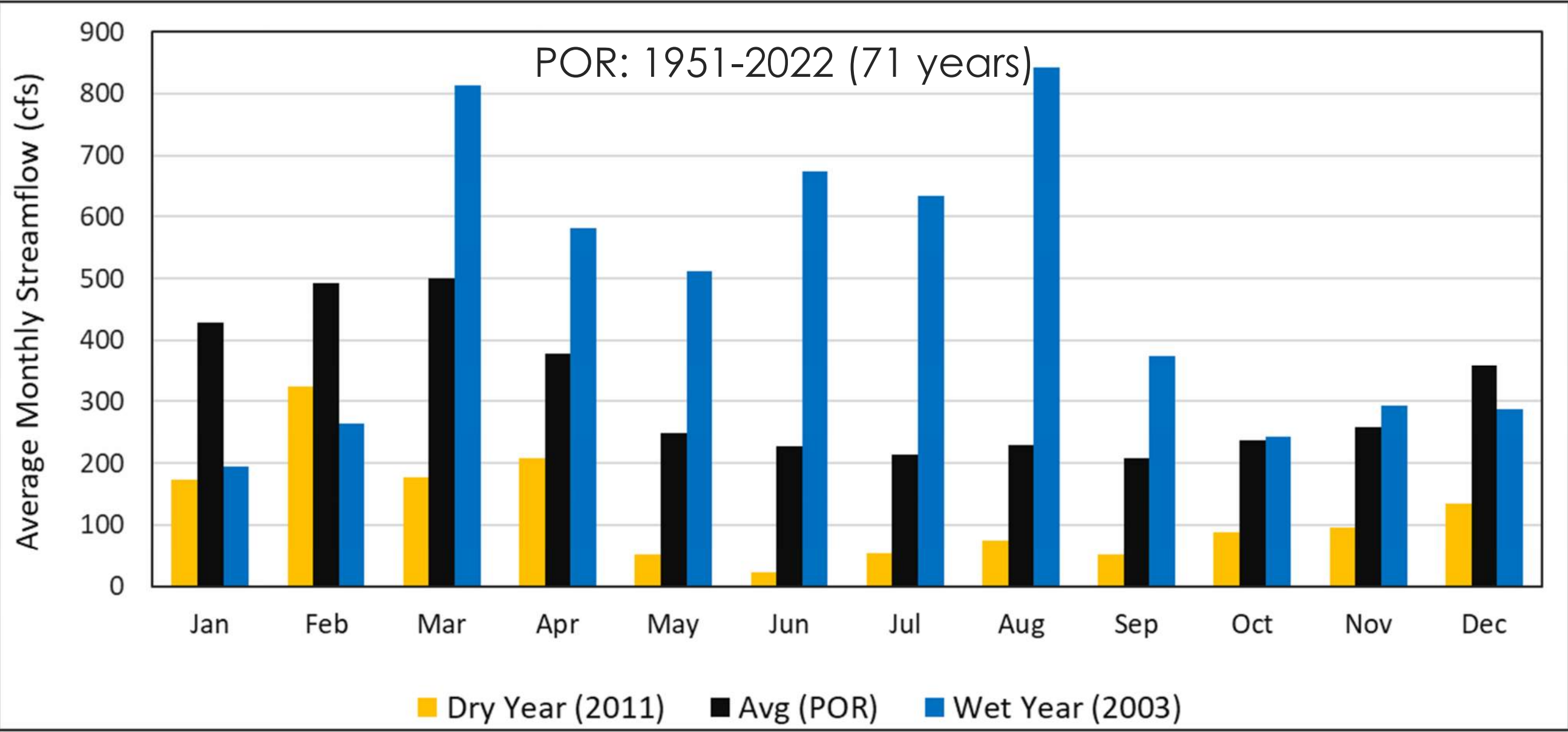


Average Annual Flows – Salkehatchie River nr Miley

POR: 1951-2022 (71 years)

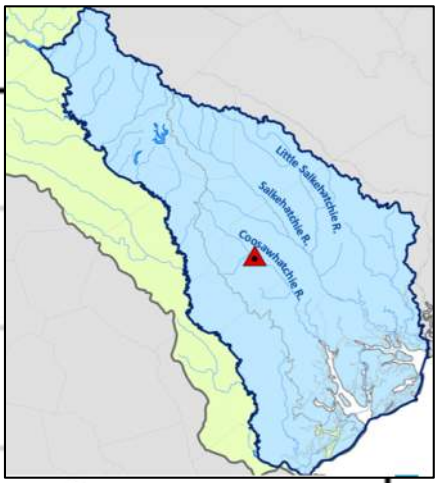
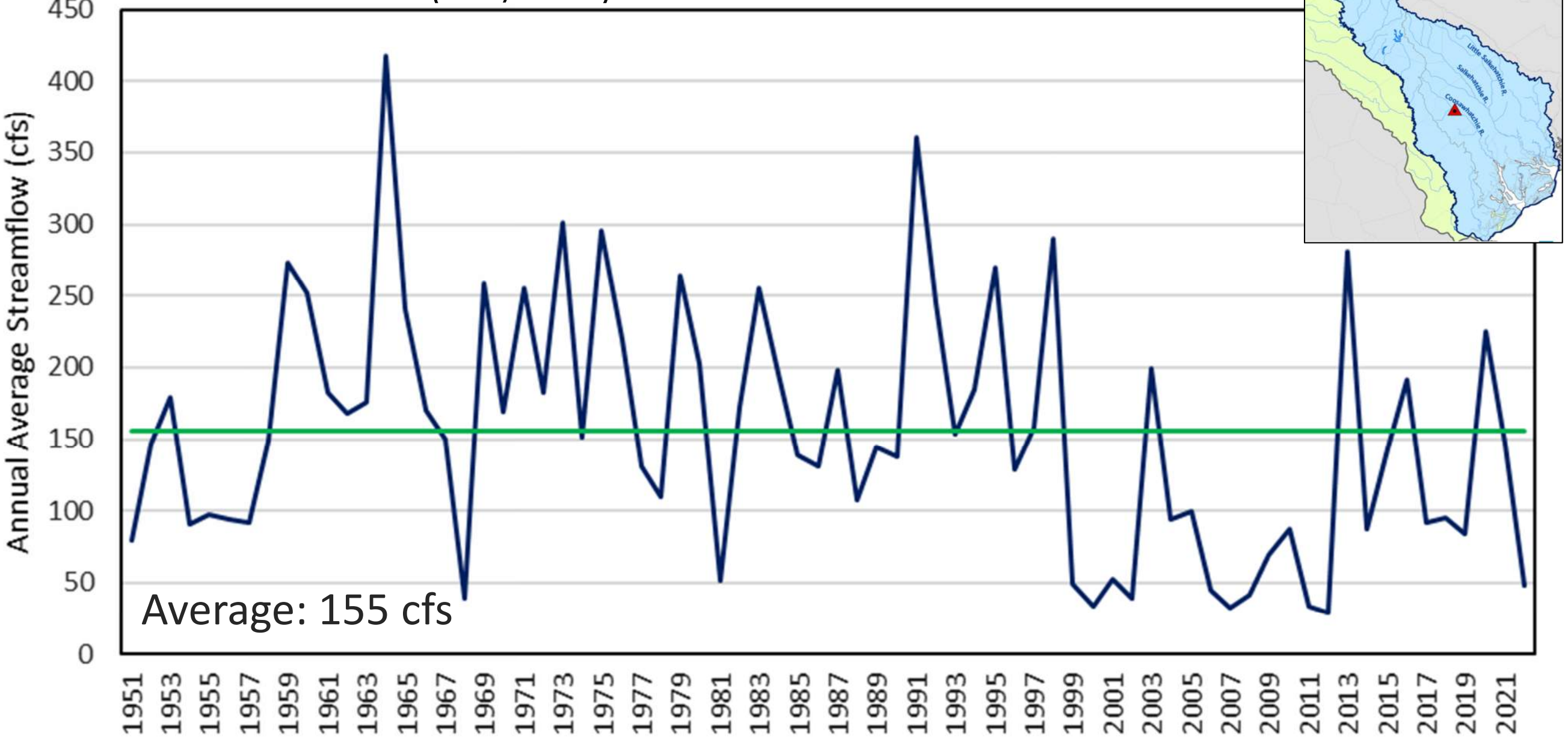


Average Monthly Flows – Salkehatchie River

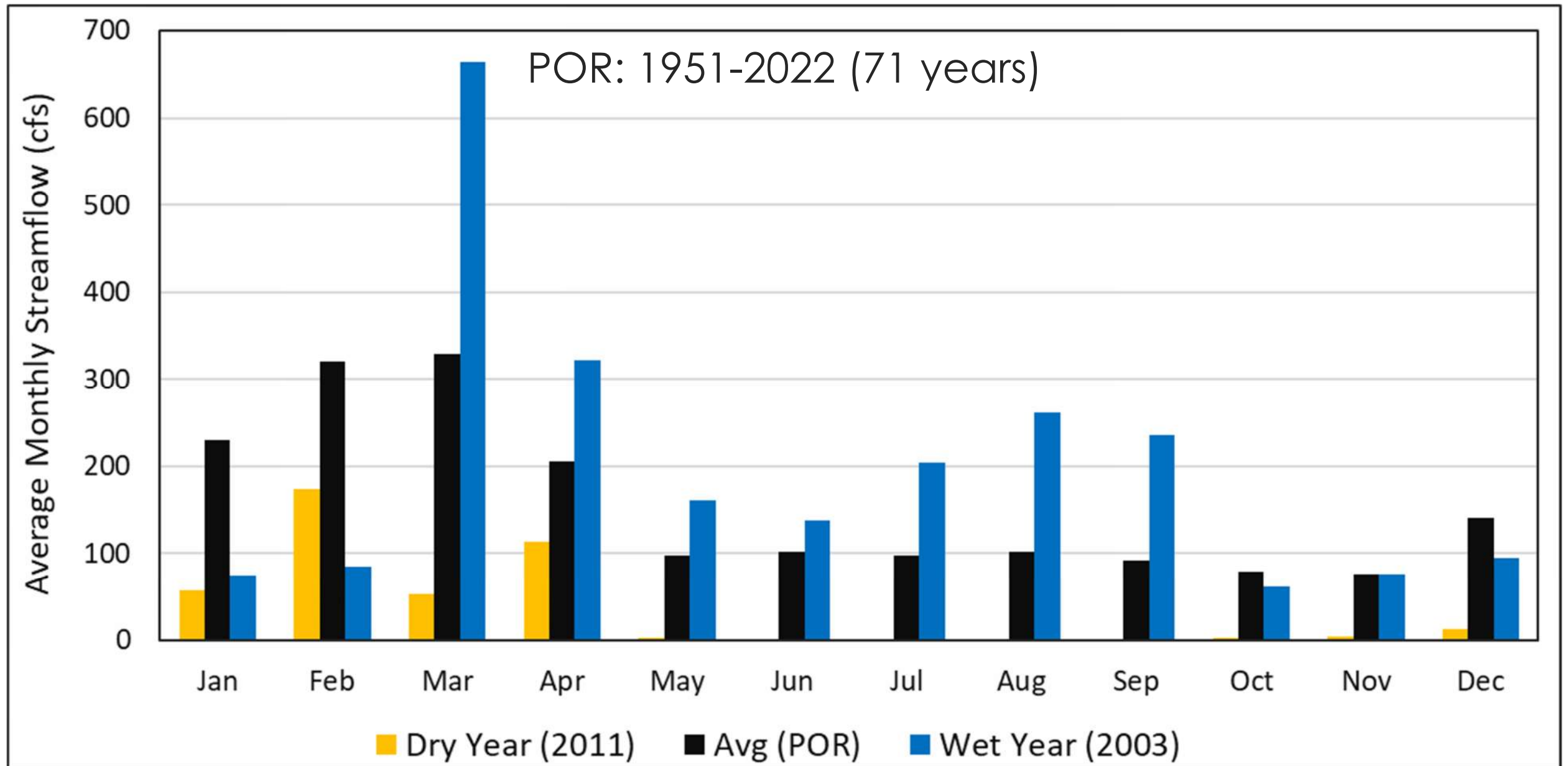


Average Annual Flows – Coosawhatchie River nr Hampton

POR: 1951-2022 (71 years)

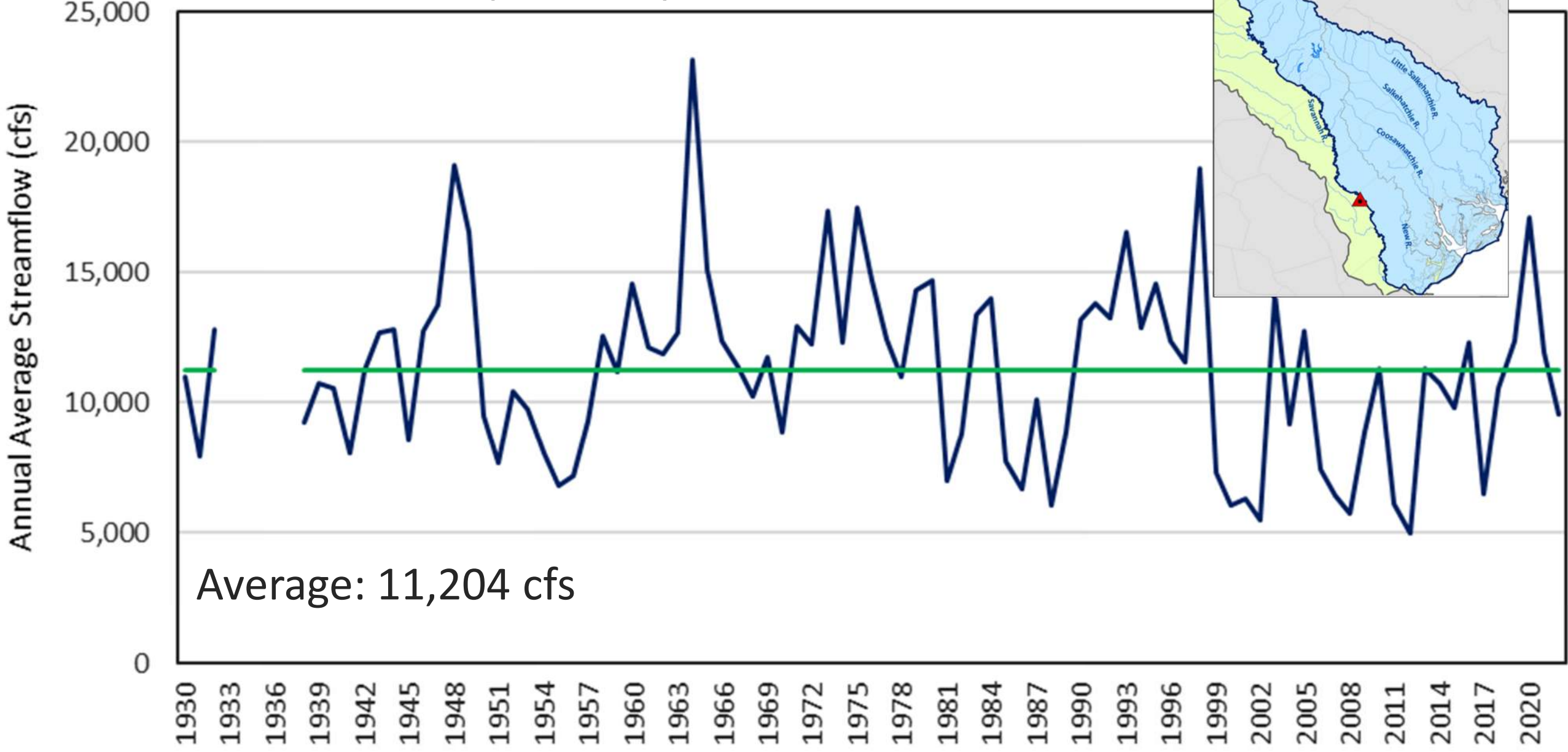


Average Monthly Flows – Coosawhatchie River

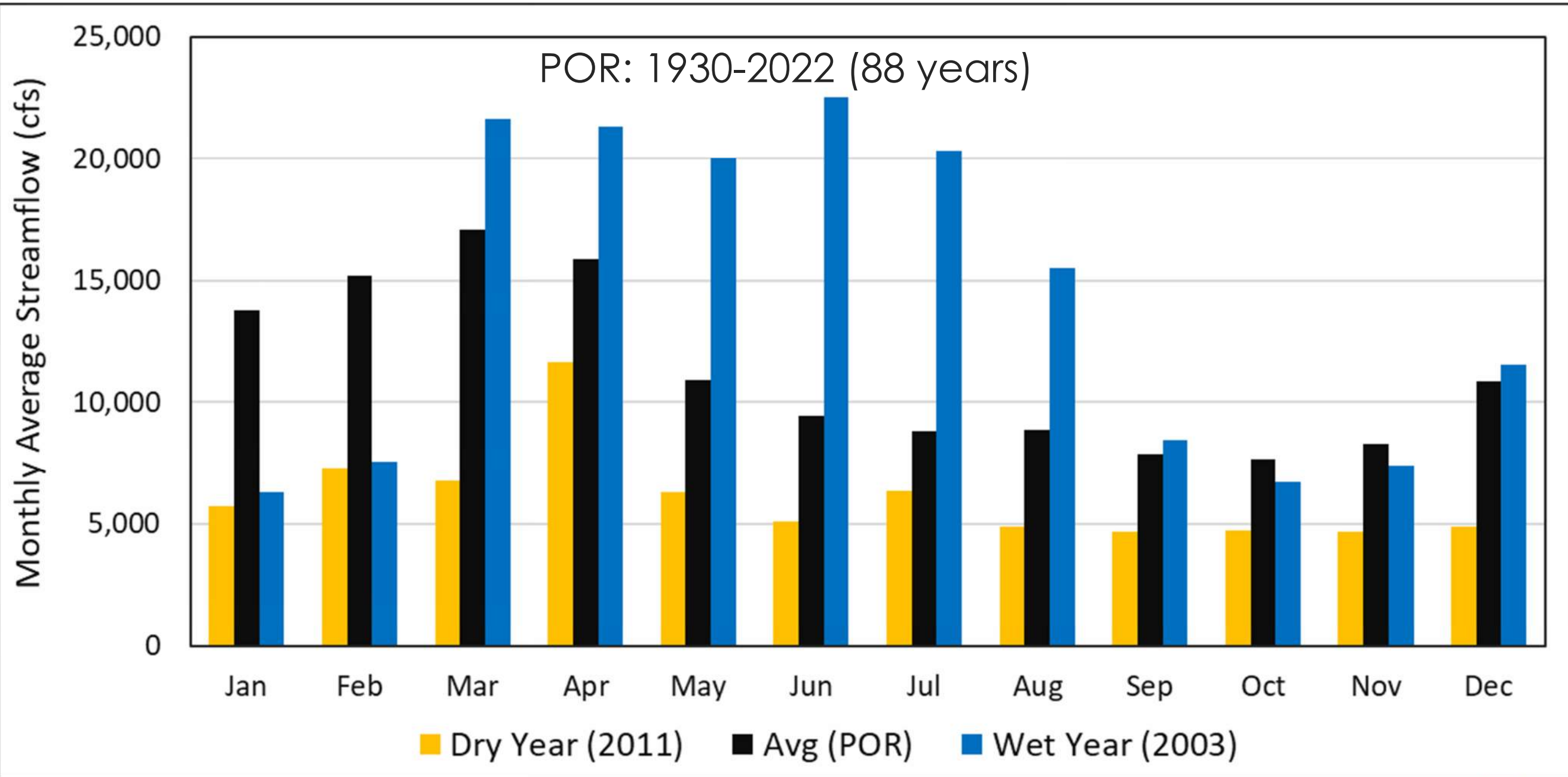


Average Annual Flows – Savannah River nr Clio

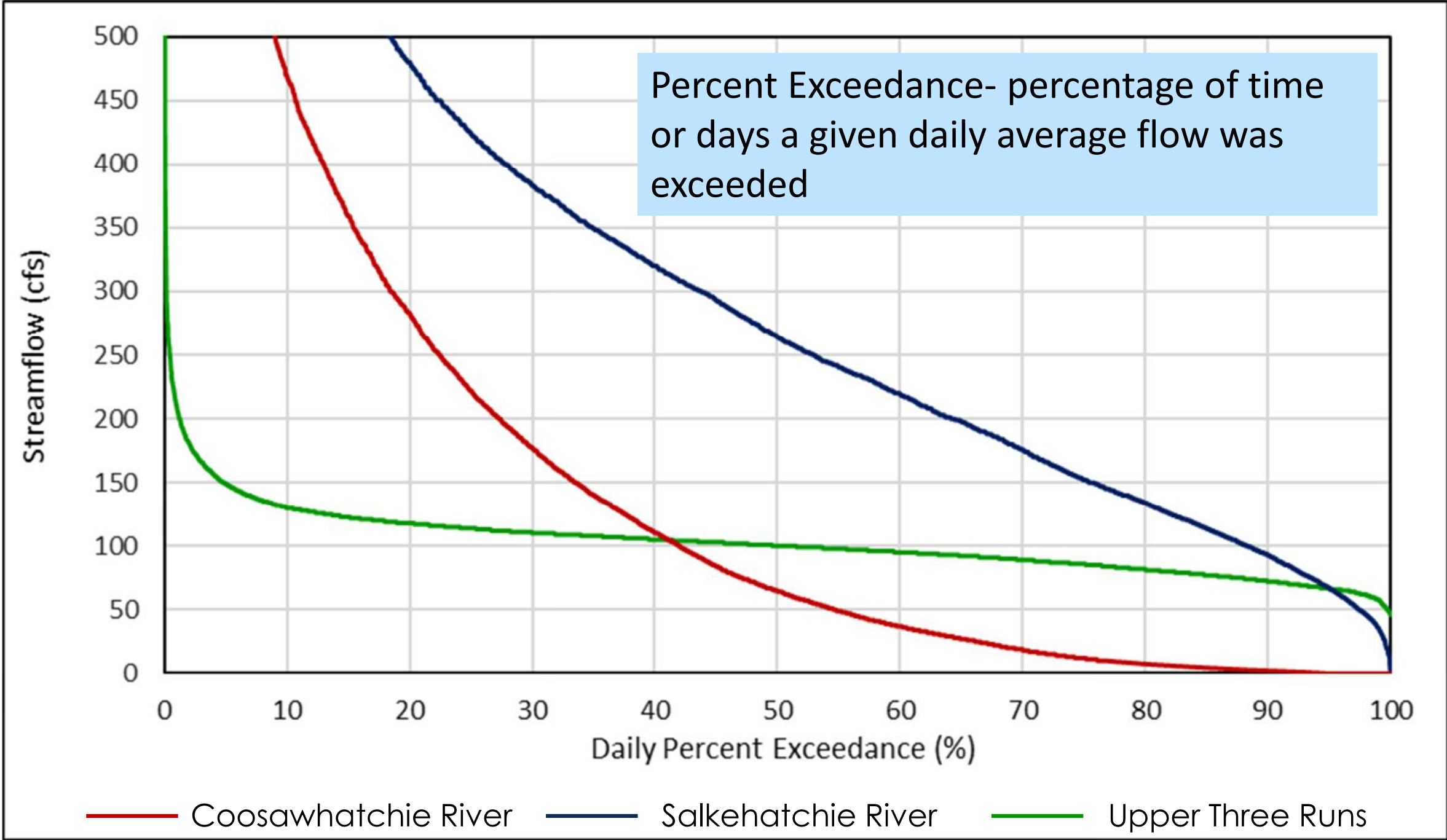
POR: 1930-2022 (88 years)



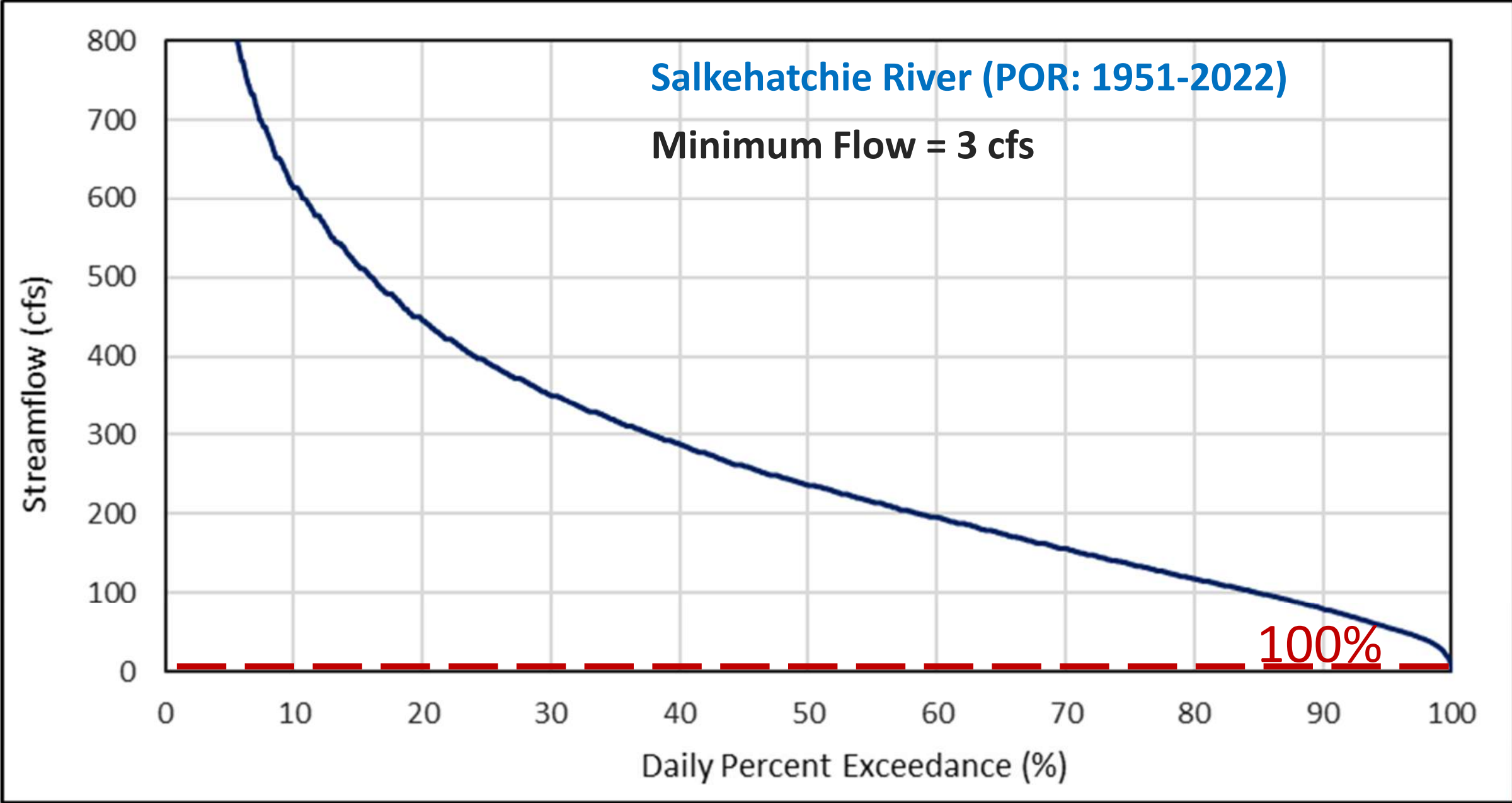
Average Monthly Flows – Savannah River nr Clyo



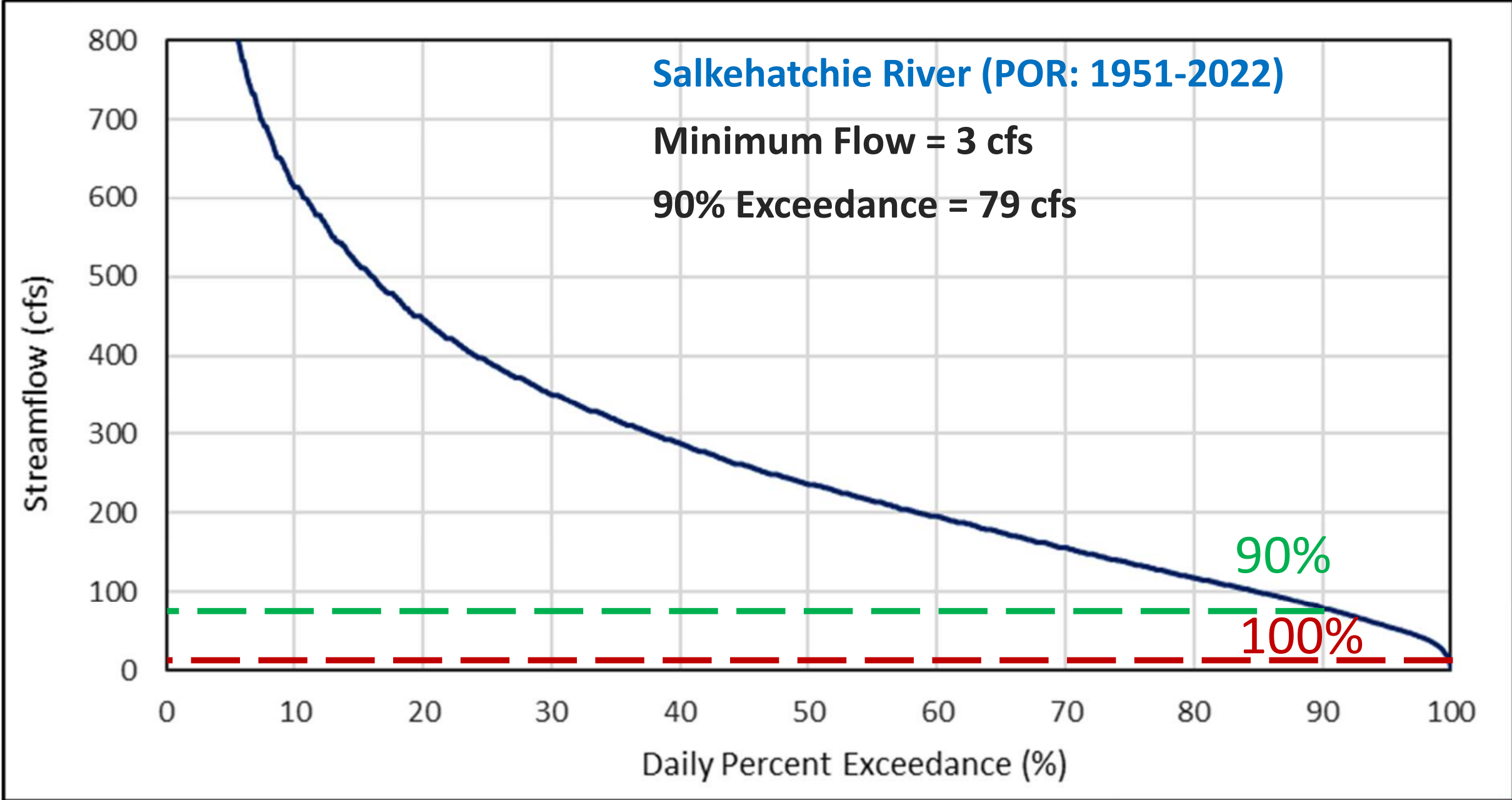
Flow Duration Curve



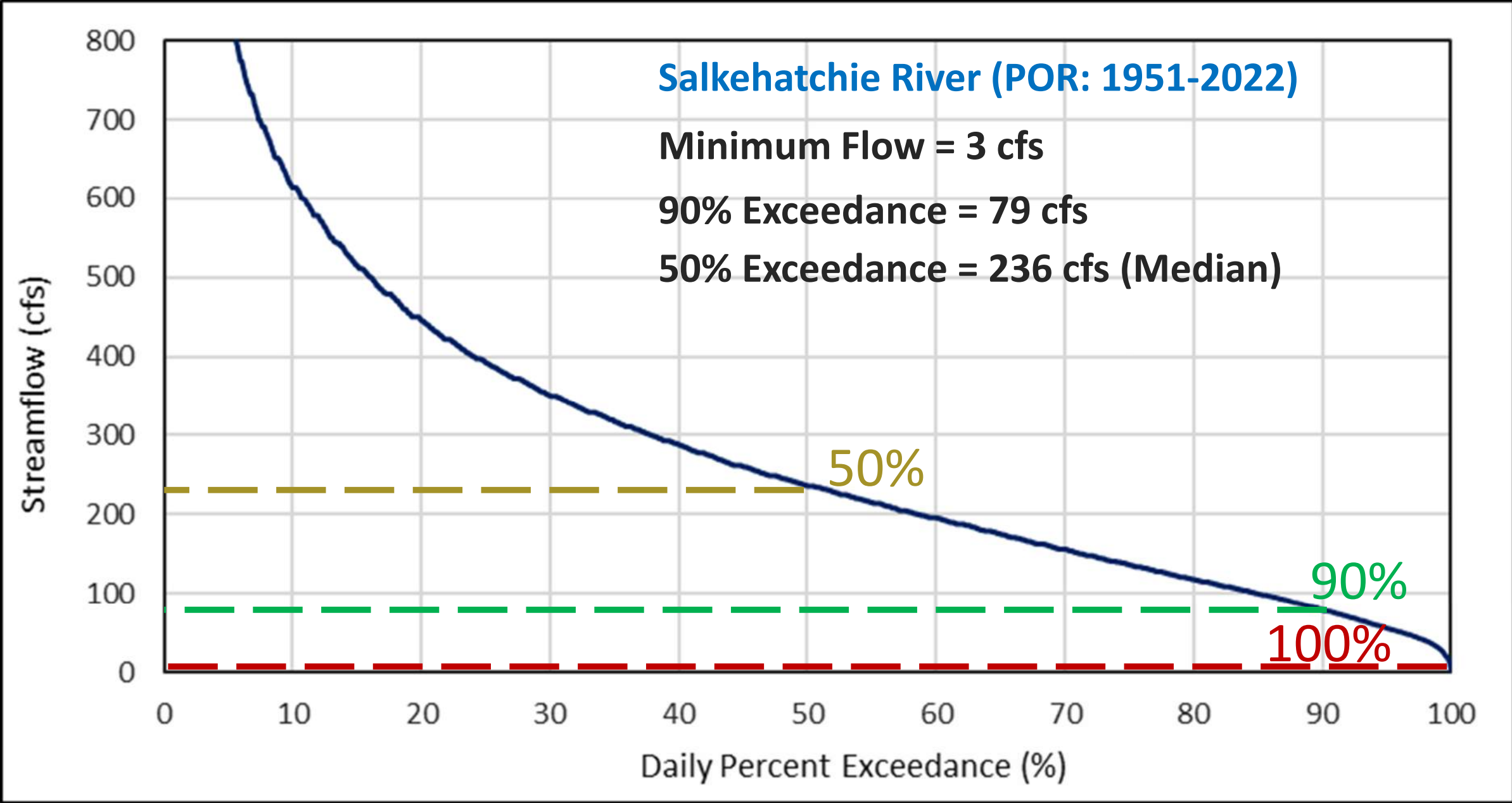
Flow Duration Curve – Salkehatchie



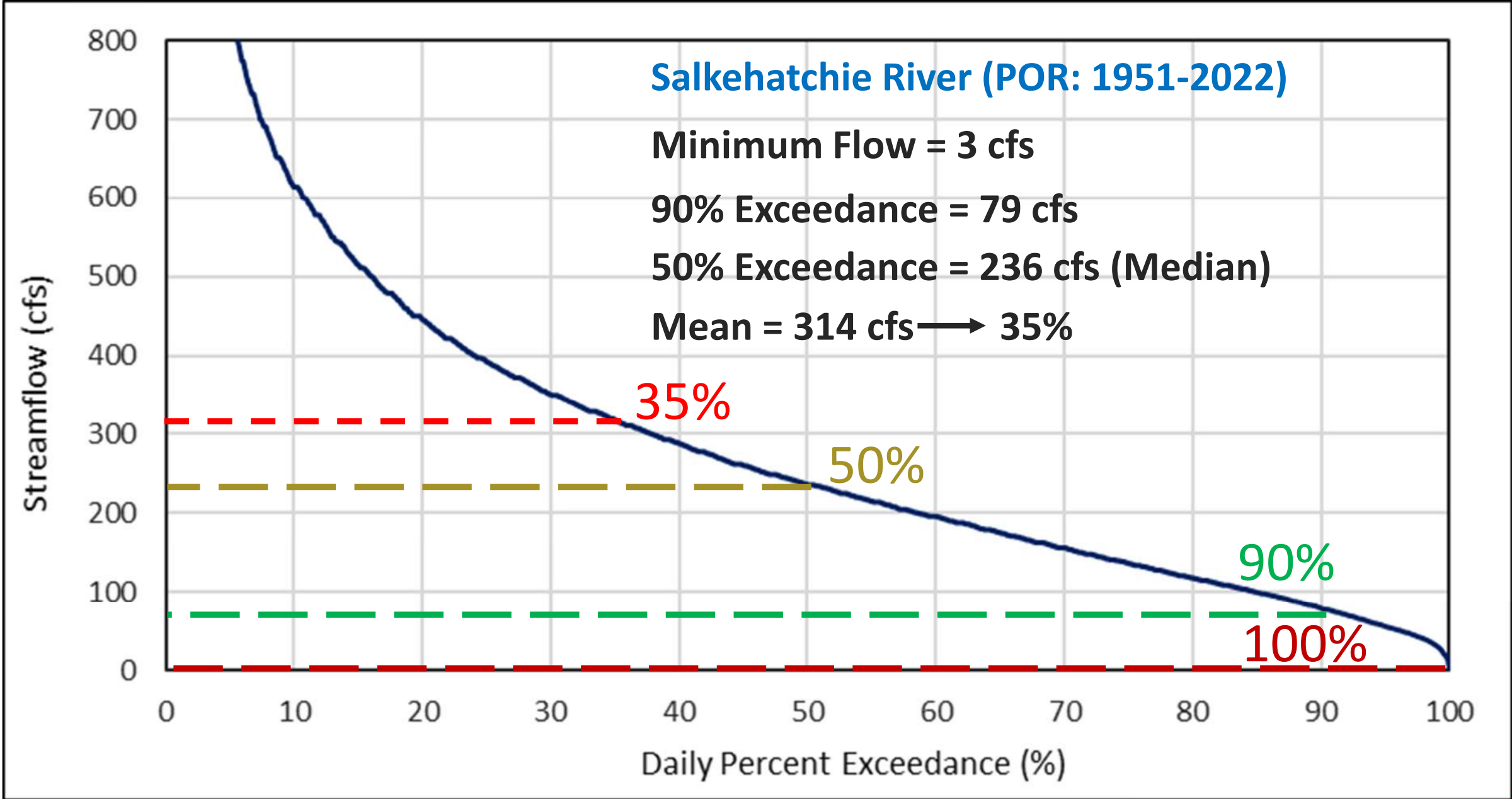
Flow Duration Curve – Salkehatchie



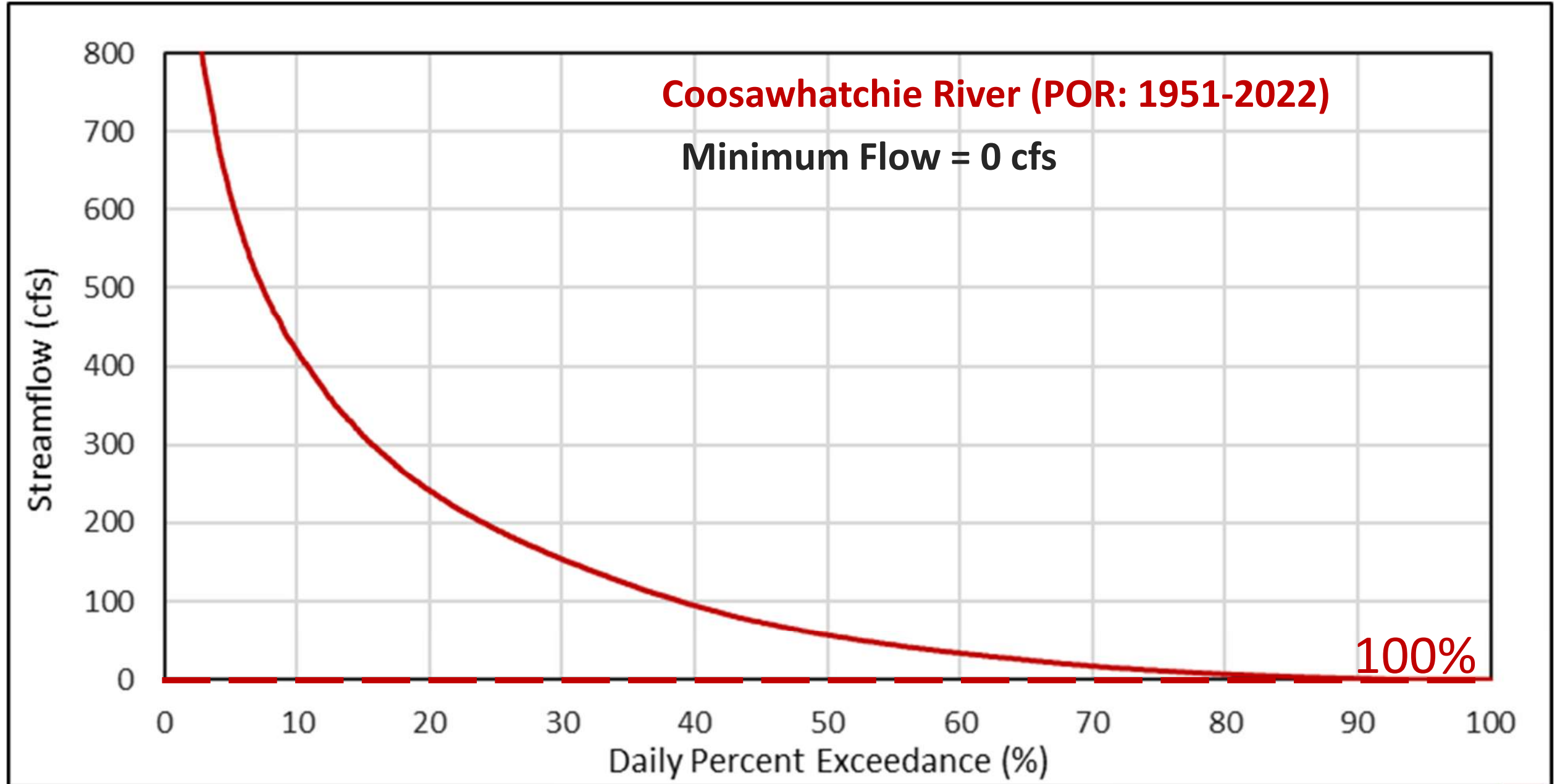
Flow Duration Curve – Salkehatchie



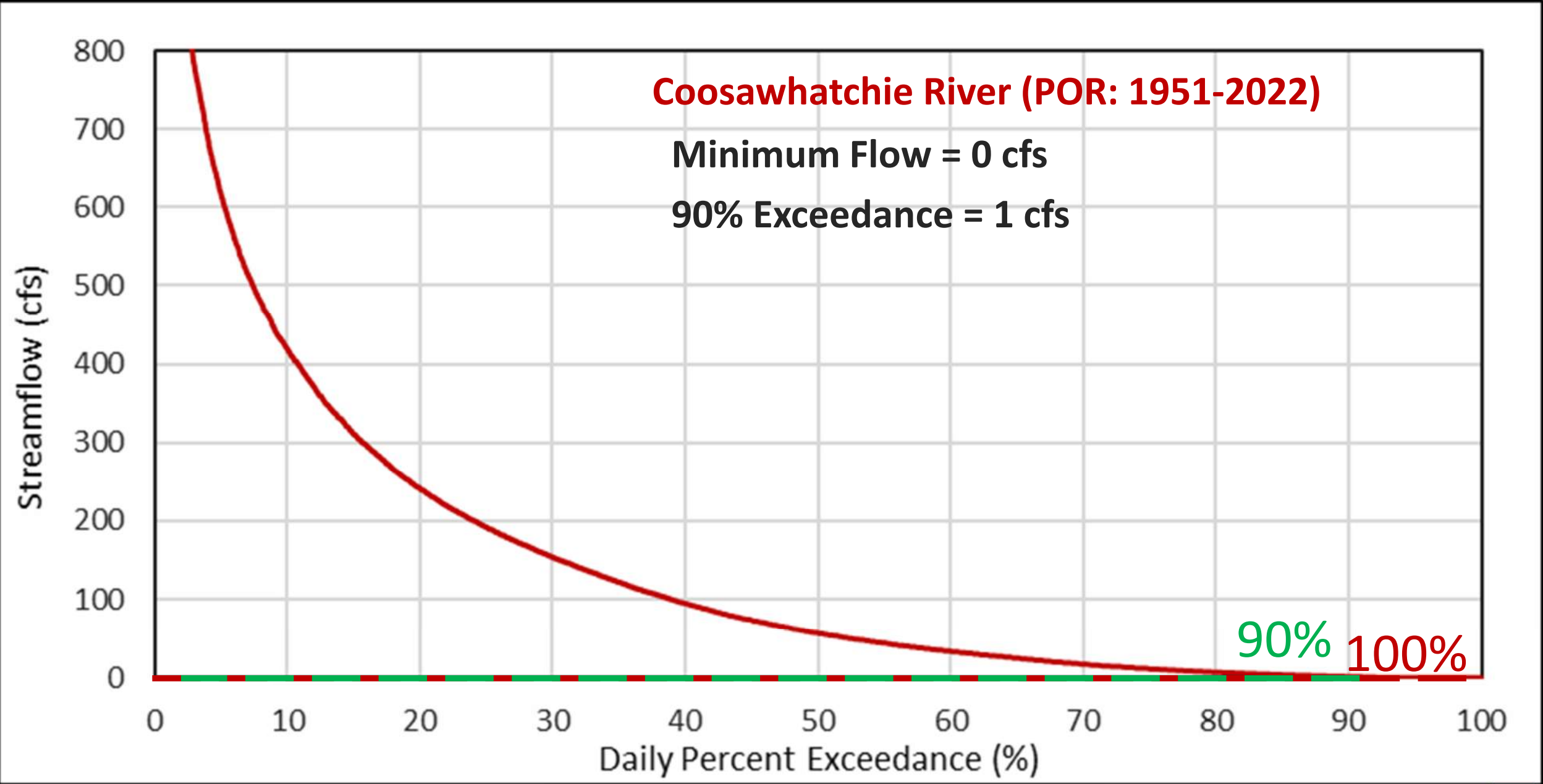
Flow Duration Curve – Salkehatchie



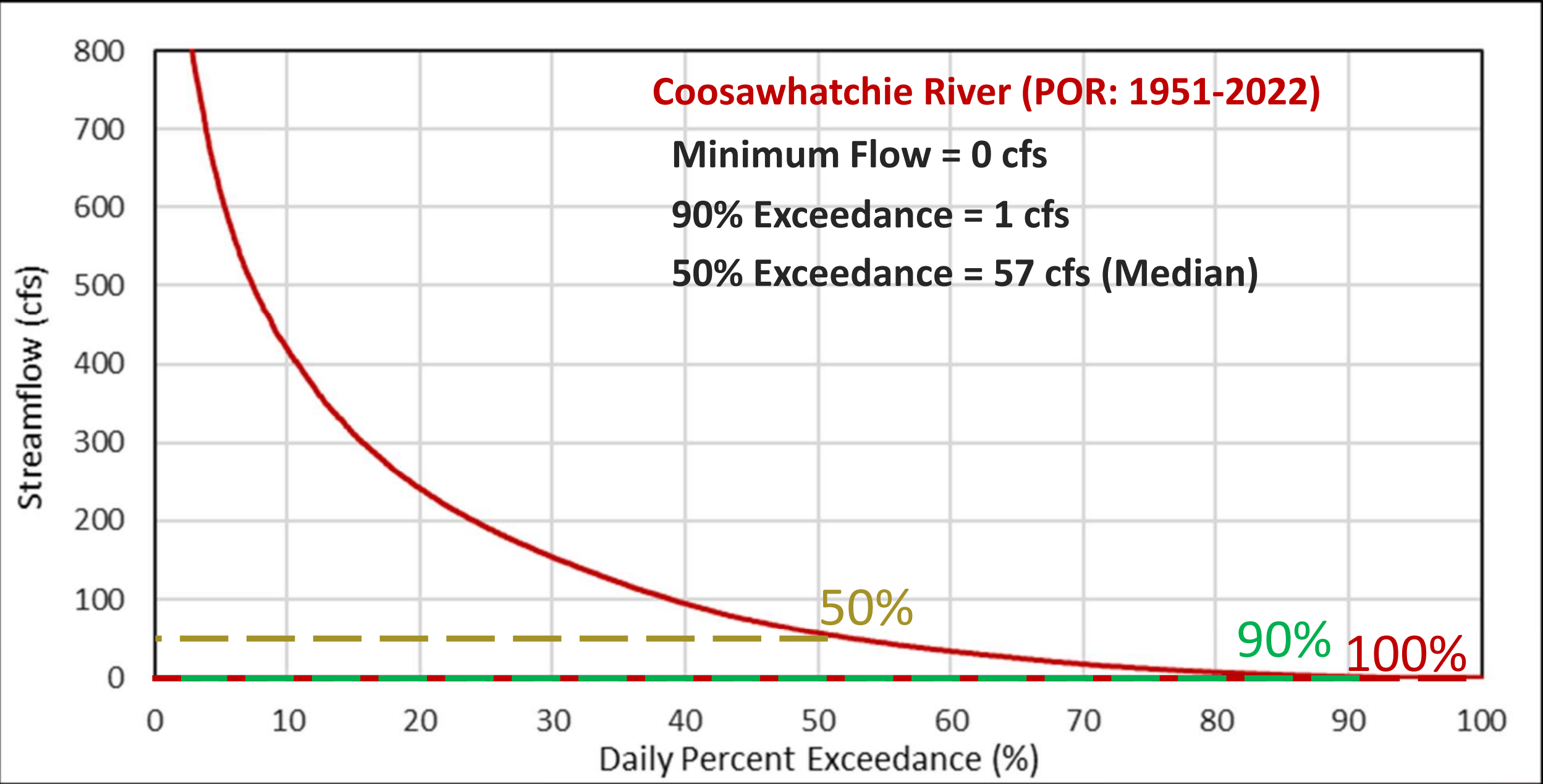
Flow Duration Curve – Coosawhatchie River



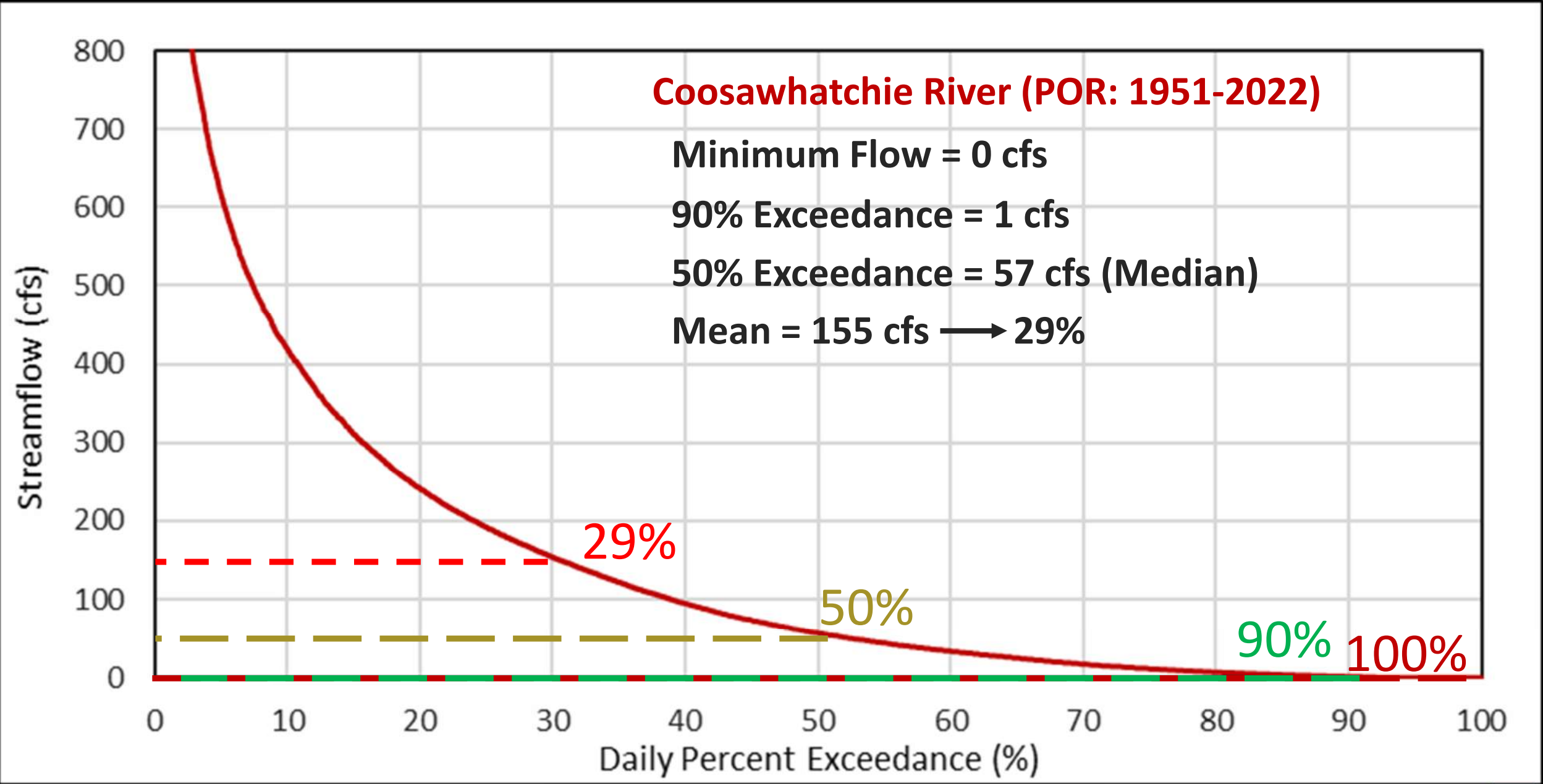
Flow Duration Curve – Coosawhatchie River



Flow Duration Curve – Coosawhatchie River

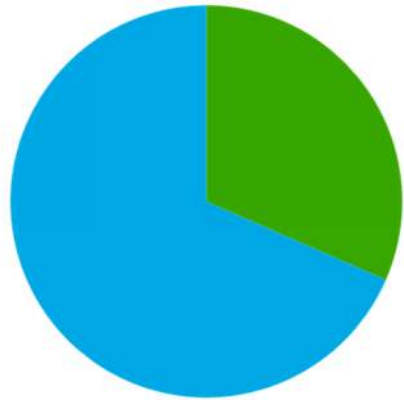


Flow Duration Curve – Coosawhatchie River



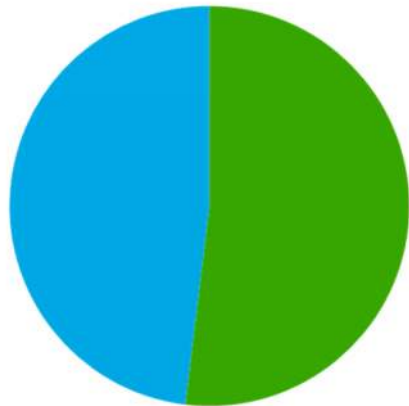
Lower Savannah-Salkehatchie Water Withdrawals – SC

Both surface water and groundwater are important resources in the basin.



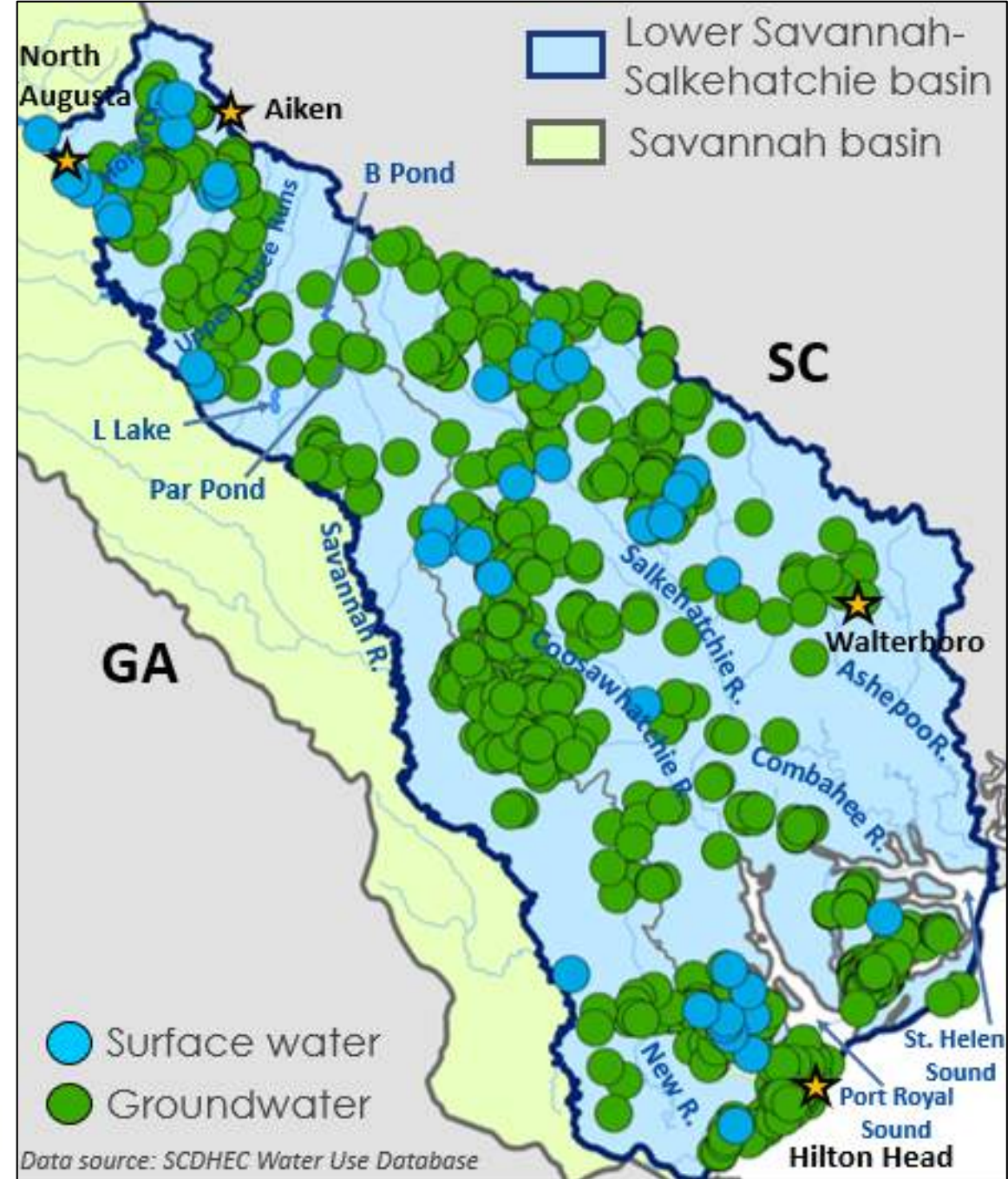
Including Energy

- SW : 68% 155 MGD
- GW: 32% 73 MGD



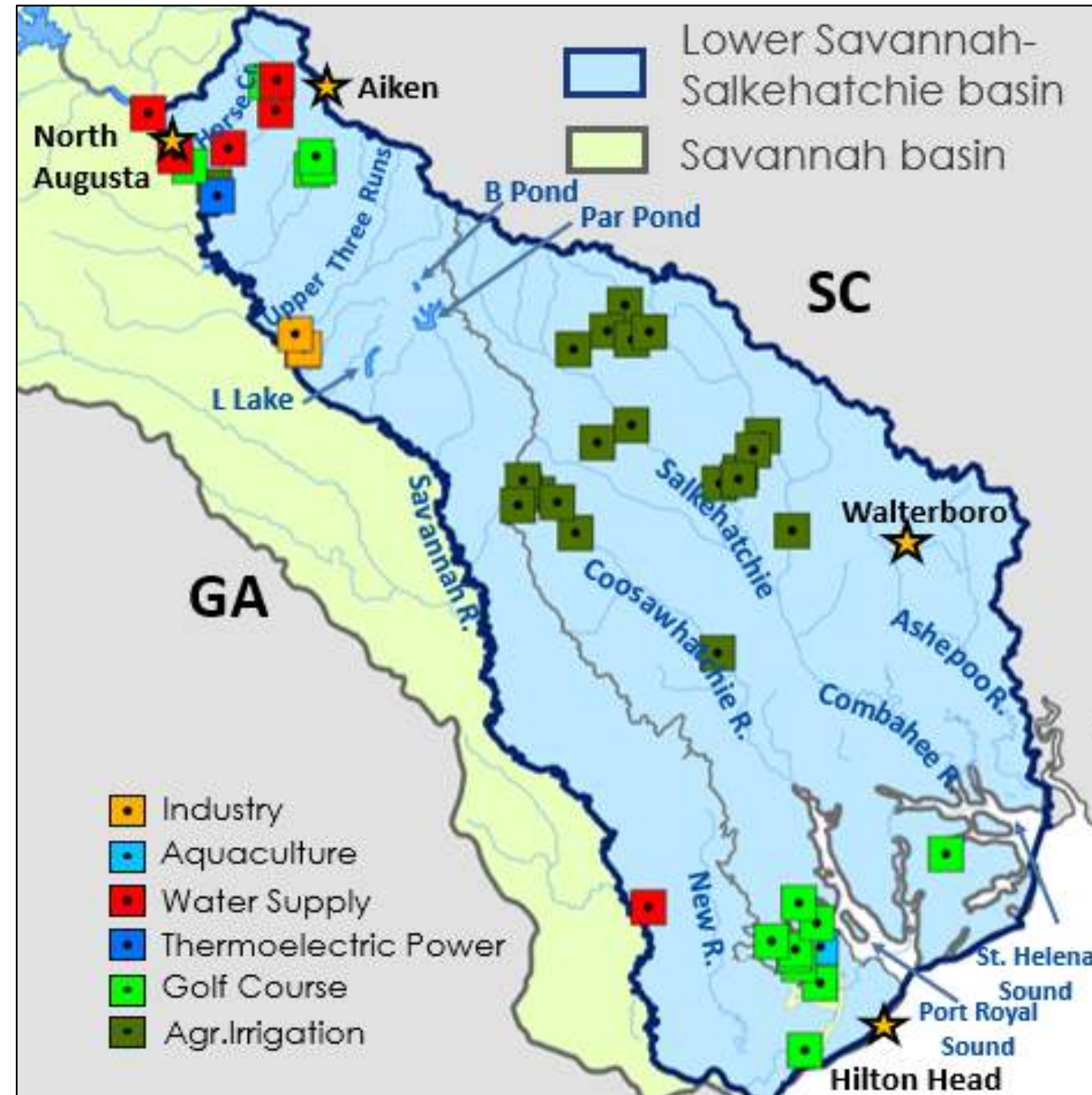
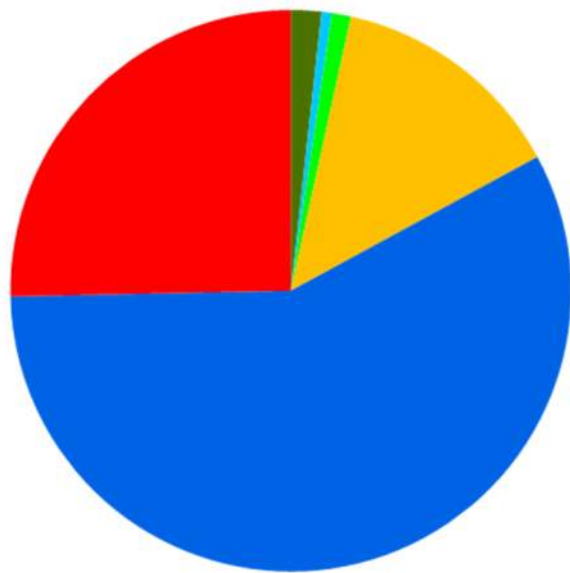
Excluding Energy

- SW : 47% 66 MGD
- GW: 53% 73 MGD



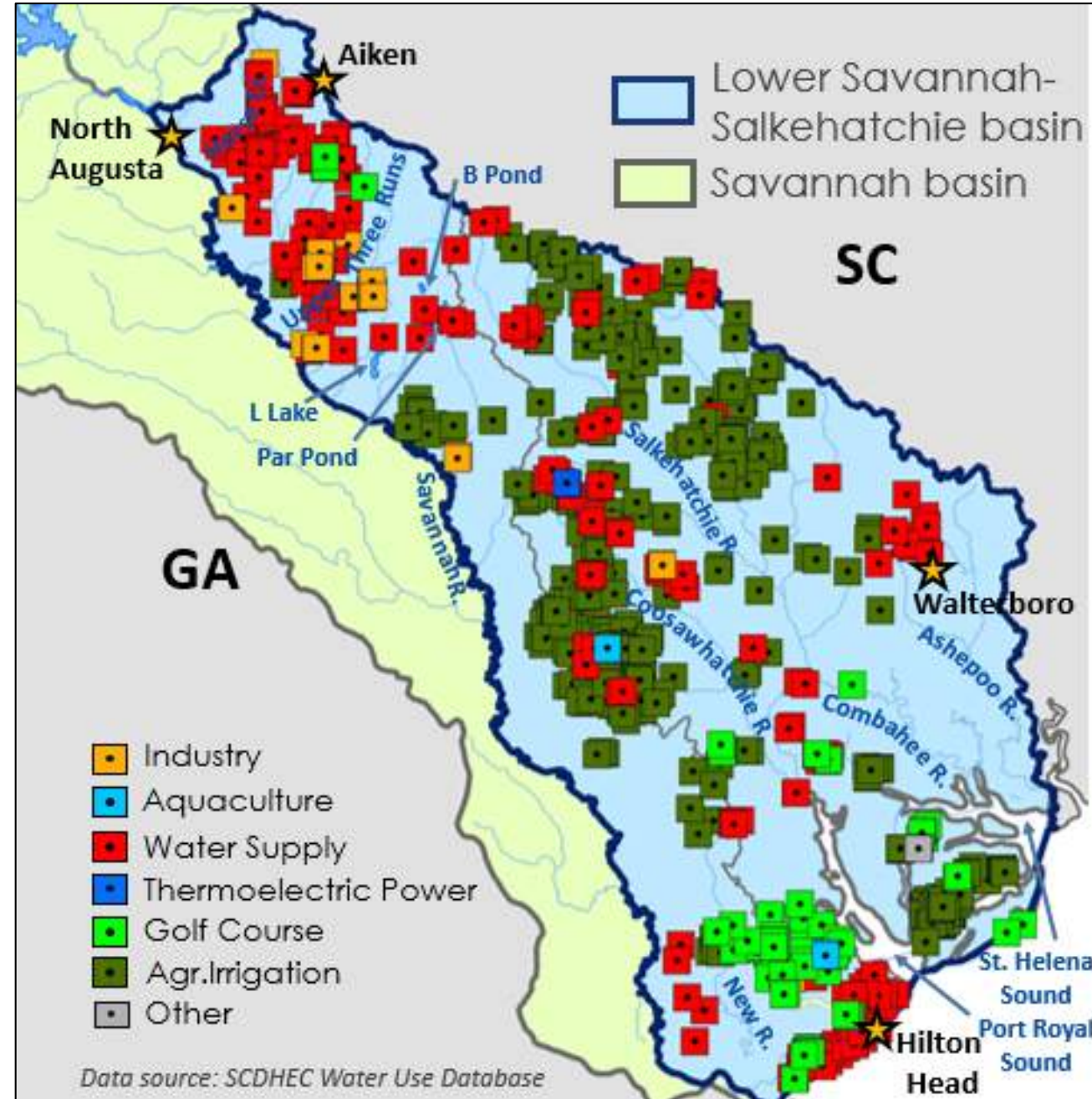
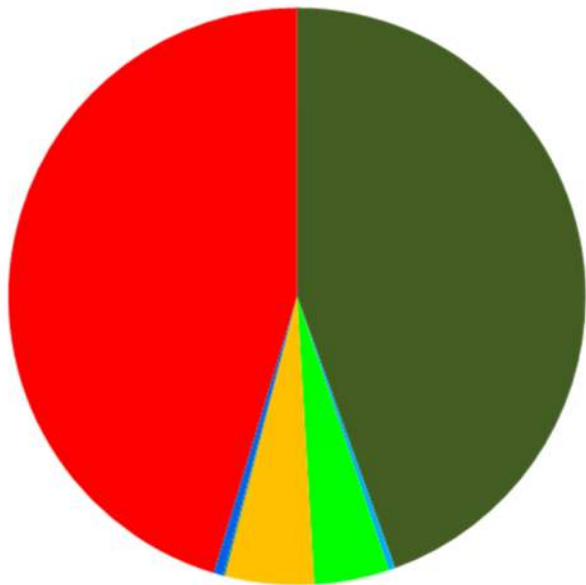
Reported SC Surface Water Withdrawals

- Thermoelectric Power (58%, 89 MGD)
- Water Supply (25%, 39 MGD)
- Industry (14%, 21 MGD)
- Agr. Irrigation (2%, 3 MGD)
- Golf Course (1%, 2 MGD)
- Aquaculture (1%, 0.9 MGD)

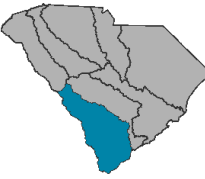


Reported SC Groundwater Withdrawals

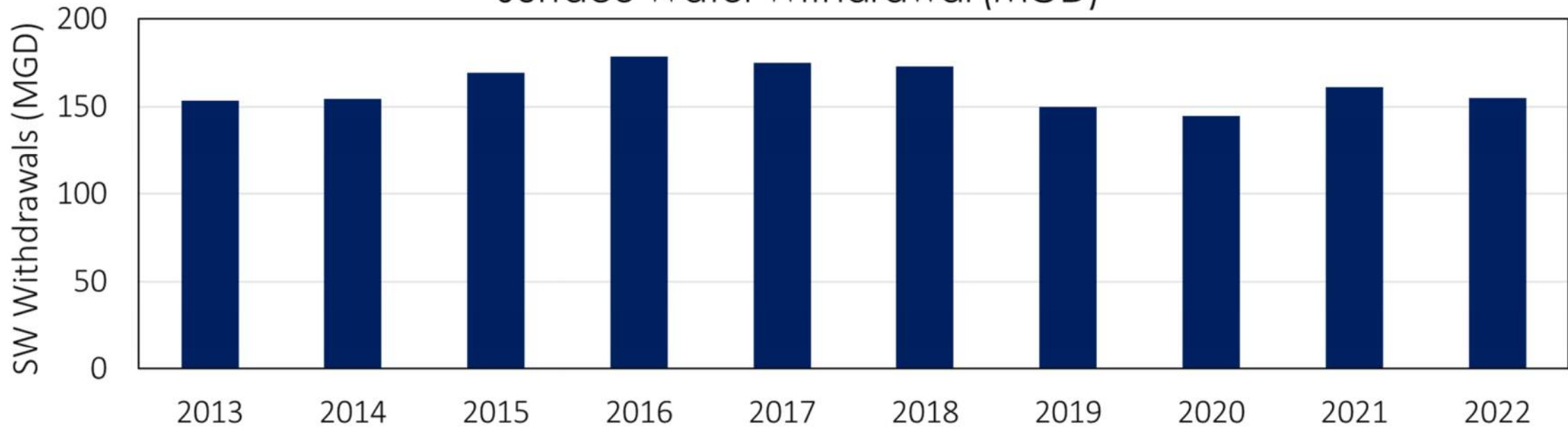
- Water Supply (47%, 34 MGD)
- Agr. Irrigation (43%, 32 MGD)
- Industry (5%, 4 MGD)
- Golf Course (4%, 3 MGD)
- Thermoelectric Power (1%, 0.4 MGD)
- Aquaculture (<1%, 0.3 MGD)
- Other (<1%, 0.07 MGD)



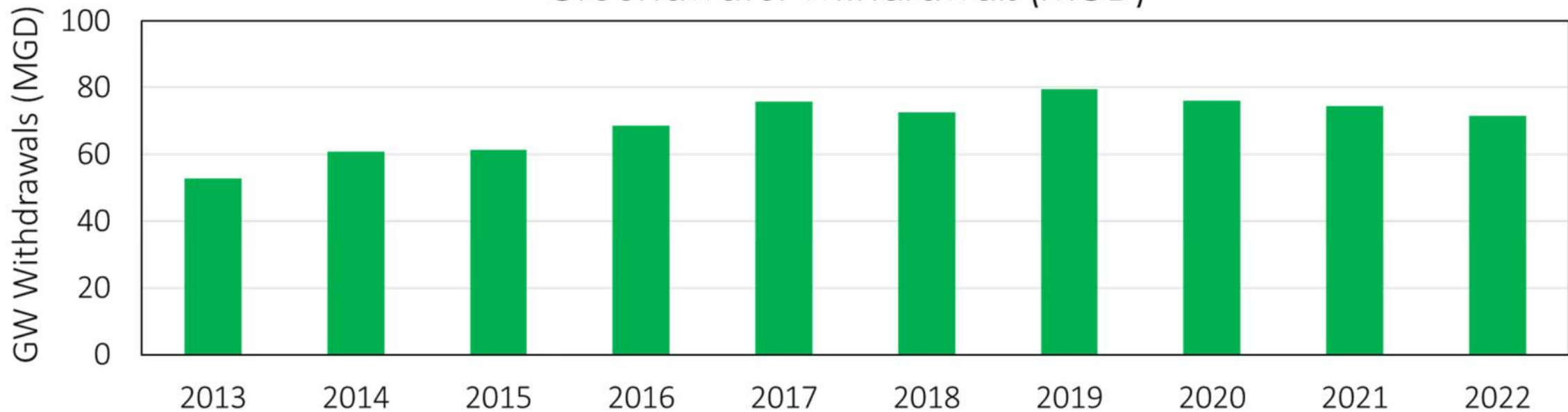
Reported Water Withdrawals (2013 – 2022)



Surface Water Withdrawal (MGD)



Groundwater Withdrawals (MGD)



Summary



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SC Department of
Natural Resources

- Lower Savannah mainstem has less variable flows and well sustained low flows due to upstream regulation.
- Unregulated streams in the Upper Coastal Plain have well sustained flows due to higher baseflow.
- Unregulated streams in the Lower Coastal Plain are highly variable with less sustained low flows due to lower baseflow.
- Both surface water and groundwater are important resources in the basin.