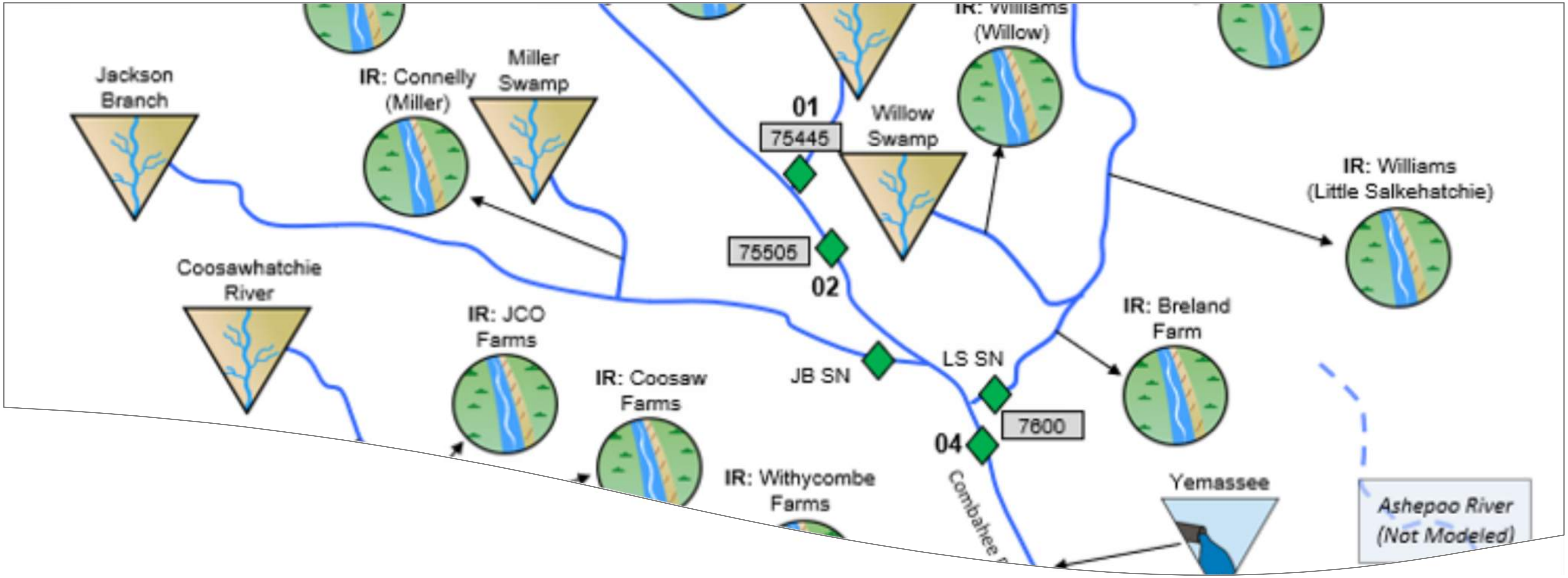


Updated Surface Water Modeling Results and Discussion

John Boyer

Agenda Item 6

Updates to the Savannah Model

- Updated stage storage curves for Hartwell, Russell and Thurmond based on recent survey information provided in the ***Hartwell Lake Integrated Water Supply Storage and Reallocation Report*** (USACE March 2024).
    - Reported **Decrease** in Conservation Storage since construction due to sedimentation:
        - Lake Hartwell: 17%
        - Lake Russell: 19%
        - Lake Thurmond: 4%
- Lake Hartwell, Russell and Thurmond "rule sets" were updated to reflect the new stage-storage curves

Comparisons to Minimum Instream Flows

2009 SCDNR Instream Flow Policy

- Adopted results of 1988 study
  - Seasonal variability in flows
  - Fisheries requirements as limiting
- Based on variation in fish habitat needs in the Piedmont vs the Coastal Plain, DNR recommended MIFs vary
- DNR will request MIFs below proposed or existing dams be maintained at minimum levels noted in the table

Table VI. DNR recommended minimum acceptable instream flows.

Region	Period	Minimum Recommended Instream-Flow
Coastal Plain	July – November	20% of mean annual daily flow
	January – April	60% of mean annual daily flow
	May, June & December	40%' of mean annual daily flow
Piedmont	July – November	20% of mean annual daily flow
	January – April	40% of mean annual daily flow
	May, June & December	30% of mean annual daily flow

SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES

DNR

INSTREAM FLOWS TO PROTECT AQUATIC RESOURCES IN SOUTH CAROLINA

Minimum Instream-Flow Policy

Determination of General Instream-Flow Recommendations

March 2009

This document is available on the Department of Natural Resources web site at http:www.dnr.sc.gov/

Minimum Instream Flows in the SW Regulations

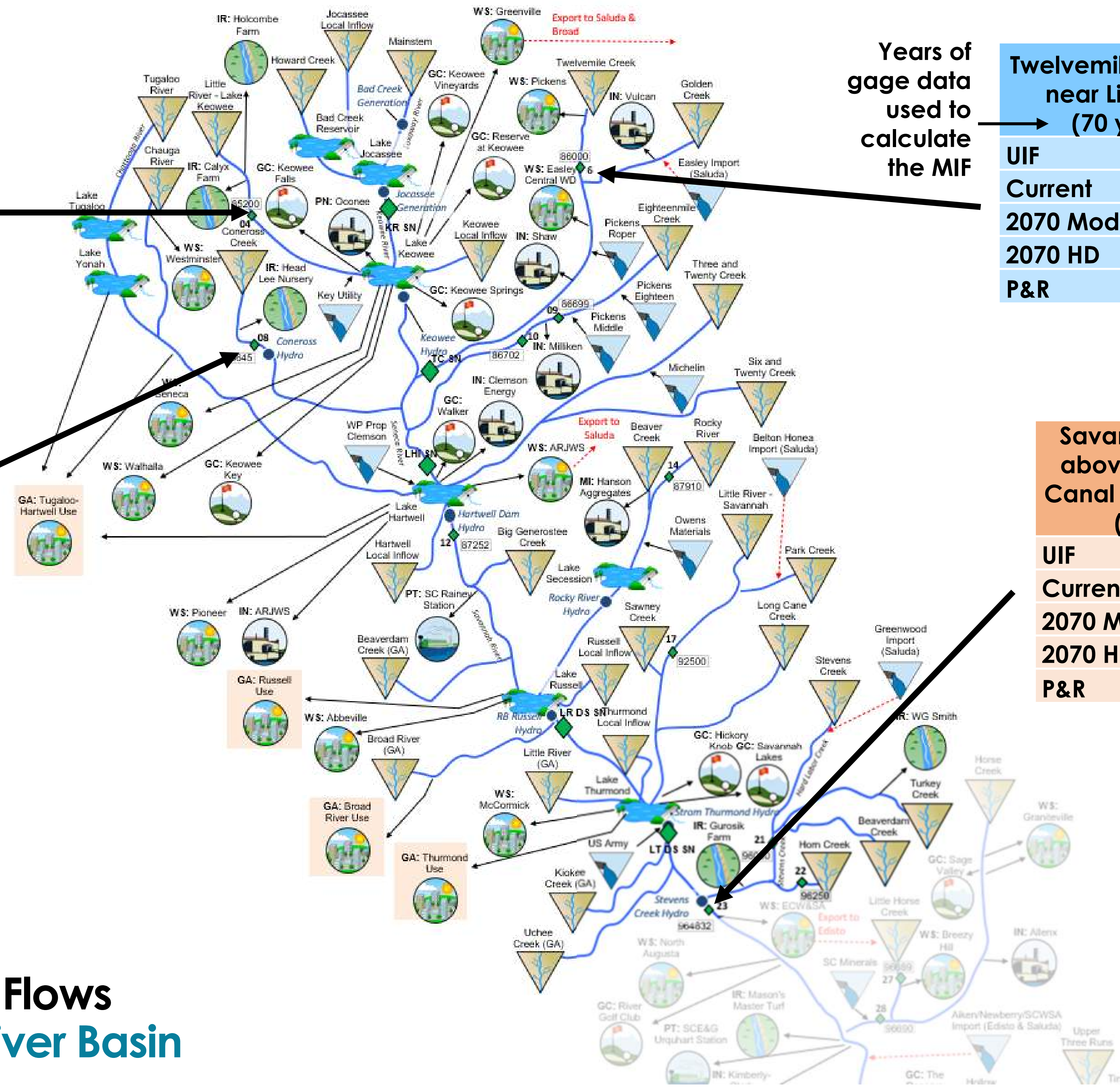
The South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act defines the Minimum Instream Flow as:

"… the flow that provides an adequate supply of water at the surface water withdrawal point to maintain the biological, chemical, and physical integrity of the stream taking into account the needs of downstream users, recreation, and navigation and that flow is set at forty percent of the mean annual daily flow for the months of January, February, March, and April; thirty percent of the mean annual daily flow for the months of May, June, and December; and twenty percent of the mean annual daily flow for the months of July through November for surface water withdrawers as described in Section 49 4 150(A)(1).

For surface water withdrawal points located on a surface water segment downstream of and influenced by a licensed or otherwise flow controlled impoundment, "minimum instream flow" means the flow that provides an adequate supply of water at the surface water withdrawal point to maintain the biological, chemical, and physical integrity of the stream taking into account the needs of downstream users, recreation, and navigation and that flow is set in Section 49 4 150(A)(3)." ***(which says that MIF shall be the flow specified in the license by the appropriate governmental agency)***

Little River near Walhalla (36 yrs)	
UIF	7.4
Current	7.5
2070 Mod	7.4
2070 HD	7.5
P&R	7.5

Coneross Creek near Seneca (14 yrs)	
UIF	4.5
Current	4.6
2070 Mod	4.5
2070 HD	4.6
P&R	5.2



Years of gage data used to calculate the MIF

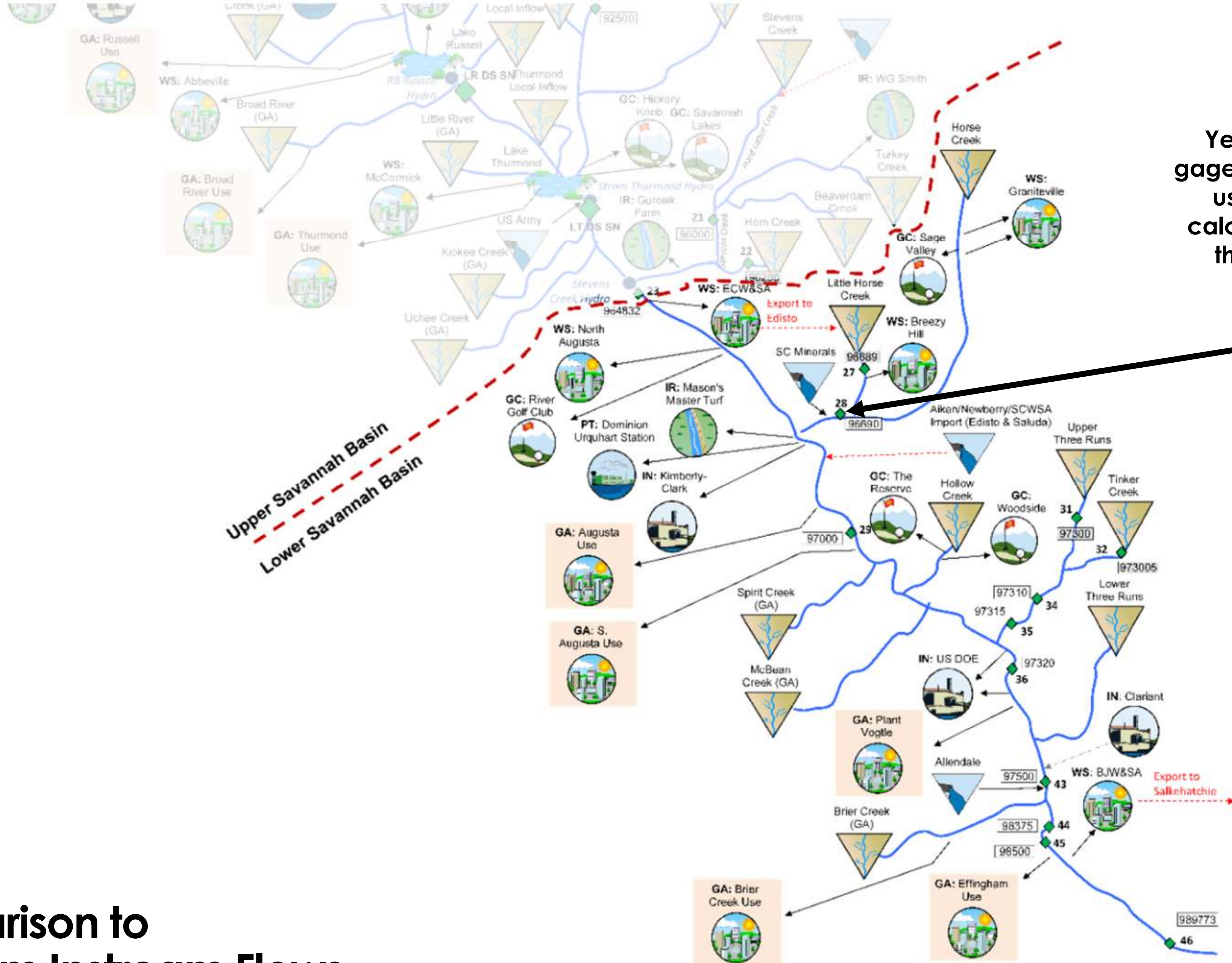
Twelvemile Creek near Liberty (70 yrs)	
UIF	3.9
Current	4.3
2070 Mod	4.7
2070 HD	5.1
P&R	6.5

Percent of days below MIF for the location

Savannah River above Augusta Canal near Bonair (7 yrs)	
UIF	1.6
Current	0
2070 Mod	0
2070 HD	0
P&R	0

Comparison to Minimum Instream Flows

Upper Savannah River Basin

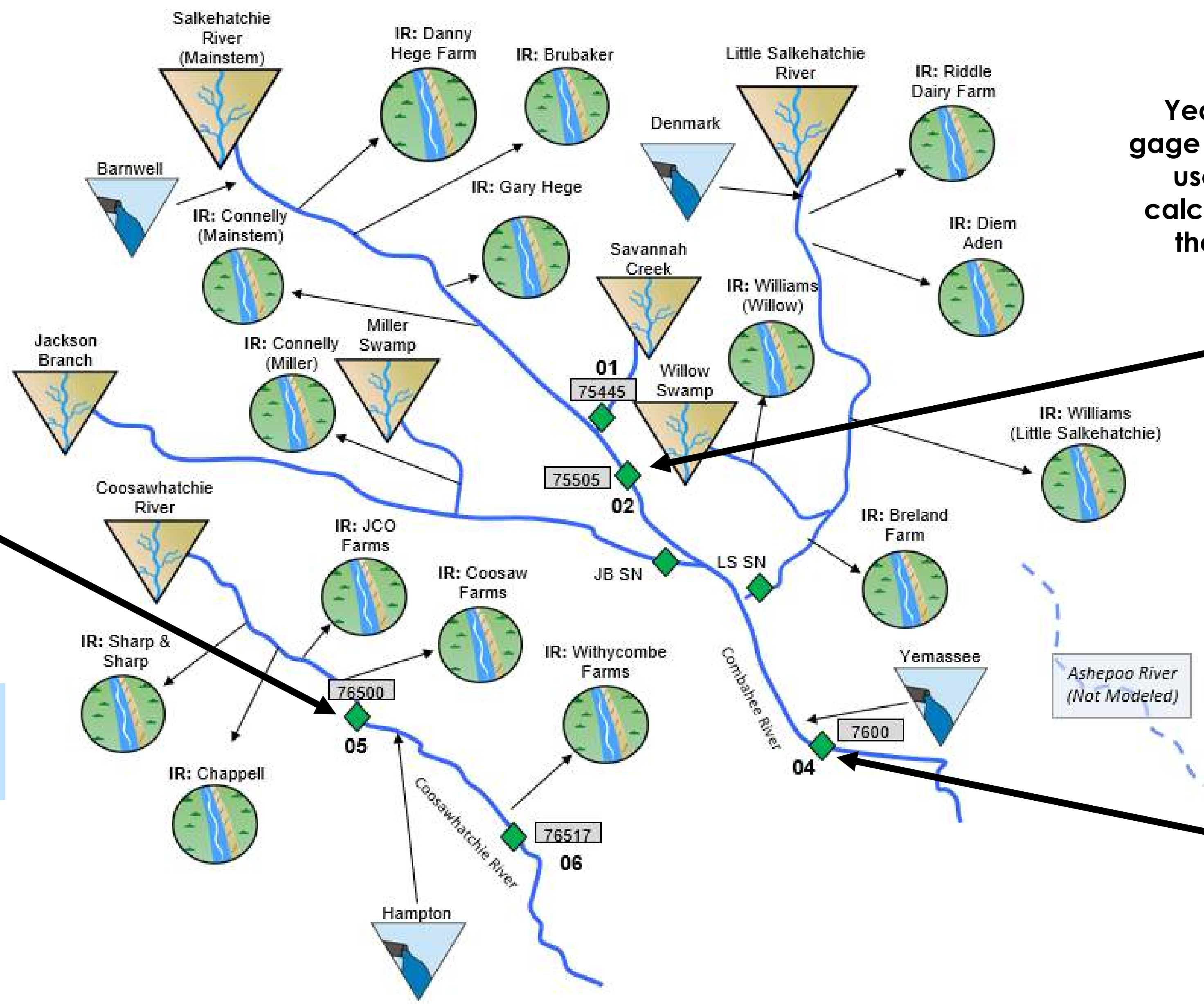


Years of gage data used to calculate the MIF

Horse Creek at Clearwater (19 yrs)	
UIF	0.1
Current	0.2
2070 Mod	0.3
2070 HD	1.0
P&R	4.9

Percent of days below MIF for the location

Comparison to Minimum Instream Flows
Lower Savannah River Basin



Coosawhatchie River near Hampton (73.5 yrs)	
UIF	44.6
Current	45.4
2070 Mod	45.6
2070 HD	45.8
P&R	50.0

MIF ranges from 31 to 62 cfs
Mean flow is 155 cfs
Median flow is 57 cfs

Years of gage data used to calculate the MIF

Salkehatchie River near Miley (73.5 yrs)	
UIF	9.7
Current	9.8
2070 Mod	9.9
2070 HD	10.1
P&R	12.2

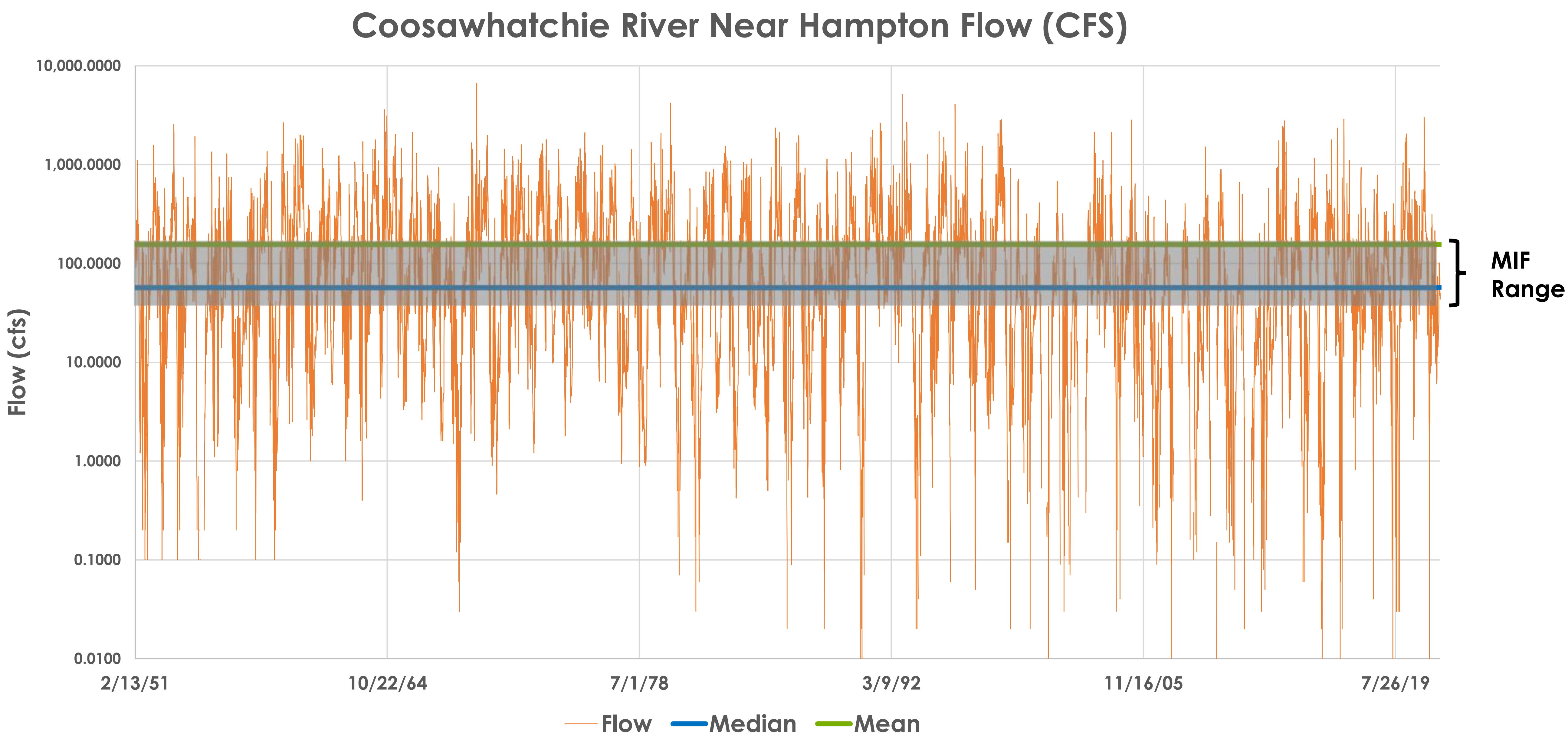
Percent of days below MIF for the location

MIF ranges from 63 to 125 cfs
Mean flow is 313 cfs
Median flow is 236 cfs

Combahee River near Yemassee (6.1 yrs)	
UIF	7.6
Current	7.7
2070 Mod	7.9
2070 HD	8.2
P&R	9.7

MIF ranges from 94 to 189 cfs
Mean flow is 472 cfs
Median flow is 302 cfs

Comparison to Minimum Instream Flows
Salkehatchie River Basin



MIF ranges from 31 to 62 cfs
Mean flow is 155 cfs
Median flow is 57 cfs

Update on Synthetic/Extended Drought Analysis (Thurmond Releases)

Resequencing Historical Flows to Investigate Potential Future Droughts

Methods

Three (3) constructed scenarios:

1. Repeating 5-year drought constructed by splicing together the **five driest water years** in the hydrologic period of record with respect to mainstem total annual flow. These were **2001**, **2008**, **1981**, **1988**, and **2017**.

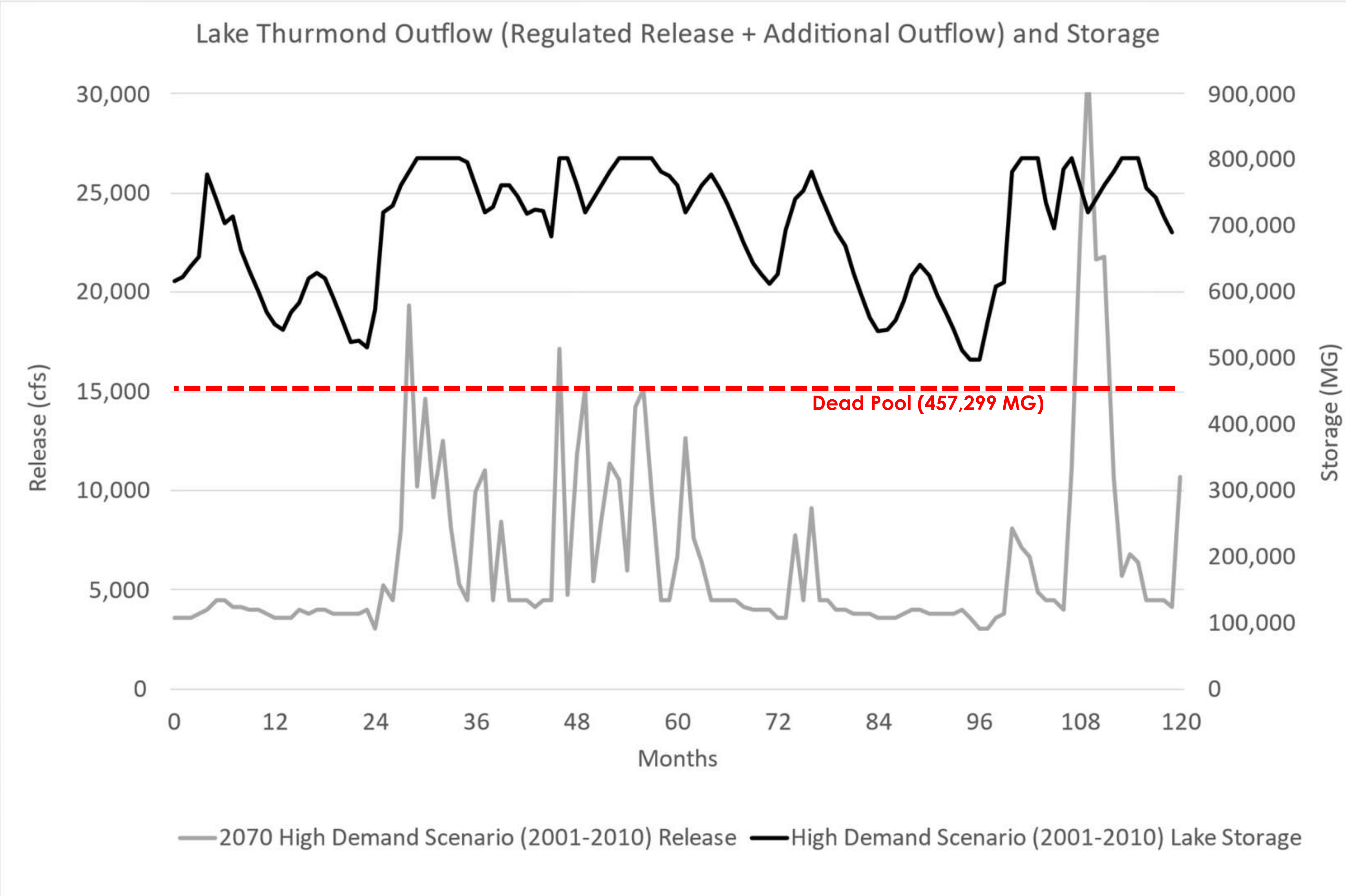
2. **Repeating single year drought** corresponding to the **second driest water year (2008)** and identified as the critical single year drought with respect to Lake Thurmond water supply availability.

3. **Repeating synthetic drought year** constructed by splicing together the **twelve driest calendar month flows** in the hydrologic period of record.

USACE Plan for Emergency Drought Operations

- **Goal:** Provide a continuous water supply to the greatest population for as long as possible.
- Drops the lake pools below the bottom of their conservation zones in a predefined manner.
  - Due to the lower density of population around Lake Russell, USACE would sacrifice the volume of water in Russell while maintaining supplies to Hartwell and Thurmond.
  - Thurmond has the next lower population density and would be sacrificed second.
  - Lake Thurmond would continue to provide its minimum release requirement of 3,600 cfs measured at Augusta
  - Once Thurmond supply was depleted, USACE would begin to draw the Hartwell pool below the bottom of its conservation zone. At this point, most all the M&I intakes on the reservoirs would be unusable.
- USACE would work with their Emergency Management Team to establish alternate sources of water, trucking from the inactive storage zone of the reservoirs, or elsewhere.

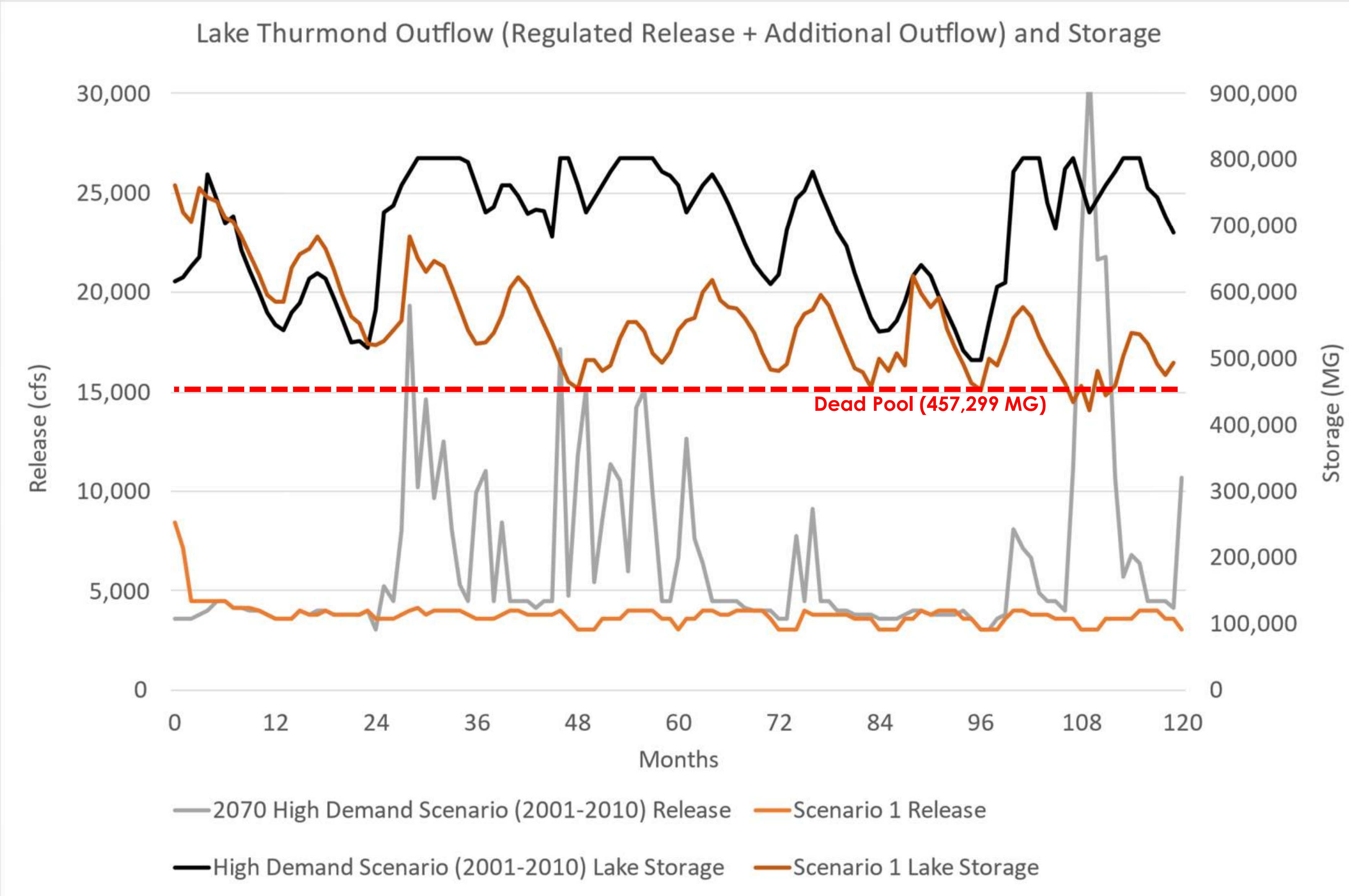
Source: Stan Simpson, USACE Water Manager. 6-25-2024 e-mail to John Boyer, CDM Smith.



Resequencing Historical Flows to Investigate Potential Future Droughts

This graph plots Lake Thurmond storage and releases (monthly timestep)

2070 High Demand Scenario
For years 2001 – 2010

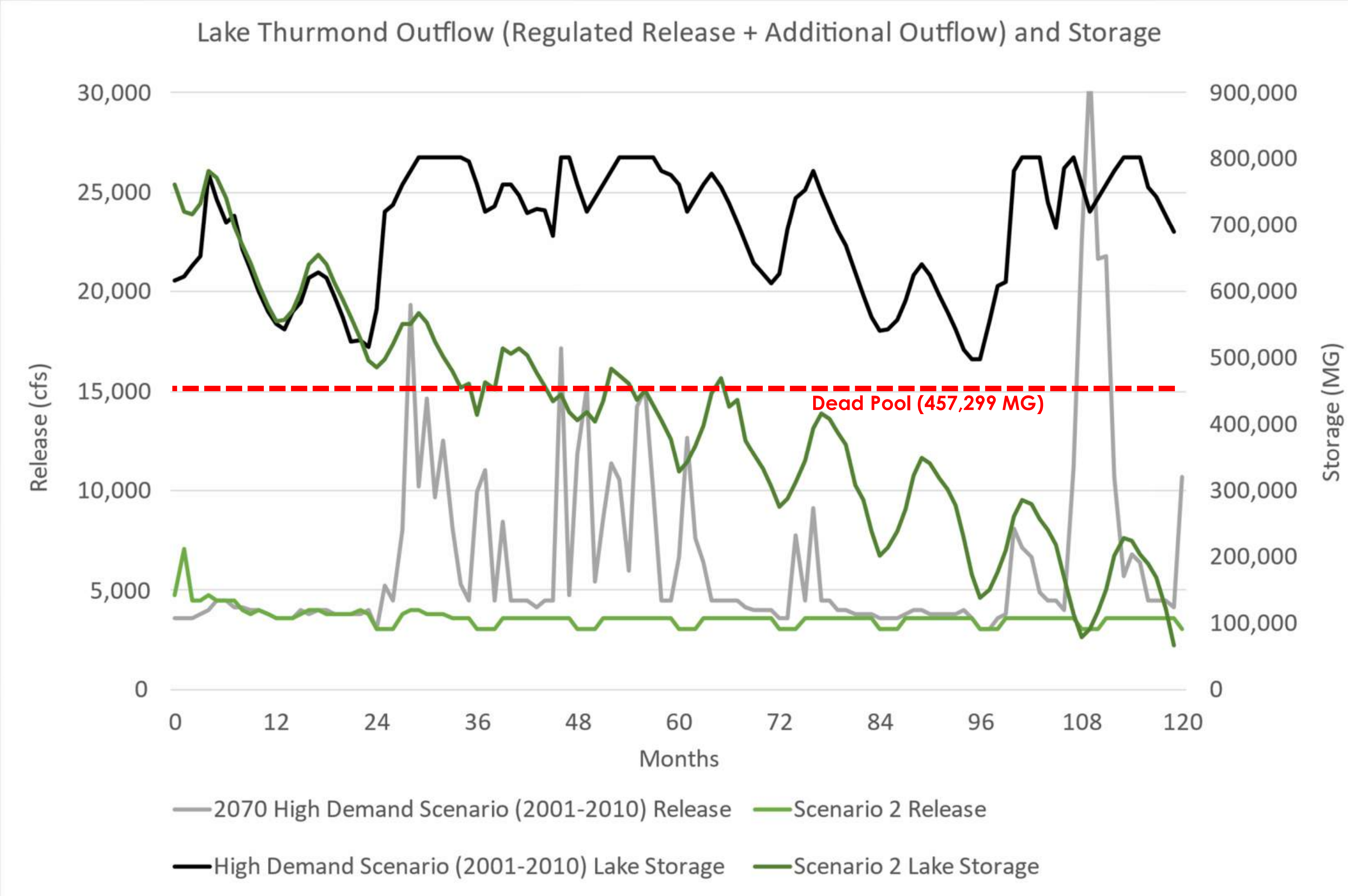


Resequencing Historical Flows to Investigate Potential Future Droughts

This graph plots Lake Thurmond storage and releases (monthly timestep)

2070 High Demand Scenario
For years 2001 – 2010

Drought Scenario 1

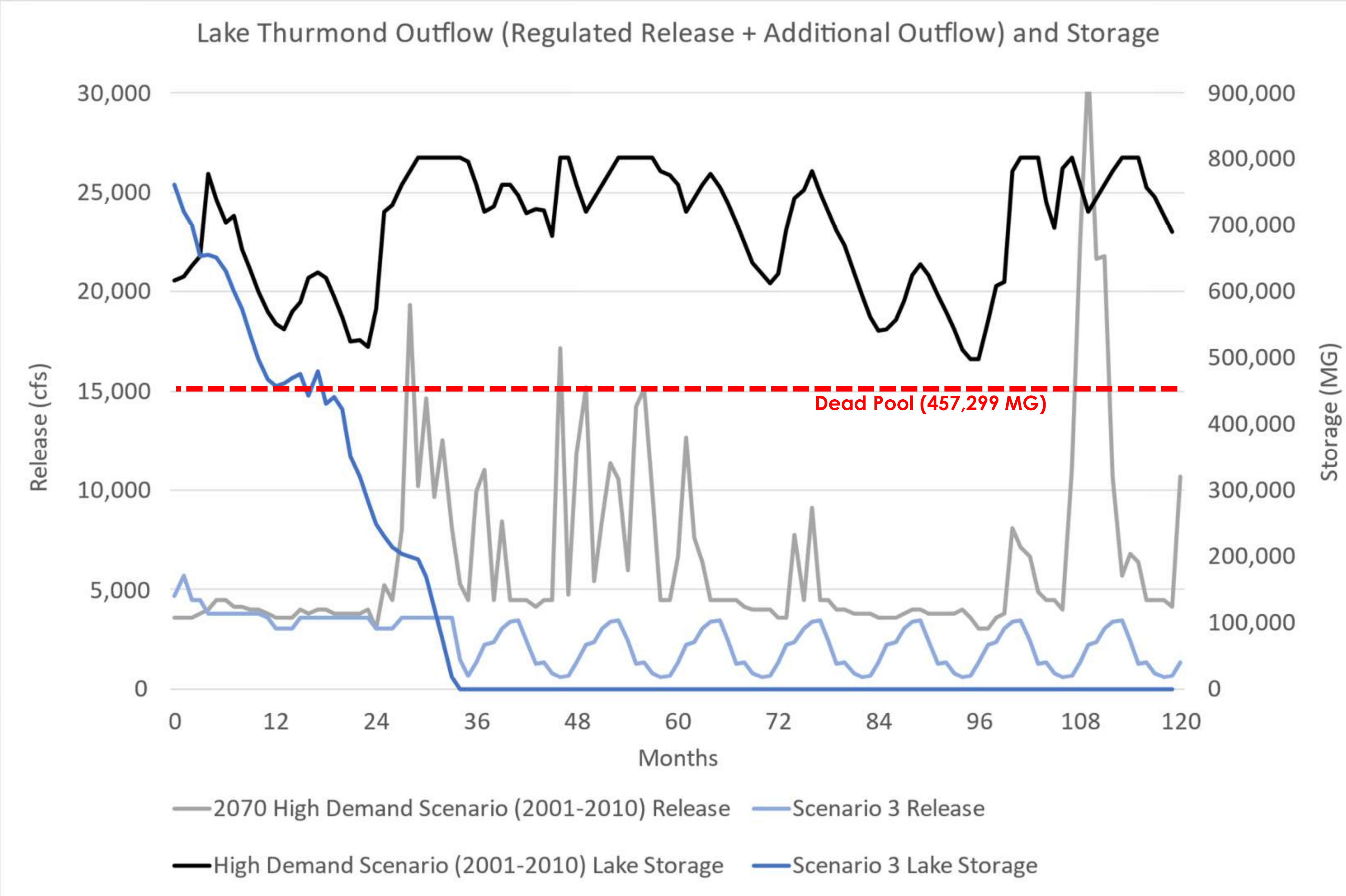


Resequencing Historical Flows to Investigate Potential Future Droughts

This graph plots Lake Thurmond storage and releases (monthly timestep)

2070 High Demand Scenario
For years 2001 – 2010

Drought Scenario 2



Resequencing Historical Flows to Investigate Potential Future Droughts

This graph plots Lake Thurmond storage and releases (monthly timestep)

2070 High Demand Scenario
For years 2001 – 2010

Drought Scenario 3