Preliminary Moderate and High Demand Scenario Results

Kirk Westphal, Amy Shaw, and John Boyer, CDM Smith

Agenda Item 4

River Basin Planning Process

Phase 2	- **Evaluate current and future water availability issues** - Identify and quantify shortages, select surface water conditions, reaches of interest and groundwater areas of concerns
Phase 3	- Develop and evaluate **water management strategies** - Recommend and prioritize strategies

Surface Water Scenarios

Base Scenarios

- Current Surface Water Use Scenario
  - *Uses most recent 10-yr average withdrawals (as reported by month) in most cases*

- Permitted and Registered (P&R) Surface Water Use Scenario
  - *Uses current fully-permitted and registered amounts*

- Moderate Water Demand Projection Scenario
  - *Future water demand projection based on moderate growth and normal climate*

- High Water Demand Projection Scenario
  - *Future water demand projection based on high growth and hot/dry climate*

Additional Scenarios

- Unimpaired Flow (UIF) Scenario
 - *Naturalized conditions (no surface water withdrawals, discharges, or reservoirs)*

Summary of Average Annual Surface Water Demands by Scenario (in MGD)

Surface Water Use Sector	Current Use	2070 Moderate Demand	2070 High Demand	Permitted & Registered
Mining	0.1	0.1	0.1	0.5
Agriculture	2.7	3.1	4.4	15.2
Golf Courses	0.6	0.5	1.1	10.1
Industrial/Manufacturing	24.9	56.0	91.6	44.9
Public Water Supply	142.6	188.5	262.0	525.1
Thermoelectric[1]	171.2	171.2	171.2	502.0
Total Demand all Sectors*	342	419	530	1,098
Scenario Demand as a % of P&R	31%	38%	48%	--
Total Demand without Thermoelectric*	171	248	359	596
Scenario Demand as a % of P&R without Thermoelectric	29%	42%	60%	--

Rounded to nearest MGD

[1] *Approximately 76% of the thermoelectric withdrawals are returned*

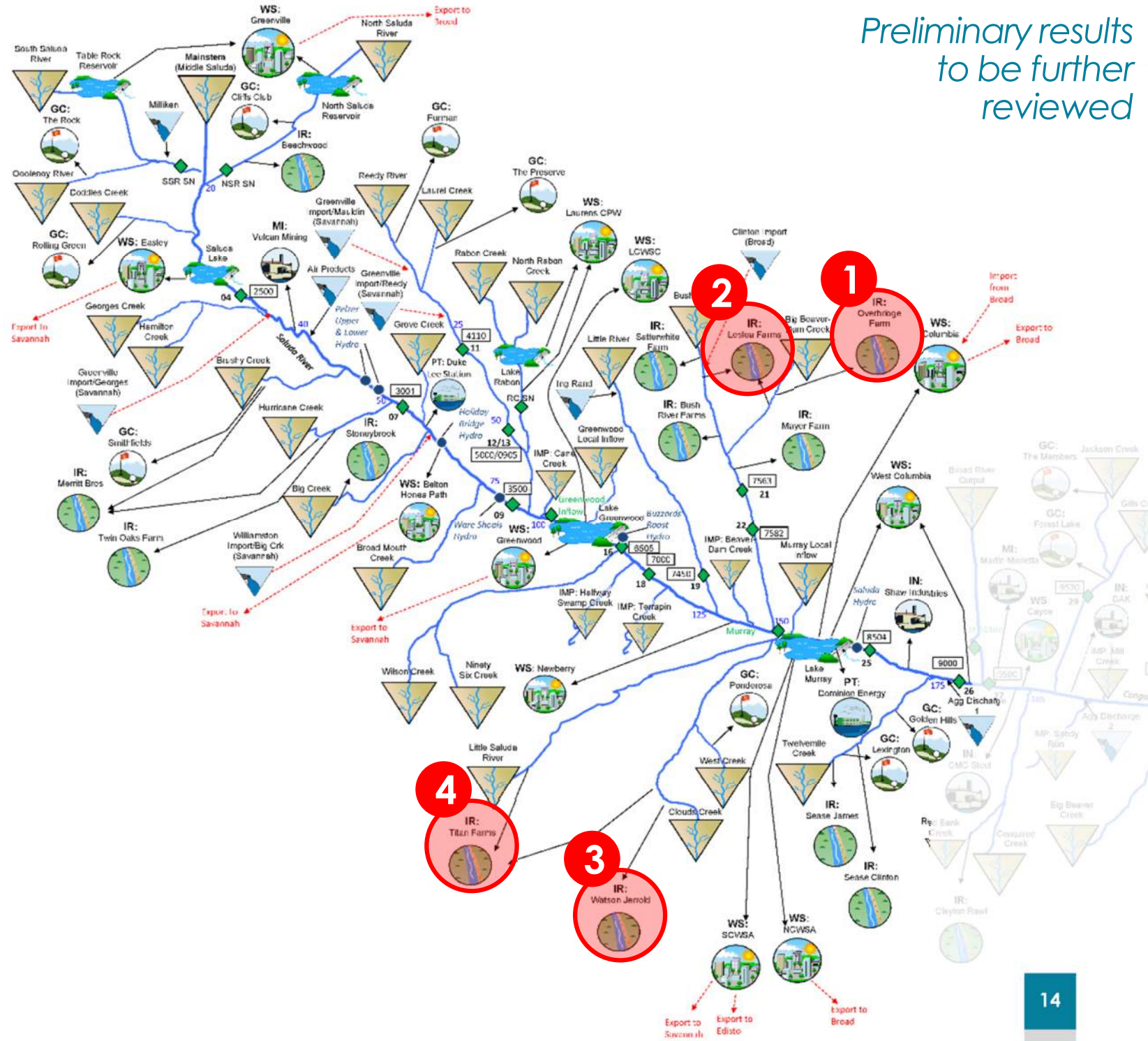# Preliminary Planning Scenario Model Results
(monthly timestep)
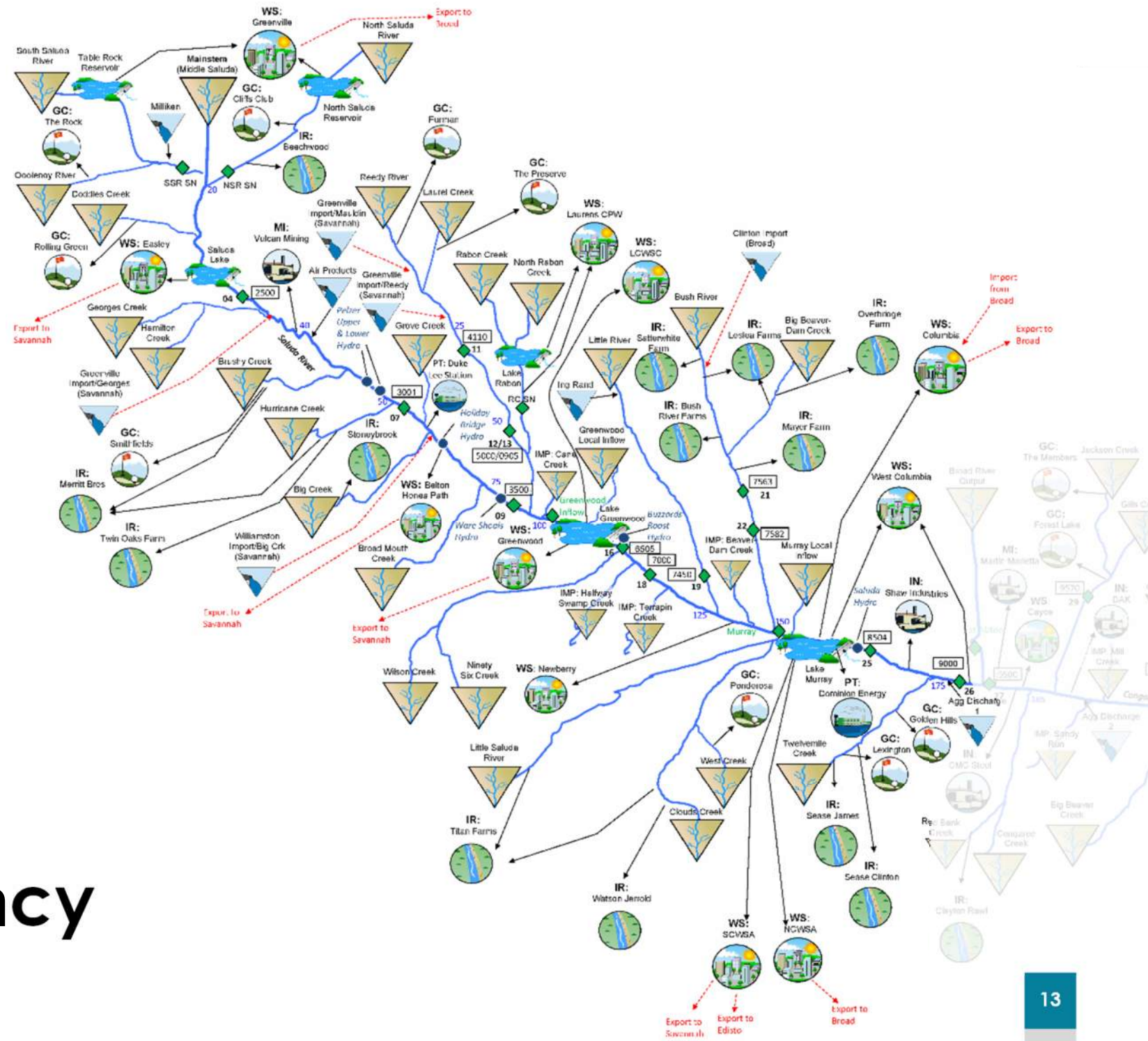
Where do we see simulated shortages and at what frequency and magnitude?

Current Use Scenario

Physical Shortage

Surface Water Shortage Table

Map ID	Water User	Max Shortage (MGD)	Frequency of Shortage
1	IR: Overbridge Farm	0.03	0.2%
2	IR: Leslea Farms	0.02	0.1%
3	IR: Watson Jerrold Farm	0.9	14%
4	IR: Titan Farms	1.5	9%

14

IR: Leslea Farms
Impoundments totaling 12 acres

Impoundment on Bush River

3 acres


Impoundment on Big Beaver Dam Creek

9 acres

Surface water user with storage not included in the model
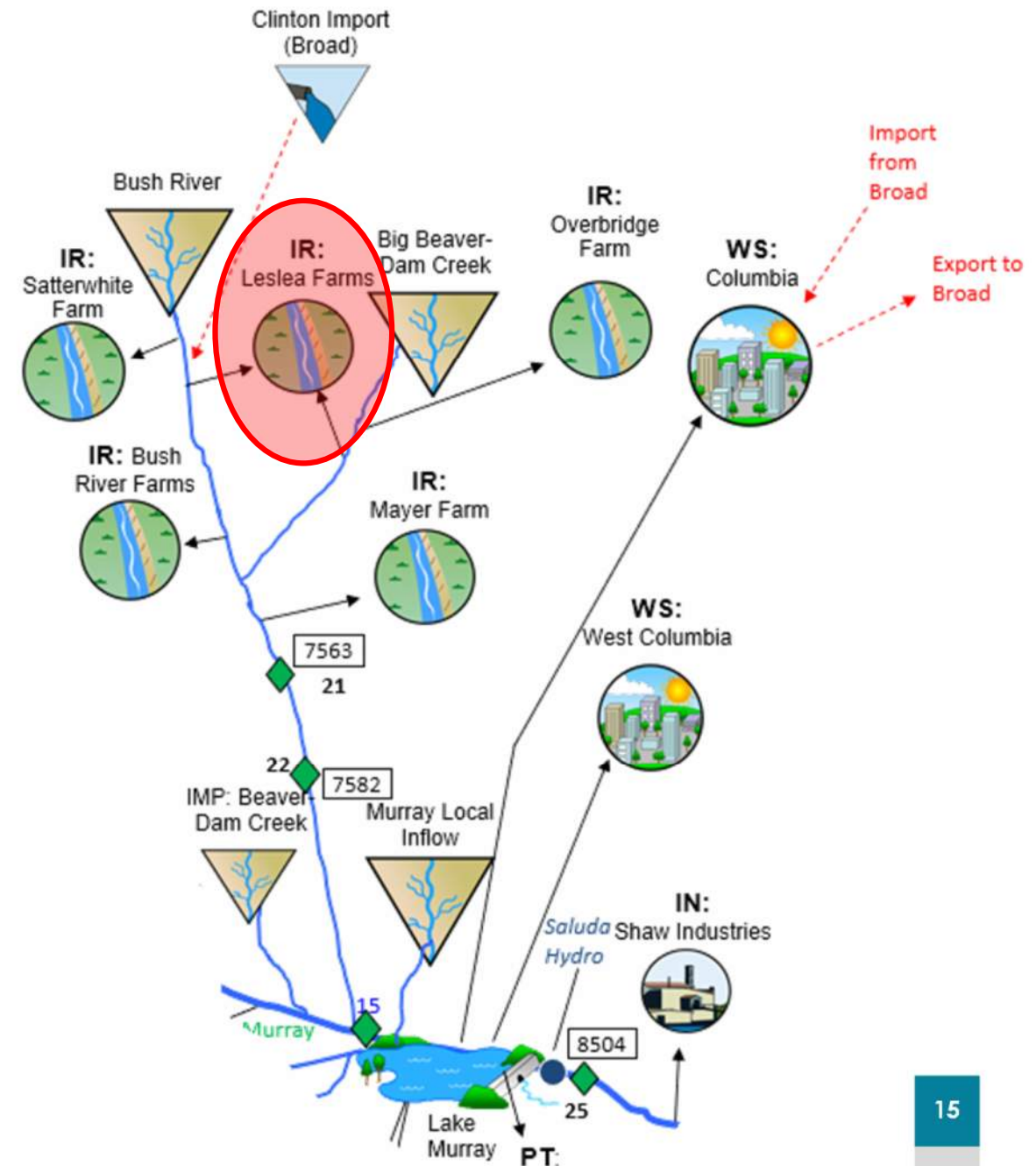
Permitted & Registered Scenario

Surface Water Shortage Table

Map ID	Water User	Max Shortage (MGD)	Frequency of Shortage
1	IR: Overbridge Farm	0.3	5%
2	IR: Leslea Farms	0.5	9%
3	IR: Watson Jerrold	5.9	76%
4	IR: Titan Farms	3.0	40%
5	PT: Duke Lee Station	295	38%
6	WS: Greenville	123	95%
7	GC: Smithfields	1.4	6%
8	WS: Laurens CPW	66	69%
9	GC: The Preserve	1.3	8%
10	GC: Furman	1.3	6%
11	IR: Satterwhite Farm	0.1	0.1%
12	GC: Ponderosa	0.6	0.2%
13	IR: Sease James	0.9	0.9%
14	GC: Lexington	0.03	0.1%
15	IR: Sease Clinton	0.7	0.9%

Physical Shortage

16
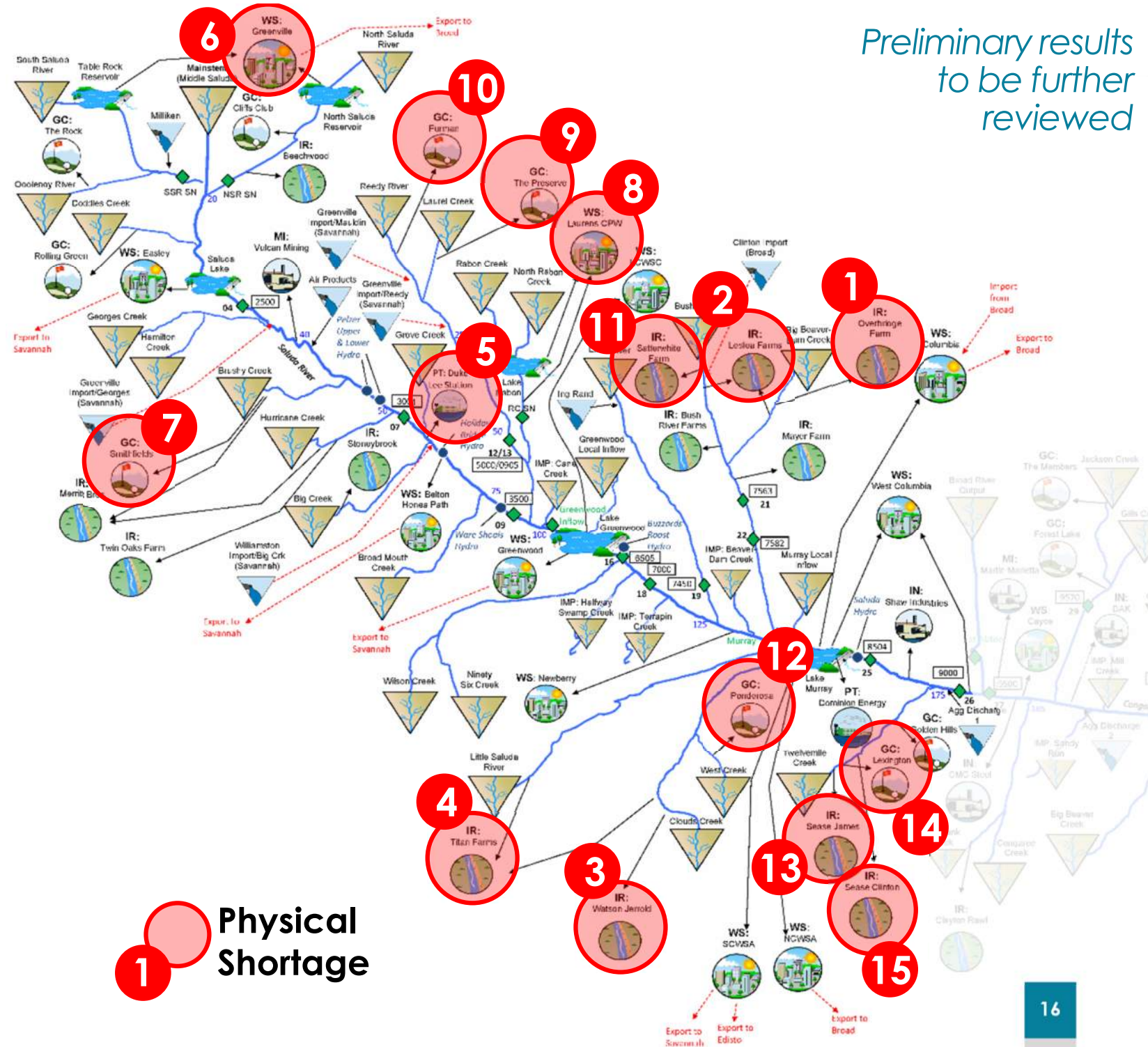
2070 Moderate Demand Scenario
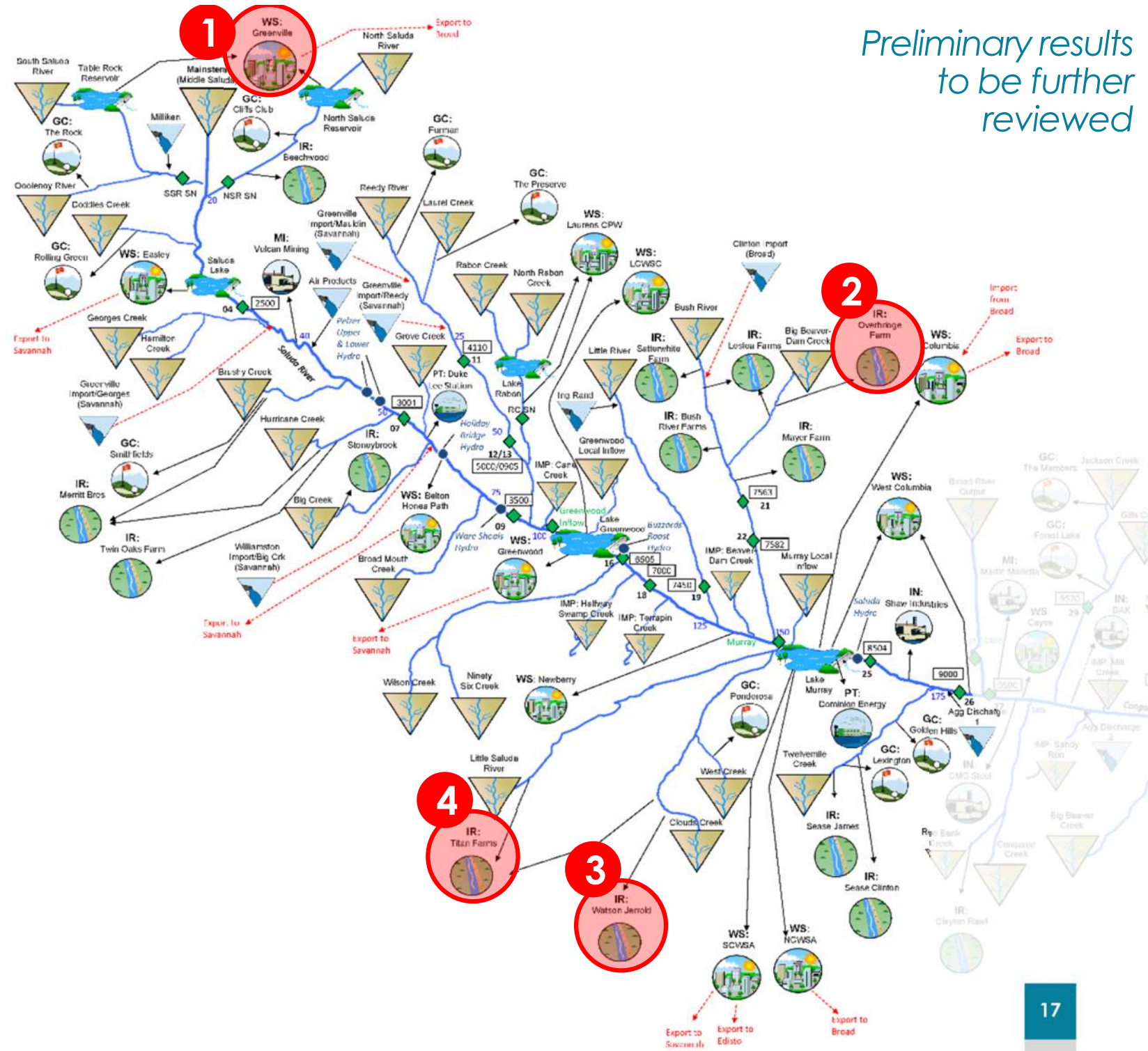
Surface Water Shortage Table

Map ID	Water User	Max Shortage (MGD)	Frequency of Shortage
1	WS: Greenville	61.6	20%
2	IR: Overbridge Farm	0.03	0.2%
3	IR: Watson Jerrold Farm	0.6	7%
4	IR: Titan Farms	1.9	10%

Physical Shortage

17

2070 High Demand Scenario

Physical Shortage
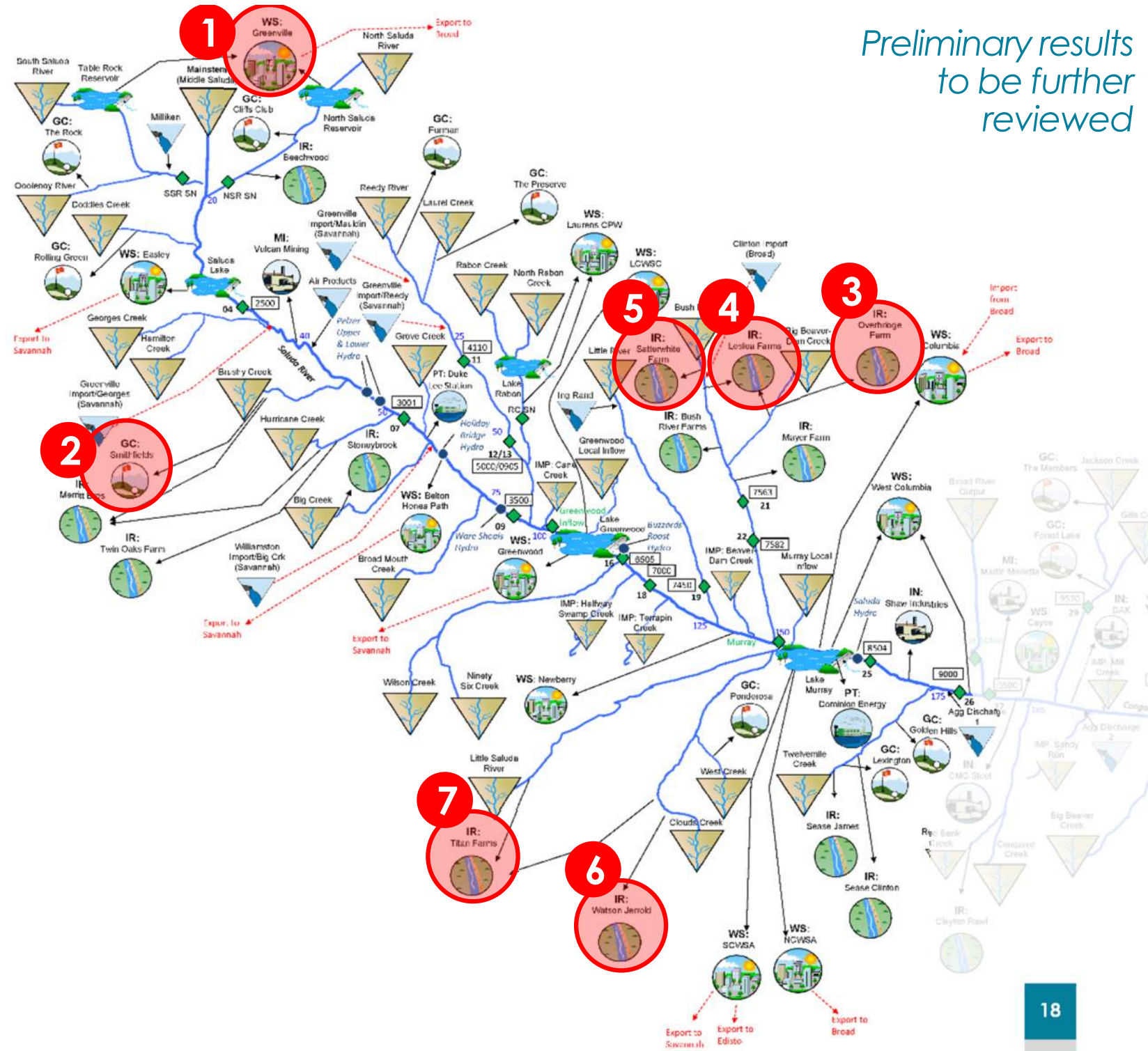
Surface Water Shortage Table

Map ID	Water User	Max Shortage (MGD)	Frequency of Shortage
1	WS: Greenville	67.9	34%
2	GC: Smithfields	0.03	0.1%
3	IR: Overbridge Farm	0.03	0.2%
4	IR: Leslea Farms	0.1	0.3%
5	IR: Satterwhite Farms	0.04	0.1%
6	IR: Watson Jerrold Farm	0.8	12%
7	IR: Titan Farms	2.5	12%

Notes on Greenville Water

Reservoir or Water Treatment Plant	Permitted Withdrawal	Current Firm Capacity	Planned Firm Capacity by 2030	Planned Firm Capacity by 2050
Table Rock Reservoir	67			
North Saluda Reservoir	60			
Total	127			
Stovall WTP		75	75	75
Lake Keowee	150			
Adkins WTP		60	90	110
Total		135	165	185
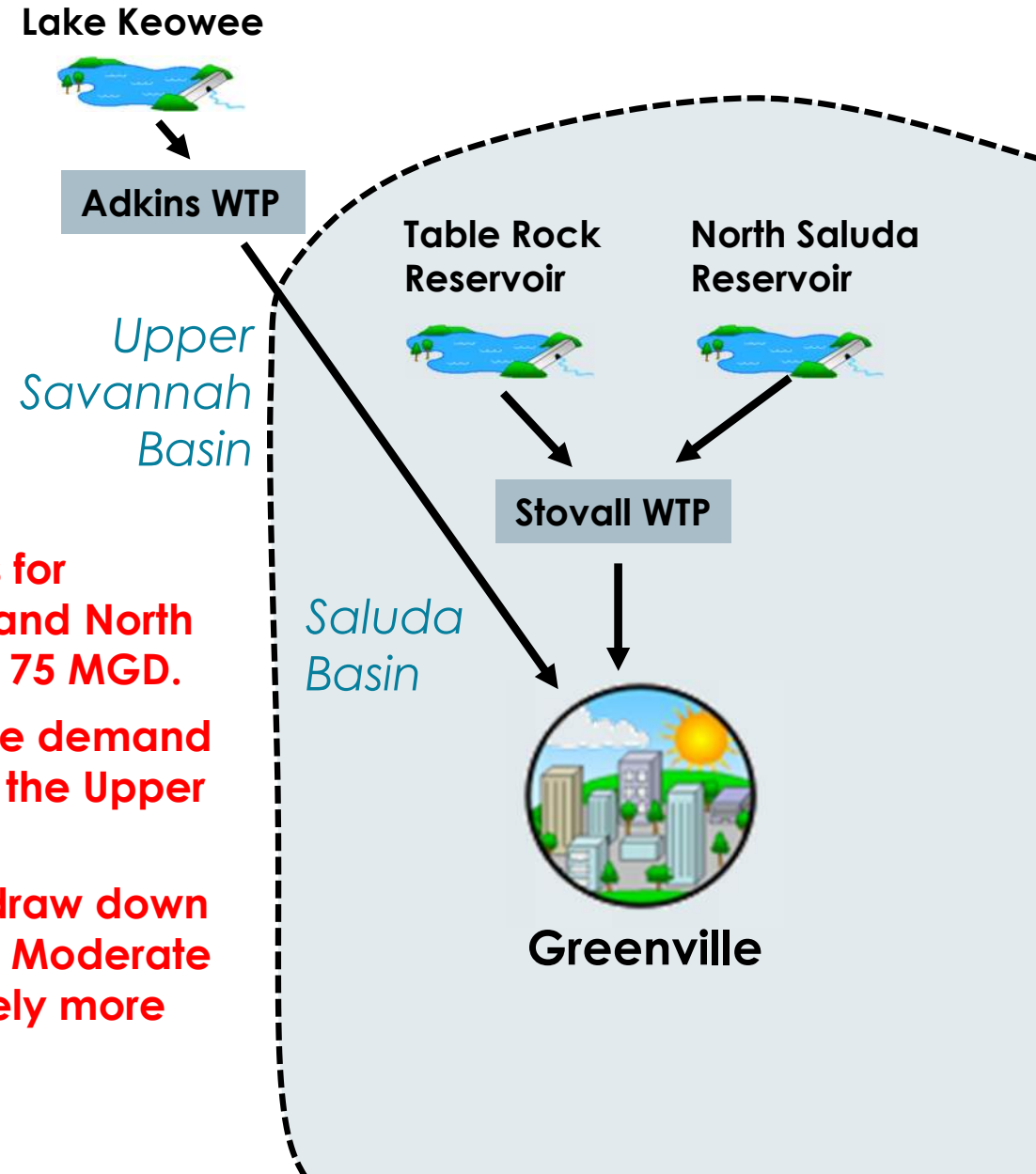
The combined safe yield of Table Rock and North Saluda reservoirs is 50.6 MGD.

- **The 2070 High Demand Projections for Greenville Water from Table Rock and North Saluda Reservoirs were capped at 75 MGD.**

- **Additional water to meet Greenville demand would come from Lake Keowee in the Upper Savannah basin.**

- **Greenville Water would likely not draw down both reservoirs, as was done in the Moderate and High Demand Scenarios but rely more on Lake Keowee.**

Lake Keowee

Adkins WTP

Upper Savannah Basin

Table Rock Reservoir

North Saluda Reservoir

Saluda Basin

Stovall WTP

Greenville

Source: Greenville Water Facility Master Plan, 2022 Update, Brown and Caldwell

Summary of Water Supply Shortages

Supply Shortage Metric	Current Use	2070 Moderate Demand	2070 High Demand	Permitted & Registered
Total basin annual mean shortage (MGD)	0.09	5.7	10.8	122.0
Maximum water user shortage (MGD)	1.5	61.6	67.9	294.5
Total basin annual mean shortage as a percentage of total water demand	0.03%	1.4%	2.0%	11%
Percentage of surface water users experiencing a shortage	10.8%	9.3%	16.3%	41%
Average frequency of shortage (%)	0.6%	0.9%	1.4%	10%

This is Table 4 of the memo

The differences in flow and percent of flow are tabulated in Table 6 of the memo

South Saluda River

2070 Mod	-12.8%
2070 HD	-13.2%

North Saluda River

2070 Mod	-31.1%
2070 HD	-31.8%

SLD04 Saluda River near Greenville

2070 Mod	-16.9%
2070 HD	-25.9%

SLD11 Reedy River above Fork Shoals

2070 Mod	-14.6%
2070 HD	-15.3%

SLD07 Saluda River near Williamston

2070 Mod	-13.4%
2070 HD	-18.9%

Rabon Creek

2070 Mod	-13.4%
2070 HD	-75.5%

SLD09 Saluda River near Ware Shoals

2070 Mod	-12.7%
2070 HD	-17.5%

SLD22 Bush River near Prosperity

2070 Mod	-25.0%
2070 HD	14.4%

SLD18 Saluda River at Chappells

2070 Mod	-11.4%
2070 HD	-16.6%

SLD25 Saluda River below L. Murray Dam

2070 Mod	0.0%
2070 HD	0.0%

SLD26 Saluda River near Columbia

2070 Mod	-0.4%
2070 HD	-1.3%
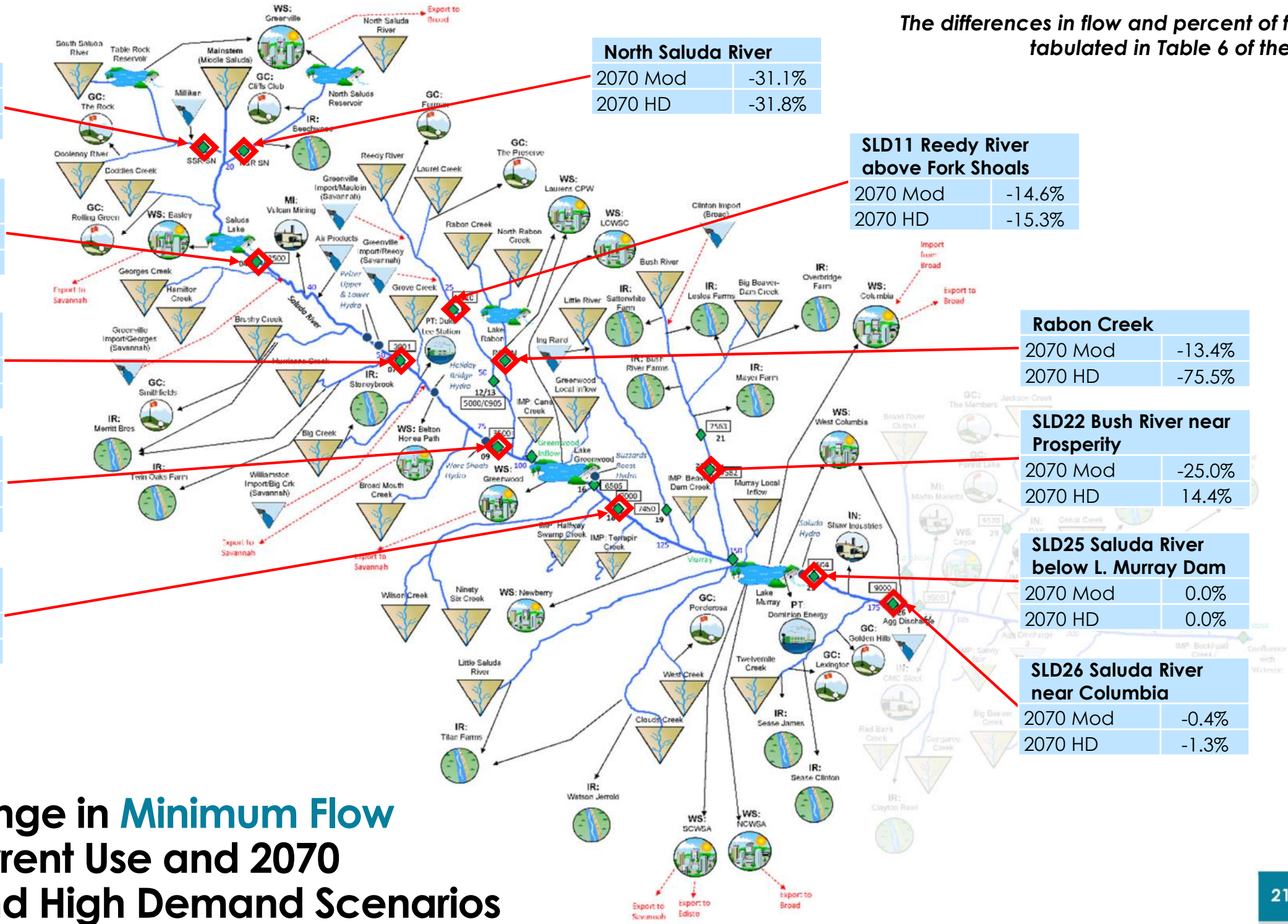
Percent Change in Minimum Flow between Current Use and 2070 Moderate and High Demand Scenarios

The differences in flow and percent of flow are tabulated in Table 6 of the memo

South Saluda River

South Saluda River	
2070 Mod	-2.3%
2070 HD	-3.5%

North Saluda River

North Saluda River	
2070 Mod	-5.0%
2070 HD	-5.7%

SLD04 Saluda River near Greenville

SLD04 Saluda River near Greenville	
2070 Mod	-2.7%
2070 HD	-6.9%

SLD11 Reedy River above Fork Shoals

SLD11 Reedy River above Fork Shoals	
2070 Mod	2.8%
2070 HD	1.8%

SLD07 Saluda River near Williamston

SLD07 Saluda River near Williamston	
2070 Mod	-0.6%
2070 HD	-3.0%

Rabon Creek

Rabon Creek	
2070 Mod	-0.9%
2070 HD	-8.0%

SLD09 Saluda River near Ware Shoals

SLD09 Saluda River near Ware Shoals	
2070 Mod	-2.0%
2070 HD	-3.4%

SLD22 Bush River near Prosperity

SLD22 Bush River near Prosperity	
2070 Mod	-6.1%
2070 HD	4.4%

SLD25 Saluda River below L. Murray Dam

SLD25 Saluda River below L. Murray Dam	
2070 Mod	0.0%
2070 HD	0.0%

SLD18 Saluda River at Chappells

SLD18 Saluda River at Chappells	
2070 Mod	-1.2%
2070 HD	-3.9%

SLD26 Saluda River near Columbia

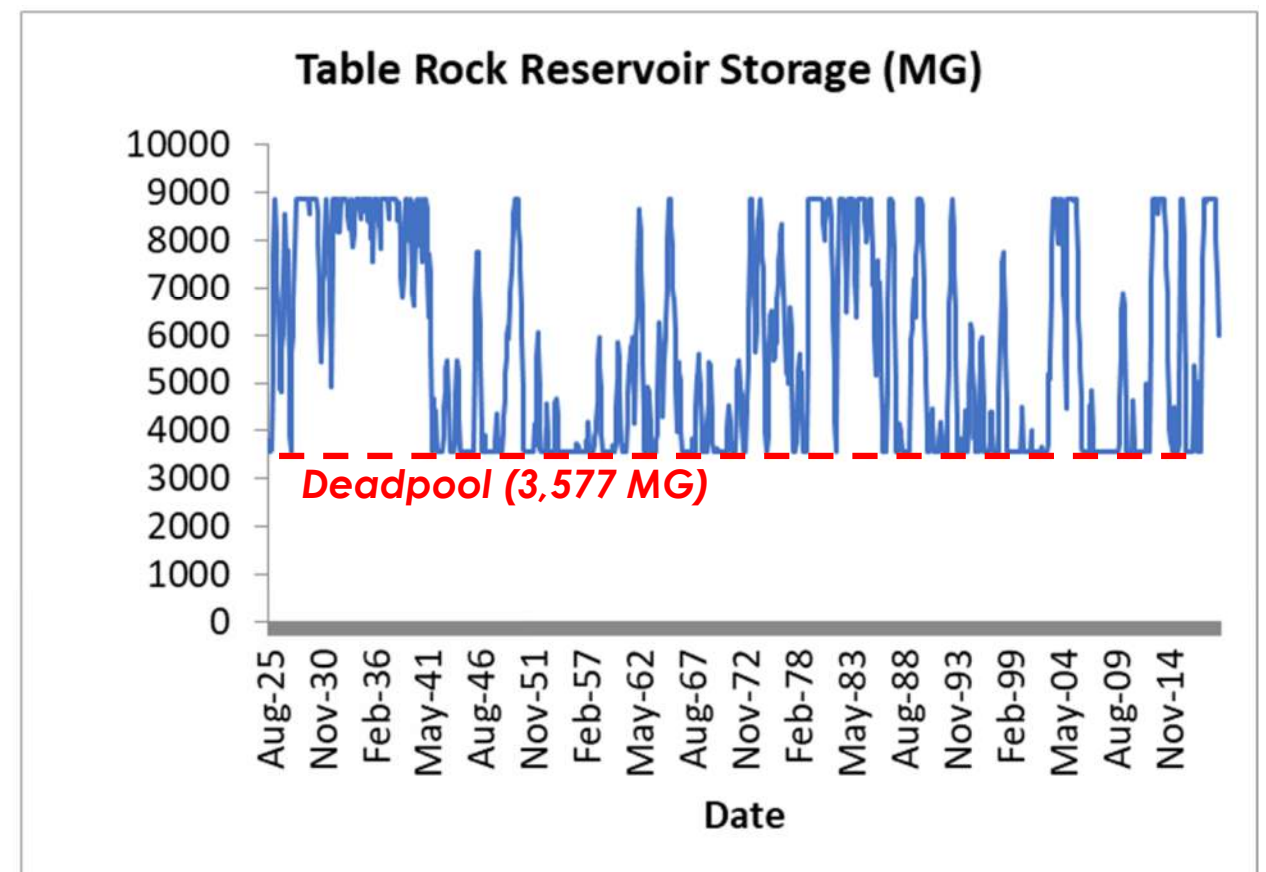| SLD26 Saluda River near Columbia	
2070 Mod	-0.4%
2070 HD	-1.2%

Percent Change in 10th Percentile Flow between Current Use and 2070 Moderate and High Demand Scenarios
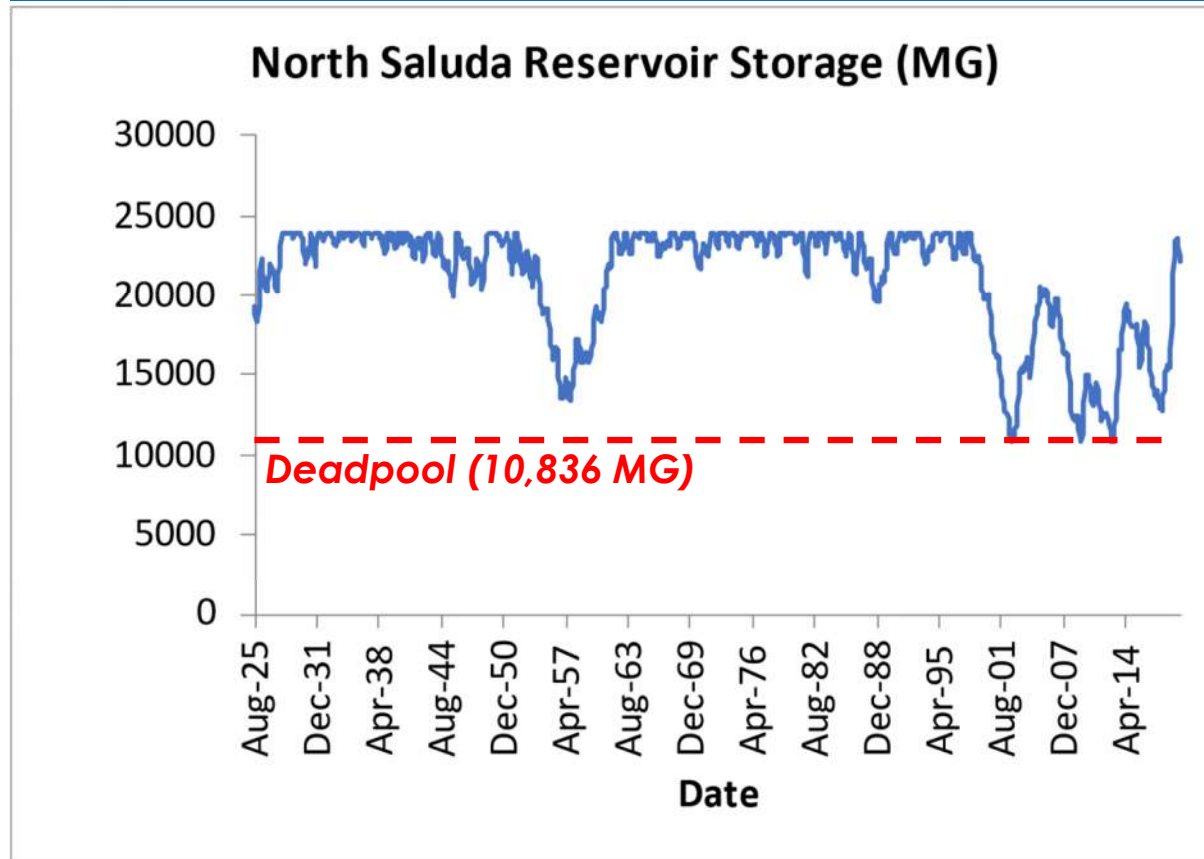
Reservoir Storage – Table Rock Lake
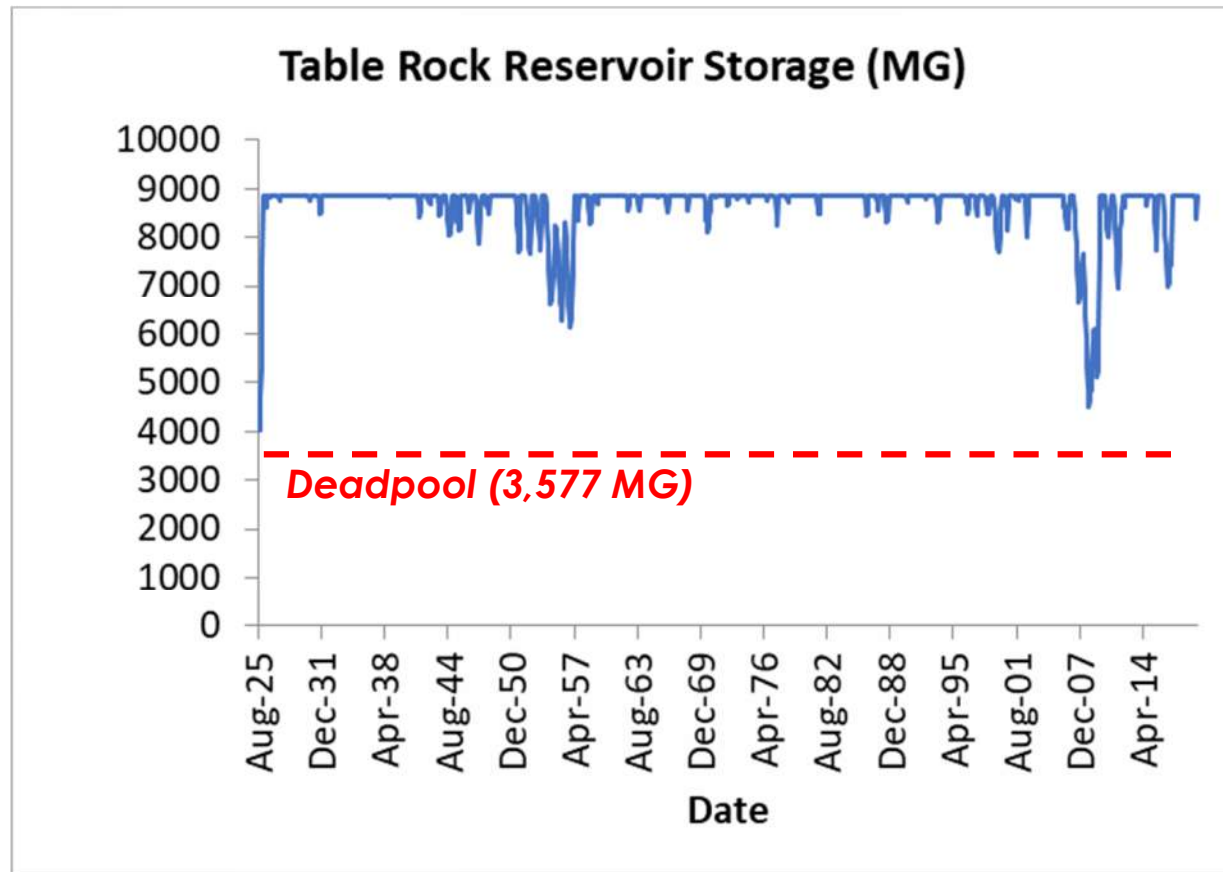
Reservoir Storage – North Saluda Reservoir

Current Use Scenario

North Saluda Reservoir Storage (MG)

Deadpool (10,836 MG)

2070 High Demand Scenario

North Saluda Reservoir Storage (MG)

Deadpool (10,836 MG)
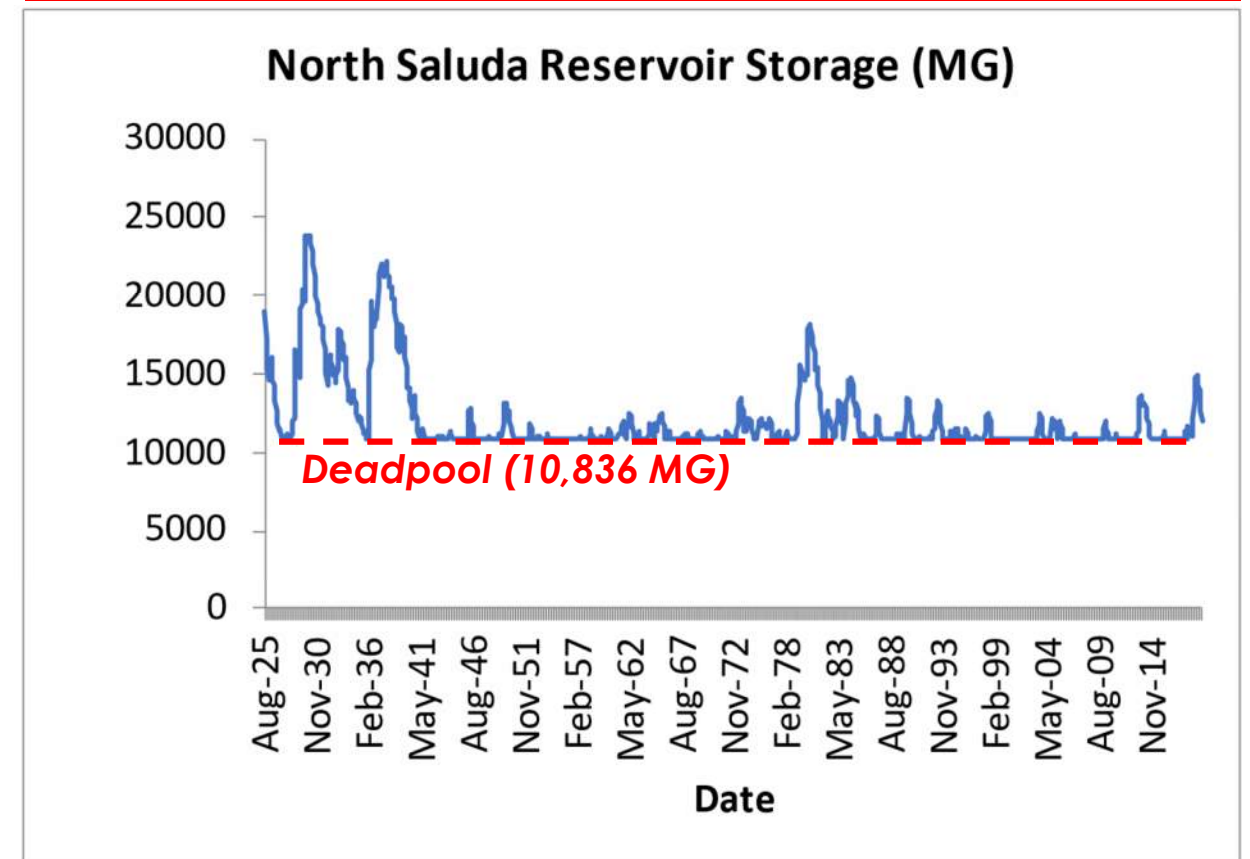
Reservoir Storage –Saluda Lake

Current Use Scenario

2070 High Demand Scenario

Saluda Lake Storage (MG)
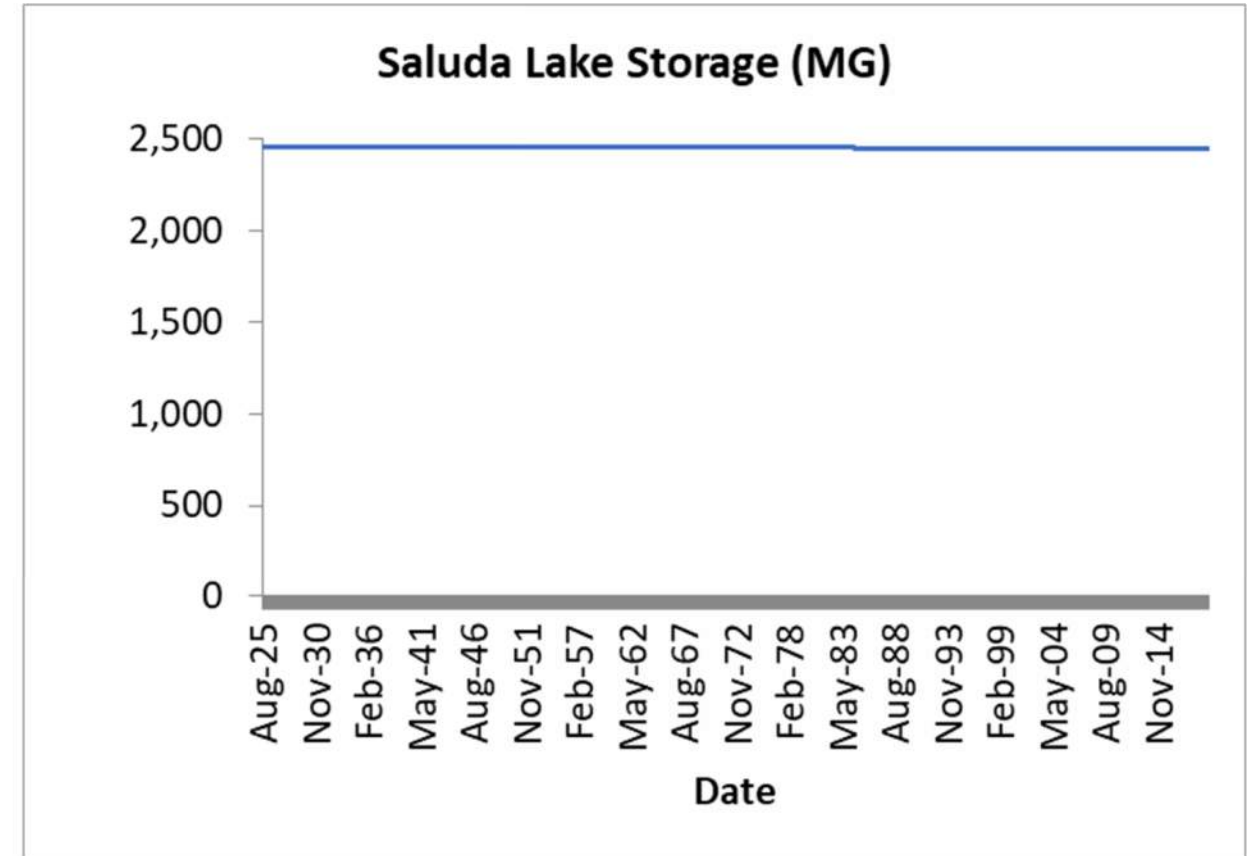
Deadpool storage level was not known

Reservoir Storage – Rabon Lake

Current Use Scenario
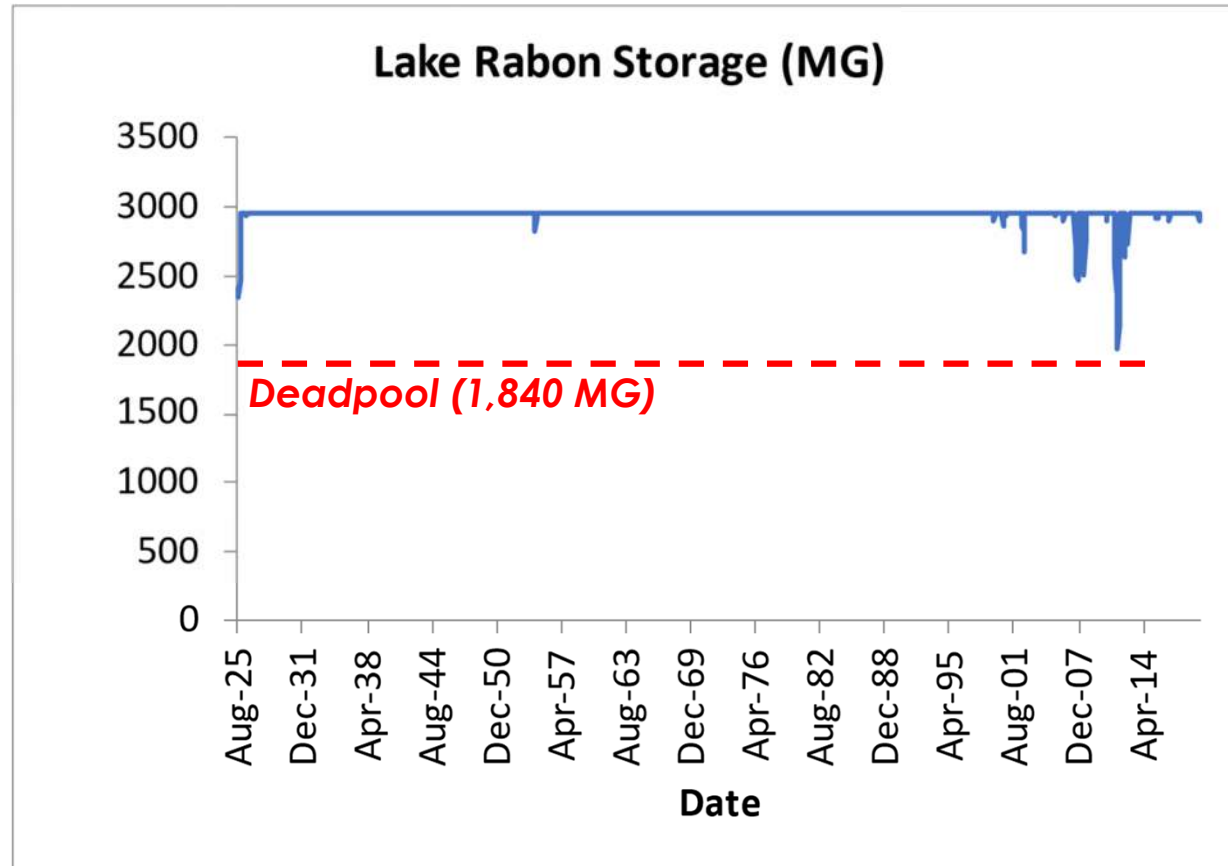
2070 High Demand Scenario
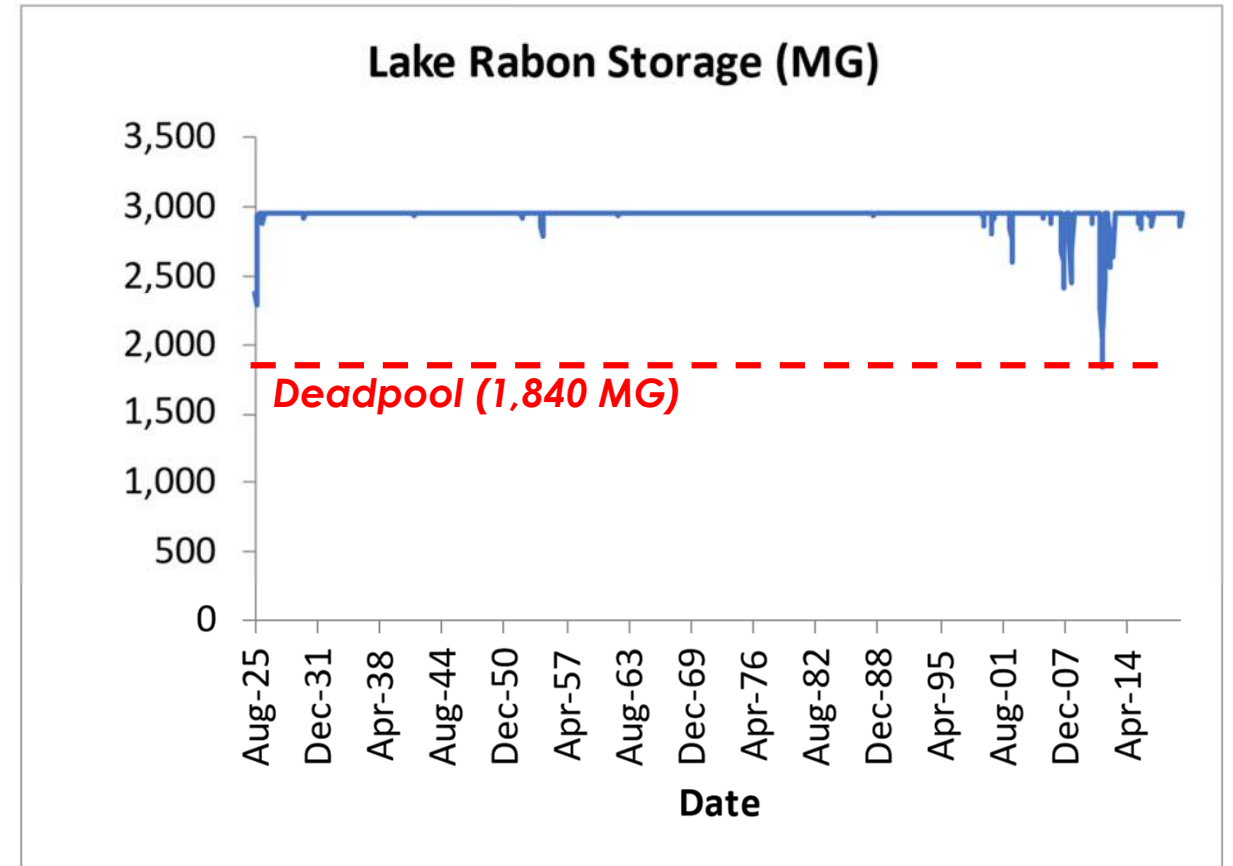
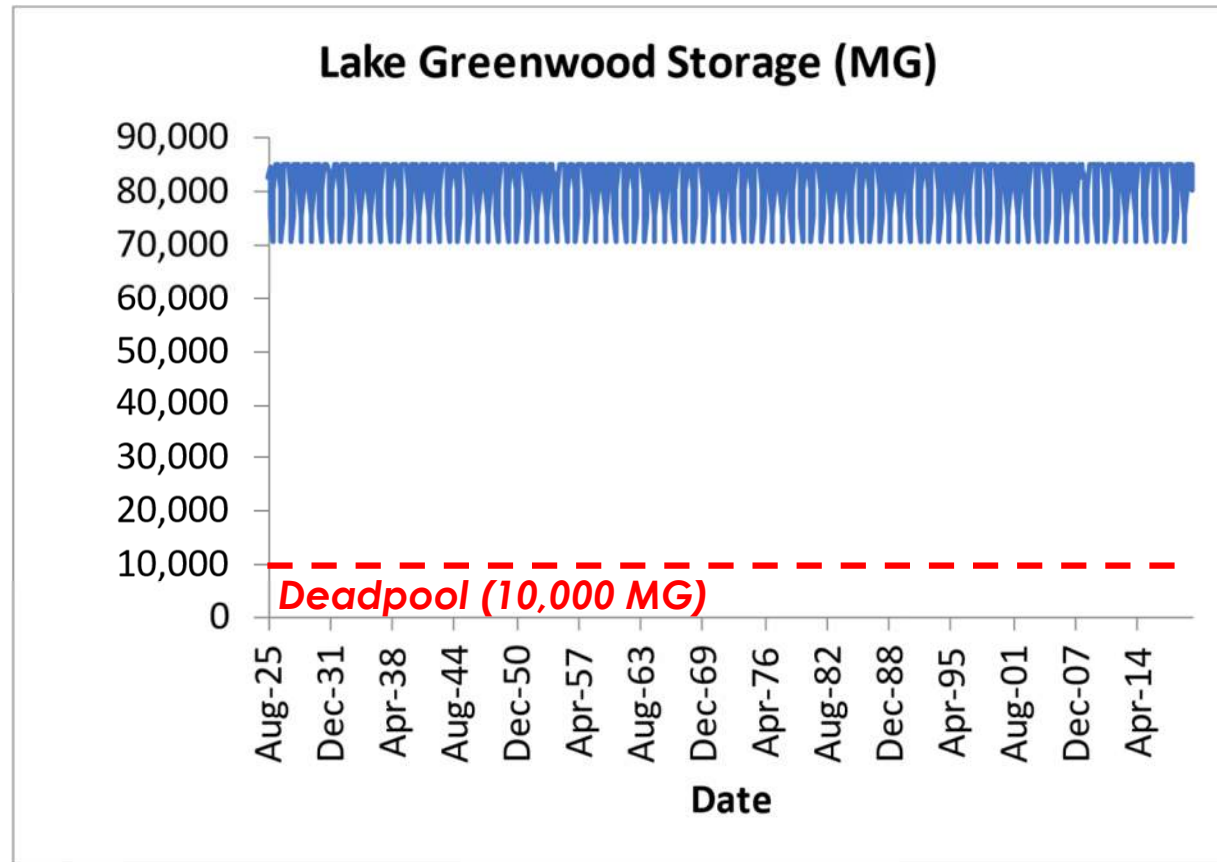*Deadpool storage level was not known*
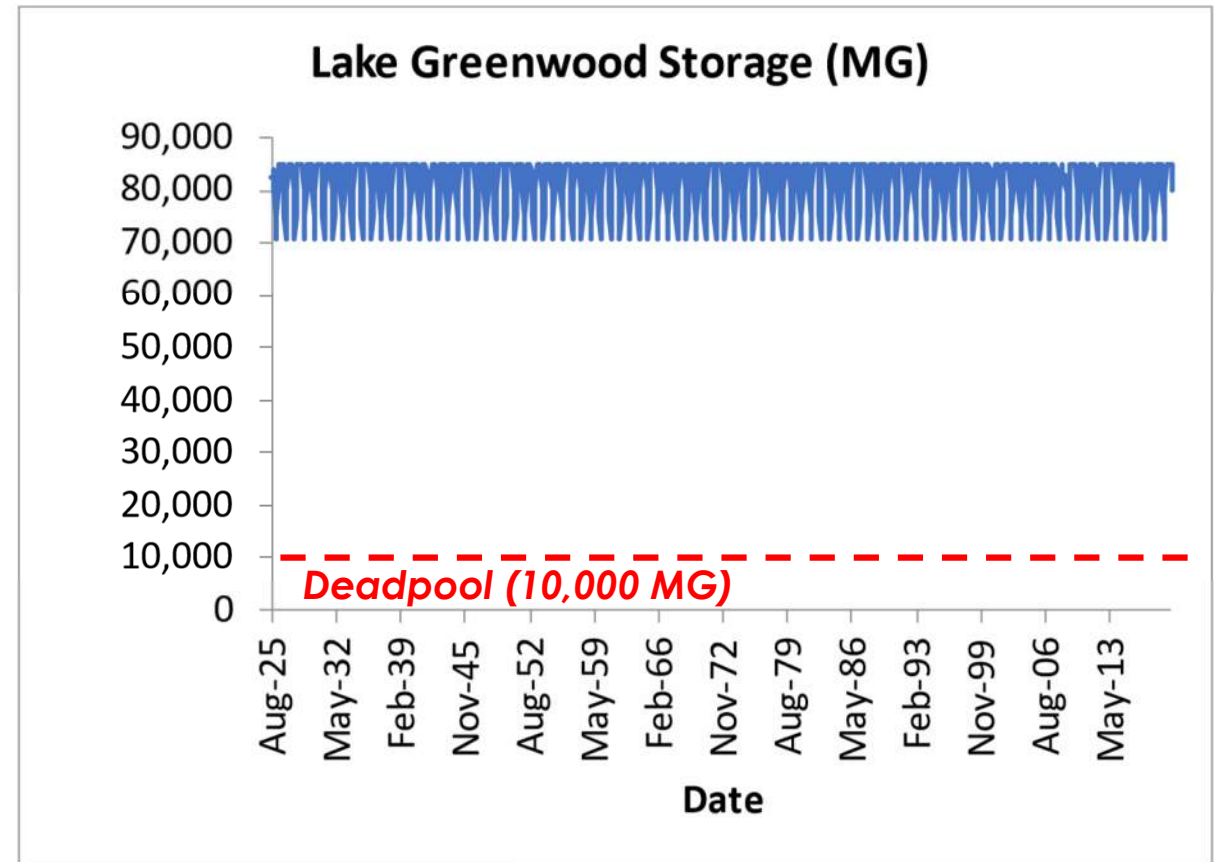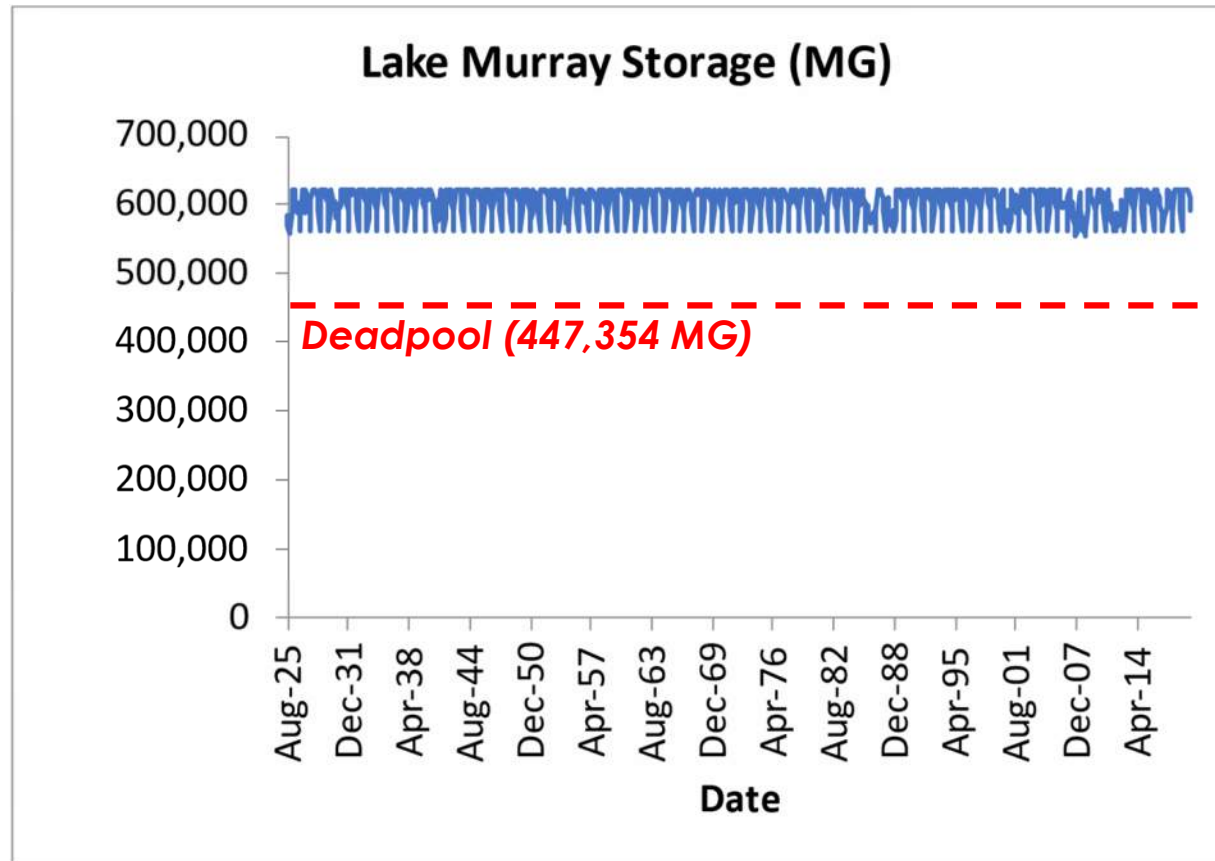
Reservoir Storage – Lake Greenwood

Reservoir Storage – Lake Murray

Current Use Scenario	2070 High Demand Scenario

Lake Murray Storage (MG) — Deadpool (447,354 MG)