Additional Surface Water Analyses

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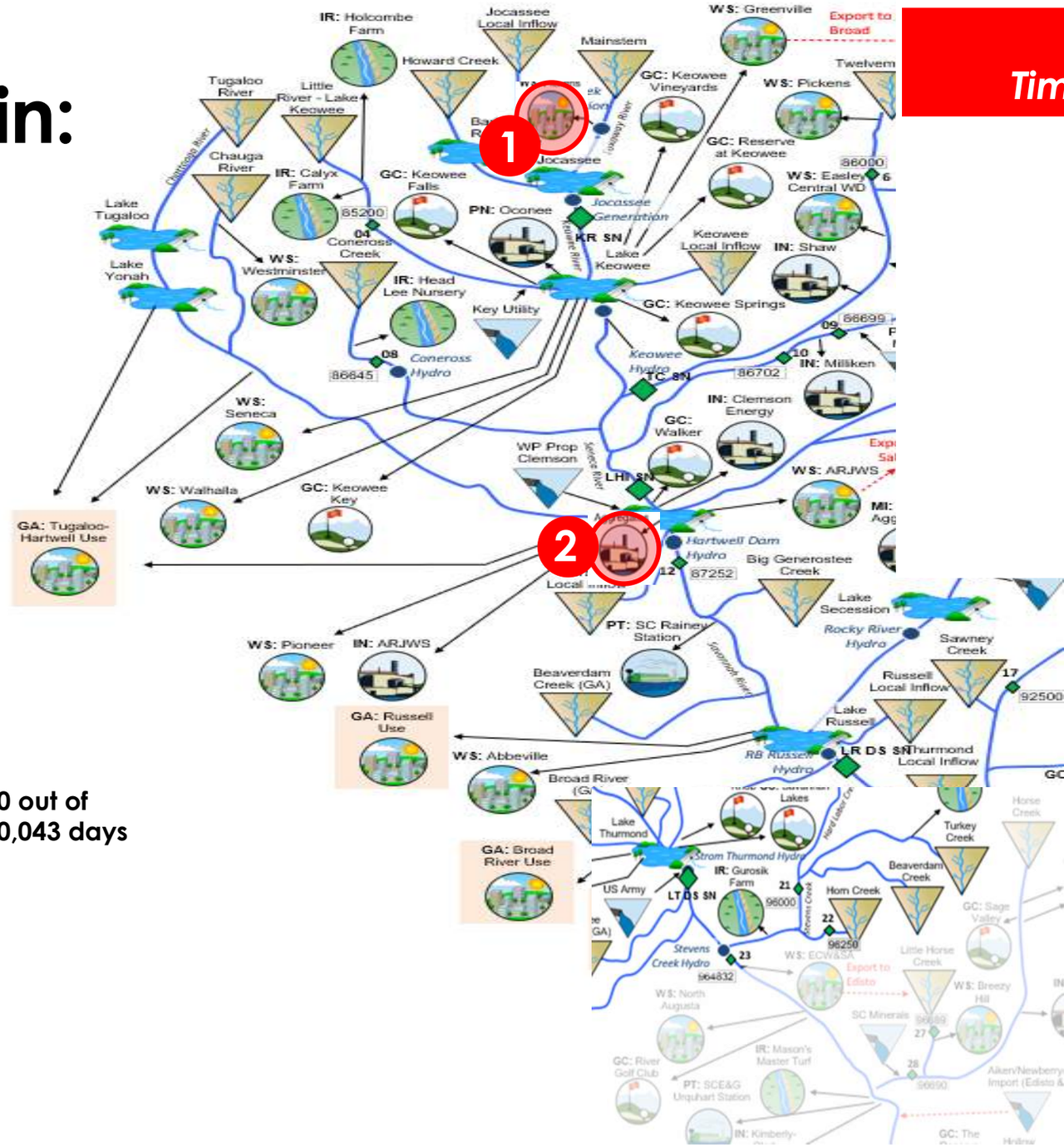
Agenda Item 4

Additional Surface Water Analyses

- Daily Timestep Results
- Comparison to Minimum Instream Flows
- Possible Nodes for Assessing Flow-Ecology Relationships
- Lower Savannah Scenario Current Use and P&R Scenario Results

Upper Savannah River Basin:
Current Use Scenario



1 Physical Shortage

Surface Water Shortage Table

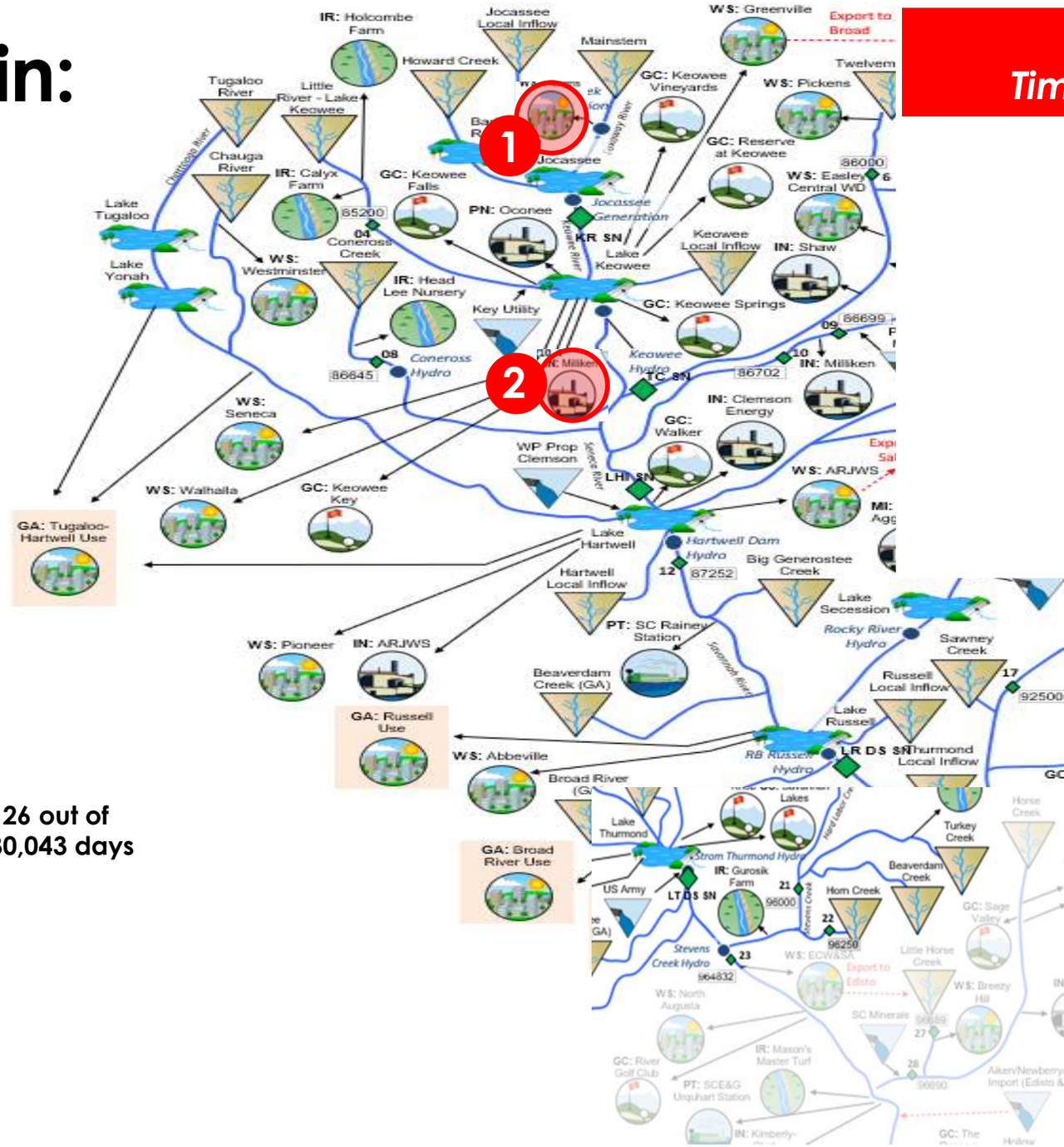
Map ID	Water User	Max Shortage (MGD)	Frequency of Shortage
1	WS: Pickens*	0.32	0.03%
2	MI: Hanson Aggregates	0.09	0.18%

10 out of 30,043 days

There were no shortages using a monthly timestep

* In the next 3 to 4 years, Pickens will no longer rely on Twelvemile Creek as its source of surface water supply.

Upper Savannah River Basin:
2070 Moderate Demand Scenario



1 Physical Shortage

Surface Water Shortage Table

Map ID	Water User	Max Shortage (MGD)	Frequency of Shortage
1	WS: Pickens*	1.41	0.42%
2	IN: Milliken	0.4	0.03%

126 out of 30,043 days

There were no shortages using a monthly timestep

* In the next 3 to 4 years, Pickens will no longer rely on Twelvemile Creek as its source of surface water supply.

Upper Savannah River Basin:
2070 High Demand Demand Scenario

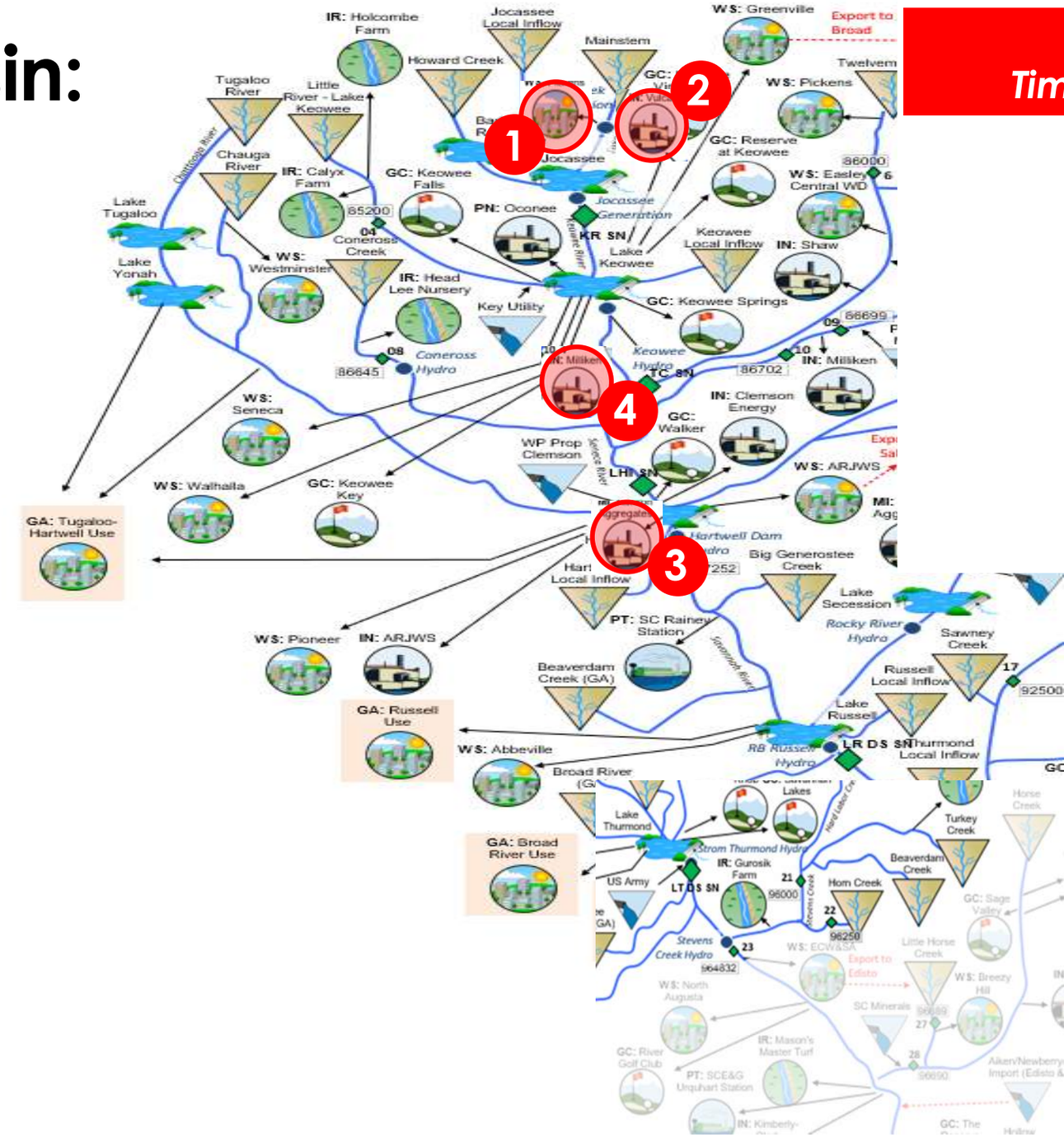
1 Physical Shortage

Surface Water Shortage Table

Map ID	Water User	Max Shortage (MGD)	Frequency of Shortage
1	WS: Pickens*	2.1	0.9%
2	IN: Vulcan	3.0	14.7%
3	MI: Hanson Aggregates	0.5	2.2%
4	IN: Milliken	2.2	0.15%

Shortages also observed at the monthly timestep

* In the next 3 to 4 years, Pickens will no longer rely on Twelvemile Creek as its source of surface water supply.



Upper Savannah River Basin: Permitted & Registered Scenario

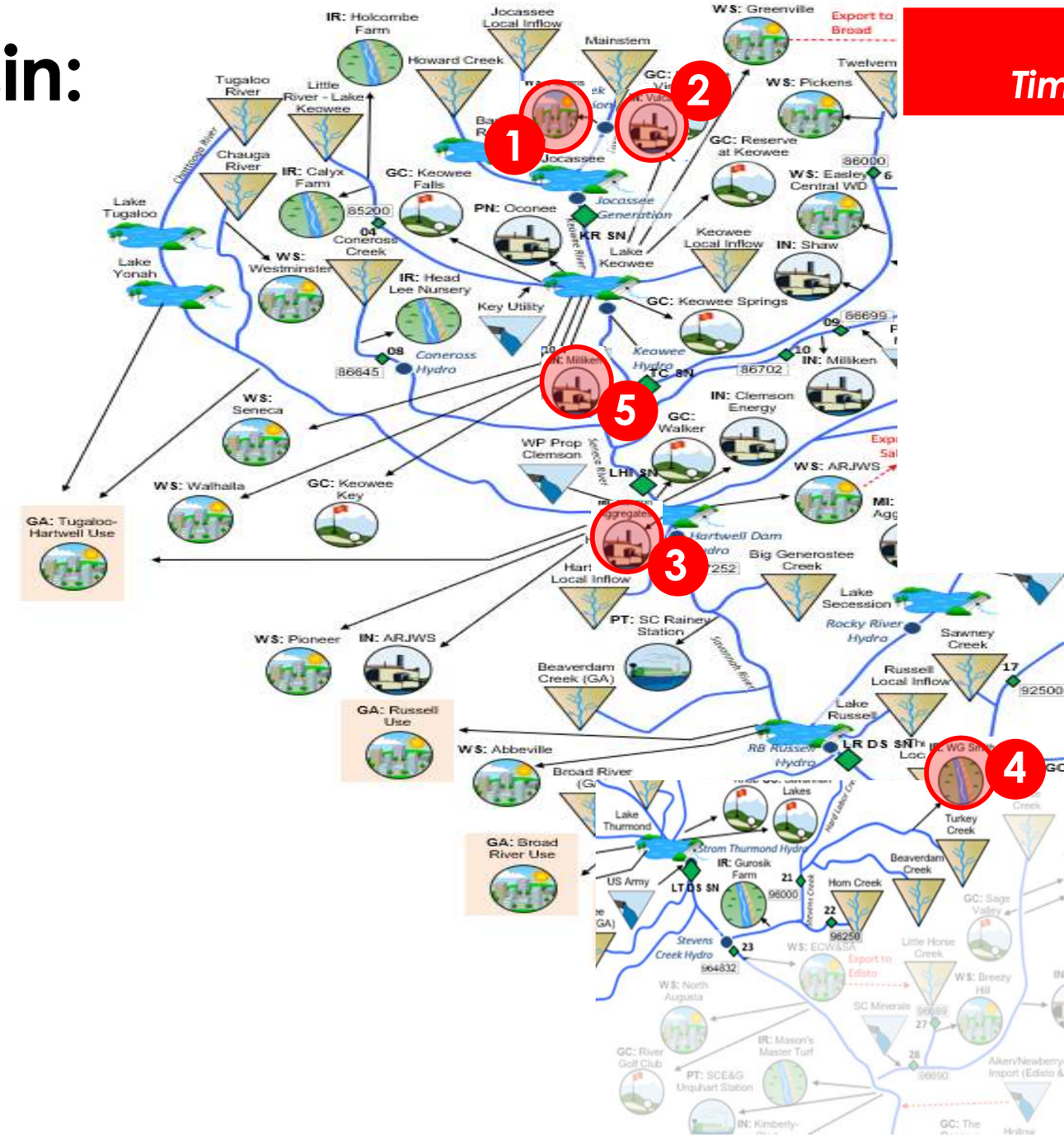
1 **Physical Shortage**

Surface Water Shortage Table

Map ID	Water User	Max Shortage (MGD)	Frequency of Shortage
1	WS: Pickens*	6.0	9.7%
2	IN: Vulcan	1.7	15.6%
3	MI: Hanson Aggregates	0.8	5.2%
4	IR: WG Smith	0.1	2.6%
5	IN: Milliken	0.7	0.04%

Shortages also observed at the monthly timestep

* In the next 3 to 4 years, Pickens will no longer rely on Twelvemile Creek as its source of surface water supply.

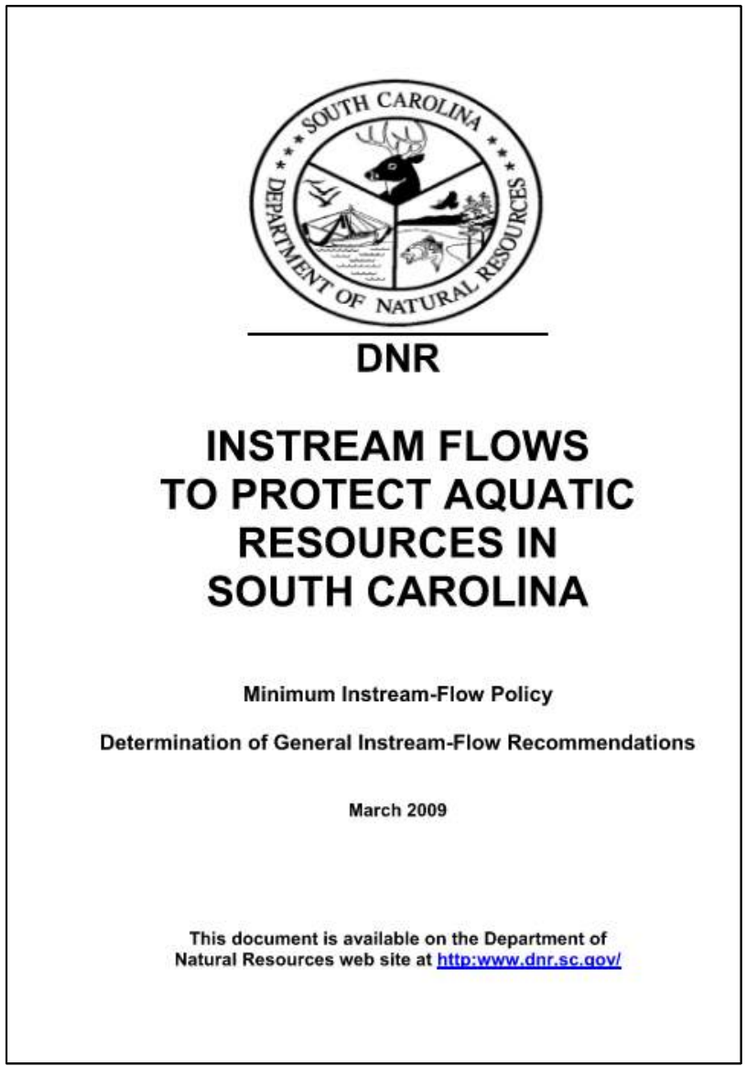


2009 SCDNR Instream Flow Policy

- 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



Minimum Instream Flows in the SW Regulations

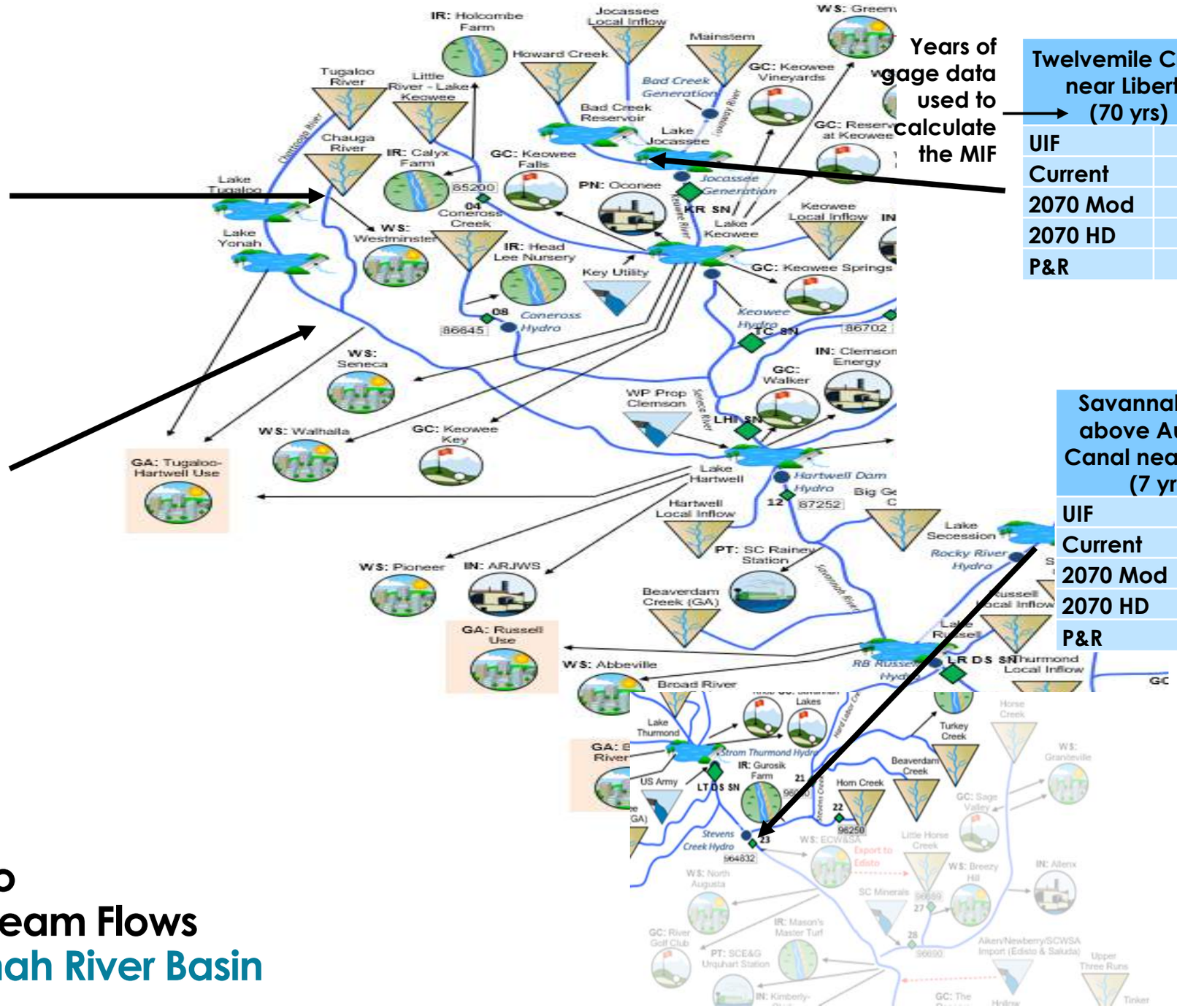
The South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act defines the Minimum Instream Flow as:

"… 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

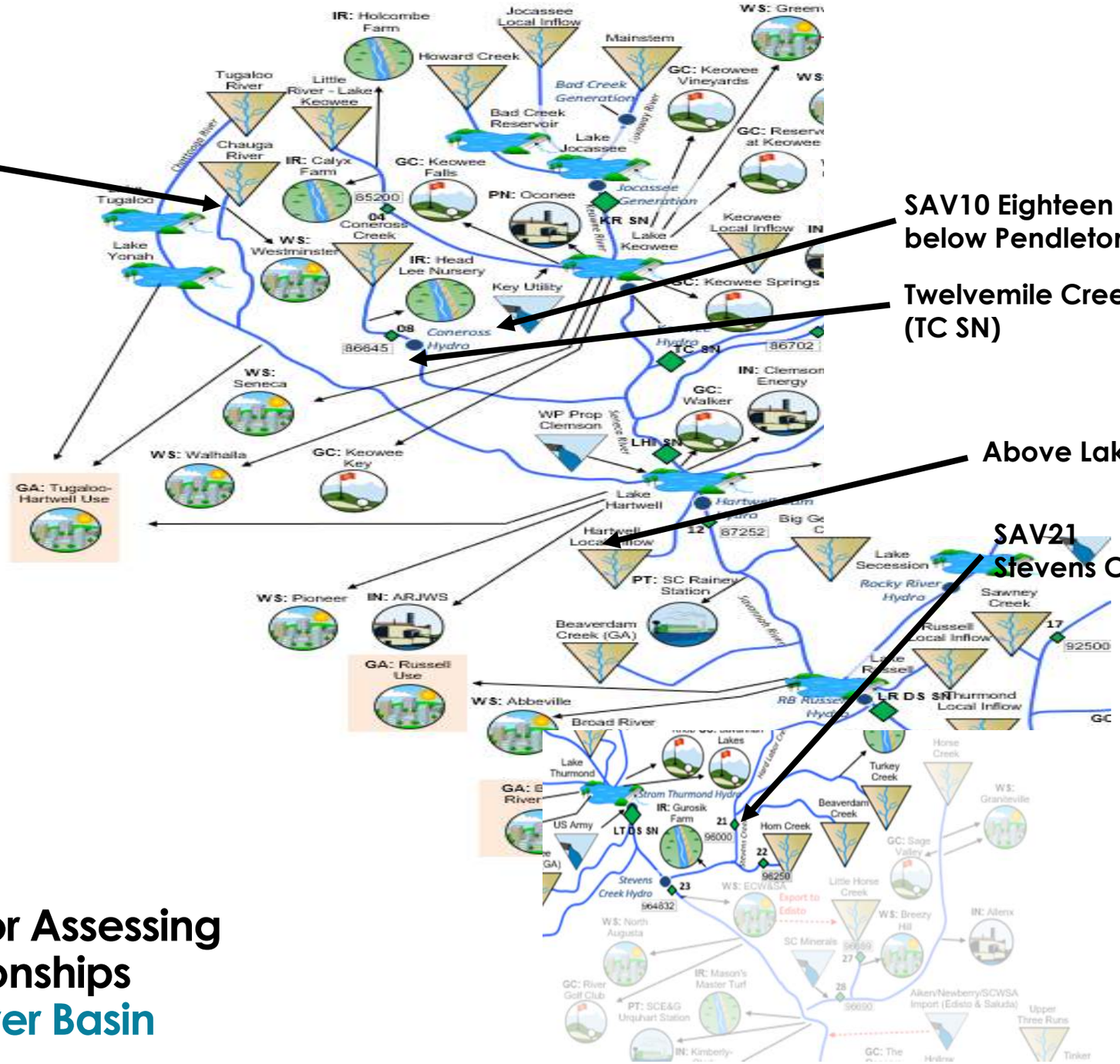
Little River near Walhalla

SAV10 Eighteen Mile below Pendleton

Twelvemile Creek (TC SN)

Above Lake Secession

SAV21 Stevens Creek near Modoc



Possible Locations for Assessing Flow Ecology Relationships

Upper Savannah River Basin

Lower Savannah River Basin Current Use and P&R Scenario Results

Lower Savannah River Basin - Summary of Average Annual Surface Water Demands by Scenario

All values in million gallons per day

Surface Water Use Sector	Current Use	Permitted and Registered (P&R)	Current Use as a Percent of P&R
Thermoelectric Power[1]	103	217	47%
Public Water Supply	45	304	15%
Industrial	18.7	882	2%
Golf Courses	0.6	13.2	5%
Agricultural	0.0	0.00023	0%
Mining	0.0	0.0	0%
GA-Side Water Users	171	461	37%
Total all Sectors*	338	1,877	18%

** Rounded to nearest MGD*

[1] Most of the thermoelectric power withdrawals are returned.

Lower Savannah River Basin Current Use Scenario

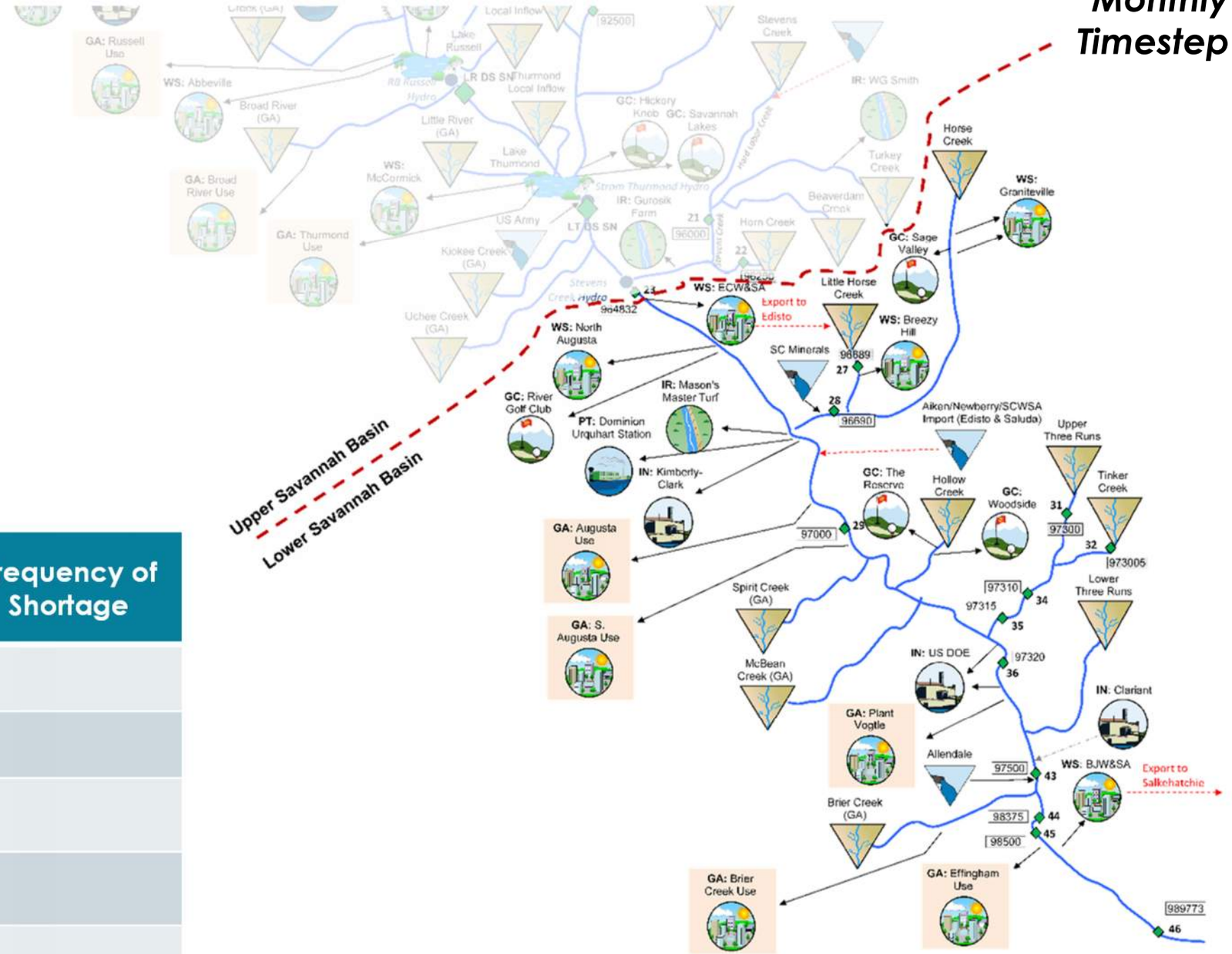
Monthly Timestep

1 **Physical Shortage**

Surface Water Shortage Table

Map ID	Water User	Max Shortage (MGD)	Frequency of Shortage

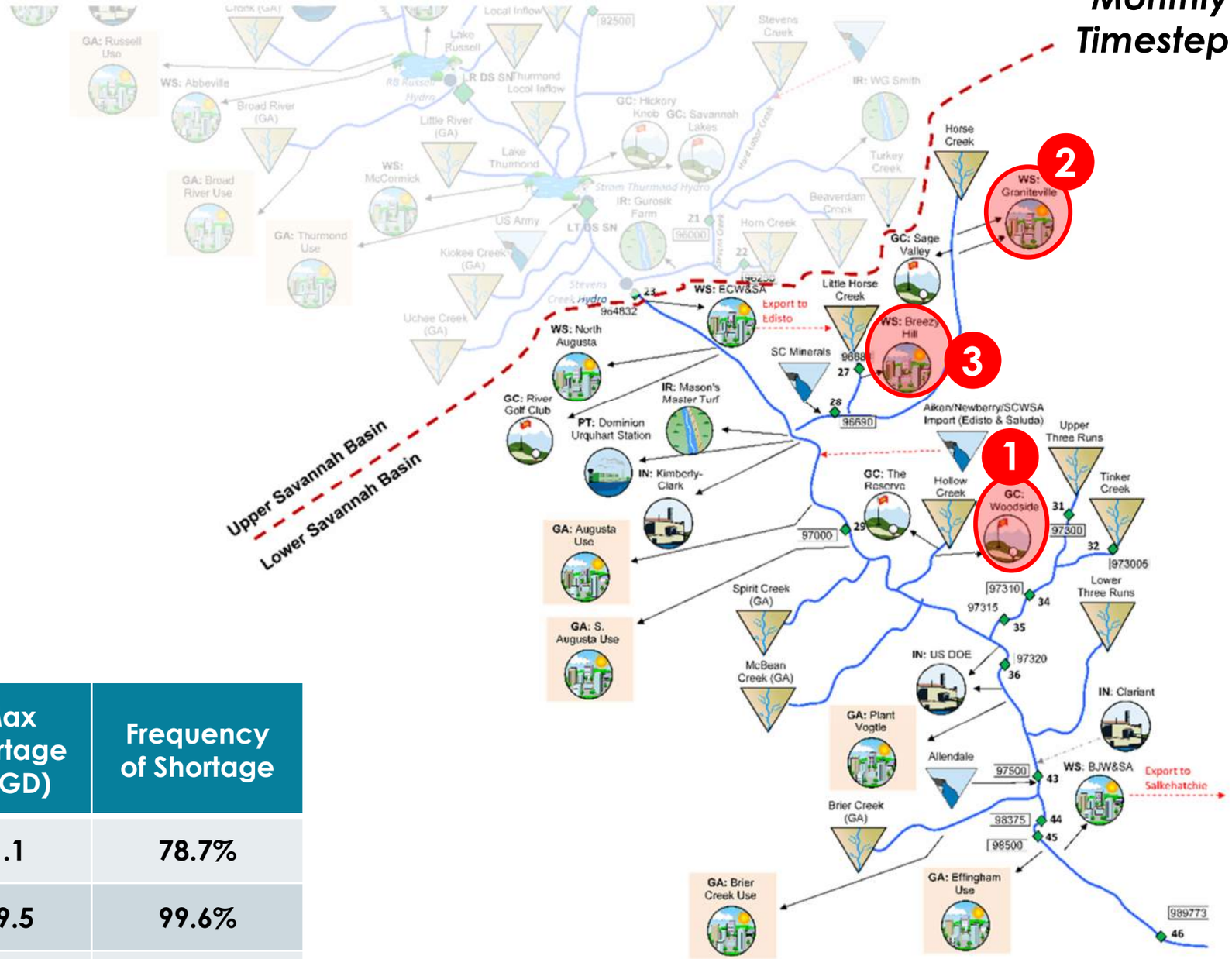
No Shortages



Lower Savannah River Basin

Permitted & Registered Scenario

Monthly Timestep



1 **Physical Shortage**

Surface Water Shortage Table

Map ID	Water User	Minimum Available Supply (MGD)	Max Shortage (MGD)	Frequency of Shortage
1	GC: Woodside	2.7	1.1	78.7%
2	WS: Breezy Hill	3.8	29.5	99.6%
3	WS: Graniteville	9.1	0.2	4.9%