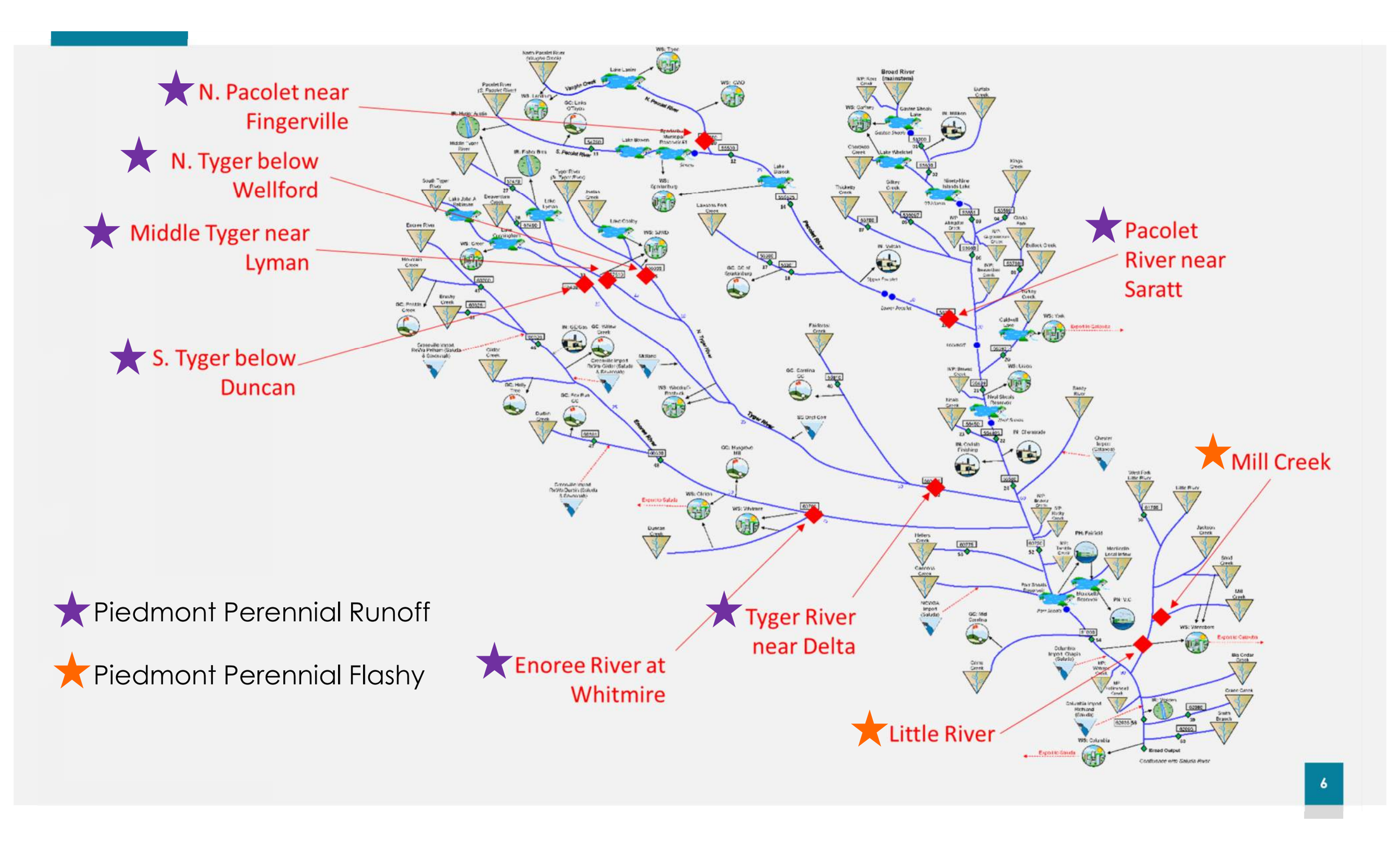
January RBC Meeting Review

Agenda Item 3

Flow-Ecology Relationships

- Four flow-ecology metrics were considered
  - **Mean daily flow (MA1): Perennial runoff and Perennial Flashy**
  - **Timing of low flow (TL1): Perennial runoff**
  - **High flow pulse count (FH1): Perennial Flashy**
  - **High flow pulse duration (DH15): Perennial Flashy**
- These were chosen based on:
  - relevance to water withdrawal and drought management;
  - strength of relationship
  - distribution (most stream classes and basin area represented)
  - calculable from SWAM output

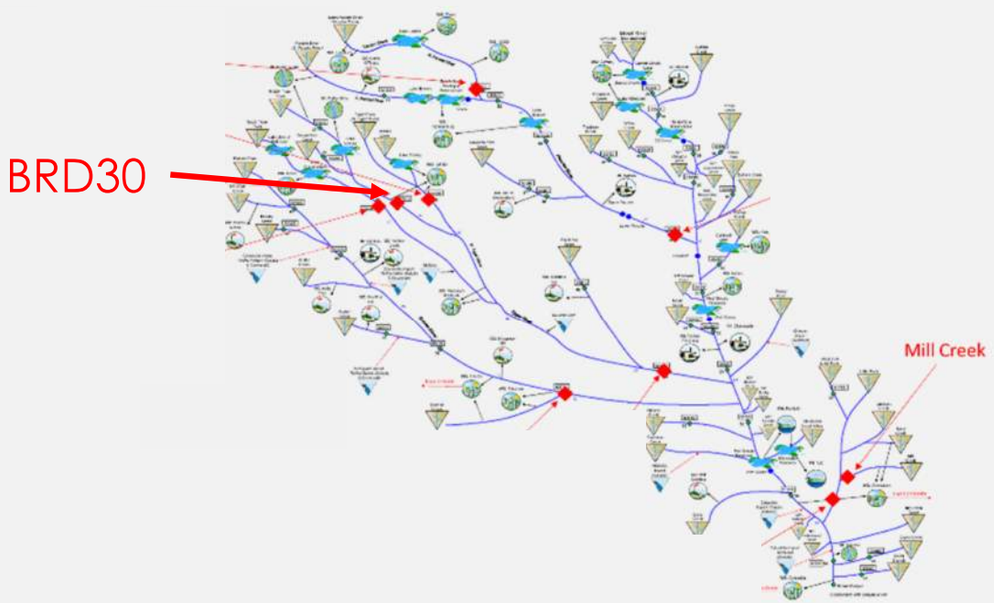

N. Pacolet near Fingerville
N. Tyger below Wellford
Middle Tyger near Lyman
S. Tyger below Duncan
Pacolet River near Saratt
Mill Creek
Piedmont Perennial Runoff
Piedmont Perennial Flashy
Enoree River at Whitmire
Tyger River near Delta
Little River

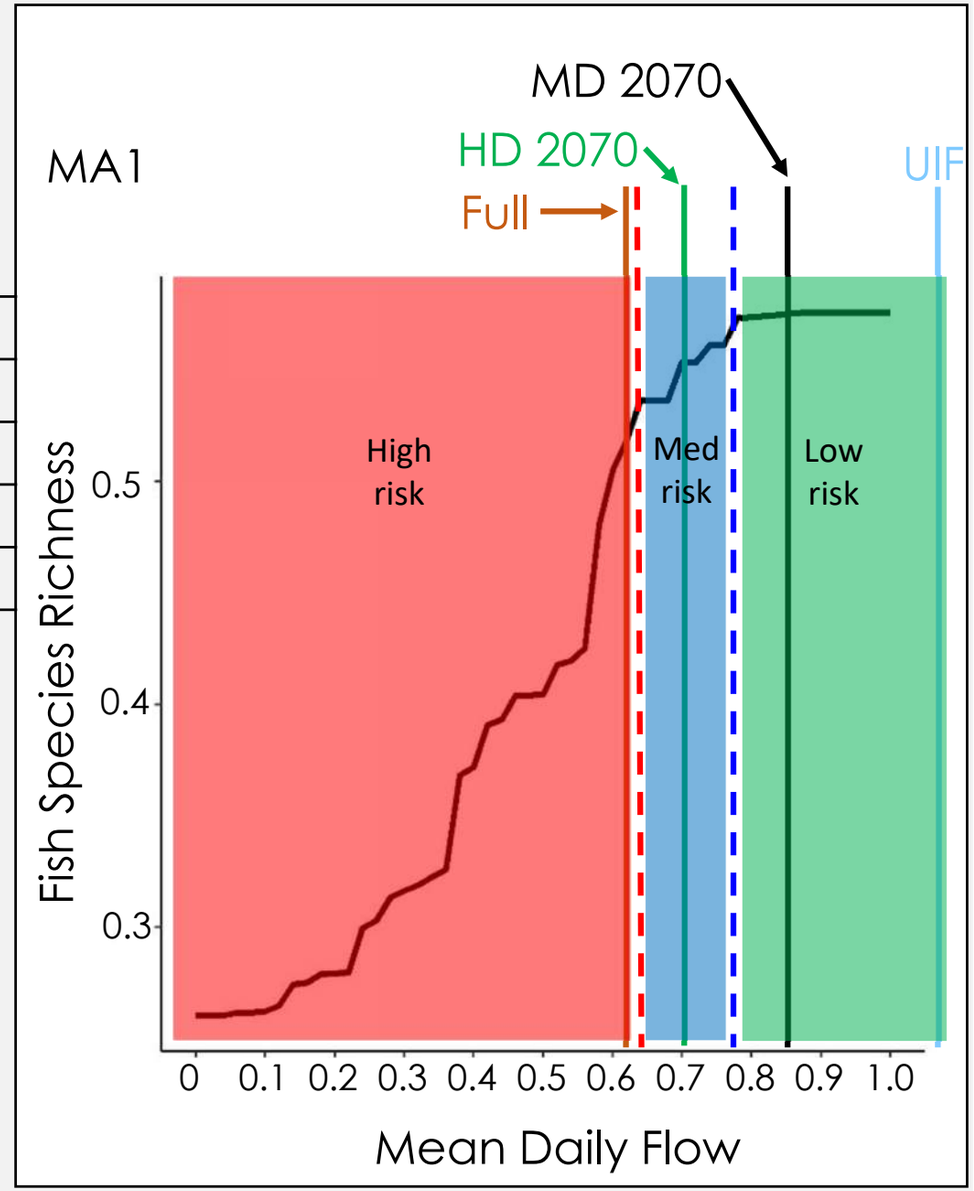
How can we use these relationships?

- Defining biological response limits
  - Zones of **low, medium, and high** change in the biological condition of streams along flow gradients
  - Searching for areas along flow gradients that induce changes in the biological metric
- Predicting responses
  - If we alter flow by X amount what will be the biological response?

Middle Tyger River near Lyman

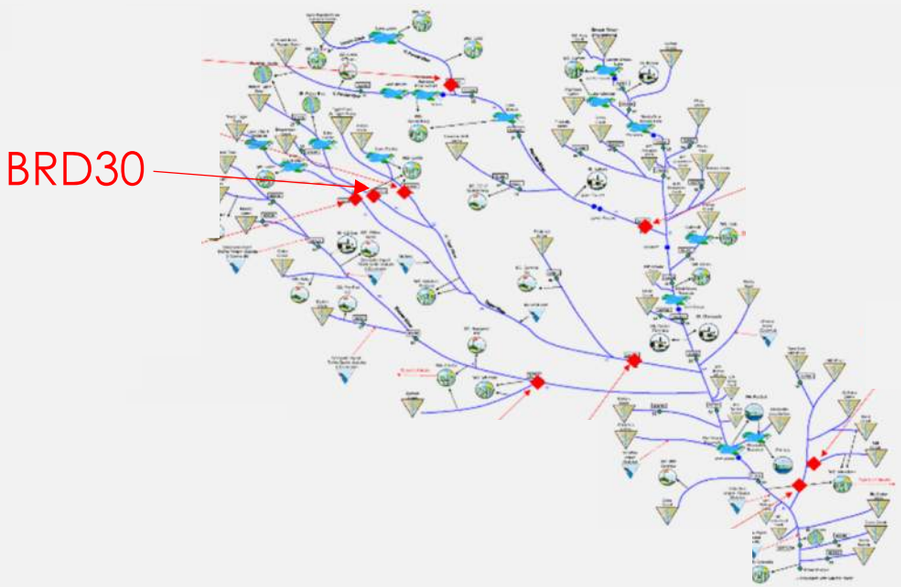
Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	98.35	107.83	9.6%	Richness	7.9%	7
HD 2070	98.35	69.85	-29.0%	Richness	-23.8%	7
Full	98.35	61.68	-37.3%	Richness	-30.6%	7
MD 2070	98.35	84.57	-14.0%	Richness	-11.5%	7

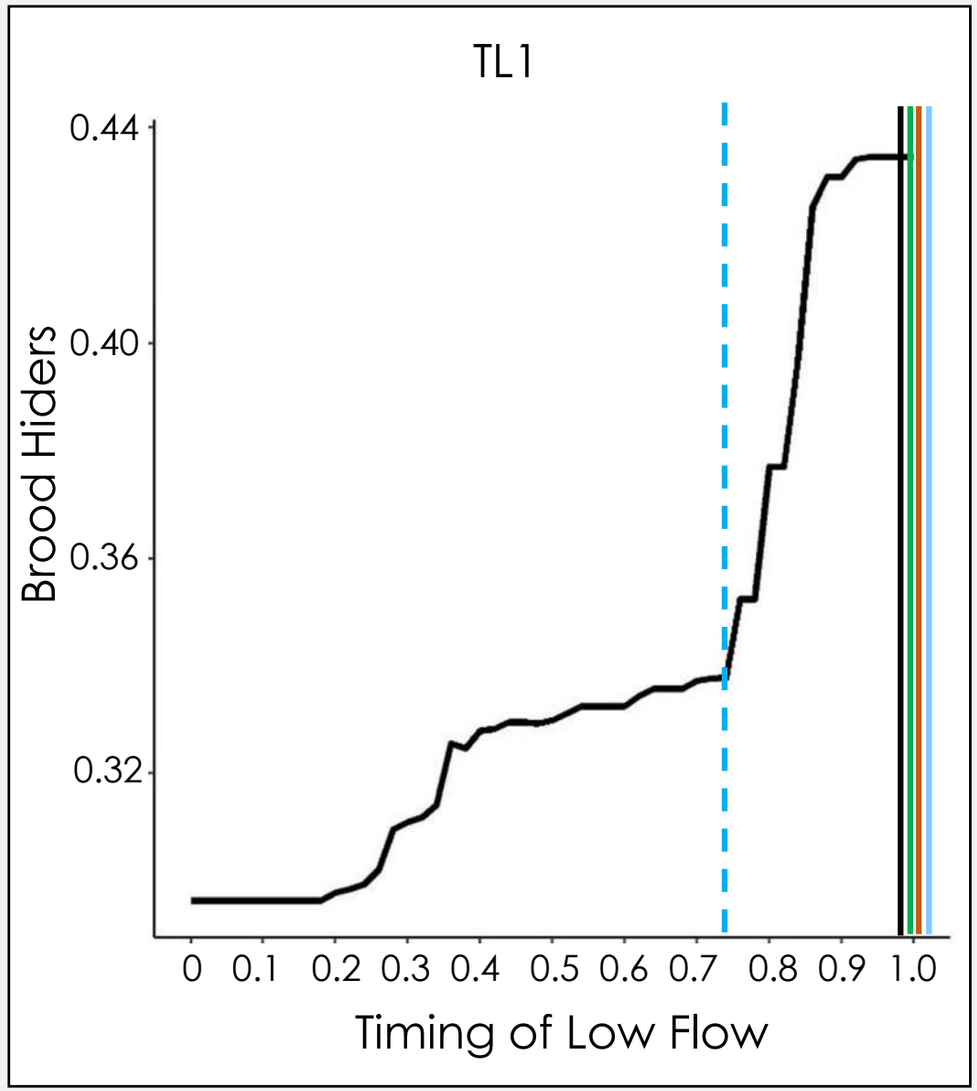




Middle Tyger River near Lyman

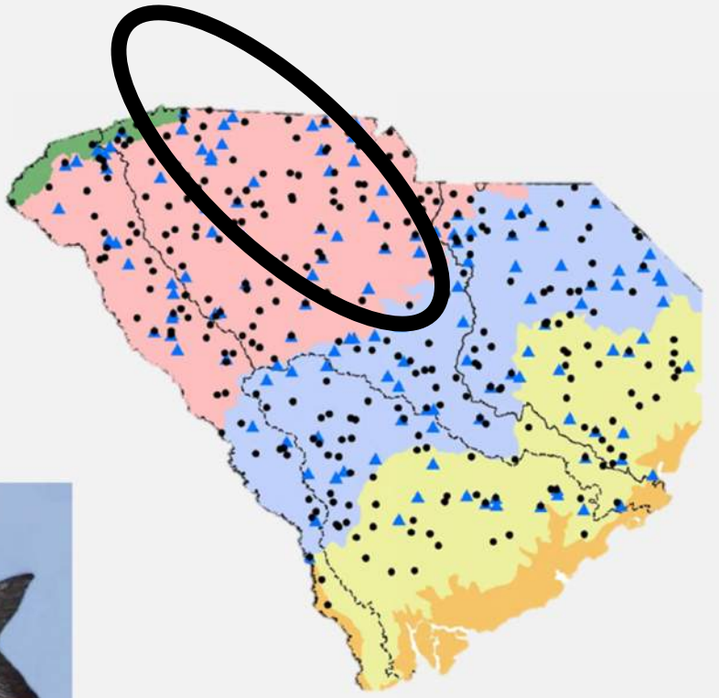
Scenario	Current	Predicted	% change
UIF	257	259	0.8%
HD 2070	257	256	-0.4%
Full	257	259	0.8%
MD 2070	257	254	-1.2%





Expected results: richness

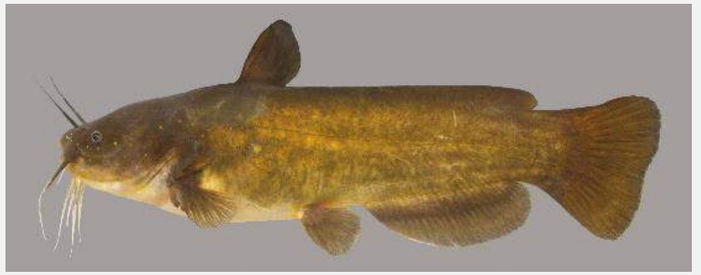
- Up to 50% biodiversity loss in some streams at **full allocation**
- Replacement by common generalists & invasives



Green sunfish

White sucker

Eastern mosquitofish



Yellow Bullhead

Golden Shiner

Spartanburg Water System Reservoirs

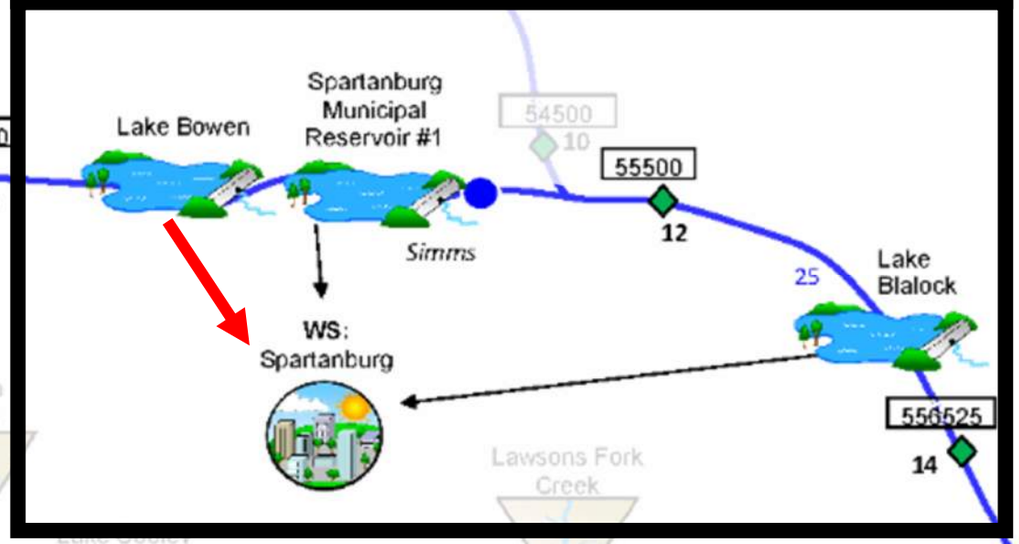
Month	Safe Yield Demands (MGD	2070 High Demand (MGD)
Jan	66.1	57.0
Feb	65.3	57.0
Mar	65.9	70.4
Apr	66.9	56.5
May	74.1	61.0
Jun	80.0	68.2
Jul	83.8	69.0
Aug	81.0	65.5
Sep	80.5	65.7
Oct	74.1	62.7
Nov	68.1	59.0
Dec	64.8	52.8
Average	72.6	62.1

Water User	Freq. of Shortage	Max Shortage (MGD)
WS: Spartanburg	0.4%	36.9

Safe Yield Scenario 1 (SY1) was calculated for the entire 3-reservoir system

Current Use: 72.6 MGD

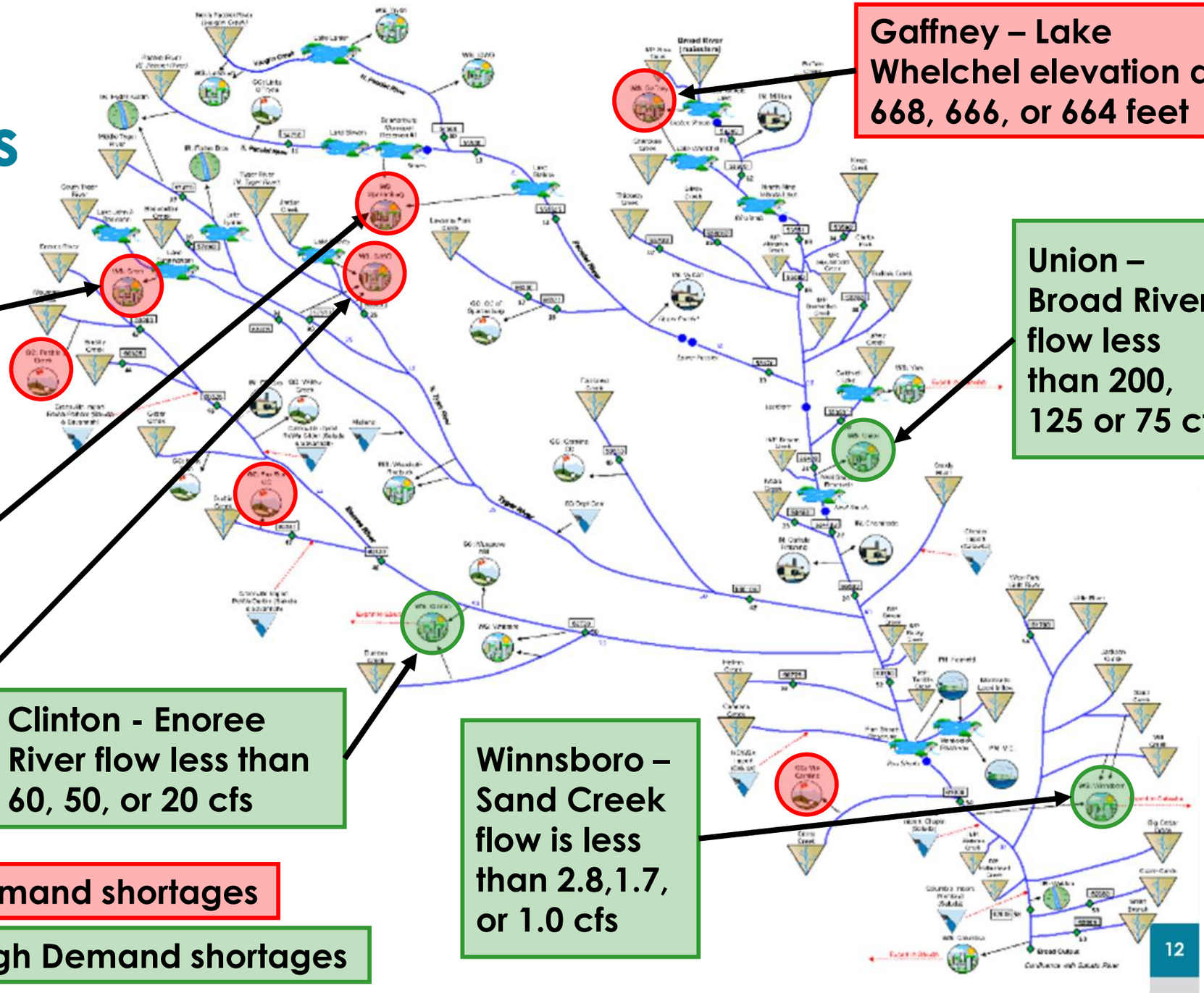
Full Allocation: 65.8 MGD



SWS Scenario Demands (for reference)

Scenario	MGD
Current	26.4
2070 Mod	45.7
2070 High	62.1

Modeled Drought Triggers



Greer – System effective storage is 4,484 MG, 4,248 MG, 3,776 MG, or 3,304 MG

SWS – Combined stream flow entering the reservoir system from the N. and S. Pacolet Rivers drops below 60, 40, 30, or 25 cfs

SJWD – Storage in Lake Lyman falls below 841, 840, or 836 feet

Clinton - Enoree River flow less than 60, 50, or 20 cfs

Gaffney – Lake Whelchel elevation at 668, 666, or 664 feet

Union – Broad River flow less than 200, 125 or 75 cfs

Winnsboro – Sand Creek flow is less than 2.8,1.7, or 1.0 cfs

Red = User with 2070 High Demand shortages

Green = User with no 2070 High Demand shortages

High Demand Scenario 2070 Shortages With and Without Drought Management Plan (DMP) Triggers and Tiered Reductions in Demand

Water User	Without DMP Reductions		With DMP Reductions in Demand	
	Freq. of Shortage	Max Shortage (MGD)	Freq. of Shortage	Max Shortage (MGD)
WS: Greer*	7.1%	17.0	No Change	
WS: SJWD*	0.6%	18.3	No Change	
WS: Gaffney	1.1%	27.8	0.8%	19.2
WS: Spartanburg	0.4%	36.9	0.1%	5.2
GC Mid Carolina	0.2%	0.03	No Change	
GC: Pebble Crk.	0.1%	0.1	No Change	
GC: Fox Run	0.1%	0.02	No Change	

"No Change" because no rules were in place to release more water from Lake Robinson (Greer) or Lake Lyman (SJWD)

* Additional data collection and analysis is being performed to evaluate modeled vs. actual operation of upstream reservoirs, and the effect on modeled shortages.

Timing of High Demand Scenario Shortages

	Maximum Shortage (MGD) for Each High Demand Scenario						Frequency of Shortage for Each High Demand Scenario					
Water User Name	2025	2030	2040	2050	2060	2070	2025	2030	2040	2050	2060	2070
WS: Gaffney	6.2	10.0	12.9	18.9	23.3	27.8	0.3%	0.3%	0.5%	0.7%	1.0%	1.1%
WS: Spartanburg	No shortage				15.0	36.9	No shortage				0.1%	0.4%
WS: SJWD*	No shortage				6.9	18.3	No shortage				0.1%	0.6%
WS: Greer*	No shortage		4.2	9.3	13.3	17.0	No shortage		0.8%	2.6%	4.4%	7.1%
GC: Pebble Creek	0.1	0.1	0.1	0.1	0.1	0.1	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
GC: Fox Run CC	0.02	0.02	0.02	0.02	0.02	0.02	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
GC: Mid Carolina	0.03	0.03	0.03	0.03	0.03	0.03	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%

* Additional data collection and analysis is being performed to evaluate modeled vs. actual operation of upstream reservoirs, and the effect on modeled shortages.

Vision and Goals Statements… Quiz!

What is the Broad RBC's Vision Statement?

A *The Broad River Basin Council seeks to manage our water resources in order to protect public health, allow for growth, and provide opportunities for recreation.*

B *Empowered stakeholders taking coordinated actions to conserve and enhance the resilience of the Broad River Basin to provide water resources for quality of life, while accounting for the ecological integrity of our shared water resources.*

C *The vision of the Broad River Basin Council is to promote the sustainable management of water resources under South Carolina's riparian-based water withdrawal laws while supporting the region's economy, protecting public health and enhancing the quality of life for all citizens.*

Vision and Goals Statements… Quiz!

What are the three goals that we developed for the Broad RBC?

A *Enhance the understanding of regional water issues and the need for support of policies and behaviors to protect resources through promotion and education.*

B *Identify strategies to maximize water imports into the basin and eliminate water exports*

C *Use sound science and data driven practice to support collaboration for all entities to effectively and efficiently manage the basin.*

D *Provide policy and legislative recommendations.*