Safe Yield Results for Additional Reservoirs

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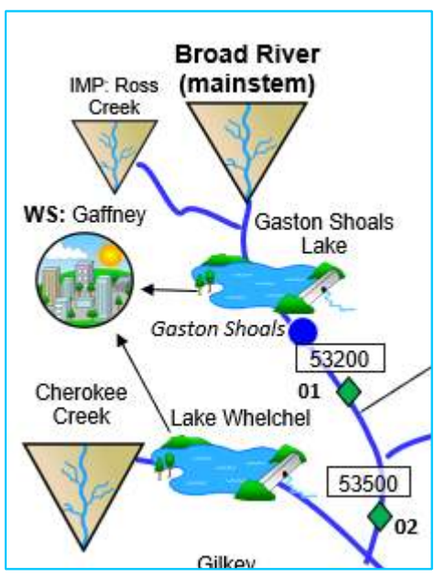
Agenda Item 5

Concepts and Purpose

- **Safe Yield** = Maximum annual average demand that can be sustained through the period of record without depleting available storage.
- **Reservoir Balancing**: In some cases, we adjusted rules so that reservoirs in a system drew down together at the same relative rate to avoid water in one but not others (for example)
- **Demand Assumptions**: Conservative – High Demand 2070 Scenario
- **Process**: Consistent process but with nuances for each system to be explained
- **PURPOSE**: Compare water availability in reservoirs to potential extreme future conditions.
    - Greer
    - Gaffney
    - SJWD
    - Spartanburg

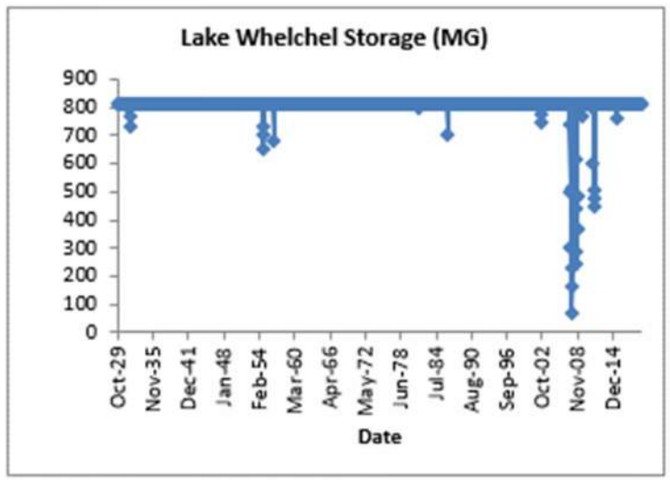
Safe Yield for Gaffney

Reservoir	Safe Yield (MGD)
Lake Whelchel	6.8
Gaston Shoals (FERC allowance)	6.0
Combined	12.8
Prior Total System Assessment (AECOM)	12.7

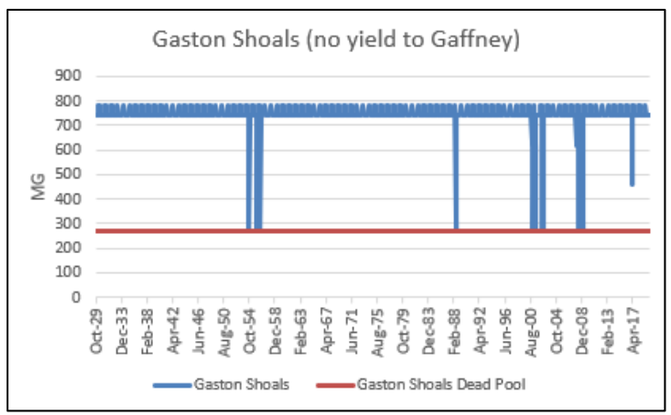


No upstream SC users, so demand scenario doesn't matter

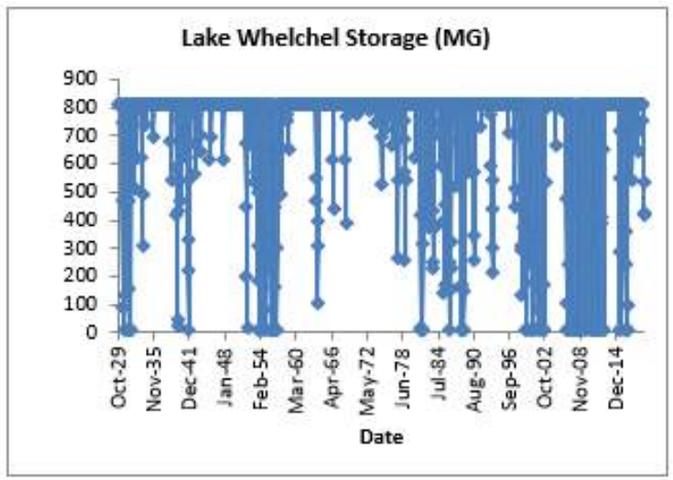
Lake Whelchel Yield of 6.8 MGD

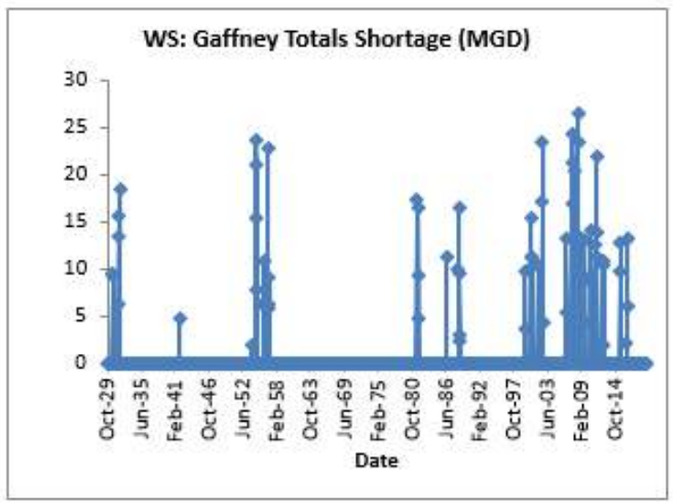


Gaston Shoals with Only Downstream Releases



System at 25 MGD 2070 High Demand

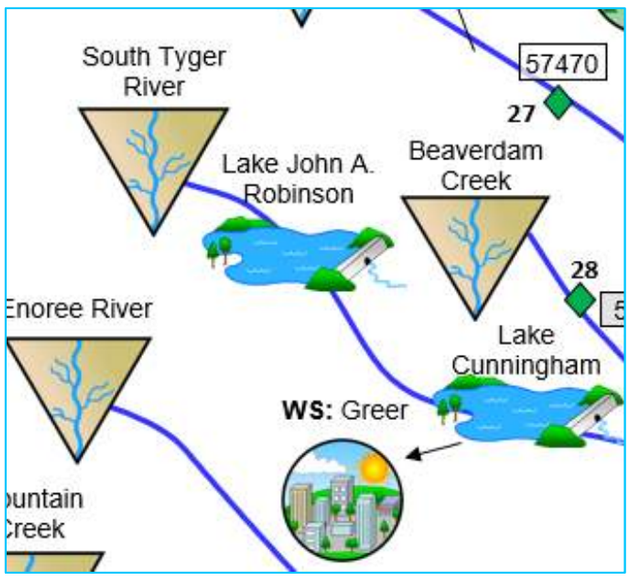




Safe Yield for Greer

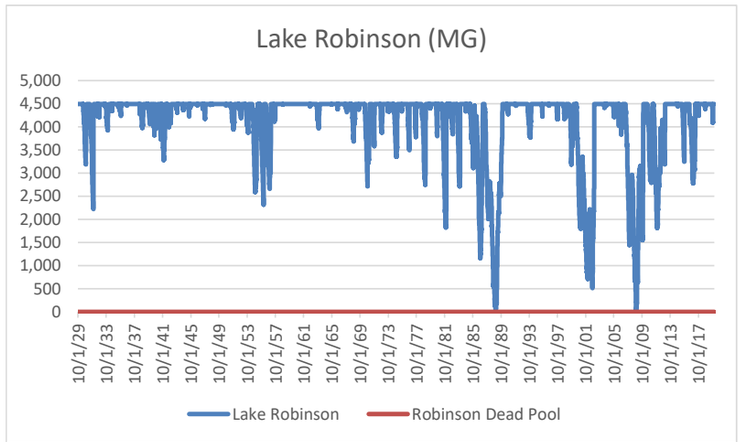
Reservoir	Safe Yield (MGD)
Lake Robinson	26.8
Lake Cunningham	12.0*

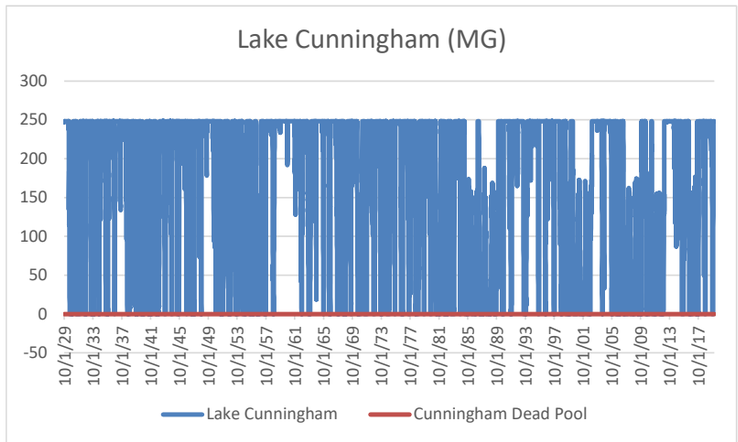
**Without coordinated release from Robinson*



No upstream users, so demand scenario doesn't matter

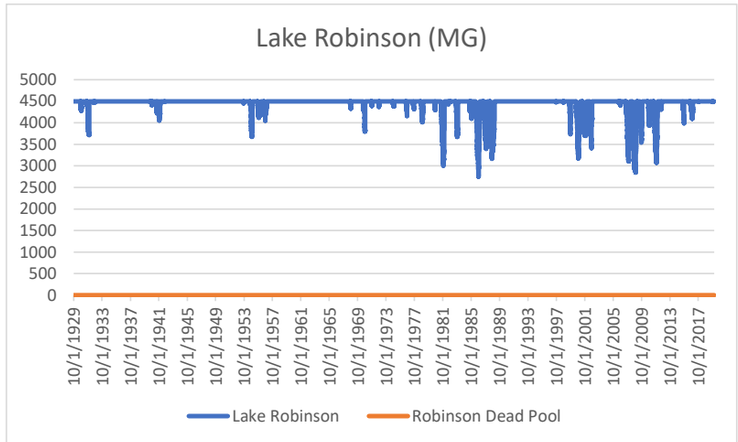
Yield is not completely additive- When Extracting 38.8 MGD from System:

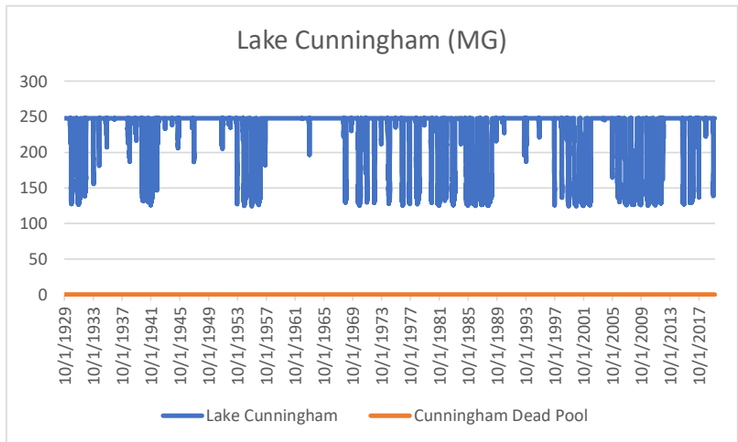




Experimental Rules to Satisfy 2070 HD Demand (22 MGD)

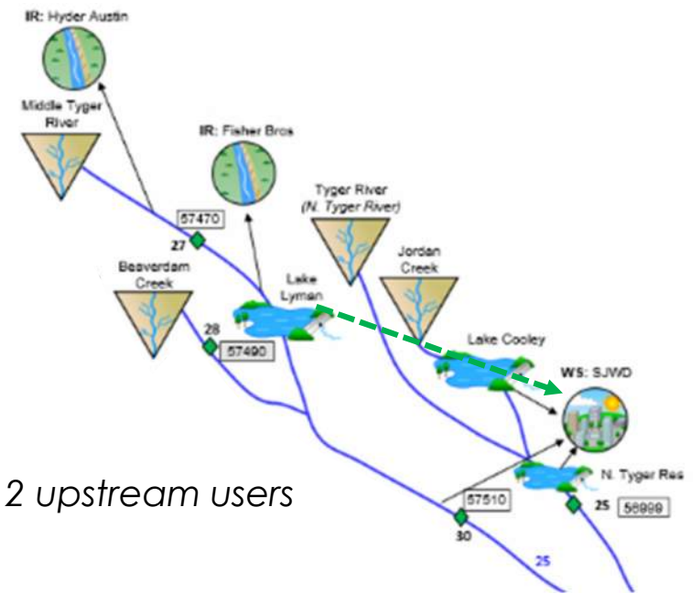
Robinson to release 44 cfs when Cunningham < 150 MG





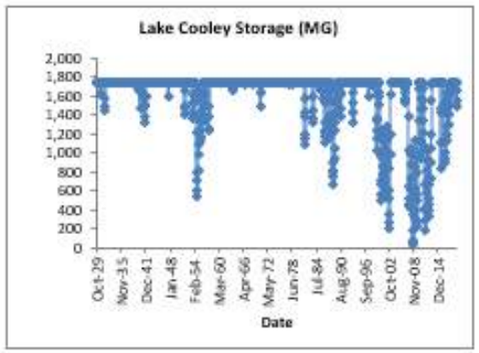
Safe Yield for SJWD

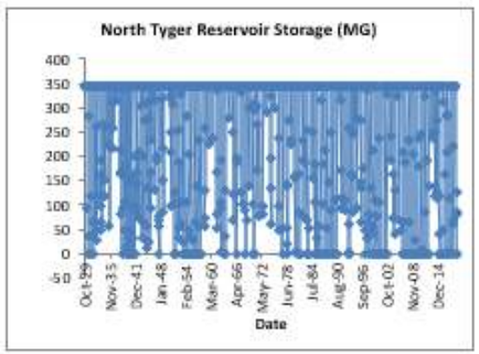
Reservoir	Safe Yield (MGD)
Lake Cooley	3.6
North Tyger Res	4.6
North Tyger System	10.2
Lake Lyman	11.5
Middle Tyger System	13.7
Total Yield	20.5-23.9

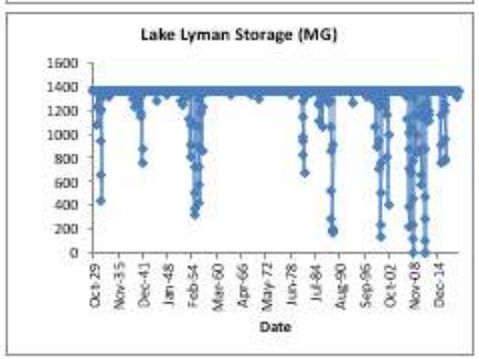


2 upstream users

Balanced drawdown rules at ~safe yield







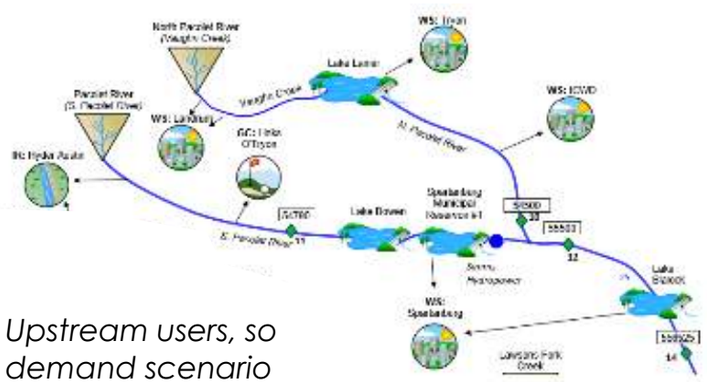
Comparison with other recent study

	GMC 2022 (MGD)	CDM Smith 2023 (SWAM-MGD)	Notes
Lake Cooley		3.6	
North Tyger Reservoir		4.6	
North Tyger River System	6.7	10.2	
Lake Lyman		11.5	
Middle Tyger River System	14.5	13.7	
Total System	21.2	20.5 - 23.9	Depends on balancing operations
ASSUMPTIONS			
Time Period for Analysis	2008-2020	1929-2019	Most stress occurs after 2008, but in CDM Smith analysis, reservoirs are significantly drawn down at the beginning of 2008, which creates a very different initial condition.
Timestep for Analysis	Appears to be daily	Monthly	Note that daily analysis with SWAM model for ops balancing shows that 25 mgd avg. can be withdrawn reliably. Daily appears to yield higher values (likely because of variable reservoir releases)
Demand Pattern	Constant	Monthly Variable	Monthly variability tends to lower reliable yield because high demand coincides with low flow.
Min Instream Flows	20/30/40 applied – if inflow is lower, release = inflow.	None	GMC analysis of nearby S. Tyger showed that natural conditions fall short of MIF frequently.
North Tyger Reservoir	Included	Included	

Safe Yield for Spartanburg

Reservoir Balancing:
- Increase Lake Bowen Releases by 5 – 10 cfs
- Divide Res #1 priority around Blalock

Individual Reservoir	Safe Yield (MGD)
Lake Bowen / Res #1	32
Lake Blalock	30
Total System	62 MGD
Total System (Current Demand)	72.6 MGD



Upstream users, so demand scenario matters

System at 62 mgd, 2070 High Demand, Reservoirs balanced