

Upstream / Downstream Equitability

- Compared % of target minimum flow volume achieved for the year with % of target average usable storage volume achieved for the year.
- Target minimum flow includes striped bass flows. In 2007, 100% of target flow volume would have been 581,416 ac-ft. This is the sum of all continuous minimum flow released over the year.
- Target usable storage is average usable storage in the lake for the year if we maintain the reservoir on the proposed guide curve – 497,279 ac-ft.

Upstream / Downstream Equitability

- Comparing Minimum Flow –
 - If in 2007, 497,000 ac-ft were released as continuous minimum flow, then the % of target minimum flow would be $(497,000/581,416) \times 100\% = 85.5\%$.
- Comparing Average Storage –
 - If in 2007, average usable storage throughout the year was 419,600 ac-ft, then the % of target average storage would be $(419,600/497,279) \times 100\% = 84.4\%$.

Upstream / Downstream Equitability

- Are these comparing “apples to apples”?
 - Target minimum flow profile was arrived at by consensus of Instream Flow TWC. Addition of striped bass flows means target varies year to year.
 - Represents a volume of water released in a defined pattern through the year to achieve certain goals for the resource.
 - Target average usable storage depends on guide curve, which was developed with input from SCDNR & upstream and downstream stakeholders.
 - Represents a volume of water stored in a defined pattern through the year to achieve certain goals for the resource.

Lake Murray and Santee Cooper Lakes Compared

Evaporation, Central SC			Reservoir Evaporation Loss Estimates in CFS & AF			
	Avg. Monthly FWS Evap. (in).	Evap. Rate (CFS/1000 ac.)	Lake Murray Evap. Rate (CFS)	Total Evaporation (ac-ft) Lake Murray	Santee-Cooper Lakes Evap. Rate (CFS)	Total Evaporation (ac-ft) Santee Lakes
January	1.29	1.75	84	5,175	281	17,250
February	1.82	2.74	131	8,074	438	26,913
March	3.19	4.33	208	12,773	692	42,576
April	4.50	6.31	303	18,617	1009	62,056
May	5.24	7.10	341	20,947	1136	69,822
June	5.53	7.75	372	22,873	1240	76,245
July	5.77	7.82	375	23,072	1251	76,906
August	5.00	6.78	325	20,012	1085	66,708
September	4.03	5.64	271	16,654	903	55,513
October	3.08	4.18	201	12,337	669	41,125
November	2.00	2.80	134	8,259	448	27,529
December	1.37	1.85	89	5,470	297	18,232
Whole Year	42.8	4.92	236	174,263	787	580,876
May-October	28.7	6.54	314	115,896	1047	386,318
	(Sum)	(Average)	(Average)	(Sum)	(Average)	(Sum)
Source: Pan Evaporation Records for the South Carolina Area , John C. Purvis, South Carolina State Climatology Office						
FWS values were computed as 75 percent of pan evaporation values.						
This factor was estimated from a discussion in NOAA Technical Report NWS 33, Evaporation Atlas for the 48 Contiguous States .						
Reservoir evaporation loss estimates are based on surface area of 48,000 acres for Lake Murray and 160,000 acres for the Santee-Cooper Lakes.						
The conversion from evaporation in inches to evaporation rate in CFS per thousand acres is:						
$(\text{inches}) \times (1 \text{ ft}/12 \text{ in}) \times (1 \text{ month}/31 \text{ [or } 30 \text{ or } 28] \text{ days}) \times (43,560 \text{ SF}/\text{acre}) \times (1 \text{ day}/86,400 \text{ sec}) \times (1,000 \text{ acres}/\text{thousand acres})$						

Annual evaporation from the Santee-Cooper lakes is about equal to the total annual volume of proposed minimum flow releases from Lake Murray, including striped bass flows.

Assume that SCE&G was asked to release 96,000 acre feet of water from Saluda Hydro in July to help boost inflow to the Santee-Cooper lakes. This would be about 2,300 CFS continuous discharge for 3 weeks. Here's the what happens compared with keeping the water in Lake Murray:

Lake Murray – 48,000 acres

96,000 Ac-Ft in July:

≈ 2 feet of water in Lake Murray.

Evap. in 30 days = 23,000 ac-ft (24% loss).

73,000 ac-ft remain ≈ 1.5 feet of water in Lake Murray.

Assume that SCE&G was asked to release 96,000 acre feet of water from Saluda Hydro in July to help boost inflow to the Santee-Cooper lakes. This would be about 2,300 CFS continuous discharge for 3 weeks. Here's the what happens compared with keeping the water in Lake Murray:

Lake Murray – 48,000 acres

96,000 Ac-Ft in July:

≈ 2 feet of water in Lake Murray.

Evap. in 30 days = 23,000 ac-ft (24% loss).

73,000 ac-ft remain ≈ 1.5 feet of water in Lake Murray.

Santee Lakes – 160,000 acres

96,000 Ac-Ft in July:

≈ 7 inches of water in Santee-Cooper lakes.

Evap. in 30 days = 77,000 ac-ft (80% loss).

19,000 ac-ft remain ≈ 1.4 inches of water in Santee-Cooper lakes.

Assume that SCE&G was asked to release 96,000 acre feet of water from Saluda Hydro in July to help boost inflow to the Santee-Cooper lakes. This would be about 2,300 CFS continuous discharge for 3 weeks. Here's the what happens compared with keeping the water in Lake Murray:

Lake Murray – 48,000 acres

96,000 Ac-Ft in July:

≈ 2 feet of water in Lake Murray.

Evap. in 30 days = 23,000 ac-ft (24% loss).

73,000 ac-ft remain ≈ 1.5 feet of water in Lake Murray.

Santee Lakes – 160,000 acres

96,000 Ac-Ft in July:

≈ 7 inches of water in Santee-Cooper lakes.

Evap. in 30 days = 77,000 ac-ft (80% loss).

19,000 ac-ft remain ≈ 1.4 inches of water in Santee-Cooper lakes.

Which is a more efficient use of water?

Implications for the Saluda LIP discussion using 2007 as an example:

2 foot LIP trigger w/ 14 day averaging

Annual Flow Volumes:

Minimum Flow: 512,000 ac-ft
Rec. & Safety Flow: 92,800 ac-ft
Add'l Generation: 320,300 ac-ft
Total Outflow: 925,100 ac-ft

1 foot LIP trigger w/ 14 day averaging

Annual Flow Volumes:

Minimum Flow: 496,700 ac-ft
Rec. & Safety Flow: 95,000 ac-ft
Add'l Generation: 320,300 ac-ft
Total Outflow: 912,000 ac-ft

Using the 1 foot LIP trigger reduces minimum flow volume by 15,300 ac-ft for the year, and the total releases from the project by 13,100 ac-ft.

This represents 2.6% of the annual evaporation from the Santee-Cooper lakes.

Or, this is a little over an inch in the Santee-Cooper lakes, if no evaporation takes place. In reality, 1 inch would evaporate in about 5 days in July.