Surface Water Quantity Models

Progress Meeting Notes

November 7, 2016

Attendees: **CDM Smith**: John Boyer, Tim Cox, Nina Caraway
SCDNR: Scott Harder, Alex Pellet, Bill Clendenin
DHEC: Rob Devlin, Harriet Gilkerson, Leigh Anne Monroe
Technical Advisory Committee: Ed Bruce, Ruth Albright, Eddie Twilley, Eric Krueger, Harrison Watson, K.C. Price, Mike Harrelson

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1. **Catawba-Wateree River Basin Model**
   - Regarding the second stakeholder meeting held on November 2nd, Ed Bruce noted that the their seemed to be interest model, based on the questions and participation in the model demonstrations.
   - Scott Harder asked about the influence of discharges along Rocky Creek, and their impact on the calibration. John Boyer explained that Chester County discharges, like most discharges, were only available as monthly averages, and there appeared to be some variability with regard to the consumptive use percentages. Since an average consumptive use per month was assigned, daily low flows for Rocky Creek won't be matched exactly unless all of these discharges are separated out of the user object and made into distinct discharge objects to better reflect monthly variation. Nina Caraway also noted that Rocky Creek's headwater flow is made from the UIF at CAT17, where the only impairment was discharge. CAT17's gaged flow was so low for so many days, that subtracting discharge resulted in negative values. These required correcting to a very small final flow to appear realistic.
   - Scott Harder indicated the DNR was reviewing the updated model and modeling report, and would get back to CDM Smith with any further questions or comments.

2. **Santee River Basin Model**
   a. Calibration Results (see attached slides)
   - Tim Cox reviewed several adjustments made to the Santee model framework during calibration. The Santee River has been reassigned as the mainstem, which is a more

intuitive representation for the user. A water user object has been added to represent the diversion of water from Lake Marion to Lake Moultrie through the Lake Marion Diversion Canal. Similarly, a water user object has been added to represent the Rediversion Canal which moves water from Lake Moultrie to the Santee River.

- Tim Cox reviewed calibration charts for Lake Moultrie and Male Marion, comparing modeled vs. measured reservoir levels. Tim noted that, while the model follows the rule curve and that lake operators sometimes veer away from the assigned elevation/storage targets, the model appears to reasonable follow the historical elevations for both lakes, especially with regard to the drought-induced drawdown in 2007-2008.
- Scott Harder commented that while Lake Marion model elevations closely match the measured elevations during the severe decline in 2007-2008, the timing of the Lake Moultrie decline is delayed slightly. Tim Cox indicated that this may be due to the model assumptions assigned to the Rediversion canal and he would investigate it further.
- Scott suggested combining the Lake Moultrie Local Inflow object and the Cooper River tributary object. Tim Cox agreed that the Local Inflow object was probably not needed as a separate object.
- Eric Krueger asked if the historical Furgeson gage was used. Nina Caraway commented that because the gage was abandoned when Lake Marion was constructed in the 1940's, data from that gage was not directly used to support the calibration.

3. Model Training (in Columbia)

a. DNR and DHEC, Monday December 19th
b. TAC, Tuesday December 20th
c. Model distribution to TAC

- John Boyer noted that he will be sending out calendar invitations for SWAM training sessions on December 19th an 20th for DNR/DHEC and the TAC respectively. John also indicated that, with DNR and DHEC approval, CDM Smith will send any existing model to the TAC for review, upon their request. John asked that interested TAC members simply send John an e-mail requesting the specific model(s).

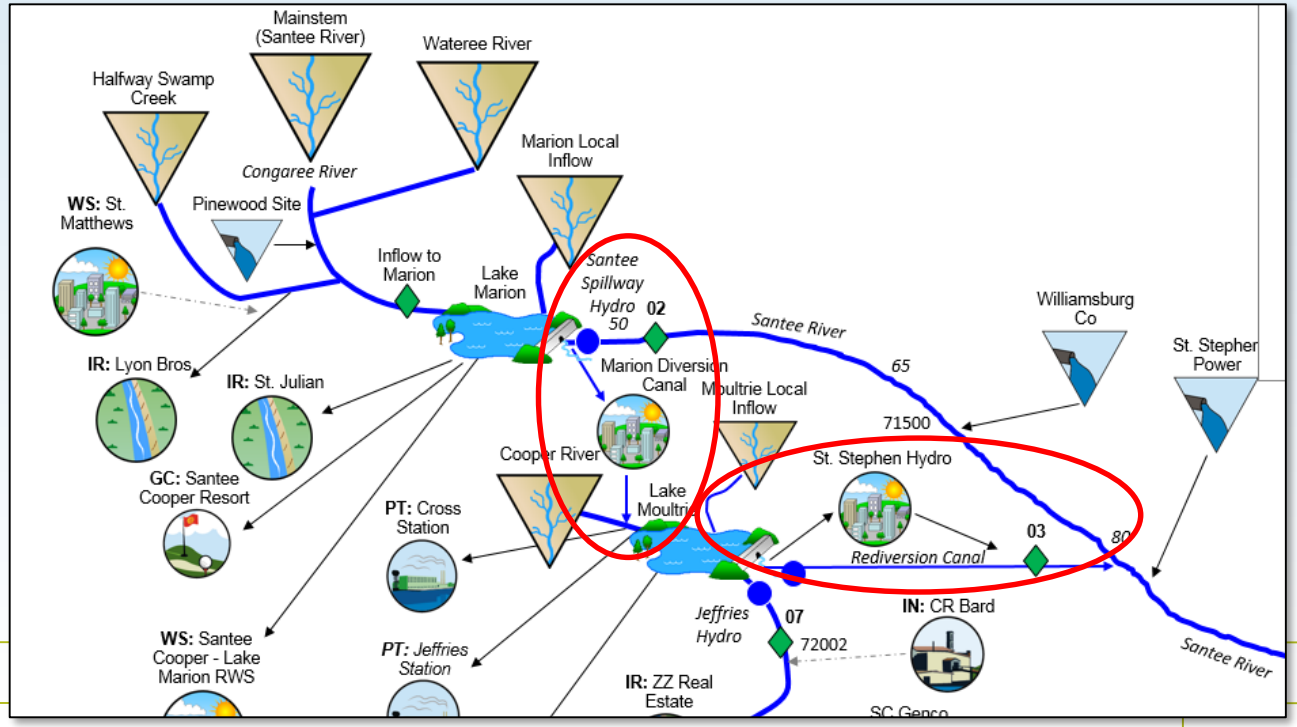
4. Upcoming Stakeholder Meetings

a. Santee 2nd Meeting week of November 28th?

- John Boyer indicated that Clemson has several venues in mind for the second Santee Basin stakeholder meeting, but needs to select a date. Scott Harder said he can be available on both the 28th and the 20th; however, the 30th was the preferred date. Rob Devlin indicated that the 30th would work for DHEC.

Model Construction

- Complex reservoir system: Lake Marion, Lake Moultrie, diversion canal, re-diversion canal, multiple hydropower facilities
- Well metered: Marion and Moultrie daily levels, flow gages just downstream of Marion (SNT02) and in re-diversion canal (SNT03)

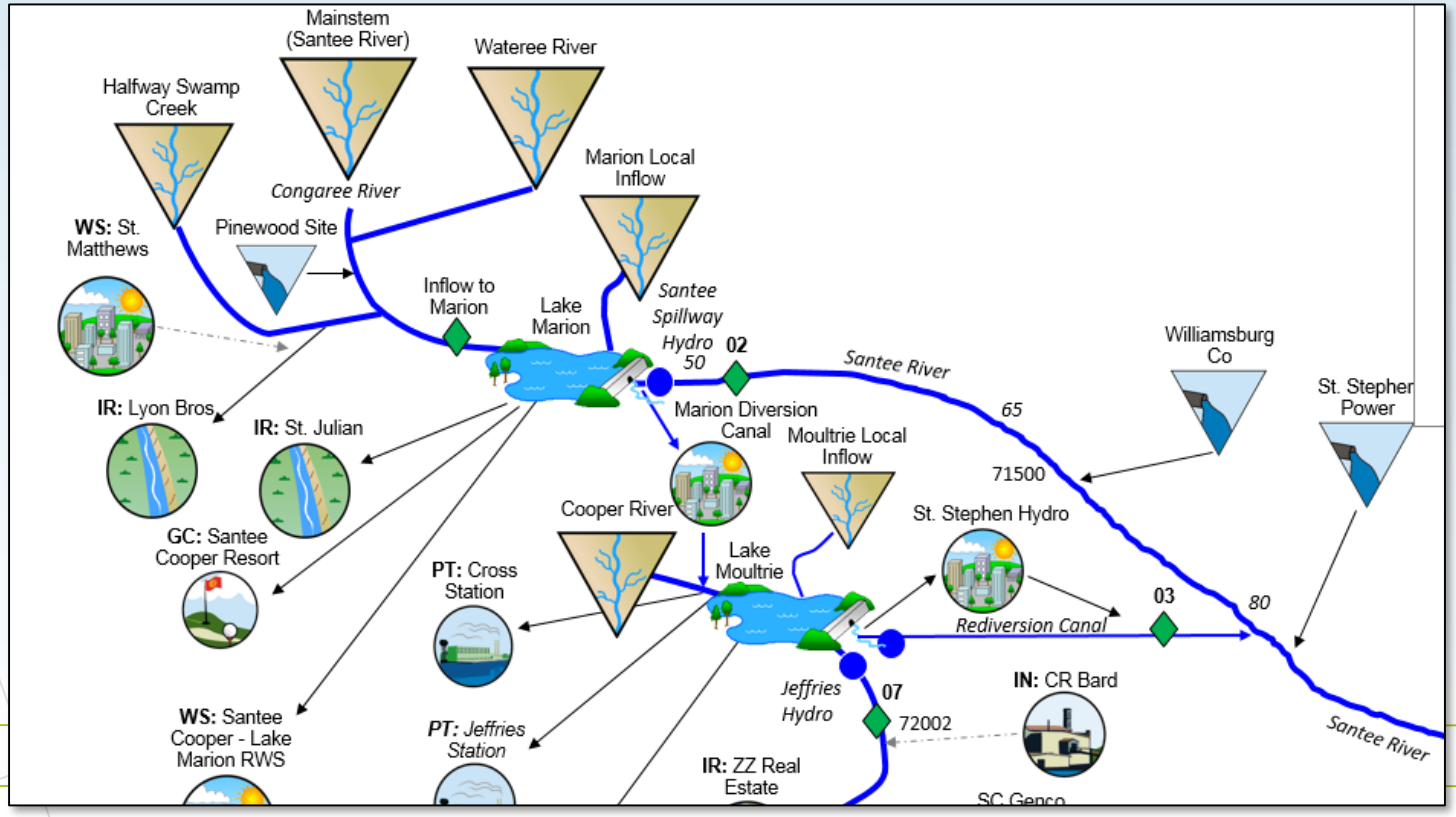


Model Construction

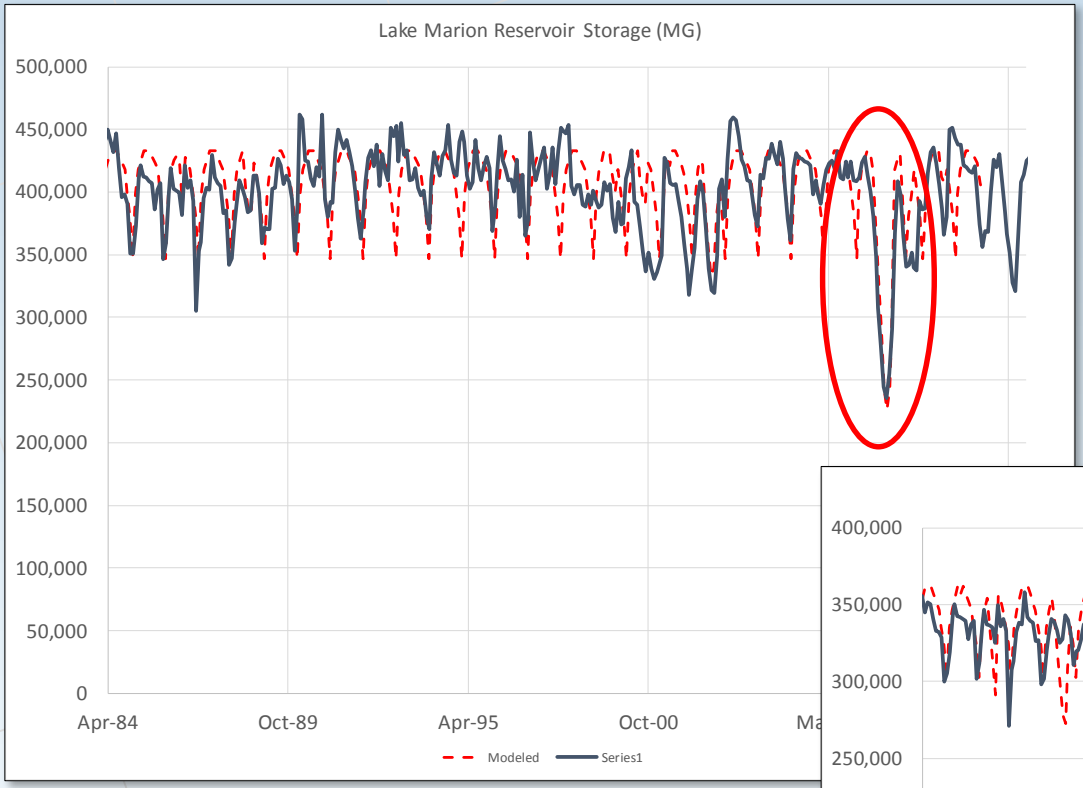
- Marion diversion canal
  - diverts excess water from Marion to Moultrie, up to capacity limit and subject to Santee minimum instream flow.
- Moultrie re-diversion
  - provides water for St. Stephen hydroplant and ultimately back to Santee River, subject to Jeffries (Cooper River) hydro demands but prioritized Santee River flows during fish passage season (Mar – Apr)
- Daily varying storage targets for both Marion and Moultrie (hydraulically connected)

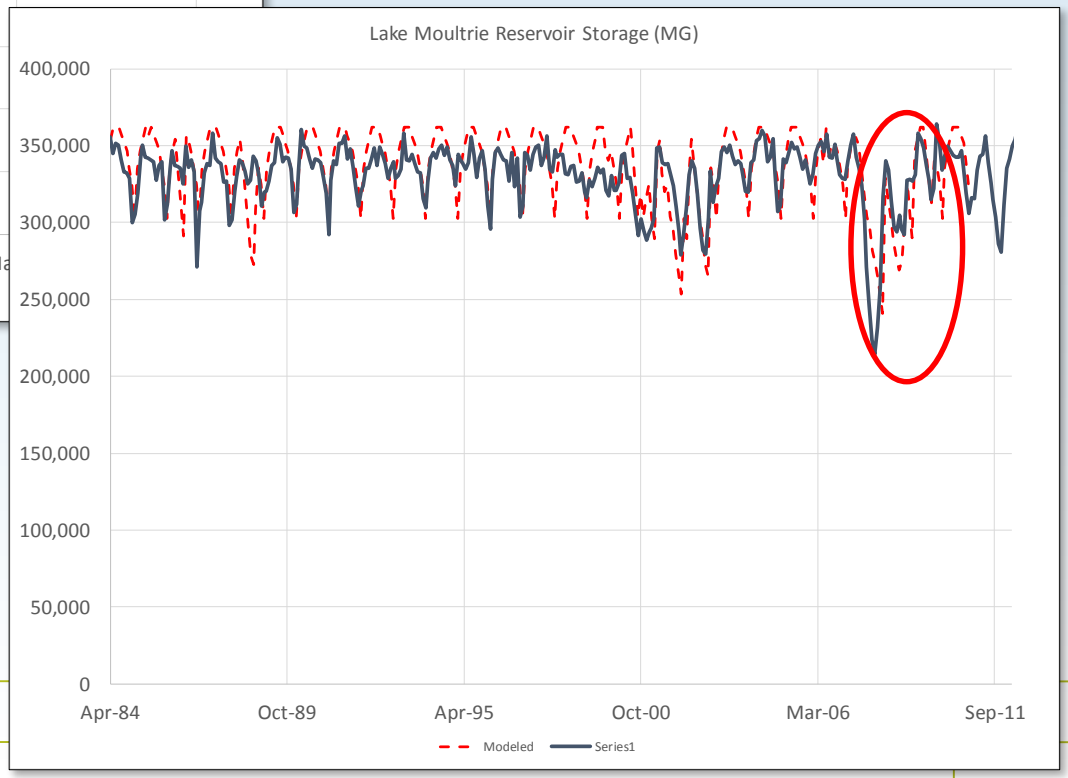
Model Construction

- Simulated in the model with a combination of "dummy" water user objects (withdrawals, instream flow constraints, and return flows) and reservoir operating rules (minimum releases and storage targets)

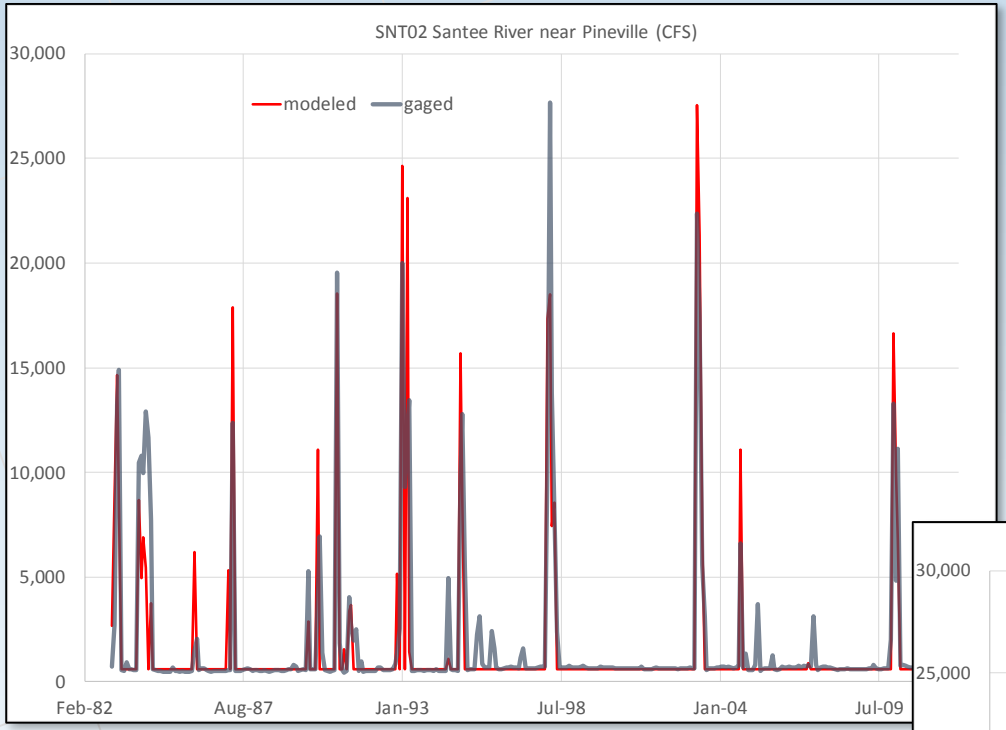


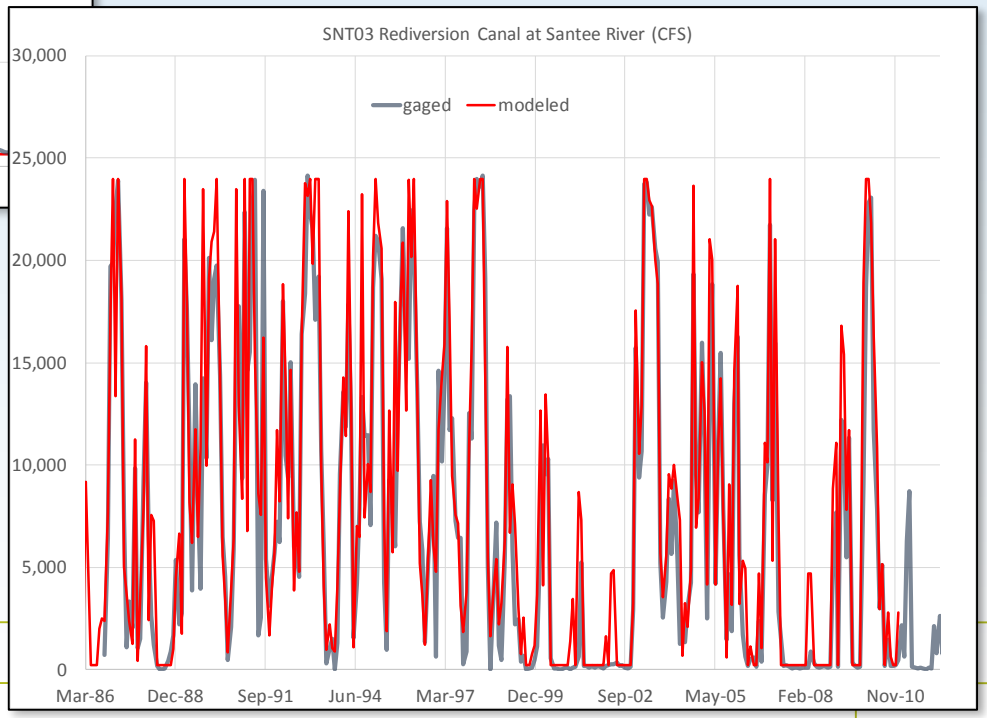
Monthly Calibration Results: Reservoir Levels





Monthly Calibration Results: Stream Flows





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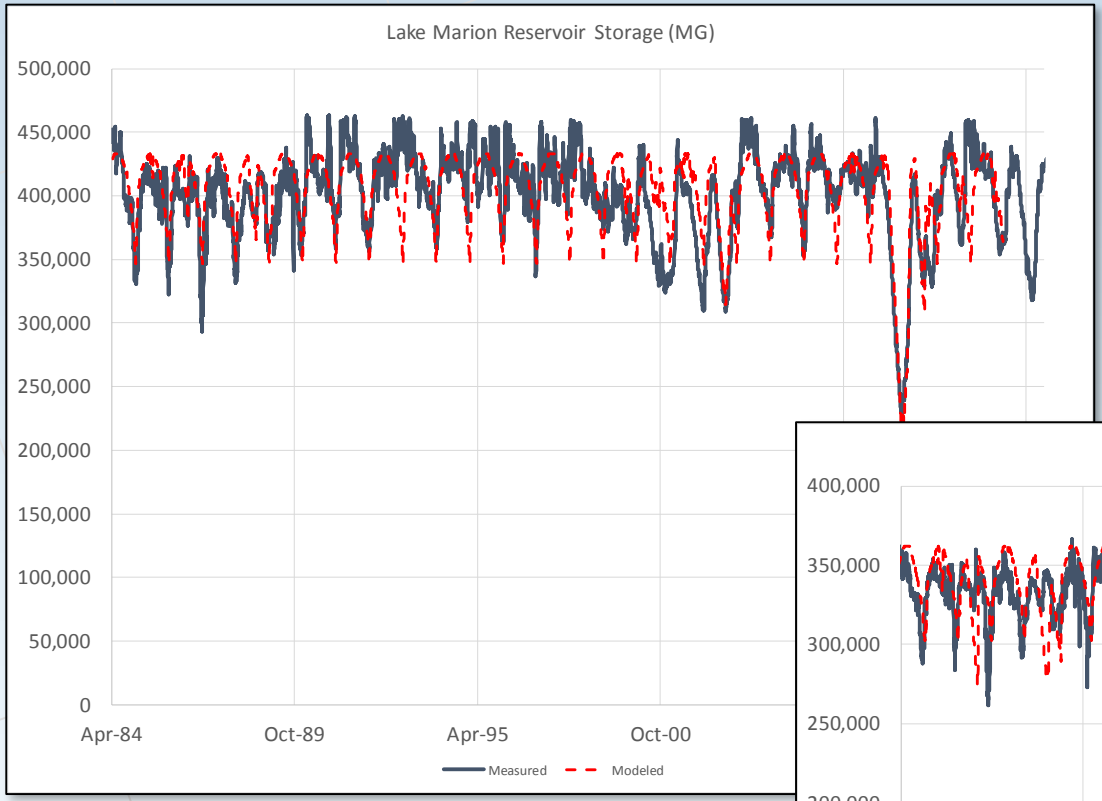
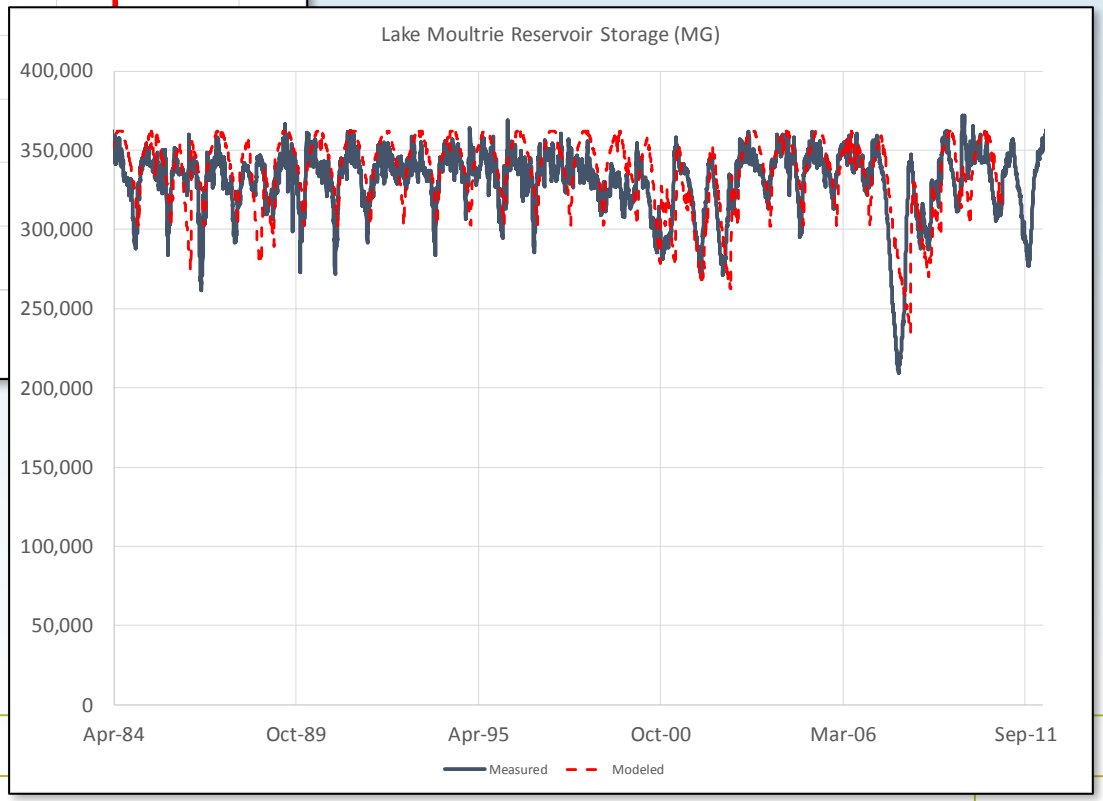
Daily Calibration Results: Reservoir Levels





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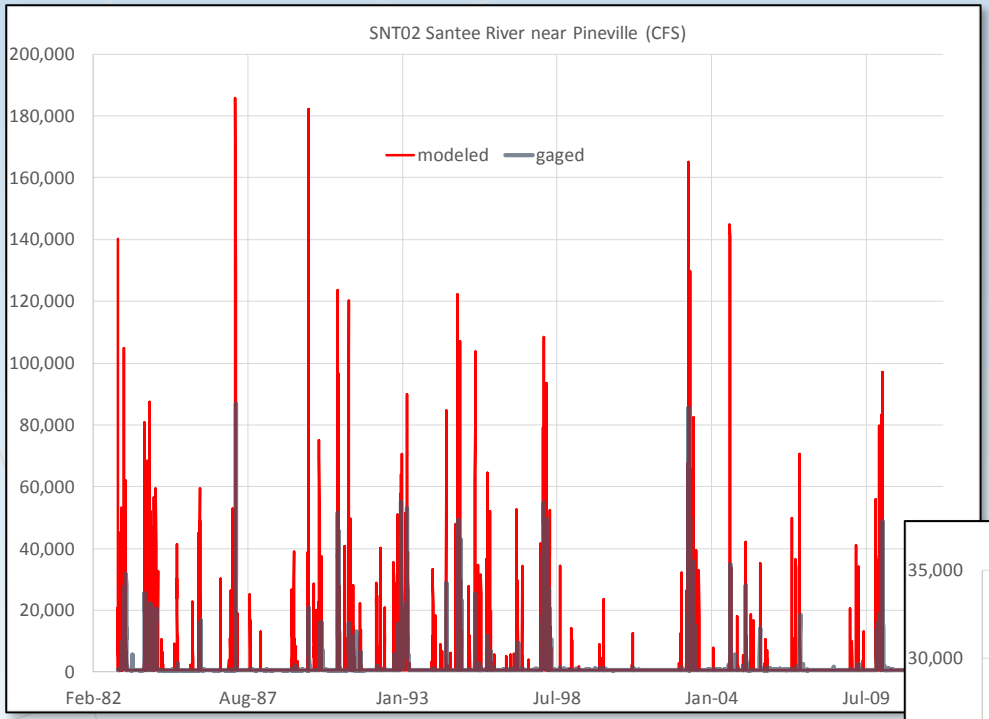

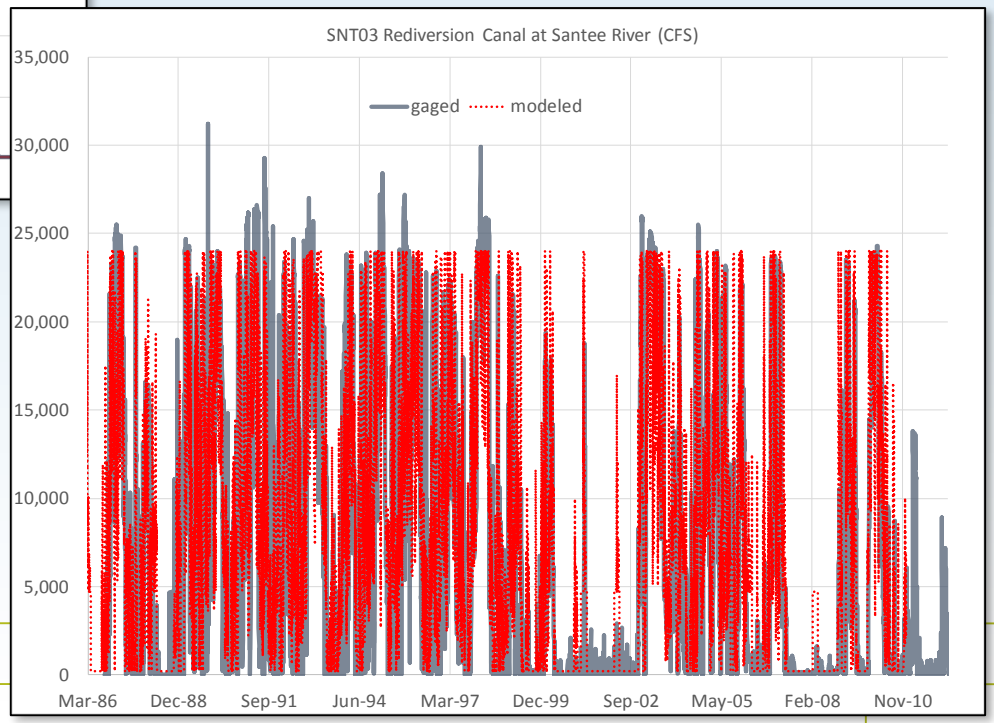

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