



Surface Water Quantity Models

Progress Meeting Agenda

February 1, 2016 – Teleconference

Attendees:

- CDM Smith:** John Boyer, Tim Cox, Kirk Westphal, Nina Caraway
- SCDNR:** Joe Gellici, Andy Wachob, Scott Harder, Alex Pellet, Bill Clendenin
- DHEC:** Rob Devlin, Leigh Anne Monroe, Chuck Gorman
- Technical Advisory Committee:** Eddie Twilley, Ed Bruce, K.C. Price, Heather Nix, Eric Kruger, Andy Fairey, Ruth Albright, Julie Metts, Mike Harrelson, Charles Wingard, Harrison Watson
- Guest:** William Gaither (Santee Cooper)

1. Edisto Calibration Model

- a. Updated Calibration Results (slides)
 - John Boyer summarized results of adjustments made to the Edisto Basin calibration. Various reference gages were tested for use as area-weighted headwater flows for ungagged tributaries. The goal was achieve the right balance between “flashy” tributary and attenuated mainstem flows that best reflect the Edisto’s complex hydrology.
 - Scott Harder asked what the process was for selecting reference gages. John noted that emphasis was placed on using reference gages for headwaters tributaries that are expected to best represent their hydrology. Their applicability was evaluated based primarily on calibration point comparisons of low flow metrics such as drought periods, annual 7-day low flows, and 7Q10s.
 - Charles Wingard asked what additional data is available to review. John explained that most of the data used in the model is summarized in the various memos, reports, and meeting materials provided to the TAC. There is also a significant amount of data involved in developing unimpaired flows, and that data has been provided to DNR and DHEC.
 - Charles indicated he would touch base with John after the call to discuss what data he may want.



2. Santee Basin

a. Review of Draft Framework

- John Boyer reviewed the draft framework for the Santee River Basin. The SWAM model will include Lake Marion, Lake Moultrie, the Cooper River, and the Santee River. The Ashley River, which is tidally influenced over a significant portion, has no major withdrawals and limited available streamflow data. As such, it will not be included in the model. The Cooper River, below Lake Moultrie, is tidally influenced over a significant portion; however, it will be represented to its confluence with the Ashley River in Charleston Harbor, primarily to allow for accounting of major withdrawals and discharges. Calibration of the model on the Cooper will not be possible below the USGS gage just downstream of Lake Moultrie. Similarly, the Santee River will be included to its terminus; however, calibration will be limited to the upstream portions, where USGS gage data is available.

- Julie Metts indicated that Santee Cooper is reviewing the framework and will provide written comments. Julie noted that the FERC relicensing for Santee Cooper's two hydroelectric projects is still in progress.

- Ruth Albright suggested that a label for the Rediversion Canal be added to all figures.

b. First Stakeholder Meeting planning

- John Boyer indicated that the first stakeholder meeting is being targeted for the week beginning February 29th. John will coordinate with Clemson to select a date and location.

3. Other Basins

a. Saluda Basin

i. Lake Murray verification exercise (in progress)

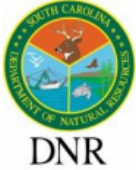
- John noted that, as discussed during the January Progress Call, CDM Smith was performing a verification exercise on Lake Murray. Releases from Murray are being fixed, and the estimates of inflows into Lake Murray, and evaporation from Lake Murray are being verified based on the model's ability to predict historical lake levels.

b. Broad Basin

i. UIFs for Pacolet, Tyger, and Enoree reviewed

- CDM Smith is working to address DNR's comments on these three tributaries to the mainstem.

ii. Mainstem UIFs in progress



- CDM Smith has develop UIFs down to the Parr Reservoir, and is currently waiting on SCE&G to clarify withdrawal/return data associated with the Fairfield Pumped Storage Project, before finalizing the draft UIFs on the mainstem.

c. Pee Dee

i. UIFs in progress

- CDM Smith has substantially completed draft UIFs on the Lynches River, Black River, and Black Creek, and will be forwarding the UIF workbooks to DNR for review in the next several days.

d. Catawba-Wateree

i. Discussions regarding model extent in progress

- John Boyer summarized the discussion held earlier between DNR, Ed Bruce of Duke and CDM Smith regarding the advantages and disadvantages of extending the SWAM model into the North Carolina portion of the Catawba-Wateree Basin. Joe Gellici noted that they are still discussing this internally at DNR.

e. Savannah

i. UIFs and Reservoir Ops data requested from GA EPD and ACOE

- John Boyer noted that requests have been made to Dr. Wei Zeng to obtain the most current UIF dataset for the Savannah, and to Stan Simpson with the ACOE to obtain the reservoir operating rules, as they are currently included in the Savannah HEC-RESSIM model.

4. Other Items

a. Updated Project Schedule

- John Boyer noted that the updated project schedule, which had previously been distributed to DNR, DHEC and Clemson, was attached to the Progress Summary.

February 1st Progress Meeting Materials

South Carolina Surface Water Quantity Modeling Project

- Edisto Basin
 - Calibration Results
- Santee Basin Draft Framework

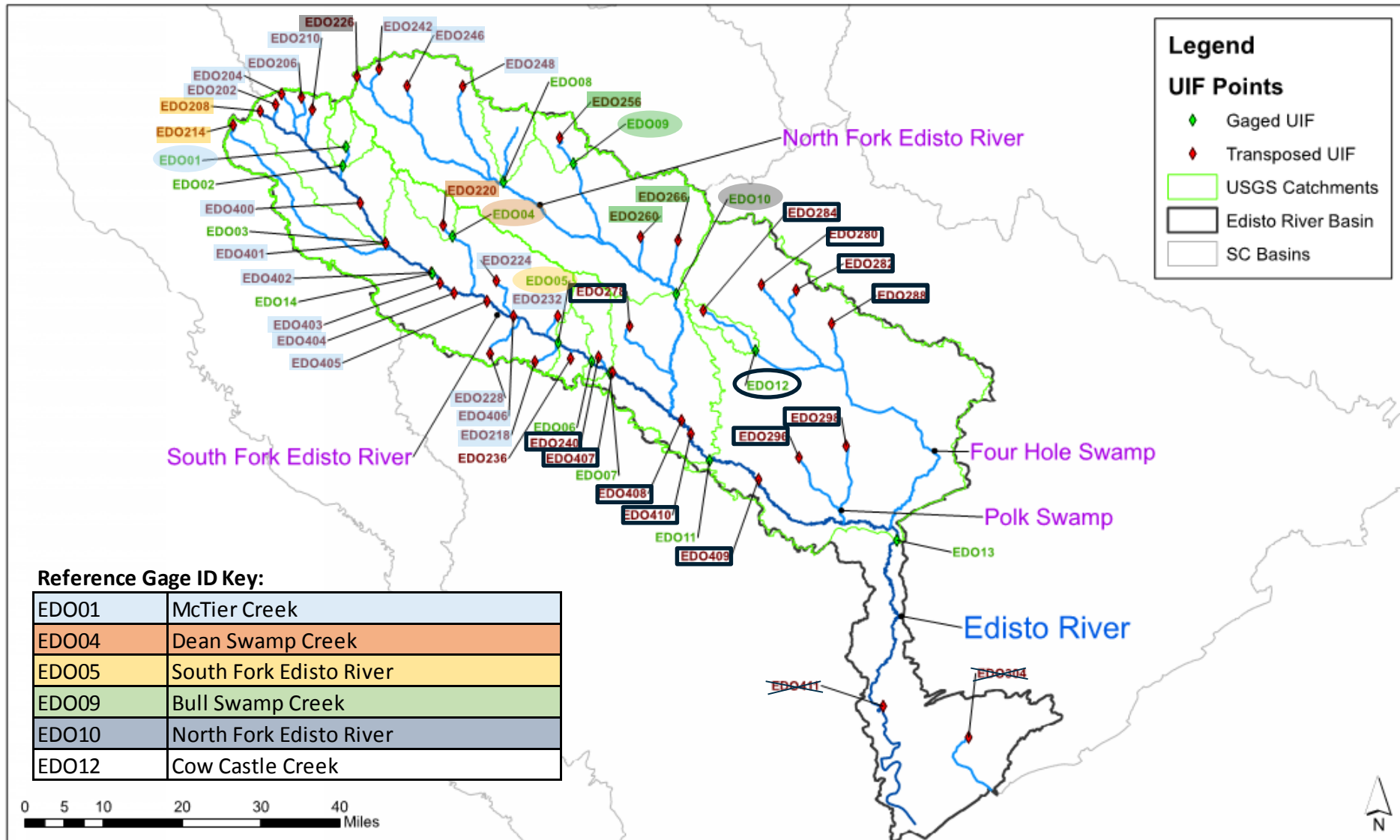
Overview of Edisto Calibration Adjustments

- Several iterations performed over the last month where varying reference gages were used for SWAM tributary objects.
- **Goal:** achieve the right balance between “flashy” tributary and attenuated mainstem flows that best reflect the Edisto’s complex hydrology.
- Emphasis was placed on low flow metrics such as drought periods, annual 7-day low flows, and 7Q10s.
- Emphasis was also given to using reference gages for headwaters tributaries that are expected to best represent their hydrology.

Edisto Basin

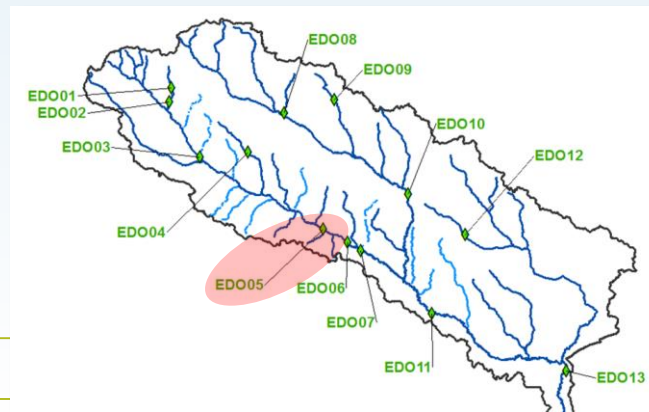
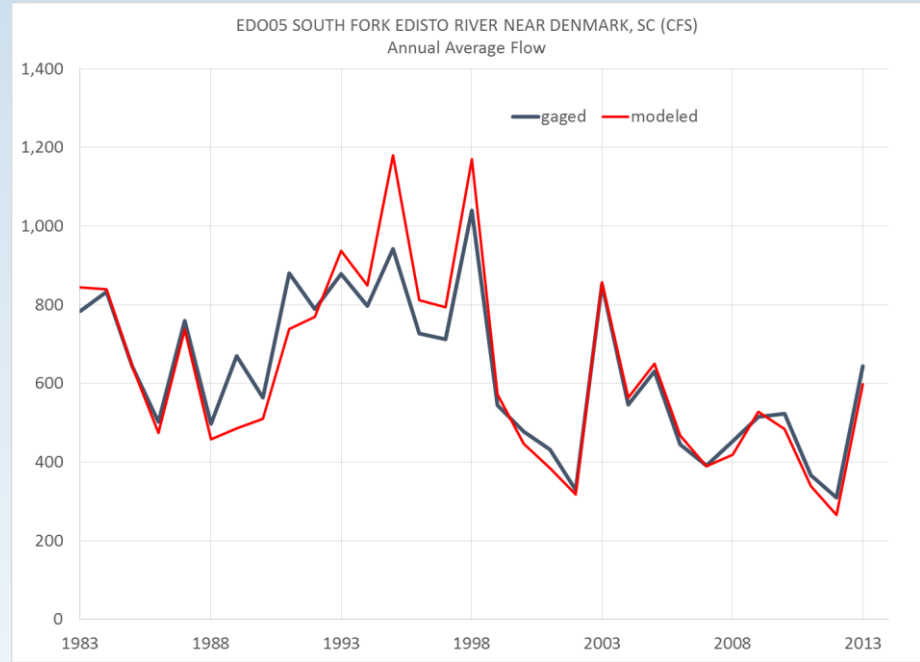
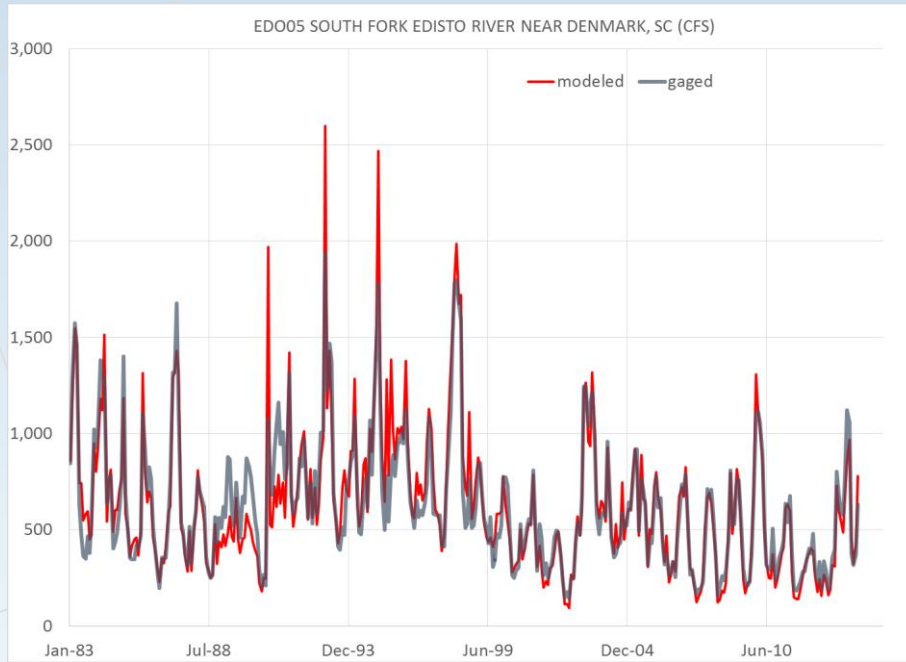
Reference Gages Used for UIFs and Headwater Flows

Calibration Model_20160124



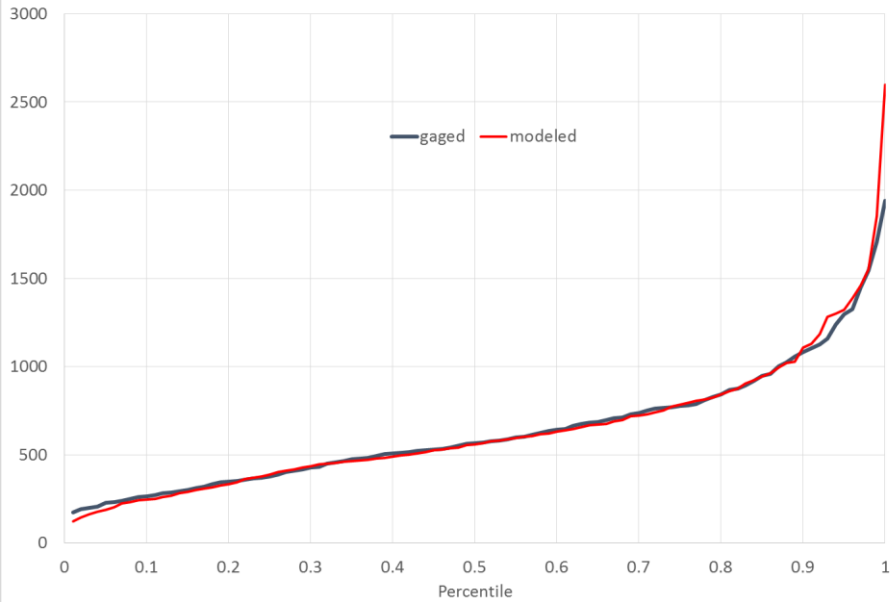
EDO05 – South Fork near Denmark

(USGS 2173000) - MONTHLY

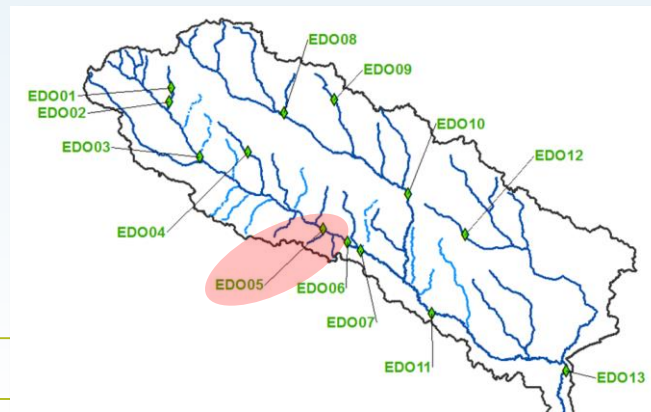
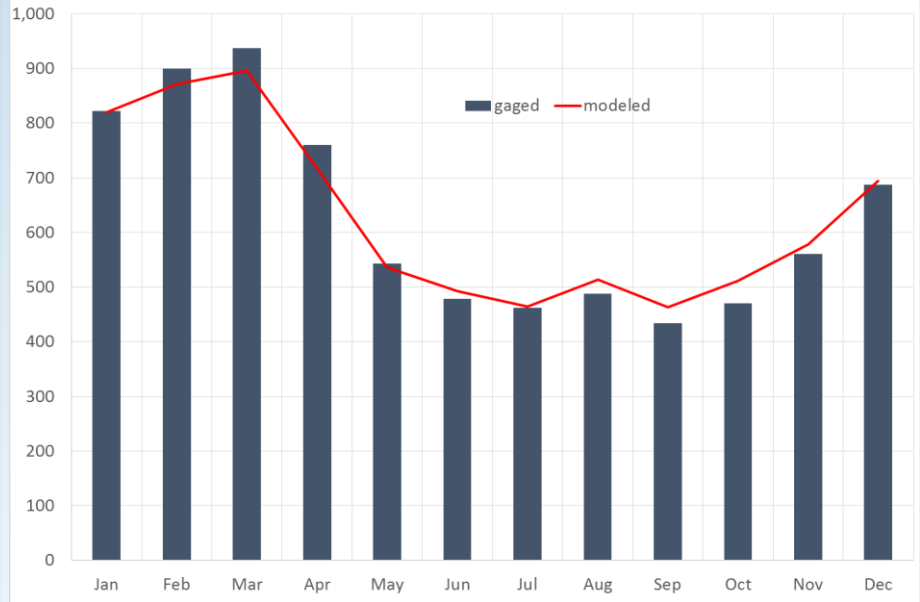


EDO05 – South Fork near Denmark (USGS 2173000) - MONTHLY

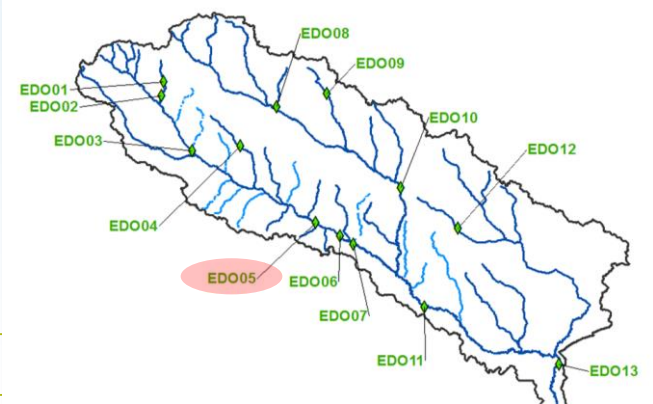
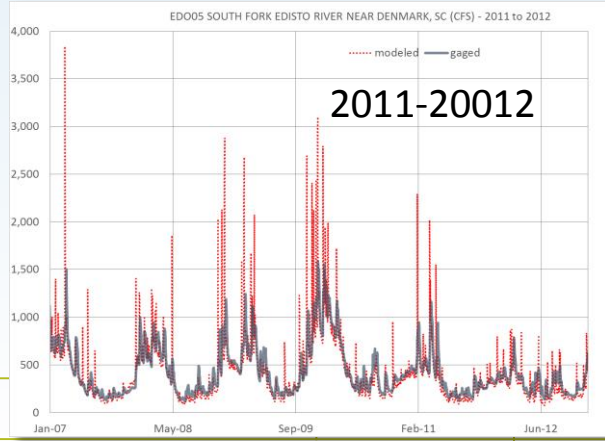
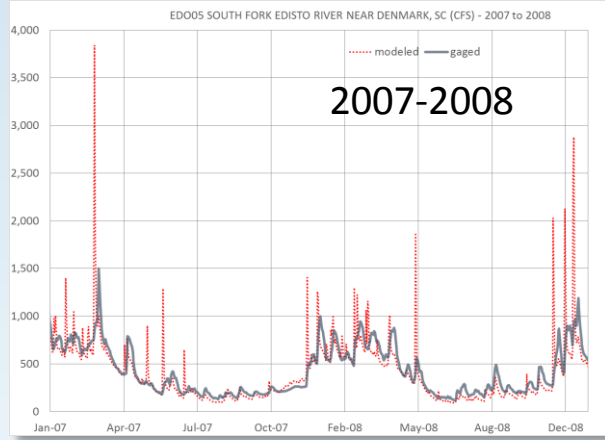
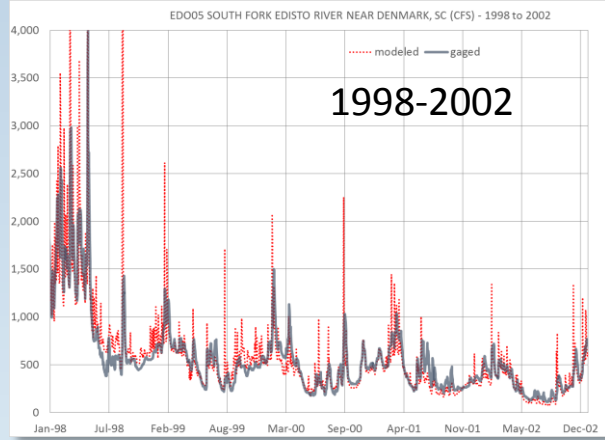
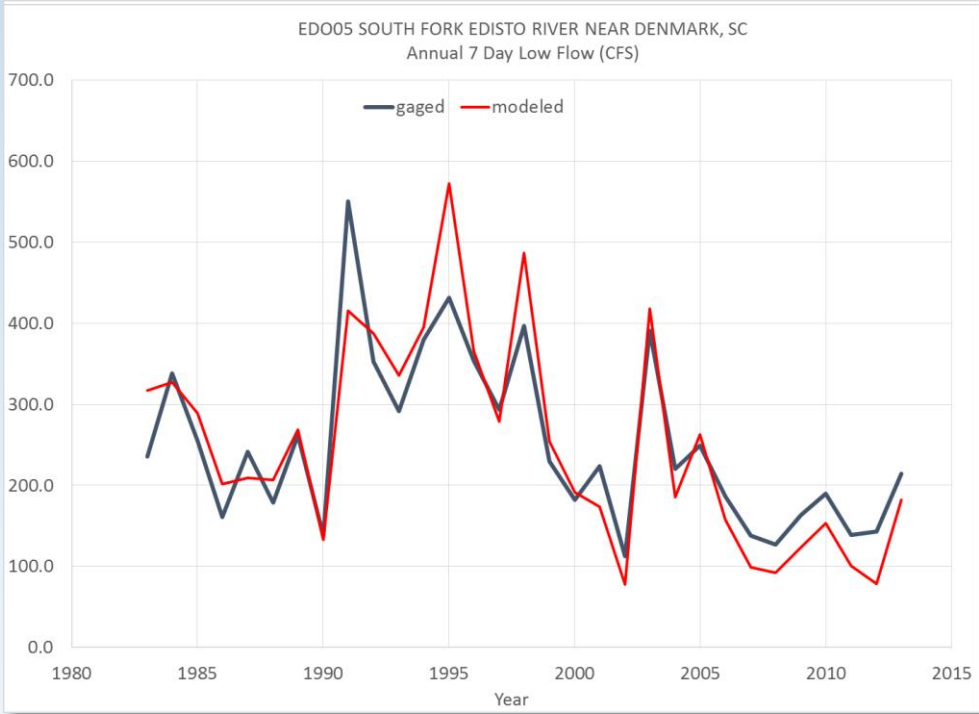
EDO05 SOUTH FORK EDISTO RIVER NEAR DENMARK, SC
Monthly Flow Percentiles (CFS)



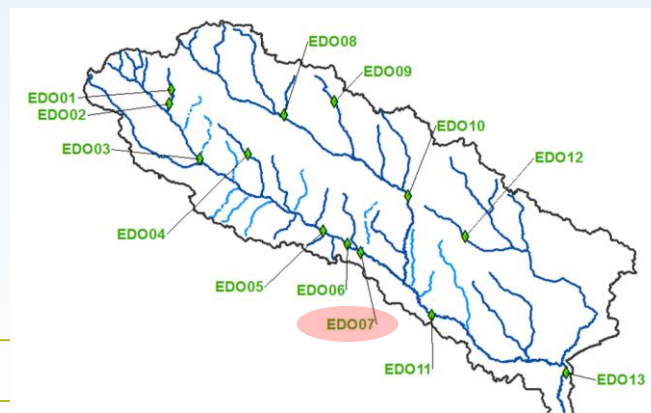
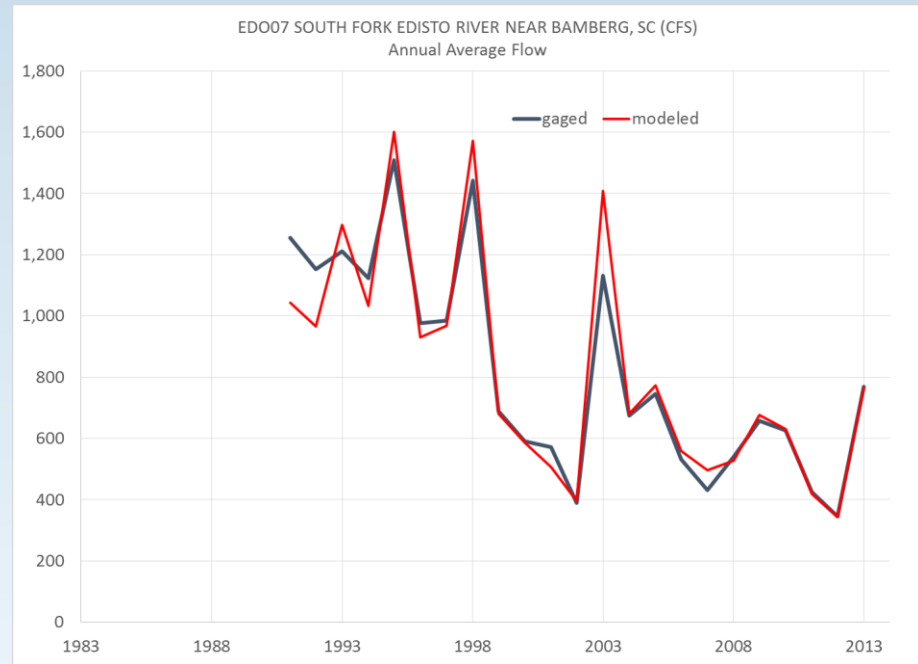
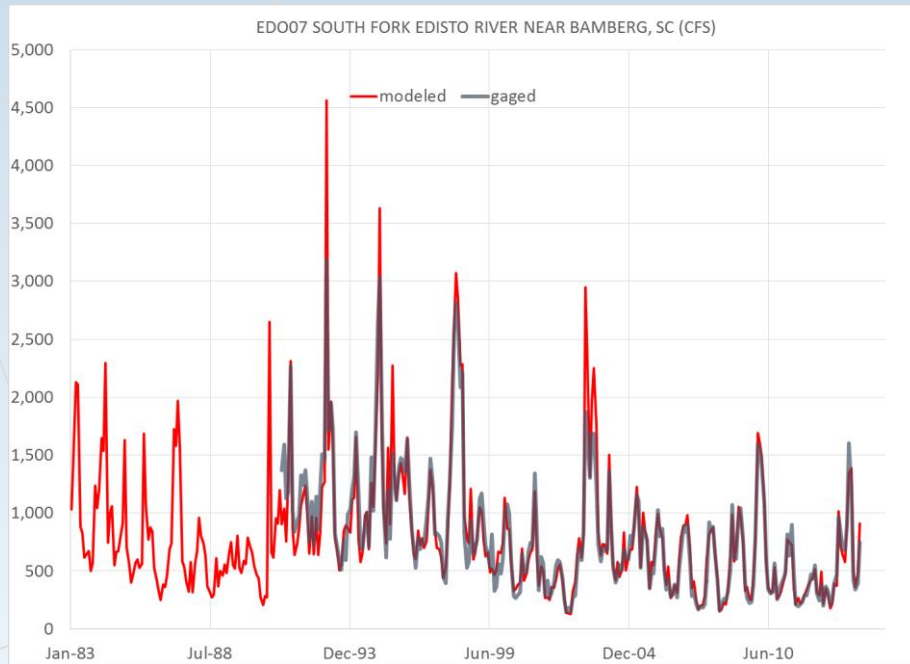
EDO05 SOUTH FORK EDISTO RIVER NEAR DENMARK, SC
Monthly Mean Flow (CFS)



EDO05 – South Fork near Denmark (2173000) – DAILY, LOW FLOWS

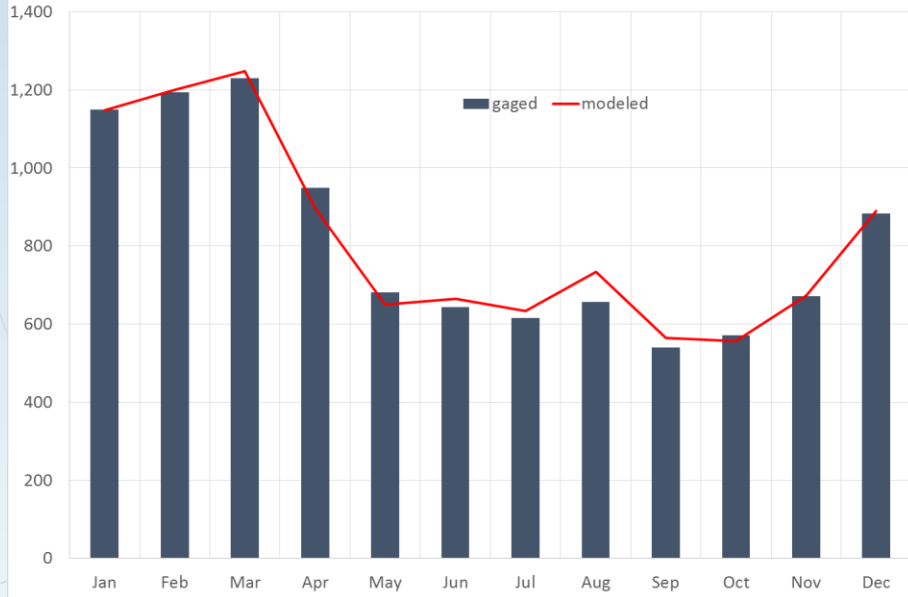


EDO07 – South Fork near Bamberg (USGS 2173051) - MONTHLY

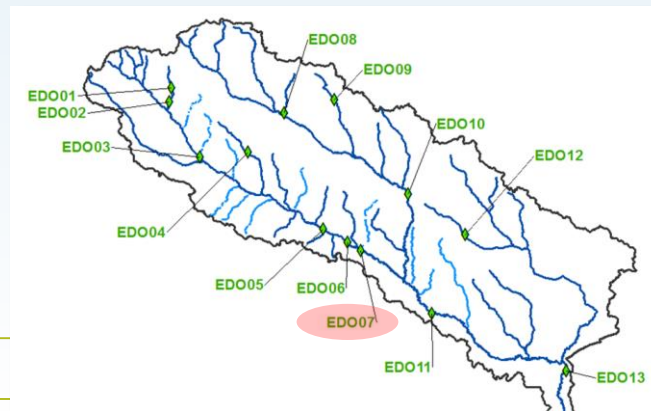
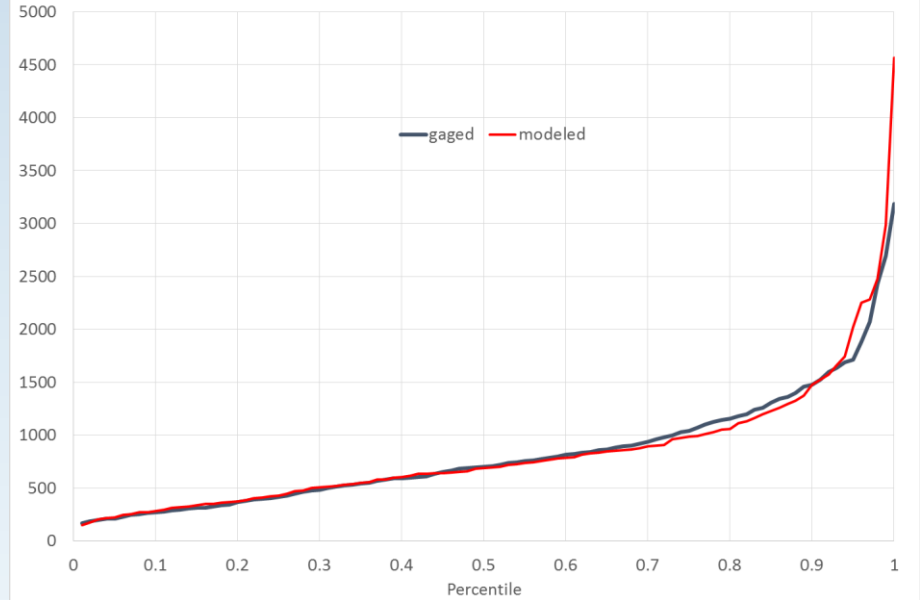


EDO07 – South Fork near Bamberg (USGS 2173051) - MONTHLY

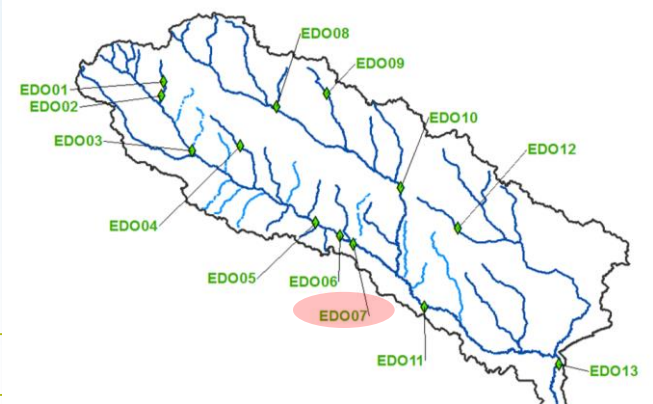
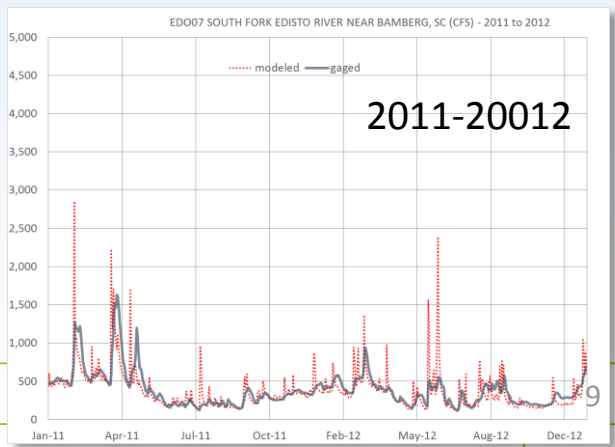
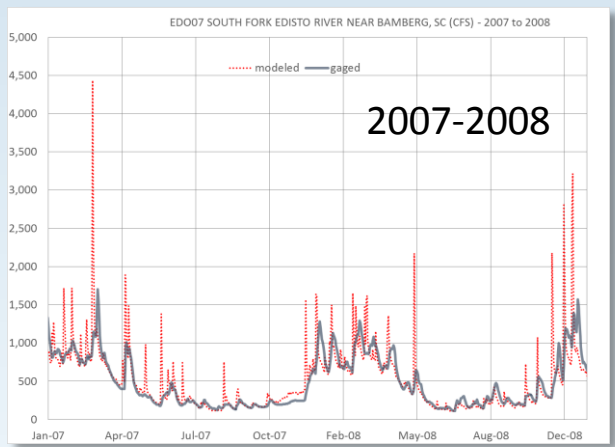
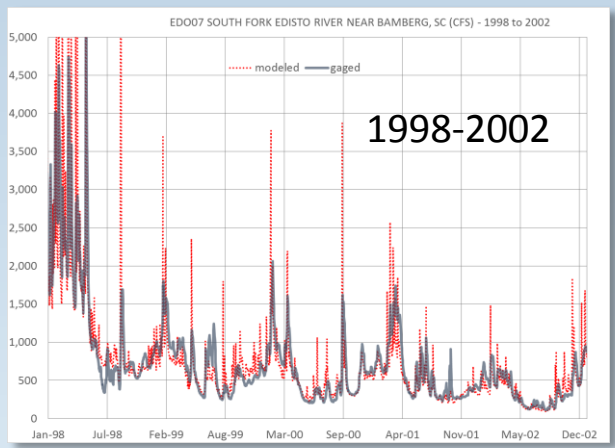
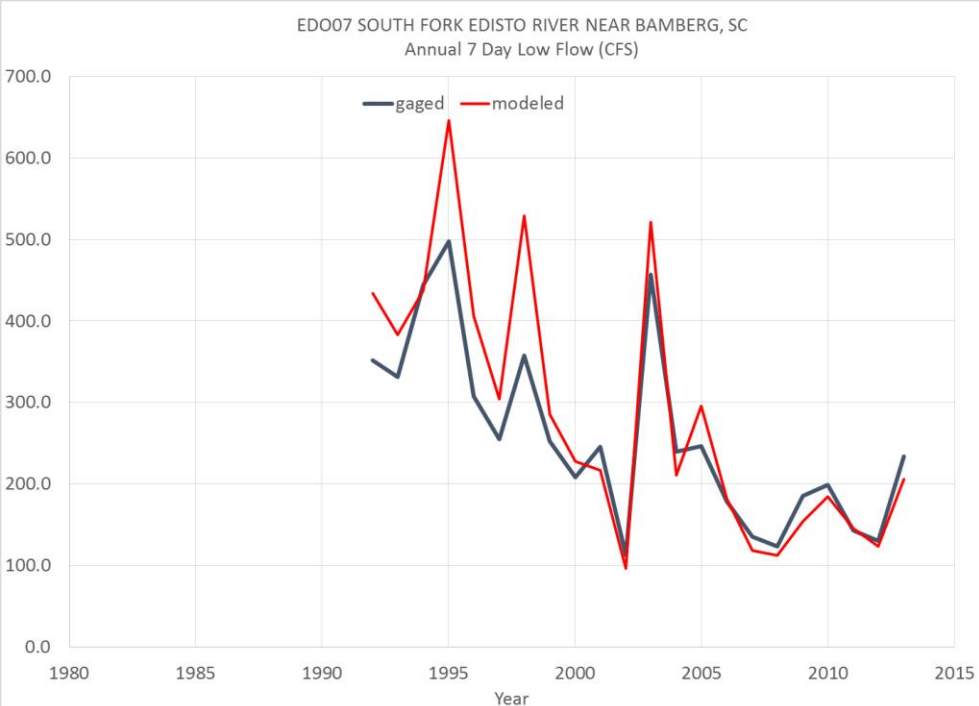
EDO07 SOUTH FORK EDISTO RIVER NEAR BAMBERG, SC
Monthly Mean Flow (CFS)



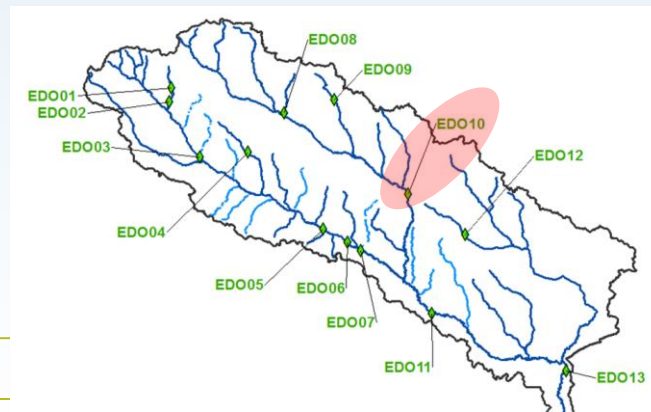
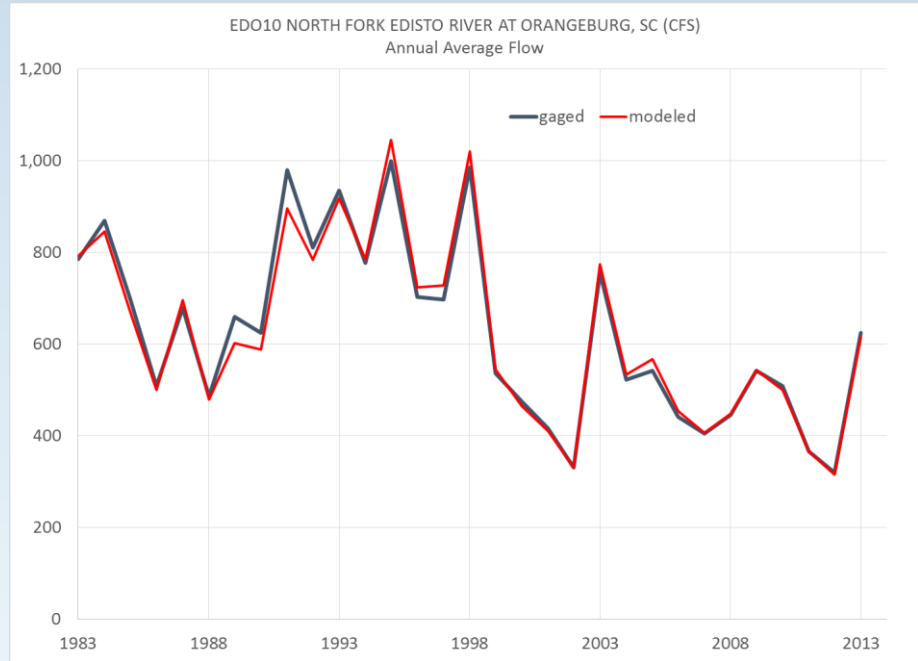
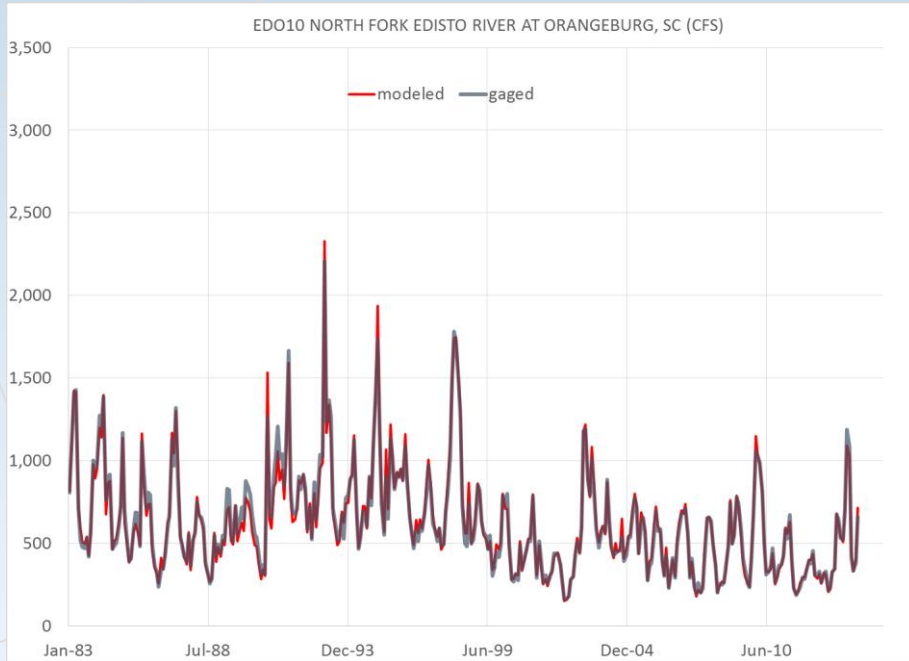
EDO07 SOUTH FORK EDISTO RIVER NEAR BAMBERG, SC
Monthly Flow Percentiles (CFS)



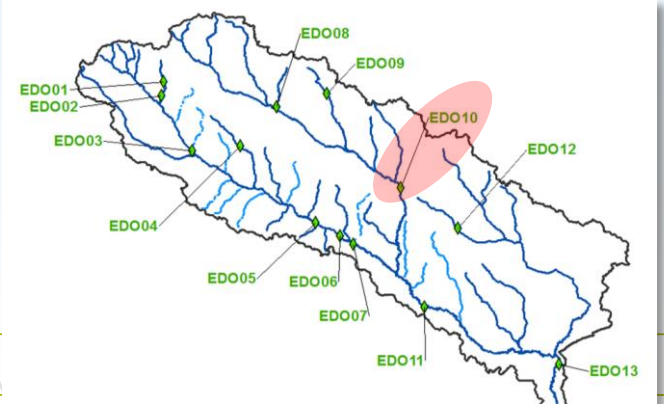
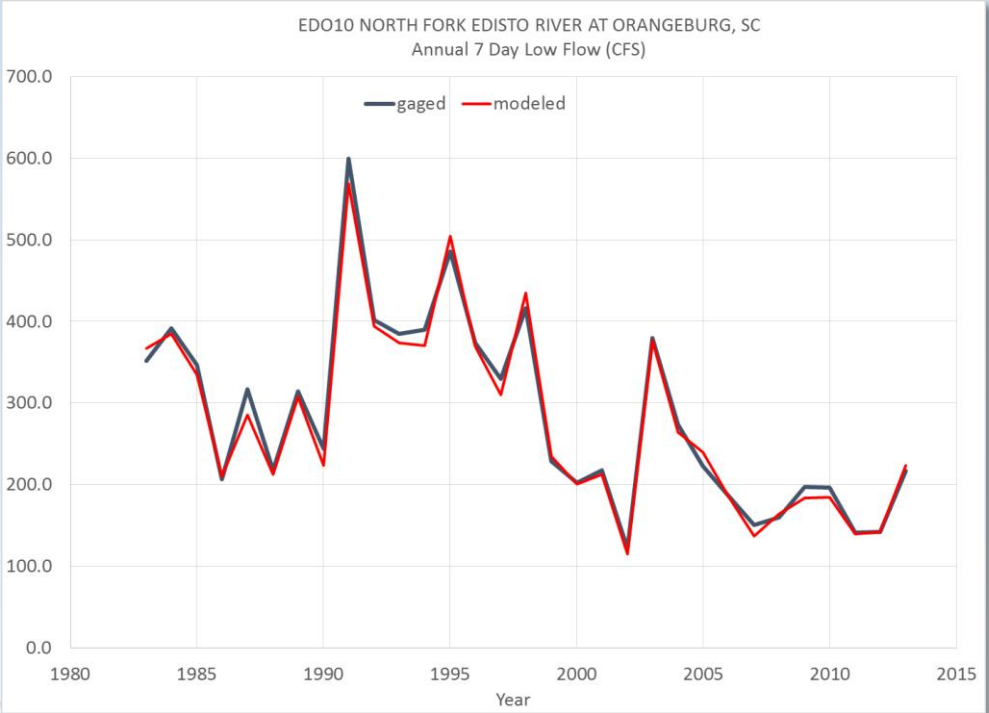
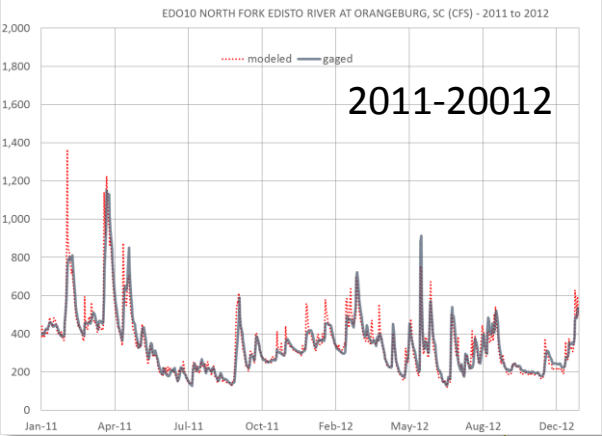
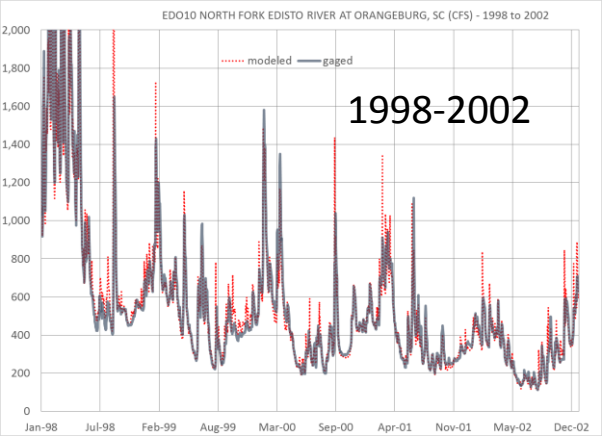
EDO07 – South Fork near Bamberg (2173051) – DAILY, LOW FLOWS



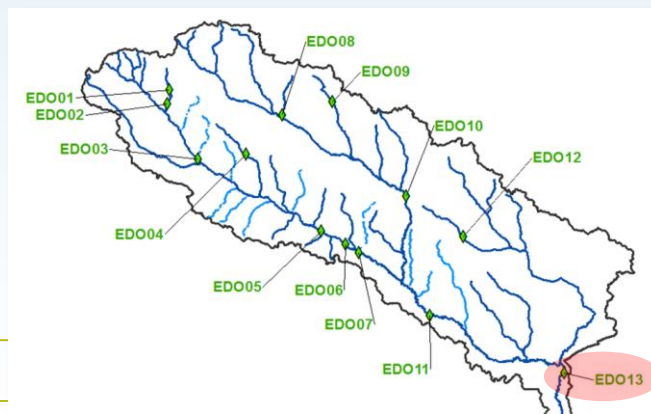
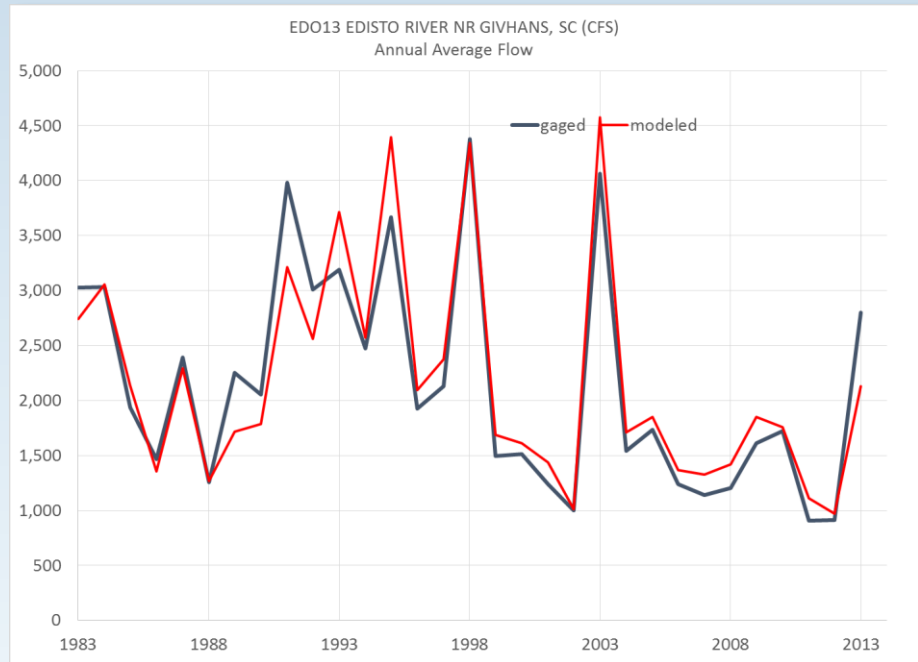
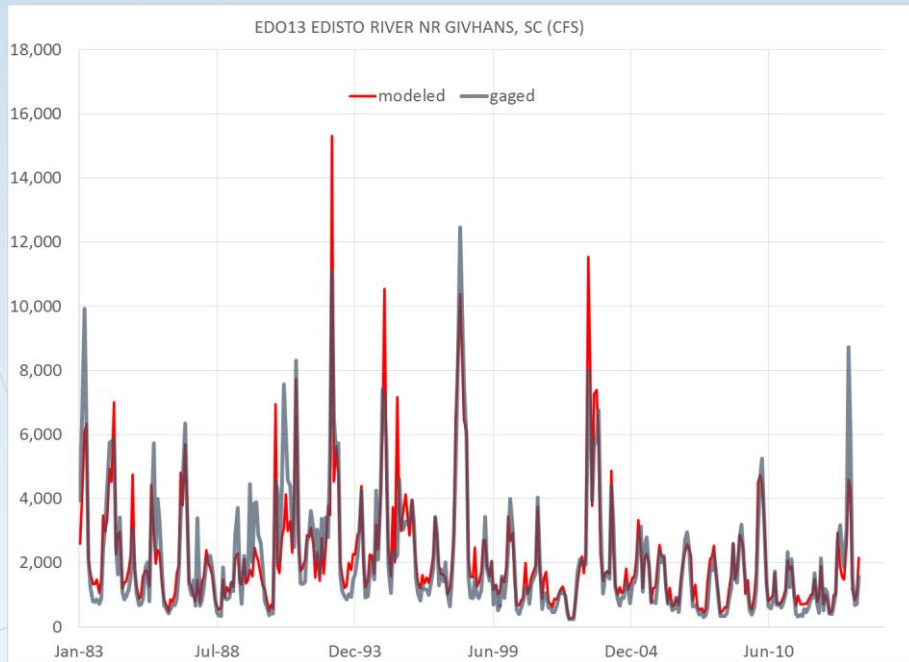
EDO10 North Fork at Orangeburg (USGS 2173500) - MONTHLY



EDO10 North Fork at Orangeburg (2173500) – DAILY, LOW FLOWS



EDO13 Edisto River near Givhans (USGS 2175000) - MONTHLY



EDO13 Edisto River near Givhans (2175000) – DAILY, LOW FLOWS

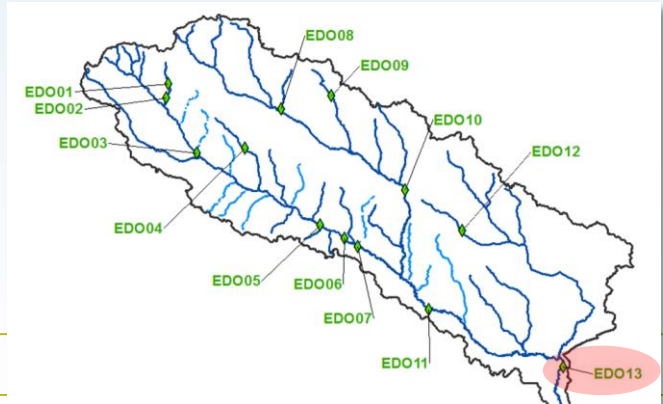
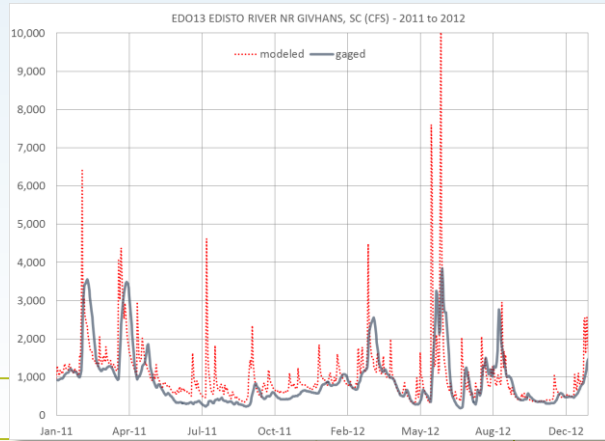
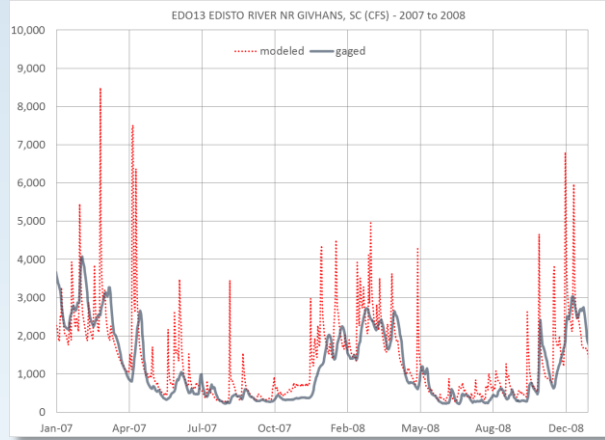
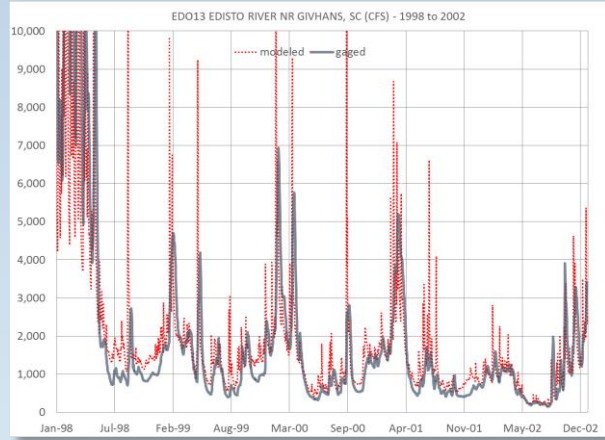
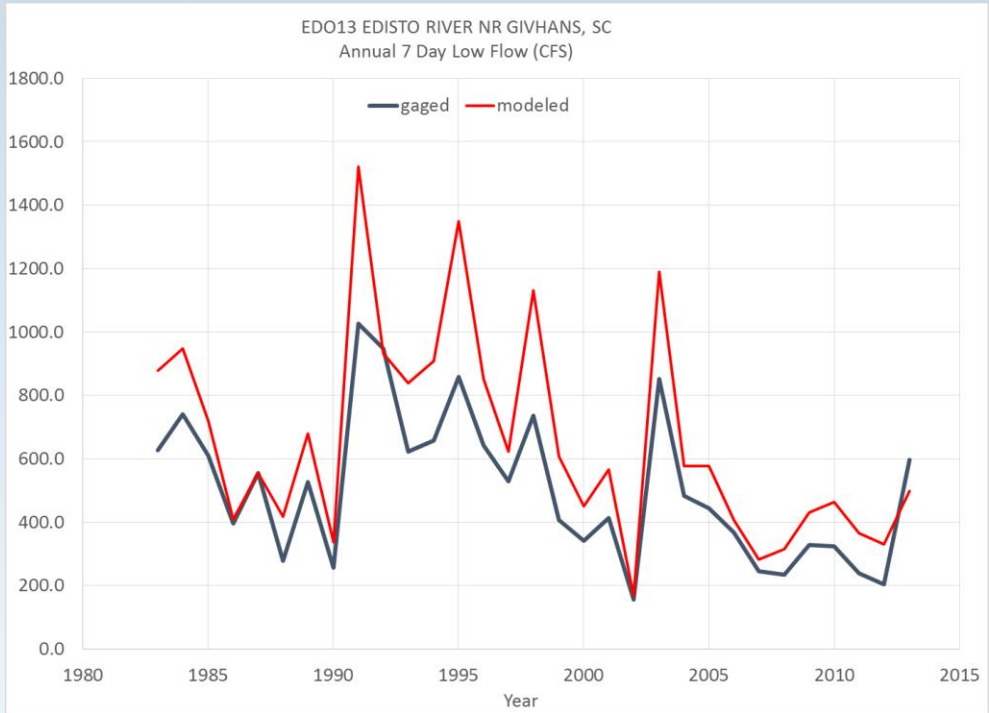
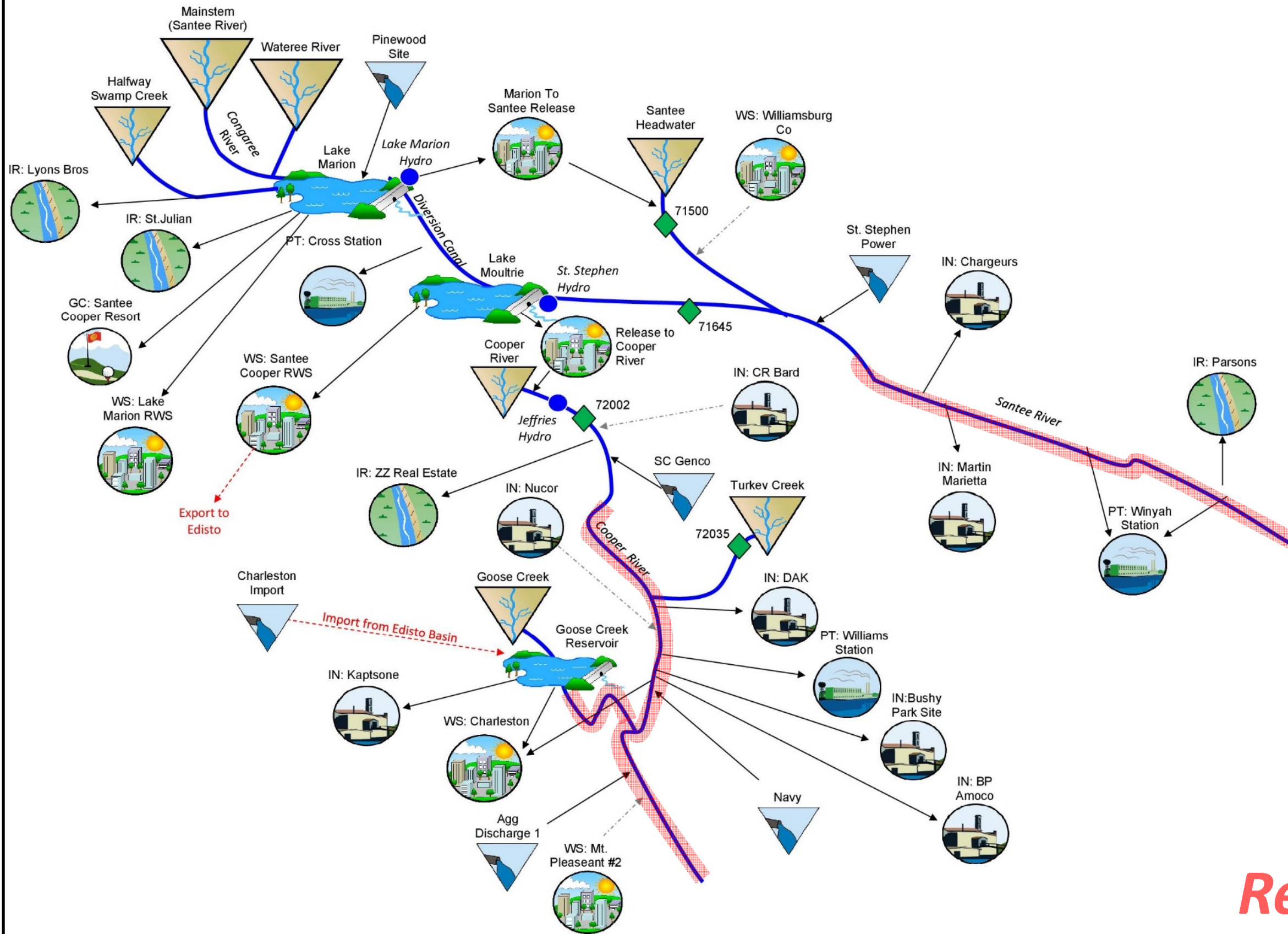





Figure 6. Santee River Basin SWAM Model Framework





Model Objects

-  Tributary
-  Discharge
-  Current or Former USGS Stream Gauge (with last 4 digits of Gage ID)


Water User Objects

-  Municipal
-  Agriculture (Irrigation)
-  Thermoelectric
-  Industrial
-  Golf Course

 Import or Export (Interbasin Transfer)

 Discharge from a Groundwater User*

** The associated Water User Object does not have a Surface Water Withdrawal.*

 Approximate extent of tidally influenced portion

Revised 2-1-16