Edisto River Basin Council

Meeting #8 (Virtual)

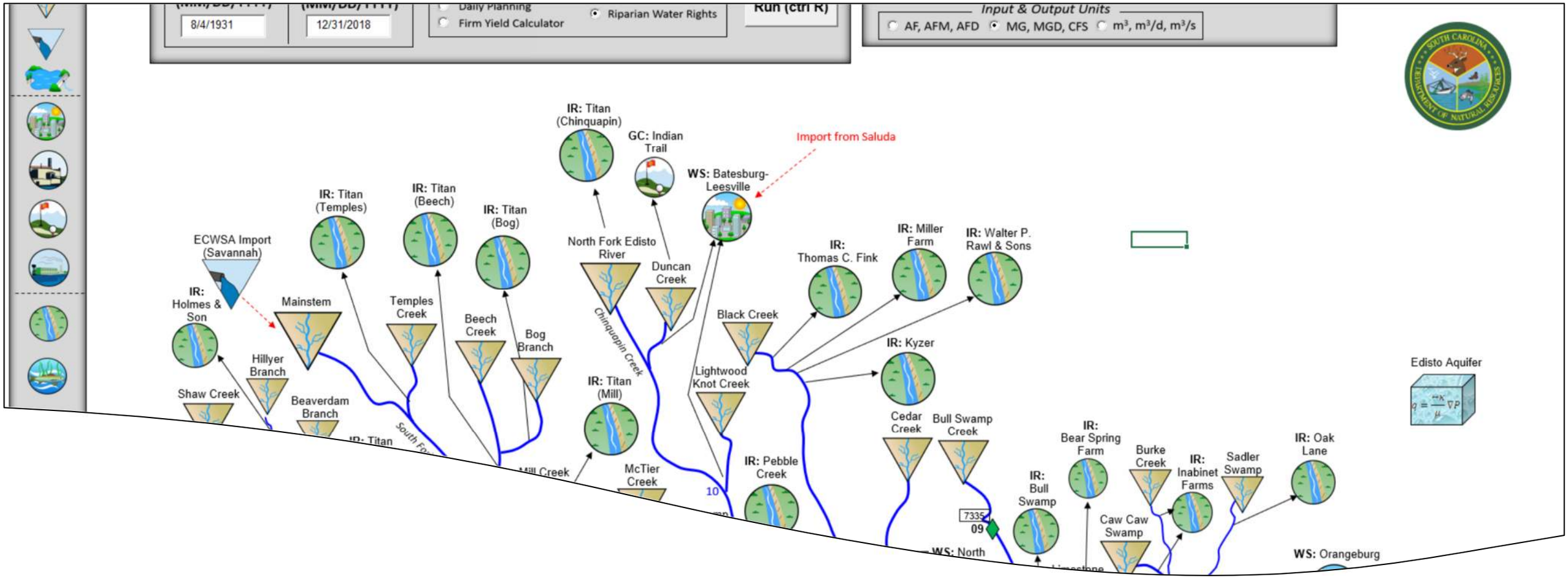
December 9th, 2020

Agenda

Meeting Objectives:

1) Surface Water Model Overview
2) Groundwater Model Overview
3) Environmental Flows Study Introduction
4) RBC Discussion

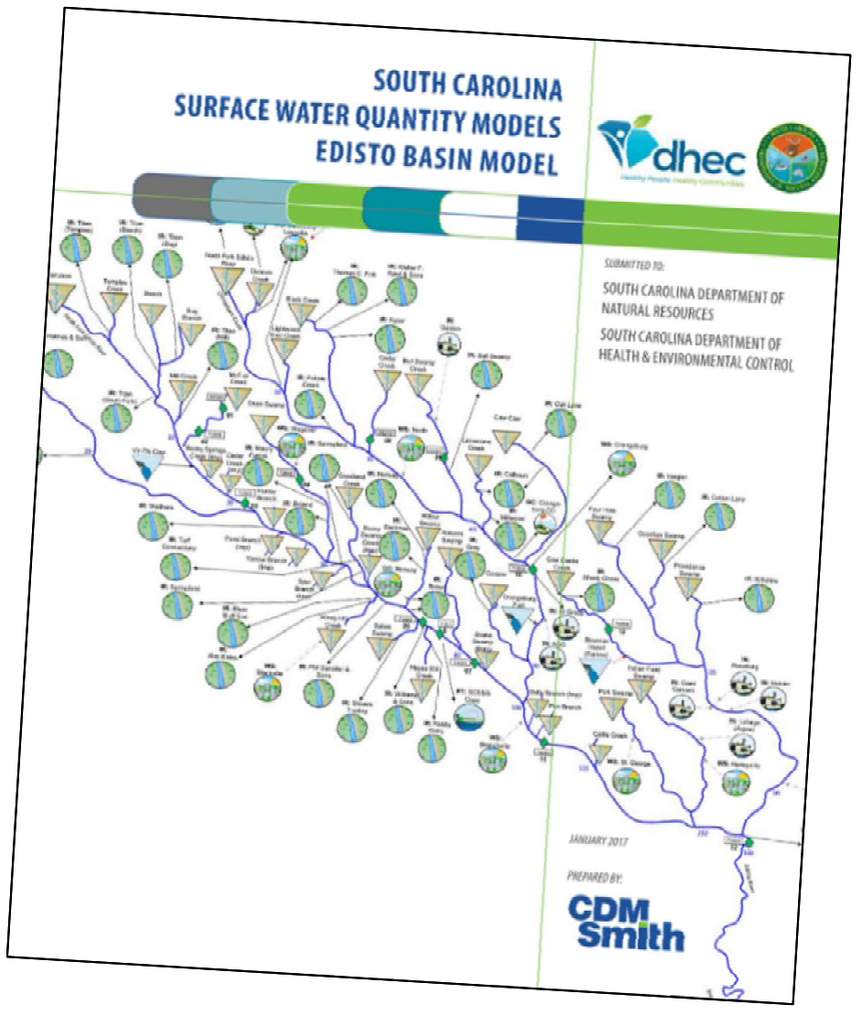
1.	Call the Meeting to Order (John Boyer, Facilitator) a. Review of Meeting Objectives b. Approval of Agenda c. Approval of November 18th Minutes and Summary	9:00–9:05
2.	Public Comment (John Boyer) a. Public Comment Period[1]	9:05-9:10
3.	Surface Water Model Overview and Q & A (John Boyer, CDM Smith)	9:10-9:50
4.	Groundwater Model Overview and Q & A (Bruce Campbell, USGS (Retired))	9:50-10:30
5.	Environmental Flows Study Introduction and Q & A (Eric Krueger, The Nature Conservancy)	10:30-10:50
	Break	10:50-11:05
6.	Edisto RBC Member Vision Statement and Goals for the Edisto Basin (John Boyer & Planning Team)	11:05-11:55
7.	Meeting Conclusion (John Boyer)	11:55-12:00



Overview of the Edisto Basin Surface Water Quantity Model

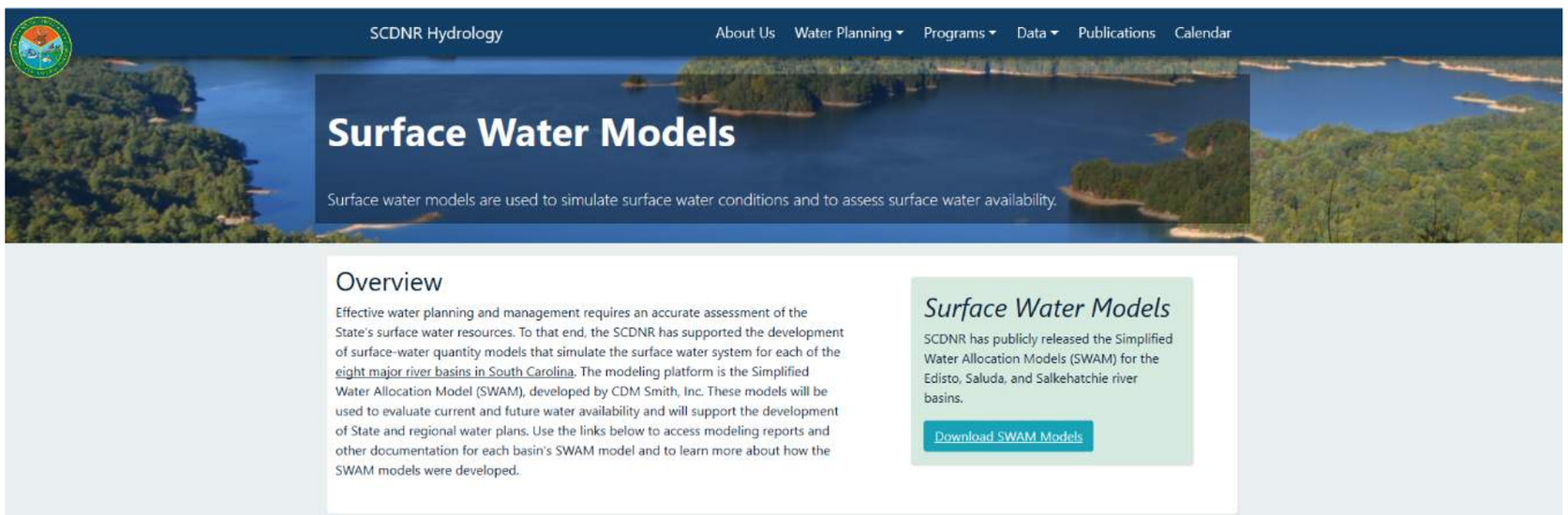
Simplified Water Allocation Model (SWAM)

- Developed as a desktop tool to facilitate regional and statewide water planning and allocation
- SWAM calculates physically and legally available water, diversions, storage, consumption and return flows at user-defined nodes
- From 2014 to 2017, all eight South Carolina surface water quantity models were built in the SWAM platform



Surface Water Model Access

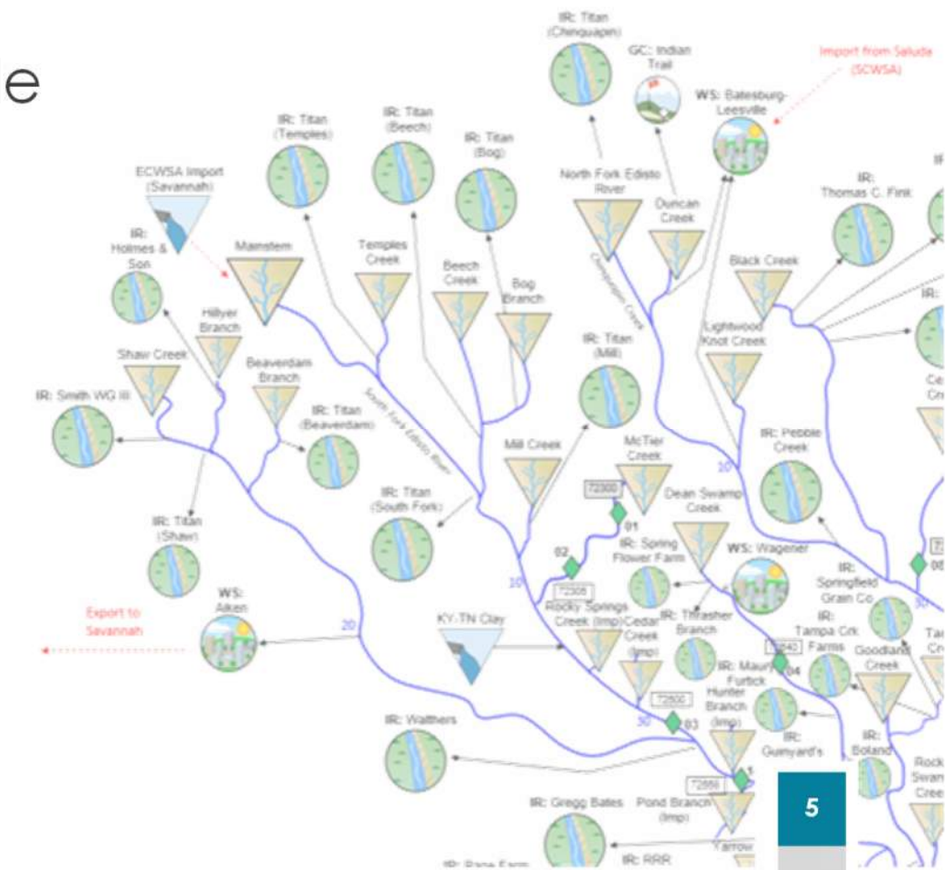
- Available for download at: http://hydrology.dnr.sc.gov/surface-water-models.html
- Also available for download:
  - SWAM User's Manual
  - Model reports for each basin
  - Supplementary technical memoranda



Edisto Surface Water Model Overview

Water Allocation Modeling ***is***:

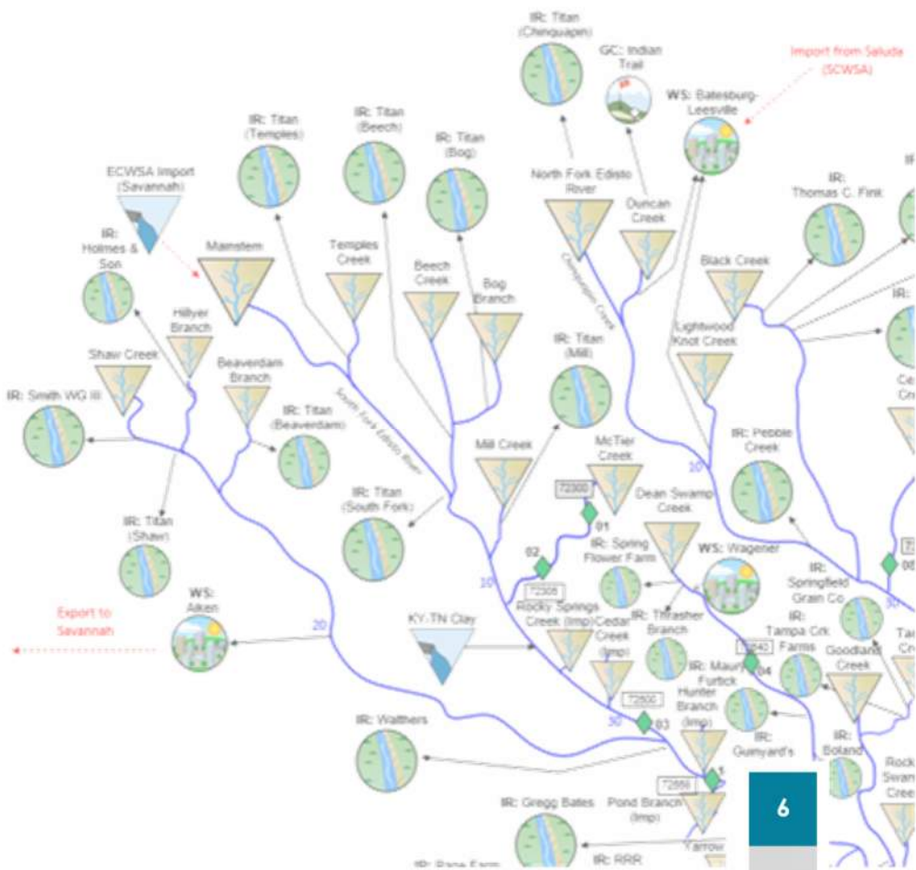
- Water balance calculations of physical flow
- Water rights calculations of legally available flow
- Demands, withdrawals, and return flows
- Reservoir storage
- Stream networks, multiple “nodes”
- Data intensive



Edisto Surface Water Model Overview

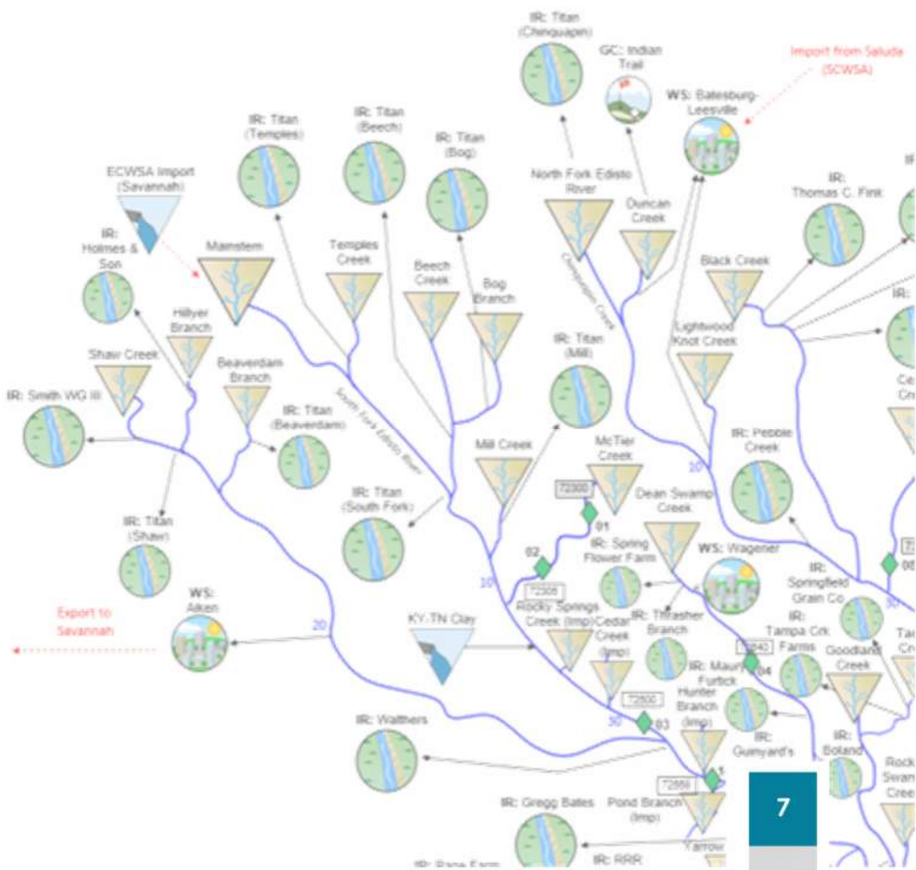
Water Allocation Modeling ***is not***:

- Rainfall-runoff calculations
- Hydrologic routing calculations
- Groundwater hydrology modeling
- Water quality modeling



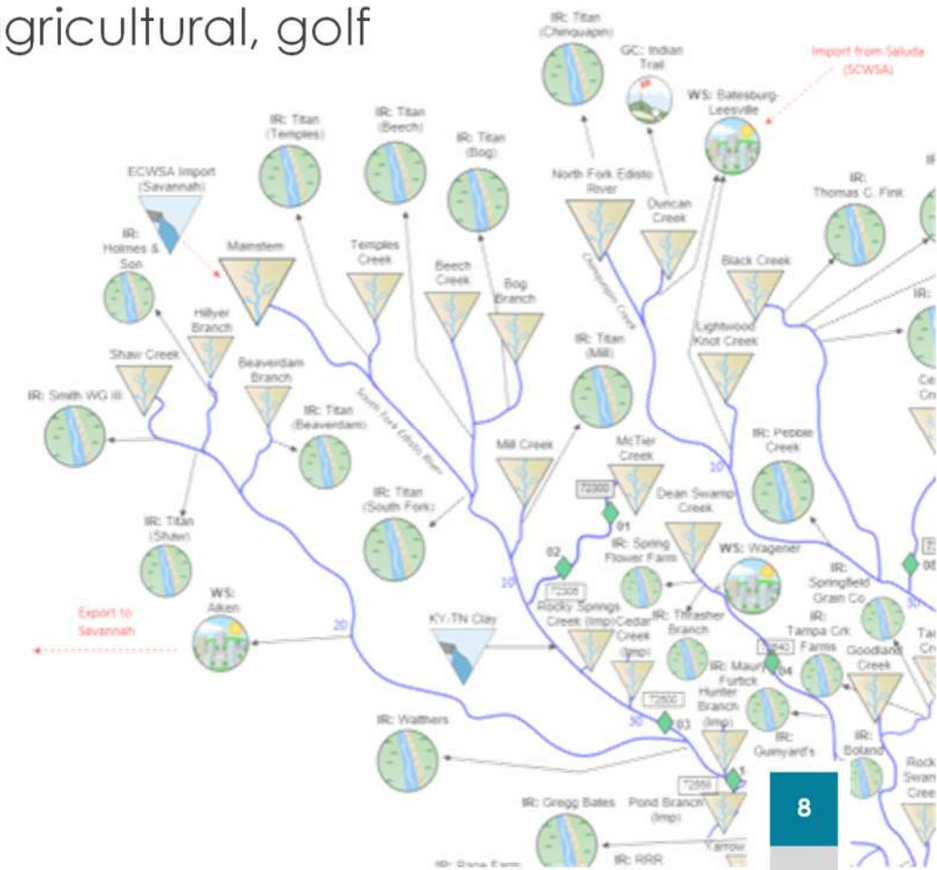
In Support of Edisto River Basin Planning, the Model Will be Used to:

- Assess current supply availability and shortages across a range of hydrologic conditions (conditions from1931 through 2018)
- Assess potential impacts of a "full allocation" scenario
- Assess a range of future potential scenarios with respect to changes in water demand, climate, and/or regulation
- Evaluate and help prioritize water management strategies

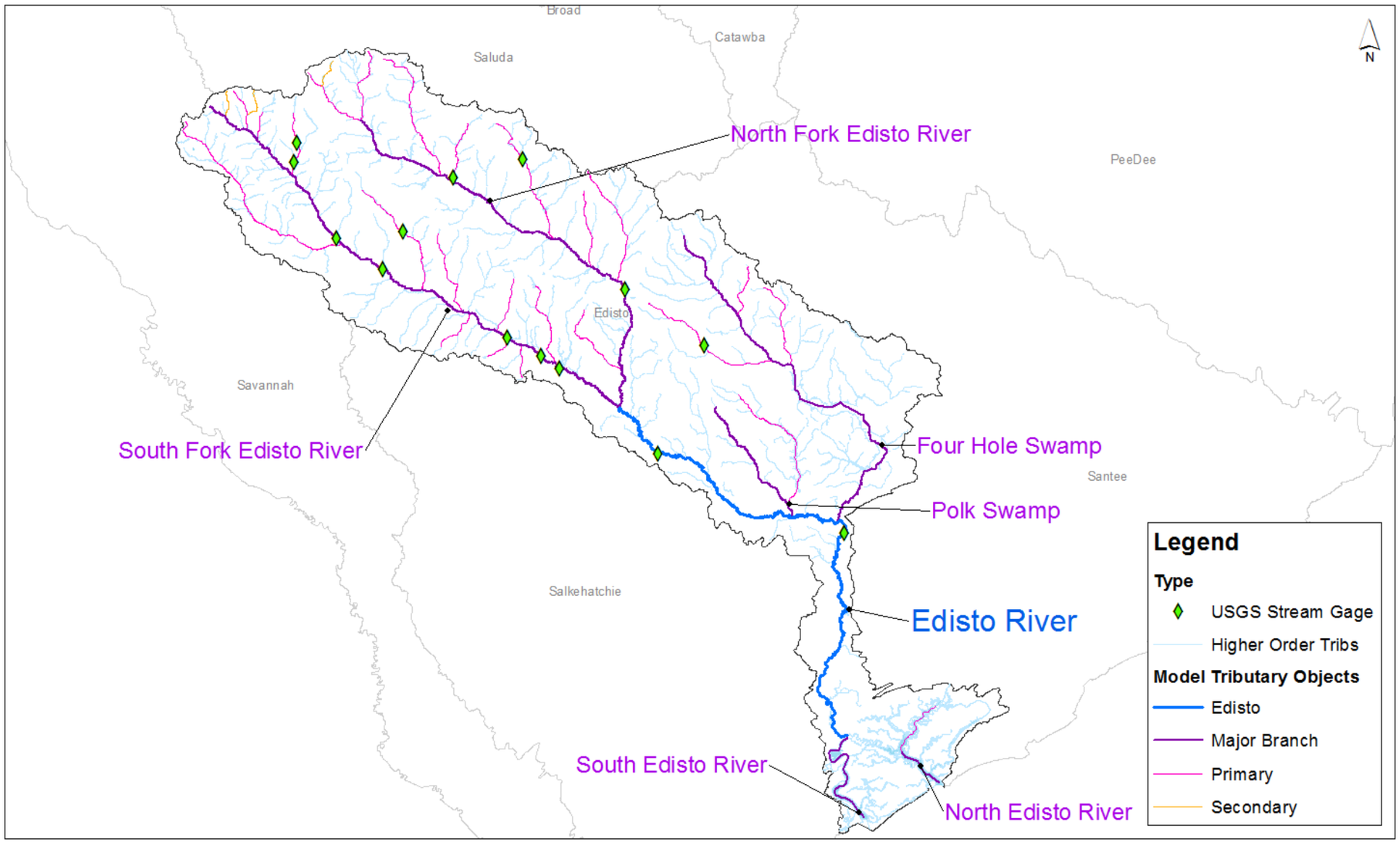


Edisto Model Inputs

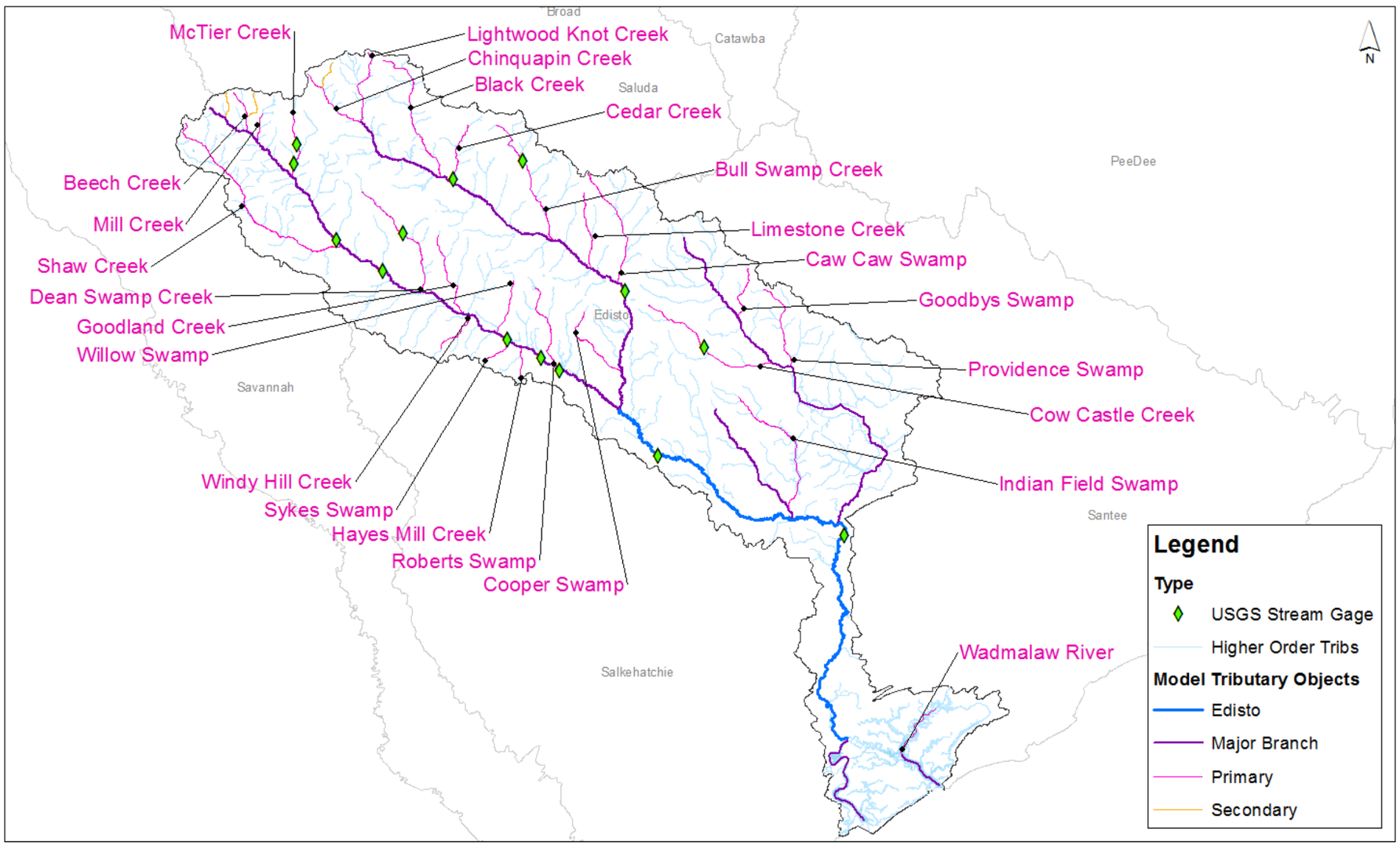
- USGS daily flow records
- Historical Operational Data
  - Withdrawals (municipal, industrial, thermoelectric, agricultural, golf courses, hatcheries)
  - Wastewater discharges and return flows
  - Includes transfers in and out of the basin
- Subbasin characteristics (from GIS)
  - Drainage area
  - Land use
  - Basin slope



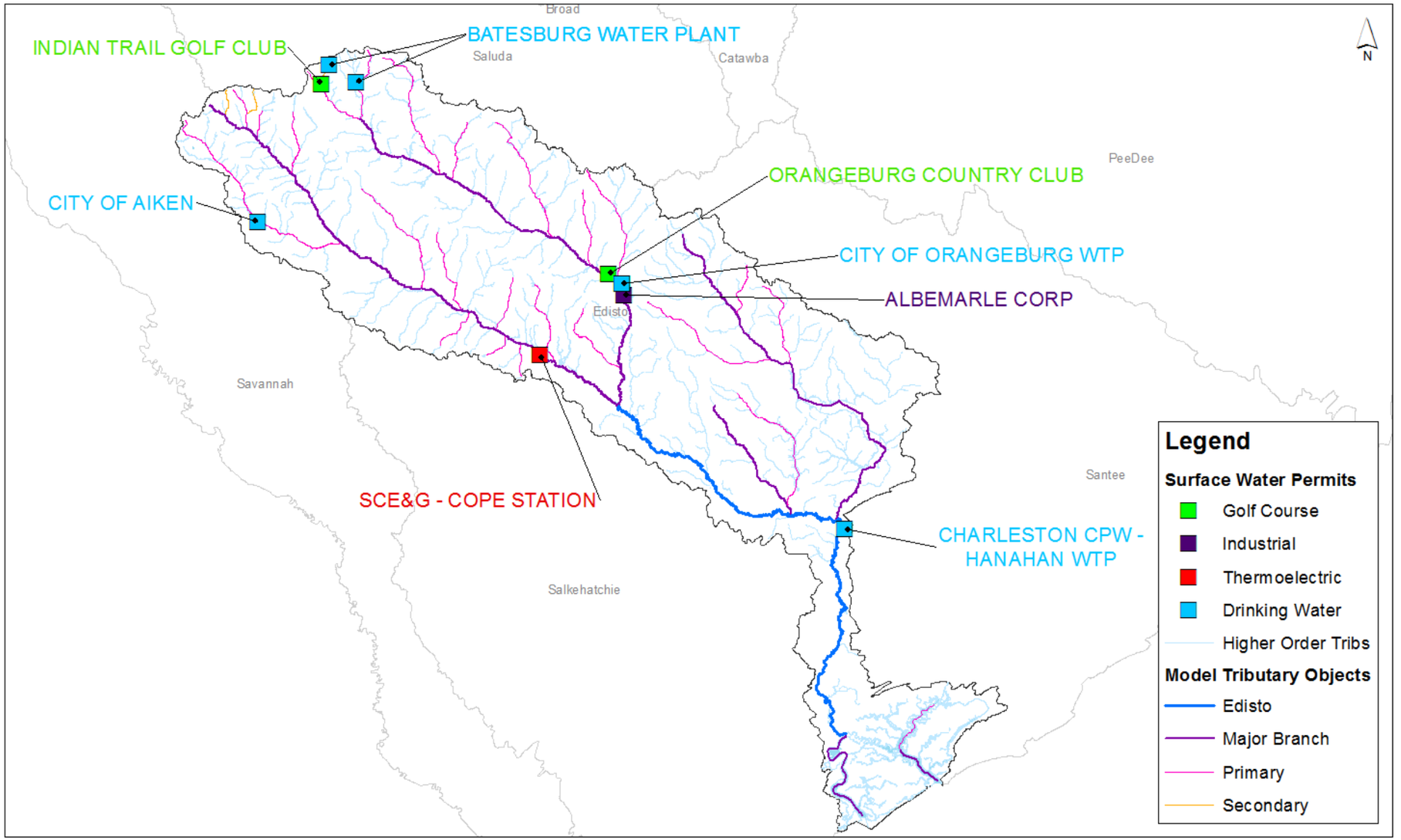
Main Stem and Major Branches



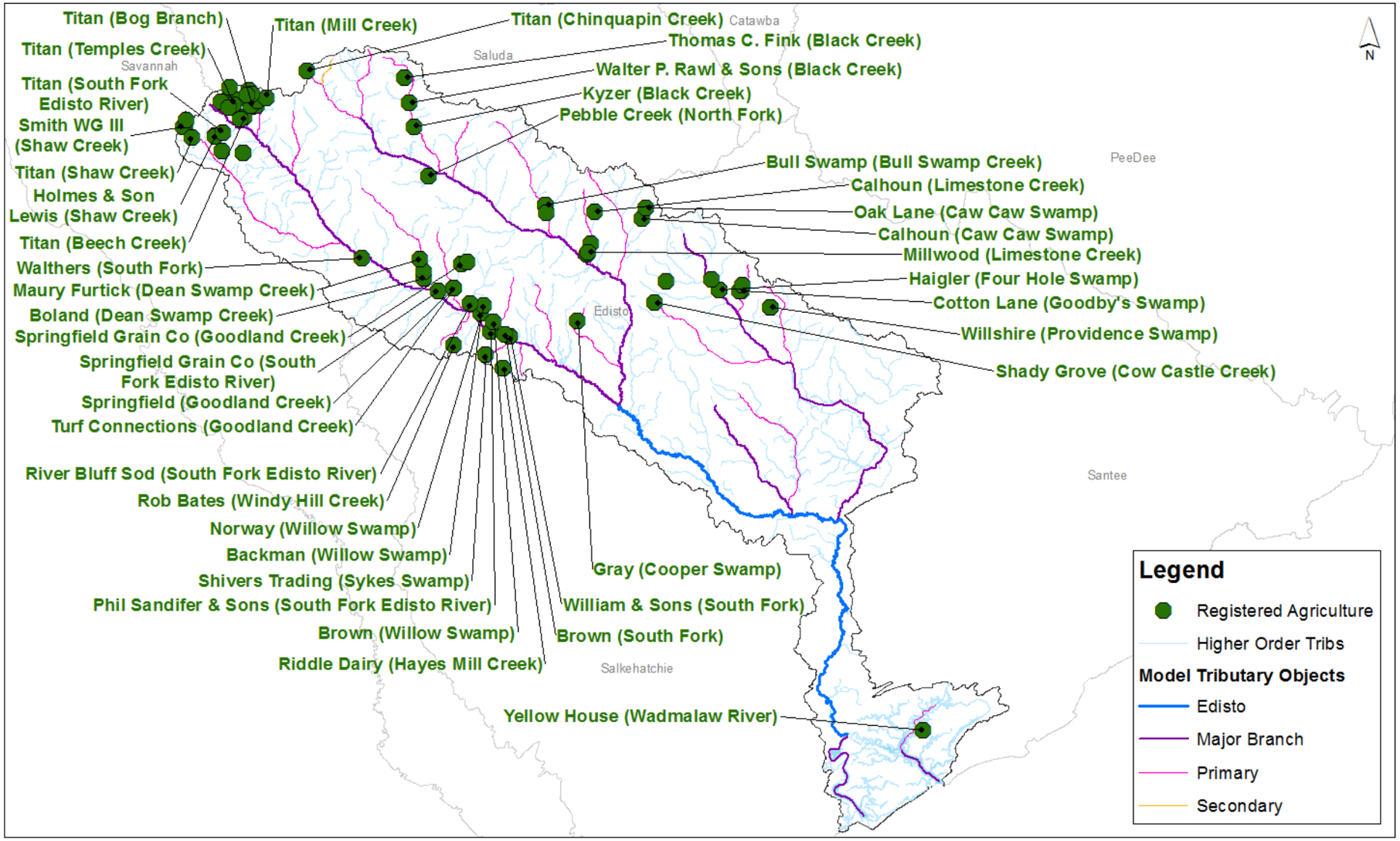
Primary Tributaries



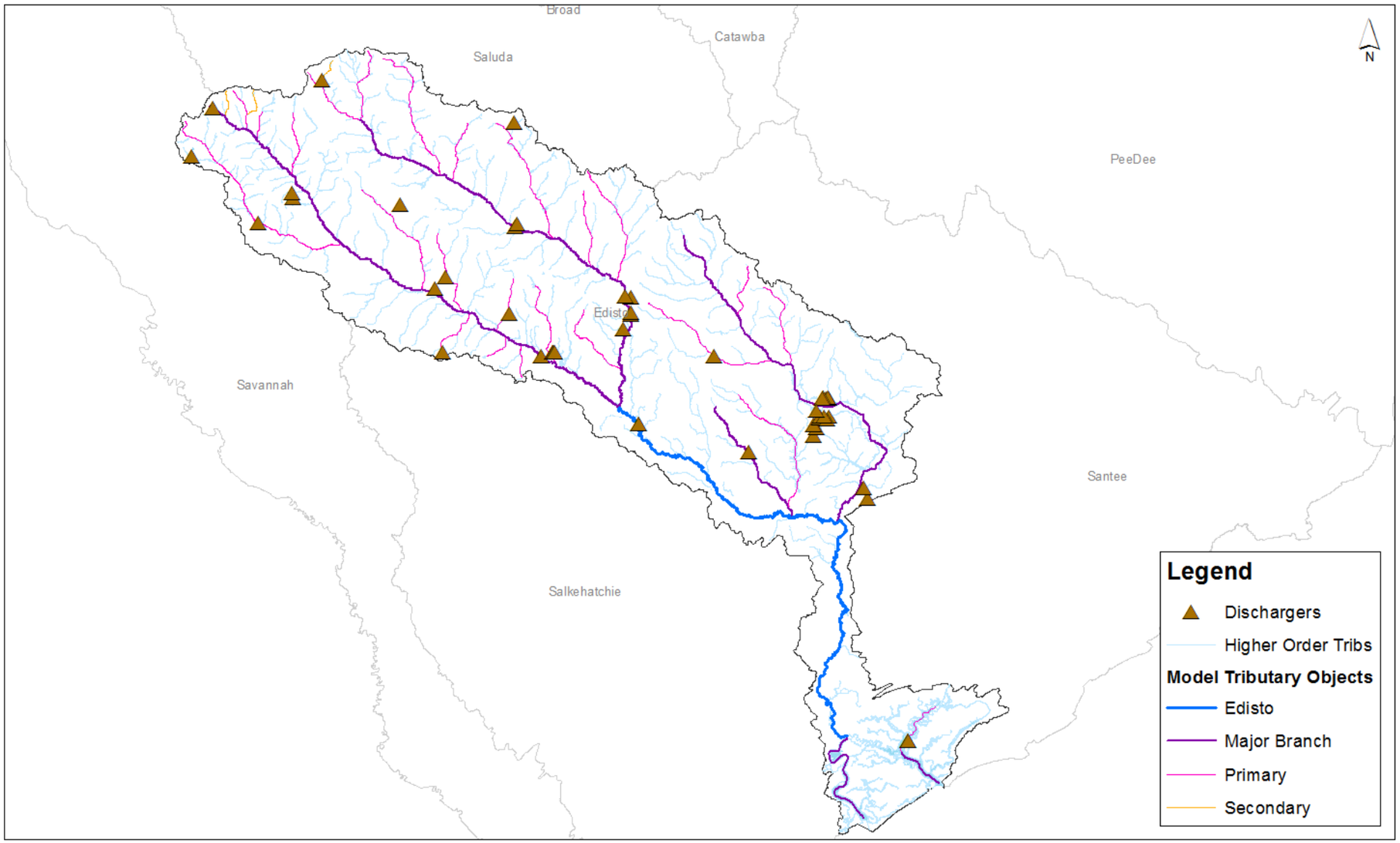
Municipal Water Supply, Industrial, Thermoelectric and Golf Course Withdrawals



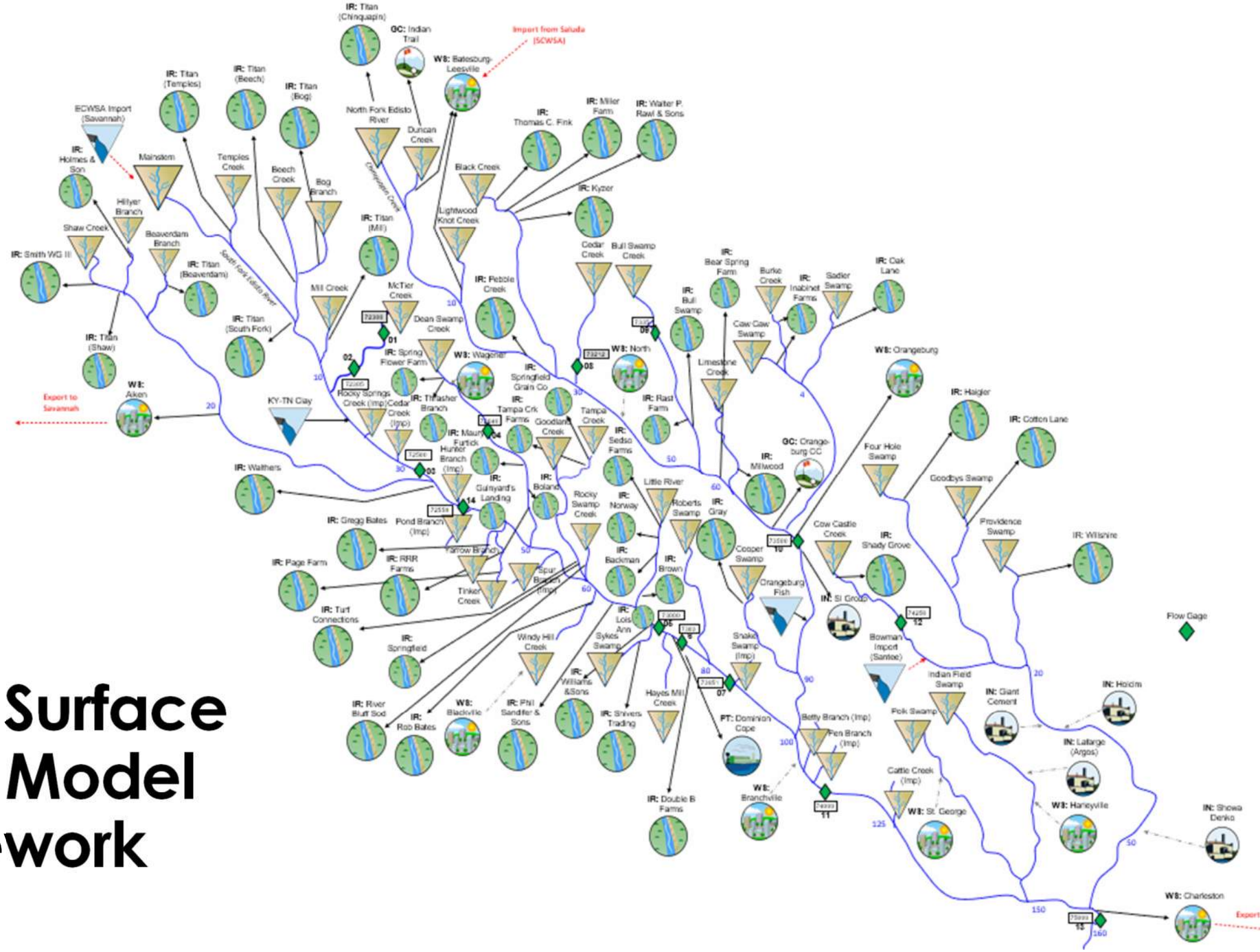
Agriculture Withdrawals



Wastewater Discharges and Returns

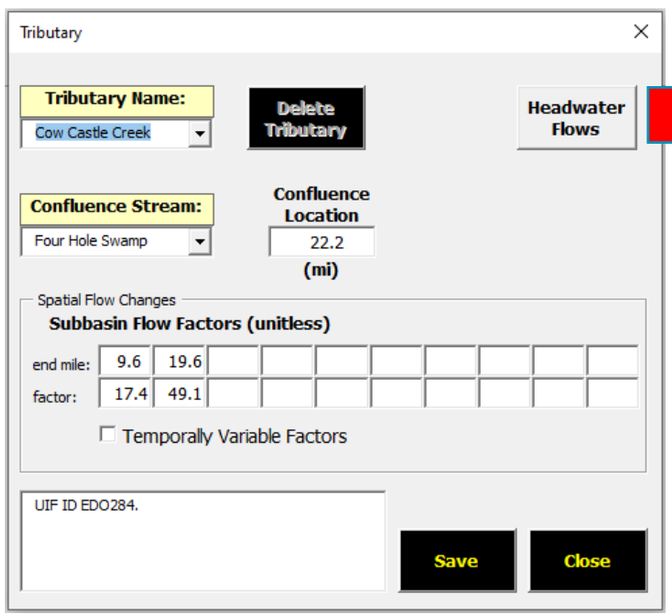


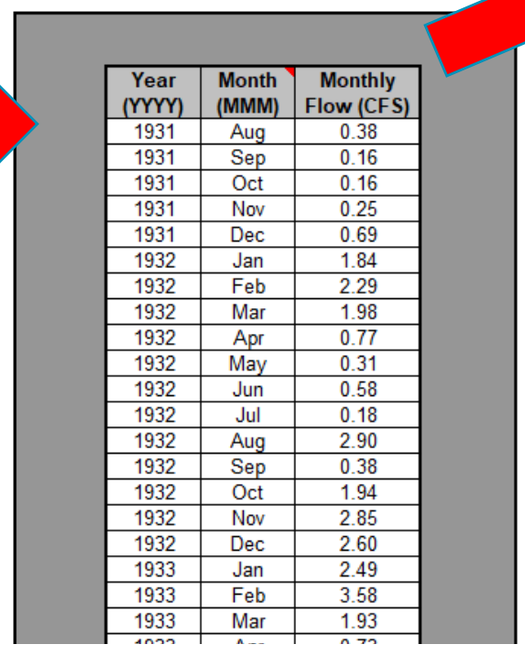
Edisto Surface Water Model Framework



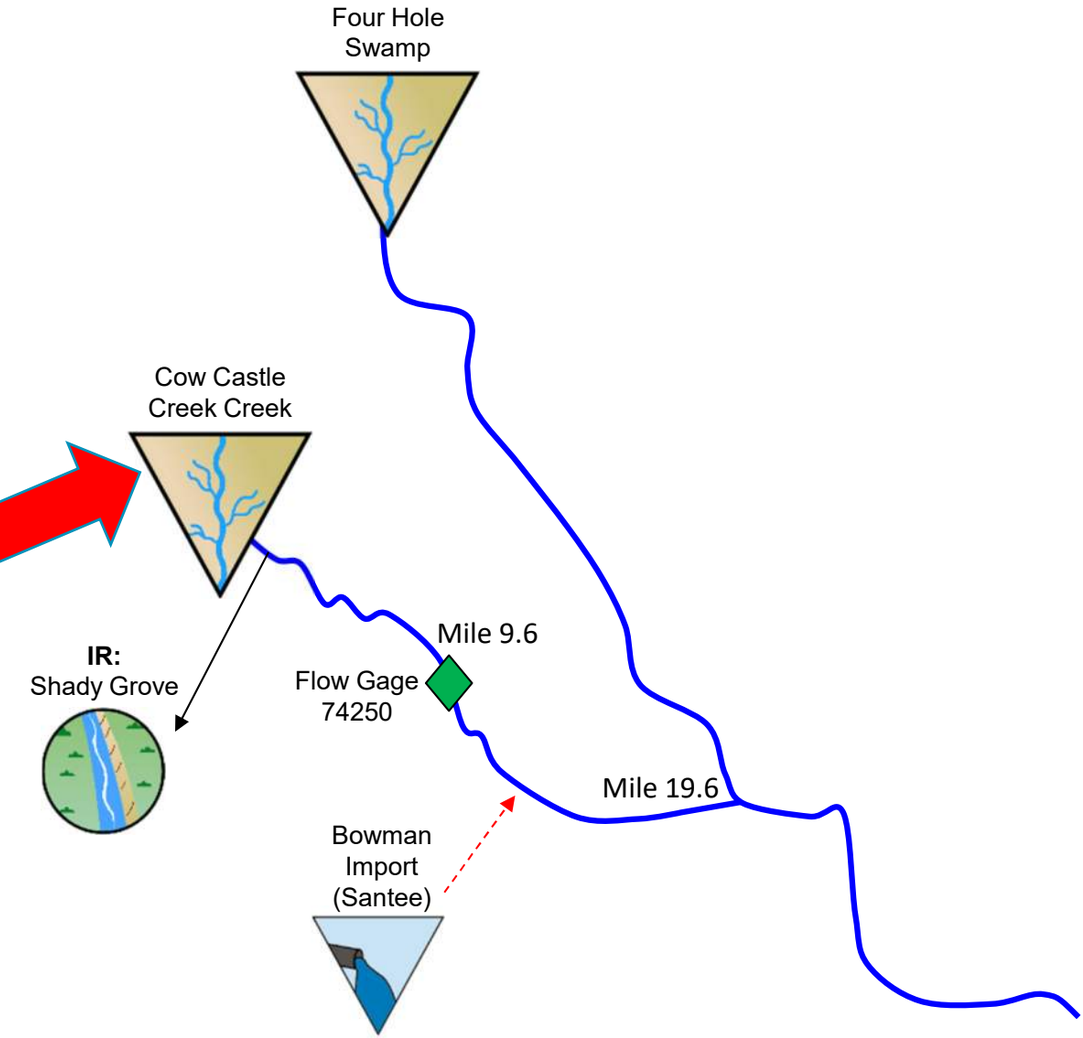
SWAM Calculations: Supply

- **Physically available** flow is a function of:
  - upstream tributary inflows,
  - reach gains and losses,
  - upstream diversions, withdrawals, returns, and storage



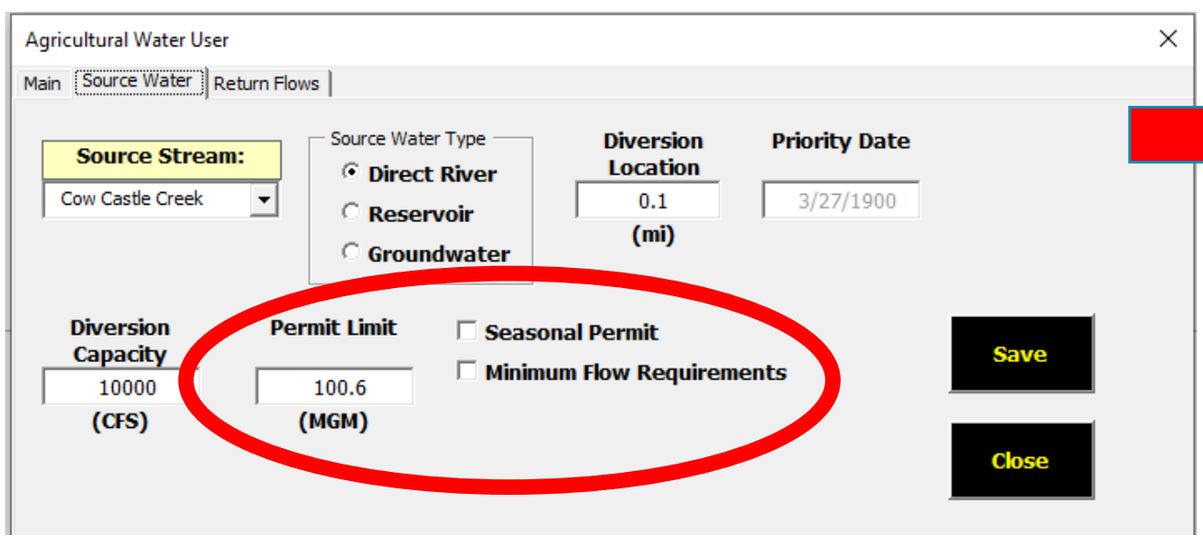


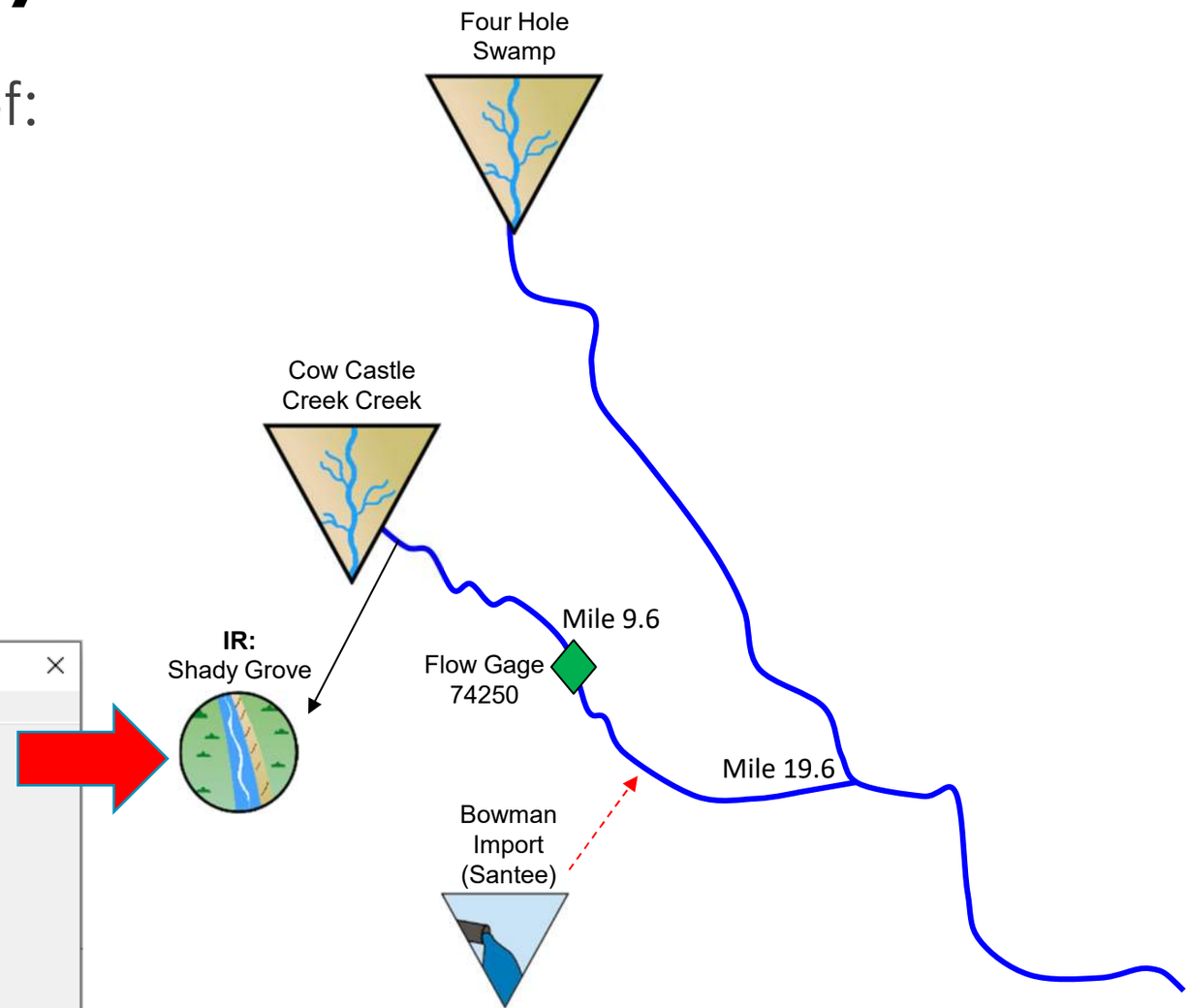
Year (YYYY)	Month (MMM)	Monthly Flow (CFS)
1931	Aug	0.38
1931	Sep	0.16
1931	Oct	0.16
1931	Nov	0.25
1931	Dec	0.69
1932	Jan	1.84
1932	Feb	2.29
1932	Mar	1.98
1932	Apr	0.77
1932	May	0.31
1932	Jun	0.58
1932	Jul	0.18
1932	Aug	2.90
1932	Sep	0.38
1932	Oct	1.94
1932	Nov	2.85
1932	Dec	2.60
1933	Jan	2.49
1933	Feb	3.58
1933	Mar	1.93



SWAM Calculations: Supply

- **Legally available** flow is a function of:
  - Water rights / permit limits
  - Storage rights
  - Minimum Instream flow requirements
  - Downstream priority water uses

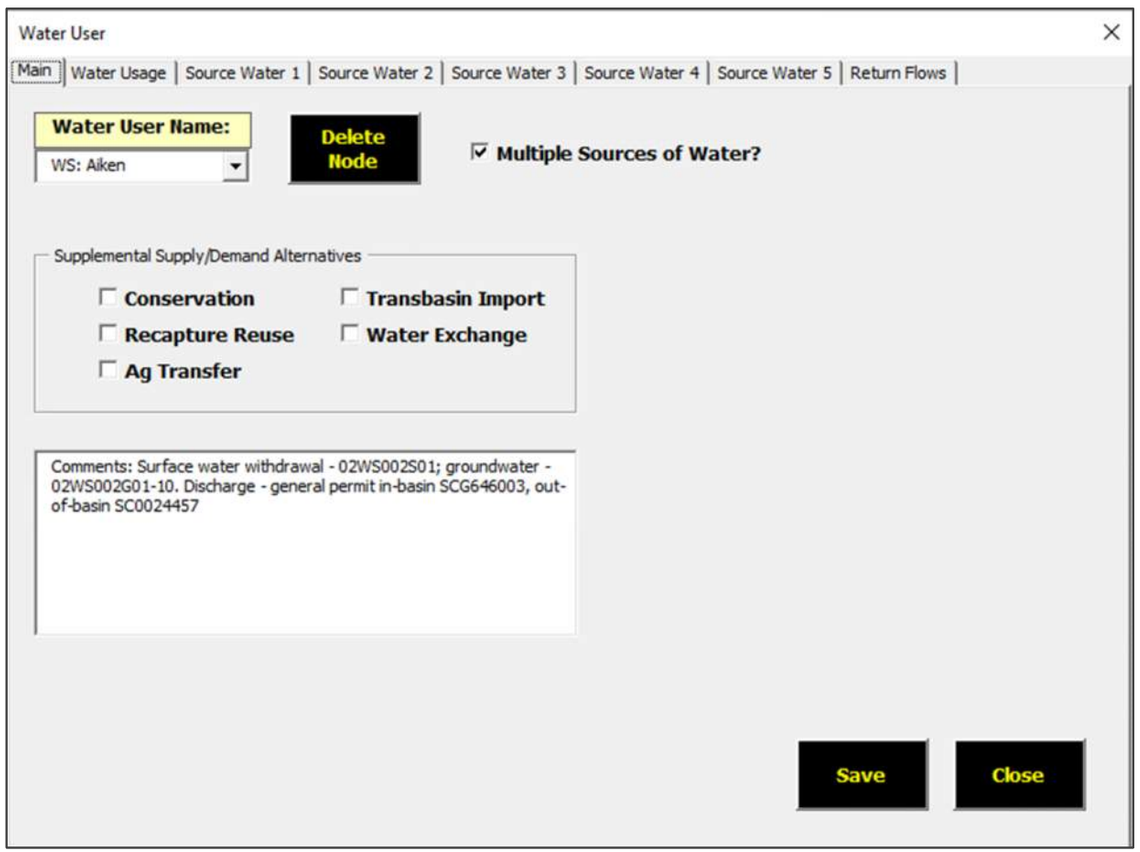




SWAM Calculations: Demand

- **Water User Object:**
  - Node-based demand, use and returns

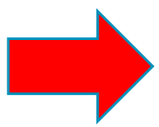
WS: Aiken

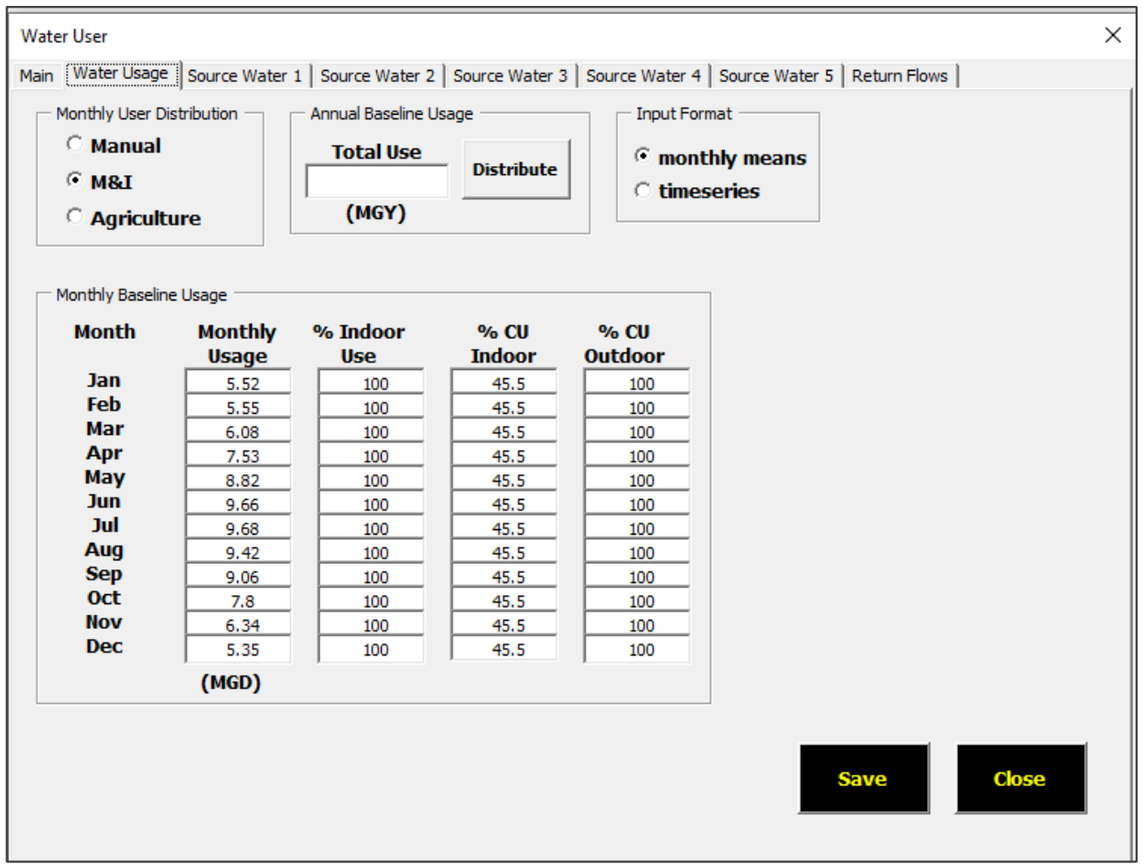


SWAM Calculations: Demand

- **M&I User Object:**
  - Municipal and industrial water demands (prescribed monthly mean)

WS: Aiken

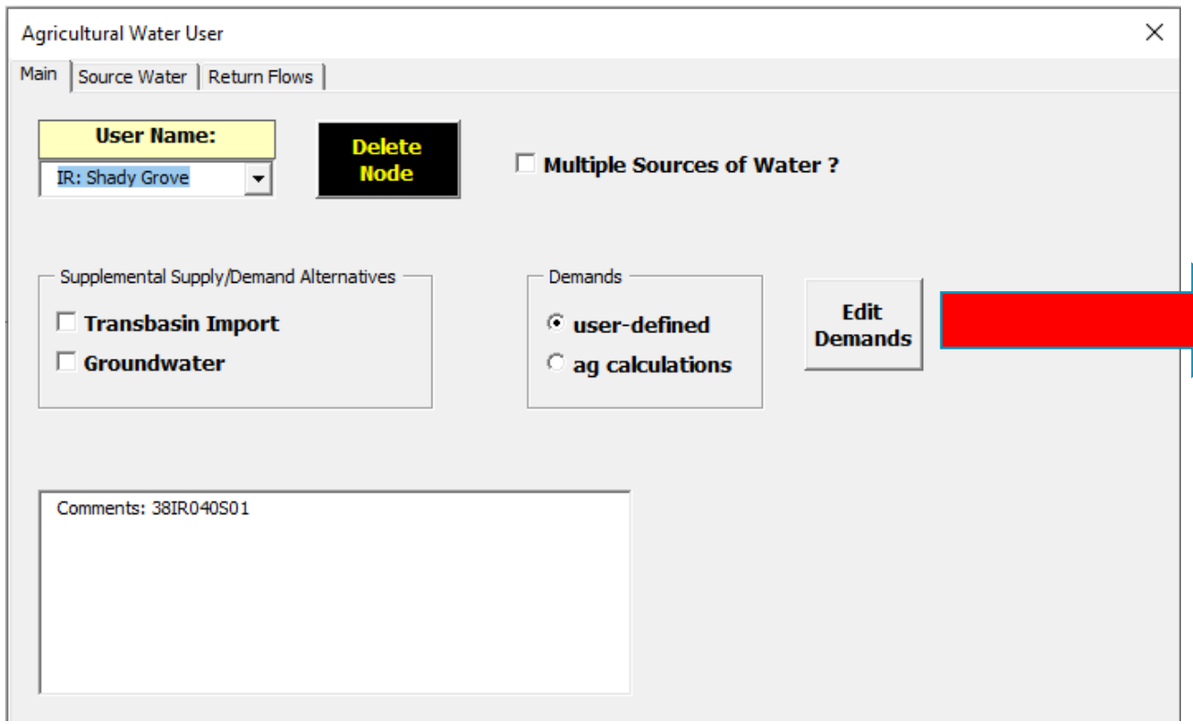




SWAM Calculations: Demand

- **Ag User Object:**
  - Agricultural water demands (prescribed monthly mean – repeated time series)

IR:
Shady Grove



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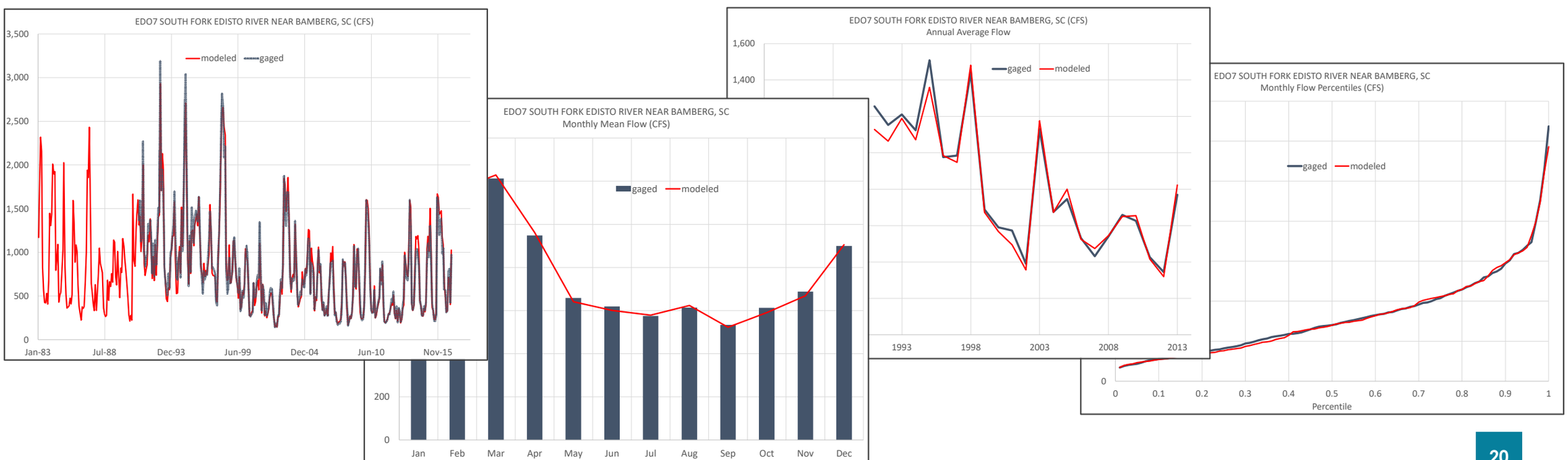
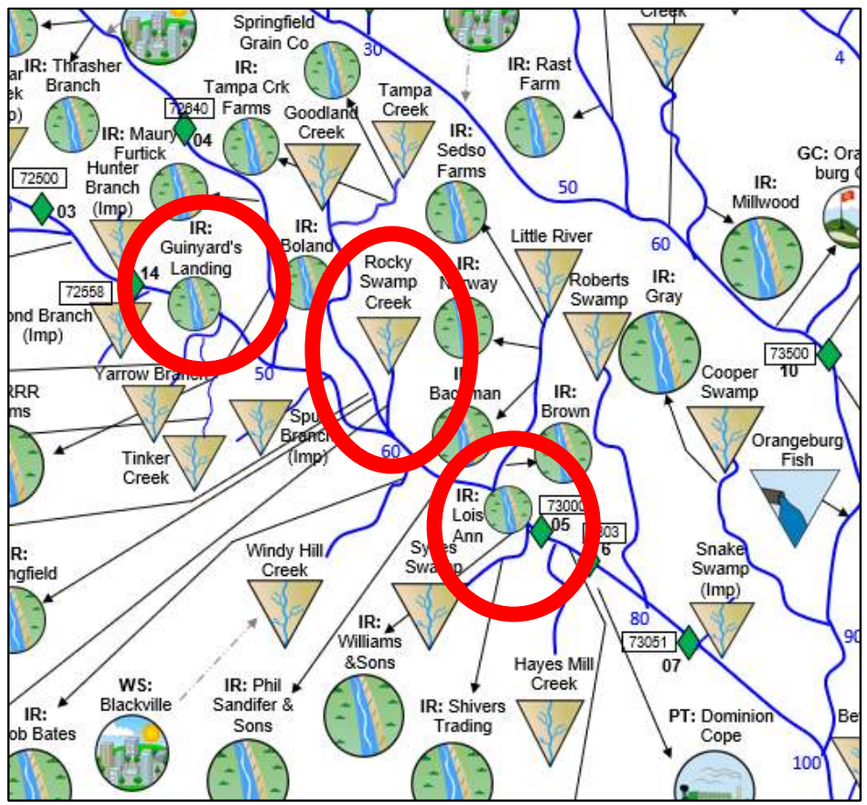
Model Calibration

- Calibration performed for multiple sites across wide range of hydrologic conditions
- Key calibration parameters = reach gain/loss factors (hydrology)



2020 Surface Water Model Updates

- Extended baseline hydrology through 2018 (added 5 years)
- Updated monthly mean water demands based on recent water use data
- Added new permittees (including Lois Ann Farms and Guinyard's Landing)
- Increased model resolution bay adding several small streams
- Refined calibration



Model Limitations

- Greater uncertainty in predictions for ungaged reaches compared to gaged
- Model not designed for reach routing of flow changes at a daily or sub-daily timestep
- Greater uncertainty in supply availability (and "shortage") predictions associated with small stream withdrawals compared to larger river and reservoir withdrawals
  - e.g. offline irrigation ponds
- Baseline model assumes past hydrologic variability is representative of future hydrologic variability (stationary climate)

Surface Water Scenarios

Base Scenarios

- Current Surface Water Use Scenario
  - *Uses most recent 10-yr average withdrawals (as reported by month)*
- Permitted and Registered Surface Water Use Scenario
  - *Uses current fully permitted and registered amounts*
- Business-as-Usual Water Demand Projection Scenario
  - *Future water demand projection based on moderate growth and normal climate*
- High Water-Demand Projection Scenario
  - *Future water demand projection based on high growth and hot/dry climate*

Additional scenarios may be identified and requested by the RBC

Performance Measures

Assessment of simulation results will focus on quantifying key performance measures for multiple reaches of interest across the basin.

Examples:

- Percent change in a monthly minimum flow or 5th percentile flow
- Percent change in surface water supply
- Percent change in magnitude of a surface water shortages
- Percent of time recreational facilities were unavailable on a stream reach
- Change in the number and magnitude of excursions below 20, 30 and 40 percent mean annual daily flows