



## Surface Water Availability Assessment in South Carolina Legislative Quarterly Report, February 2015

### Background

South Carolina currently has limited scientific information about the future demands on and availability of our water supply. As a result, the General Assembly allocated \$1.5M to complement South Carolina's new surface water permitting program administered by SC Department of Health and Environmental Control (DHEC), and to gather the information necessary to update the State Water Plan developed by SC Department of Natural Resources (DNR). The two agencies are in the process of gathering data on South Carolina's eight basins: Broad, Catawba, Edisto, Pee Dee, Salkehatchie, Saluda, Santee, and Savannah.





## Scientific Process for Measurement and Legislative Reporting

The availability assessment will develop a computer-generated model of each of the eight basins to evaluate existing water availability. These analyses will be used to inform the resource agencies and stakeholders if there are areas of the State where there is a “gap” or concern about the amount of water needed to meet our increasing demands over the next 50 years.

The funds appropriated above to the DNR for the State River Basin Study Project must be used for water data collection to provide scientific information on water resources in the state’s eight major river basins. The DNR shall, in cooperation with DHEC, submit to the Senate Finance Committee, the House Ways and Means Committee, the Senate Agriculture and Natural Resources Committee, and the House Agriculture, Natural Resources and Environmental Affairs Committee, a report on the project’s timeline, findings, and expenditure of funds on a quarterly basis. Additionally, this information will be posted electronically on DNR and DHEC websites.

## Summary of Activities During the Past Quarter

CDM Smith’s *Simplified Water Allocation Model (SWAM)* will be used for the project. The Saluda River basin will serve as the pilot study area and will be the first basin model developed. During the past quarter, work has focused on developing the Saluda model, which is scheduled to be completed by the end of June 2015.

Several drafts of the UIF Methodology Technical Memorandum for the Saluda basin were reviewed by DNR and DHEC staff, and a final memorandum was posted on DNR’s webpage. A draft Modeling Framework for the Saluda basin is currently under review, as is a draft Technical Memorandum summarizing historical agriculture irrigation withdrawal estimates for all eight basins. A second draft copy of the Modeling Plan was reviewed and a final plan was posted on the DNR webpage.

Clemson University submitted a work plan to DNR and DHEC for a stakeholder engagement process and attended the monthly meeting in February with CDM Smith and the state agencies. Progress is being made toward implementing a formal stakeholder process for the project.

During the past quarter, DNR, DHEC, and CDM Smith attended meetings with the AWWA Water Utility Council and the Chamber of Commerce Environmental Technical Committee, and organized a meeting with various environmental groups to discuss project goals and the SWAM modeling tool. CDM Smith gave a presentation of the SWAM model at each of these meetings.

Progress reports are being provided by CDM Smith at monthly conference calls and at in-person meetings with DNR and DHEC. Written monthly progress reports are being posted on the DNR



webpage. In addition to the monthly progress reports, CDM Smith is required to prepare quarterly progress reports, the second of which is provide below. Financial statements can be found at the end of this report.

# South Carolina Surface Water Quantity Models Quarterly Progress Report No. 2

November 16, 2014 to February 15, 2015

## Introduction

The South Carolina Departments of Natural Resources (DNR) and Health and Environmental Control (DHEC) have contracted with CDM Smith to develop surface water quantity models in the eight major river basins in South Carolina. Per the requirements of the contract, CDM Smith will prepare and submit Quarterly Progress Reports summarizing work completed on each basin model. This second Quarterly Progress Report covers the three month period from November 16, 2014 to February 15, 2015.

The Quarterly Progress Report provides a bulleted summary of activities and accomplishments; identifies upcoming work and deliverables; highlights issues that have the potential to impact scope, schedule or costs; and provides the current project schedule. Activities and accomplishments are presented for the following categories: (1) project planning and management; (2) data collection; (3) data analysis and modeling; and (4) stakeholder involvement.

## Activities and Accomplishments

### Project Planning and Management

- Monthly Progress meetings attended by CDM Smith and DNR/DHEC project staff were held on December 3, 2014, January 6, 2015, and February 12, 2015.
- CDM Smith incorporated additional DNR/DHEC comments on the Draft Modeling Plan and submitted a Final Modeling Plan which has been posted on the DNR's project website.
- Project submittals to date include:
  - Draft and Final Modeling Plan
  - Draft and Final UIF Methodology Technical Memorandum for the Saluda basin
  - Draft Modeling Framework for the Saluda basin
  - Draft Technical Memorandum summarizing historical agriculture irrigation withdrawal estimates for all basins

### Data Collection

- CDM Smith continued contacting registered and permitted water users in the Saluda basin and began contacting water users in the Broad and Edisto basins to confirm reported withdrawal amounts, sources, and discharge amounts; collect pre-reporting withdrawal amounts (or estimates); and confirm other operational parameters.
- Historical lake levels from USGS stage recorders located at Lake Murray and Lake Greenwood in the Saluda basin were obtained.
- Estimates of surface water withdrawal amounts used for agriculture irrigation from 1950 through 2013 in all eight basins were developed. The estimates were generated from a spreadsheet-based model that incorporates surface water agriculture irrigation withdrawals

reported to DHEC and the U.S. Department of Agriculture’s (USDA) National Agricultural Statistics Service (NASS) Census of Agriculture (COA), which is conducted every five years. A draft technical memorandum summarizing the development of the estimates was provided to DNR and DHEC for review.

## **Data Analysis and Modeling**

### Saluda (Pilot Basin Model)

- A draft technical memorandum summarizing the process for developing Unimpaired Flows (UIFs) in the Saluda basin was prepared. Following DNR and DHEC review and comment, a final technical memorandum was submitted and has been posted on DNR’s project website.
- A draft SWAM model schematic and framework of the Saluda basin was developed and provided to DNR and DHEC for review and comment.
- SWAM model enhancements to incorporate the daily time step were completed and tested. Additional enhancements were made to allow for the user to select between different units for flow and volume. Several enhancements are ongoing, including the addition of several new model objects to improve the visual representation of each river basin.

### Edisto

- Historical estimates of surface water withdrawals for agriculture irrigation were developed for incorporation into the UIF dataset that will be prepared.

### Broad

- Historical estimates of surface water withdrawals for agriculture irrigation were developed for incorporation into the existing UIF dataset that will be extended.

### PeeDee

- Historical estimates of surface water withdrawals for agriculture irrigation were developed for incorporation into the UIF dataset that will be prepared.

### Catawba

- Historical estimates of surface water withdrawals for agriculture irrigation were developed for incorporation into the UIF dataset that will be prepared.

### Santee

- Historical estimates of surface water withdrawals for agriculture irrigation were developed for incorporation into the UIF dataset that will be prepared.

### Savannah

- Historical estimates of surface water withdrawals for agriculture irrigation were developed. These will be evaluated in light of the UIF dataset already prepared through efforts conducted by Georgia.

### Salkehatchie

- Historical estimates of surface water withdrawals for agriculture irrigation were developed for incorporation into the UIF dataset that will be prepared.

## Stakeholder Involvement

- As previously noted, CDM Smith continued contacting permitted and registered water users in the Saluda basin, and began contacting users in the Broad and Edisto basin to confirm and collect pertinent information about their water withdrawals, discharges, hydropower or dam operations, and other pertinent data.
- CDM Smith gave a presentation on the Simplified Water Allocation Model (SWAM) and project approach and schedule to the AWWA Water Utility Council on December 3; the Chamber of Commerce Environmental Technical Committee on January 7; and various environmental organizations on February 13.

## Summary of Upcoming Work

Over the next quarter, the project team will:

- Complete data collection from permitted users in the Saluda, Edisto, and Broad basins, and initiate data collection in all remaining basins.
- Finalize development of the UIF dataset for the Saluda Basin to the confluence of the Broad River. The Broad River UIF dataset, which already exists for the period 1950 through 2006, will be obtained, reviewed, and extended. Once it has been extended, the Saluda UIF dataset will be completed to the terminus of the basin at Lake Marion.
- Prepare a technical memorandum summarizing the methodology proposed to extend the Broad River UIF dataset.
- Finalize development of the Saluda Basin model framework.
- Begin development of the Broad and Edisto model framework.
- Prepare for and participate in a Panel Discussion along with DNR and DHEC staff at the South Carolina Rural Water Association's Decision Makers Summit on February 27, 2015.
- Give a presentation summarizing project status at the South Carolina Environmental Conference in Myrtle Beach on March 16, 2015.
- Assist Clemson University (the DNR-procured project stakeholder facilitator) in developing and executing a stakeholder involvement plan through the exchange of technical information.

## Issues Impacting Scope, Schedule, or Project Cost

No major issues were identified during the previous quarter that are expected to significantly impact schedule; however, data collection from several permitted users in the Saluda basin was taking longer than expected, which may delay development of the UIF dataset. Other minor schedule adjustments were made to reflect the project progress and more accurately account for future deliverables. An updated schedule is attached.

During the project kickoff meeting, and based on DNR and DHEC review of the draft Modeling Plan, several potential out-of-scope model enhancements were identified. These include:

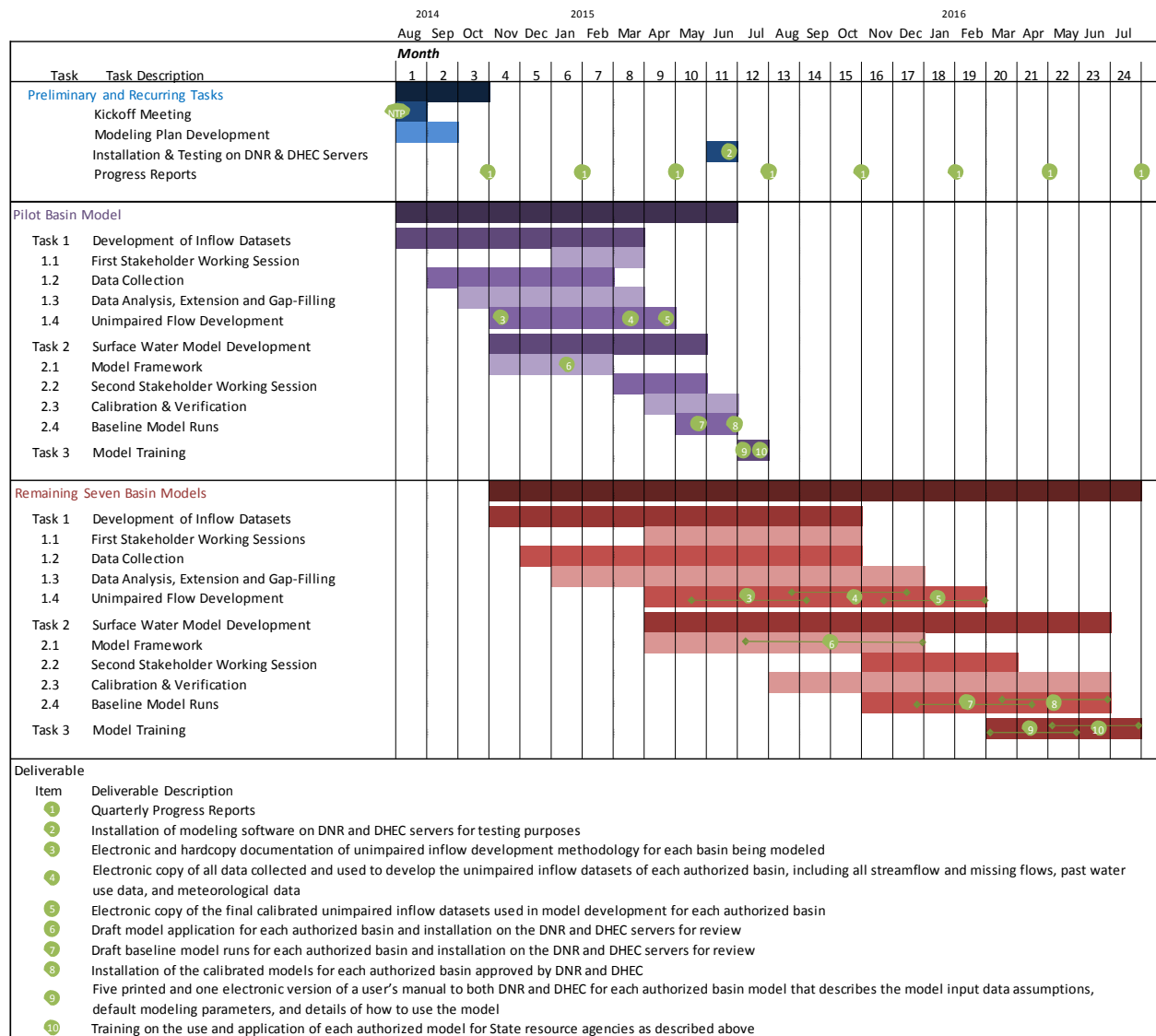
- A "Current Situation Analysis" for quasi-real time operational support. This functionality would provide a probabilistic analysis of current conditions at any future point in time and how

conditions are likely to change within 6 or 12 months based on projected use and management patterns.

- The ability to use near-term hydrologic flow forecasts (for example, 60-day streamflow forecasts from NOAA) for month-to-month operational planning.
- Use of HEC DSSVue and DSS files for results display and analysis.

CDM Smith will discuss the expected level of effort with DNR and DHEC, so that decisions can be made about prioritizing and implementing these possible future enhancements as the project moves forward.

## Project Schedule





### CDM Smith Invoice Number 3

Invoice Date: November 21, 2014  
 For Services Between: October 19, 2014 and November 15, 2014

River Basin	Contract Amount	This Invoice	Total Invoiced	Amount Remaining	Percent Complete
Saluda	\$155,926	\$10,084	\$30,981	\$124,945	20%
Edisto <sup>1</sup>	\$226,034	\$11,240	\$49,790	\$176,244	22%
Broad	\$132,960	\$550	\$550	\$132,410	0.4%
Pee Dee	\$189,865	\$-	\$-	\$189,865	0%
Catawba	\$141,639	\$-	\$-	\$141,639	0%
Santee	\$128,775	\$-	\$-	\$128,775	0%
Savannah	\$154,637	\$-	\$-	\$154,637	0%
Salkehatchie	\$128,775	\$-	\$-	\$128,775	0%
Total	\$1,258,611	\$21,874	\$81,321	\$1,177,290	6%

<sup>1</sup> Project startup-activities including the kickoff meeting, modeling plan, model enhancement and other activities were included under the Edisto Basin budget. The Edisto was originally identified as the pilot basin for modeling.

### CDM Smith Invoice Number 4

Invoice Date: December 29, 2014  
 For Services Between: November 16, 2014 and December 13, 2014

River Basin	Contract Amount	This Invoice	Total Invoiced	Amount Remaining	Percent Complete
Saluda	\$155,926	\$13,855	\$44,836	\$111,090	29%
Edisto <sup>1</sup>	\$226,034	\$11,600	\$61,390	\$164,644	27%
Broad	\$132,960	\$1,350	\$1,900	\$131,060	1.4%
Pee Dee	\$189,865	\$-	\$-	\$189,865	0%
Catawba	\$141,639	\$-	\$-	\$141,639	0%
Santee	\$128,775	\$-	\$-	\$128,775	0%
Savannah	\$154,637	\$-	\$-	\$154,637	0%
Salkehatchie	\$128,775	\$-	\$-	\$128,775	0%
Total	\$1,258,611	\$26,805	\$108,126	\$1,150,485	8.6%

<sup>1</sup> Project startup-activities including the kickoff meeting, modeling plan, model enhancement and other activities were included under the Edisto Basin budget. The Edisto was originally identified as the pilot basin for modeling.





## CDM Smith Invoice Number 5

Invoice Date: January 26, 2015  
 For Services Between: December 14, 2014 and January 17, 2015

River Basin	Contract Amount	This Invoice	Total Invoiced	Amount Remaining	Percent Complete
Saluda	\$155,926	\$28,180	\$73,016	\$82,910	47%
Edisto <sup>1</sup>	\$226,034	\$16,820	\$78,210	\$147,824	35%
Broad	\$132,960	\$2,390	\$4,290	\$128,670	3.2%
Pee Dee	\$189,865	\$1,000	\$1,000	\$188,865	0%
Catawba	\$141,639	\$1,000	\$1,000	\$140,639	1%
Santee	\$128,775	\$1,000	\$1,000	\$127,775	1%
Savannah	\$154,637	\$1,000	\$1,000	\$153,637	1%
Salkehatchie	\$128,775	\$1,000	\$1,000	\$127,775	1%
<b>Total</b>	<b>\$1,258,611</b>	<b>\$52,390</b>	<b>\$160,516</b>	<b>\$1,098,095</b>	<b>12.8%</b>

<sup>1</sup> Project startup-activities including the kickoff meeting, modeling plan, model enhancement and other activities were included under the Edisto Basin budget. The Edisto was originally identified as the pilot basin for modeling.