



Surface Water Availability Assessment in South Carolina Legislative Quarterly Report, May 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 focused on the Saluda and Edisto basins. The Saluda model is scheduled to be completed by the end of June 2015, and the Edisto model by the end of August 2015. The Modeling Framework for the Saluda basin was finalized and posted on the DNR webpage. A draft Modeling Framework for the Edisto basin is currently under review.

Several draft Technical Memoranda and models of the historical agriculture irrigation withdrawal estimates for all eight basins were reviewed. A final memorandum and model was completed.

Clemson University was hired to lead a stakeholder engagement process for the project. Two stakeholder meetings per basin will be held. The first formal stakeholder meeting for the Saluda basin was held on April 21 in Greenville. The first stakeholder meeting for the Edisto basin is scheduled for June 18 in Blackville. A project website <http://www.scwatermodels.com> was created to keep stakeholders and the general public informed of project activities and meetings.

During the past quarter, DNR, DHEC, and CDM Smith presented project overviews and updates at the 74th Annual S.C. Conservation Partnership Conference in Columbia; the Fifth Interagency Conference on Research in the Watersheds Conference in North Charleston; the S.C. Rural Water Association Decision Makers Summit in Charleston; and the S.C. Environmental Conference in Myrtle Beach.



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 and meeting notes 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 provided below. Financial statements can be found at the end of this report.

South Carolina Surface Water Quantity Models Quarterly Progress Report No. 3

February 16, 2015 to May 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 third Quarterly Progress Report covers the three month period from February 16, 2015 to May 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 March 2nd, April 6th and May 4th, 2015
- Project submittals to date include:
 - Draft and Final Modeling Plan
 - Draft and Final UIF Methodology Technical Memorandum for the Saluda basin
 - Draft and Final Modeling Framework for the Saluda basin
 - Draft Modeling Framework for the Edisto basin
 - Draft and Final Technical Memoranda and model summarizing historical agriculture irrigation withdrawal estimates fall all basins
- A teleconference meeting was held with CDM Smith and DNR and DHEC Information Technology representatives to discuss various options for providing stakeholder access to the models, once completed. A hosted, “cloud based” approach was identified as the option of choice.

Data Collection

- CDM Smith finished contacting registered and permitted water users in the Saluda basin and continued 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. CDM Smith also began contacting water users in the Pee Dee basin and organizing existing data in the remaining basins.

- CDM Smith received additional, detailed climate and withdrawal data collected by Greenville Water.
- Estimates of surface water withdrawal amounts used for agriculture irrigation from 1950 through 2013 in all eight basins were refined based on feedback from DNR staff, and after conducting a model calibration exercise, using 2002 through 2013 reported irrigation withdrawals.

Data Analysis and Modeling

Saluda (Pilot Basin Model)

- A final SWAM model schematic and framework of the Saluda Basin was developed following DNR and DHEC review.
- CDM Smith began inputting water withdrawal, discharge, and operating data into the Saluda Basin model.
- Development of the unimpaired flow (UIF) dataset was initiated, using the streamflow, water withdrawal, discharge, and other data collected for the Saluda Basin. Example UIF calculations at reservoir nodes and stream nodes in the Saluda headwaters were provided to DNR and DHEC for review and to confirm methodology prior to continuing with UIF development throughout the basin. Based on DNR request, CDM Smith evaluated the use of two different methods (Hargreaves and Hamon) for calculating evaporation from reservoirs. Ultimately, it was determined that the initially chosen Hargreaves method was most appropriate.
- UIF calculations at the Table Rock and North Saluda Reservoir were also provided to Greenville Water, for their review. A teleconference was held with Greenville Water's Director of Water Resources to discuss the assumptions and methodology used in developing the reservoir UIFs.
- A one-day training session on the use of the SWAM model was provided to DNR and DHEC staff on April 23rd in CDM Smith's Columbia office.

Edisto

- Historical estimates of surface water withdrawals for agriculture irrigation were refined based on DNR comment through model calibration.
- A draft SWAM model schematic and framework of the Edisto Basin was developed and submitted for DNR and DHEC review.
- CDM Smith began preparing the UIF methodology report for the Edisto Basin and organizing the collected withdrawal and discharge data to facilitate development of the UIF dataset.

Broad

- Historical estimates of surface water withdrawals for agriculture irrigation were refined based on DNR input and through model calibration.
- CDM Smith began organizing the collected withdrawal and discharge data to facilitate development of the UIF dataset.

- A conference call was held with representatives of Duke Power and the consulting firm HDR to discuss the existing UIF dataset for the Broad River Basin. Because the existing UIF dataset focused only on the main stem of the Broad, and lumped the withdrawals and returns for nodes along the river, it was deemed to be inconsistent with the approved methodology that is being used to develop UIFs in the other basins. With DNR and DHEC approval, CDM Smith submitted an amendment request to develop a compatible UIF dataset for the Broad Basin.

Pee Dee

- Historical estimates of surface water withdrawals for agriculture irrigation were refined based on DNR input and through model calibration.

Catawba

- Historical estimates of surface water withdrawals for agriculture irrigation were refined based on DNR input and through model calibration.

Santee

- Historical estimates of surface water withdrawals for agriculture irrigation were refined based on DNR input and through model calibration.

Savannah

- Historical estimates of surface water withdrawals for agriculture irrigation were refined. 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 refined based on DNR input and through model calibration.

Stakeholder Involvement

- CDM continued contacting permitted and registered water users in the Edisto and Broad basins, and began contacting users in the Pee Dee Basin to confirm and collect pertinent information about their water withdrawals, discharges, hydropower or dam operations, and other pertinent data.
- A CDM Smith representative participated in a panel discussion on the Surface Water Availability Assessment at the South Carolina Rural Water Association Annual Meeting on February 27th.
- A CDM Smith representative gave a project update presentation at the South Carolina Environmental Conference on March 16th.
- Conference calls were held with DNR, DHEC and Clemson University on March 6th, 13th, 20th, and 27th to discuss and plan for stakeholder involvement and public outreach activities.

- The first of two planned Stakeholder Meetings in the Saluda Basin was held on April 21st at the Clemson University International Center for Automotive Research in Greenville.
- A CDM Smith representative participated in the taping of a project introductory video explaining the purpose of the Surface Water Availability Assessment. Clemson University produced the video for display on the project website.
- CDM Smith, DNR, and DHEC staff reviewed the proposed content and organization of a project website being developed by Clemson University.

Summary of Upcoming Work

Over the next quarter, the project team will:

- Completing data collection from permitted users in the Edisto, Broad, Pee Dee, and Catawba basins, and initiate data collection in the Santee, Salkehatchie and Savannah Basins.
- Finalize development of the UIF dataset for the Saluda Basin to the confluence of the Broad River.
- Complete development and calibration of the Saluda Model at least to the confluence of the Broad River. Completion of the Saluda Model to the terminus of the basin will depend on completion of the Broad River Basin UIF dataset, and approval of the associated amendment.
- Begin development of the Edisto and Broad UIF datasets. Once the Broad dataset is complete, the Saluda Basin UIF dataset will be completed to the terminus of the basin at Lake Marion.
- Finalize development of the Broad and Edisto basins model framework.
- Begin development of the Edisto and Broad basin models.
- Hold the first Stakeholder Meetings in the Edisto and Broad basins (in June and July, respectively). Tentatively, a second stakeholder meeting is planned for the Edisto Basin in August, pending completion of the complete UIF dataset and model to the terminus of the basin.

Issues Impacting Scope, Schedule, or Project Cost

Data collection from permitted users in each basin has taken longer than expected, which may delay development of the UIF datasets. Additionally, the decision was made to develop a Broad River Basin UIF dataset, rather than attempt to use the existing, incomplete dataset. An amendment has been submitted for approval. As of May 15th, the amendment has not yet been approved by the Budget and Control Board. 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.



CDM Smith Invoice Number 6

Invoice Date: February 25, 2015
 For Services Between: January 18, 2015 and February 14, 2015

River Basin	Contract Amount	This Invoice	Total Invoiced	Amount Remaining	Percent Complete
Saluda	\$155,926	\$29,300	\$102,316	\$53,610	66%
Edisto ¹	\$226,034	\$6,120	\$84,330	\$141,704	37%
Broad	\$132,960	\$5,820	\$10,110	\$122,850	7.6%
Pee Dee	\$189,865	\$-	\$1,000	\$188,865	1%
Catawba	\$141,639	\$-	\$1,000	\$140,639	1%
Santee	\$128,775	\$-	\$1,000	\$127,775	1%
Savannah	\$154,637	\$-	\$1,000	\$153,637	1%
Salkehatchie	\$128,775	\$-	\$1,000	\$127,775	1%
Total	\$1,258,611	\$41,240	\$201,756	\$1,056,855	16.0%

¹ 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 7

Invoice Date: March 24, 2015
 For Services Between: February 15, 2015 and March 14, 2015

River Basin	Contract Amount	This Invoice	Total Invoiced	Amount Remaining	Percent Complete
Saluda	\$155,926	\$15,434	\$117,750	\$38,176	76%
Edisto ¹	\$226,034	\$43,730	\$128,060	\$97,974	57%
Broad	\$132,960	\$5,495	\$15,605	\$117,355	12%
Pee Dee	\$189,865	\$-	\$1,000	\$188,865	1%
Catawba	\$141,639	\$-	\$1,000	\$140,639	1%
Santee	\$128,775	\$-	\$1,000	\$127,775	1%
Savannah	\$154,637	\$-	\$1,000	\$153,637	1%
Salkehatchie	\$128,775	\$-	\$1,000	\$127,775	1%
Total	\$1,258,611	\$64,659	\$266,415	\$992,196	21.2%

¹ 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 8

Invoice Date: April 30, 2015
 For Services Between: March 15, 2015 and April 18, 2015

River Basin	Contract Amount	This Invoice	Total Invoiced	Amount Remaining	Percent Complete
Saluda	\$155,926	\$25,240	\$142,990	\$12,936	92%
Edisto ¹	\$226,034	\$25,050	\$153,110	\$72,924	68%
Broad	\$132,960	\$11,590	\$27,195	\$105,765	20%
Pee Dee	\$189,865	\$9,750	\$10,750	\$179,115	6%
Catawba	\$141,639	\$900	\$1,900	\$139,739	1%
Santee	\$128,775	\$850	\$1,850	\$126,925	1%
Savannah	\$154,637	\$850	\$1,850	\$152,787	1%
Salkehatchie	\$128,775	\$900	\$1,900	\$126,875	1%
Total	\$1,258,611	\$75,130	\$341,545	\$917,066	27.1%

¹ 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.