South Carolina Surface Water Quantity Models
Monthly Summary

Invoice Date:	March 4, 2016
For Services Between:	February 1, 2016 and March 4, 2016
Invoice No.:	18

Summary of Work Completed During Invoice Period

Project Management and Related Tasks

- Continued internal project coordination and management tasks, including:
  - Weekly project team meetings
  - Monthly project meeting by teleconference

Data Collection

- Data collection most river basins is substantially complete; however additional follow-up calls are being made as the data is analyzed and incorporated and used for unimpaired flow (UIF) development and model development. Some additional data collection and/or clarification of data that occurred over the previous month included:
  - CDM Smith worked with SCE&G to clarify and correct previously submitted hydropower data associated with the Fairfield Pumped Storage (FFPS) Facility in the Broad Basin. Corrections were made to data for the period 2008–2015. SCE&G resubmitted the data to DHEC and CDM Smith.
  - SCE&G provided monthly pumping data reflecting the amount pumped from Parr Reservoir to Monticello Reservoir from 2006–2015 for the FFPS facility.
  - SCE&G provided hourly water levels for Lake Monticello, for the period 2002–2015.

Data Analysis and Modeling

Saluda

- CDM Smith performed a verification exercise focusing on Lake Murray. Historical releases from the lake were held constant in order to verify that inflow, evaporation, and local withdrawals/ discharges were appropriate. As a result of the exercise, CDM Smith has made several minor adjustments to inflow (by way of adjustments to headwater UIFs) and evaporation. The calibration and baseline models will be updated accordingly.

Edisto

- CDM Smith performed a verification exercise focusing on the South Fork Edisto River over the period 1940–1966, when streamflow gage data was available at the USGS gage at Montmorenci. The results of the exercise were presented to DNR, and CDM Smith and DNR are evaluating whether a slight adjustment in the South Fork Edisto reach gain is warranted.

Broad

- Based on comments from DNR, CDM Smith made several minor revisions to UIFs for the Enoree, Tyger and Pacolet Rivers. Extensions of these UIFs were then performed.
- CDM Smith continued working on development of UIFs on the Broad mainstem.
- Based on new data received from SCE&G, CDM Smith developed a water balance of the Parr Reservoir and Monticello Reservoir, to aid in UIF development.

Pee Dee

- Pee Dee Basin UIFs were completed and submitted for the Lynches River, Black River, and Black Creek. DNR competed their review of these unextended UIFs, and indicated their concurrence.
- Development of the remaining (unextended) UIFs was completed for the Great Pee Dee and Little Pee Dee Rivers.

Catawba-Wateree

- Work continued on the UIF Methodology Memorandum and development of the tributary UIFs.

Santee

- The draft model framework memorandum was updated based on comments received from Santee Cooper and the TAC.

Savannah

- No additional work was conducted.

Salkehatchie

- CDM Smith began working on the draft model framework and memorandum.

Stakeholder Involvement

- The first stakeholder meeting in the Santee was held on March 2 at Santee Cooper's office in Moncks Corner.
- A list of abbreviations and definitions for commonly used terms was developed and provided as a handout at the Santee stakeholder meeting.
- On February 4, CDM Smith and DNR to give a presentation to the SC Chamber of Commerce Environmental Technical Committee, at the request of the TAC.

Summary of Upcoming Work

Over the next month, the project team will:

- Submit the final Edisto UIF dataset and Results Memorandum (*pending review of the additional verification exercise by DNR, and acceptance of the headwater UIFs*).
- Update the draft Edisto Modeling Report, based on the final, calibrated model (*pending review of the additional verification exercise by DNR, and acceptance of the headwater UIFs*).
- Submit a draft of the complete (and extended) Broad UIF dataset. Once the final Broad dataset is complete, the Saluda Basin UIF dataset will be completed to the confluence of the Wateree River.
- Submit a draft of the complete (and extended) Pee Dee UIF dataset.

Issues Impacting Scope, Schedule, or Project Cost

In late 2015, discussions were held between CDM Smith and DNR regarding how reservoir operating rules are incorporated in SWAM. DNR indicated the preference for additional flexibility in SWAM to allow the user to evaluate more complex alternative management rules. It was noted that when more complex rules (such as the Lake Murray Striped Basin release rules) were included in SWAM as "prescribed rules", user-initiated adjustments to test variations of the rule were not easily performed. CDM Smith prepared and submitted a summary of proposed model enhancements that will allow for increased flexibility with regard to reservoir operating rules. This additional work will result in a minor increase in scope and project cost. Note that, based on DNR approval, CDM Smith has been working on these enhancements, and is currently in a testing mode; however, the work associated with these enhancements is not yet reflected in the invoiced amount or the project upper limit, pending receipt of the approved change order.

Schedule adjustments were made to reflect the project progress and more accurately account for future deliverables. It is currently anticipated that due to delays in completion of the pilot model, the project schedule will need to be extended approximately six months, to the end of 2016. 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 has presented a scope for implementing these enhancements to DNR and DHEC. The decision on whether to implement one or more of these enhancements will likely be made once the additional models are completed.

South Carolina Surface Water Quantity Assessment

Schedule

Updated Jaunary 5, 2016

Basin and Milestone	2016 Jan 4-Jan	11-Jan	18-Jan	25-Jan	Feb 1-Feb	8-Feb	15-Feb	22-Feb	29-Feb	Mar 7-Mar	14-Mar	21-Mar	28-Mar	Apr 4-Apr	11-Apr	18-Apr	25-Apr	May 2-May	9-May	16-May	23-May	30-May	June 6-Jun	13-Jun	20-Jun	27-Jun	Jul 4-Jul	11-Jul	18-Jul	25-Jul	Aug 1-Aug	8-Aug	15-Aug	22-Aug	29-Aug	Sep 5-Sep	12-Sep	19-Sep	26-Sep	Oct 3-Oct	10-Oct	17-Oct	24-Oct	31-Oct	Nov 7-Nov	14-Nov	21-Nov	28-Nov	Dec 5-Dec	12-Dec	19-Dec	26-Dec
Broad																																																					
Model Framework																																																					
1st Meeting																																																			
UIF Dataset							D				F																																								
Calibrated Model													D							F																																
2nd Meeting & Training																	2											T																										
Pee Dee																																																				
Model Framework																																																					
1st Meeting																																																			
UIF Dataset									D				F																																						
Calibrated Model															D					F																																
2nd Meeting & Training																	2											T																										
Catawba-Wateree																																																				
Model Framework																																																					
1st Meeting																																																			
UIF Dataset																D					F																															
Calibrated Model																								D																												
2nd Meeting & Training																												2					F																				
Santee																																																				
Model Framework				D			F																																												
1st Meeting									1																																										
UIF Dataset																							D					F																							
Calibrated Model																																			D																
2nd Meeting & Training																																					2														
Savannah																						D				F																										
Model Framework																												1																								
1st Meeting																																	D					F												
UIF Dataset																																											D								
Calibrated Model																																															F				
2nd Meeting & Training																																																			
Salkehatchie																						D				F																										
Model Framework																												1																								
1st Meeting																																	D					F												
UIF Dataset																																											D								
Calibrated Model																																															F				
2nd Meeting & Training																																																			

1 = First Meeting
2 = 2nd Meeting
D = Draft Comlpetion Date
F = Final Completion Date
T = Training

2016 Proposed Stakeholder Meeting Schedule

Basin	1st Meeting Week of:	2nd Meeting Week of:
Saluda	*completed*	*completed*
Edisto	*completed*	*completed*
Broad	*completed*	25-Apr-16
Pee Dee	*completed*	25-Apr-16
Catawba-Water.	*completed*	11-Jul-16
Santee	*completed*	29-Aug-16
Savannah	25-Jul-16	14-Nov-16
Salkehatchie	25-Jul-16	14-Nov-16