

**Status Report**  
**Modeling Technical Review Group (MTRG)**  
**Savannah Harbor Expansion Project**  
**March 1, 2002**

A meeting was held on Friday, March 1, 2002 in Atlanta, GA at the EPA Conference Center, 3<sup>rd</sup> Floor. The goals of the meeting were as follows:

- Present updated Hydrodynamic and Salinity Calibration
- Discuss the transfer function for use with the Salinity Model output
- Present Characteristics of Dissolved Oxygen in the Savannah River

The following persons attended the meeting and participated in the MTRG discussions:

Roy Burke III	GAEPD	404-675-1665	roy_burke@mail.dnr.state.ga.us
Larry Neal	Harbor Committee	770-499-6791	lneal@lawco.com
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Bob Scanlon	City of Savannah	912-644-7778	bscanlon@ci.savannah.ga.us
Paul Conrads	USGS	803-750-6140	pconrads@usgs.gov
William Bailey	USACE	912-652-5781	william.g.bailey@sas02.army.mil
Daniel Mendelsohn	ASATM	401-789-6224	dmendelsohn@appsci.com
Wade Cantrell	SCDHEC	803-898-3548	cantrewm@columb32.dhec.state.sc.us
Sung-Chan Kim	WES	601-634-3703	sung-chan.kim@erdc.usace.army.mil
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Bo Ellis	ATM	843-884-8750	boellis@worldnet.att.net
Matt Goodrich	ATM	843-884-8750	mgoodrich@appliedtm.com
Chris Ahern	ATM	843-884-8750	cahern@appliedtm.com

**Presentation of Status of Hydrodynamic and Salinity Model Calibration**

Danny Mendelsohn presented the latest calibration run (BC9) results to the MTRG using a PowerPoint presentation. The presentation is included as Attachment A of this Status Report.

Calibration run performance was evaluated by model output (simulated) to measured data comparison and statistics. Specifically, the calibration periods suggested by the MTRG and SMART were evaluated for model performance. Comparisons between the current and previous calibration statistics were also presented to show the progress of the calibration process to date. The MTRG also discussed how the model performance compares to the goals set forth in the Federal Expectations Document. Danny Mendelsohn discussed his general approach to the current calibration run. He explained model sensitivity to changes made and observations on model characteristics.

The following are specific presentation and MTRG discussion notes:

### A. Salinity Calibration

Model output (simulated) vs. measured salinity data were plotted together to demonstrate that the model is capturing the general trends in the measured data. Generally salinity statistics in the Front River improved from the calibration run presented in the March 2001 Calibration Report (R2\_bar). Simulated salinity on the Little Back River (GPA-15) and Back River (GPA-7 and GPA-5) were improved and captured overall trends. Danny Mendelsohn explained that the current calibration is capturing more of the higher salinity events above Houlihan Bridge (improvement in the 90<sup>th</sup> percentile predictions), but will not be able to replicate all of the brief peak salinity spikes seen in the data.

### B. Water Surface Elevation (WSE) Calibration

WSE statistics showed an improvement in performance statistics in the Front, Middle and Little Back Rivers. The WSE model predictions were not quite as good as the predictions presented at previous MTRG meeting, Nov 2001, where salinity was not an issue. Danny explained that there was a balance necessary between improved prediction of WSE and salinity. The time series plots and the statistics did show improvement over the Draft Calibration report predictions.

### C. Temperature Calibration

Temperature output for the current calibration was shown to be meeting the Federal Expectations Document, within one degree Celsius, throughout the river. The simulated water temperature statistics indicated that the model predicted temperatures were too warm, particularly in the portions of the river upstream of I-95. In the March 2001 Calibration Report Runs, the temperature of the water coming into the Lower River (estuarine) portion of the system from upstream of I-95 Bridge was too warm. It was postulated therefore, that the water temperature was warming too quickly between Clio, the upstream boundary, and I-95 Bridge. Downriver of I-95 Bridge and basically, the closer the station to the open boundary outside of Ft Pulaski the more representative the water temperature statistics and trends were.

Danny explained that he corrected the overheating problem upstream of I\_95 Bridge by adding a parameterized shading term to the solar radiation reaching the water surface. The shading was included because of the high tree cover on either side of the relatively narrow river shores whereas the areas downstream of I-95 Bridge have little shading or tree cover. The shading term was implemented only in the reach between Clio (RM 63) and I-95 Bridge (RM 27.7) since that is where the river narrows and more trees line the shores. Chris Ahern presented pictures of the River in each reach to demonstrate the reasoning for including a shading term.

Roy Burke suggested that adjustment of the shading term only, may be too simplistic to represent the actual processes affecting temperatures in the river between Clio and I-95 Bridge. He and Danny discussed the use of shading in other modeling applications and the reasoning for employing it in this calibration. Danny pointed out that with the shading included, the temperature coming into the system at I-95 Bridge was correct and enabled the down river section of the temperature model, between RM 27.2 and 0, to perform correctly. The MTRG agreed that the use of the shading term in this section of the river would be a reasonable method to improve the calibration.

### **Presentation of Transfer Function**

Matt Goodrich presented an initial calibration of the salinity transfer function being developed to represent the brief duration salinity spikes in the summer 1999 data. The PowerPoint presentation of the Transfer Function is shown in Attachment B of this status report. Matt explained how a finite difference model (such as WQMAP) tends to smooth simulated salinity and how the transfer function would work to represent the salinity spikes.

Matt presented an initial application of the Transfer Function based on the r2\_bar simulated salinity and 1999 measured data. The application of the transfer function to the earlier calibration successfully reproduced the brief salinity spikes as well as the trends in the 1999 data. The same comparison was performed on the 1997 salinity simulation and the 1997 data. Similar to the 1999 application, the 1997 data was accurately reproduced using the transfer function.

### **Characteristics of Dissolved Oxygen in the Lower Savannah River Estuary**

Chris Ahern presented the general characteristics of the Lower Savannah River Estuary which ultimately affects In-stream DO concentrations. The 5 characteristics affecting DO in the Estuary are as follows: 1) Temperature, 2) Freshwater Flow at Clyn, 3) Tidal Amplitude (Spring/Neap), 4) Marsh Point and Point Source Loadings and 5) Primary Productivity. The presentation included plots of 24 hour averaged DO data from the 1999 data collection and demonstrated trends in the data which correlated to the five characteristics presented above. The PowerPoint presentation is included as Attachment C in this status report.

The purpose of this presentation was to gain feedback from the MTRG for the overall objectives of the application of the DO model to account for the characteristics of the Estuary. This presentation to discuss the trends in the data will be continued at the next MTRG meeting. Any feedback from MTRG after the review of the presentation can be addressed after reviewing the initial DO calibration results.

Larry Neal electronically submitted a memo to the MTRG titled "Comments on the November 5, 2001 Draft of the Savannah Harbor Data Analysis and Modeling Expectations of Federal Agencies". Larry was offered a chance to further clarify the points raised in his memo to the MTRG for discussion before the presentation. He briefly described the content and purpose of his memo. The memo, dated January 24, 2002 is included as Attachment D of this status report. The memo provided comment on four specific issues addressed in the Federal Expectations Memo and suggested that the MTRG review these topics. The presentation on the DO characteristics (shown in Attachment C) addressed several of the points in the memo, and there was no discussion of the memo after the presentation.

### **Distribution of an Acceptance Package to the MTRG**

Danny Mendelsohn and ATM will distribute an Acceptance Package to the MTRG by the first week of April. The package will contain a presentation of the status of the latest calibration run and the goals of the Federal Expectations Memo. In cases where the Federal Expectations are not satisfied for Salinity, WSE and Hydrodynamics, limited discussion will be provided. Specifically, discussion will include how post-processing (ie transfer functions) will be used to meet the Federal Expectations Memo. This acceptance package will contain a series of plots and will not include detailed

information on model formulation as in the Calibration Report. Electronic pdf versions of the Acceptance Package will be placed on the MTRG website maintained by ATM. An electronic message will advertise the MTRG that the Acceptance Package is available at the MTRG website, [www.applietm.com/gpa](http://www.applietm.com/gpa).

### **Future Activity**

Comments and questions related to this Status Report should be directed to Chris Ahern of ATM ([cahern@appliedtm.com](mailto:cahern@appliedtm.com)). The next MTRG meeting will be in Atlanta GA on Tuesday April 30<sup>th</sup> from 10 AM to 3 PM.

Please contact Chris Ahern if you have any comments or recommendations for the next meeting.