2.0 MODELS USED FOR RESOURCE ASSESSMENT

The following section briefly describes the models that were used for the Assimilative Capacity Resource Assessment along with a summary of how the models were calibrated. For a more detailed description of the model methodology and modeling assumptions, refer to Appendix A.

2.1 GA Dosag

Georgia Dosag is a steady-state, one-dimensional Streeter-Phelps model originally developed in 1976 by EPD in cooperation with the Georgia District of the U.S. Geological Survey. The primary purpose of the model is to predict dissolved oxygen (DO) concentrations in a branching river system, taking into account carbonaceous and nitrogenous biochemical oxygen demand (BOD) contributions from headwater inflow, tributary inflows, lateral inflows, benthic demand, and multiple wastewater discharges.

2.2 GaEst

Georgia Estuary (GaEst) was developed for EPD to compute the dissolved oxygen sag curve in the vicinity of waste discharge points in Georgia estuaries. GaEst is a modified steady-state, branching, one-dimensional, tidally-averaged model for coastal waters that is a management tool used to predict water quality under various present and future conditions. It is one of the tools that EPD uses in conducting estuary analyses in order to determine the available assimilative capacity and total maximum daily load that can be placed on the estuary's resources by wastewater dischargers and non-point sources.

2.3 LSPC

The Loading Simulation Program C++ (LSPC) is a comprehensive data management and modeling system that is capable of representing loading, both flow and water quality, from non-point and point sources, and simulating in-stream processes. It is capable of simulating flow, sediment, metals, nutrients, pesticides, and other conventional pollutants, as well as temperature and pH for pervious and impervious lands and waterbodies. LSPC was used to represent the hydrological and water quality conditions in the watersheds and was configured to simulate the watershed as a series of hydrologically connected sub-watersheds.

2.4 EFDC

The Environmental Fluid Dynamics Code (EFDC) is a hydrodynamic and water quality modeling package for simulating one-dimensional, two-dimensional, and three-dimensional flow and transport in surface water systems including: rivers, lakes, estuaries, reservoirs, wetlands, and nearshore to shelf scale coastal regions. The EFDC model was originally developed for estuarine and coastal applications and is considered public domain software. The three-dimensional hydrodynamics and water quality of lakes and estuaries were modeled using EFDC.

2.5 Model Calibration and Validation

Each model went through a rigorous calibration and validation process. Calibration of each of the models was performed by adjusting model parameters, within reasonable constraints, until an acceptable agreement was achieved between simulated and measured flow and water quality data. The model parameters were adjusted based on local knowledge, previous experience, literature data, and best professional judgment. Model validation is the process of taking the model parameters that have been calibrated, applying those parameters to other areas or time periods, and comparing the simulated and measured flow and water quality data. Model validation is sometimes called model verification, as essentially you are validating or verifying that model parameters calibrated in one model will produce acceptable results in another model. The measured data used in the calibration and validation process were collected from various sources including but not limited to USGS flow gages, GAEPD water quality sampling stations (both stream, river and lake), and local watershed studies.

2.6 Model Calibration Reports

The following reports present the detailed calibration and validation of the various models that were developed and used for the Assimilative Capacity Resource Assessment.

- *GA Dosag Modeling Report, January 31, 2010*
- *Watershed Hydrology and Water Quality Modeling Report for the Upper Oconee Watershed, Georgia – REV1, November 30, 2009*
- *Watershed Hydrology and Water Quality Modeling Report for the Upper Ocmulgee Watershed, Georgia – REV1, November 30, 2009*
- *Watershed Hydrology and Water Quality Modeling Report for the Coosa Watershed, Georgia – REV1, November 30, 2009*
- *Watershed Hydrology and Water Quality Modeling Report for the Lower Savannah Watershed, Georgia – REV1, November 30, 2009*
- *Watershed Hydrology and Water Quality Modeling Report for the Brunswick-Satilla Watershed, Georgia – REV1, November 30, 2009*
- *Watershed Hydrology and Water Quality Modeling Report for the Lake Allatoona Watershed, Georgia – REV5, November 30, 2009*
- *Hydrodynamic and Water Quality Modeling Report for Lake Jackson, Georgia – REV0, November 30, 2009*
- *Hydrodynamic and Water Quality Modeling Report for Lake Oconee and Lake Sinclair, Georgia – REV0, November 30, 2009*
- *Hydrodynamic and Water Quality Modeling Report for Brunswick Harbor, Georgia – REV0, November 30, 2009*
- *Hydrodynamic and Water Quality Modeling Report for Lake Allatoona, Georgia – REV2, November 30, 2009*