

## **Comparison of the South Florida Water Management Model (SFWMM) with a Simple Refuge Stage Model (SRSM) for the A.R.M. Loxahatchee National Wildlife Refuge**

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There can be utility in having a suite of alternative models available for research and management applications. Model credibility is improved when alternative models are in substantial agreement; model limitations and deficiencies can be highlighted when differences in model projections are identified. The latter is valuable both for identifying where to focus additional resources in model refinement and for articulating model limitations. The Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) overlays Water Conservation Area 1 (WCA-1) in the Florida Everglades. This presentation compares modeling results from two models projecting WCA-1 water stage – the South Florida Water Management Model (SFWMM) and the Simple Refuge Stage Model (SRSM) when simulating similar inflow and climatological conditions.

The South Florida Water Management District (SFWMD) developed the SFWMM for assessing water management options and to support water management decisions. The SFWMM projects water stages and flows over an area from Lake Okeechobee to Florida Bay using a 2-mile by 2-mile square grid of cells that are linked by water flow from overland, groundwater, and canal interconnections. Within the SFWMM domain, WCA-1 is represented by 57 grid cells and one canal element. When simulating alternative scenarios, outflows from WCA-1 are determined in the SFWMM primarily by simulated water supply withdrawals and regulatory releases consistent with the WCA-1 Water Regulation Schedule.

The SRSM simulates stage in WCA-1 by integrating water budget terms for a single canal cell, and a single marsh cell. Marsh stages were calibrated to represent the average of the 1-7 and 1-9 gages in WCA-1. Inflows to the canal are imposed as a boundary time series. Rain and evapotranspiration similarly are represented by time series. Outflow may be optionally calculated from a relationship based on the Water Regulation Schedule, plus an imposed time series of actual water supply discharges. Groundwater outflow from both the canal and marsh also are calculated from simulated water stage. The SRSM currently is implemented using the Berkeley Madonna simulation program, which can, depending on integration algorithm selected, run multi-decadal SRSM simulations in under a second.

A SFWMM scenario run, ECPBASE, was used to compare results between modeling programs. This scenario simulates the water control structures and management controls anticipated to be in place in 2010. Climatic data for a 36-year period from 1965 through 2000 are applied in this scenario. The current WCA-1 Water Regulation Schedule is assumed to apply throughout the simulation. Input and results of the ECPBASE run of the SFWMM are available publicly, and were provided by the SFWMD to our modeling team. An analogous SRSM simulation was performed based on the ECPBASE SFWMM model run.