



## **Forecasting in an integrated surface water-ground water system: The Big Cypress Basin, South Florida**

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The South Florida Water Management District (SFWMD) manages and protects the state's water resources on behalf of 7.5 million South Floridians and is the lead agency in restoring America's Everglades – the largest environmental restoration project in US history. Many of the projects to restore and protect the Everglades ecosystem are part of the Comprehensive Everglades Restoration Plan (CERP). The region has a unique hydrological regime, with close connection between surface water and groundwater, and a complex managed drainage network with many structures. Added to the physical complexity are the conflicting needs of the ecosystem for protection and restoration, versus the substantial urban development with the accompanying water supply, water quality and flood control issues.

In this paper a novel forecasting and real-time modelling system is presented for the Big Cypress Basin. The Big Cypress Basin includes 272 km of primary canals and 46 water control structures throughout the area that provide limited levels of flood protection, as well as water supply and environmental quality management. This system is linked to the South Florida Water Management District's extensive real-time (SCADA) data monitoring and collection system. Novel aspects of this system include the use of a fully distributed and integrated modeling approach and a new filter-based updating approach for accurately forecasting river levels. Because of the interaction between surface- and groundwater a fully integrated forecast modeling approach is required. Indeed, results for the Tropical Storm Fay in 2008, the groundwater levels show an extremely rapid response to heavy rainfall. Analysis of this storm also shows that updating levels in the river system can have a direct impact on groundwater levels.