Lago, Marcelo; Burger, Patrick; Sun, Qing

Integrated Groundwater/Surface Water Model to Evaluate Water Level of Wetland Hydroperiods and Water Depths at the Tiger Bay/Bennett Swamp Area

INTEGRATED GROUNDWATER/SURFACE WATER MODEL TO EVALUATE WATER LEVEL OF WETLAND HYDROPERIODS AND WATER DEPTHS AT THE TIGER BAY/BENNETT SWAMP AREA

Marcelo Lago[1], Patrick Burger[2], and Qing Sun[3]

The St. Johns River Water Management District (SJRWMD) is interested on evaluating surface and groundwater resources comprehensively in order to meet water supply demand without having potential adverse impacts on groundwater levels, wetlands, and other natural resources. As part of this effort, SJRWMD has been aided by numerical modeling tools to assess the impacts of surface water alterations and groundwater withdrawals at the Tiger Bay/Bennett Swamp (TBBS) area. In this work, the development of an integrated groundwater / surface water model using MIKE SHE/MIKE 11 is presented. The results from this here referred as TBBS Model are used to evaluate the water level change with time from groundwater pumping on aquifer and channelization on surface water.

As a first step in the model development process, a regional MIKE SHE model is updated and calibrated with water supply, landuse and survey data, and distributed rainfall and ET from NEXRAD meteorological data. Then, a telescoped model with higher spatial resolution incorporates more details around area of interest, and its results are used to generate annual hydroperiod maps, as well as, maps of average water depth during the hydroperiod.

Scenario analysis evaluation on pumping and canals is conducted to understand the effects of groundwater pumping and surface water channelization on wetland water depth. A set of simulations with various proposed water resources alternatives and addition of the Tiger Bay Canal and other selected canals determine the extent of the hydroperiod and water depth changes. These scenario simulations from the integrated model can be used to assist on water supply plan such as to limit the groundwater withdrawals or to offset the predicted negative environmental impacts associated with increased withdrawals, and therefore to identify water management strategies capable of recharging the surficial aquifer and rehydrating wetland systems.

[1] Senior Scientist, DHI, 100 Second Ave. South, Suite 302 North, Saint Petersburg, FL 33701, USA (mla@dhigroup.com)
[2] Supervising Hydrologist, Groundwater Sciences, SJRWMD, 4049 Reid Street, Palatka, FL 32177, USA (pburger@sjrwmd.com)
[3] Hydrologist PG/PE, Groundwater Sciences, SJRWMD, 4049 Reid Street, Palatka, FL 32177, USA (qsun@sjrwmd.com)