A Hydrodynamic Waster/Groundwater Salinity Transport Model for Biscayne Bay and the Southeastern Everglades Restoration

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Two regional hydrologic models, the Biscayne Southeastern Coastal Transport (BISECT) model of southern Florida and the Regional Simulation Model Glades-LECSA (RSMGL), are being used to test the effects of proposed water-management changes for the Biscayne Bay and Southeastern Everglades Ecosystem Restoration (BBSEER) project. The U.S. Geological Survey developed BISECT, which simulates coupled hydrodynamic surface-water/groundwater model with salinity transport. The RSMGL is a water-management model created by the South Florida Water Management District that extends further inland than the BISECT model and is used to test various water management scenarios, including changes in control-structure operations and other potential restoration actions. The RSMGL provided simulated boundary conditions to BISECT to evaluate shallow groundwater salinity for BBSEER.

Periodic porewater salinity measurements provided by an Institute of Environment study at Florida International University were used to improve the calibration of BISECT. Recalibration of the model resulted in increased near-shore evapotranspiration, lower dispersion, and increased surface-water leakage, compared to the previously calibrated model.

Canal stages for various restoration scenarios simulated by RSMGL were input to BISECT to simulate changes in coastal salinity. BISECT results were communicated to restoration managers through performance measures, which use the magnitude and duration of simulated pore-water salinities to evaluate restoration scenarios. This evaluation provides a clearly defined rating of restoration effects that managers can use for decision-making.

The BISECT simulation period, originally 2005-2017, is being extended to the year 2022 to provide a larger range of climatic variations for evaluation. This change would also allow for more recent field measurements of salinity to be applied for further calibration and reduction of the uncertainty in the resulting restoration evaluations.

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