

Numerical Simulation of Saltwater Intrusion in Response to Sea-Level Rise

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Numerical modeling of variable-density groundwater flow is a scientifically accepted method for predicting the extent and rate of saltwater intrusion in response to hydrologic stresses, such as sea-level rise. The U.S. Geological Survey distributes the SEAWAT-2000 numerical modeling program—a combined version of MODFLOW-2000 and MT3DMS designed to simulate variable-density groundwater flow and solute transport. The present version of SEAWAT-2000 simulates transient, fully saturated, isothermal, groundwater flow and transport in two or three dimensions. SEAWAT-2000 is used extensively in southern Florida to simulate the rate and extent of saltwater intrusion in response to water management practices and natural hydrologic processes. The procedure for using SEAWAT-2000 to simulate the effects of sea-level rise on a coastal aquifer is presented, and examples from Florida are described. A SEAWAT-2000 simulation of sea-level rise suggests that the saltwater interface may contaminate many of the coastal wellfields in Broward County during the next hundred years. SEAWAT-2000 is a robust computer program that has applicability to many of the coastal aquifers experiencing saltwater intrusion in response to sea-level rise.