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Abstract

The Texas Water Development Board is constructing a 3-D finite-difference groundwater flow model for the Gulf Coast aquifer in South Texas using MODFLOW and MT3D codes to assess the availability of fresh and brackish water. The Chicot, Evangeline, and Jasper aquifers and the Burkeville Confining System comprise the four layers of the model. All four layers in the model thicken considerably (total thickness of up to 12,000 feet) downdip towards the Gulf of Mexico. Model layers were developed using pre-published information and additional data acquired from geophysical logs. There has been little historical change in water levels over most of the model area. Groundwater flows west to east from the outcrop areas towards the Gulf of Mexico. Recharge is mainly from rainfall in the outcrop areas, canal losses and return flow in the irrigated areas, and the Rio Grande in the south. Rainfall decreases from east (26 in/yr) to west (19 in/yr). Groundwater pumping was about 17,000 ac-ft/yr in 1980 and nearly doubles by 1999. Part of the model area has mesquite with deep root systems capable of extracting significant quantities of water by evapo-transpiration (ET). ET rates for mesquite can potentially be as much as 95 percent of the rainfall depending on the depth of the water table, density and age of the stands. Initial model runs indicate that recharge is about 2 to 3 percent of rainfall. Brackish water for desalination constitutes a significant portion of the groundwater available for future use.