



Groundwater Availability Modeling

Groundwater, along with surface water, is important for maintaining the viability of the state's natural resources, health, and economic development. The projected 70 percent increase of the state's population by the year 2070, coupled with the constant threat of drought, makes it imperative that Texas develop effective plans to meet future water needs. Effective planning, however, requires accurate assessments of the availability of water, and accessing the availability of groundwater is often much more difficult than assessing that of surface water. Surface water is easily observed at the land surface, and the response of rivers and lakes to rainfall can be repeatedly measured over time. Groundwater is more difficult to observe and measure because it resides below the land surface and responds to rainfall much more slowly than rivers and lakes do. Aquifer systems are complex due to flows into and out of the aquifer, the interaction between surface water and groundwater, and the uncertainty of aquifer properties.

Because of this complexity, computer models are excellent tools for assessing the effect of groundwater use on groundwater availability. Groundwater availability modeling is the process of developing and using computer programs to estimate future trends in the amount of water available in an aquifer and is based on hydrogeologic principles, actual aquifer measurements, and guidance from persons with interest in the models and the program.

What is the goal of the program?

Recognizing the importance of accurate groundwater availability estimates, the 76th Texas Legislature approved initial funding for the Groundwater Availability Modeling Program. The program's goal is to provide useful and timely information for determining groundwater availability for the citizens of Texas. The Groundwater Availability Modeling Program produces standardized, thoroughly documented, and publicly available groundwater models. These models are important tools for groundwater conservation districts and regional water planning groups in evaluating water management strategies and assessing present and future groundwater availability trends under normal and drought conditions.

Are other groups involved in the program?

Stakeholder involvement is critical to the success of the program. The Texas Water Development Board (TWDB) relies on stakeholders

participating in stakeholder advisory forums to voice concerns and provide information. Stakeholder input ensures the models address the important water resource issues for each aquifer represented in the models. The forums typically consist of representatives from groundwater conservation districts, regional water planning groups, the Texas Commission on Environmental Quality, the Texas Department of Agriculture, the Texas Parks and Wildlife Department, industry, water utilities, higher education, agriculture, and private landowners.

What information does a groundwater availability model include?

Groundwater availability models include comprehensive information on each aquifer, such as recharge (amount of water entering the aquifer); geology and how that conveys into the framework of the model; rivers, lakes, and springs; water levels; aquifer properties; and pumping. Each model is calibrated to ensure that the models can reasonably reproduce past water levels and groundwater flows.

How many models have been developed for the major aquifers?

The nine major aquifers in Texas currently require 16 different models to provide full coverage. The TWDB developed four of the models: (1) the Hill Country segment of the Trinity Aquifer, (2) the northern segment of the Edwards Aquifer, (3) the southern part of the Gulf Coast Aquifer, and (4) the Edwards-Trinity (Plateau) and Pecos Valley aquifers. TWDB contractors have developed seven of the current models: (5) the High Plains Aquifer System (originally two models: the northern and southern parts of the Ogallala Aquifer); the (6) northern, (7) central, and (8) southern parts of the Carrizo-Wilcox Aquifer; (9) the Seymour Aquifer; and (10) the Barton Springs segment of the Edwards Aquifer. Groundwater conservation districts in Groundwater Management 8 funded the update of (11) the northern segment of the Trinity Aquifer (originally developed by a TWDB-contractor team). The TWDB and a contractor developed a model of (12) the central Gulf Coast Aquifer. The Lone Star Groundwater Conservation District and the Harris-Galveston and Fort Bend Subsidence Districts funded a project for the U.S. Geological Survey to update the original model of (13) the northern part of the Gulf Coast Aquifer. The U.S. Geological Survey in cooperation with the U.S. Department of Defense and the Edwards Aquifer Authority developed a model for (14) the San Antonio segment of

the Edwards Aquifer. El Paso Water Utilities and the U.S. Geological Survey supported the development of models for the (15) Mesilla and (16) Hueco Bolsons Aquifer. The TWDB is currently funding the development of a groundwater transport model of the Gulf Coast Aquifer System in the lower Rio Grande Valley.

How are the models being used?

Completed models have already proven valuable to water planning. Statute requires groundwater conservation districts and regional water planning groups to use values of total pumping and modeled available groundwater, based on the desired future conditions of relevant aquifers located within 16 groundwater management areas, in their management and regional water plans. Groundwater availability models have been and will continue to be used to estimate the modeled available groundwater for each aquifer for each groundwater conservation district, as appropriate and applicable.

Will the models be updated?

The success of the Groundwater Availability Modeling Program depends on the continued interest and support of stakeholders and the Texas Legislature. Ongoing interest is vital to ensure that the most up-to-date model information will be available to address

groundwater resource issues for each aquifer. Continued funding is required to update existing models and develop models for the minor aquifers. The original models for the major aquifers, representing 95 percent of groundwater used in Texas, were completed by October 1, 2004. Nearly all of these models have undergone updates as new data and improved modeling techniques have been made available.

Information and reports on the existing models are available to the public on the TWDB's website, and the currently completed models are available on CD upon request.

Where may I get more information?

Please contact Larry French at (512) 463-5067 or Cindy Ridgeway at (512) 936-2386 or visit www.twdb.texas.gov/groundwater/models/ for more information about the Groundwater Availability Modeling Program.