

**TEXAS
WATER
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**Texas Natural Resources
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**Borderlands Information Center
(BIC)
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**Water Information Integration and
Dissemination
(TWDB WIID System)
<http://wiid.twdb.state.tx.us/>**



GROUNDWATER AVAILABILITY MODELING

Groundwater, along with surface water, is important for maintaining the viability of the state's natural resources, health, and economic development. A projected doubling of the state's population by the year 2050, coupled with the constant threat of drought, makes it imperative that Texas develops effective plans to meet future water needs. Effective planning, however, requires accurate assessments of the availability of water, and assessing 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 pumping and droughts 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 stakeholder guidance.

The 76th Texas Legislature, recognizing the importance of accurate groundwater availability estimates, approved initial funding for the Groundwater Availability Modeling (GAM) program. The GAM program's goal is to provide useful and timely information for determining groundwater availability for the citizens of Texas. The GAM program will result in standardized, thoroughly documented, and publicly available groundwater models. These models will be important tools for Groundwater Conservation Districts and Regional Water Planning Groups to evaluate water-management strategies and to assess present and future groundwater availability trends under normal and drought conditions.

Stakeholder involvement is critical to the success of the GAM program. Stakeholders, participating in Stakeholder Advisory Forums (SAFs), are relied upon to voice concerns and provide information. Stakeholder input ensures the models address the important water-resource issues concerning them for each major aquifer. SAFs 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.

Groundwater Availability Models include comprehensive information on each aquifer, including: recharge (amount of water entering the aquifer); geology and structure; 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.



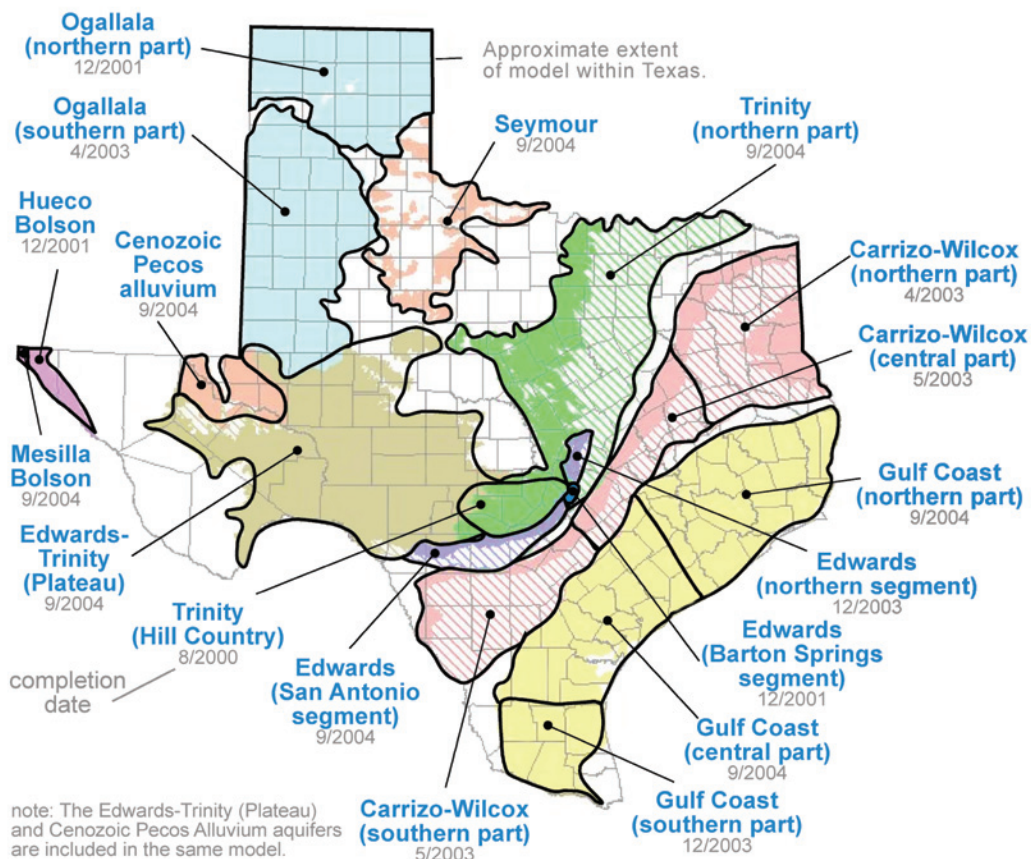
The nine major aquifers in Texas required seventeen different models to provide full coverage. TWDB staff developed four of the models: (1) the Hill Country segment of the Trinity aquifer, (2) the northern segment of the Edwards aquifer, (3) the southern part of the Gulf Coast aquifer, and (4) the Edwards-Trinity (Plateau) and Cenozoic Pecos Alluvium aquifers. TWDB contractors developed eight of the models: (5) the northern and (6) southern part of the Ogallala aquifer; the (7) northern, (8) central, and (9) southern parts of the Carrizo-Wilcox aquifer; (10) the Seymour aquifer; (11) the northern segment of the Trinity aquifer; and (12) the Barton Springs segment of the Edwards aquifer. TWDB staff and a contractor developed a model of (13) the central Gulf Coast aquifer. The TWDB and Harris-Galveston Coastal Subsidence District funded a project for the U.S. Geological Survey to develop a model of (14) 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 (15) 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 (16) Mesilla and (17) Hueco Bolson aquifer.

Completed models have already proven valuable to water planning. The model of the Hill Country Trinity aquifer has been used to evaluate the possible effects of increased pumping and drought on water levels. The model of the northern part of the Ogallala aquifer has been used to assess water-level declines and future groundwater availability trends due to continued and increased pumping. Models for the Barton Springs segment of the Edwards and the Hueco Bolson aquifers have also been successfully used as predictive tools.

The success of the GAM 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 models and develop models for the minor aquifers. The GAM models for the major aquifers, representing 95 percent of groundwater used in Texas, were completed by October 1, 2004. Information and reports on the models are available to the public on TWDB's web site and the models are available on CD upon request.

Please contact Dr. Robert E. Mace at (512) 936-0861, or Ms. Cindy Ridgeway at (512) 936-2386 or visit www.twdb.state.tx.us/GAM for more information about the GAM program.

Location of GAMs for the major aquifers of Texas



GAM 0206

Our Mission

Provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas.

EQUAL OPPORTUNITY EMPLOYER

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