

TOTAL ESTIMATED RECOVERABLE STORAGE AND MODELED AVAILABLE GROUNDWATER WHY THEY ARE DIFFERENT



Texas Water 
Development Board

Overview

- What is total estimated recoverable storage and why is TWDB providing that to groundwater management areas and groundwater conservation districts.
- How does TWDB calculate total estimated recoverable storage for the aquifers.
- What is modeled available groundwater.
- How does TWDB calculate modeled available groundwater for the aquifers.
- Why are total estimated recoverable storage and modeled available groundwater so different.
- Summary

Total Estimated Recoverable Storage in statute

- TWDB is required by law to provide the total estimated recoverable storage for each aquifer in each groundwater management area.
- Texas Water Code, §36.108 (d) states that, before voting on the proposed desired future conditions for a relevant aquifer within a groundwater management area, the groundwater conservation districts shall consider the total estimated recoverable storage as provided by the executive administrator of the TWDB along with other factors listed in §36.108 (d).
- The total estimated recoverable storage is a factor that groundwater management areas should consider before voting on their desired future conditions. It may represent an upper limit on how much water the aquifer can provide.

Other Factors

- Other factors for the groundwater management area to consider can be found in the following document:

http://www.twdb.texas.gov/groundwater/docs/Explanatory_Report_DFC_Submittal_July_2013.pdf

Total Estimated Recoverable Storage Defined

- Texas Water Code, §36.001 (24)
 - “Total aquifer storage” is defined as the total calculated volume of groundwater that an aquifer is capable of producing.
 - TWDB developed a working definition of “total estimated recoverable storage.”
- Texas Administrative Code Rule §356.10 defines the total estimated recoverable storage as the estimated amount of groundwater within an aquifer that accounts for recovery scenarios that range between 25 percent and 75 percent of the porosity-adjusted aquifer volume.

Further Considerations

- Storage within official aquifer boundaries.
 - TWDB Report No. 380 (Aquifers of Texas)
- No consideration for:
 - Water quality
 - Potential effects of pumping
 - water levels dropping below pumps
 - land surface subsidence,
 - degradation of water quality,
 - changes to surface water-groundwater interaction
- Use best available tool.
 - typically a groundwater availability model for the estimate

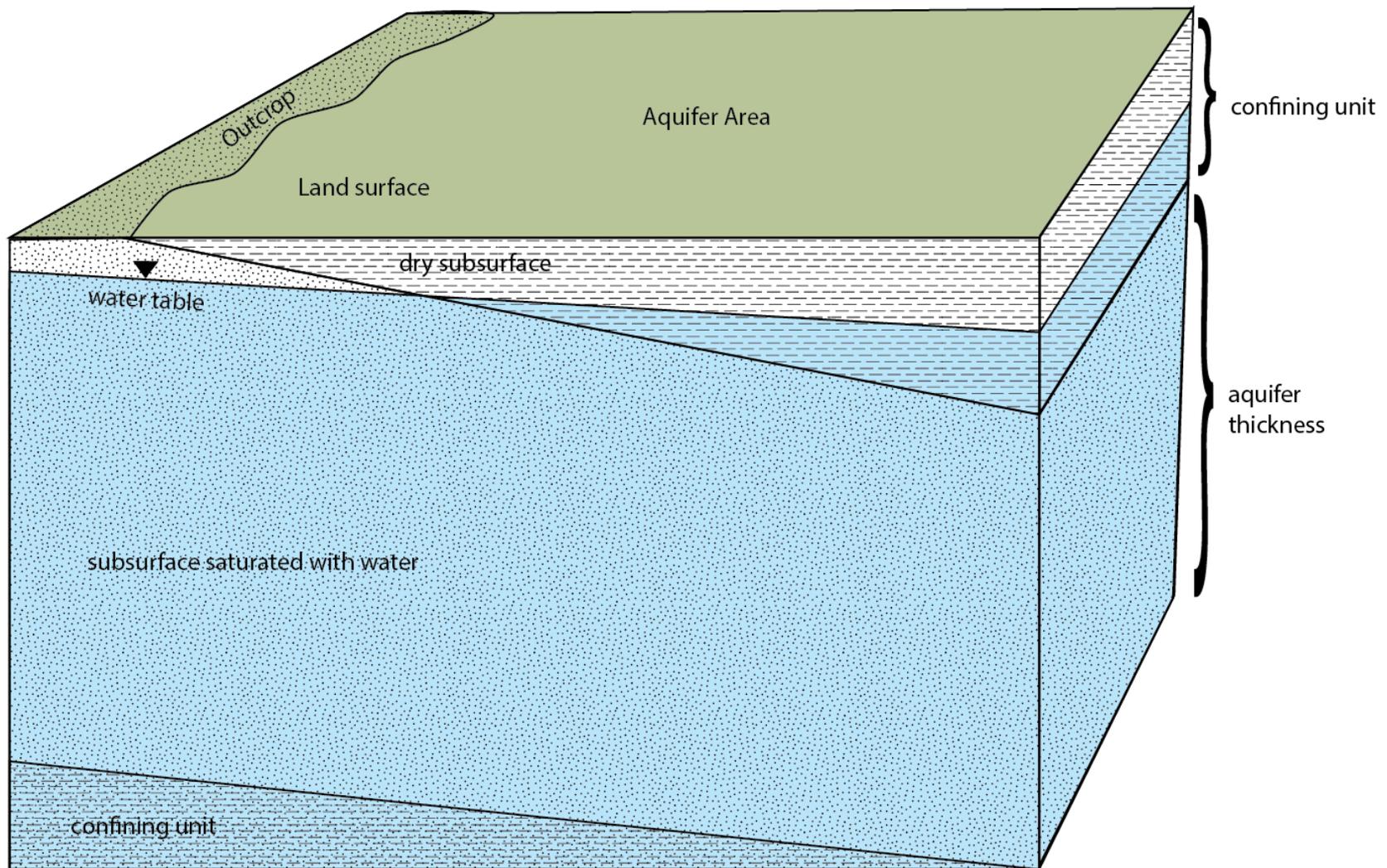
How does TWDB calculate Total Estimated Recoverable Storage

Step 1

- First we calculate total aquifer storage volume from aquifer geometry and aquifer storage properties.
Storage volume = area x thickness x specific yield
Specific yield = fraction of aquifer occupied by water that is drainable (high for sand, low for clay)
- For most of the aquifers we use aquifer geometry and storage properties from the groundwater availability models.
- For non-modeled aquifers we use aquifer data from other sources.

Step 2

- Next we estimate percent recoverable amounts ranging from 25 to 75 percent of the total.
- Again, these calculations do not account for consequences such as water levels dropping below the bottom of wells, capturing poor quality water, or changes to groundwater-surface water interactions.
- The total estimated recoverable storage is a volume for a fixed point in time.



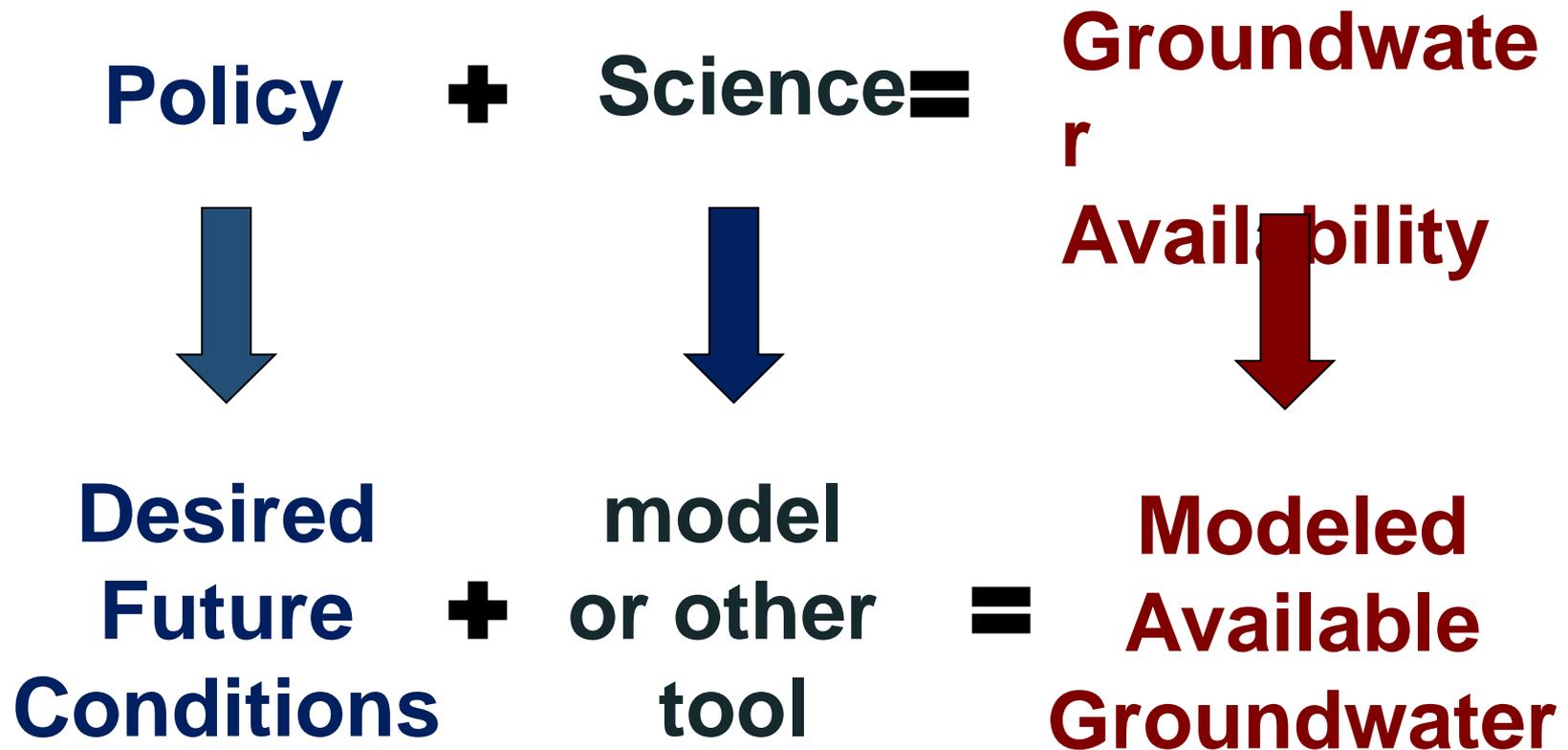
Storage volume = area x thickness x specific yield (Plus some for the confined storage)

What is Modeled Available Groundwater

Modeled Available Groundwater in statute

- Texas Water Code, §36.1084 (b) states that, the Executive Administrator of the TWDB shall provide each district and regional water planning group located wholly or partly in the management area with the modeled available groundwater in the management area based upon the desired future conditions adopted by the districts.

What is Groundwater Availability?

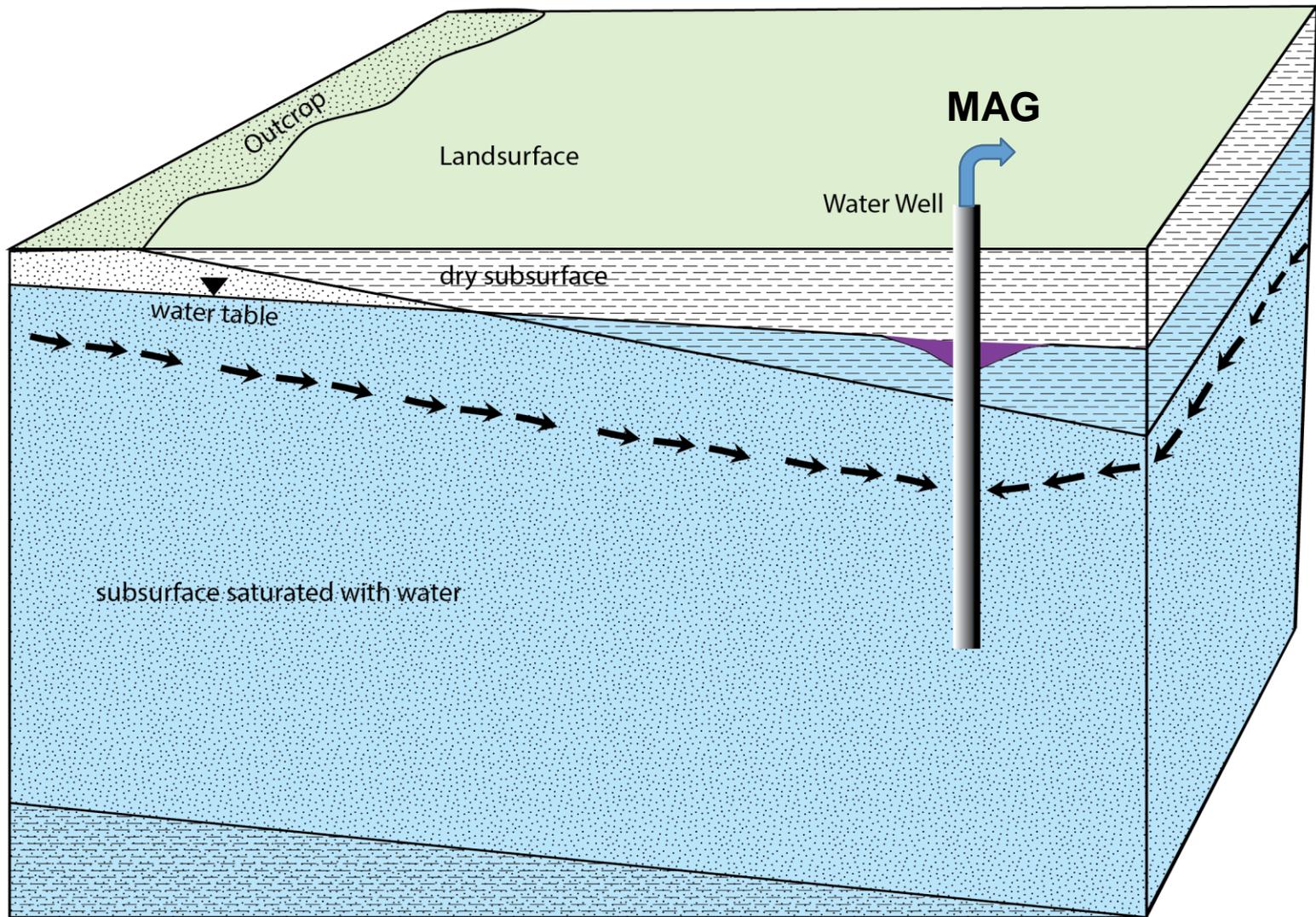


Goal: informed decision-making

How does TWDB calculate Modeled Available Groundwater

Modeled Available Groundwater

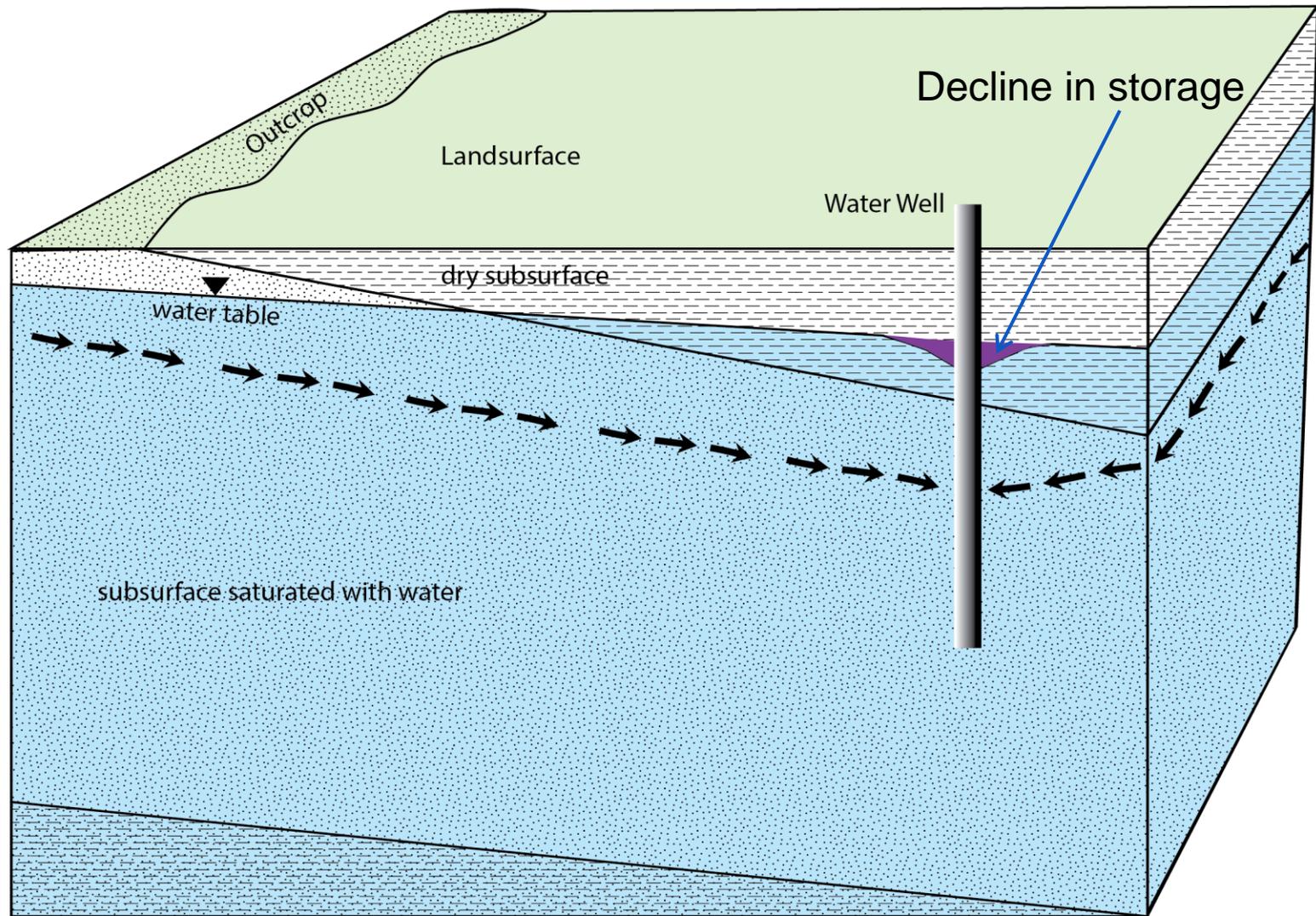
- Groundwater management areas decide on their desired future conditions considering all of the factors.
- TWDB runs the groundwater availability models and estimates how much pumping will achieve the desired future conditions of the aquifer.
- The estimated pumping rate is the modeled available groundwater. It is an annual pumping rate (volume per year).



For actual model runs we use many wells scattered throughout the groundwater management area to achieve the desired future condition

Modeled Available Groundwater

- The extracted water for the modeled available groundwater comes partially from storage decline and partially from water flowing in from other parts of the aquifer.
- The decline in storage associated with desired future conditions of thick confined aquifers are typically much less than the total storage volume of the aquifer.



The decline in storage associated with desired future conditions of thick confined aquifers are typically much less than the total storage volume of the aquifer

Summary

- Total estimated recoverable storage is determined by geology and geometry.
- TWDB provides numbers that account for recovery scenarios that range from 25 to 75 percent of an aquifer's total storage volume for a fixed point in time.
- Modeled available groundwater is determined by balancing acceptable consequences through policy (desired future conditions set by groundwater management areas) in conjunction with groundwater modeling.
- Modeled available groundwater is annual pumping rates (volumes per year).

Contact Information

Cindy Ridgeway

Cindy.Ridgeway@twdb.texas.gov

512-936-2386

Larry French

Larry.French@twdb.texas.gov

512-463-5067

Texas Water Development Board

1700 North Congress Avenue

P.O. Box 13231

Austin, Texas 78711-3231

Web information:

<http://www.twdb.texas.gov/groundwater/index.asp>

http://www.twdb.texas.gov/groundwater/management_areas/DFC.asp

http://www.twdb.texas.gov/groundwater/management_areas/TERS.asp