Hill Country Portion of the Trinity Aquifer System Groundwater Availability Model: Update

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Texas Water Development Board
August 17, 2009
OUTLINE

- Introduction
- Conceptual model
- Steady-state model
- Transient model
UPDATE ISSUES

- Meeting GAM standards
  - Map projection
  - Stress periods
- Adding Lower Trinity
- Adjust structure
- Redistribution of pumping
- Recharge distribution
THE MODEL AT A GLANCE

- Hill Country area.
- Includes: (1) Edwards Group in plateau,
  (2) Upper Trinity aquifer,
  (3) Middle Trinity aquifer.
  (4) Lower Trinity aquifer.
- Considers geology, recharge, rivers, and pumping.
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<th>ERA</th>
<th>SYSTEM</th>
<th>GROUP</th>
<th>STRATIGRAPHIC UNIT</th>
<th>HYDROLOGIC UNIT</th>
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<td>Glen Rose Limestone</td>
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HYDROSTRATIGRAPHY
Edwards Group
Upper Trinity Aquifer
Lower Trinity Aquifer
HYDRAULIC CONDUCTIVITY

Edwards Group – Layer 1

Original model

Updated model
HYDRAULIC CONDUCTIVITY

Upper Trinity Aquifer – Layer 2

Original model  Updated model
HYDRAULIC CONDUCTIVITY

Middle Trinity Aquifer – Layer 3

Original model

Updated model
HYDRAULIC CONDUCTIVITY

Lower Trinity Aquifer – Layer 4

Updated model
RECHARGE

Original model

Updated model
PUMPAGE

Original model

Updated model
PUMPAGE

Edwards Group

Upper Trinity Aquifer
Edwards Group

Mean Error: 20.5 feet
Mean Absolute Error: 27.5 feet (15 %)
MODEL RESULTS: STEADY-STATE

Upper Trinity Aquifer

Mean Error: 13.5 feet
Mean Absolute Error: 60.4 feet (5.5%)
MODEL RESULTS: STEADY-STATE

**Middle Trinity Aquifer**

- Mean Error: -13.6 feet
- Mean Absolute Error: 53.0 feet (5.1 %)
MODEL RESULTS: STEADY-STATE

Calculated Water Levels (ft MSL) vs. Observed Water Levels (ft MSL)

Lower Trinity Aquifer

Mean Error: 17.2 feet
Mean Absolute Error: 59.8 feet (4.9 %)
MODEL RESULTS: TRANSIENT
MODEL RESULTS: TRANSIENT

Water-Level Elevation (feet MSL)

- **69-15-401**
  - Bandera County
  - Layer 4

- **68-19-208**
  - Bexar County
  - Layer 4

- **57-55-401**
  - Hays County
  - Layer 4

- **68-02-807**
  - Kendall County
  - Layer 4

*Measured vs. Simulated*
MODEL RESULTS: TRANSIENT

- 57-57-703
  Kerr County
  Layer 4

- 57-40-304
  Travis County
  Layer 4

- 69-16-201
  Kerr County
  Layer 4

[Graphs showing water-level elevation for different locations and years]
MODEL RESULTS: TRANSIENT

- **Edwards Group (1990)**
  - Mean Error: 6 feet
  - Mean Absolute Error: 54 feet (7.3%)

- **Upper Trinity Aquifer (1990)**
  - Mean Error: -81 feet
  - Mean Absolute Error: 99 feet (9.4%)

- **Middle Trinity Aquifer (1990)**

- **Lower Trinity Aquifer (1990)**
  - Mean Error: 17 feet
  - Mean Absolute Error: 45 feet (4.2%)
MODEL RESULTS: TRANSIENT
MODEL RESULTS: COMPARISON

Original model:
- Mean Error: 2 feet
- Mean Absolute Error: 64 feet (7%)

Updated model:
- Mean Error: 10 feet
- Mean Absolute Error: 66 feet (7%)
WHAT’S NEXT?

- Report/model files
  - External review
    - Deadline for comments – September 2, 2009
  - Finalization


Send comments to:
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Groundwater Resources Division

1. **Purpose of meeting**: Stakeholder Advisory Forum for the Groundwater Availability Model of the Hill Country portion of the Trinity Aquifer System

2. **Date and location of meeting**: August 17, 2009

3. **TWDB staff in attendance**: Ian Jones, Rima Petrossian, Robert Bradley, Bill Hutchison

4. **Senators/Representatives/other VIPs in attendance**: Jay Millikin, Comal County Commissioner

5. **Who was in attendance (non-TWDB staff)**: Ron Fieseler and Neill Binford (Blanco-Pedernales GCD), David Jeffery (Bandera County RA & GD), Tommy Mathews (Cow Creek GCD), Brian Hunt (Barton Springs/Edwards Aquifer CD), Mary Ellen Summerlin (Headwaters GCD), George Wissmann (Trinity Glen Rose GCD), Rick Ilgner (Edwards Aquifer Authority), Luana Buckner (Medina County GCD), Wesley Schumacher (Hays Trinity GCD) and about 25 other attendees.

6. **Meeting report filed by**: Ian Jones

7. **Date of meeting report filing**: August 18, 2009

8. **Meeting report location and filename**: S:\PLANNING\Meeting Report\GwR_meeting_reports\2009\2009-0817 Jones Hill Country Trinity GAM SAF3.doc

9. **Agenda/Outcomes/Comments**:

   The third Stakeholder Advisory Forum for the updated Groundwater Availability Model of the Hill Country portion of the Trinity Aquifer System was held at the Upper Guadalupe River Authority Auditorium in Kerrville, Texas, August 17, 2009. This stakeholder advisory forum was held in conjunction with a meeting of Groundwater Management Area 9. Topics covered during the meeting included the work to be done to update the model, the conceptual model, and results from the steady-state and transient models. The model is currently under external review until September 2, 2009. It is expected that the model will be finalized and released by the end of September.

   During the meeting, stakeholders asked several questions pertaining to various aspects of the model. The following is a synopsis of stakeholder questions and comments (**bold**) and our responses (**italics**).

   - Isn’t the baseflow analysis methodology used in the original model more constrained than the fixed fraction of precipitation method used in the
updated model? The weakness of the baseflow method is that it does not consider groundwater flow between watersheds.

- Wouldn’t the model be better with a more recent calibration period? Which calibration period is used is not important. What is important is to use a calibration period with the best data and to get the model to match that data as much as possible. Future model updates may use a more recent calibration period.

- Has the model update resolved the issues in Bexar County? The addition of recharge from Cibolo Creek and revisions to the hydraulic conductivity in Bexar and Comal counties should resolve many of the issues associated with dry cells in that part of the model.

- Wouldn’t it have been better to retain the monthly stress periods used in the original model instead of using annual stress periods? There is not enough data to support monthly stress periods. Water-level data is at best annual.