

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



Ian C. Jones, Ph.D., P.G.

Texas Water Development Board

August 17, 2009



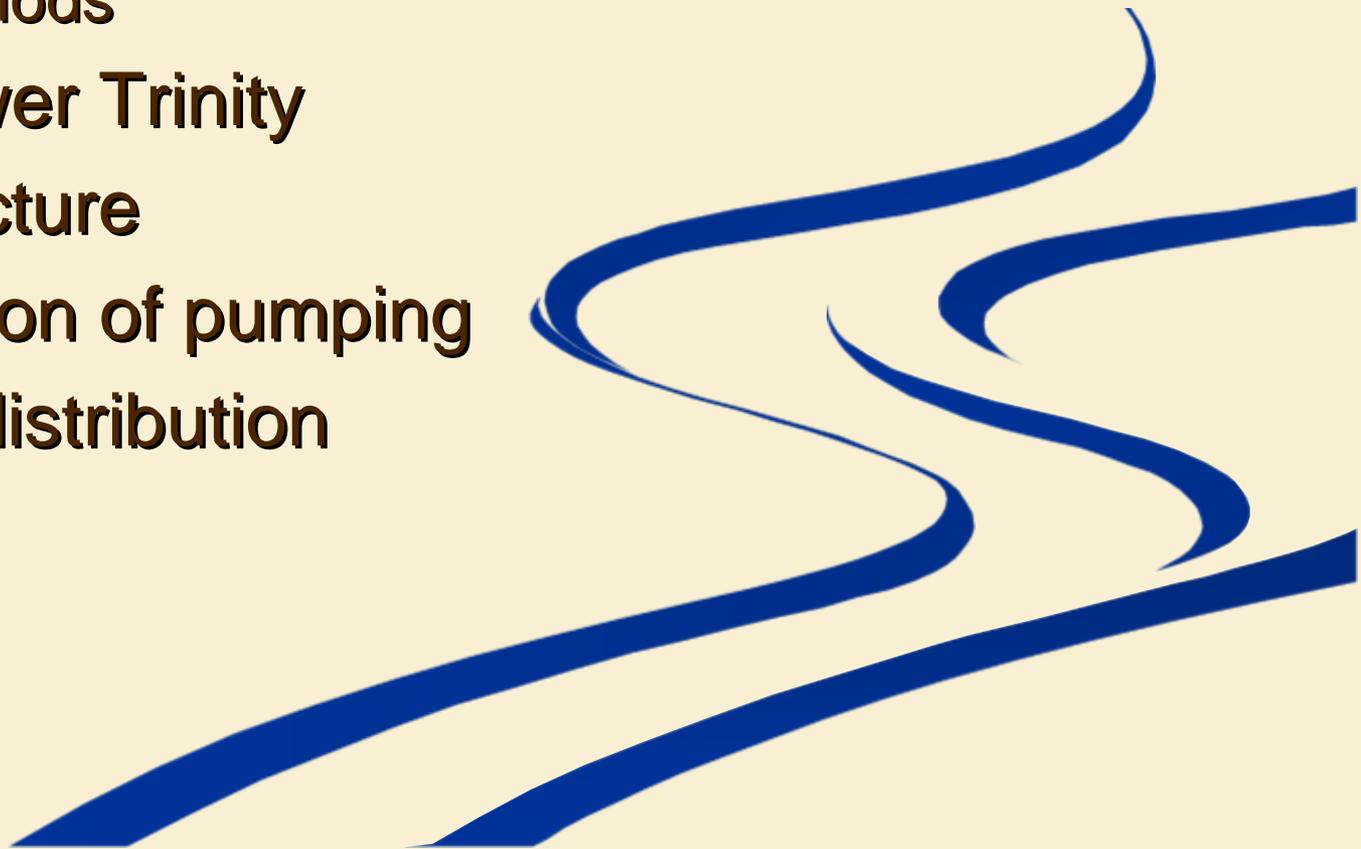
OUTLINE

- Introduction
- Conceptual model
- Steady-state model
- Transient model

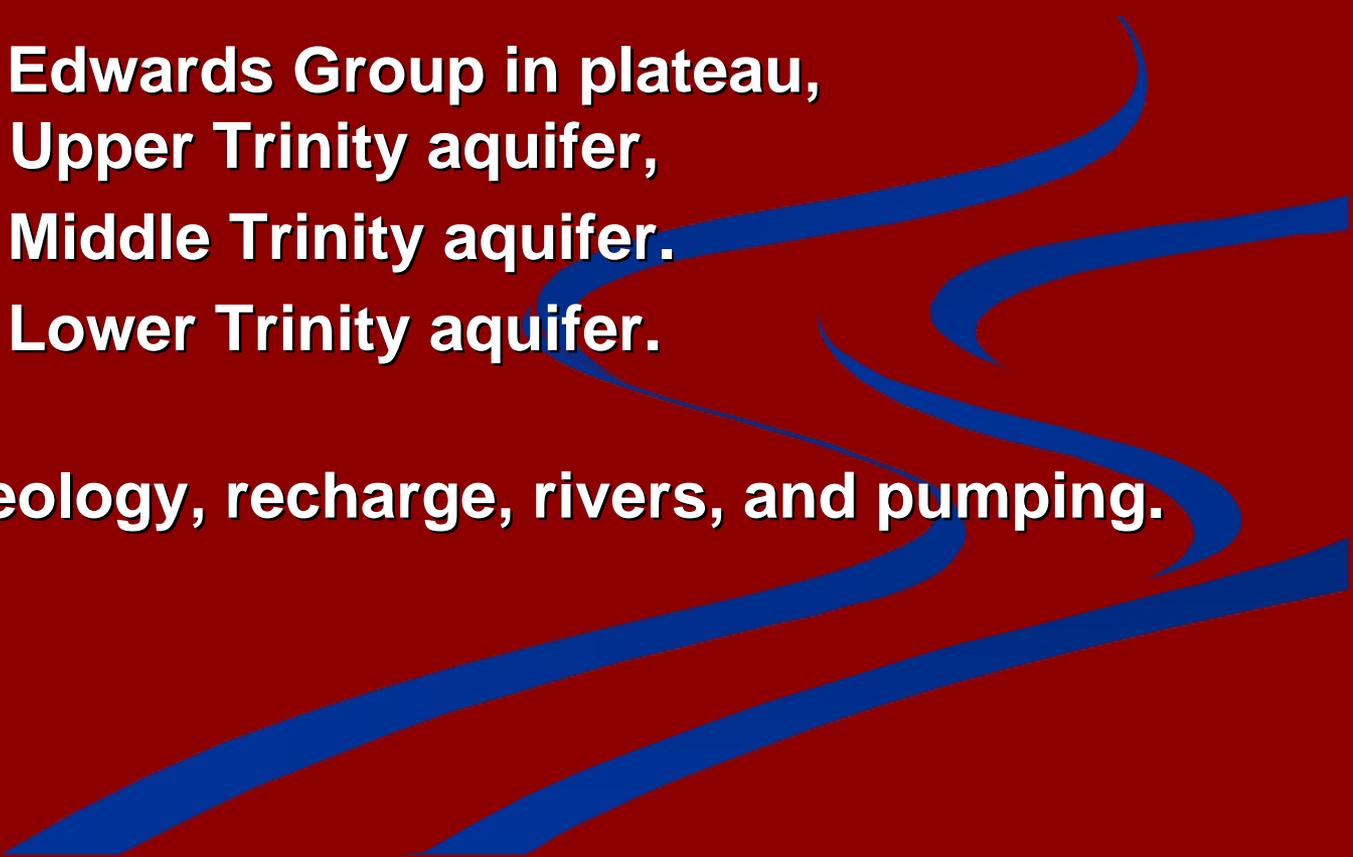


UPDATE ISSUES

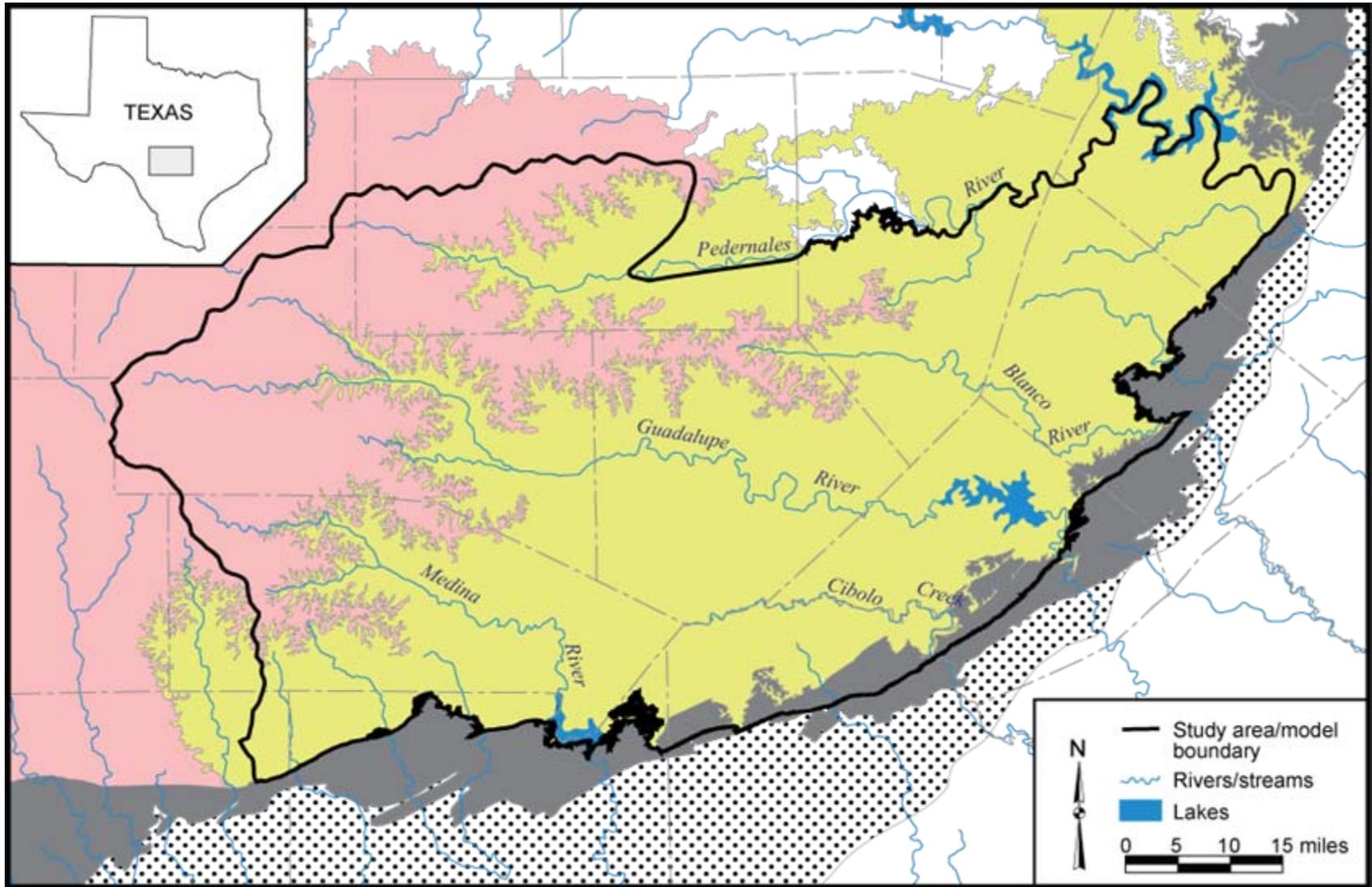
- Meeting GAM standards
 - Map projection
 - Stress periods
- Adding Lower Trinity
- Adjust structure
- Redistribution of pumping
- Recharge distribution



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.
- 

MAJOR AQUIFERS



Edwards-Trinity (Plateau)

Trinity

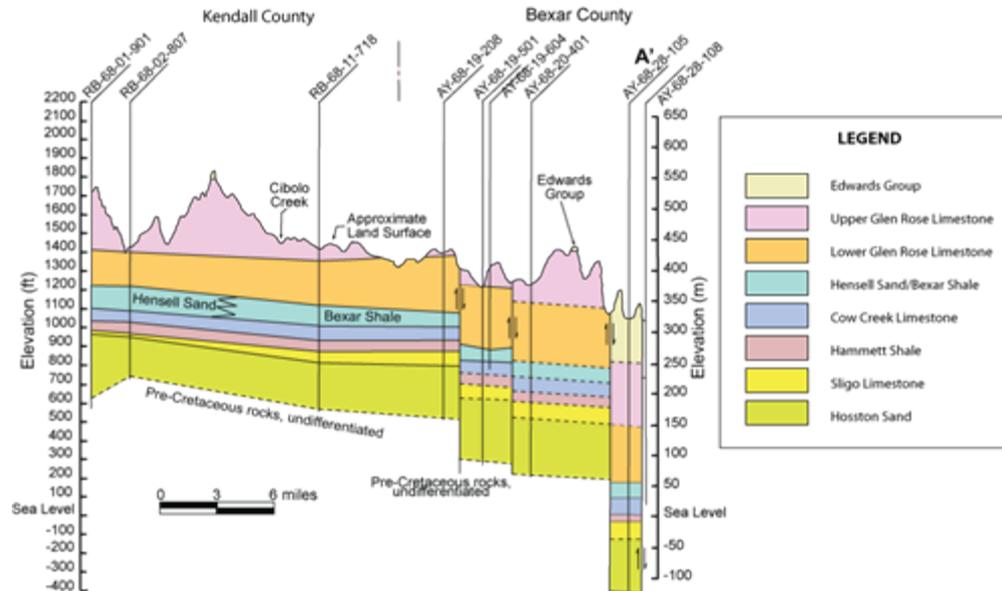
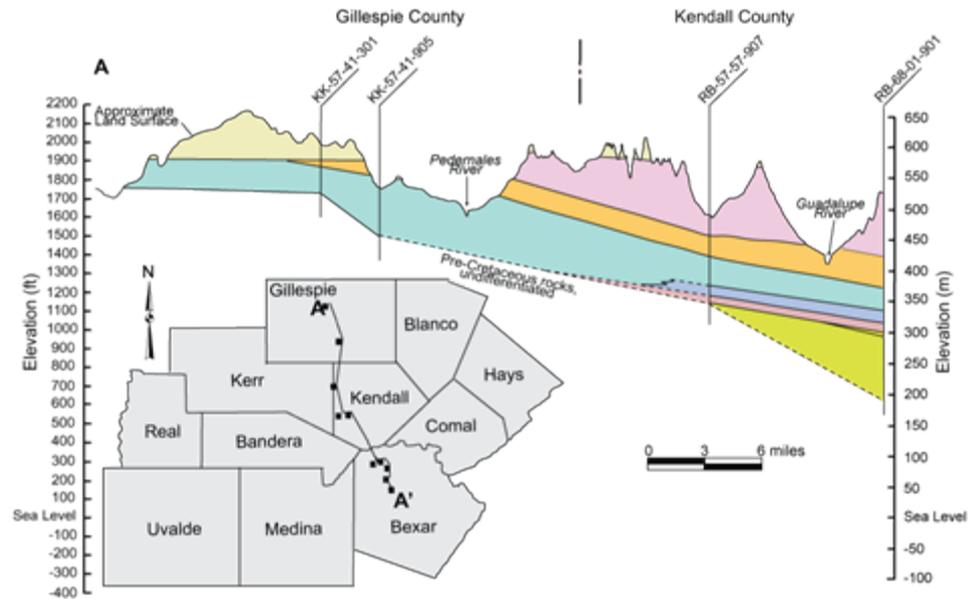
Edwards (BFZ), outcrop

Edwards (BFZ), downdip

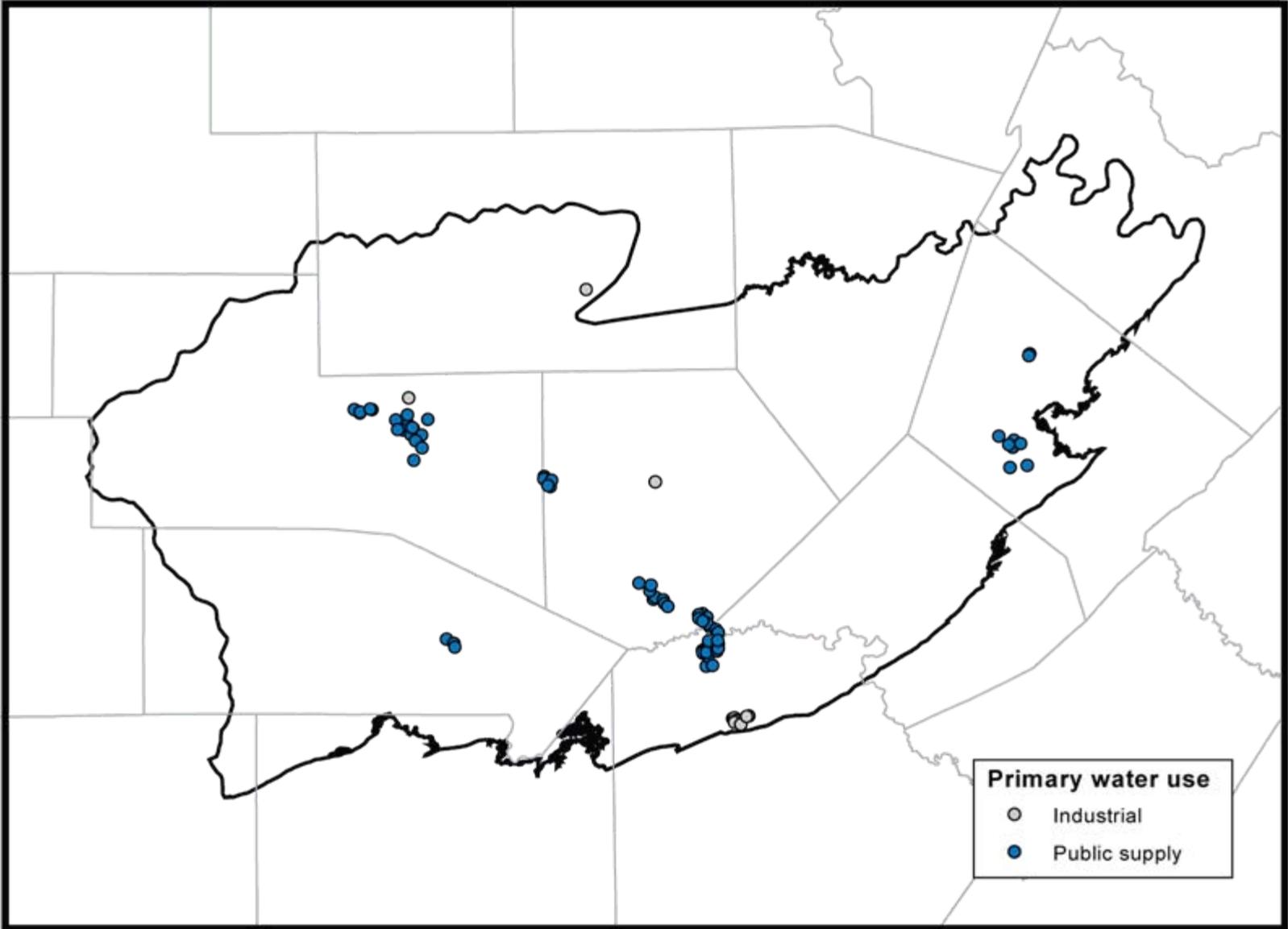
HYDROSTRATIGRAPHY

ERA	SYSTEM	GROUP	STRATIGRAPHIC UNIT	HYDROLOGIC UNIT		
Cenozoic	Quaternary		Alluvium	Alluvium		
Mesozoic	Cretaceous	Edwards	Segovia Formation	Edwards Group		
			Fort Terrett Formation			
		Trinity	Glen Rose Limestone	Upper Member	Trinity Aquifer System	Upper Trinity
				Lower Member		Middle Trinity
			Hensell Sand/Bexar Shale			
			Cow Creek Limestone			
			Hammett Shale			confining unit
			Sligo Formation			Lower Trinity
Sycamore Sand/Hosston Formation						
Paleozoic			Undifferentiated Pre-Cretaceous rock			

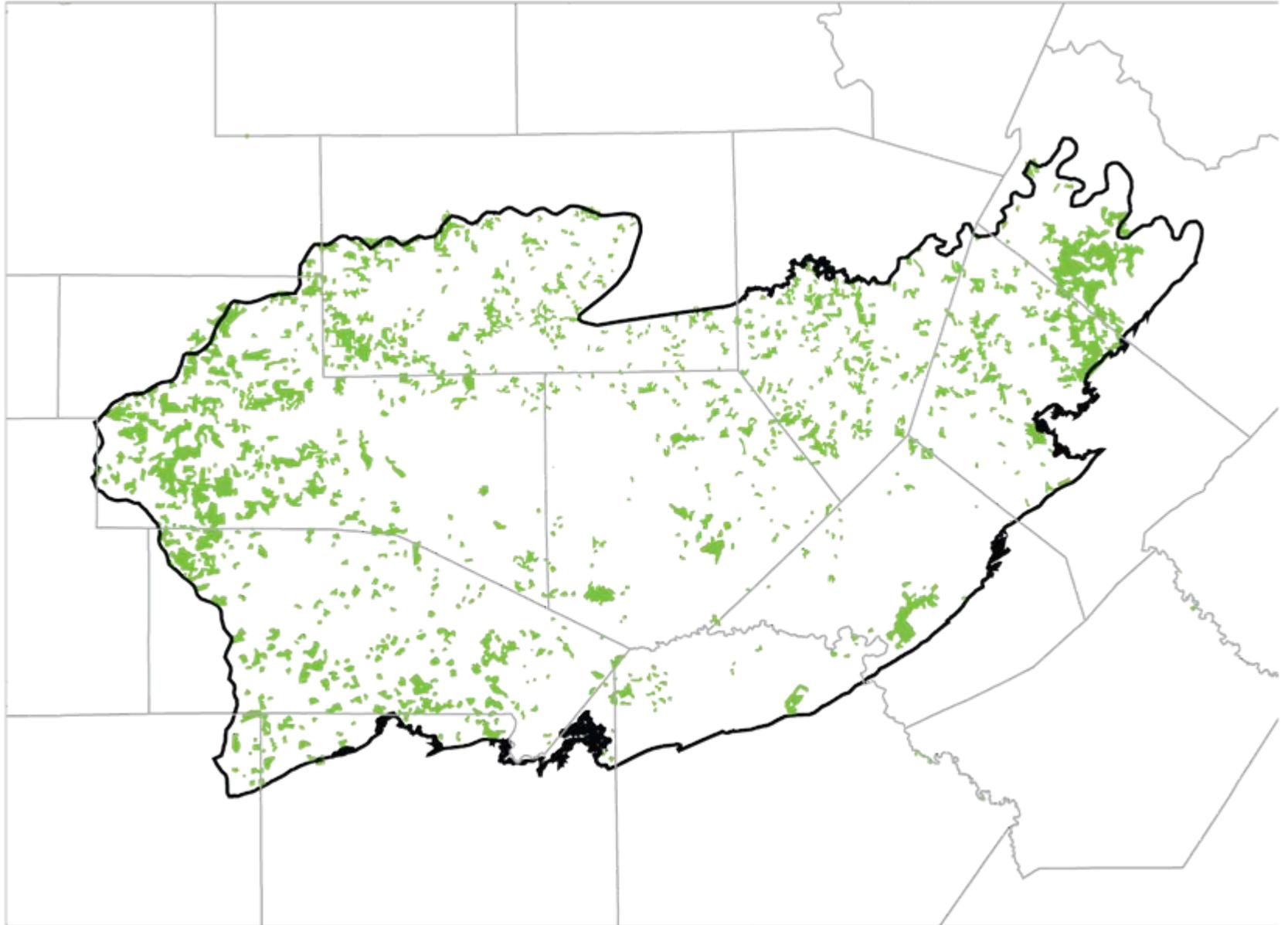
HYDROSTRATIGRAPHY



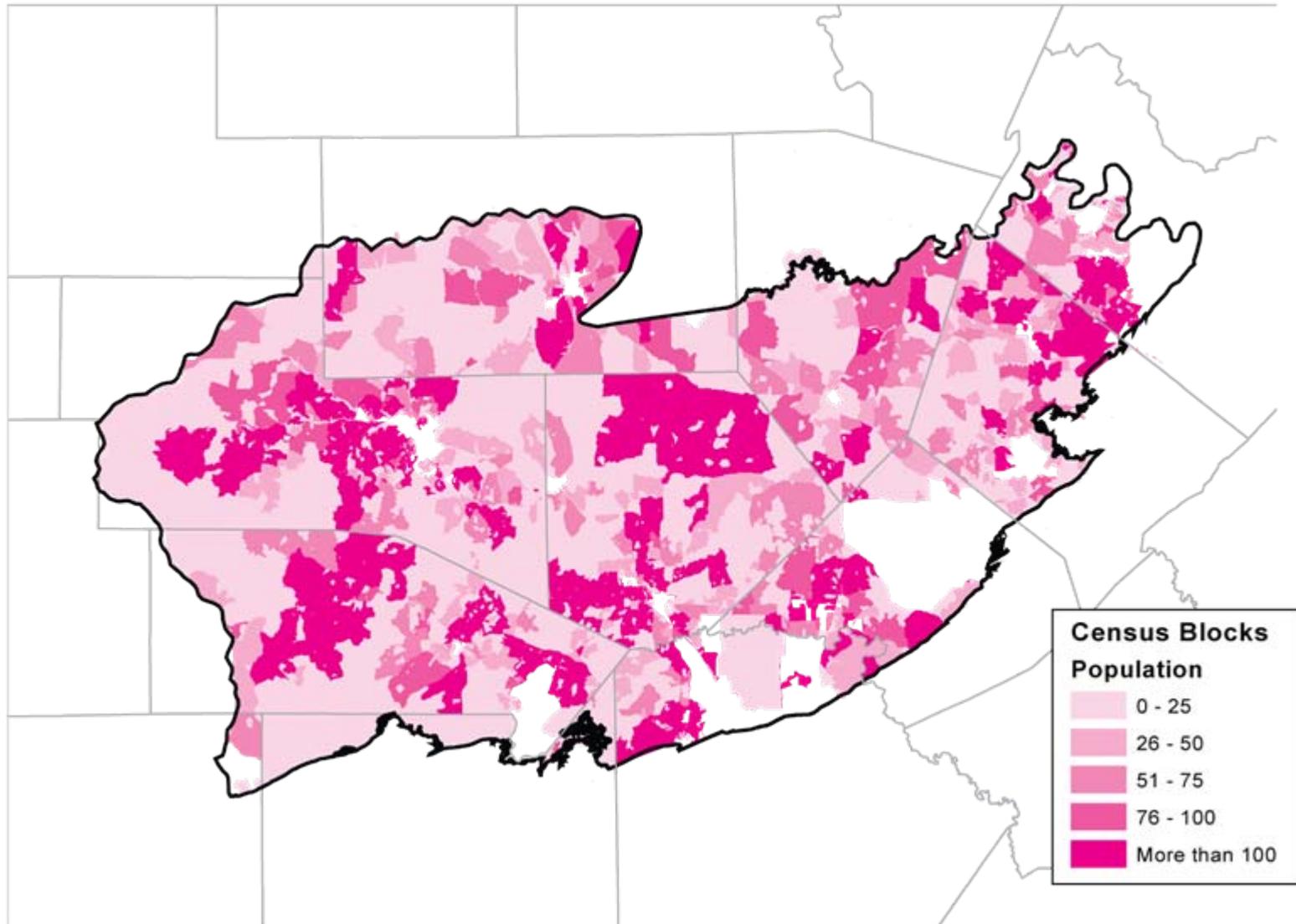
INDUSTRIAL AND PUBLIC SUPPLY



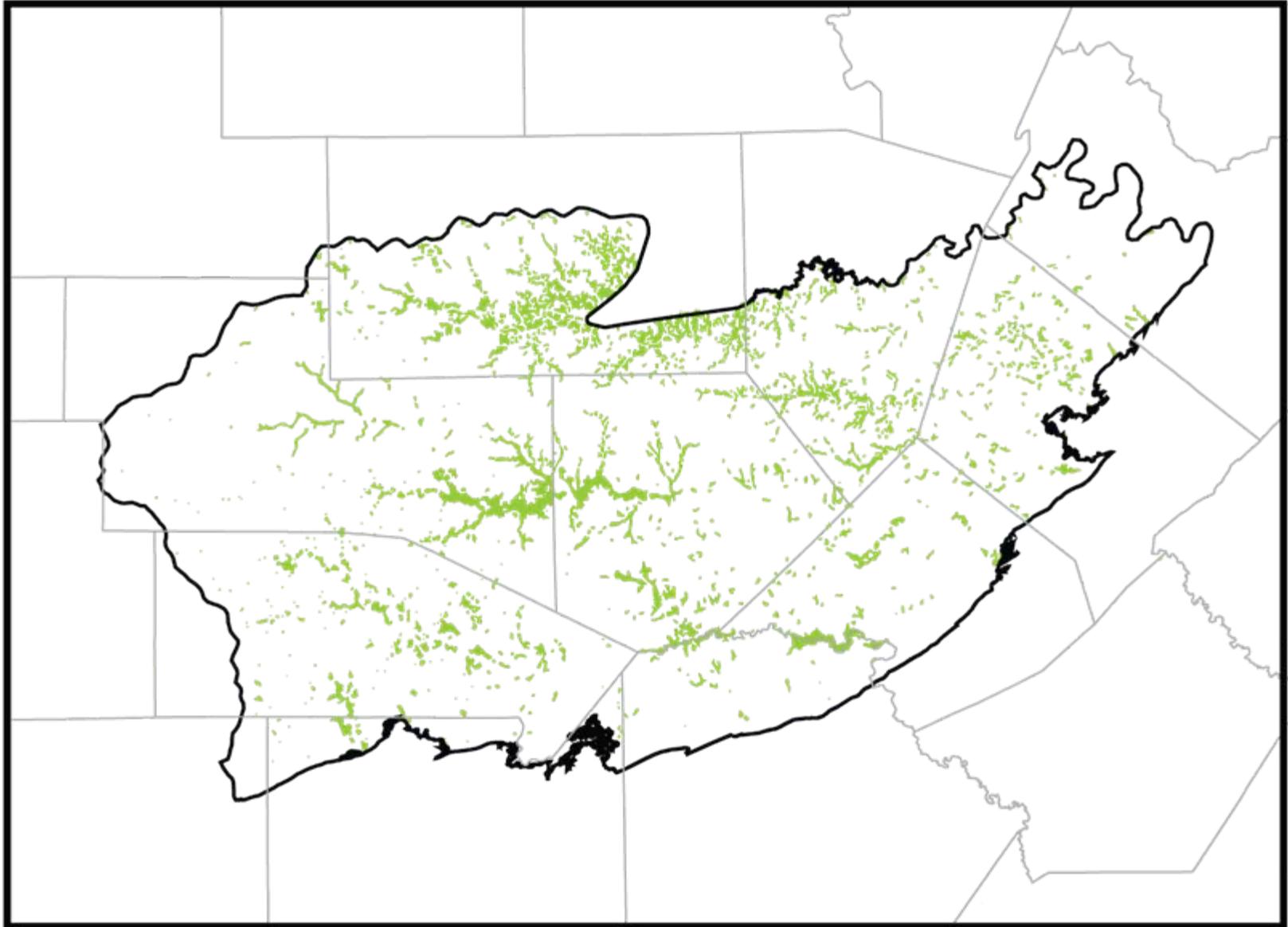
RANGELAND



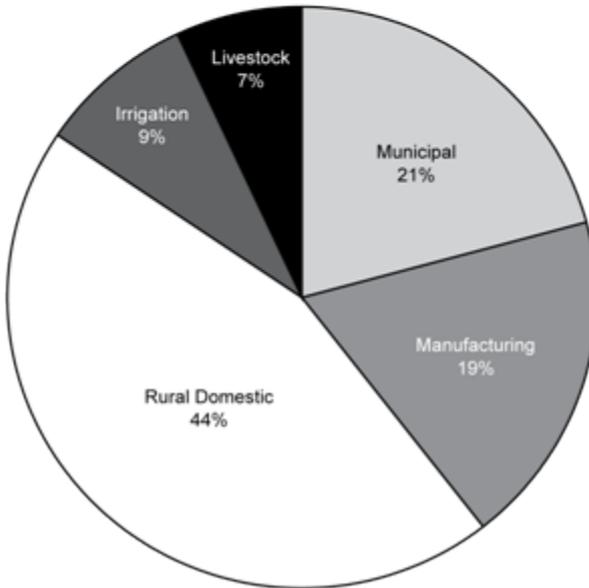
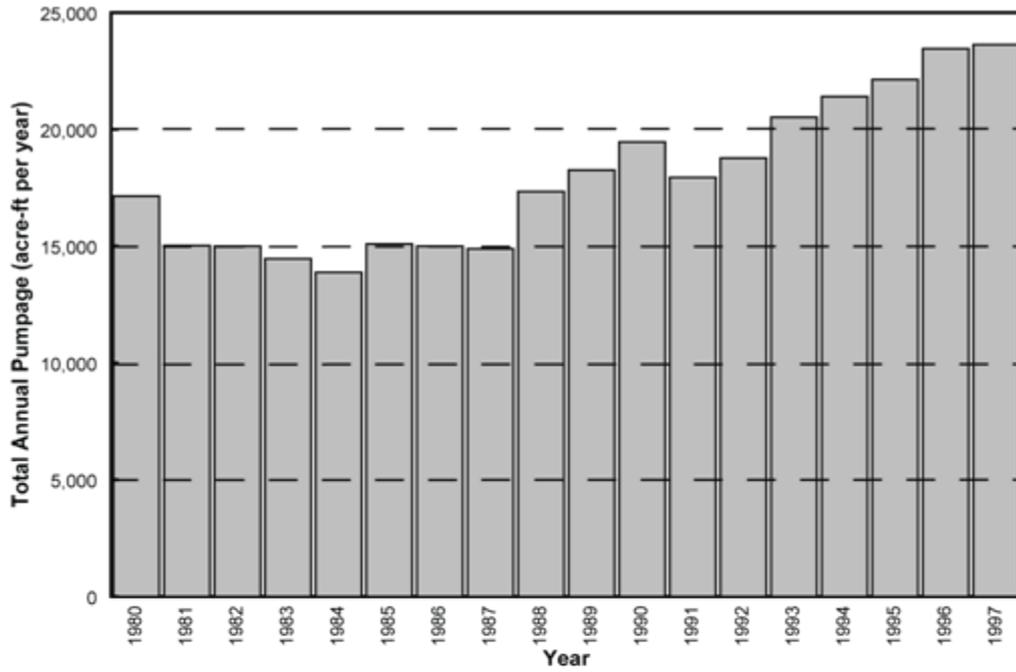
RURAL POPULATION



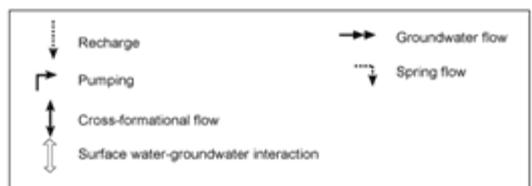
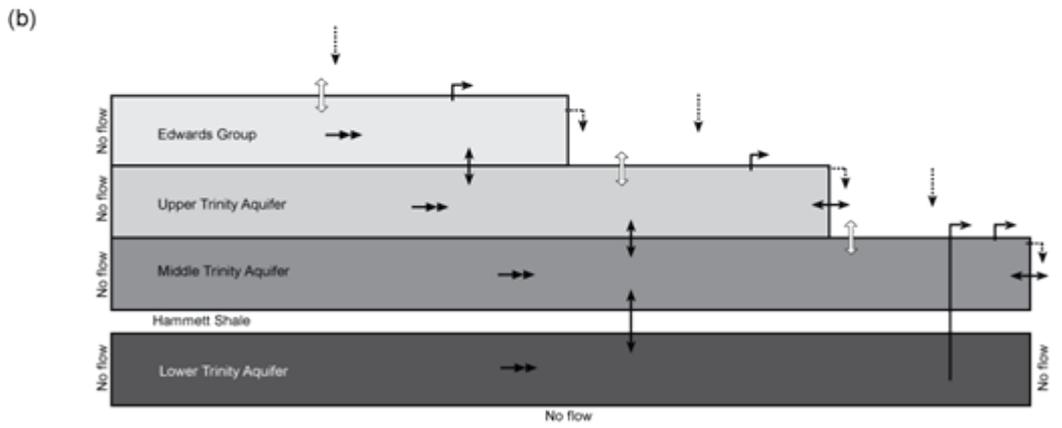
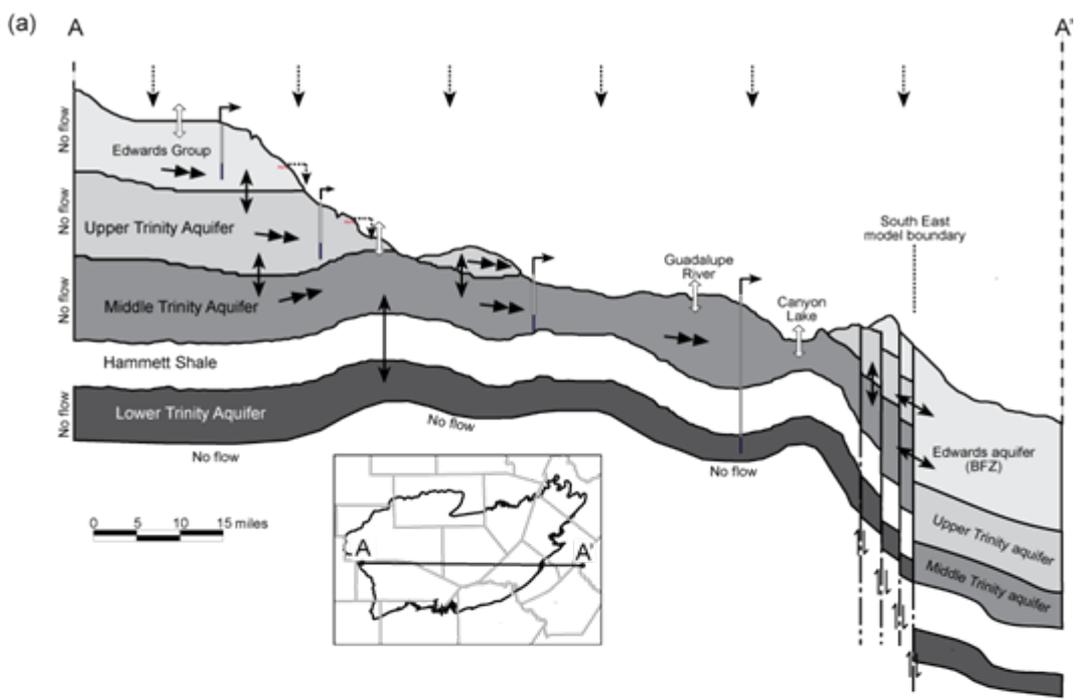
IRRIGATED FARMLAND



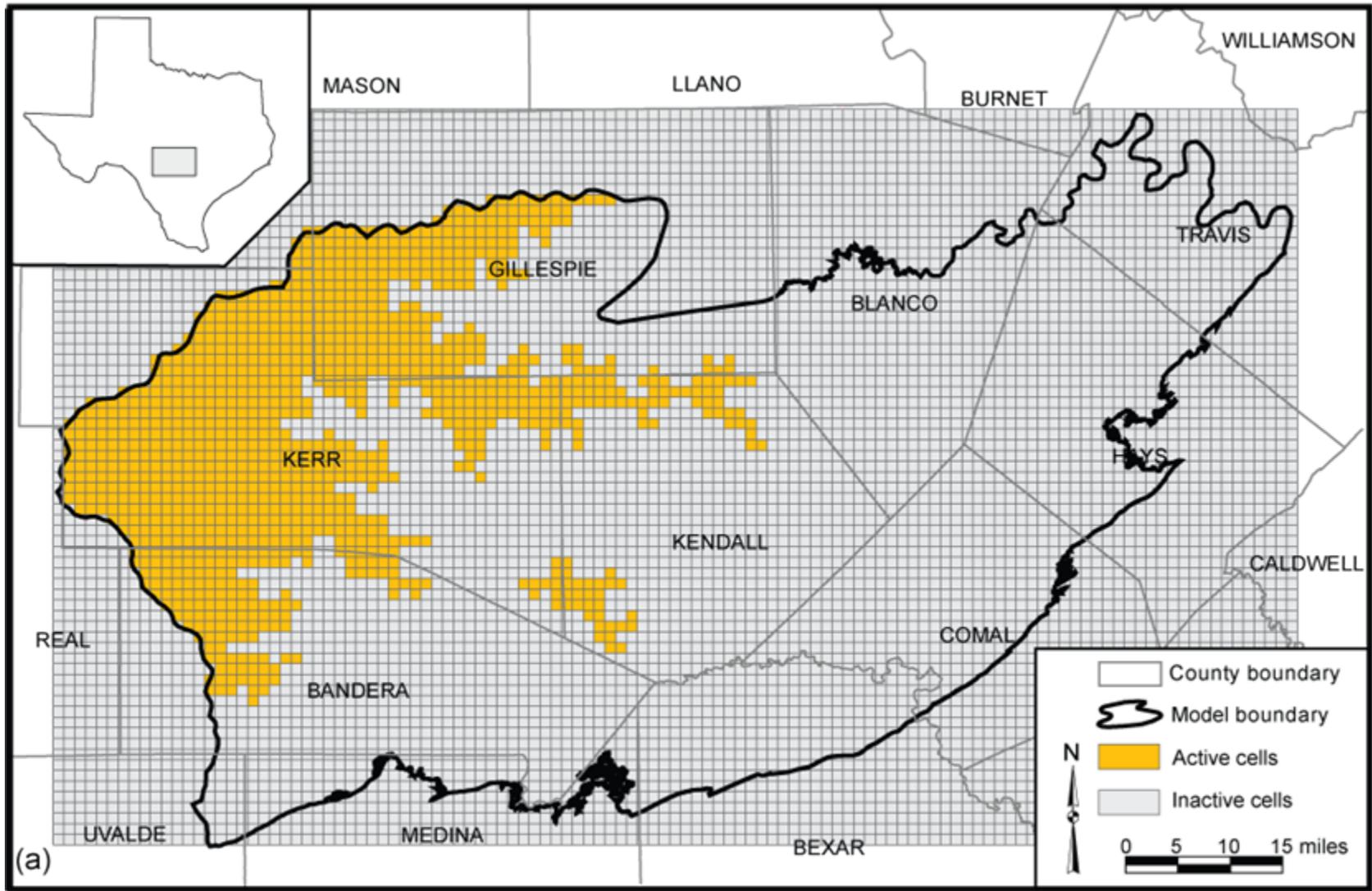
PUMPING BY USE CATEGORIES



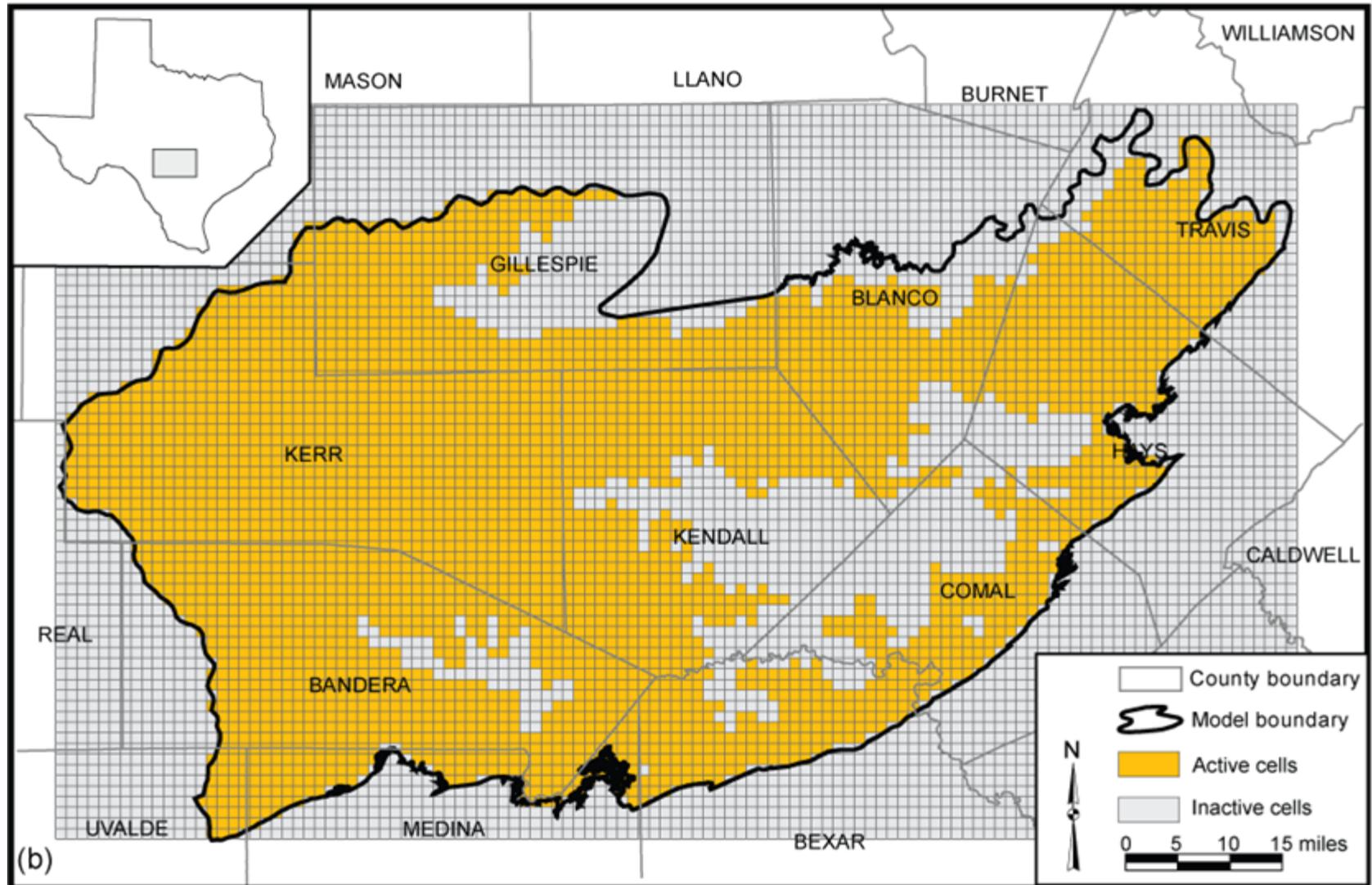
CONCEPTUAL MODEL



MODEL GRID

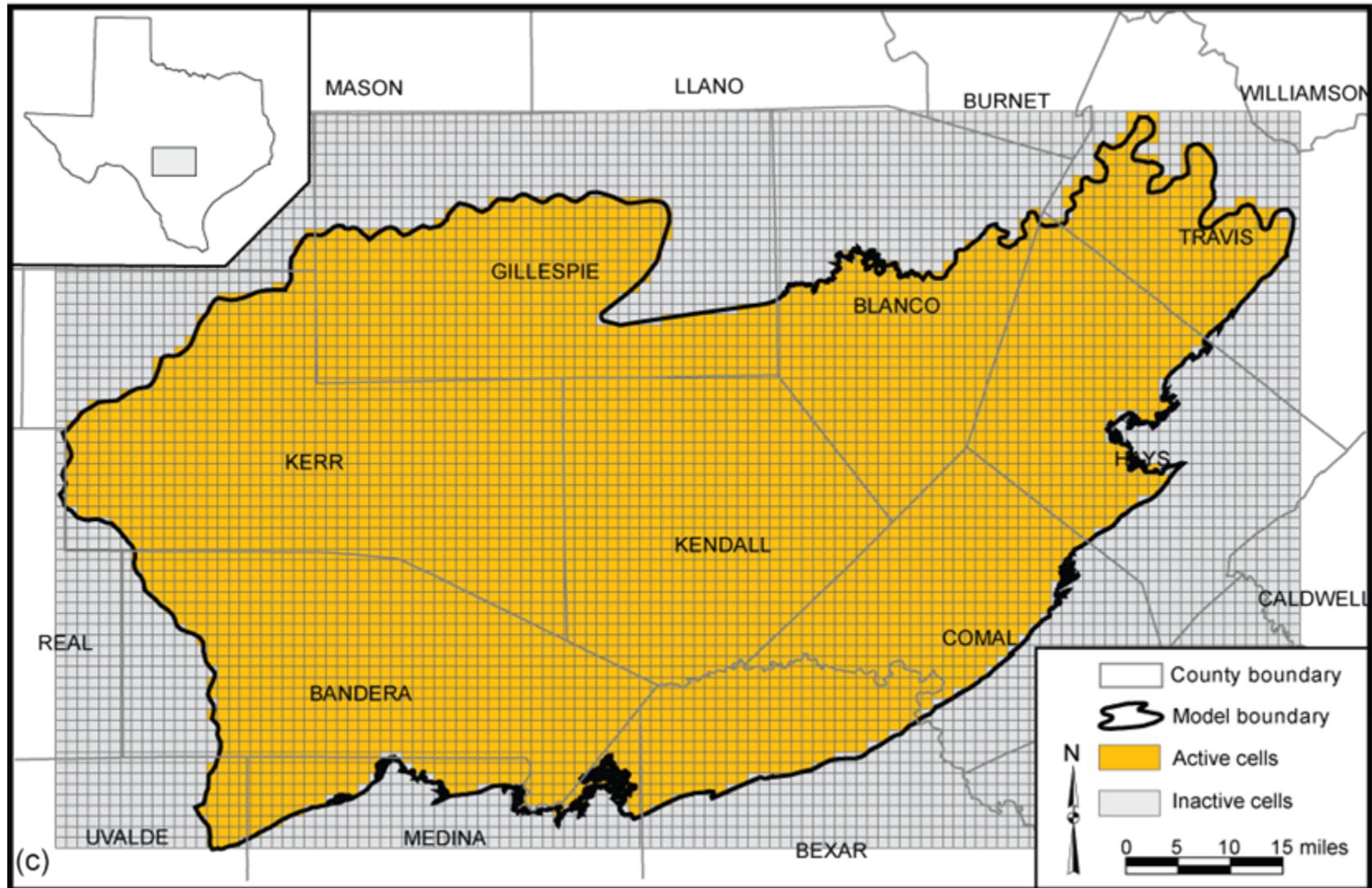


MODEL GRID



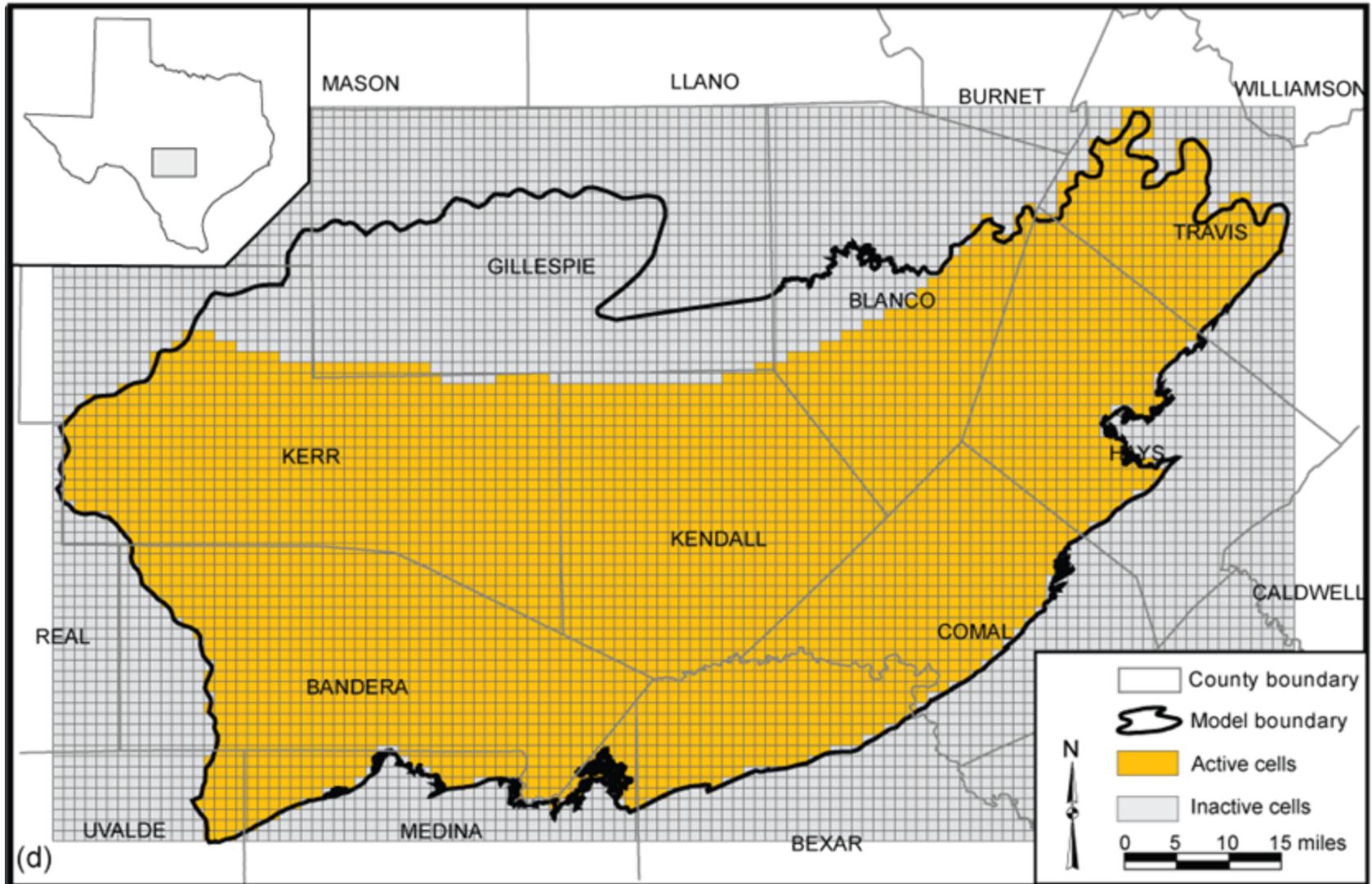
Upper Trinity Aquifer

MODEL GRID



Middle Trinity Aquifer

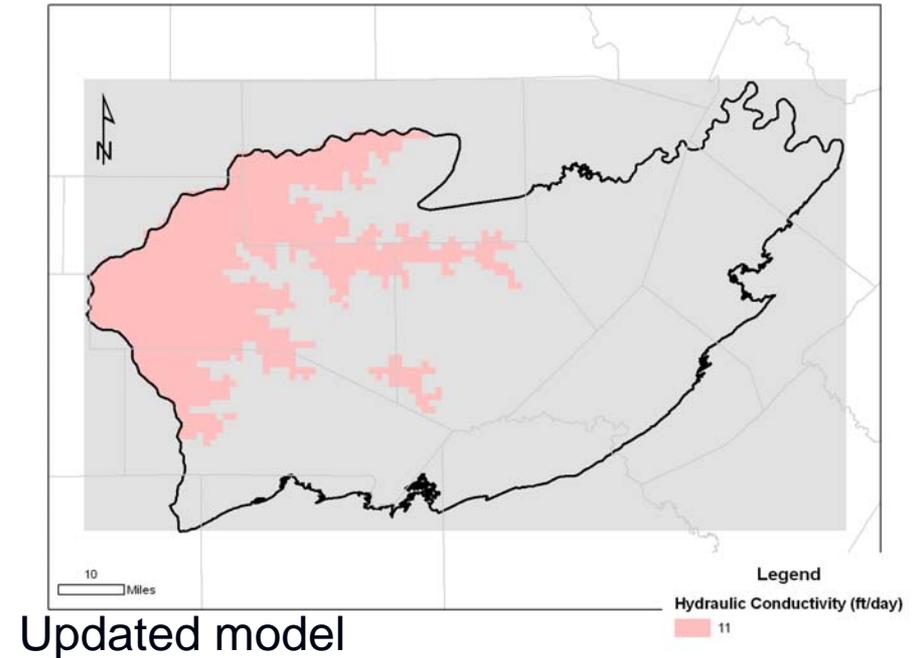
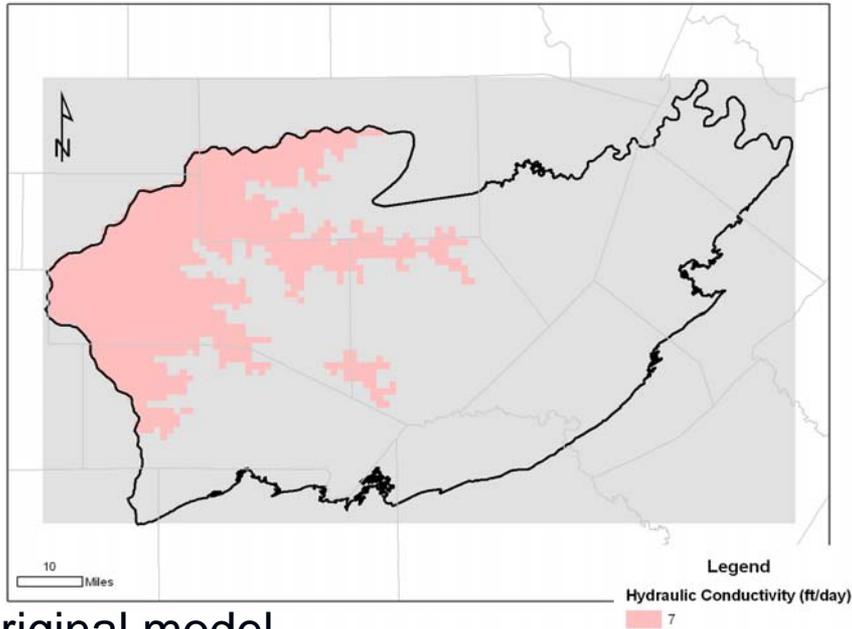
MODEL GRID



Lower Trinity Aquifer

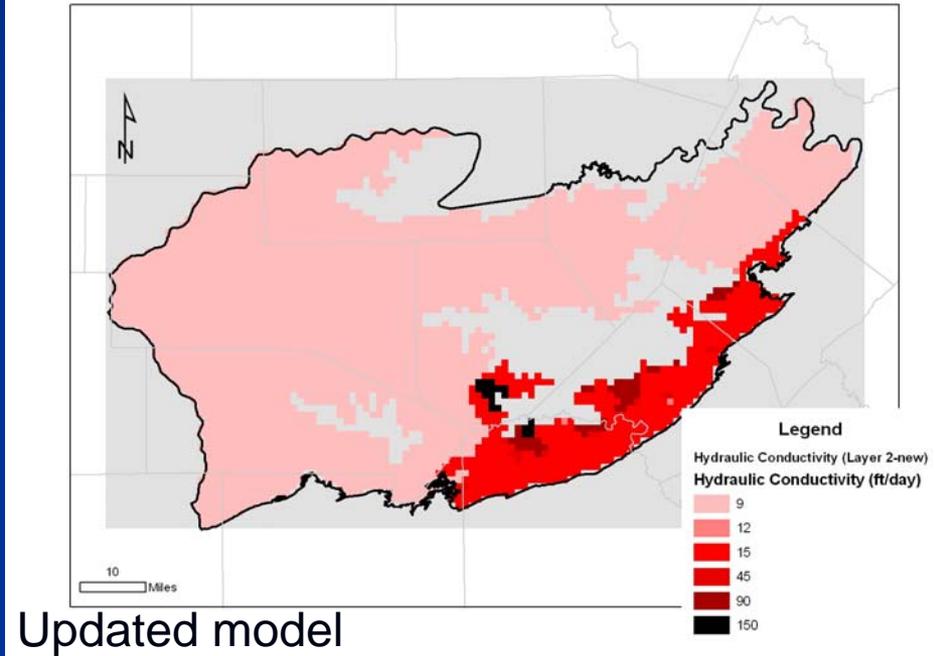
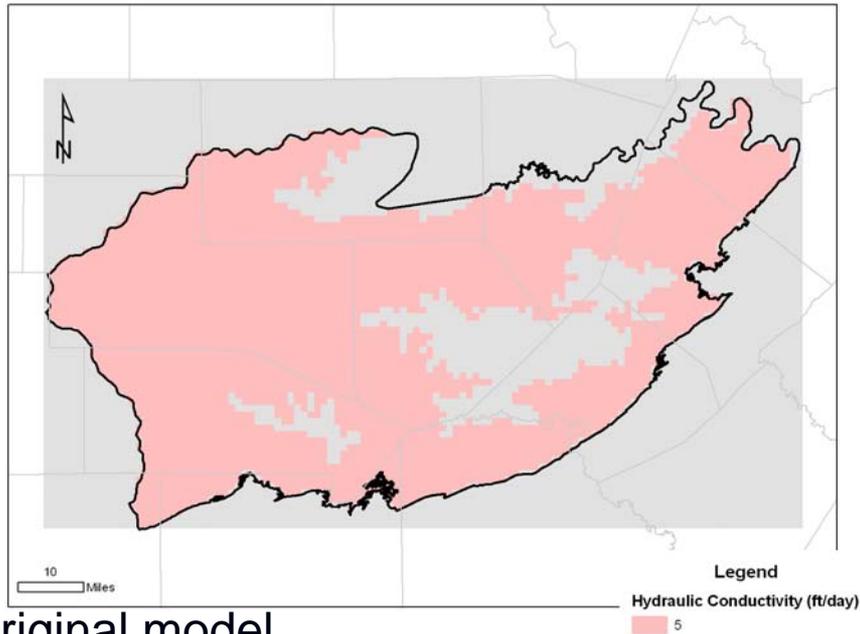
HYDRAULIC CONDUCTIVITY

Edwards Group – Layer 1



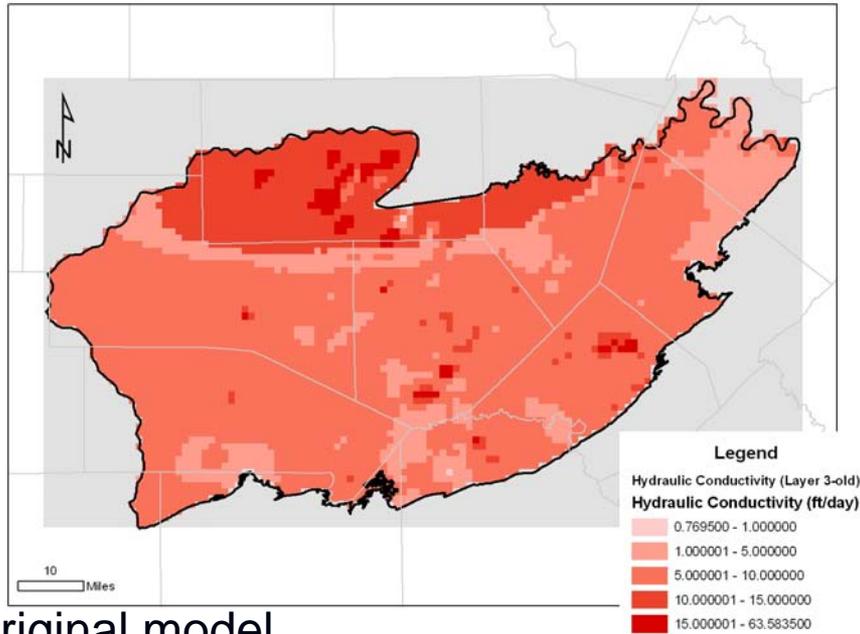
HYDRAULIC CONDUCTIVITY

Upper Trinity Aquifer – Layer 2

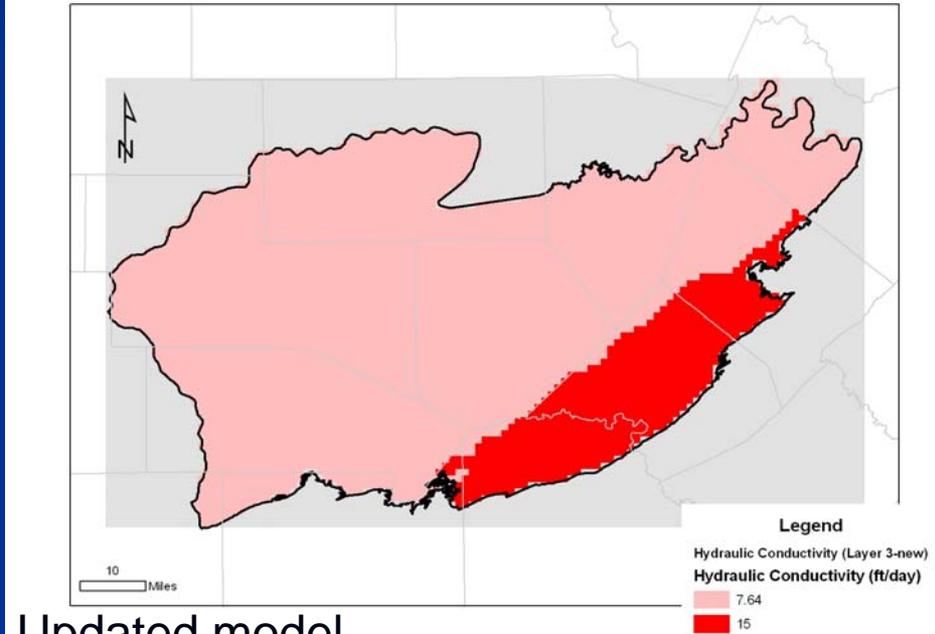


HYDRAULIC CONDUCTIVITY

Middle Trinity Aquifer – Layer 3



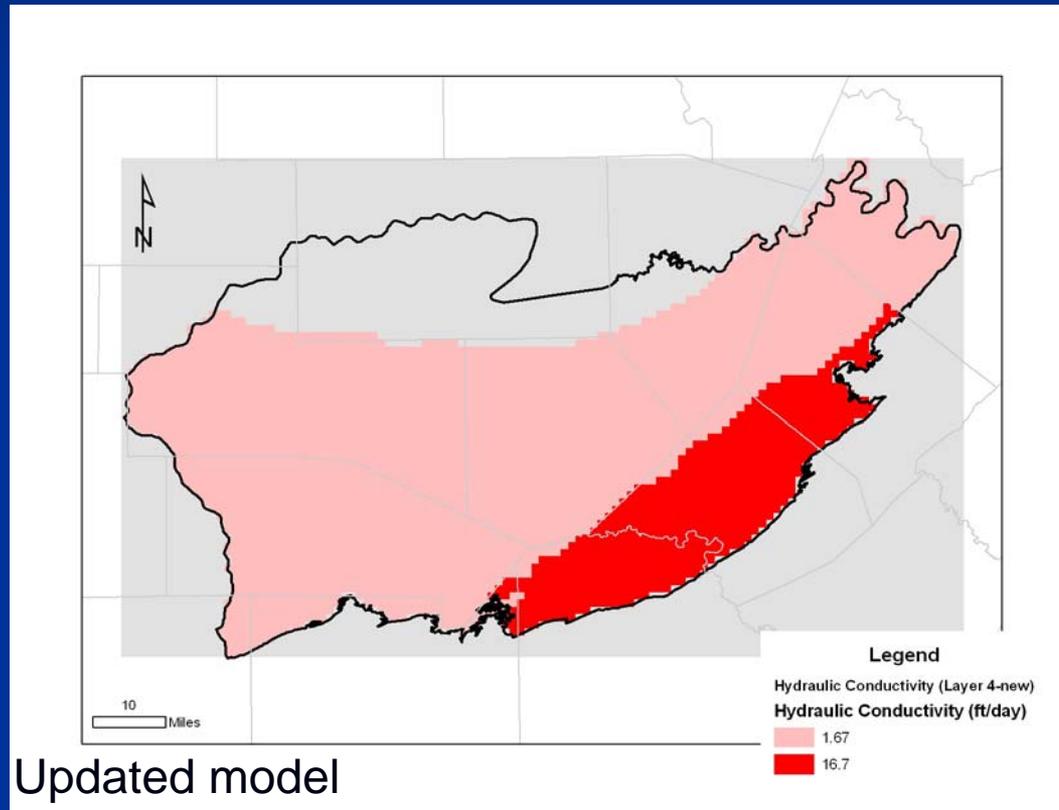
Original model



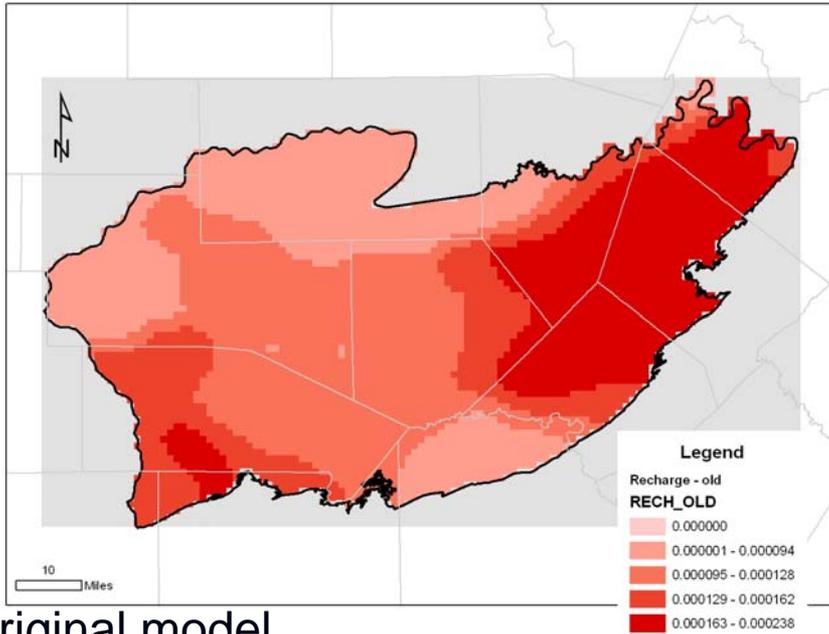
Updated model

HYDRAULIC CONDUCTIVITY

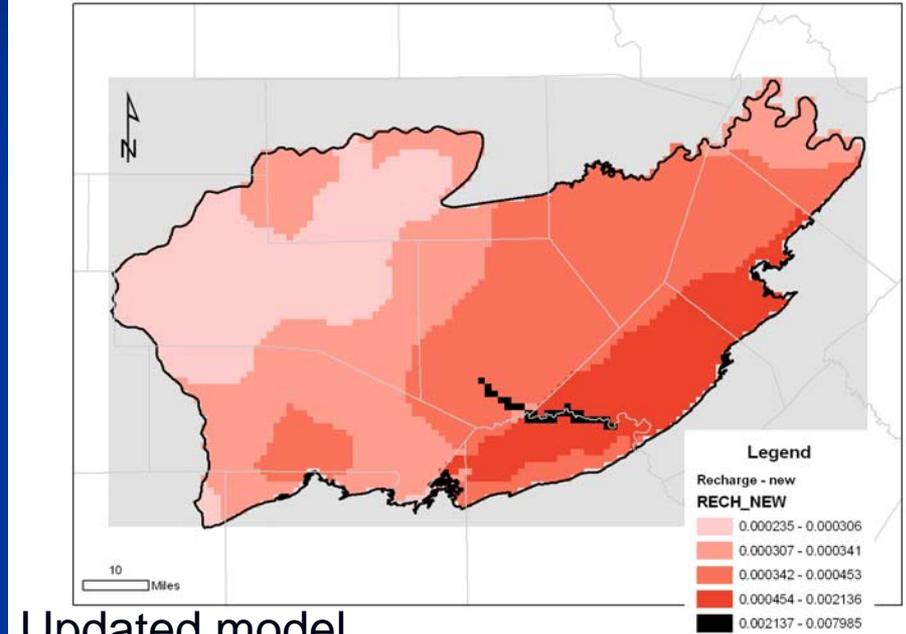
Lower Trinity Aquifer – Layer 4



RECHARGE

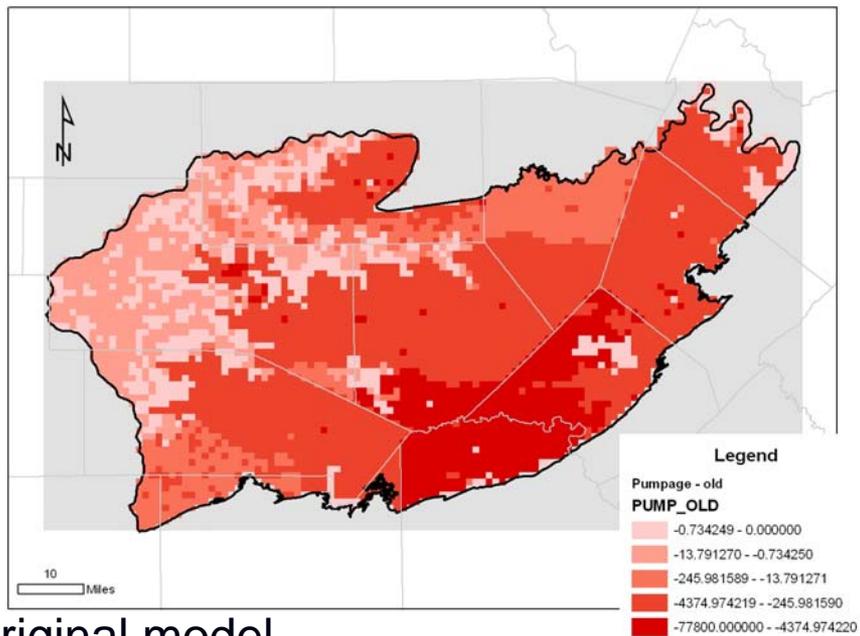


Original model

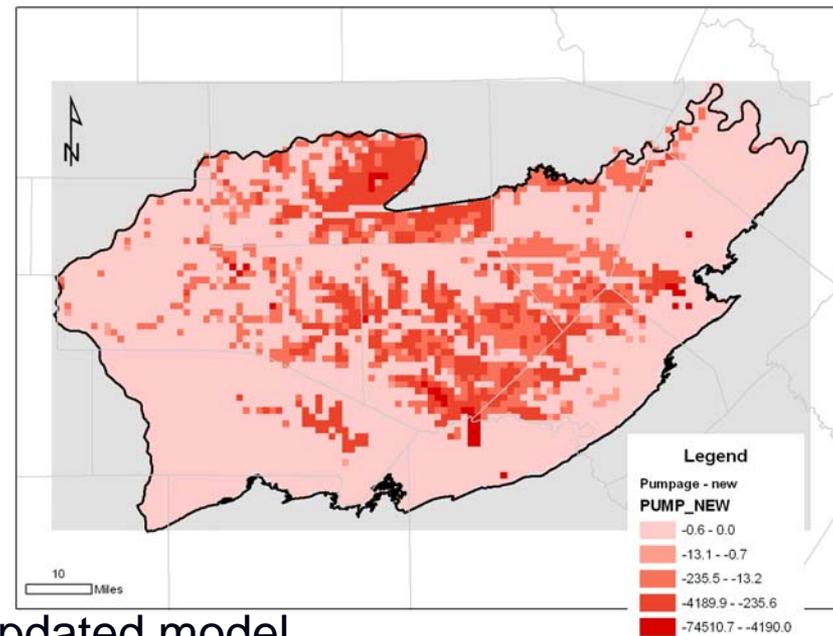


Updated model

PUMPAGE

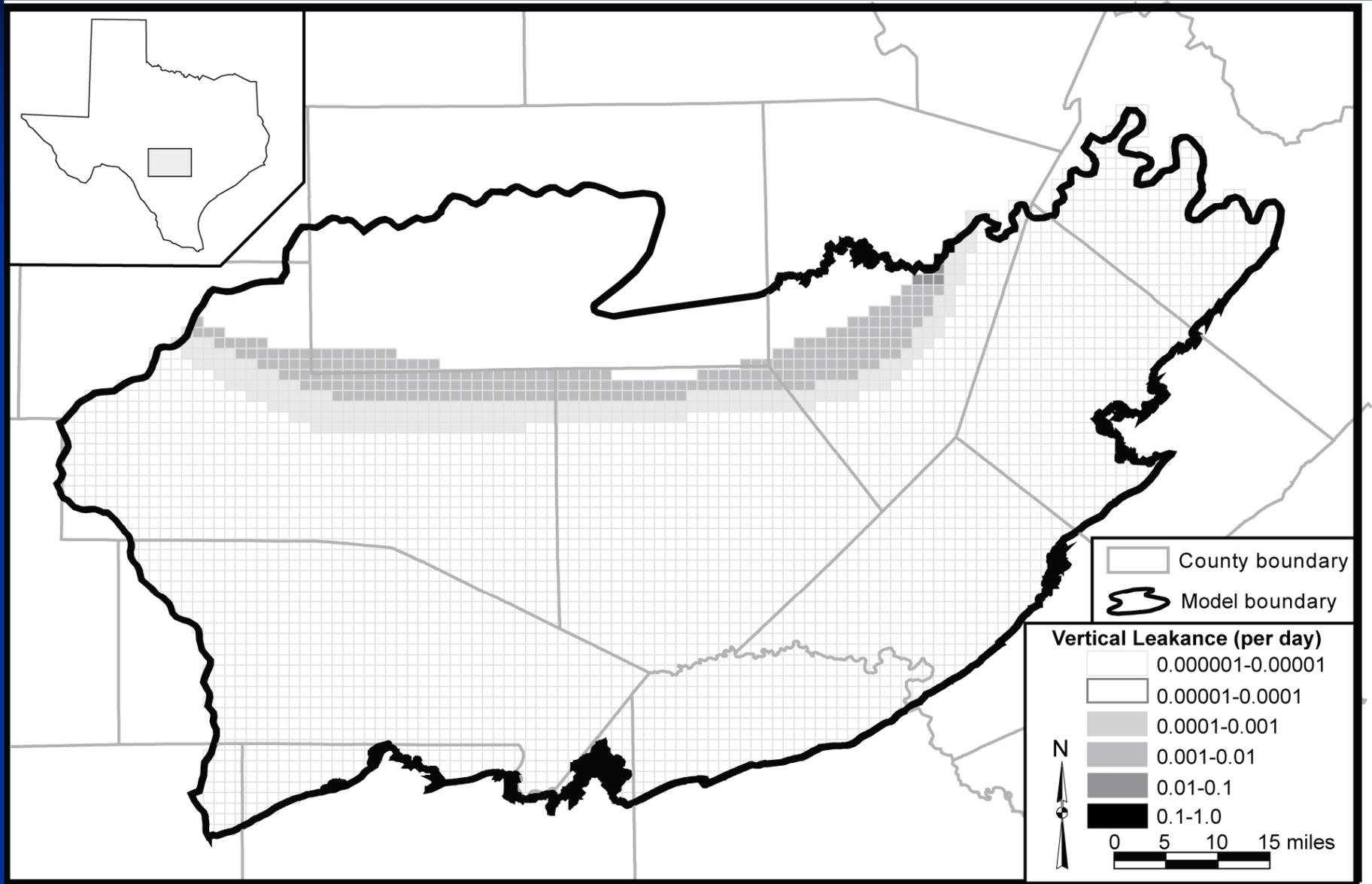


Original model

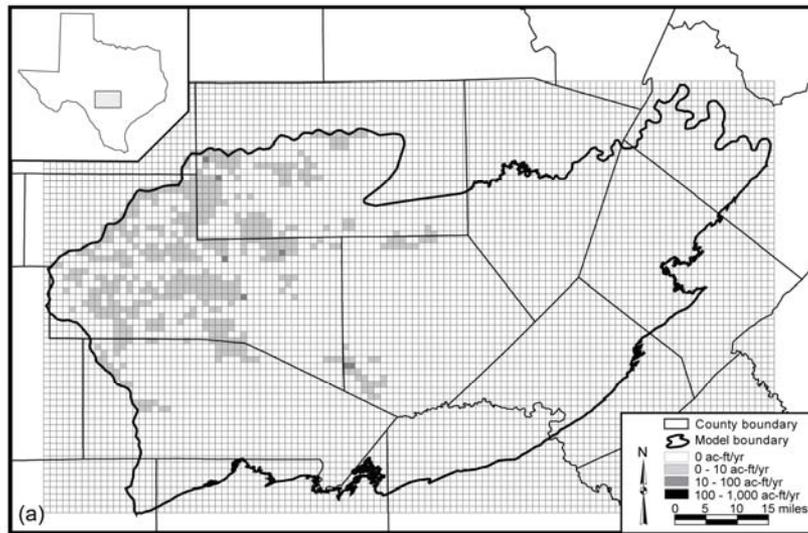


Updated model

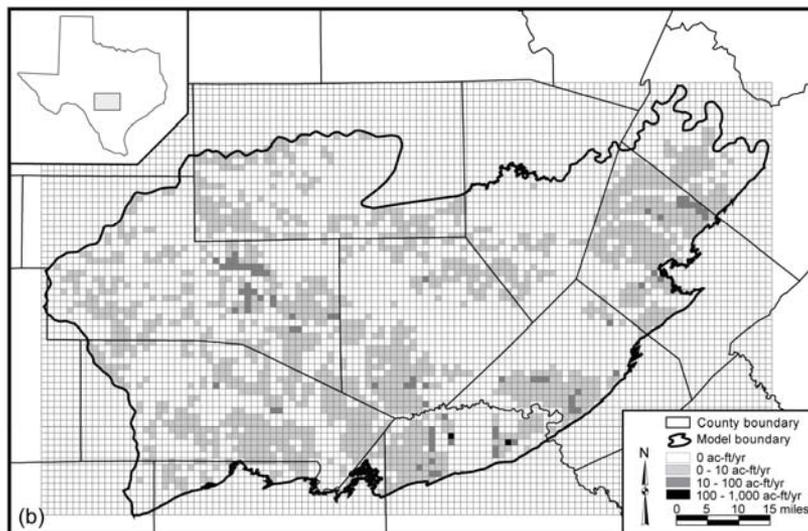
HAMMETT SHALE



PUMPAGE

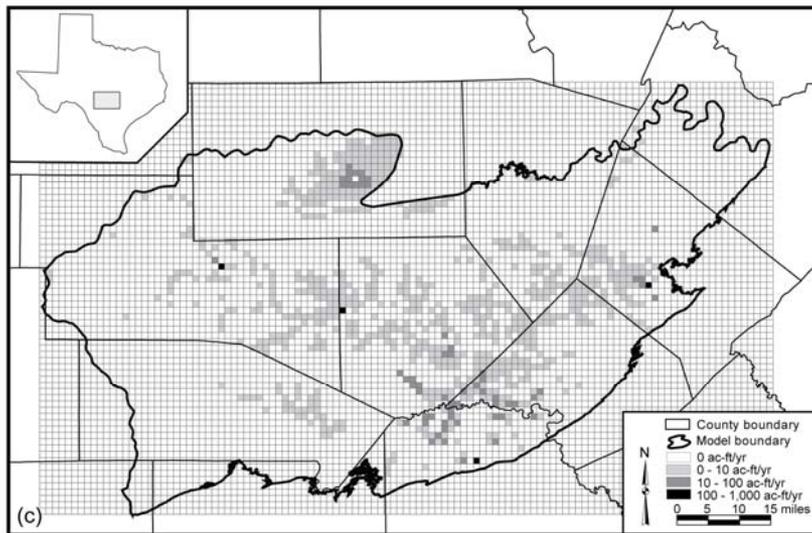


Edwards Group

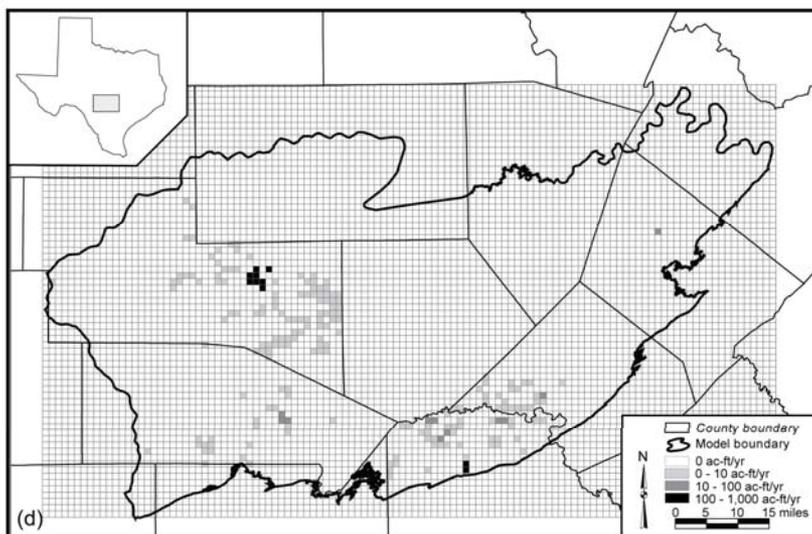


Upper Trinity
Aquifer

PUMPAGE

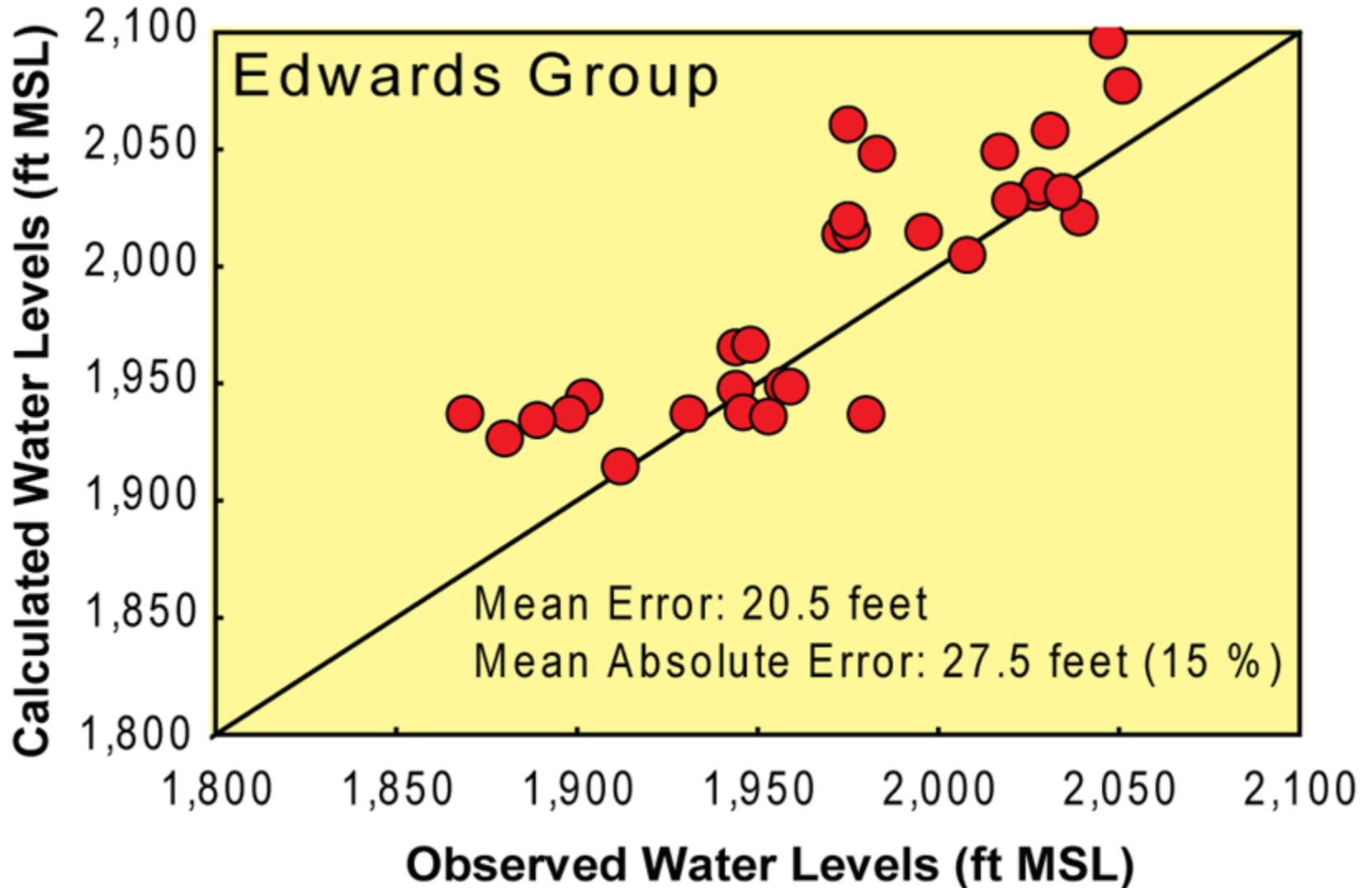


Middle Trinity
Aquifer

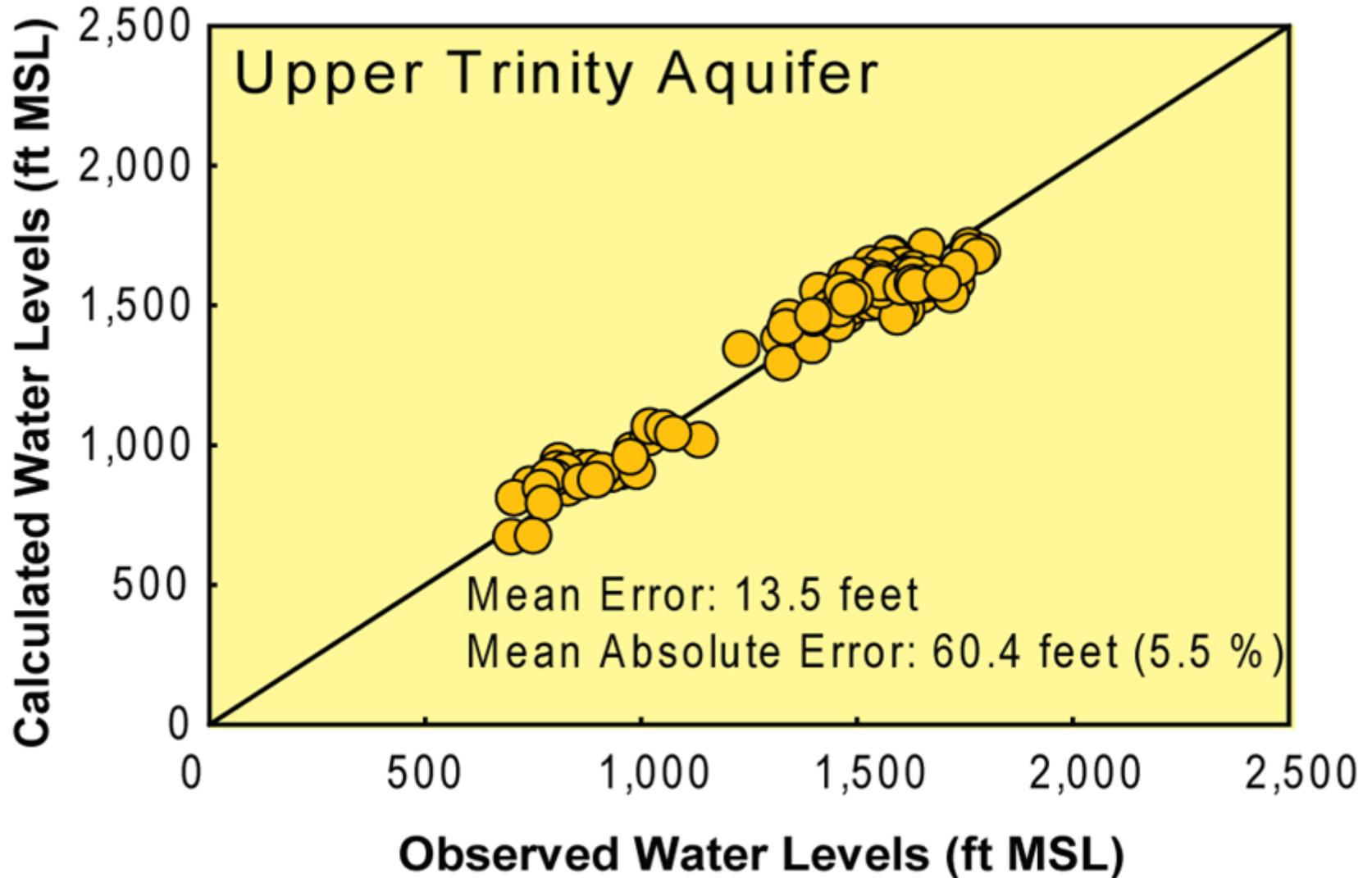


Lower Trinity
Aquifer

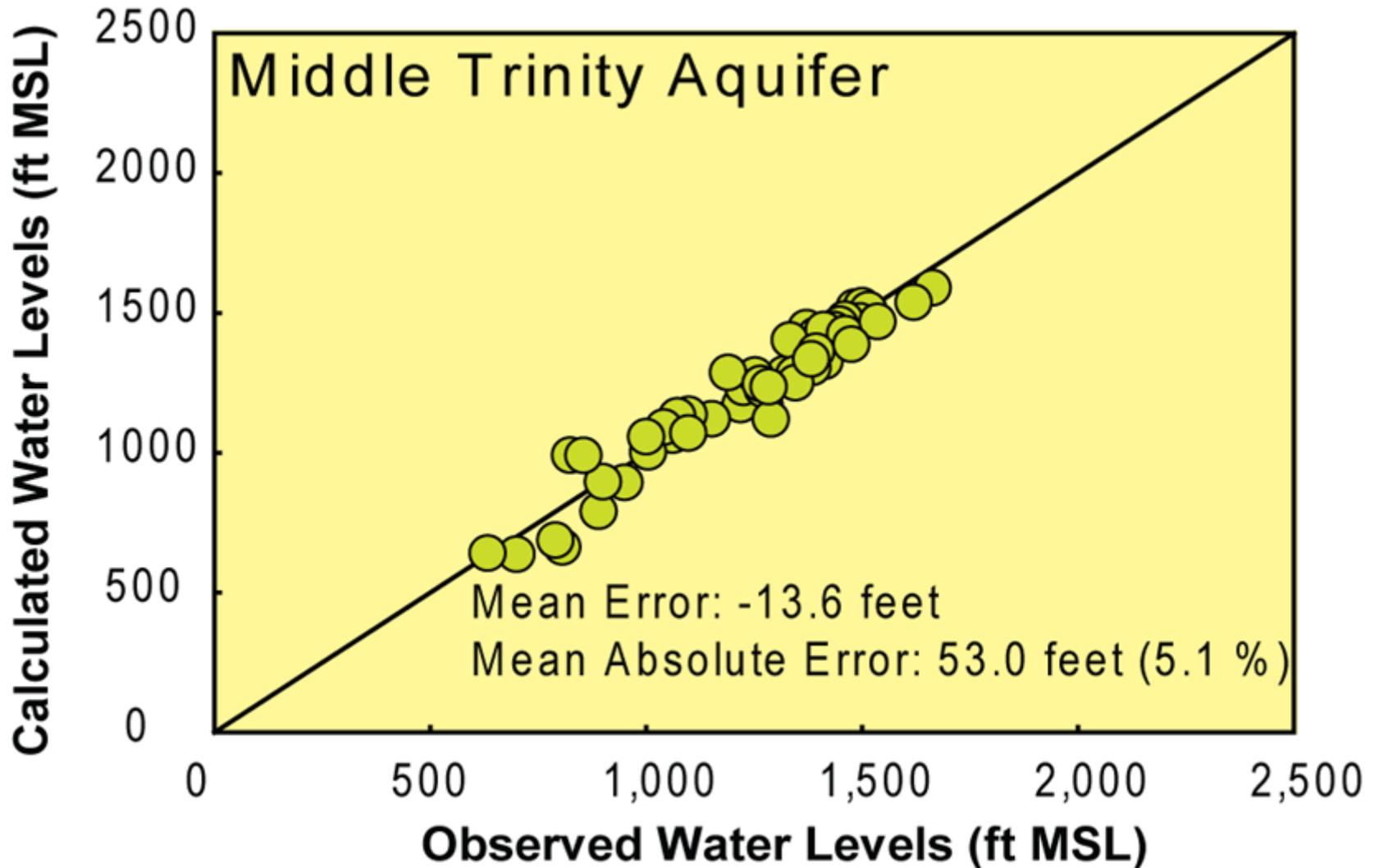
MODEL RESULTS: STEADY-STATE



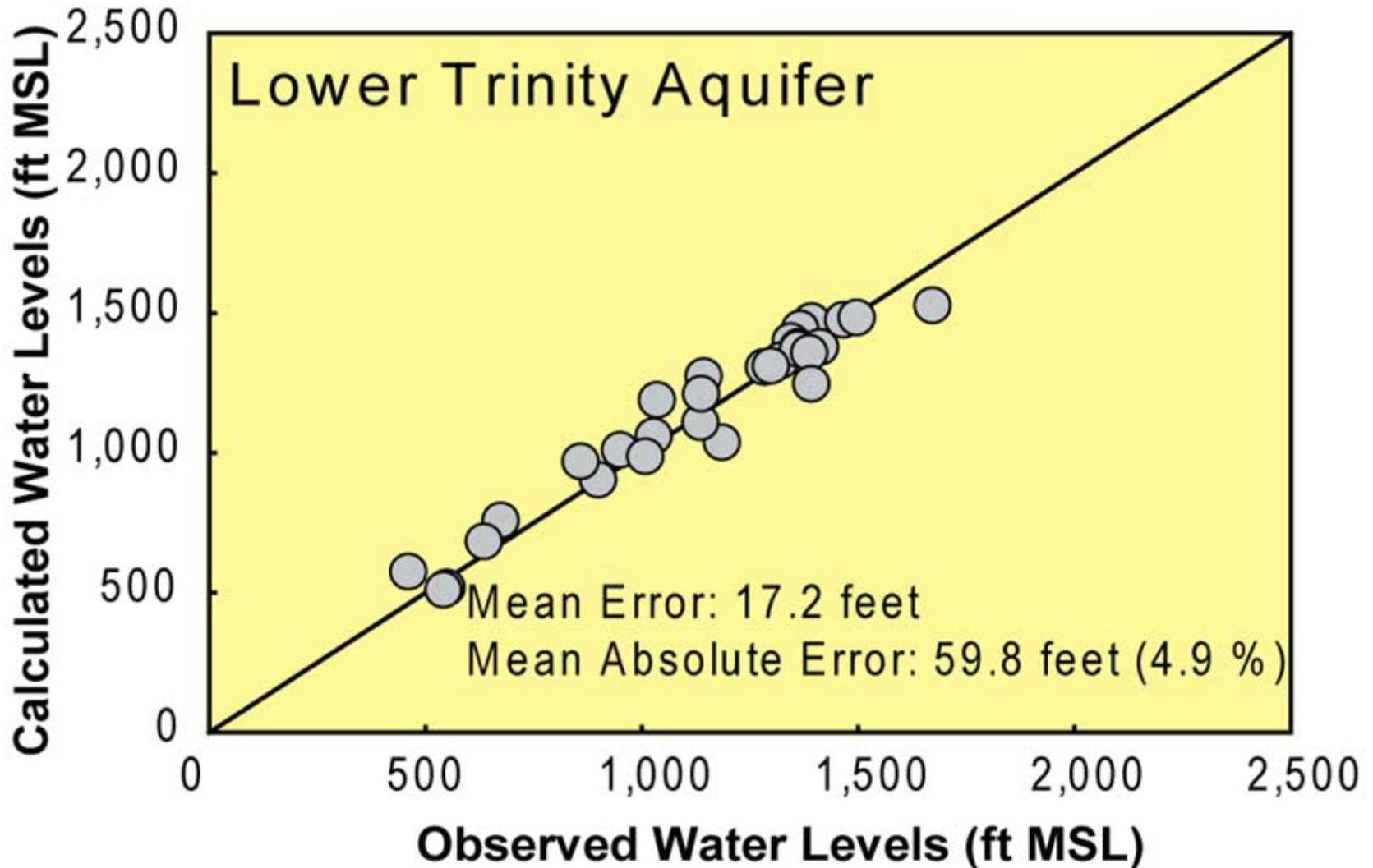
MODEL RESULTS: STEADY-STATE



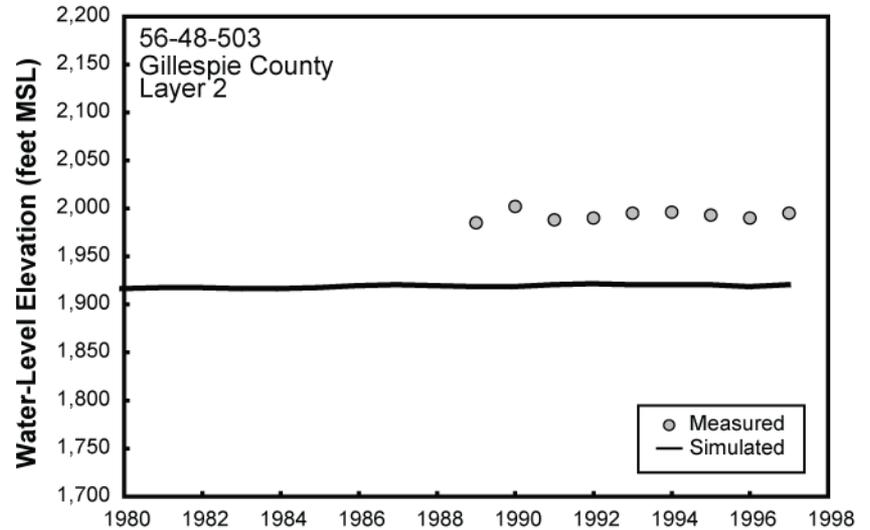
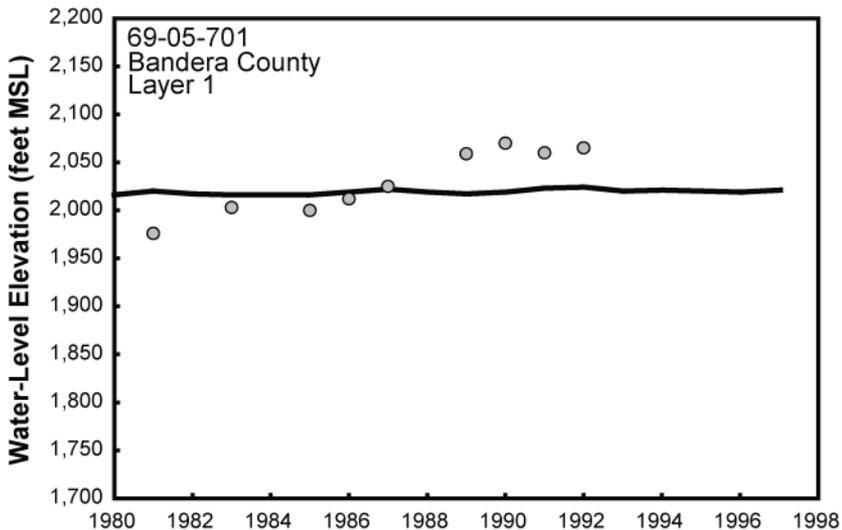
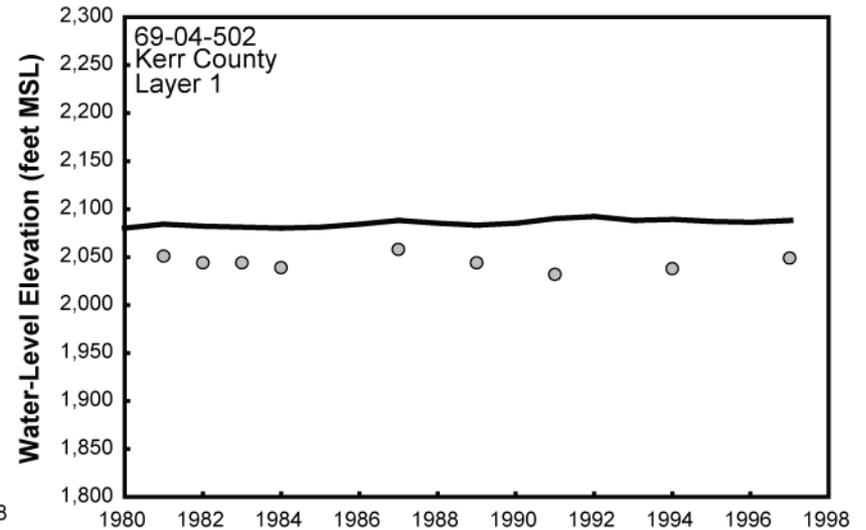
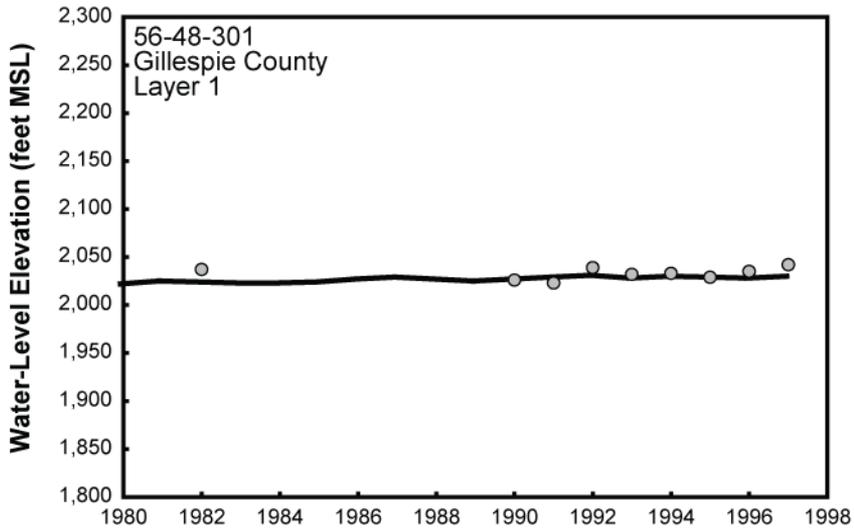
MODEL RESULTS: STEADY-STATE



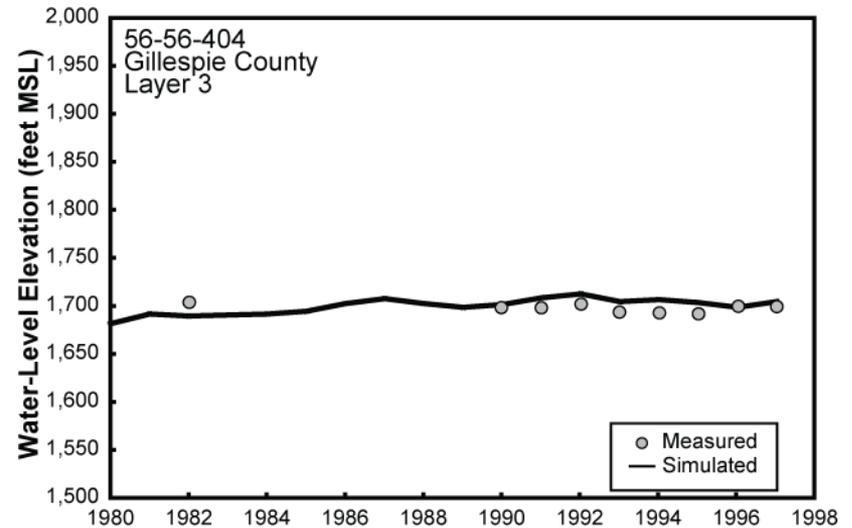
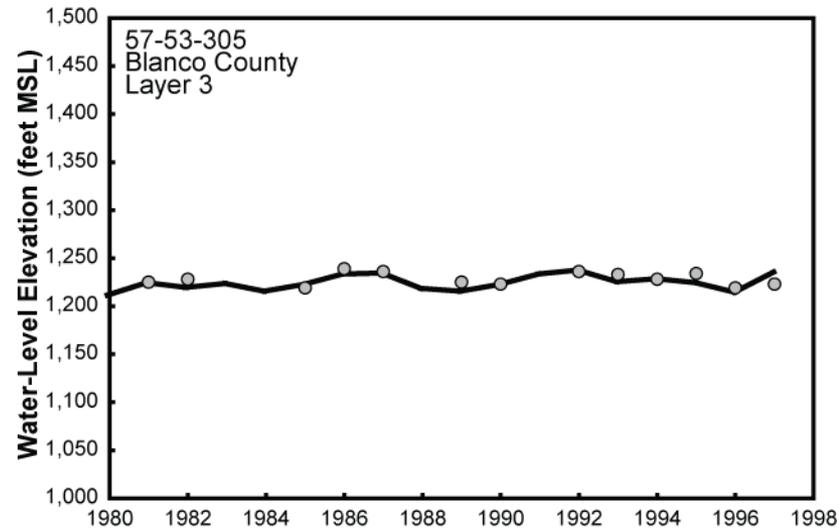
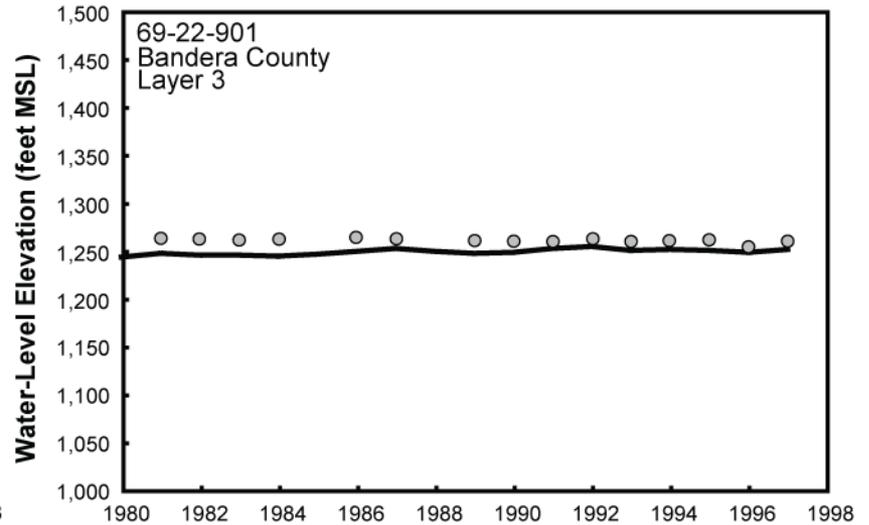
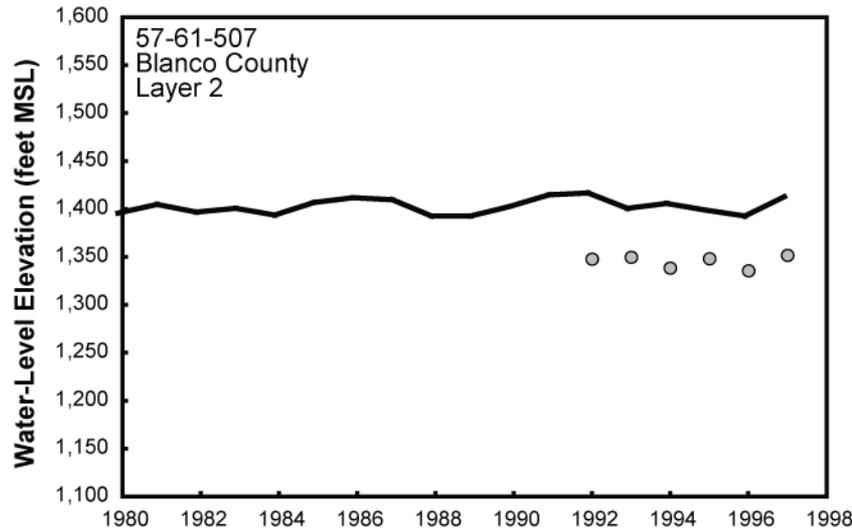
MODEL RESULTS: STEADY-STATE



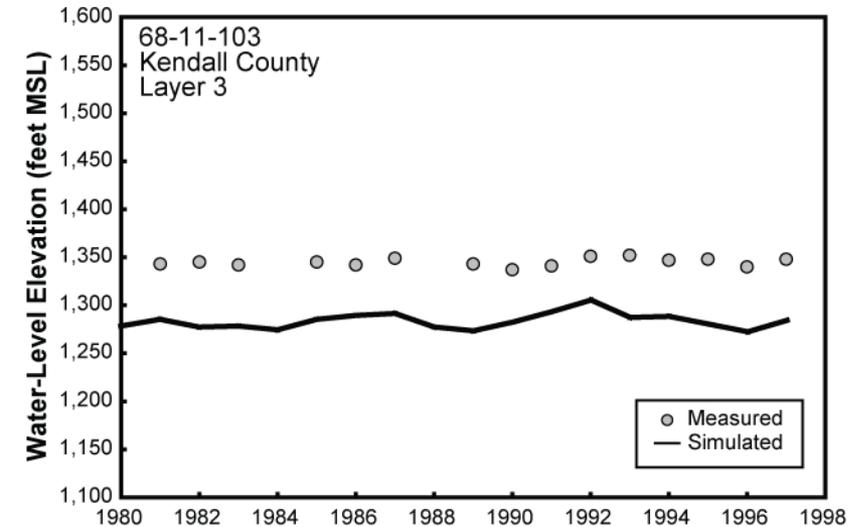
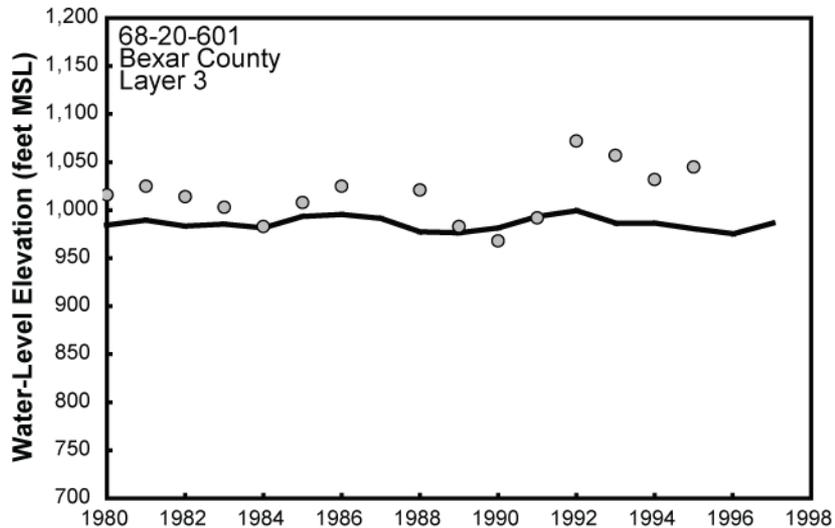
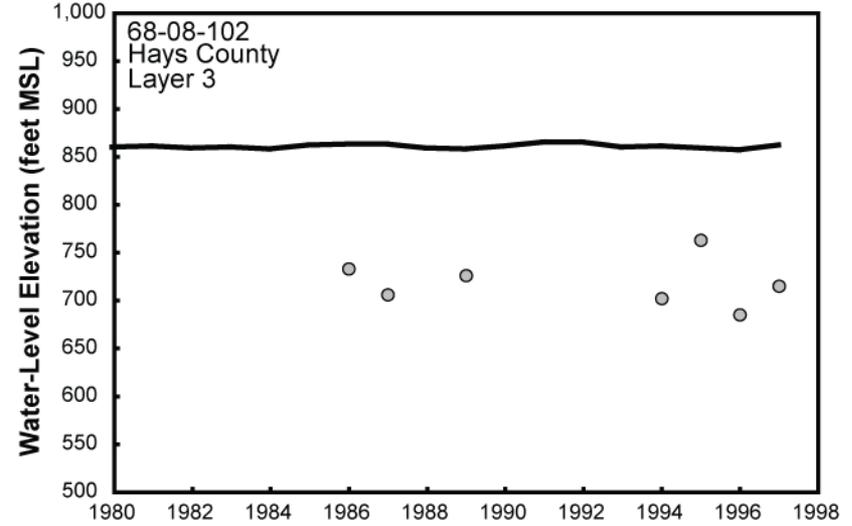
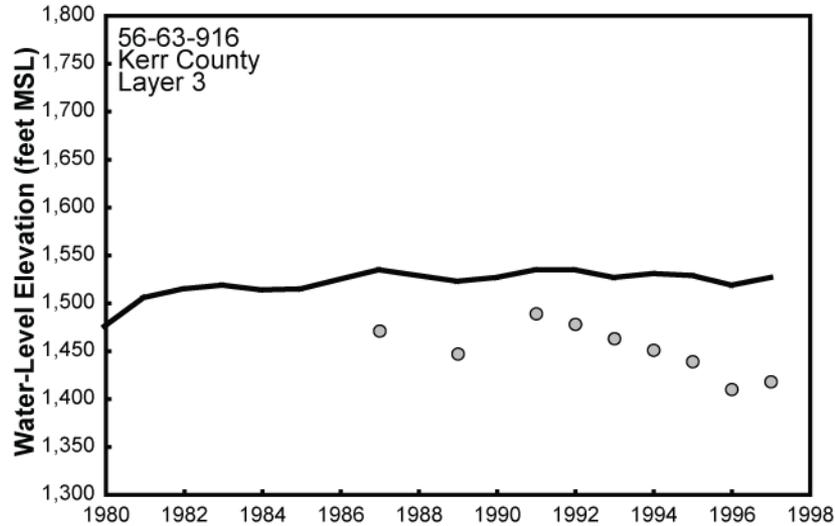
MODEL RESULTS: TRANSIENT



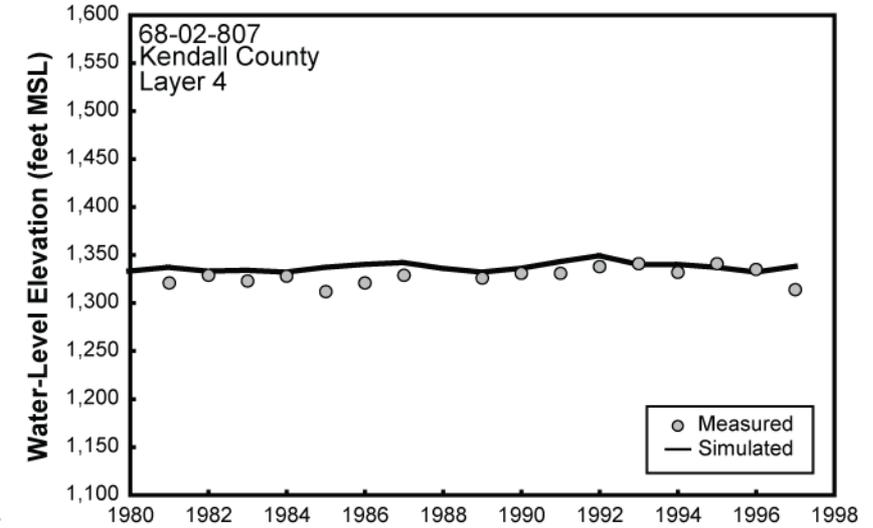
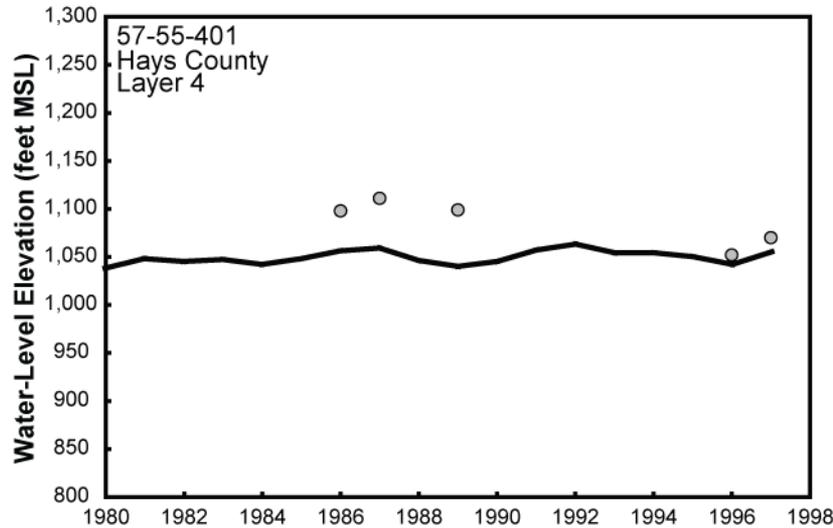
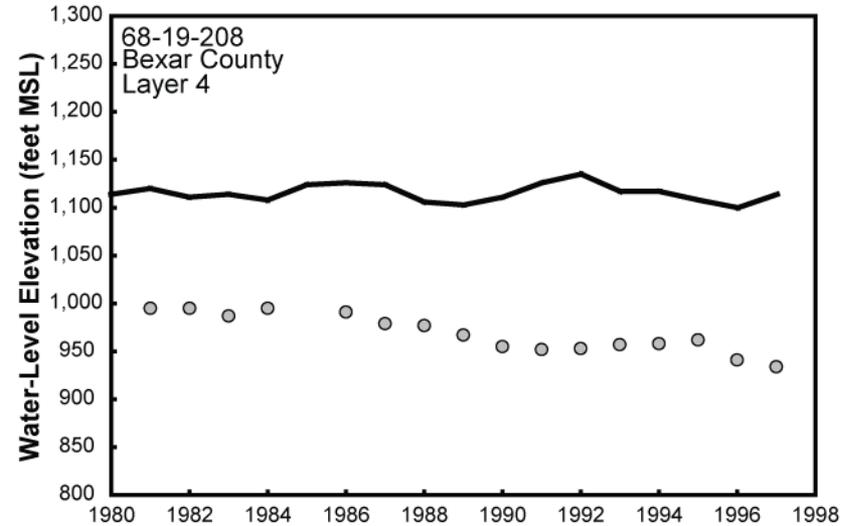
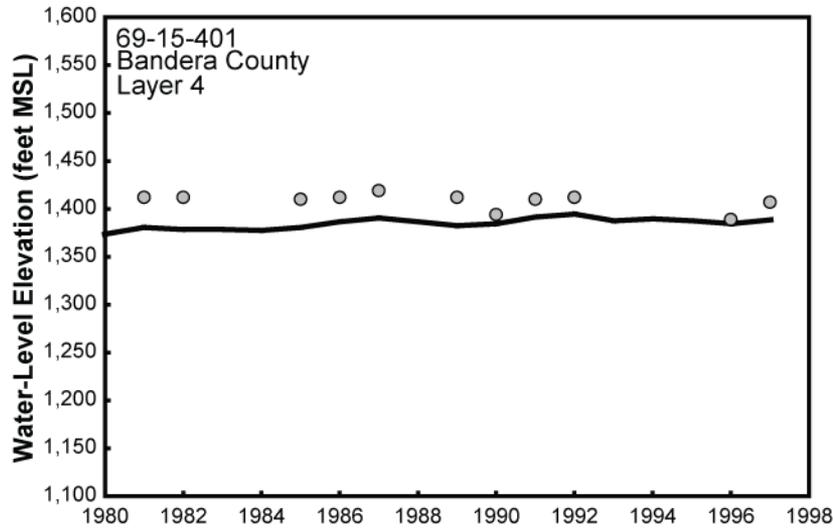
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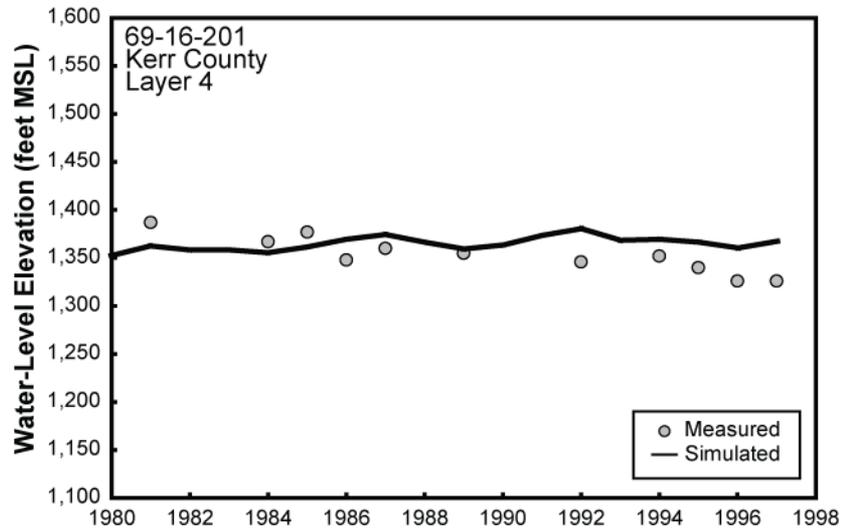
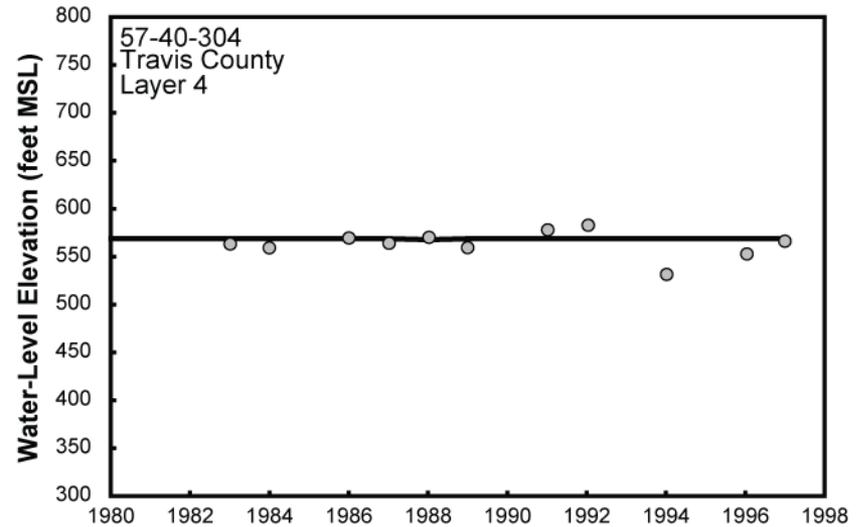
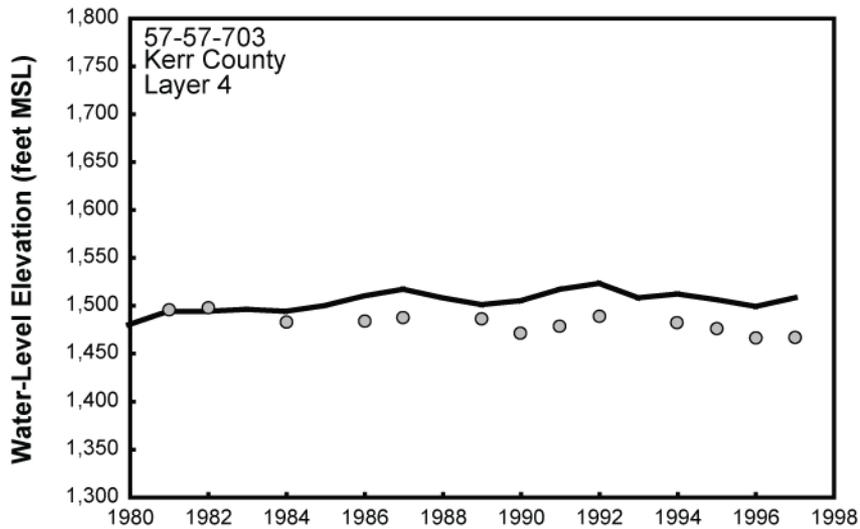
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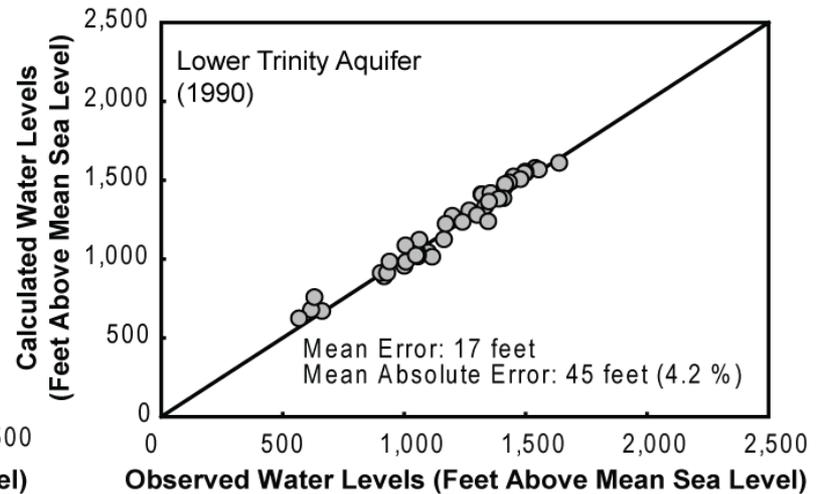
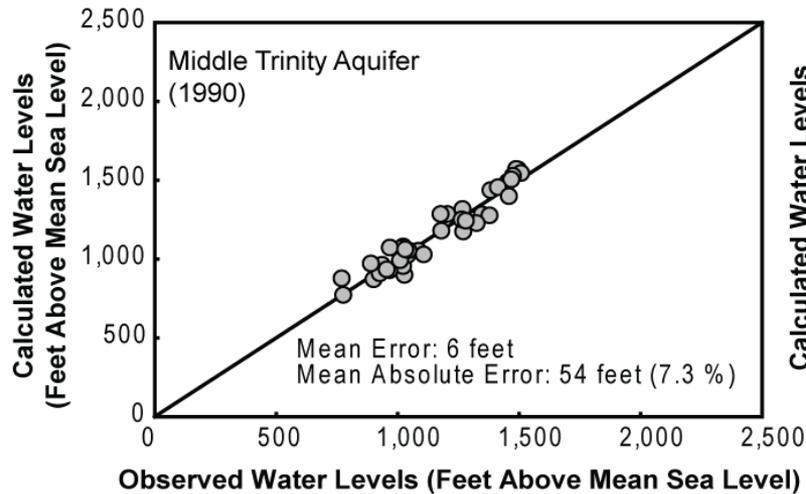
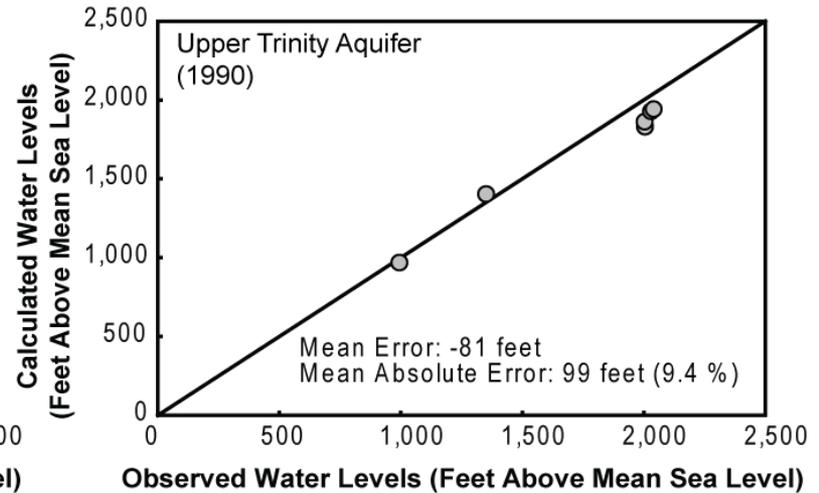
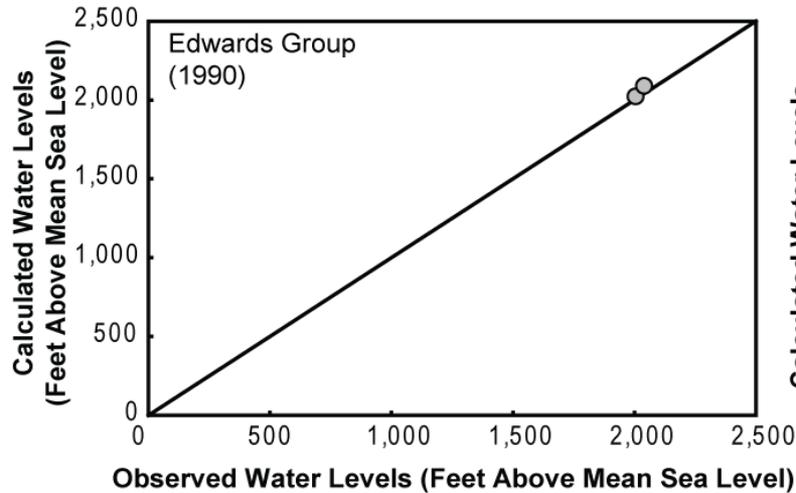
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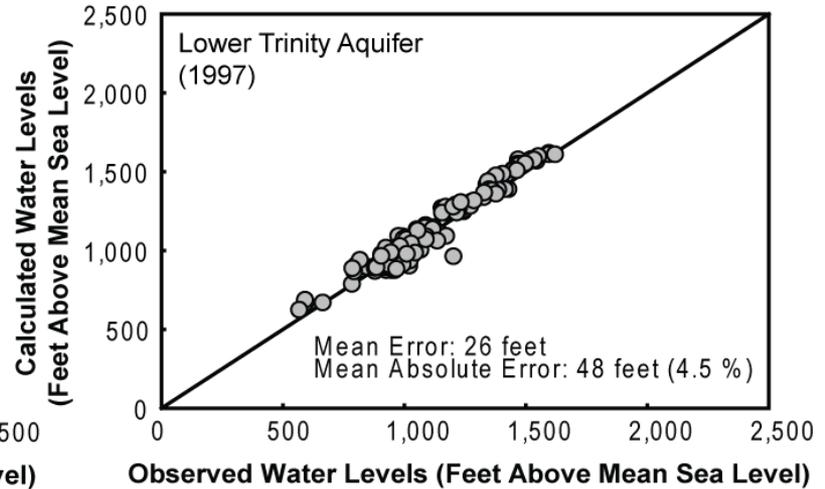
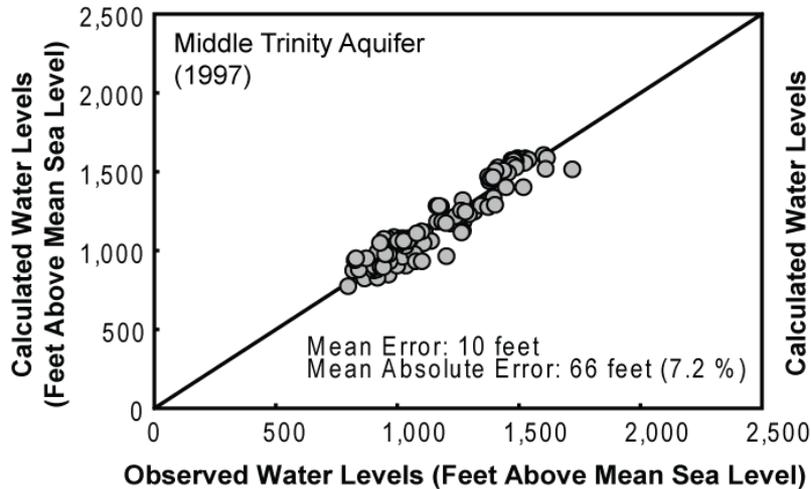
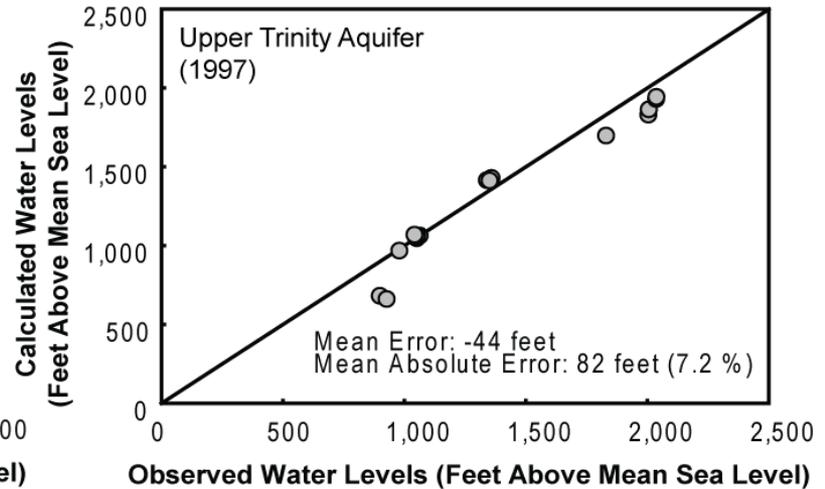
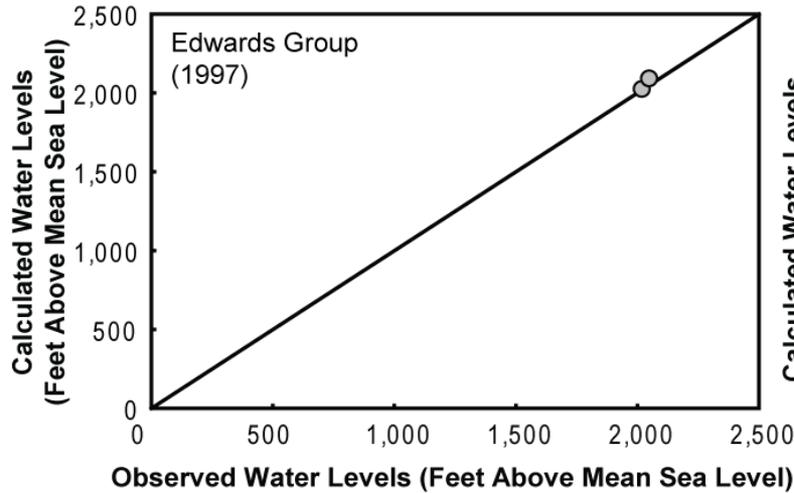
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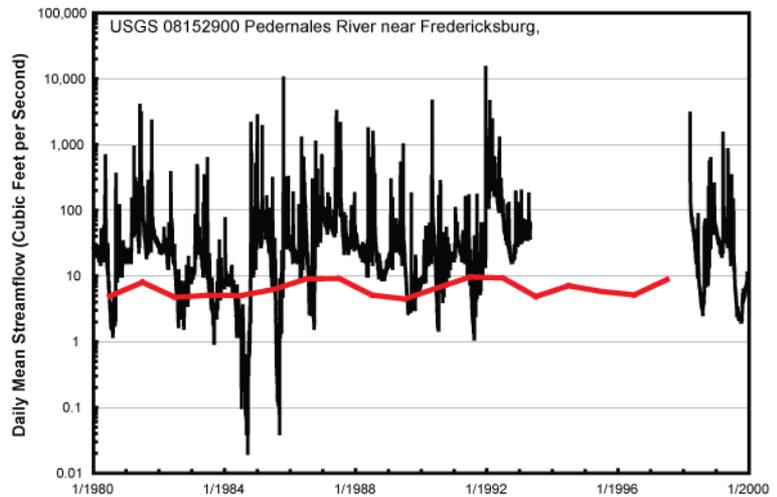
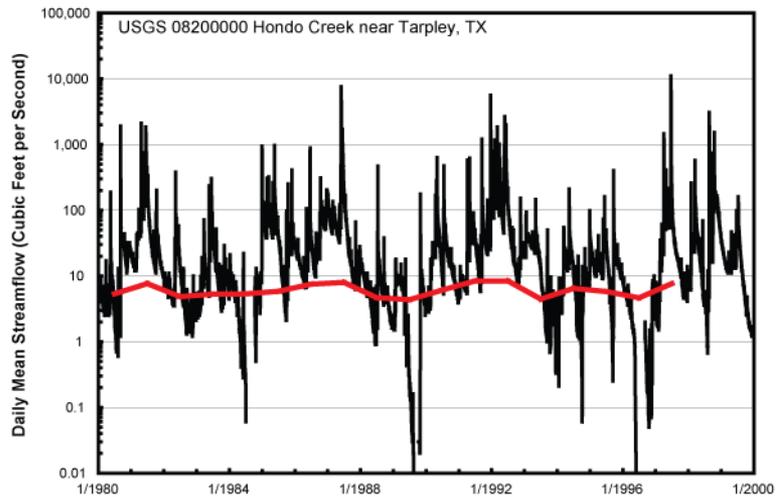
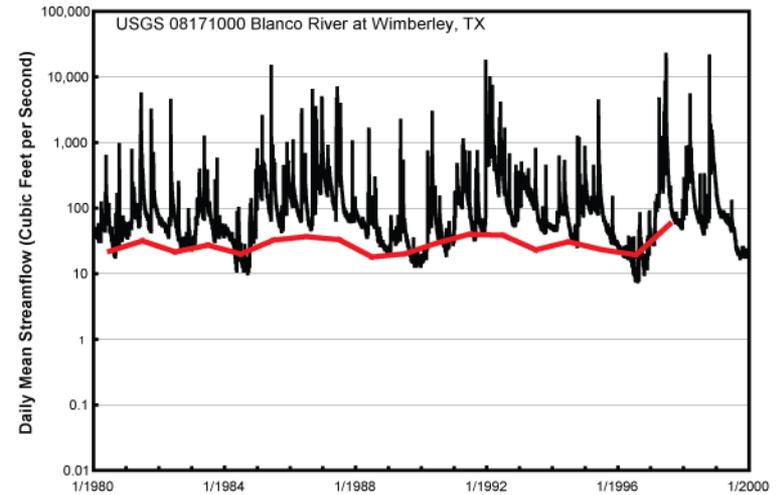
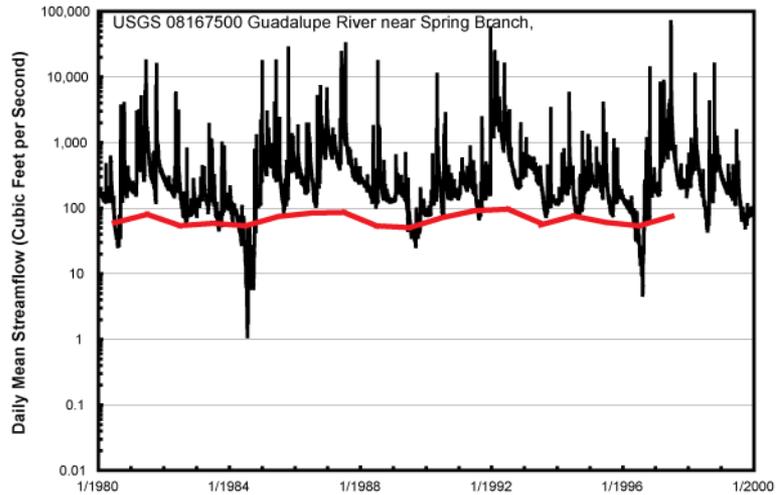
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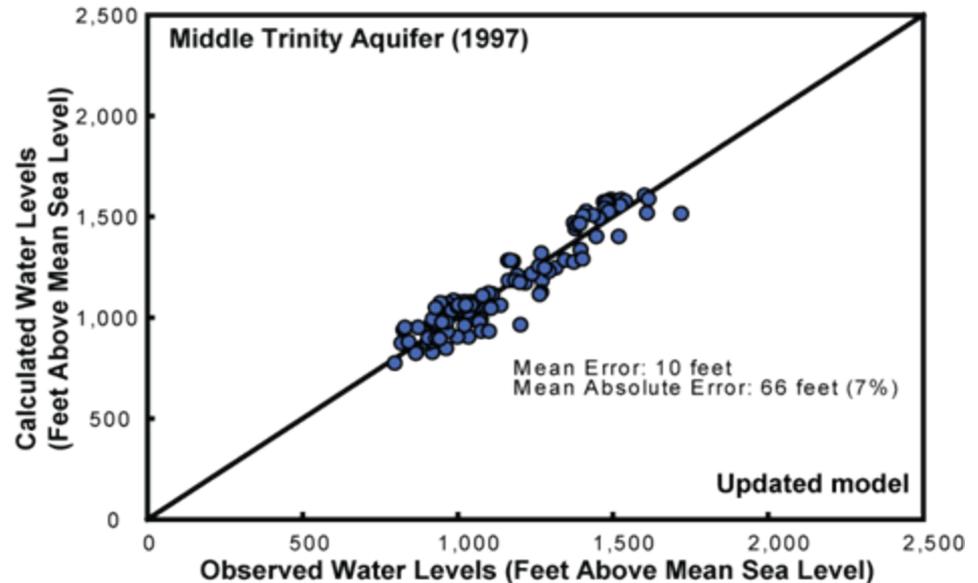
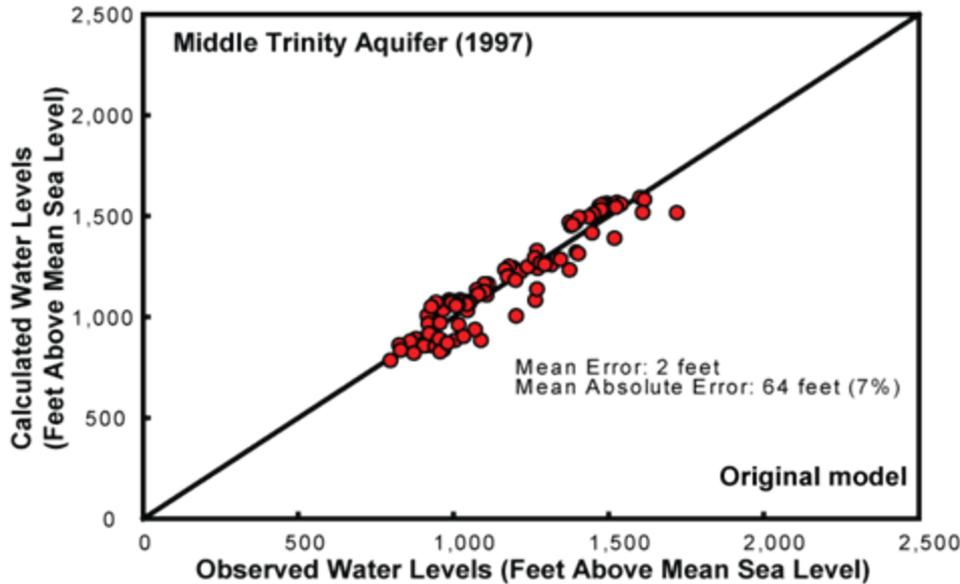
MODEL RESULTS: TRANSIENT



MODEL RESULTS: TRANSIENT



MODEL RESULTS: COMPARISON



WHAT'S NEXT?

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

http://www.twdb.state.tx.us/gam/trnth/Trinity-Hill_Country_Updated_Report.pdf

Send comments to:

Dr. Ian Jones: ian.jones@twdb.state.tx.us (512-936-0848)



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 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.*