



Welcome

to the

Igneous and West Texas Bolsons

Aquifers Modeling Project

Stakeholder Advisory Forum

Thank you for signing in early.

The meeting will begin at 10:00 am, Central Daylight Time

Please stay muted during the meeting and use the chat box to submit questions

Meeting Information

- An audio and video recording of the meeting, presentation, and the report summarizing the meeting will be made available on the project's TWDB website
- <https://www.twdb.texas.gov/groundwater/models/gam/wtbi/wtbi.asp>

Outline

- Igneous and West Texas Bolsons aquifers
 - Study area
 - Hydrologic setting
- Conceptual model
- Project schedule

Texas Water Development Board (TWDB) Groundwater Modeling (GAM) Program



Groundwater Modeling Program
Texas Water Development Board

What is the Texas Water Development Board?



Not regulatory agency like Texas Commission on Environmental Quality.



Science: Groundwater, surface water, innovative water technology, conservation, education, flooding.



Planning: Assist with regional planning and state planning (drought and flood plans)



Funding: We assist with implementing water projects with funding

Groundwater Modeling (GAM) Program



Aim: Develop groundwater flow models for the major and minor aquifers of Texas.



Purpose: Tools that can be used to aid in groundwater resources management by stakeholders.



Public process: Stakeholder involvement during model development process.

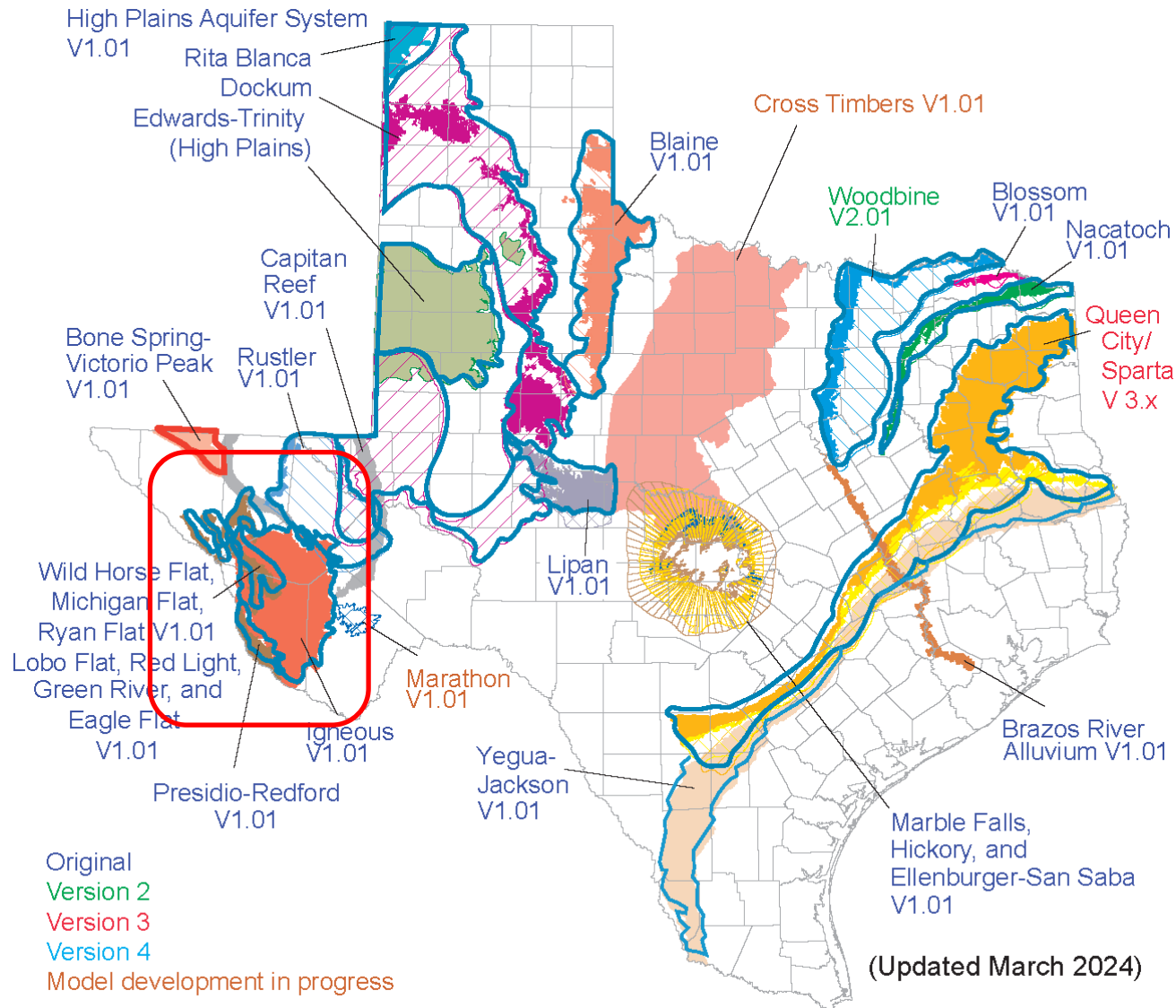


Models: Freely available, standardized, thoroughly documented. Reports, data, models are available for download from TWDB download page for models.



Living tools: Periodically updated.

GAMs for Minor Aquifers



Why Stakeholder Advisory Forums?



Keep stakeholders updated about progress of the modeling project



Inform how the groundwater model can, should, and should not be used



Provide stakeholders with the opportunity to provide input and data to assist with model development

Contact Information

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Texas Water Development Board
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Austin, Texas 78711-3231

Web information:

<https://www.twdb.texas.gov/groundwater/models/gam/wtbi/wtbi.asp>

Igneous and West Texas Bolsons Aquifers

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

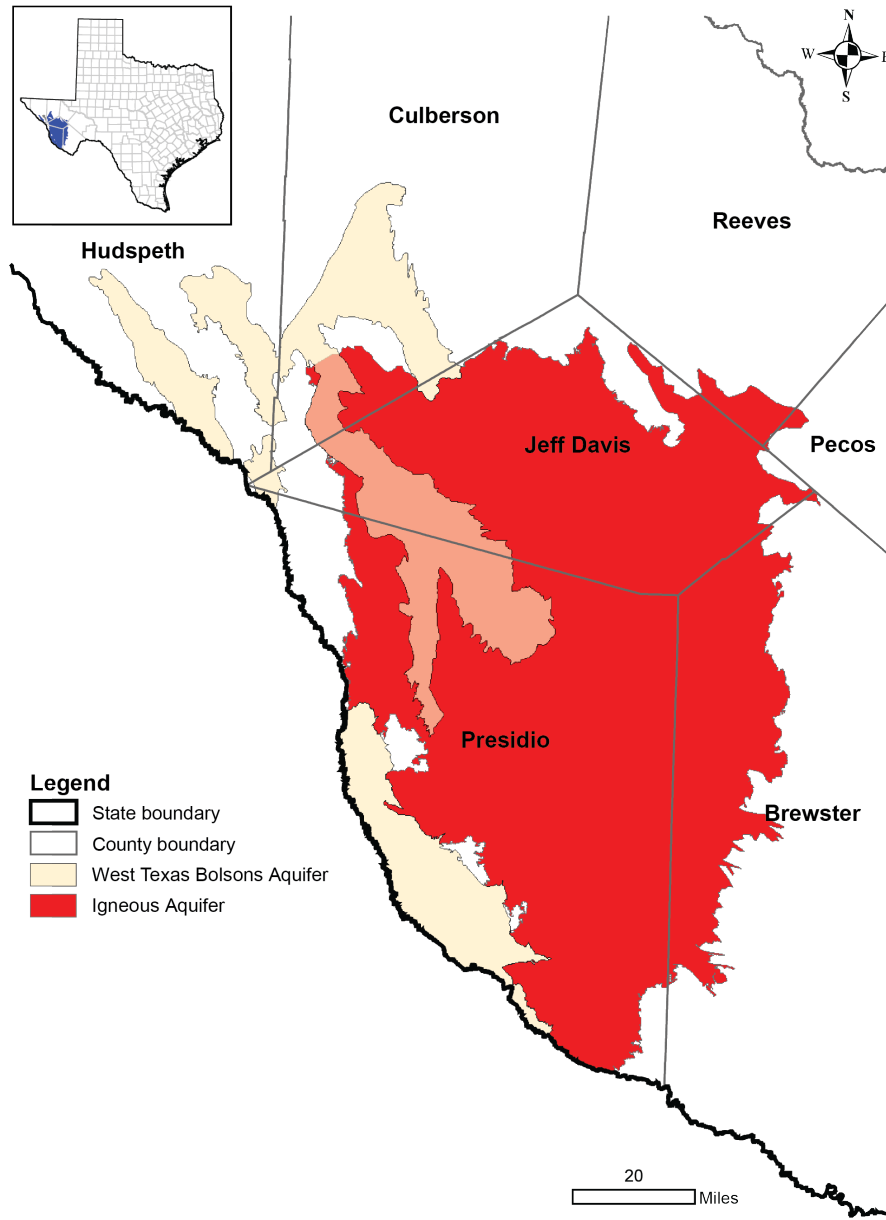
April 4, 2024

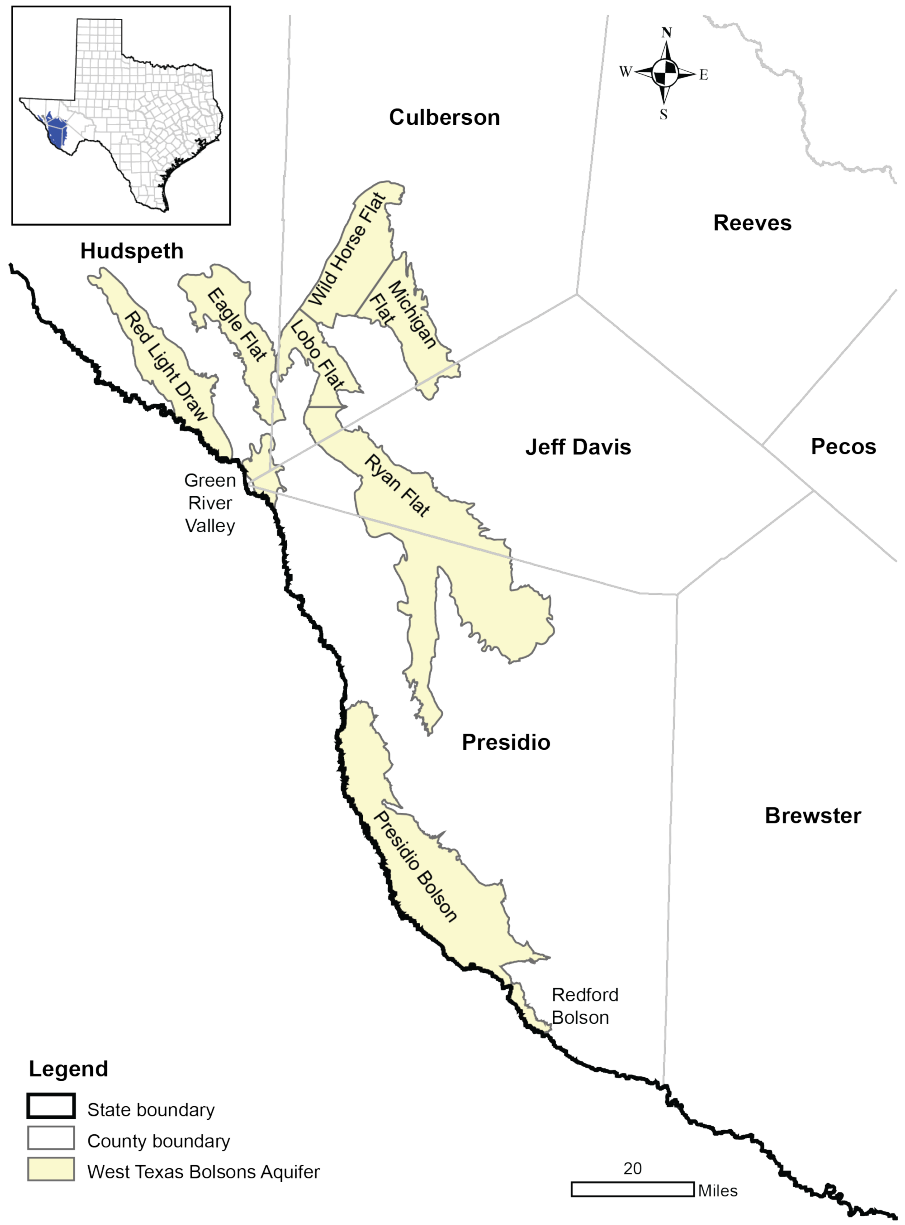


STUDY AREA






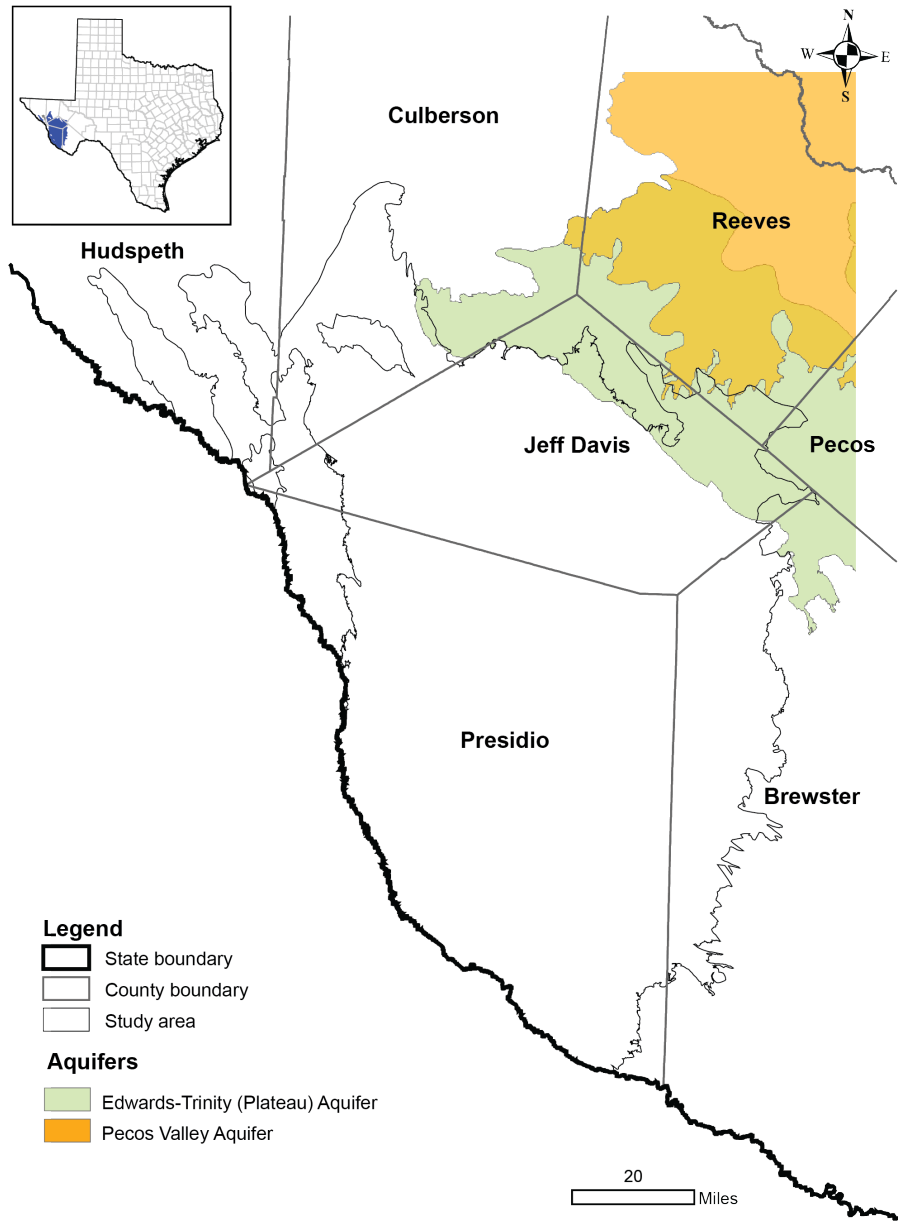
Ryan Flat

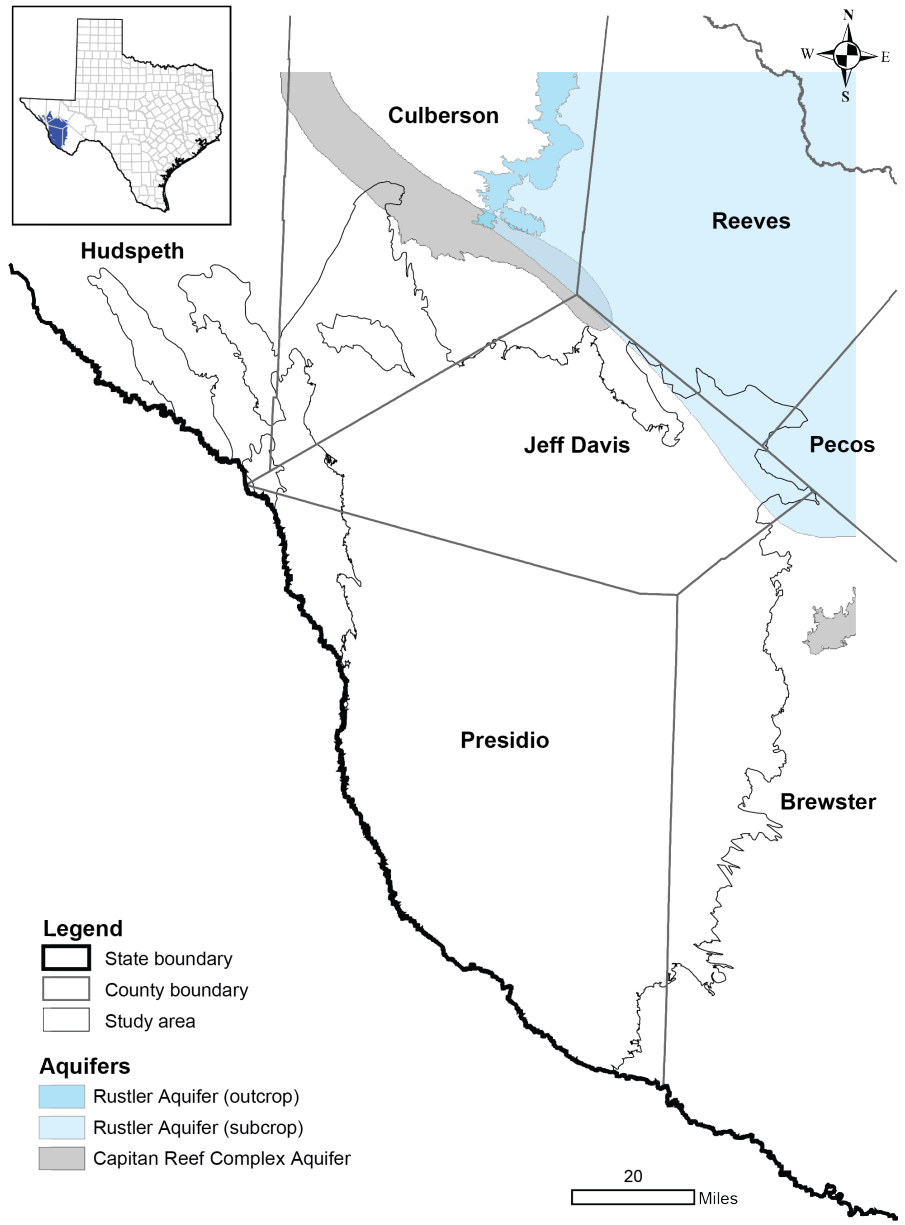


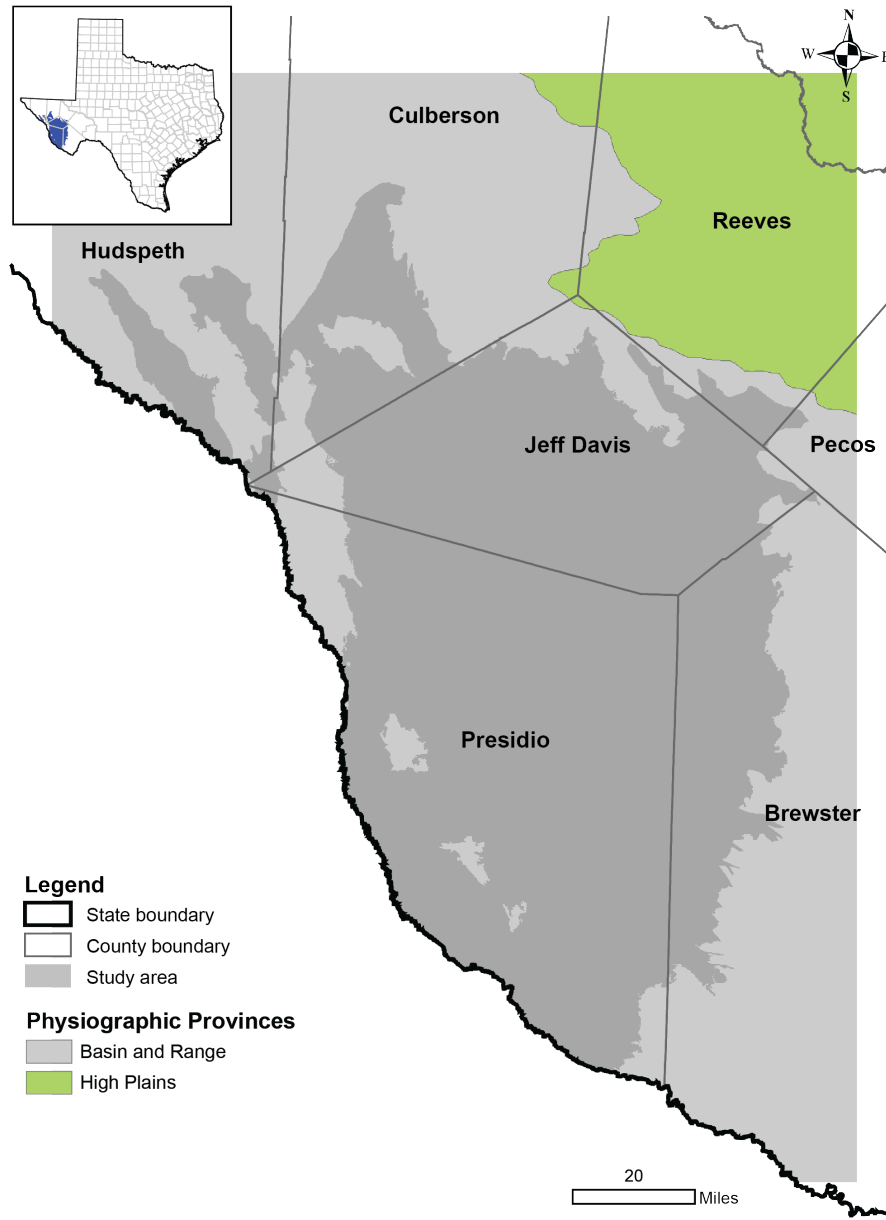


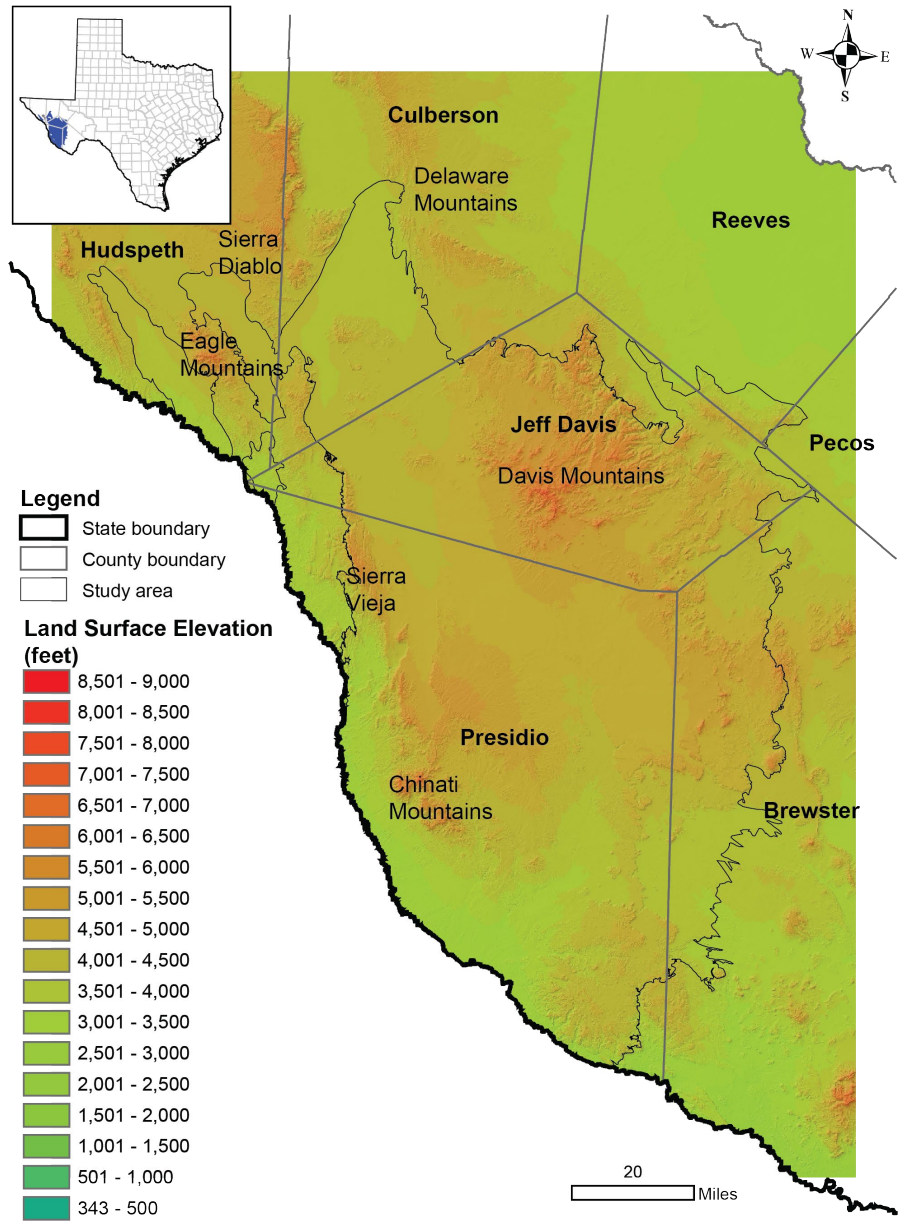
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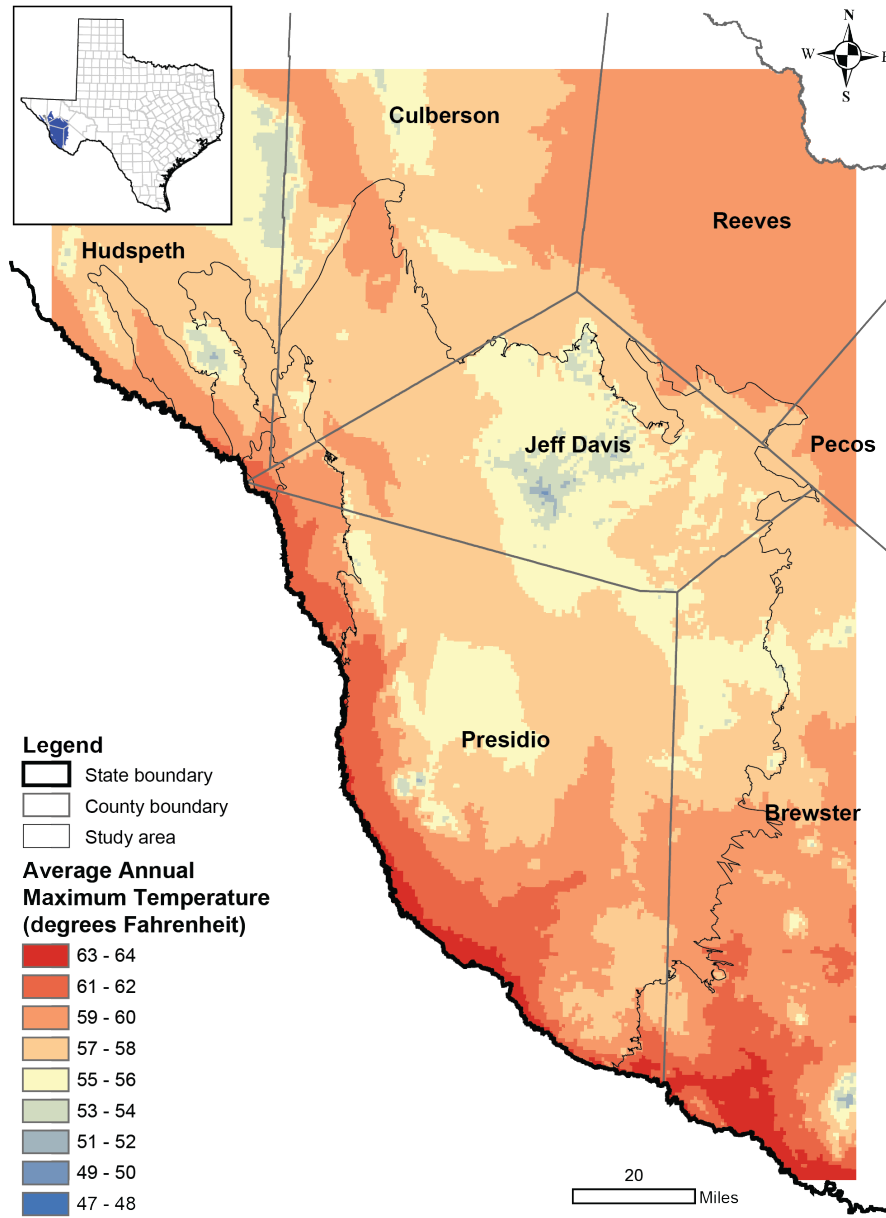
-  State boundary
-  County boundary
-  West Texas Bolsons Aquifer

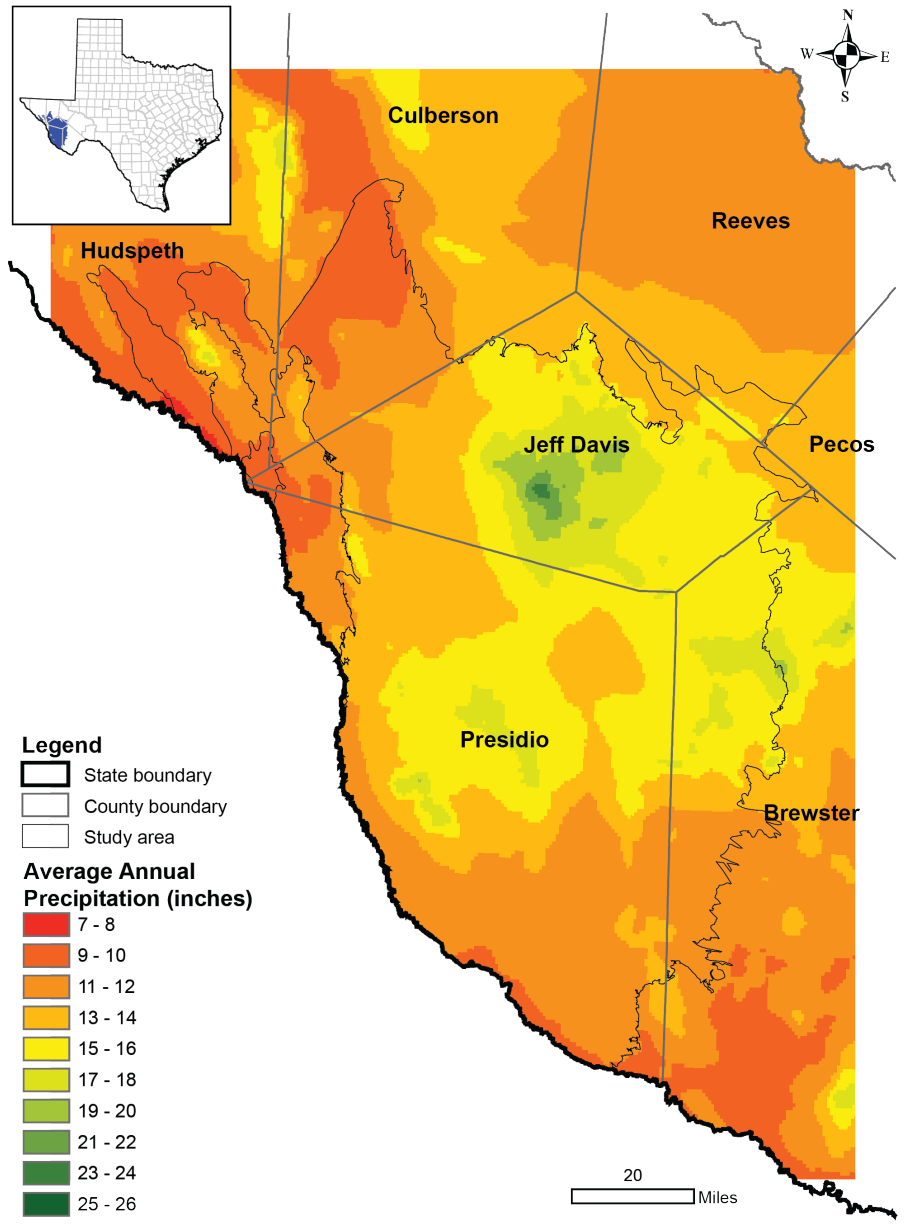


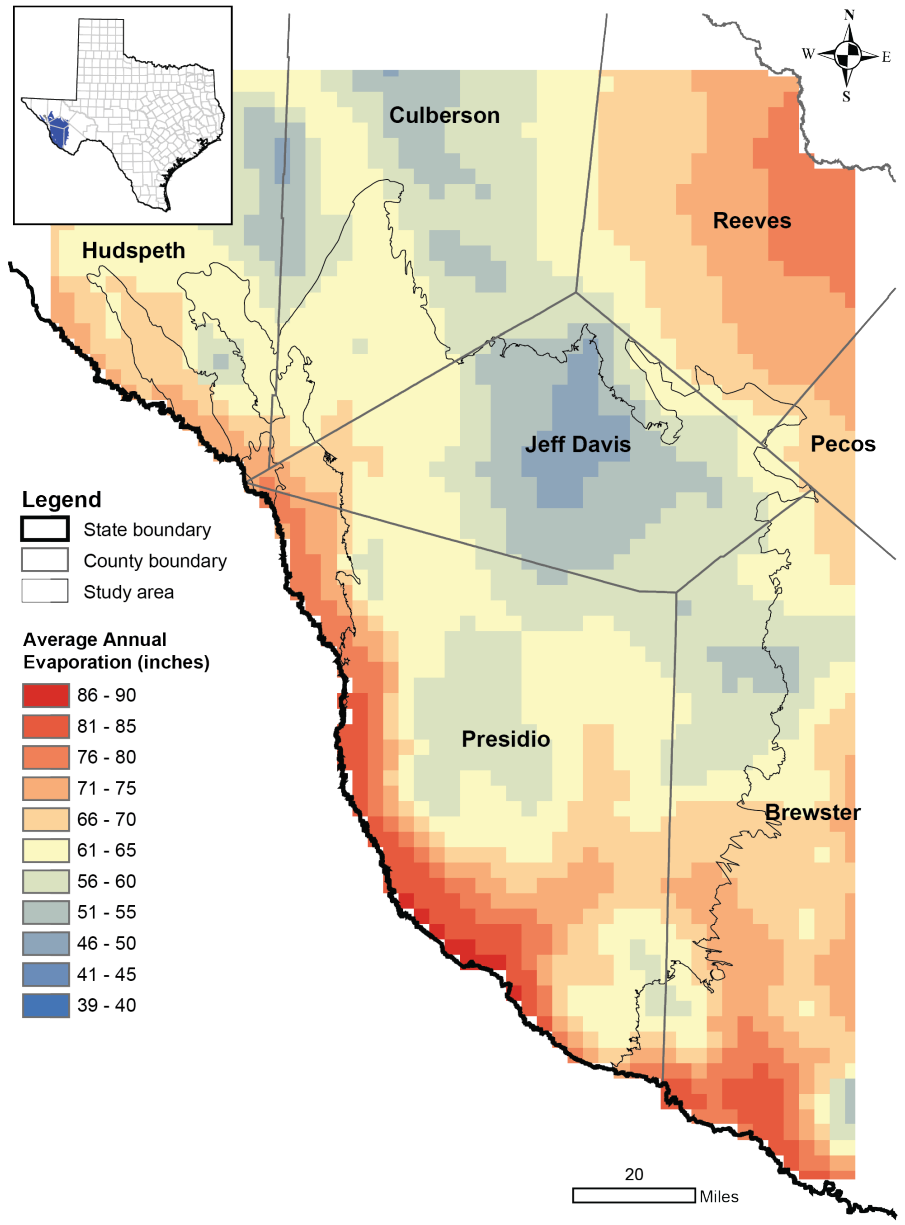


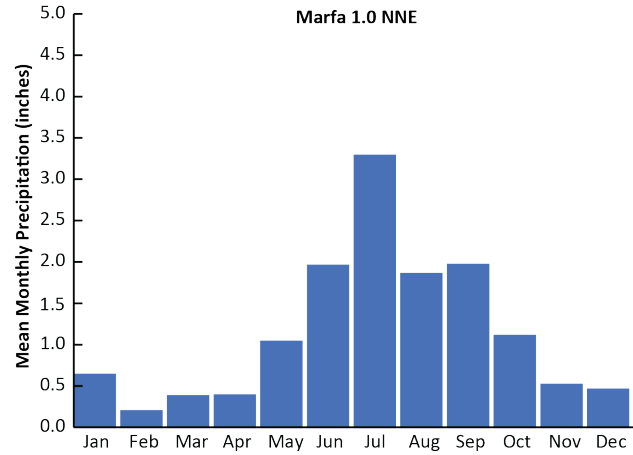
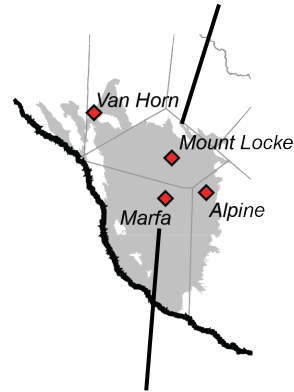
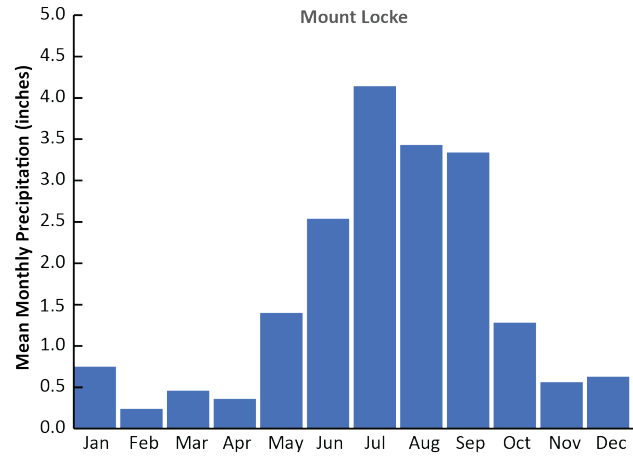


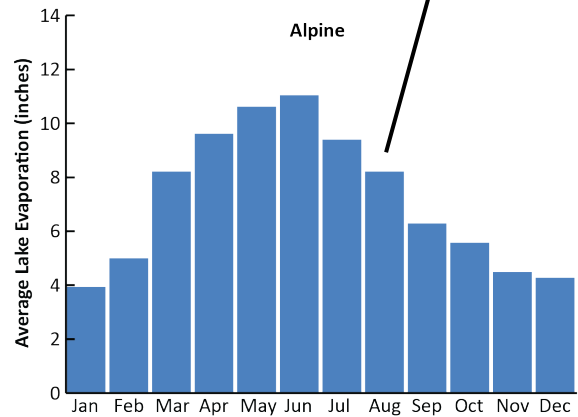
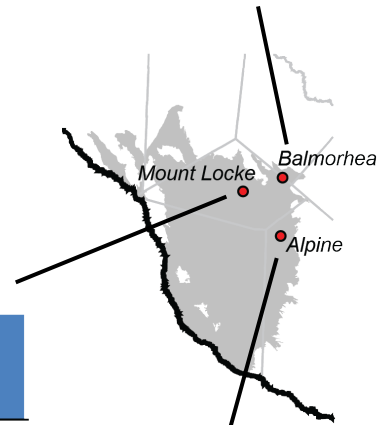
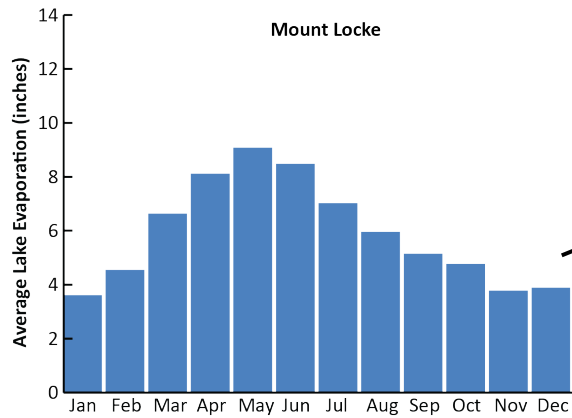
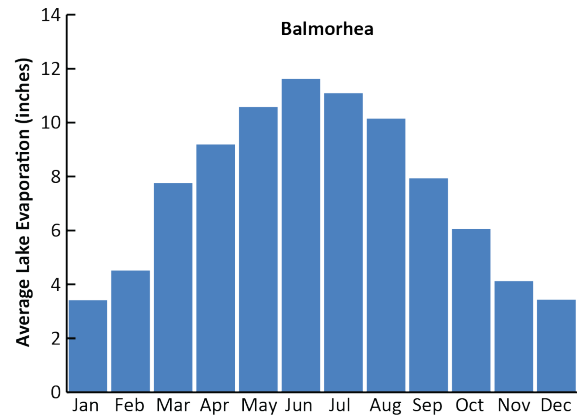








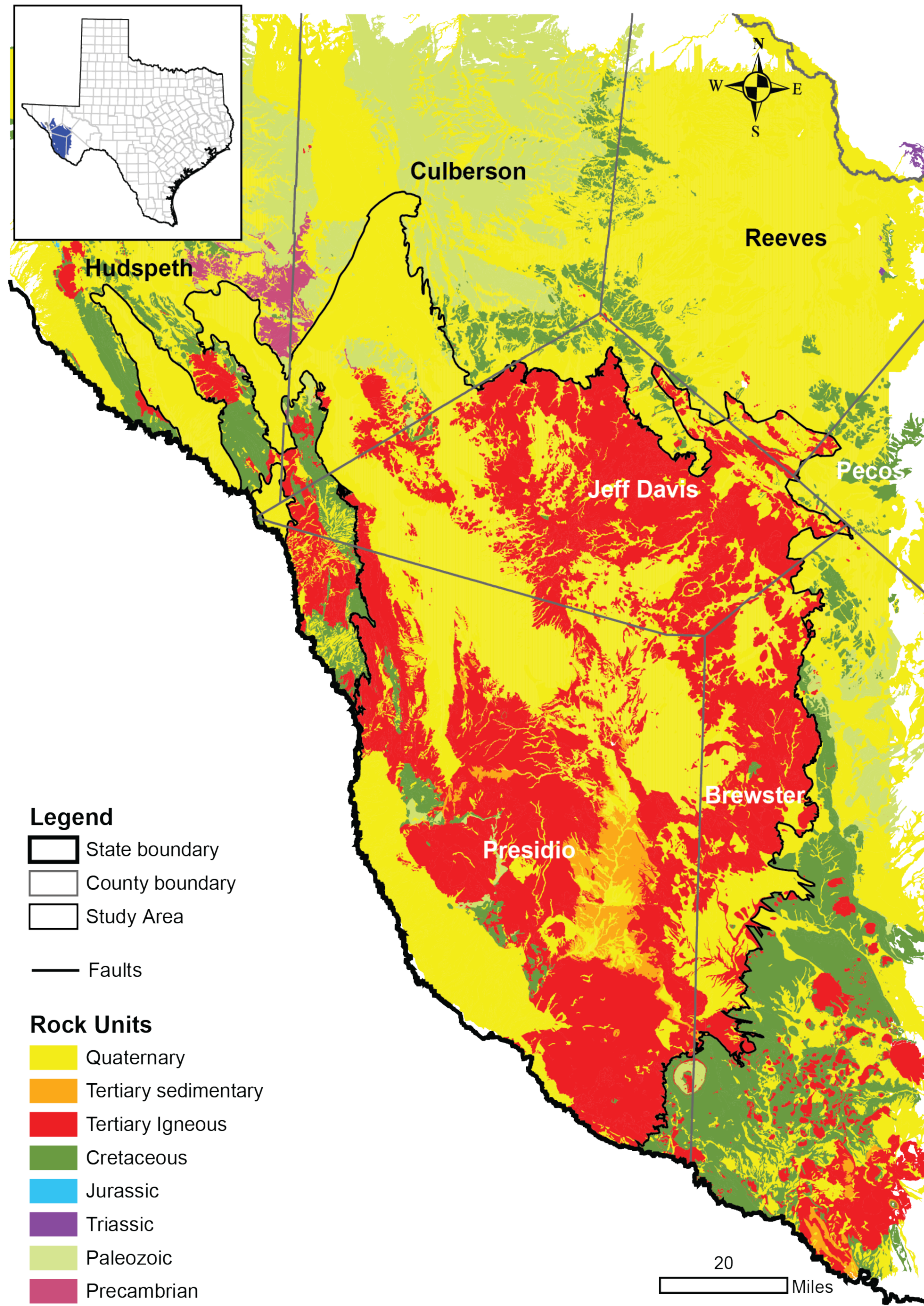




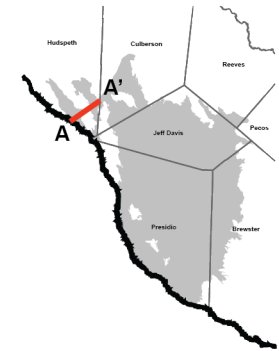
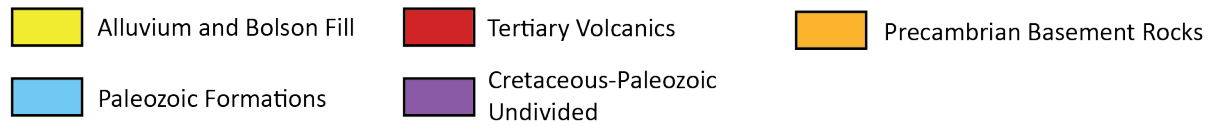
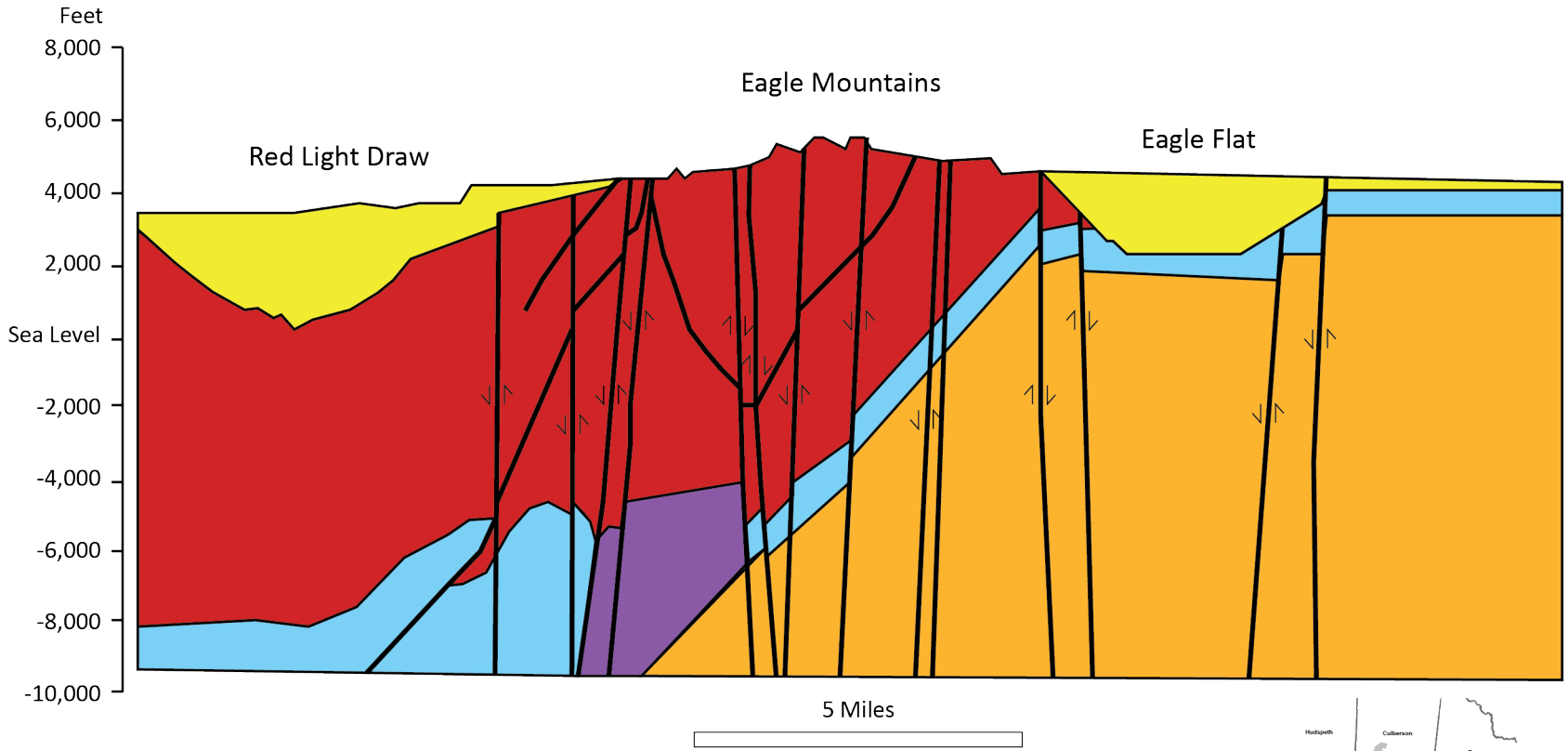


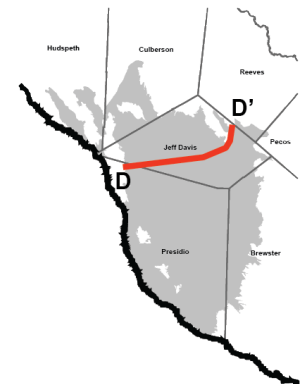
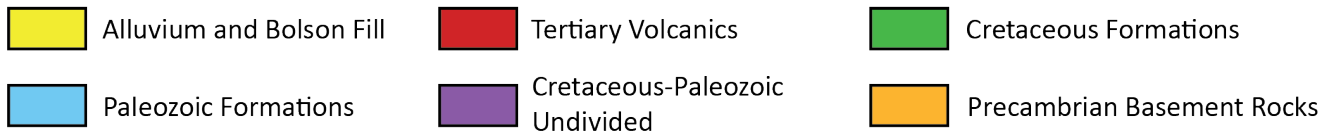
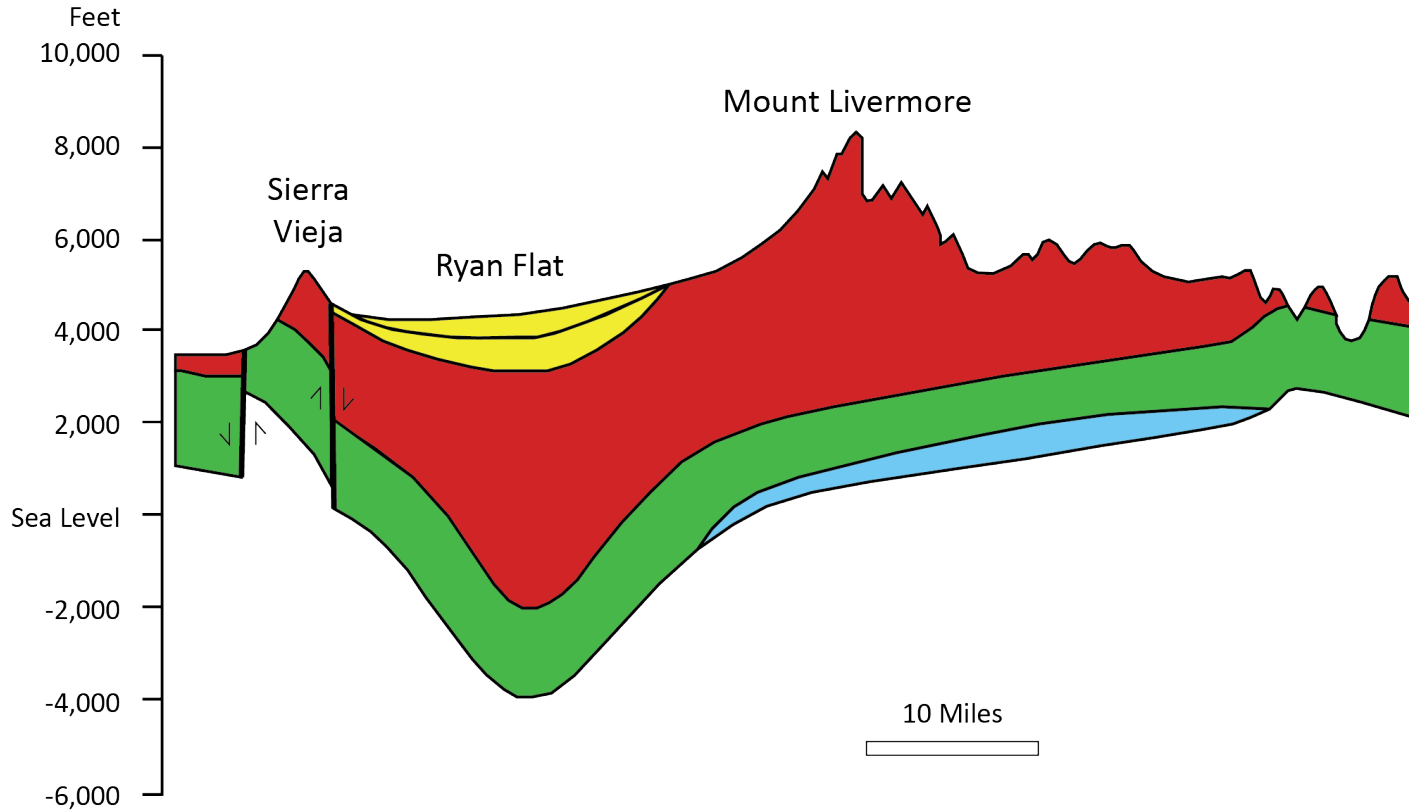
GEOLOGY

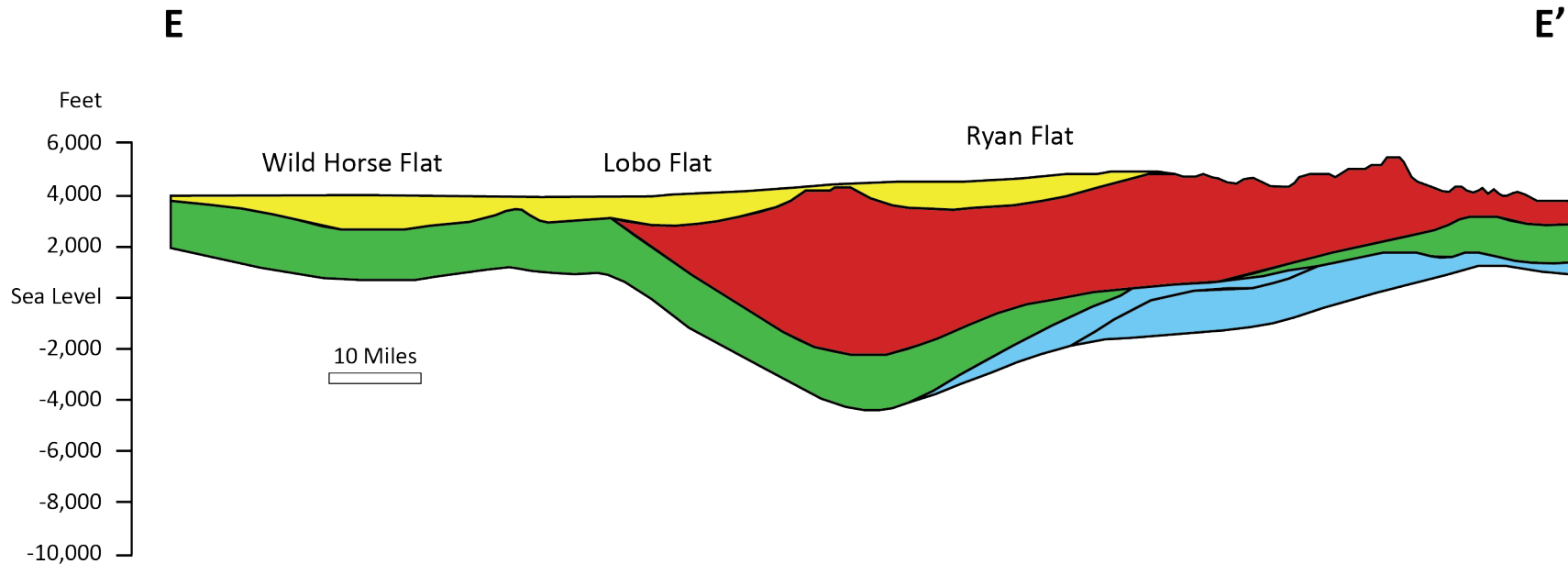
Red Light Draw









Era	System	Stratigraphic Units		
Cenozoic	Quaternary	Quaternary deposits Windblown sand Bolson deposits		
	Tertiary	Volcanic rocks undivided Intrusive Igneous rocks Chambers Tuff Garren Group Tarantula Gravel Hogeye Tuff Trachyte Porphyry Upper Rhyolite Pantera Trachyte Perdiz Conglomerate Petan Basalt Tascotal Formation Mitchell Mesa Welded Tuff Brooks Mountain Formation Goat Canyon Formation Medley Formation Wild Cherry Formation Eppenauer Ranch Formation Mount Locke Formation Barrel Springs Formation Capote Mountain Tuff	Merrill Formation Duff Formation/Decie Member Sheep Pasture Formation Sleeping Lion Formation Frazier Canyon Formation Cottonwood Spring Basalt Bracks Rhyolite Adobe Canyon Formation Chambers Tuff Limpia Formation Potato Hill Andesite Gomez Tuff Star Mountain Rhyolite Crossen Trachyte Sheep Canyon Basalt Pruett Formation Huelster Formation Buckshot Ignimbrite Colmena Tuff Gill Breccia	
	Mesozoic	Cretaceous	Cretaceous undivided	Benevides Formation
			Buda Limestone	Finlay Limestone
			Boracho Formation	Cox Sandstone
			San Martine Limestone Member	Bluff Mesa Formation
			Levinson Limestone Member	Yucca Formation
			Eagle Mountain Sandstone	Etholean Conglomerate
			Espy Limestone	Torcer Formation
		Jurassic	Malone Formation	
	Paleozoic	Permian	Hueco Limestone	
	Precambrian	Precambrian	Carrizo Mountain Group Precambrian bedrock undivided	

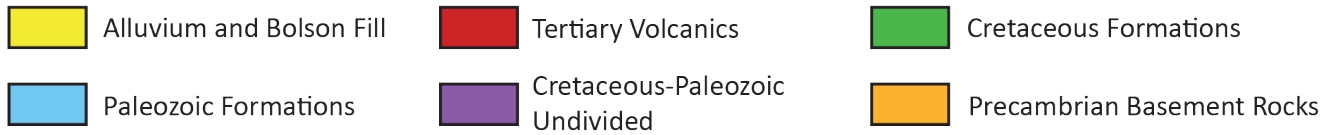
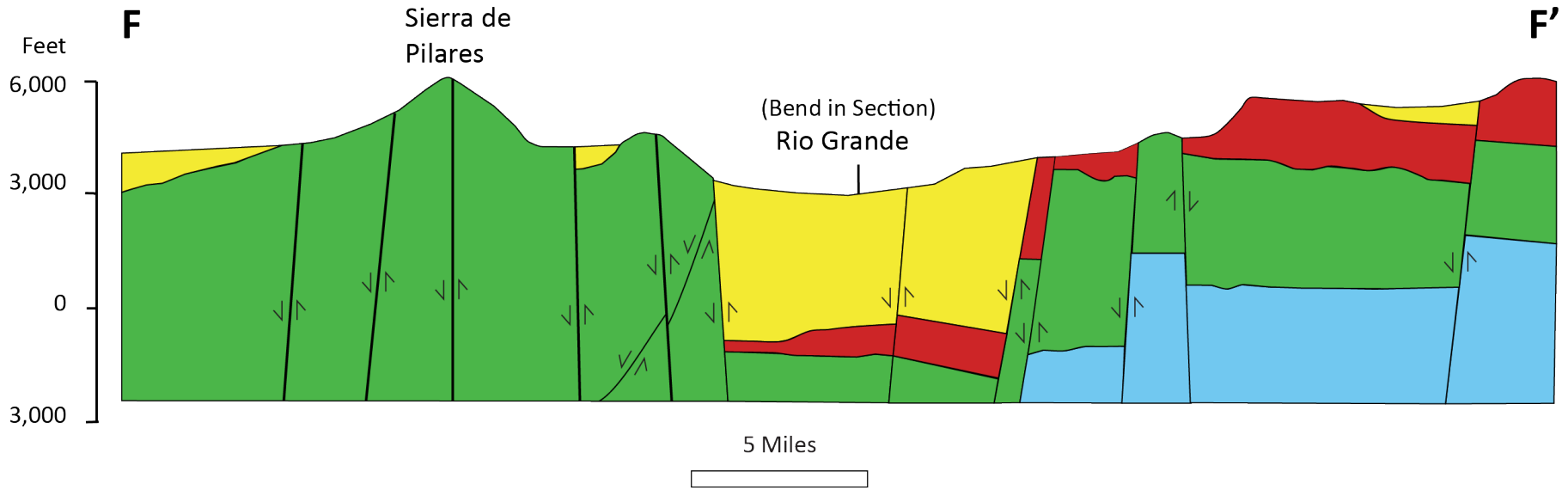
A**A'**

D**D'**

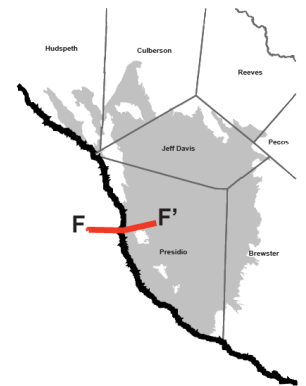


- | | | |
|---|--|--|
|  Alluvium and Bolson Fill |  Tertiary Volcanics |  Cretaceous Formations |
|  Paleozoic Formations |  Cretaceous-Paleozoic Undivided |  Precambrian Basement Rocks |





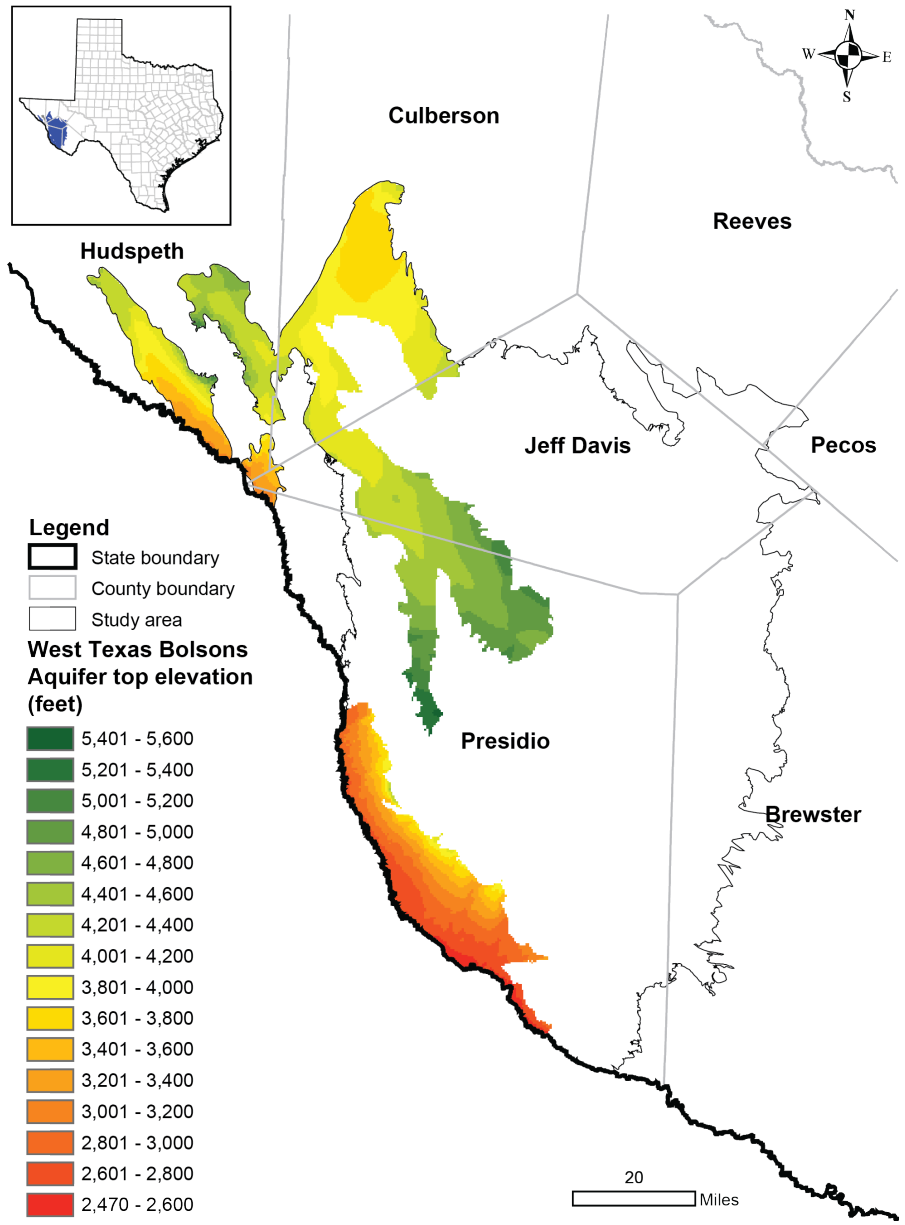
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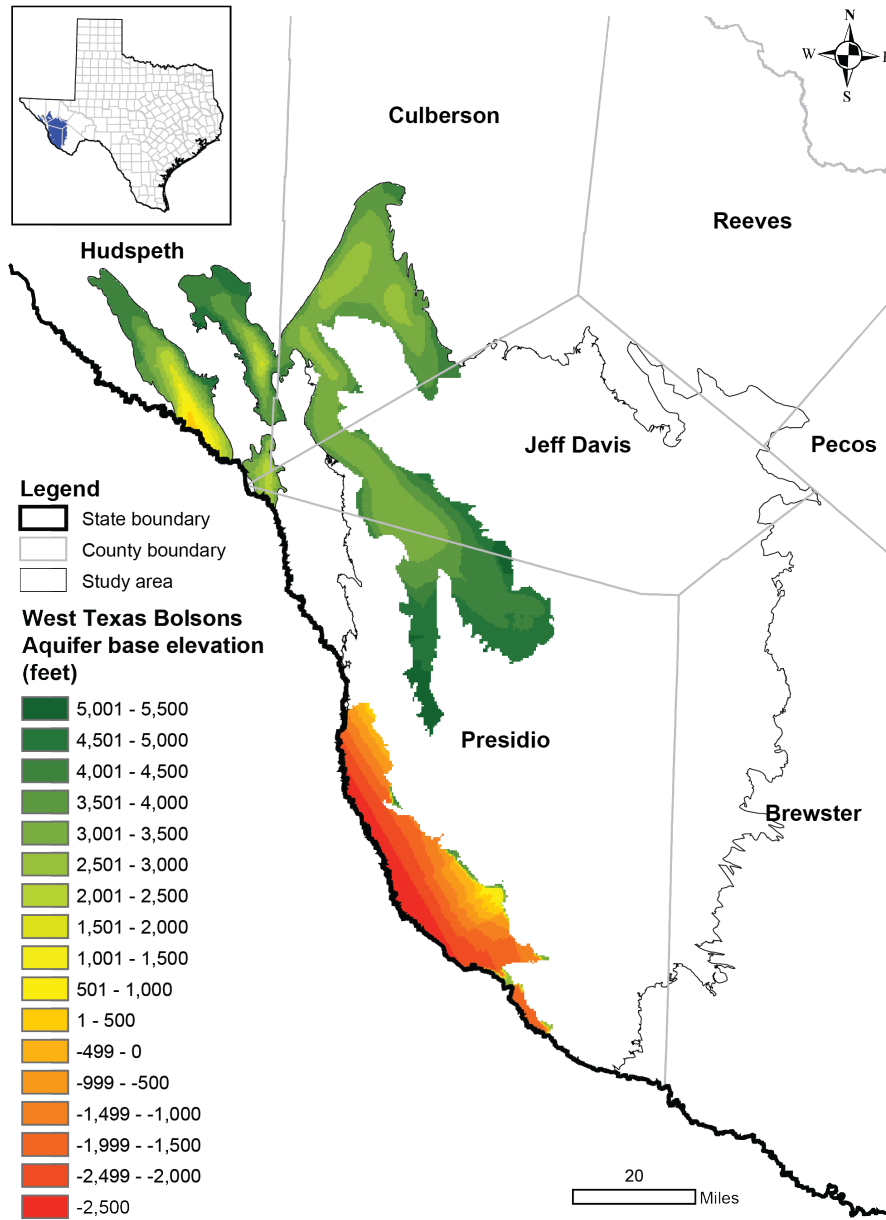


HYDROGEOLOGY

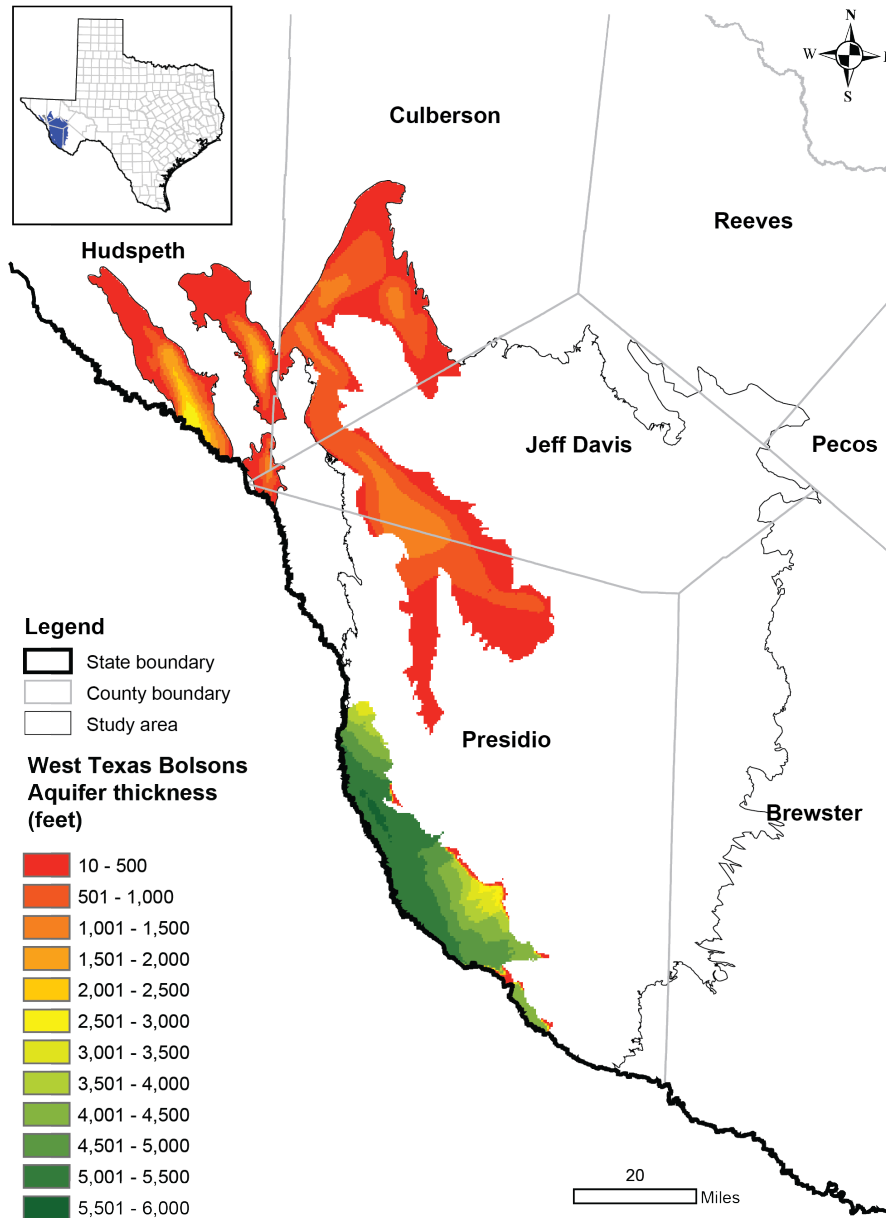
Eagle Mountains



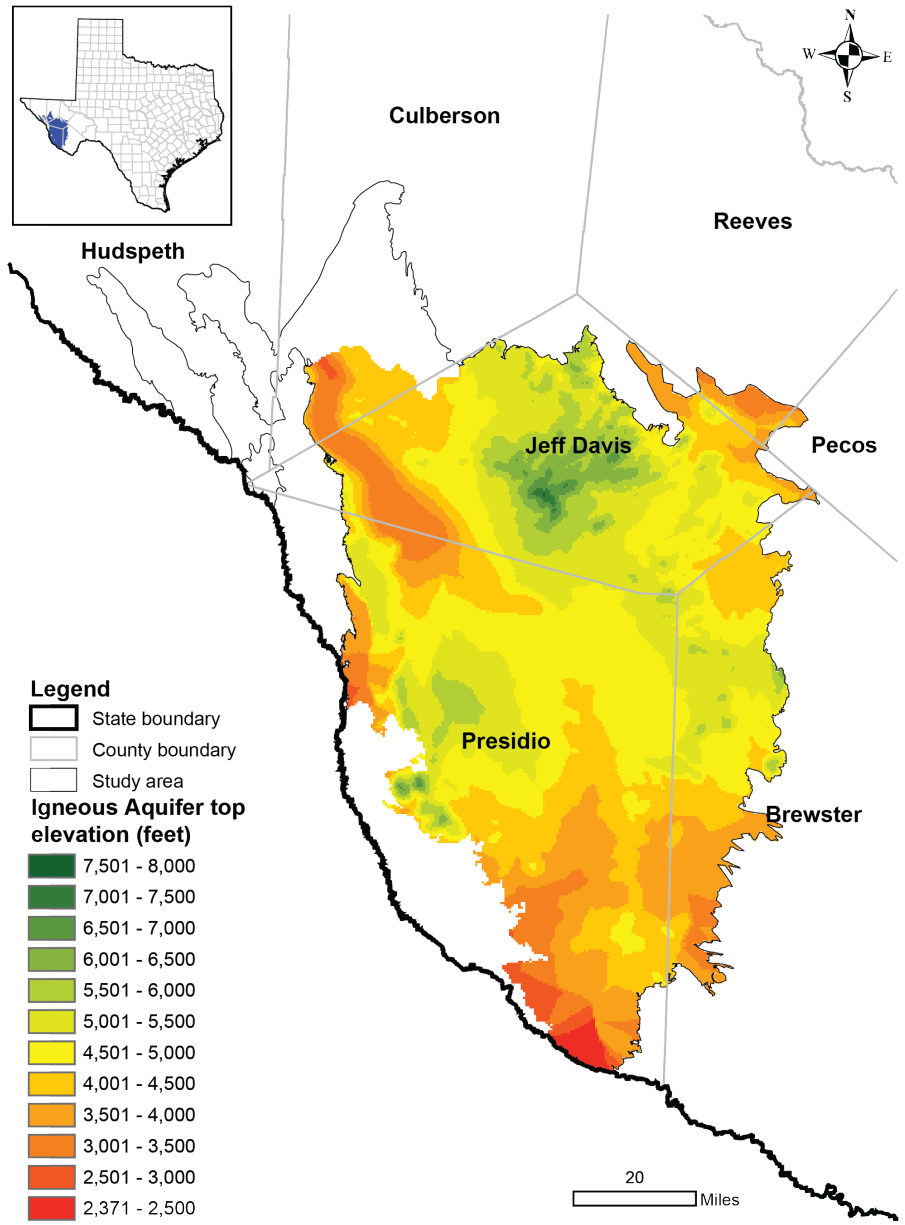
West Texas Bolsons Aquifer



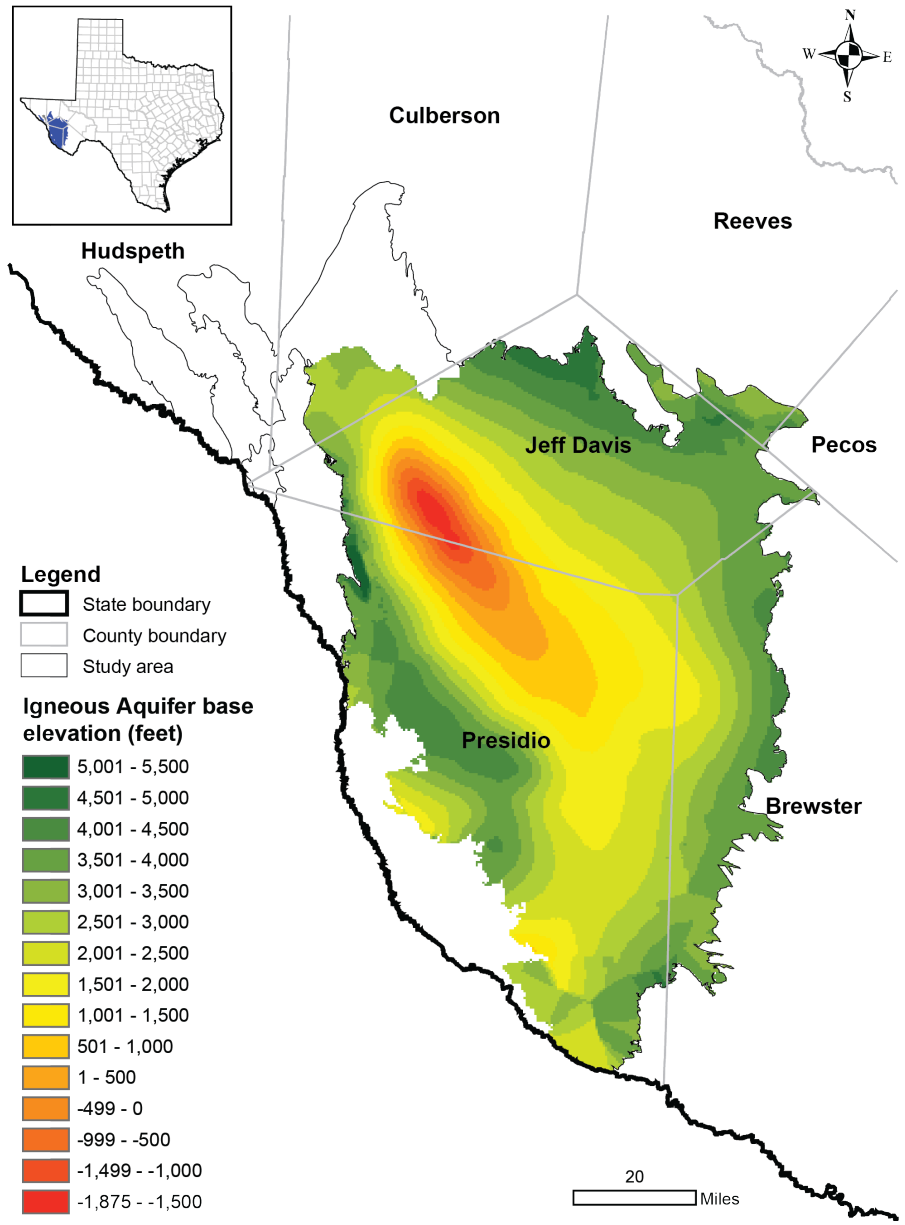
Igneous Aquifer



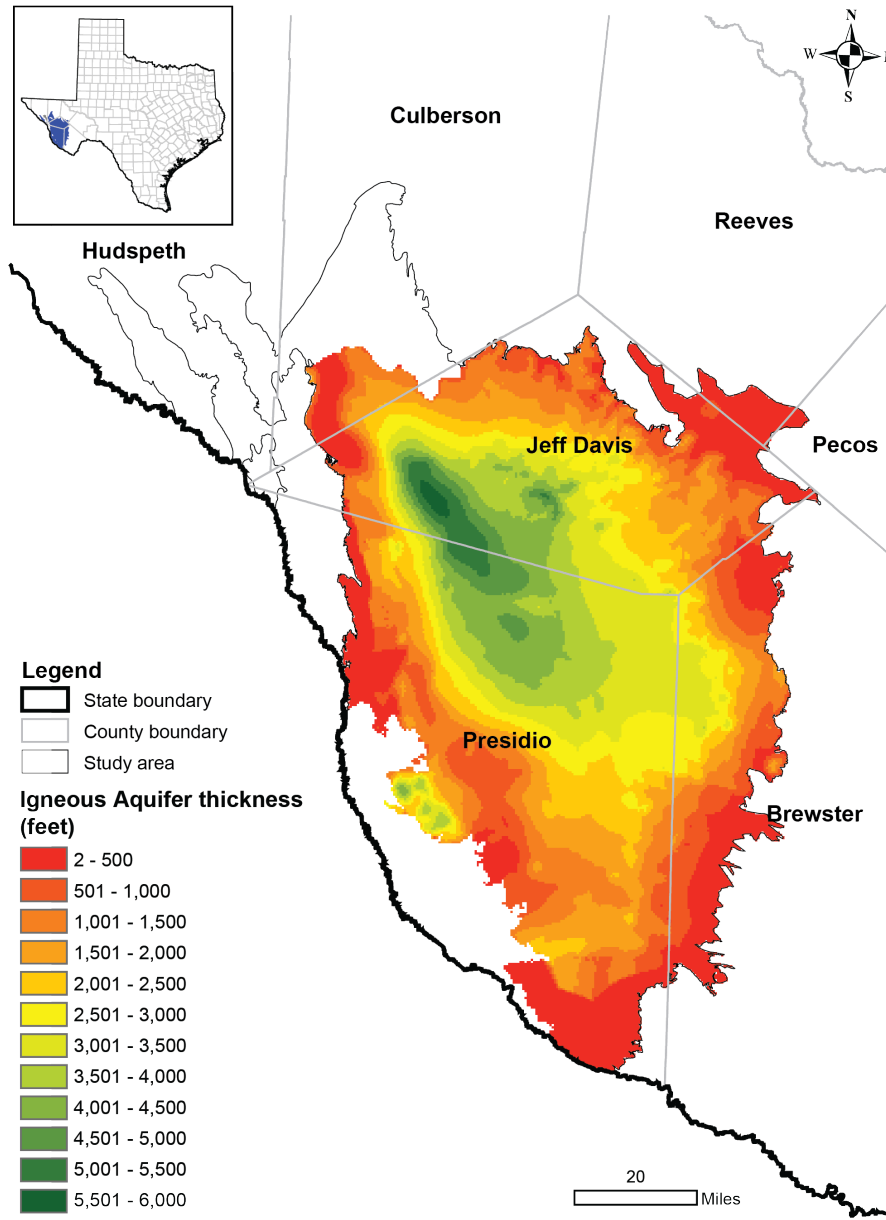
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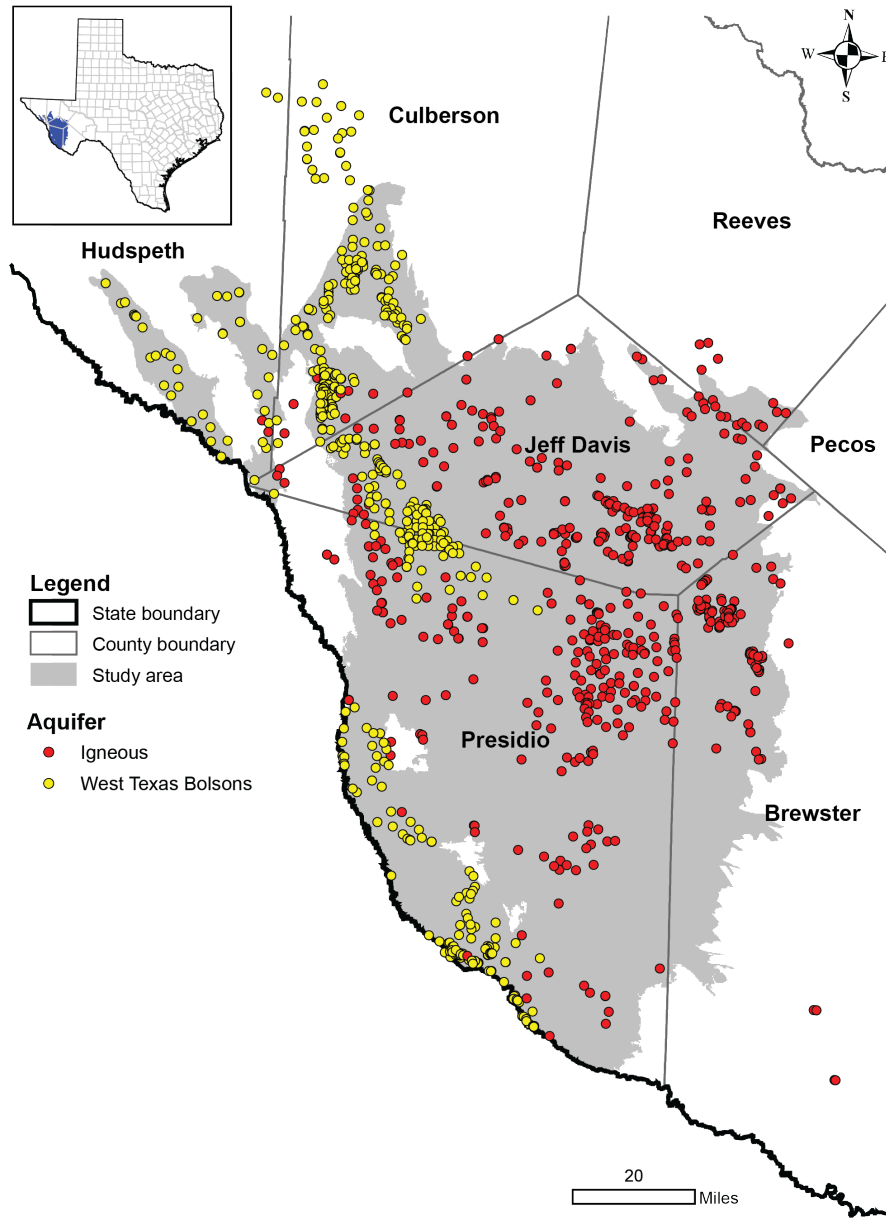
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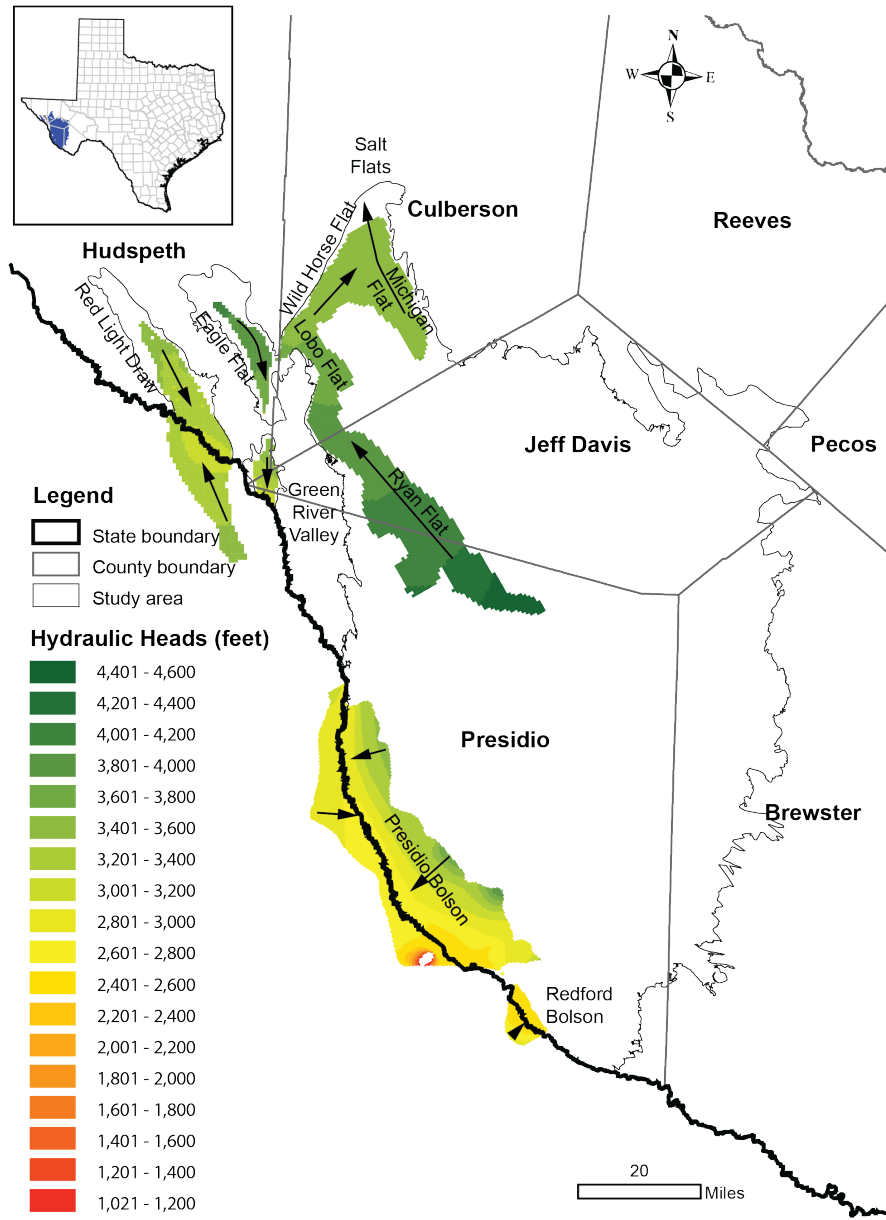


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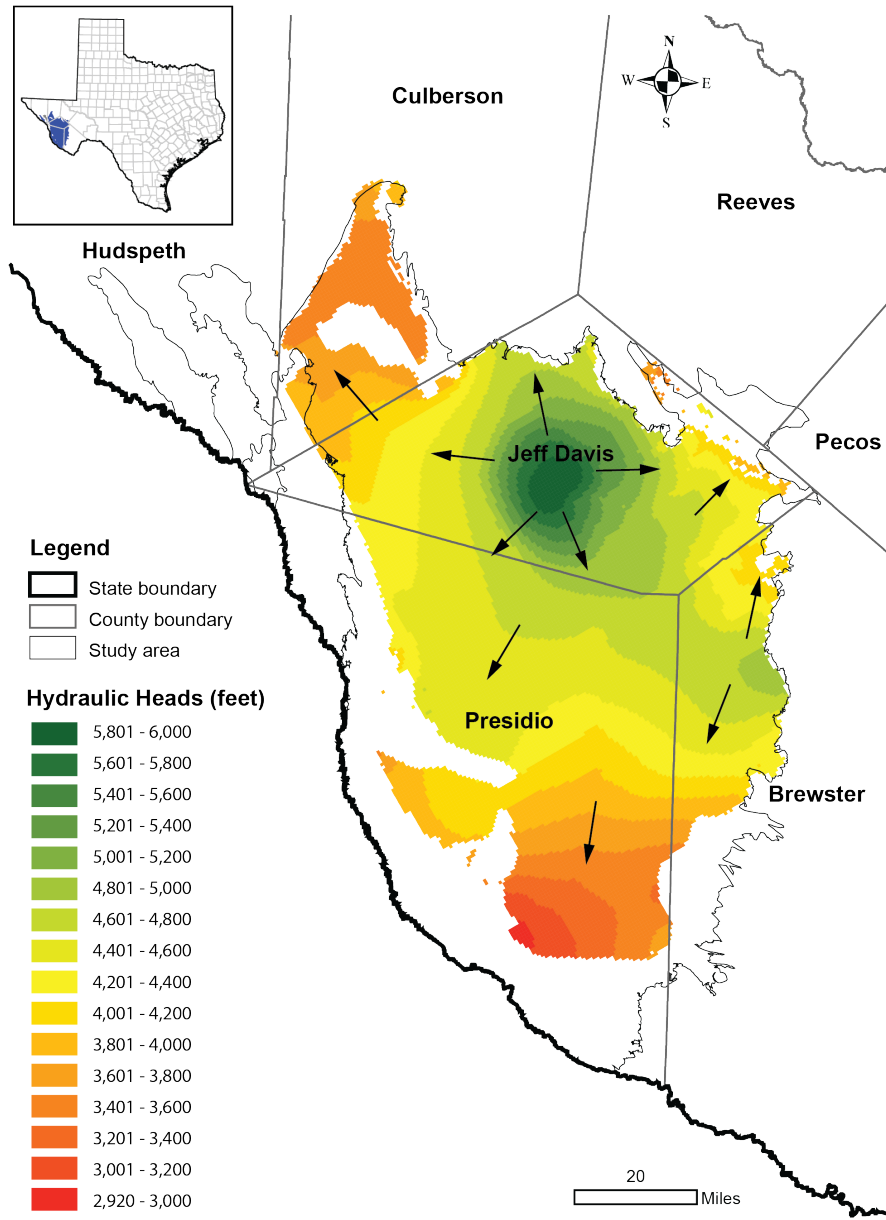


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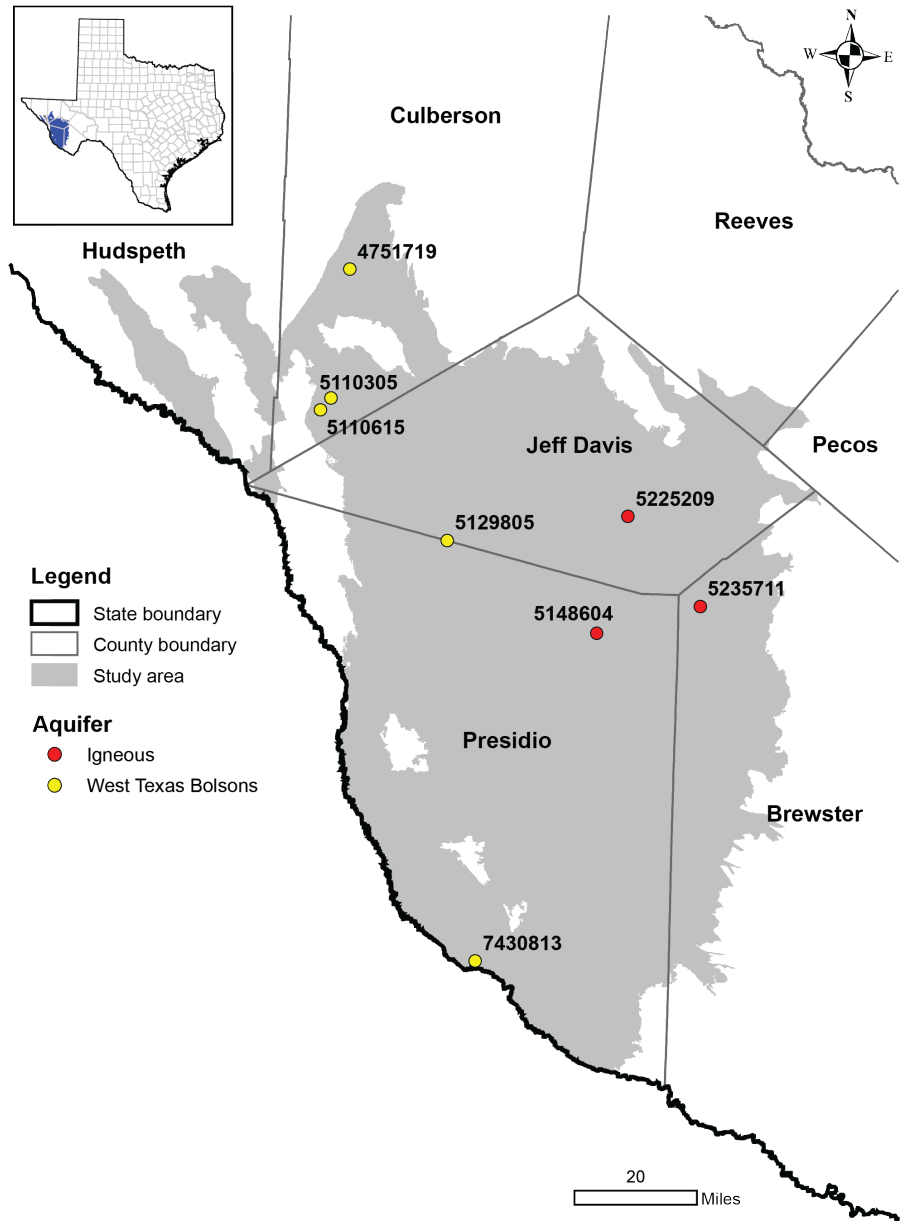




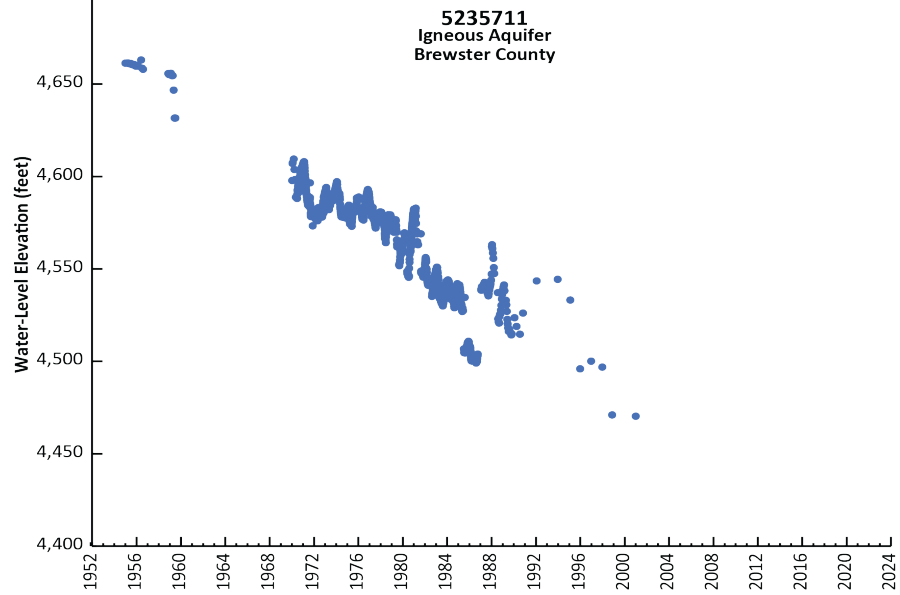
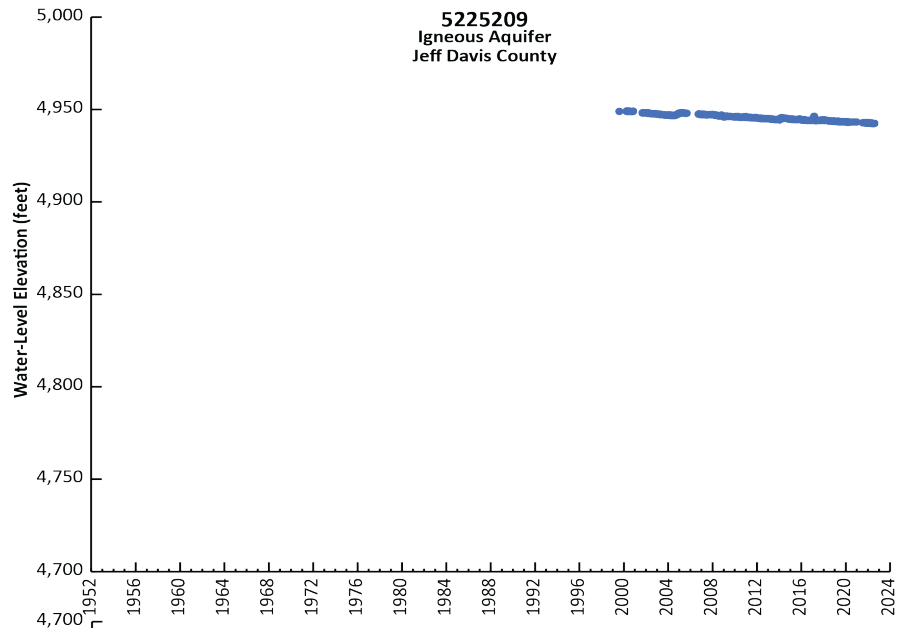
West Texas Bolsons Aquifer

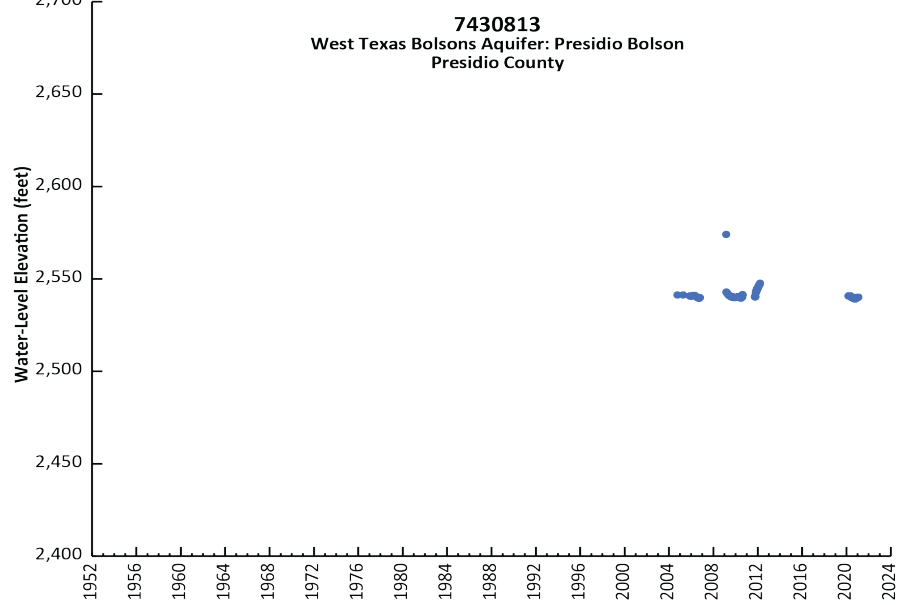
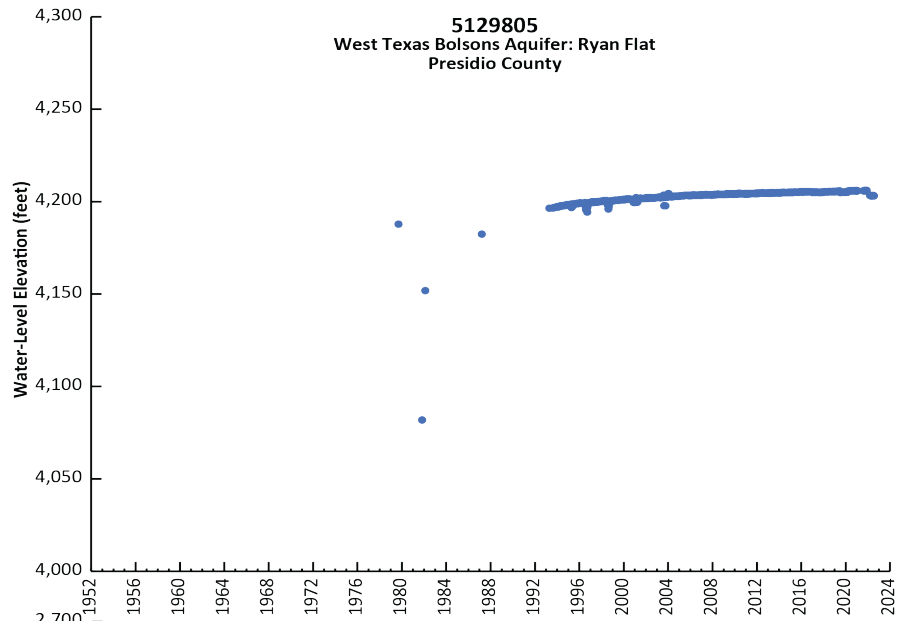


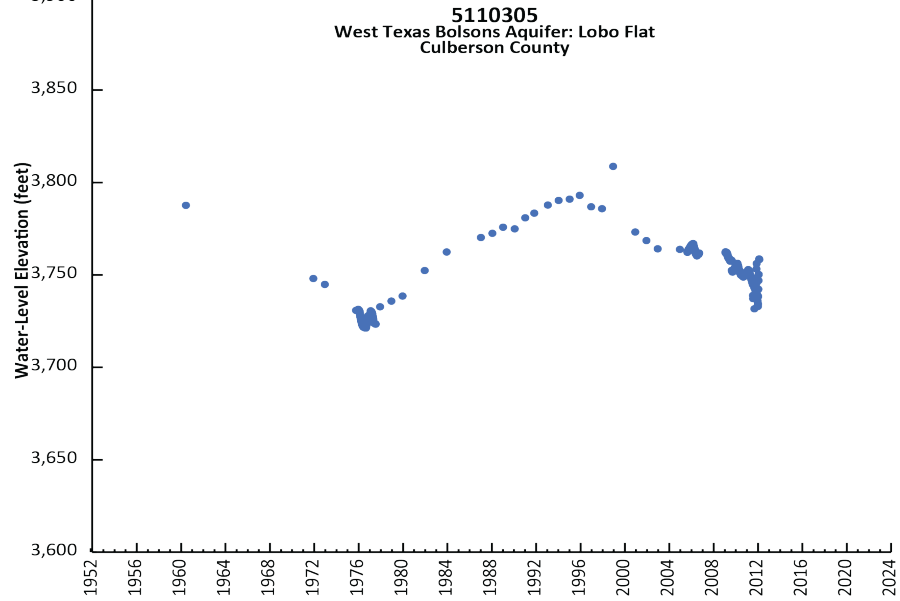
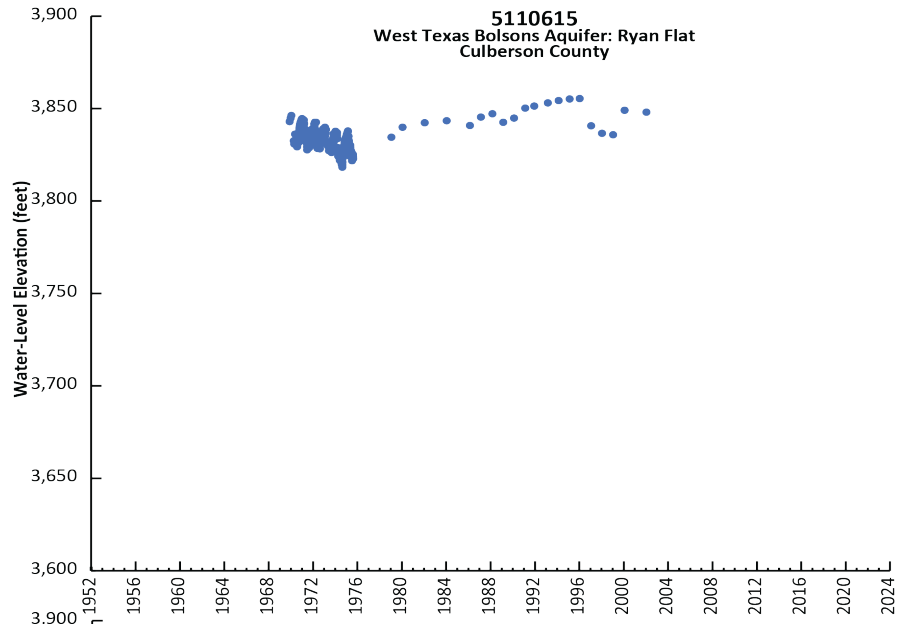
Ignеous Aquifer



West Texas Bolsons Aquifer

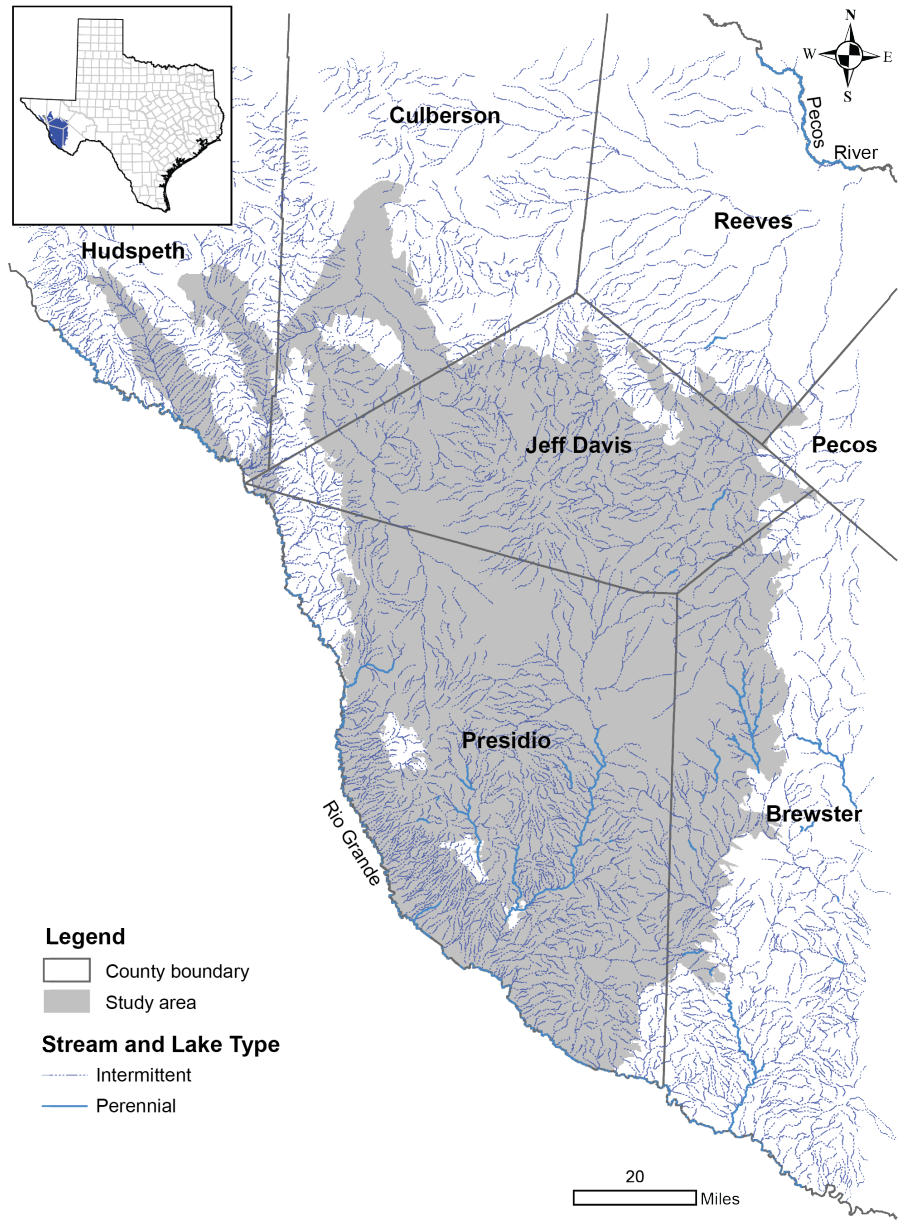








Inflow/Outflow



- Recharge
 - Process by which water enters aquifer
 - Infiltration from ephemeral streams
- Discharge
 - Process by which groundwater leaves aquifer
 - Natural discharge to springs and streams
 - Pumping wells

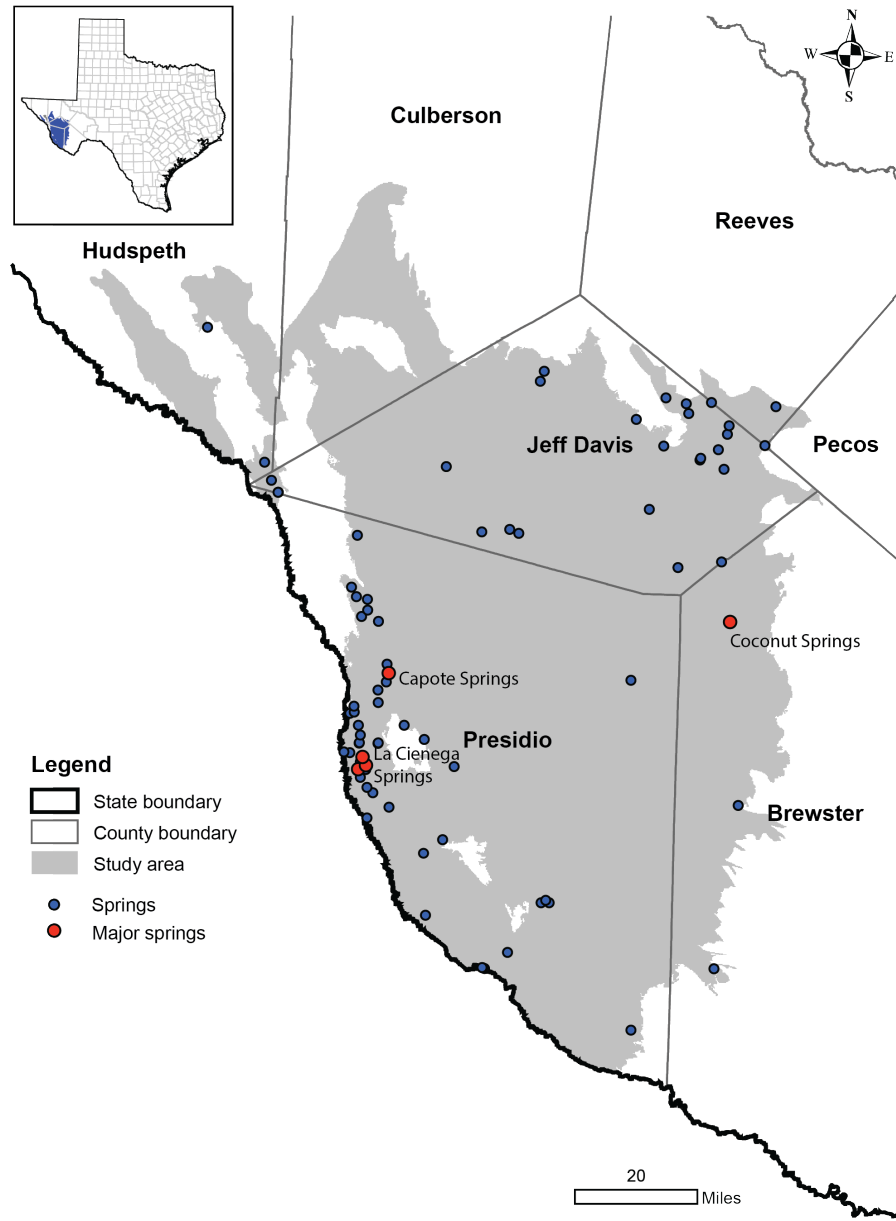


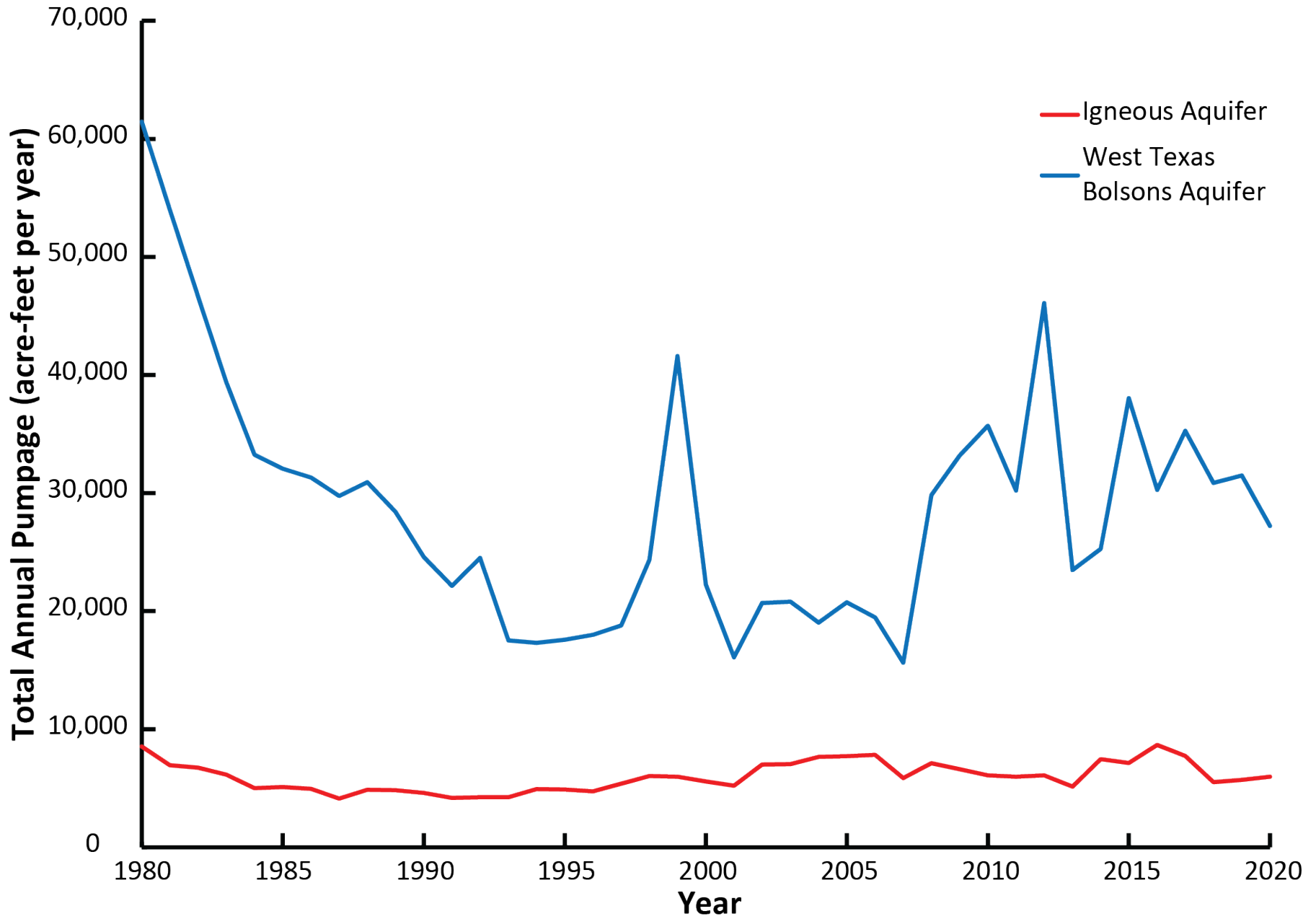
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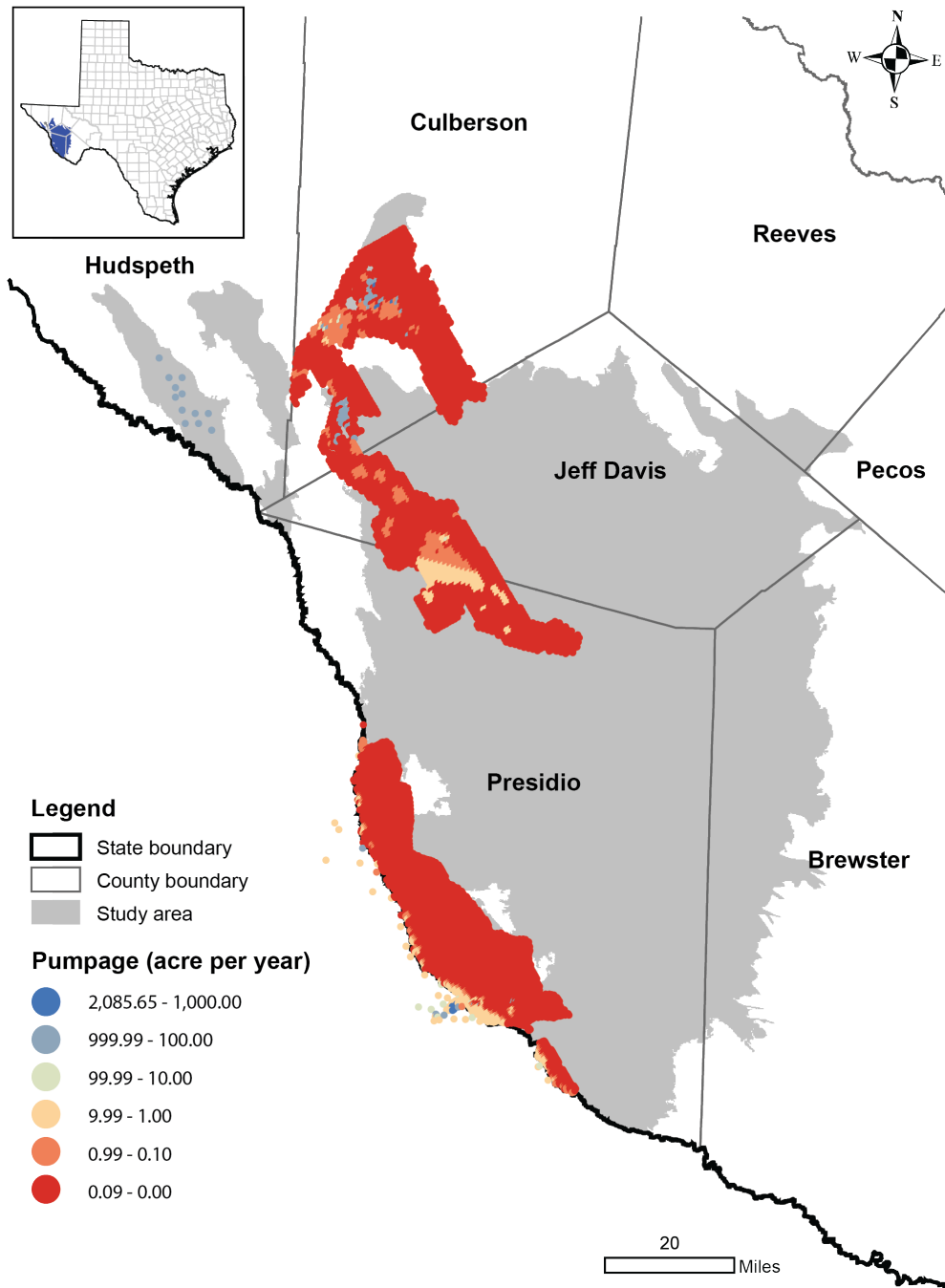
-  County boundary
-  Study area

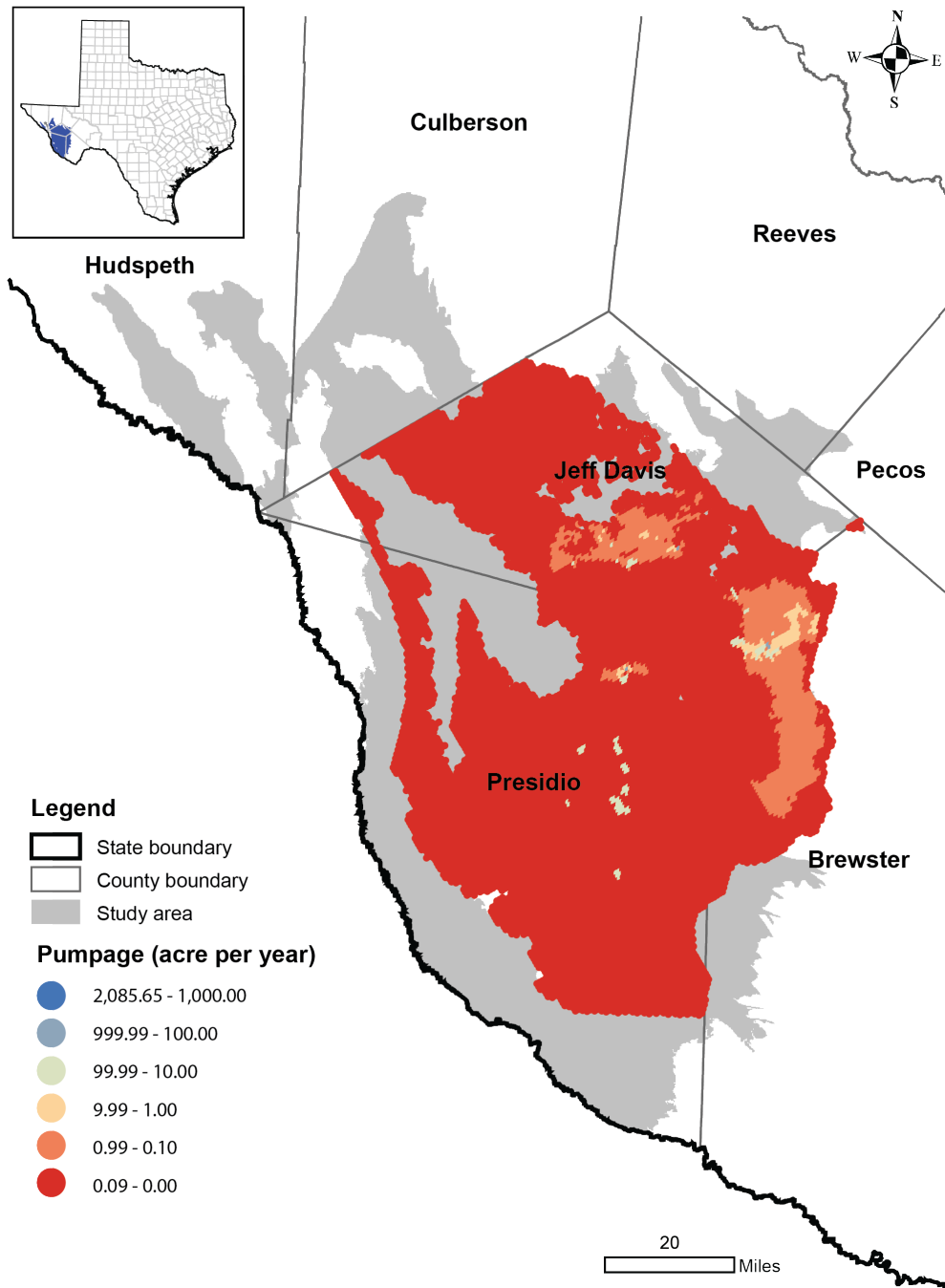
Stream and Lake Type

-  Intermittent
-  Perennial

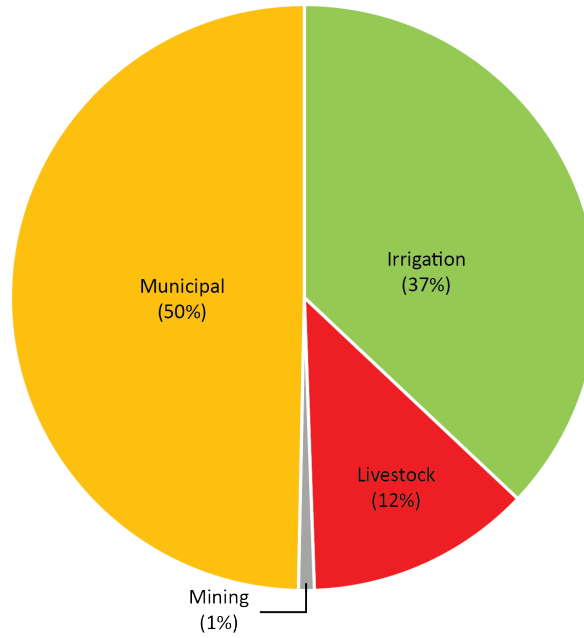




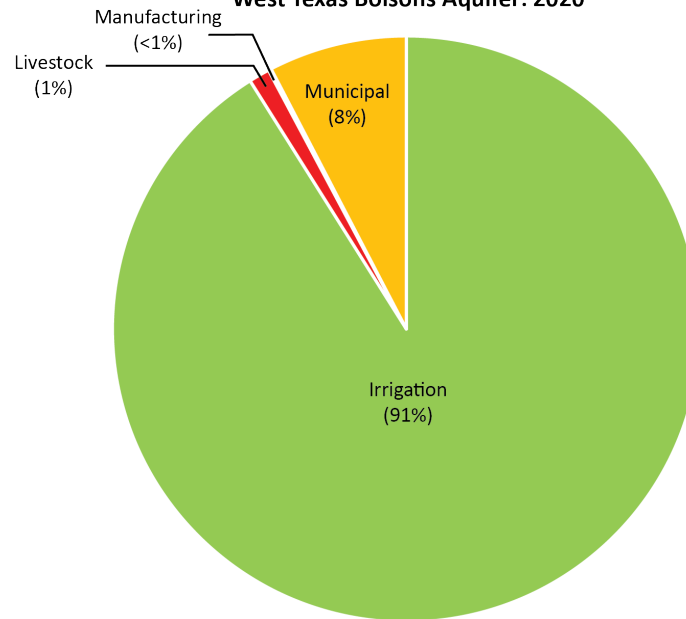


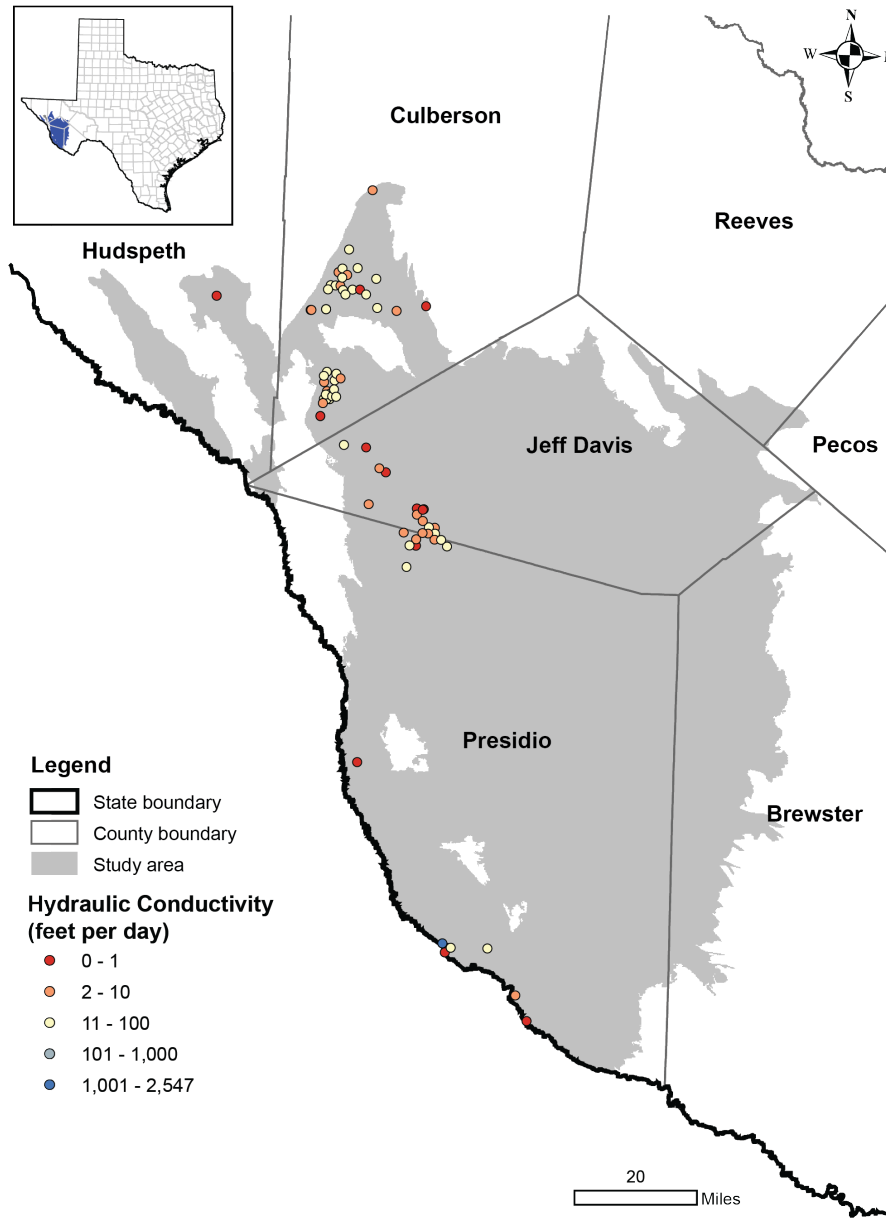


Igneous Aquifer: 2020

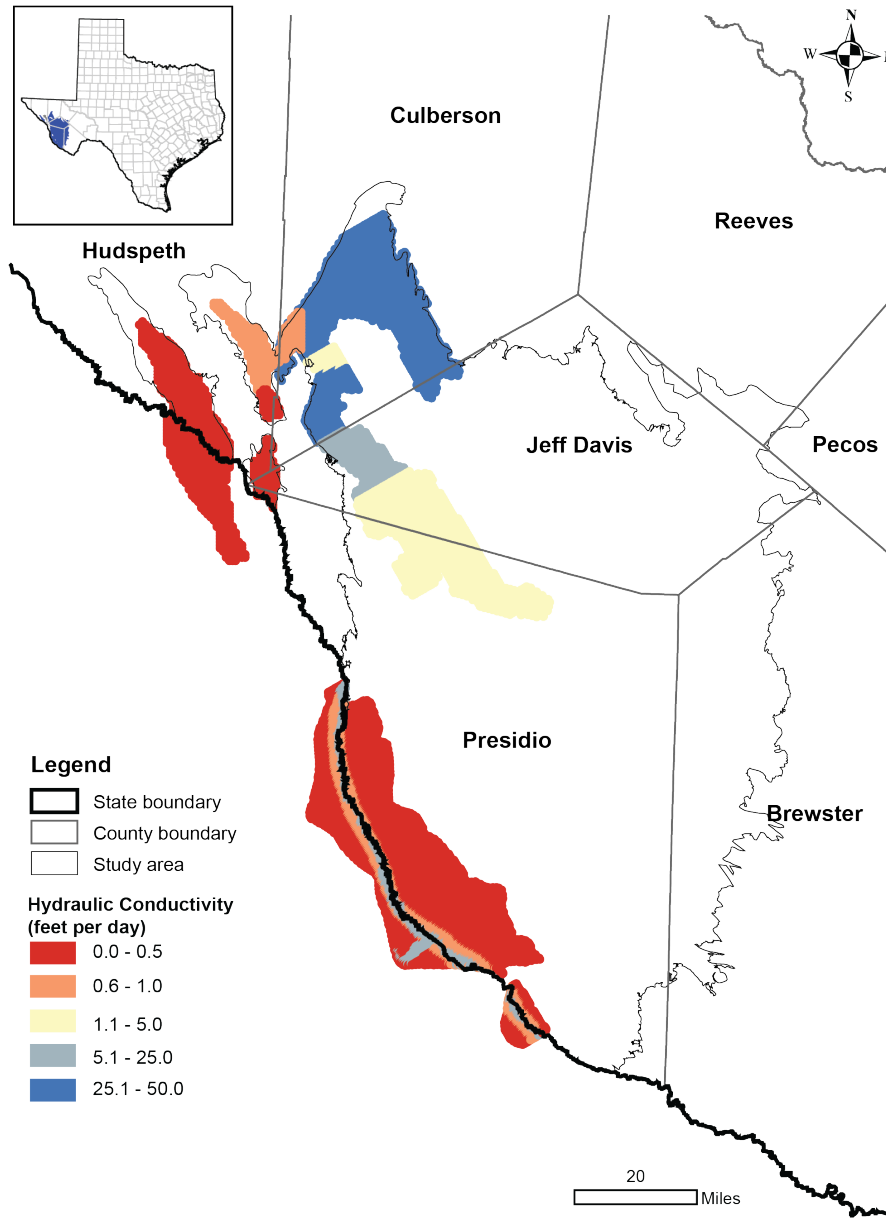


West Texas Bolsons Aquifer: 2020

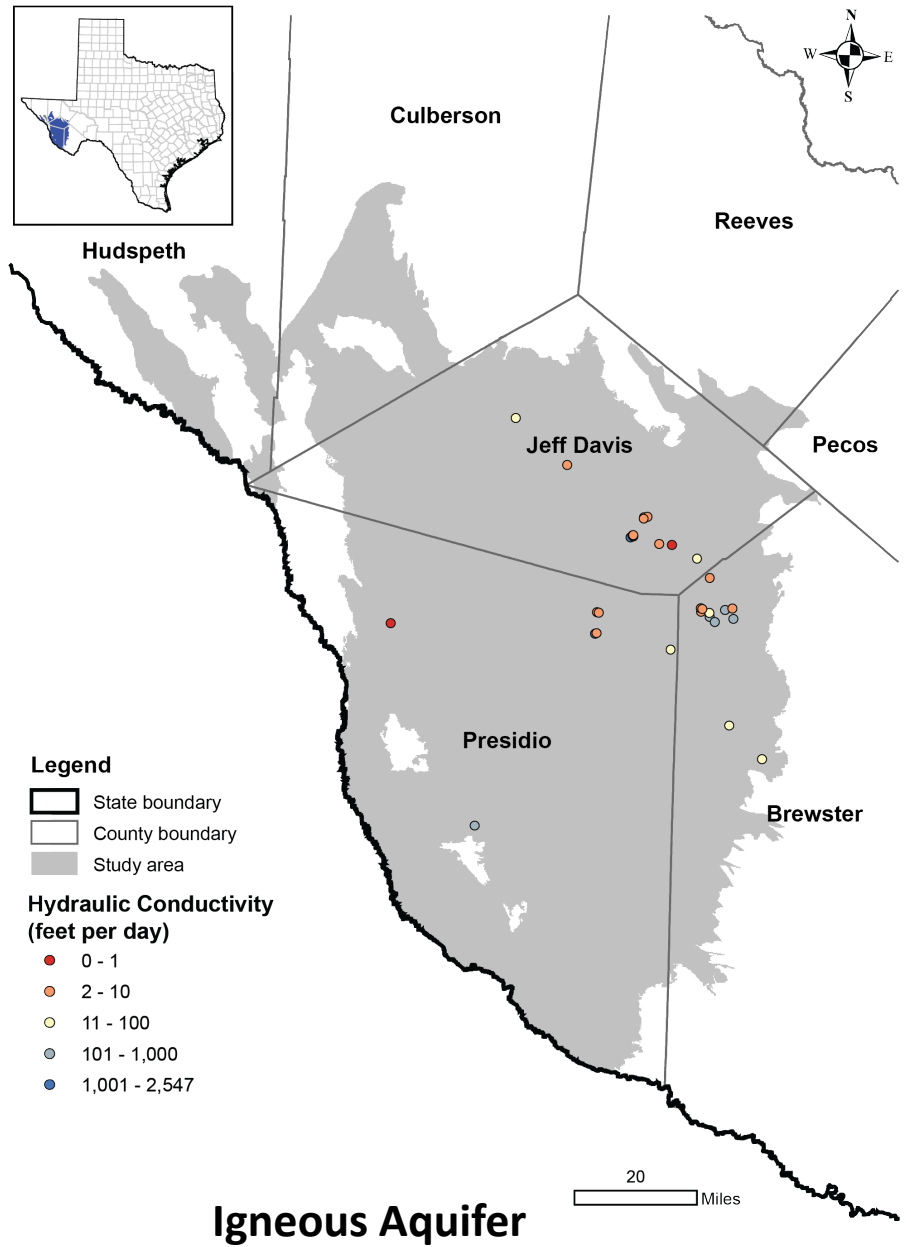




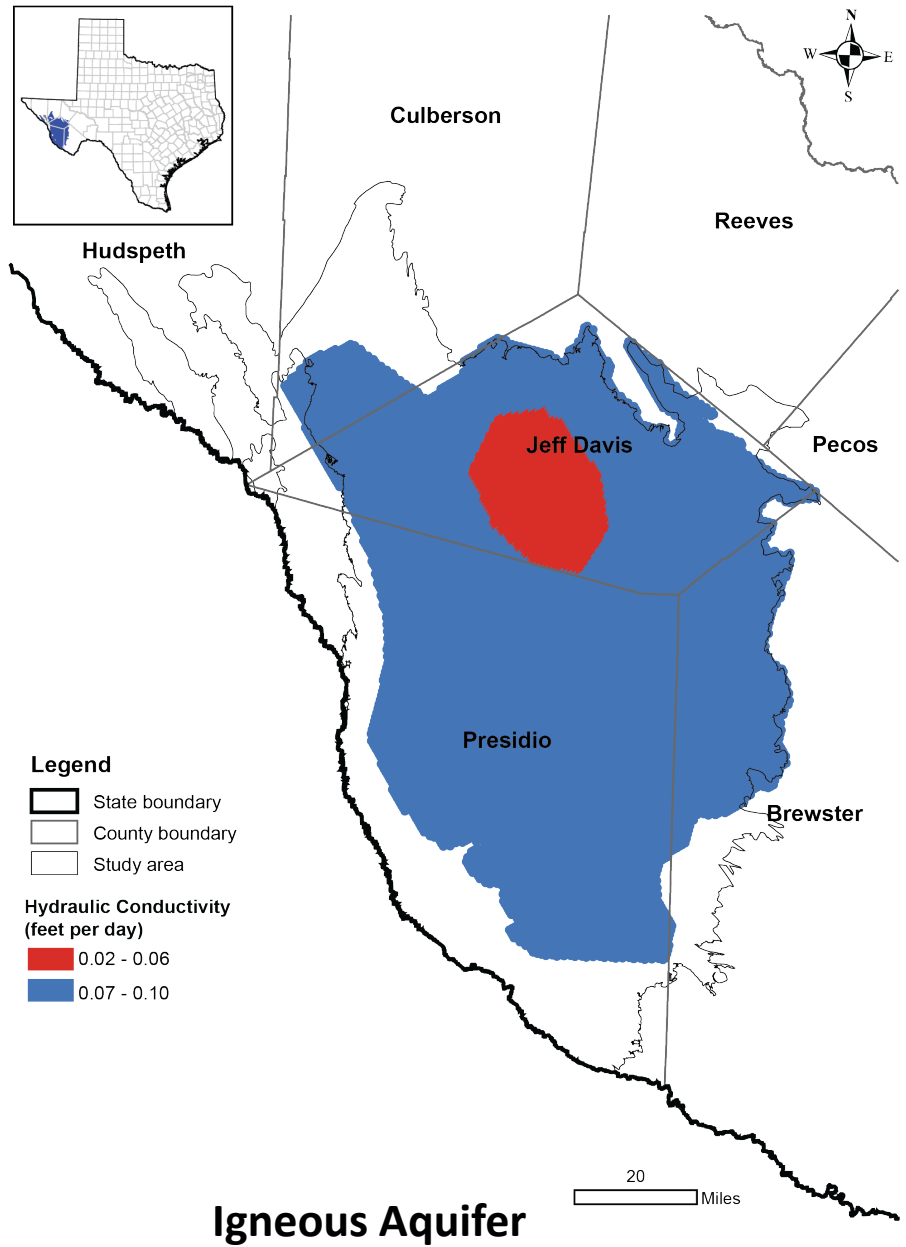
West Texas Bolsons Aquifer



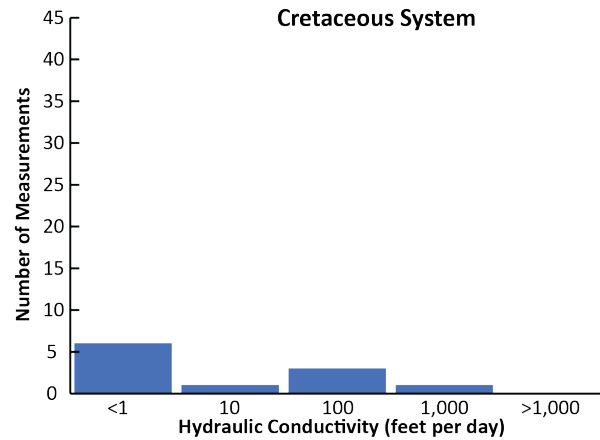
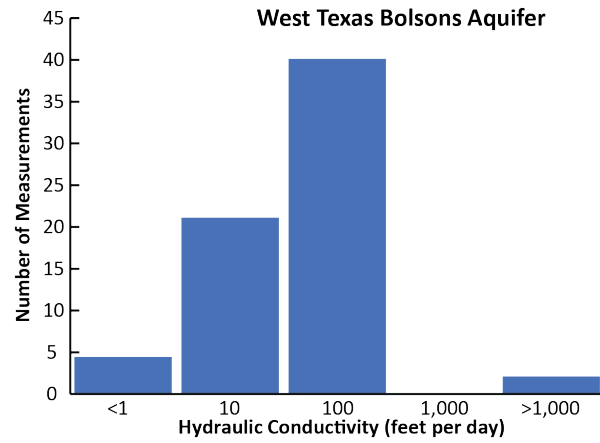
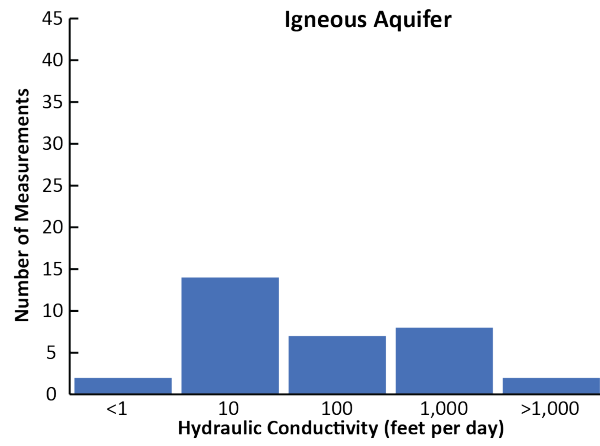
West Texas Bolsons Aquifer

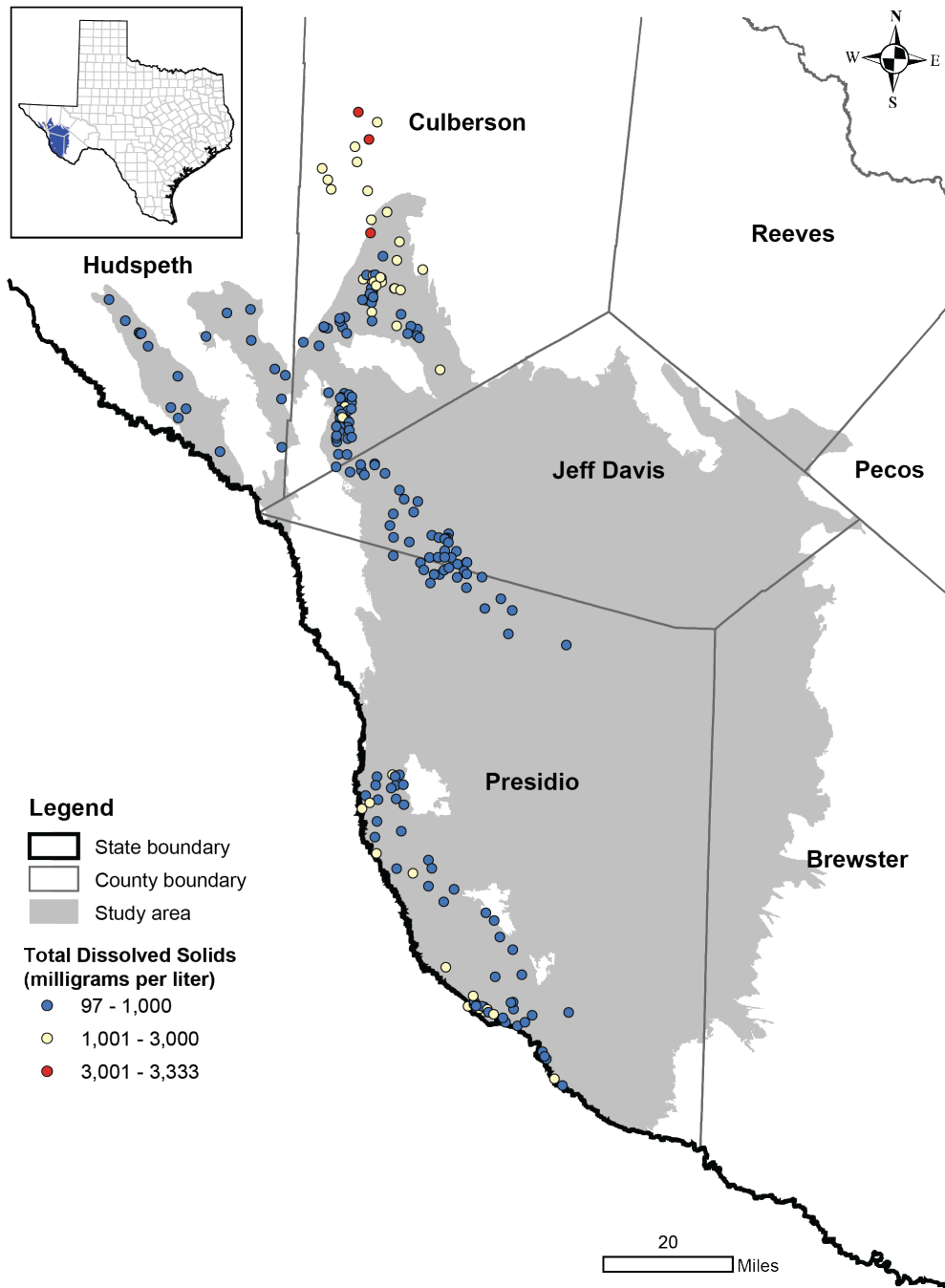


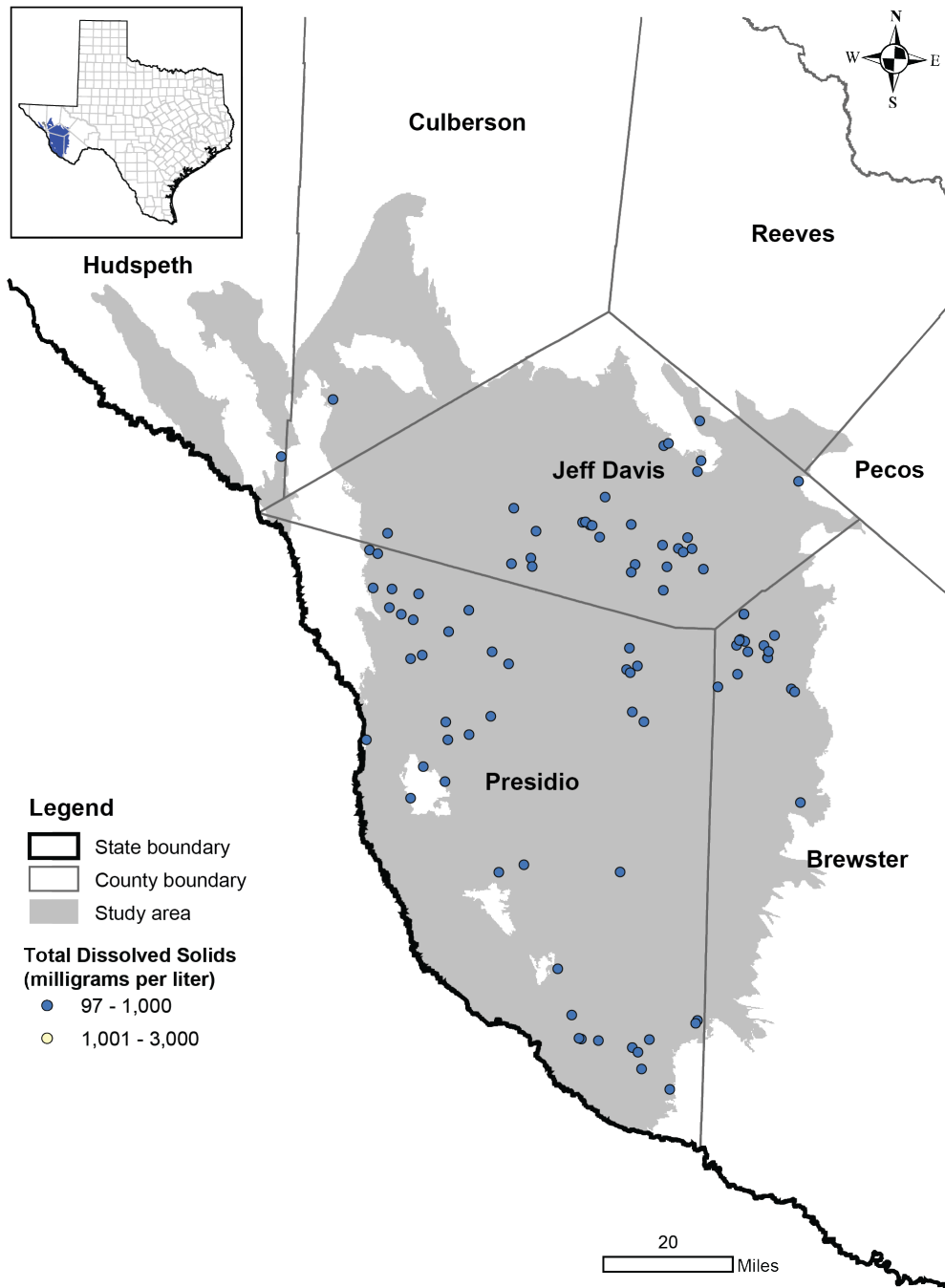
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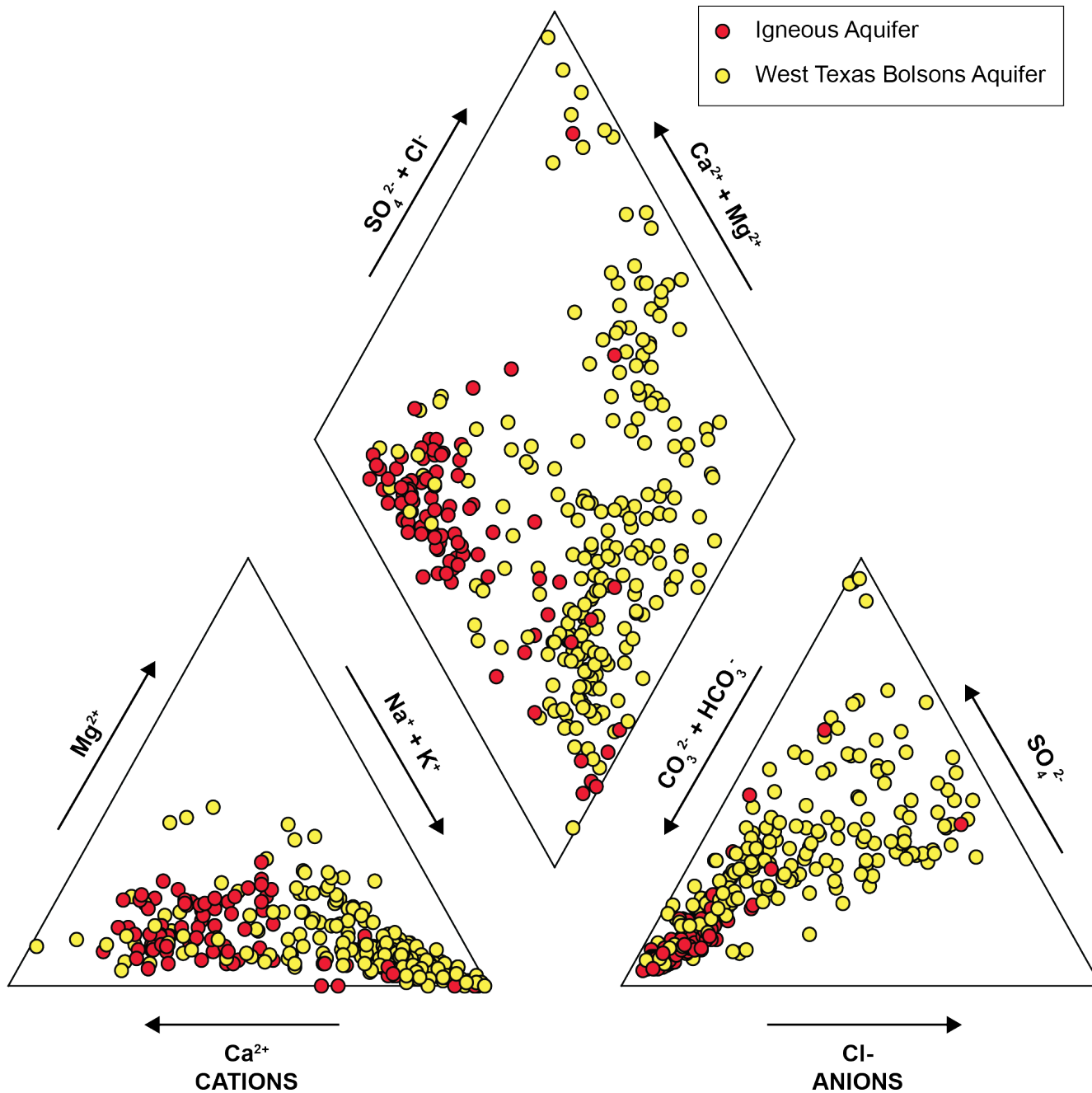


Igneous Aquifer





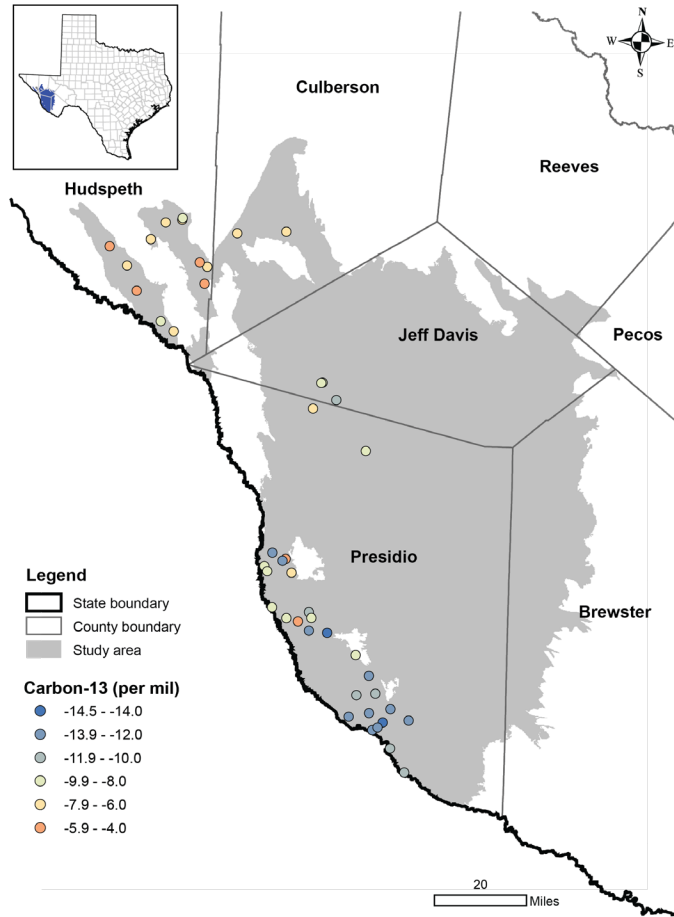




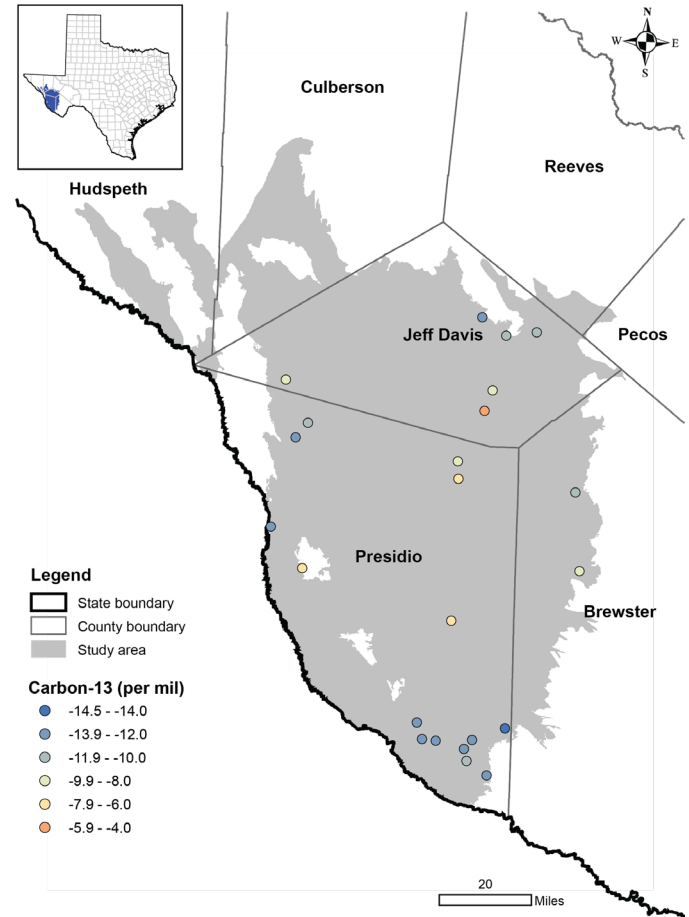
Groundwater Isotopes

- Provide information about groundwater hydrology
 - Evaporation, water-rock interaction, elapsed time since recharge, hydrologic conditions of recharge
 - Carbon-13, carbon-14, tritium, and stable hydrogen and oxygen

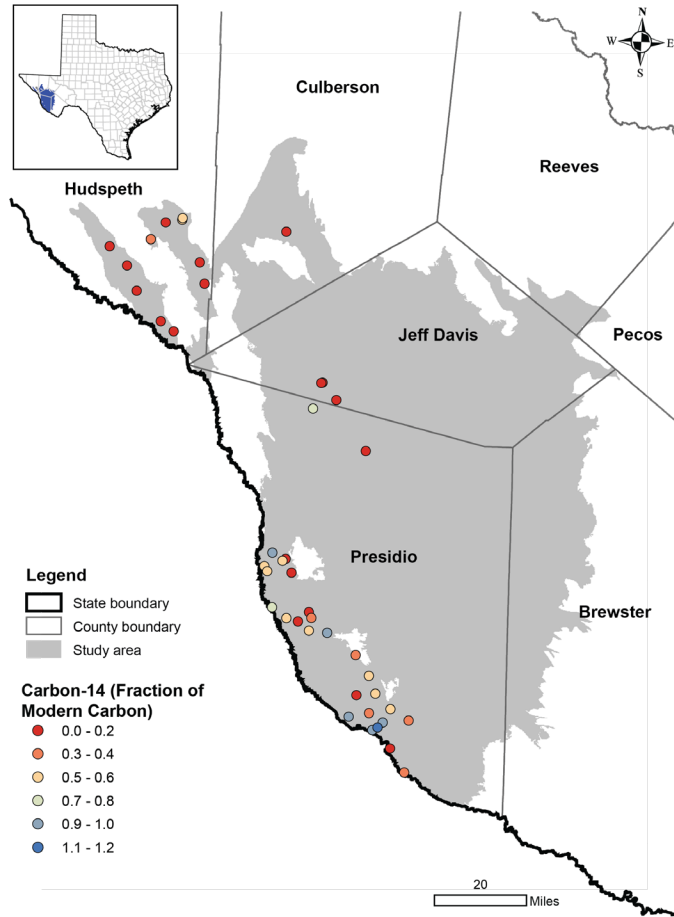
West Texas Bolsons Aquifer



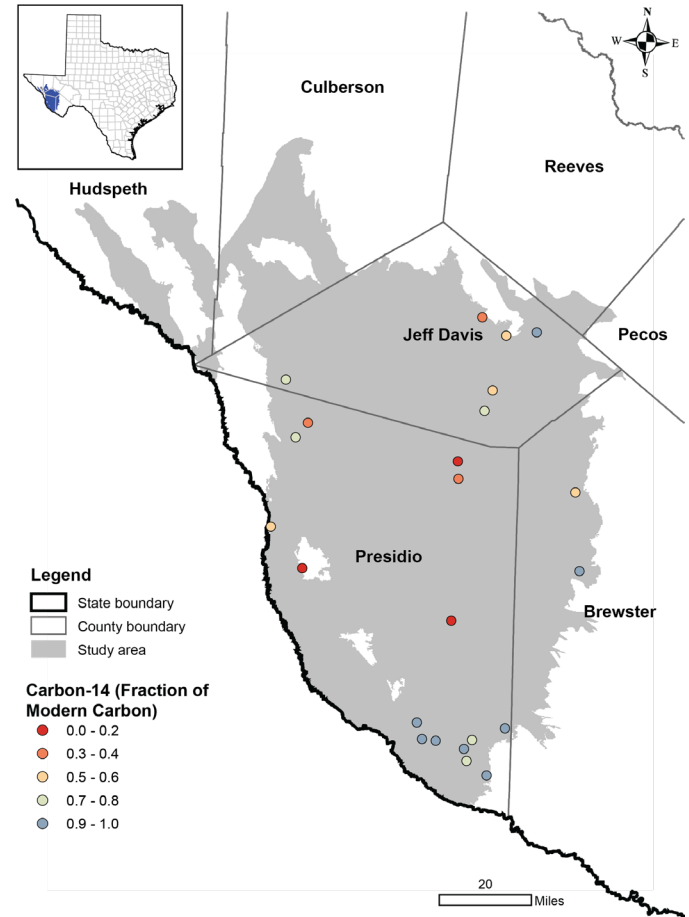
Igneous Aquifer



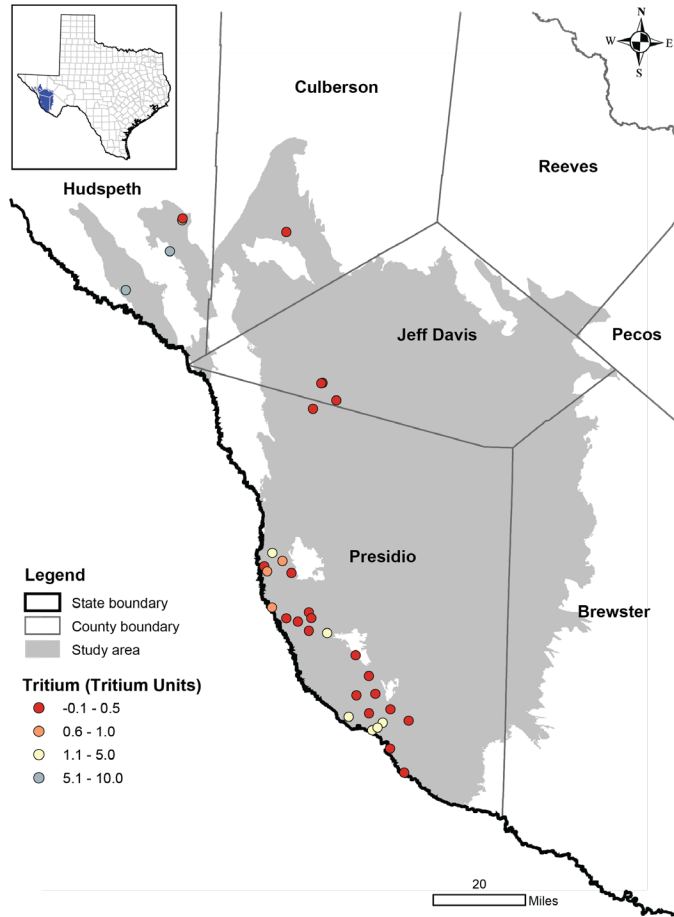
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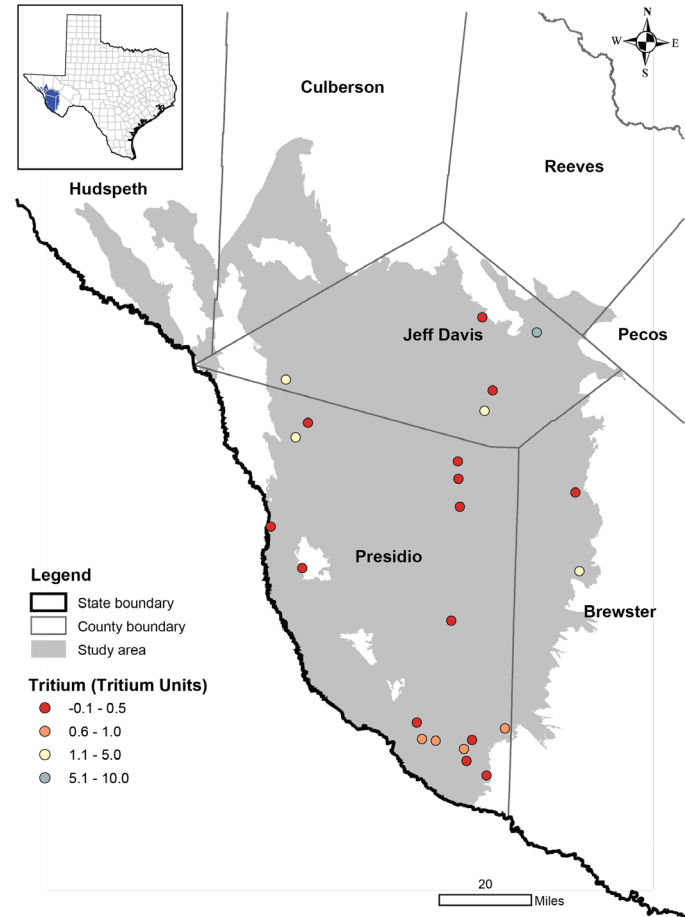
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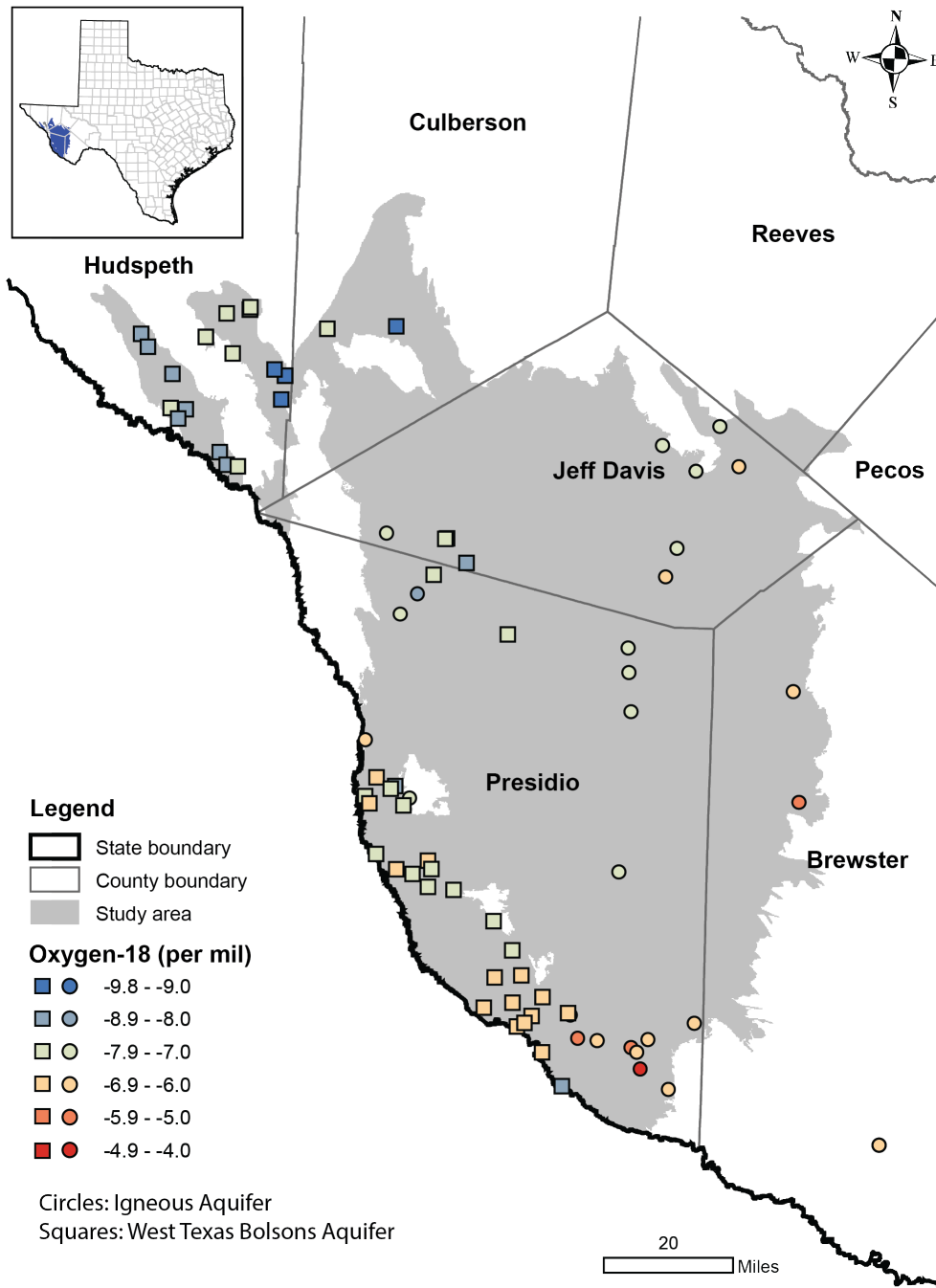


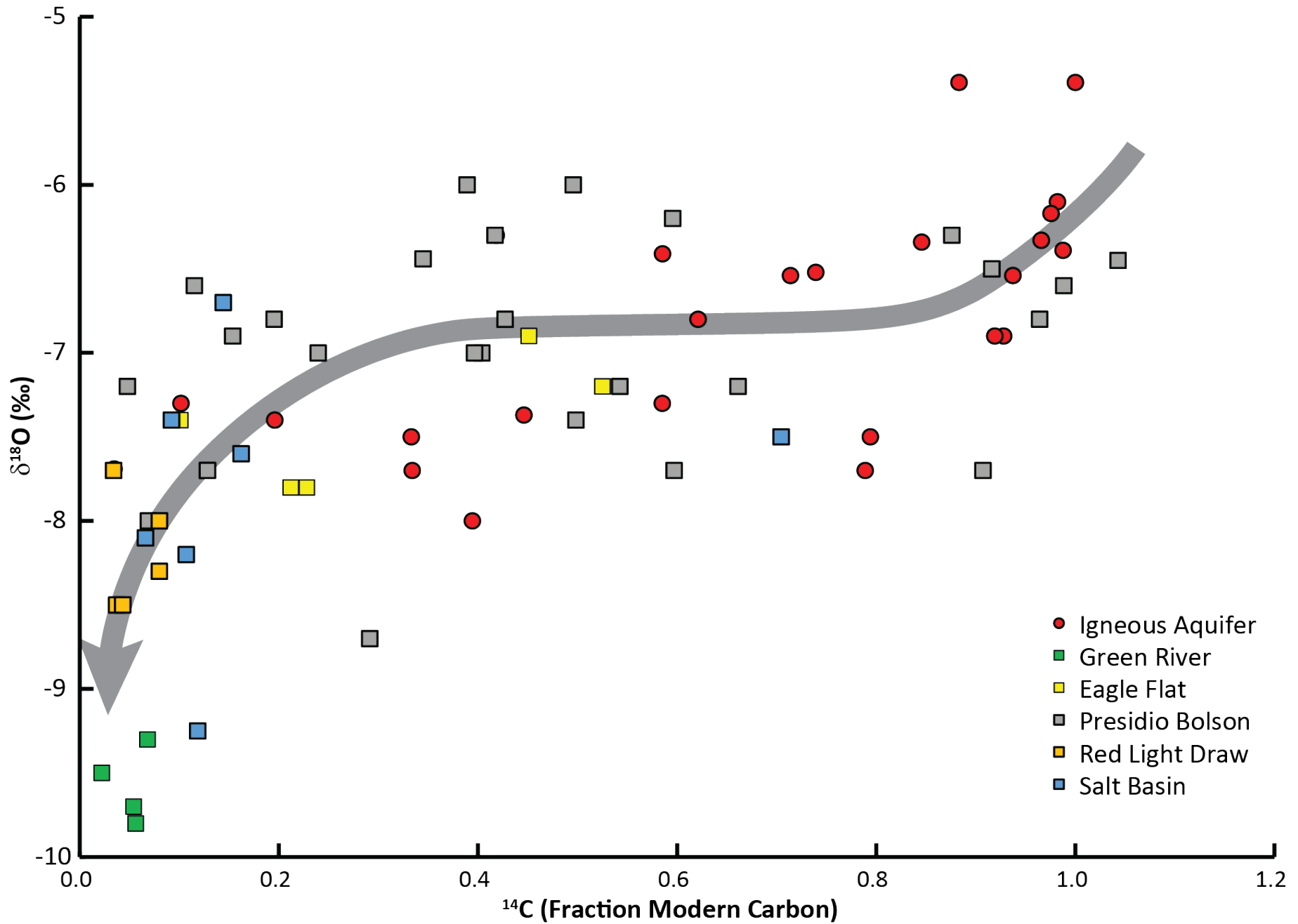
West Texas Bolsons Aquifer



Igneous Aquifer



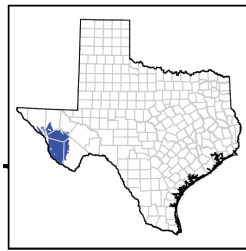




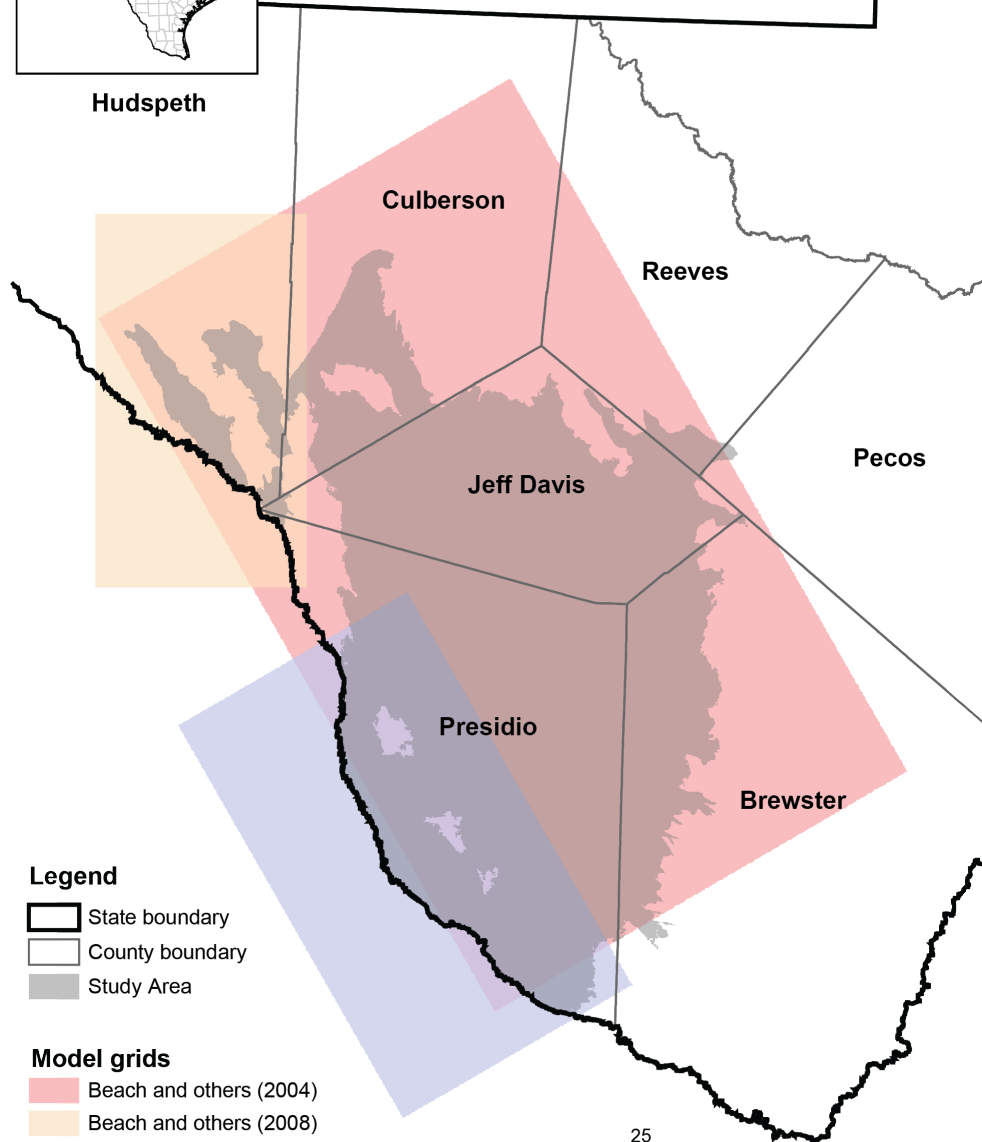
CONCEPTUAL MODEL



Eagle Flat



Hudspeth



Legend

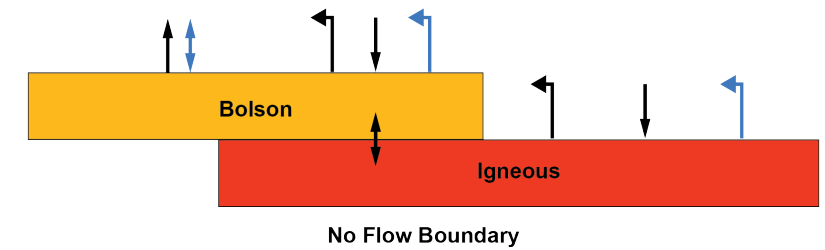
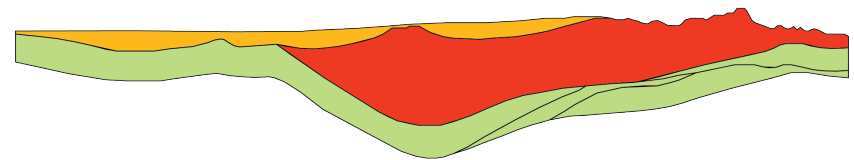
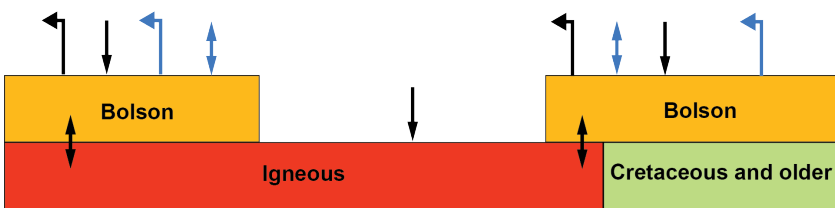
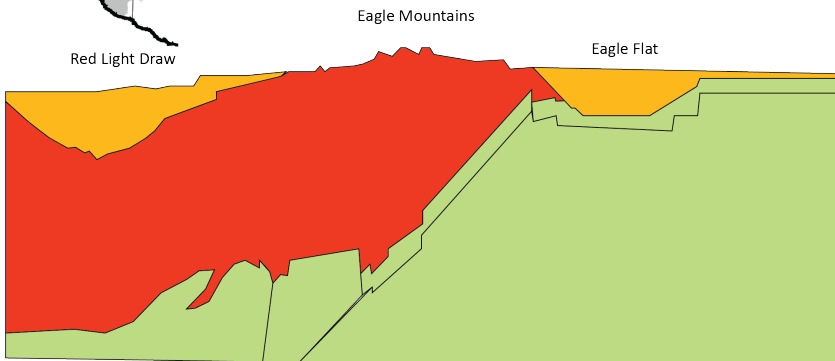
- State boundary
- County boundary
- Study Area

Model grids

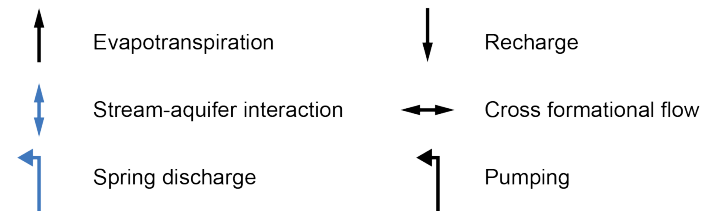
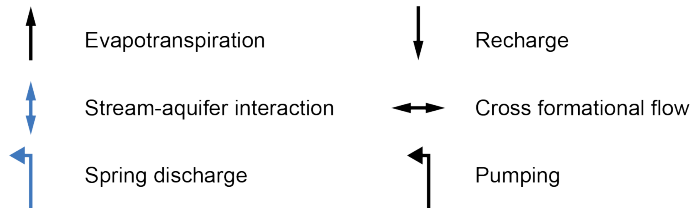
- Beach and others (2004)
- Beach and others (2008)
- Wade and Jigmond (2013)

25 Miles

Era	System	Stratigraphy	Hydrostratigraphic Units	Model Layer
	Quaternary	Quaternary deposits Bolsons deposits	West Texas Bolsons Aquifer	1
Cenozoic	Tertiary	Undifferentiated volcanic rocks, tuffs, intrusive igneous rocks, and tuffaceous sedimentary rocks	Igneous Aquifer	2
Mesozoic	Cretaceous	Limestone, sandstone,	Permian and Cretaceous hydrostratigraphic units	
Paleozoic	Permian	quartzite, marl, and mudtone		



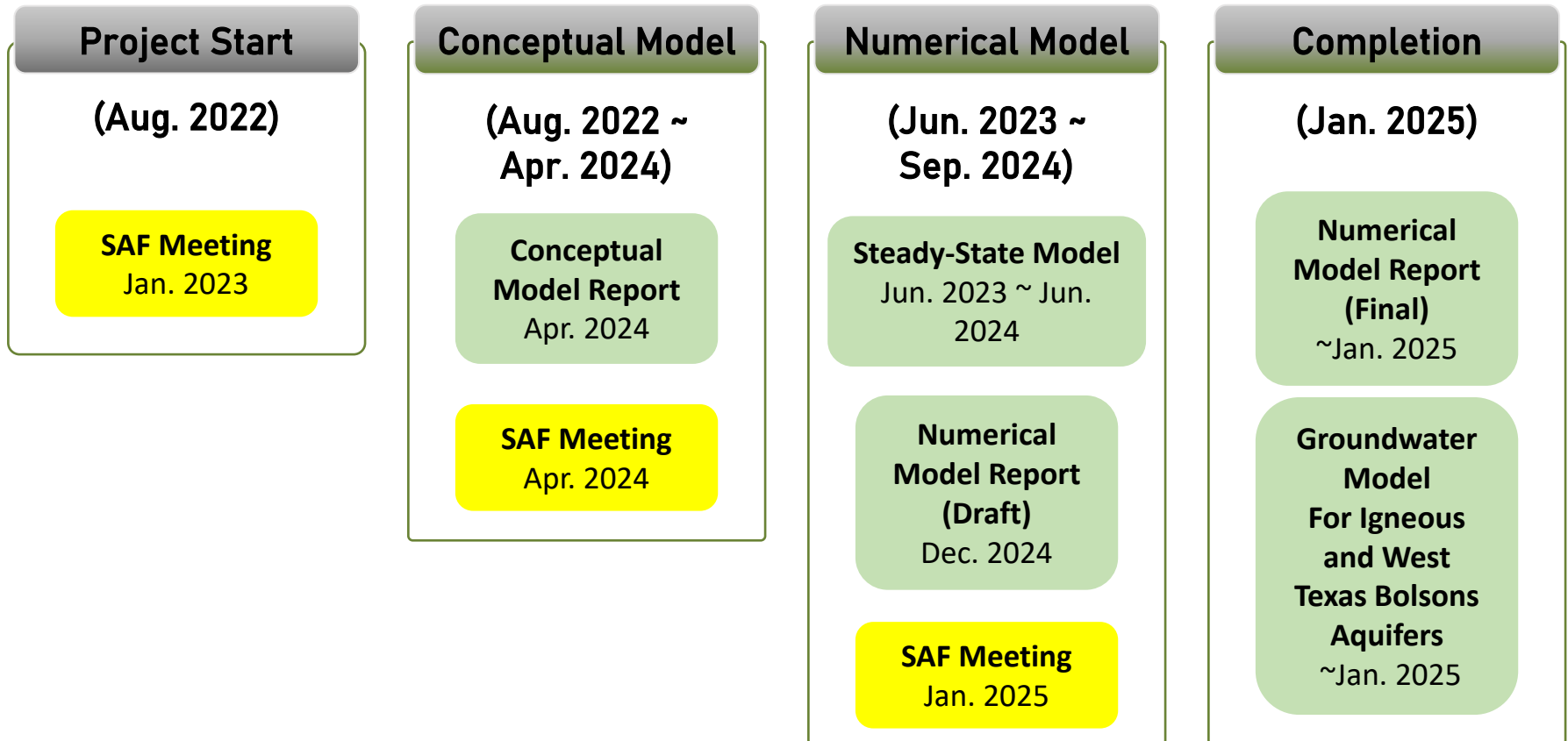
No Flow Boundary



A landscape photograph of a desert with a windmill in the distance and the text 'PROJECT SCHEDULE' overlaid. The scene features a clear blue sky with scattered white clouds, a range of low mountains in the background, and a foreground filled with green desert vegetation, including several tall yucca plants. A metal windmill with a small flag is visible in the middle ground, slightly to the left of the center. The text 'PROJECT SCHEDULE' is written in large, bold, white capital letters across the center of the image.

PROJECT SCHEDULE

Project Schedule*



*Schedule is Tentative

Additional Information

Web information:

<https://www.twdb.texas.gov/groundwater/models/gam/wtbi/wtbi.asp>

**Texas Water Development Board
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Web information:

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A landscape photograph showing a wide, flat plain in the foreground covered with sparse, green and brown vegetation. In the middle ground, there are several rounded, brown mountains. The largest mountain is in the center, with a distinct peak. The sky is a clear, pale blue. The word "QUESTIONS?" is overlaid in large, bold, black capital letters across the center of the image.

QUESTIONS?

Wild Horse Flat

A landscape photograph showing a wide, flat plain in the foreground covered with green and brown shrubs. In the middle ground, a large, rounded mountain with a flat top dominates the view. The sky is a clear, pale blue. The text "ATTENDANCE LIST" is overlaid in large, bold, black letters across the center of the image.

ATTENDANCE LIST

Wild Horse Flat

Name	Affiliation
Ian Jones	Texas Water Development Board
Bence Close	Consultant
Grayson Dowlearn	Texas Water Development Board
Ray Brady	Consultant
Amy Bush	Consultant
Daryn Hardwick	Texas Water Development Board
Nick Lamkey	Texas Water Development Board
Shirley Wade	Texas Water Development Board
Robert Bradley	Texas Water Development Board
Natalie Ballew	Texas Water Development Board
Tim Cawthon	Texas Water Development Board
Kate McKenna	Private citizen
Rebecca Storms	Texas Water Development Board
James Harcourt	Texas Railroad Commission
Cody Bjornson	Texas Water Development Board
Alyson - Collier Consulting	Consultant
Saheli Majumdar	Texas Water Development Board