

Hydrogeology of Western Travis County: A Story of Trinity Aquifer Depletion

*SCTWRIG, Edwards Aquifer Authority
December 3, 2019*

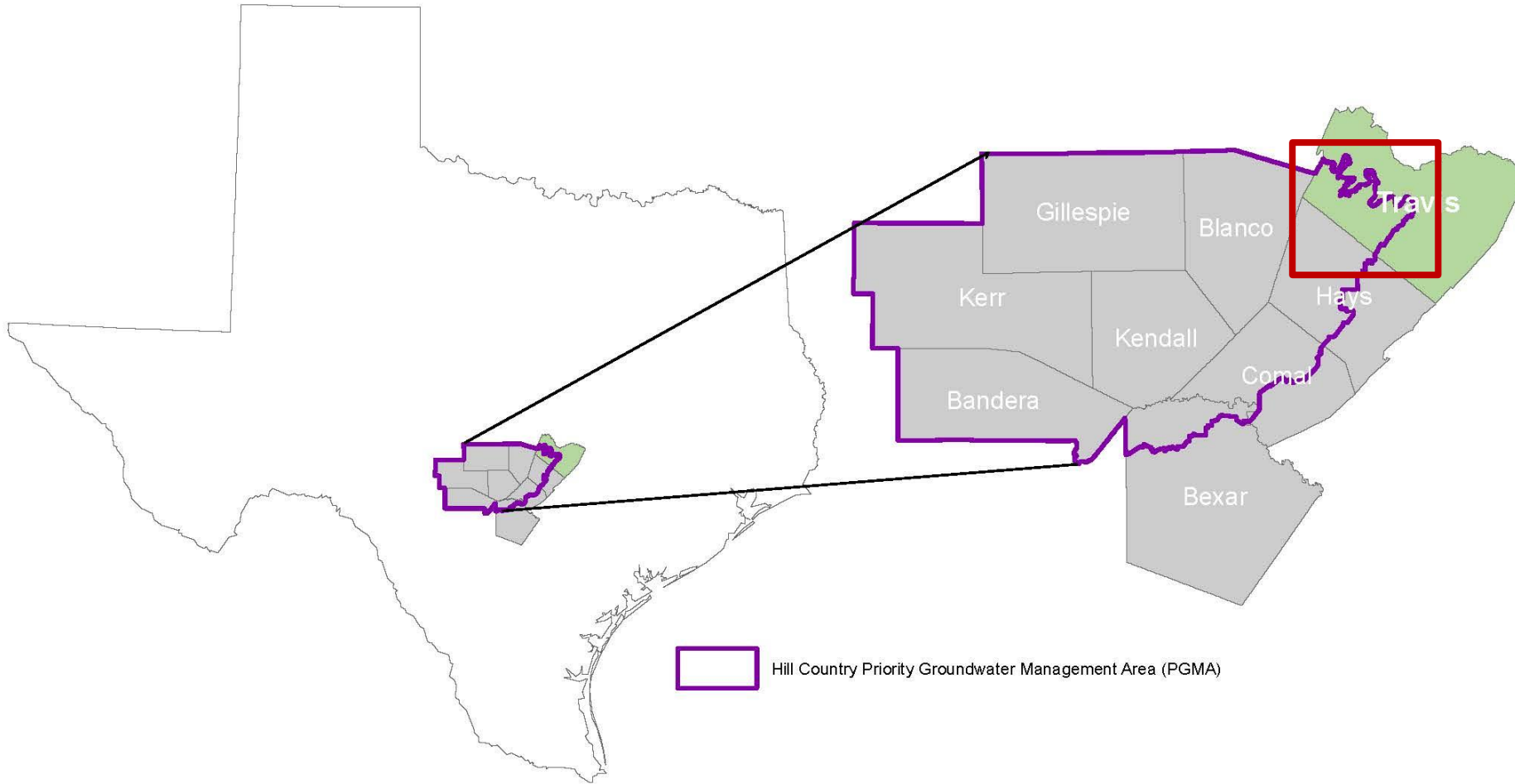


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Travis County: Vicky Kennedy



Priority Groundwater Management Area



		Stratigraphy	
		Litho	Hydro
Trinity Group	Upper Glen Rose		Upper Trinity
	Lower Glen Rose		Middle Trinity
	Hensel		
	Cow Creek		
	Hammett		confining
	Sligo		
	Hosston		Lower Trinity

Summary

- Study has significantly increased our knowledge of the hydrogeology and conceptual model of Trinity Aquifer units in Travis and Hays Counties.
- Study has documented depletion and mining of the Lower and Middle Trinity Aquifers.
- The 1990 PGMA designation was valid.

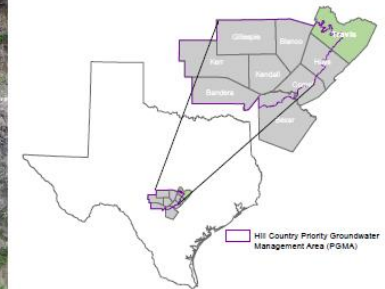
Hydrogeologic Atlas Structure

- Peer review in progress
- Expect publication in January 2020



HYDROGEOLOGIC ATLAS OF WESTERN TRAVIS COUNTY

November 2019



Barton Springs Edwards Aquifer
CONSERVATION DISTRICT



Setting and Study Area

Southwest Travis Co. PGMA

SECTION 1.0 STUDY AREA

Regional Tectonics,

Depositional History

SECTION 2.0 TECTONIC AND PALEOGEOGRAPHIC MAPS

Study Area Stratigraphy

Introduction

The preceding section describing the regional tectonics, stratigraphy, and depositional environments underscores the detailed stratigraphy of the study area. The reader is referred to the detailed descriptions in Williams et al., 2010, and references therein, for the detailed stratigraphic descriptions. Figure 3.3 illustrates the stratigraphy of the study area and is modified from Williams et al., 2010.

Figure 3.2 is a photo of an exposure of the upper Cow Creek Limestone at Renner's Ranch. The Cow Creek Limestone grades at the base of the photo from a muddy clastic (olive-rich shale) upward to more massive beach complex containing carbonate and clastic sands. The Cow Creek is a major aquifer and within the Hill Country Aquifer.

Figure 3.4 illustrates the lateral and vertical relationships of the geologic units of the study area. Figure 3.5 illustrates the relationship of the geologic, depositional setting and facies changes to the aquifer units of the study area in the Hamilton Road #1 well completed from Kerans et al., 2010. Figure 3.6 illustrates map and cross-sectional view of the depositional model for the sequence in Figure 3.5. The geologic units are time-equivalent but represent different depositional environments and lateral facies. Figure modified from Rosen and Moore, 1983.

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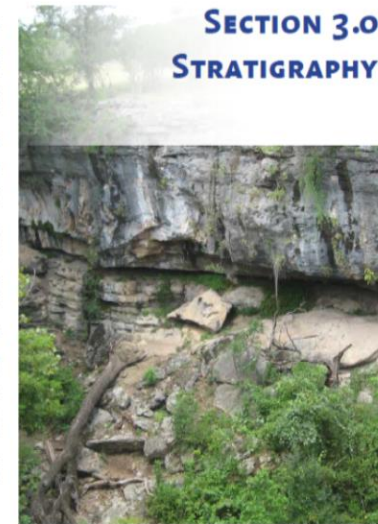
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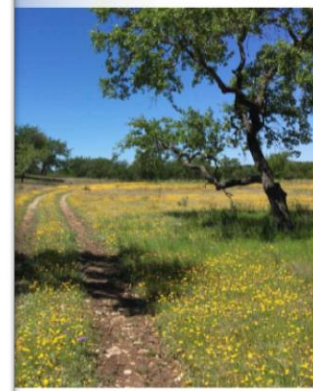
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SECTION 3.0 STRATIGRAPHY



Captions

3.1 Photograph of the Sycamore Sand. An outcrop of fine to coarse heterotidal sandstone overlain by cobble conglomerate. The tum octus apicatus, terisintis horis C. Mullae, qui crum fau, nonium id pece quod fe pro con patus huc Muldem quidi inuunt, ne tem fa, iwerthiam res orasendans. Hills.

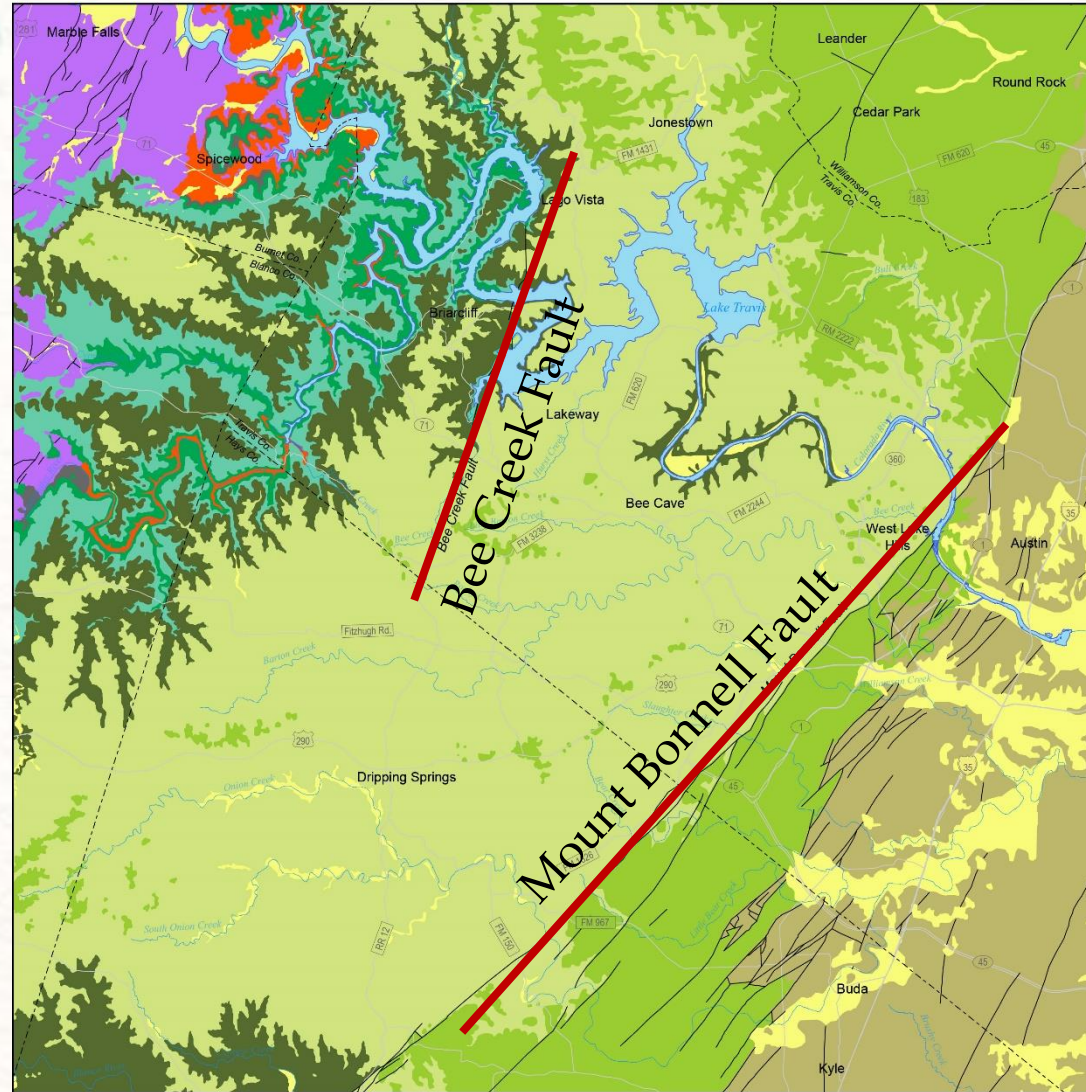


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Geologic Setting

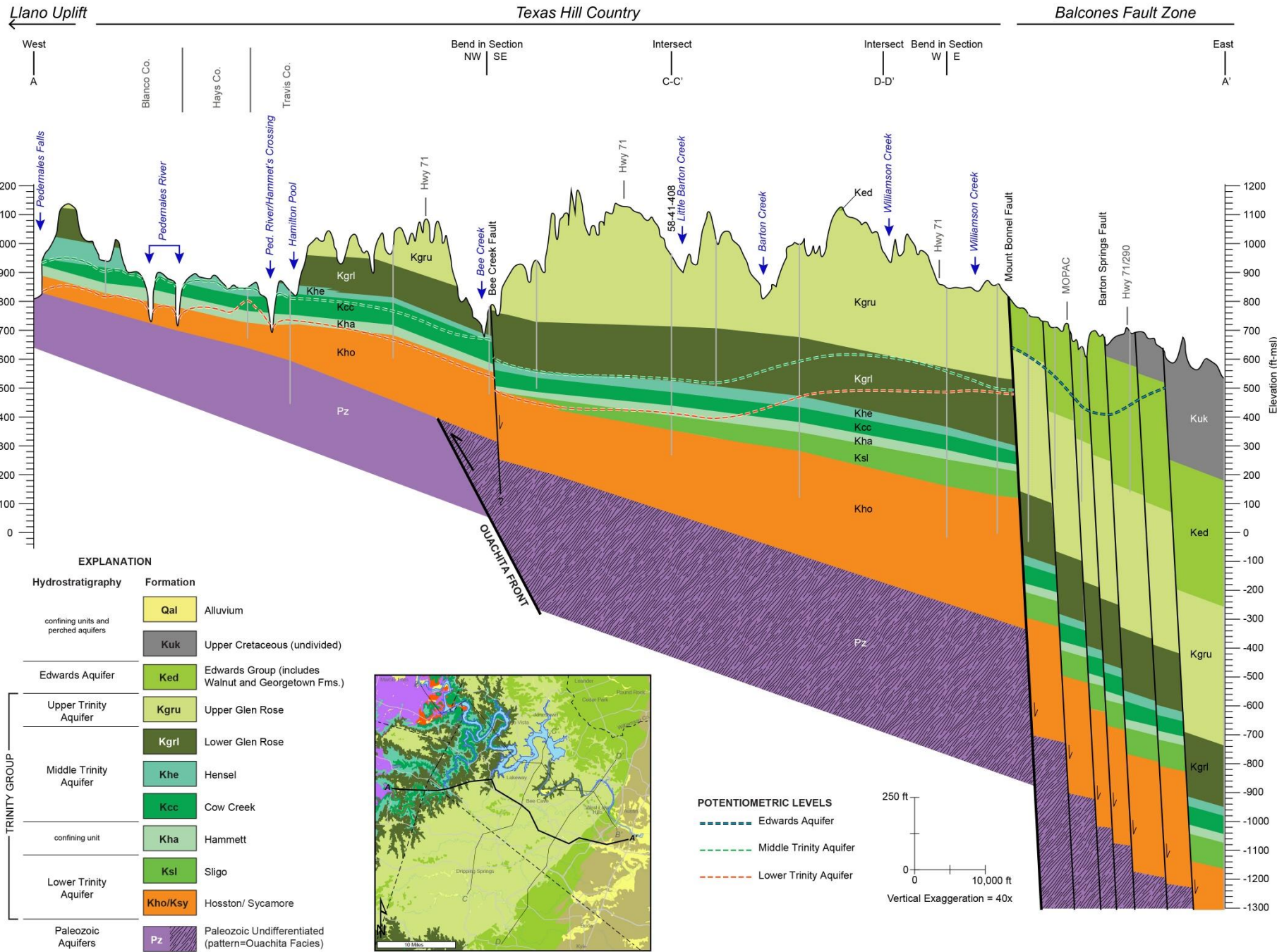


Geologic Explanation

- Qal/ Qtt**
Alluvium and Terrace deposits
Gravel, sand and silt
 - "Younger than Edwards"**
Predominantly Cretaceous-age marine limestones, claystones, chalks and marls.
 - Ked**
Edwards Group
Limestone and dolomitic limestone with chert. Argillaceous and nodular at base.
 - Kgru**
Upper Glen Rose Formation
Nodular, micritic limestone, argillaceous with skeletal clasts and interbedded marl, dolomite, and minor evaporite near base.
 - Kgrl**
Lower Glen Rose Formation
Skeletal-grain-micritic limestone shale. Two distinct massive limestone "mounds/reef" facies present in south central study area.
 - Khe**
Hensel Sand
West: Sand, silt and clay with conglomerate, commonly red-brown. East: Silty claystone and dolomite.
 - Kcu/ Khs**
Cow Creek/Hammitt Shale, undifferentiated
Cow Creek is generally shaley at base, shading upwards to a fine- to medium-grained, skeletal-grain-micritic limestone and fine crystalline dolomite. Hammitt is typically a dark gray to olive green gummy claystone.
 - Ksl**
Sligo Formation (subsurface formation; does not outcrop)
Limestone and dolomite with basal siltstone and shale. Locally contains relict coarse skeletal fragments and rudists.
 - Ksy**
Sycamore (Hosston) Formation
Basal conglomerate and fluvial sands, shoreline sands and siltstones with silty shale overbank deposits. Commonly red-brown. Hosston Fm (Kho) is subsurface equivalent with stacked channel sands and hi-energy "beach" to east.
 - Pz**
Paleozoic, undifferentiated
- Inferred fault lines
- $\frac{U}{D}$ Fault (down to the east unless noted otherwise)

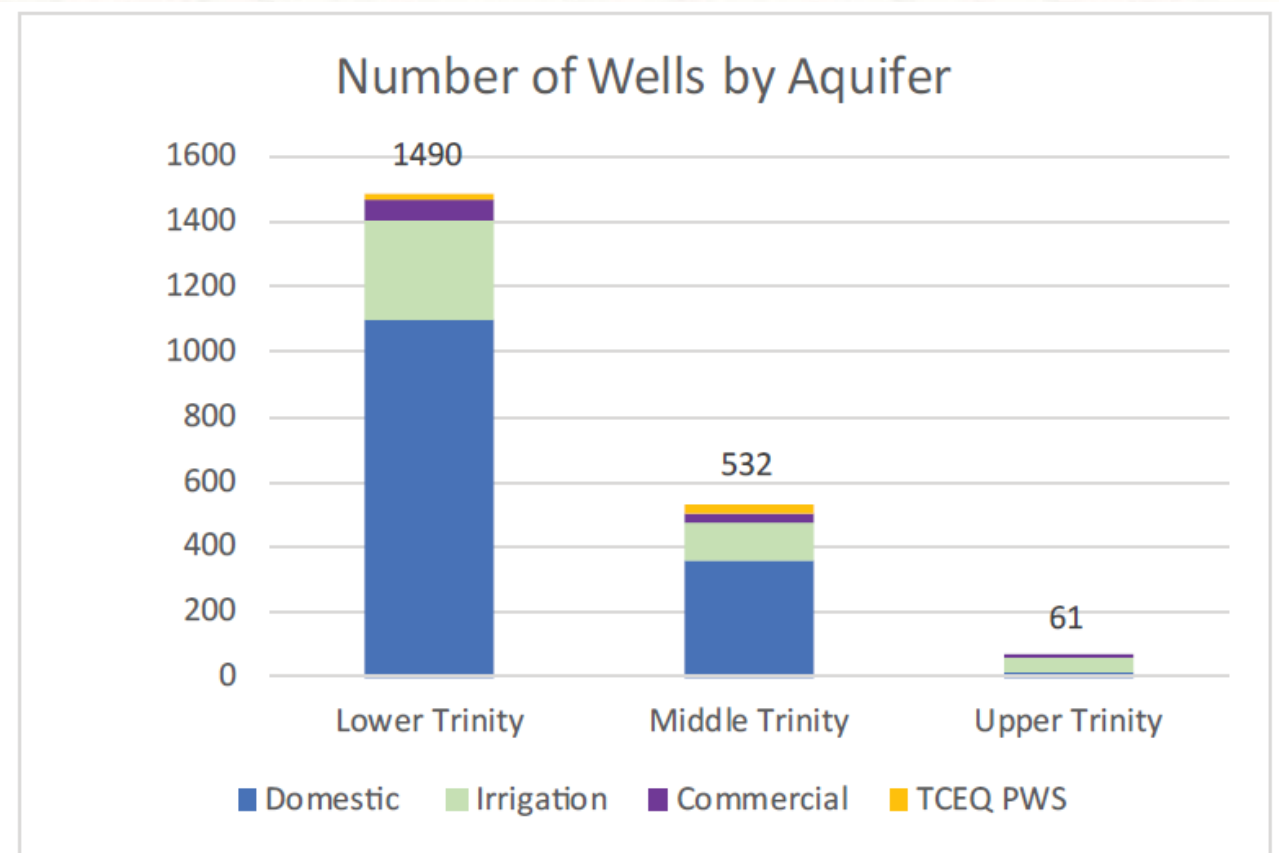
Legend

- County lines
 - Creeks
 - Major Creeks
 - Rivers
 - Lakes
 - Roads
 - Springs
- The projection for this and all other maps is Texas Albers.



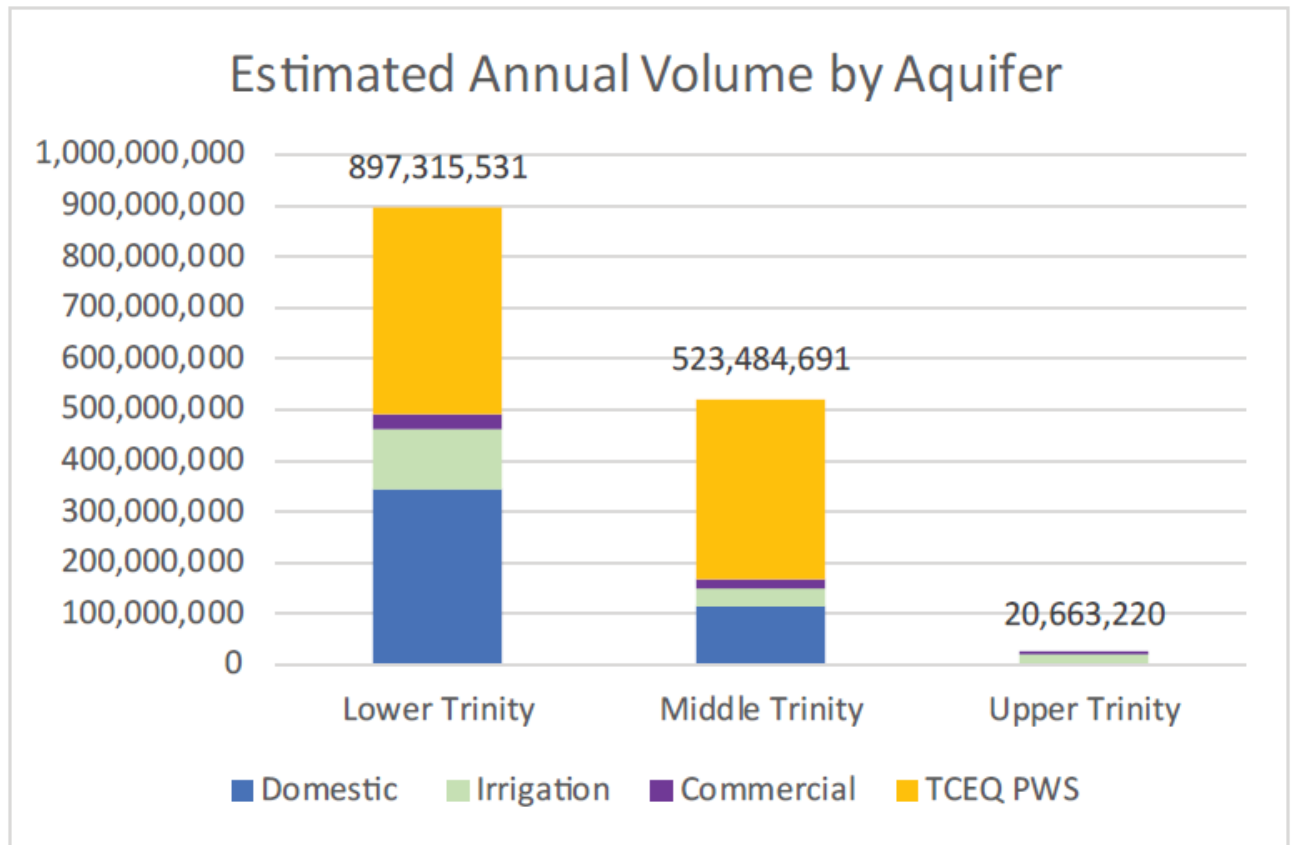
Total Wells by Aquifer

(Since 2003)



About 2,000 wells have been drilled since 2003 in the SWTC PGMA. About 75% of the wells are Lower Trinity.

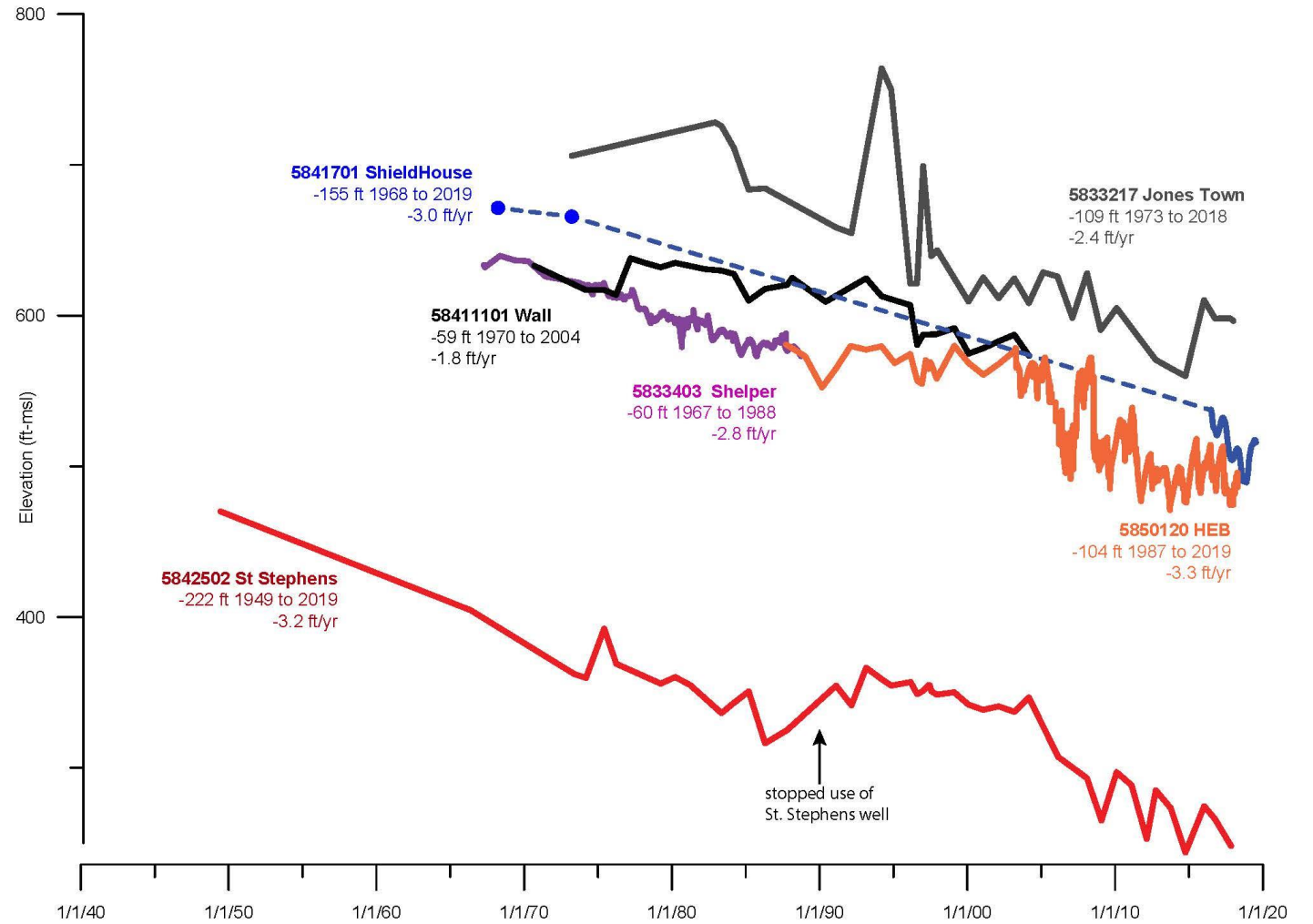
Annual Pumping Volume by Aquifer



An estimated total of 1.4 billion gallons per year is pumped from the SWTC PGMA. The volume is about 62% from the Lower Trinity, 36% Middle Trinity, and 1% Upper Trinity.

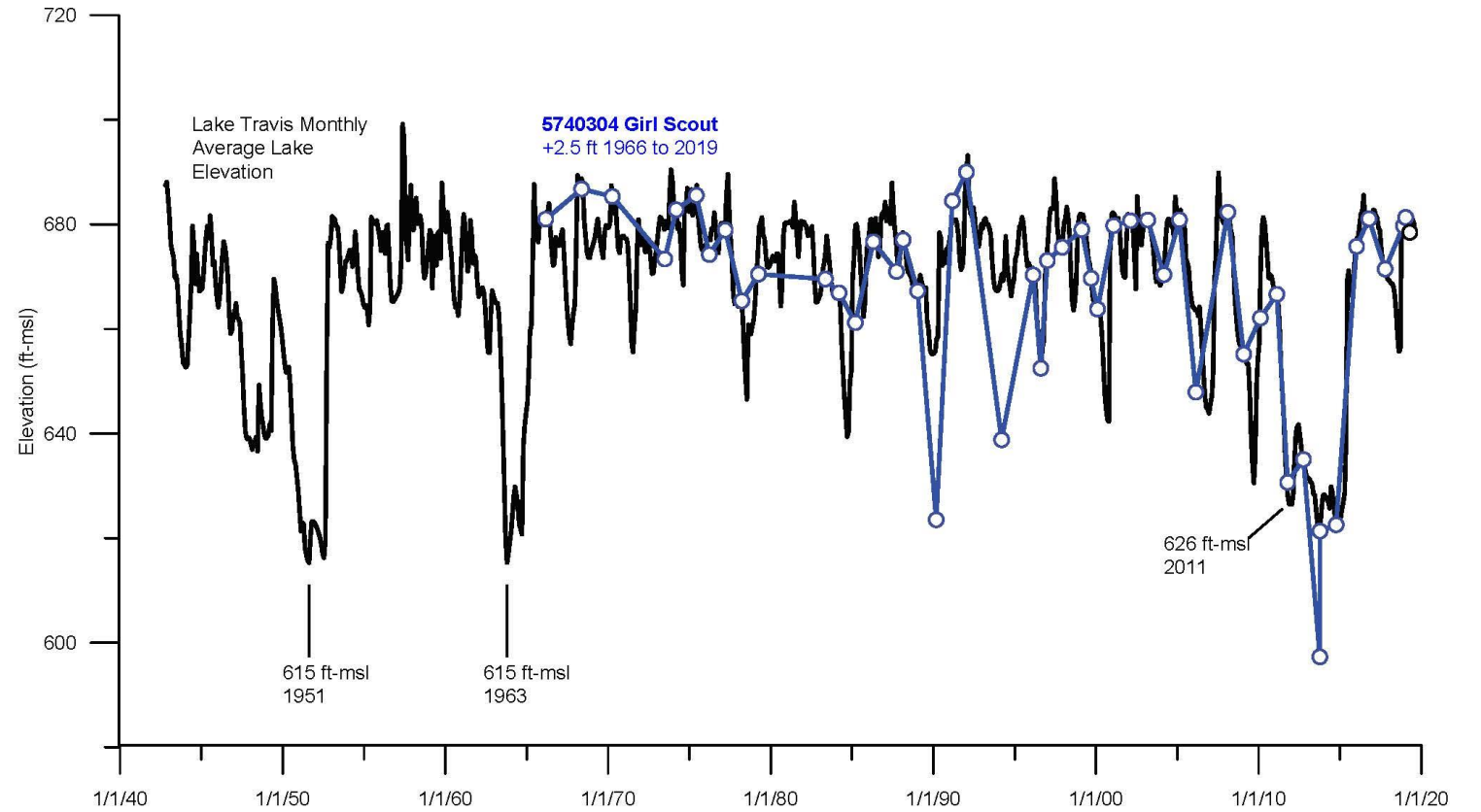
Lower Trinity Hydrographs

East of Bee Creek Fault



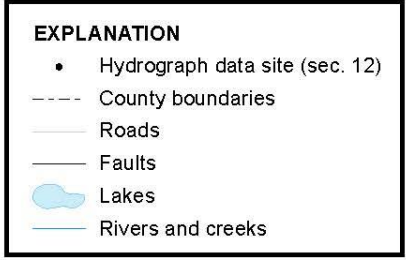
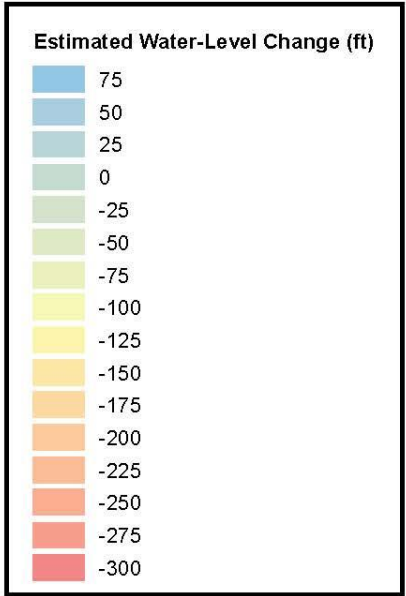
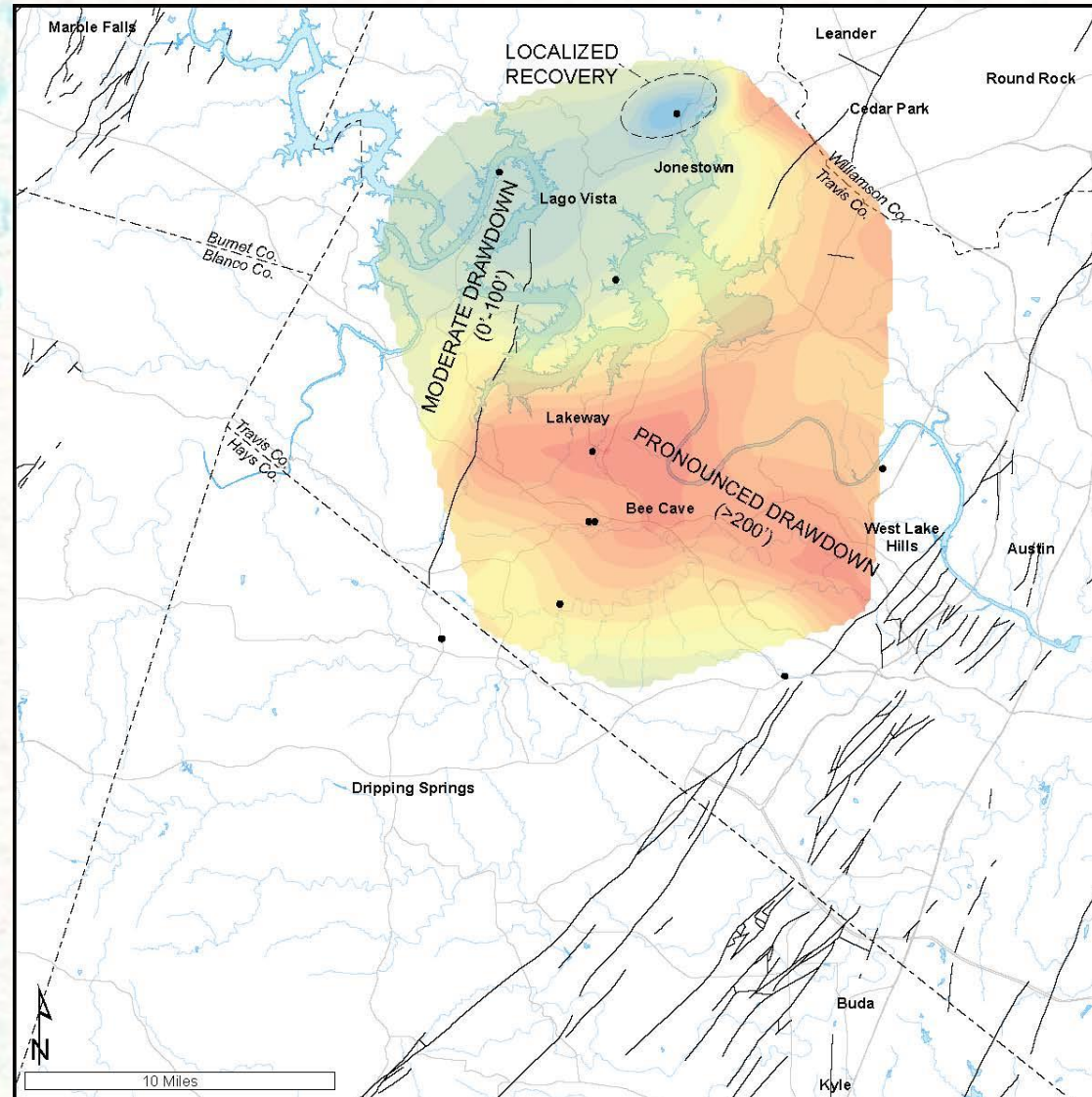
Lower Trinity Hydrographs

West of Bee Creek Fault



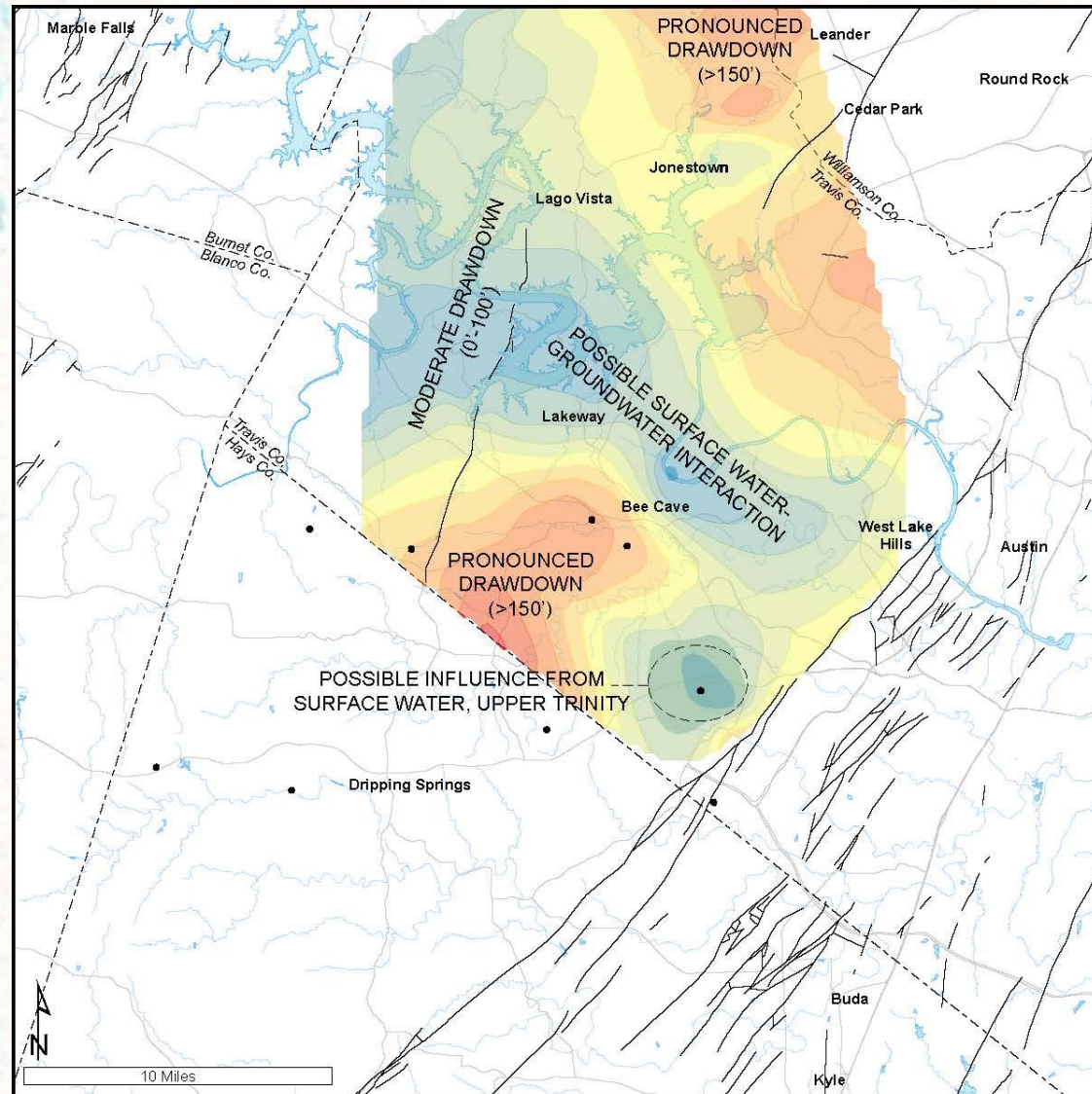
Lower Trinity Water-Level Change

1978 to present



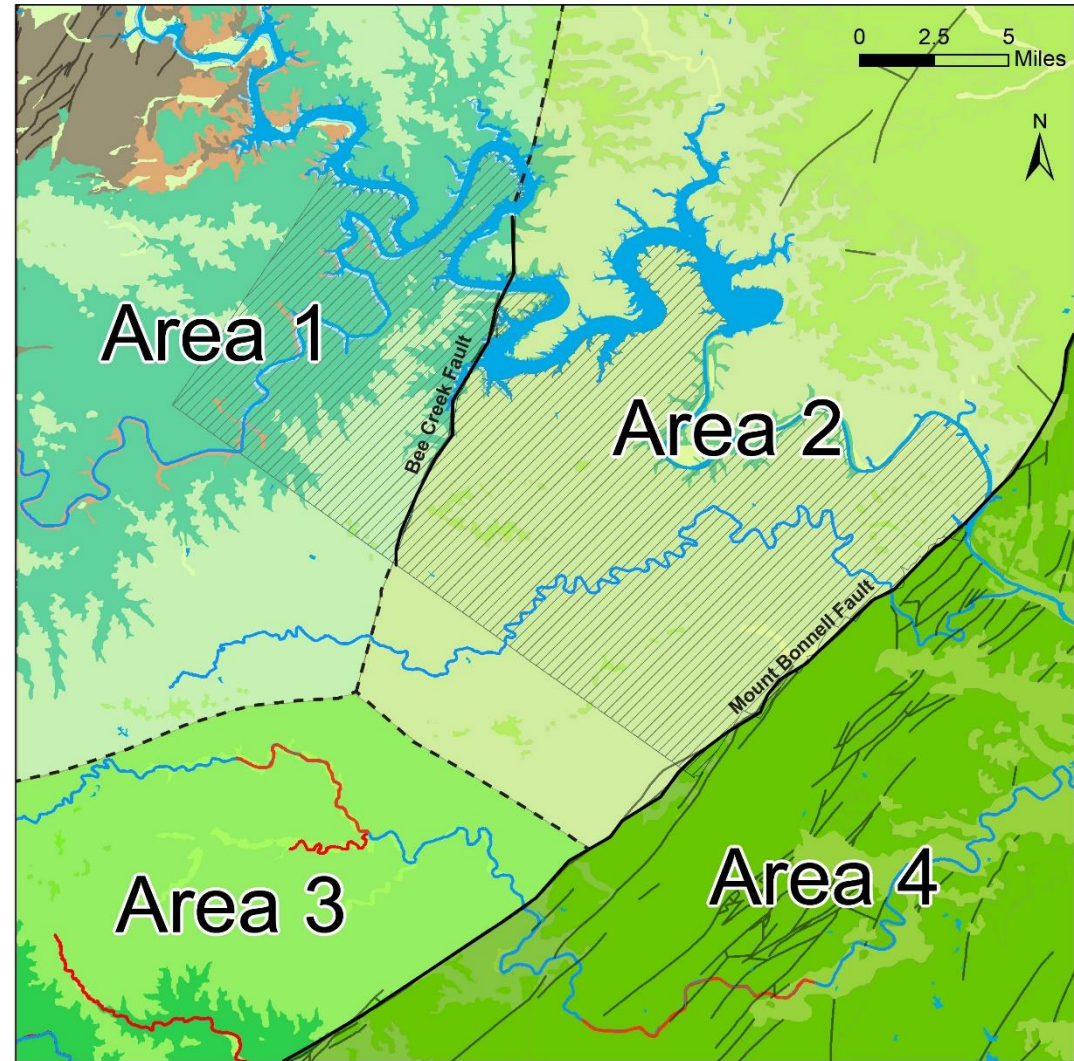
Middle Trinity Water-Level Change

1978 to present



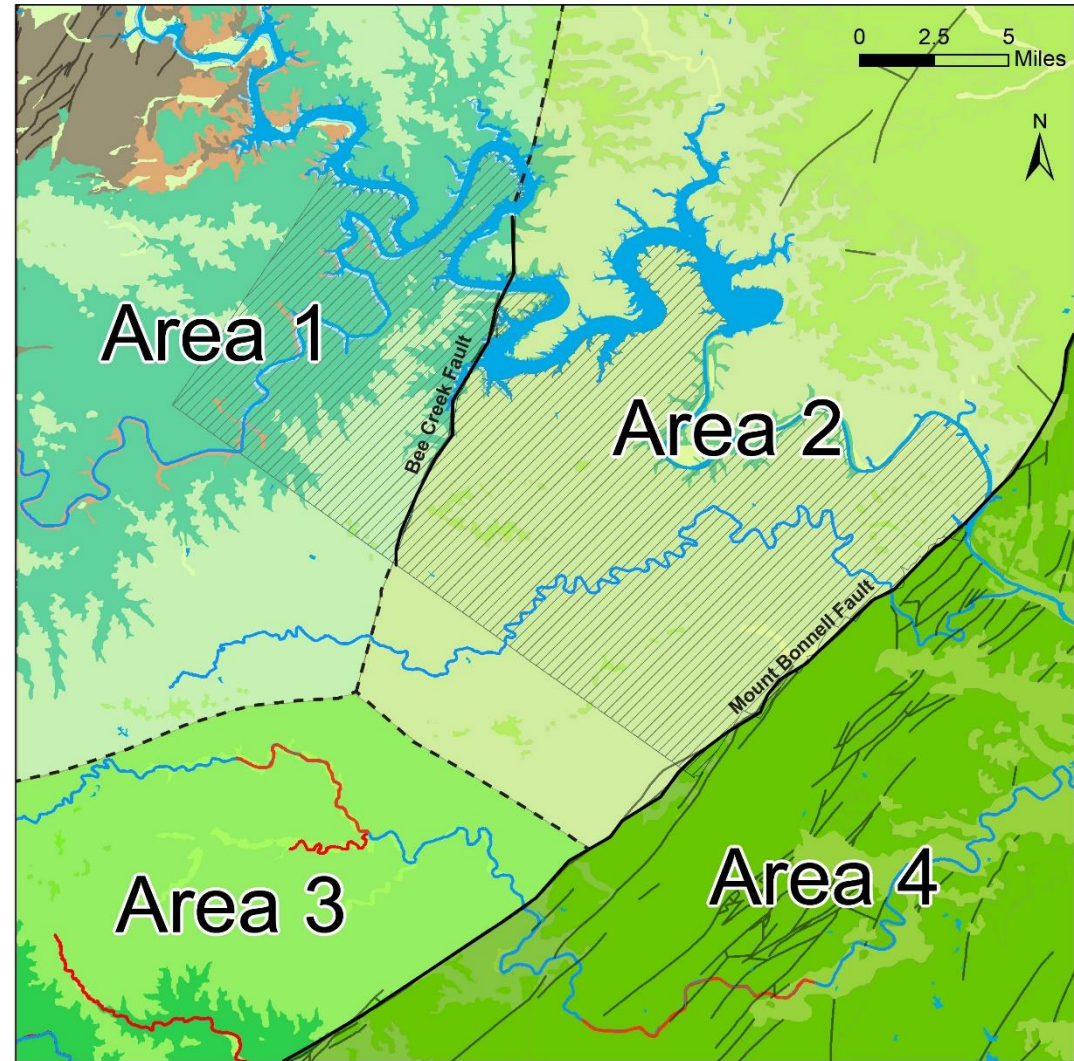
Summary Map

- The geologic history and setting directly influence the groundwater resources in the study area.
- Study has identified 4 distinct areas for the Trinity Aquifer.



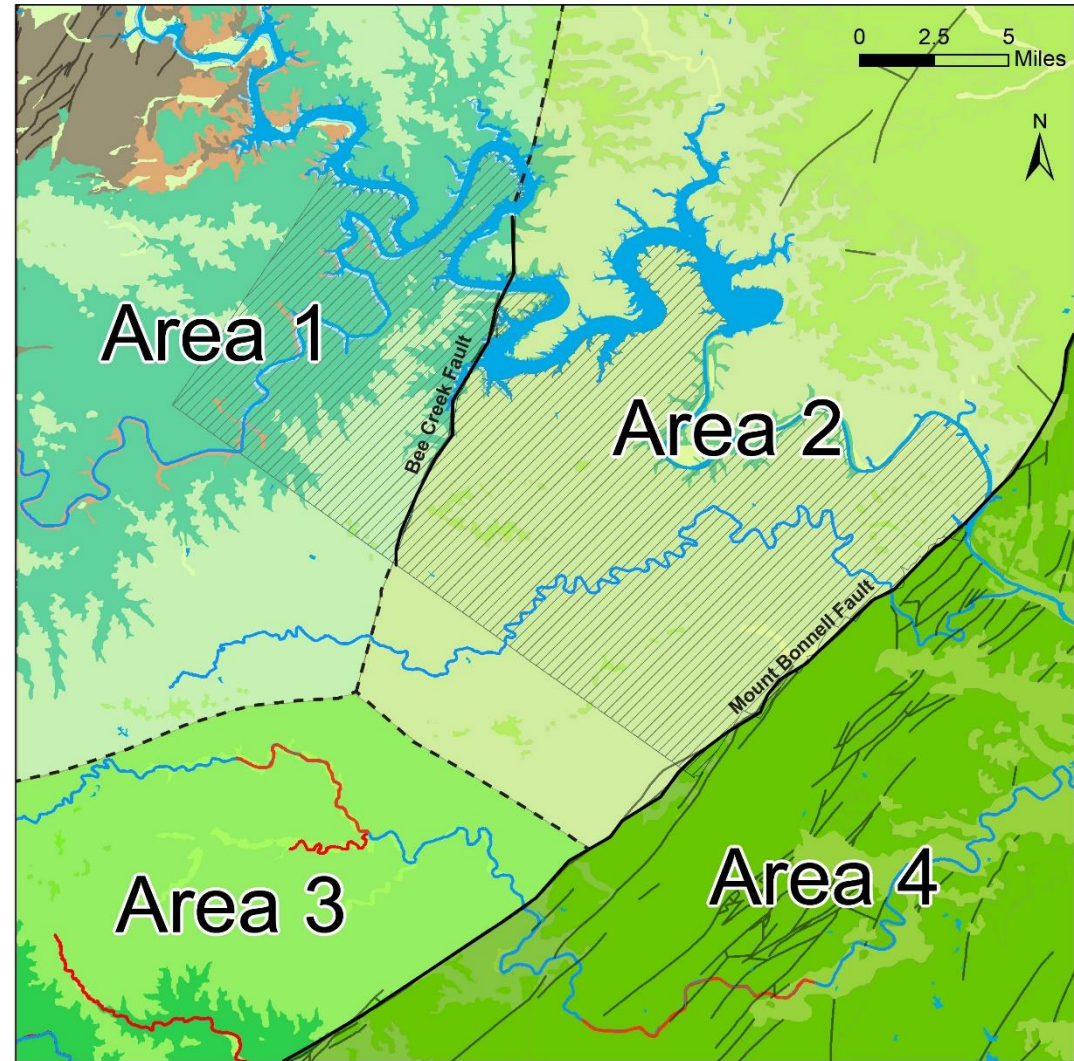
Area 1

- Recharge zone
- Generally fresh water
- Surface-groundwater interaction
- Matrix (primary) porosity
- Locally decreasing groundwater trend
 - Locally -2 ft/yr
 - Locally up to -100 ft decline since 1978



Area 2

- Confined
- Generally brackish water
- Localized (river) surface-groundwater interaction
- Matrix (primary) porosity
- Groundwater mining in Lower and Middle Trinity
 - Decline up to 2-300 ft since 1978
 - LT is -3 ft/yr



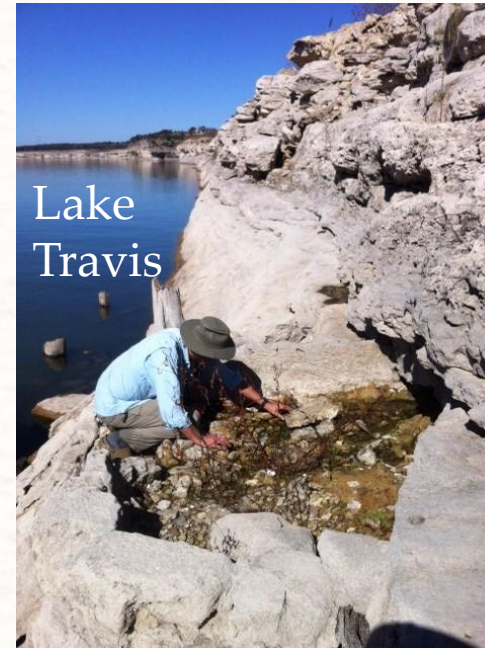
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Phase II

Aug. 2019- Aug. 2020

- Investigate surface water-groundwater exchange dynamics between the impounded Colorado River and the Trinity Aquifer in western Travis County
- Investigate the possible connection between Trinity Aquifer declines observed in southwestern Travis County and those observed in counties to the north



Middle
Trinity
Spring

Acknowledgements

- Travis County Commissioners
- BSEACD Board of Directors
- Travis County Departments and staff
- Travis County Parks
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- City of Austin Parks
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- City of Austin Water (Kevin Thuesen)
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- Westcave Preserve (Amber Ahrns Gosselin)
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- UT Austin (Dr. Michael Adams)
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- Al Broun, HTGCD
- Nature Conservancy (Ryan Smith, Brandon Crawford)
- TWDB (Janie Hopkins, Chris Muller)
- SWTCGCD Board
- Peer Reviewers (Al Broun, Doug Wierman, Juli Hennings, Kirk Holland, and others)
- The many well owners who granted access to their properties

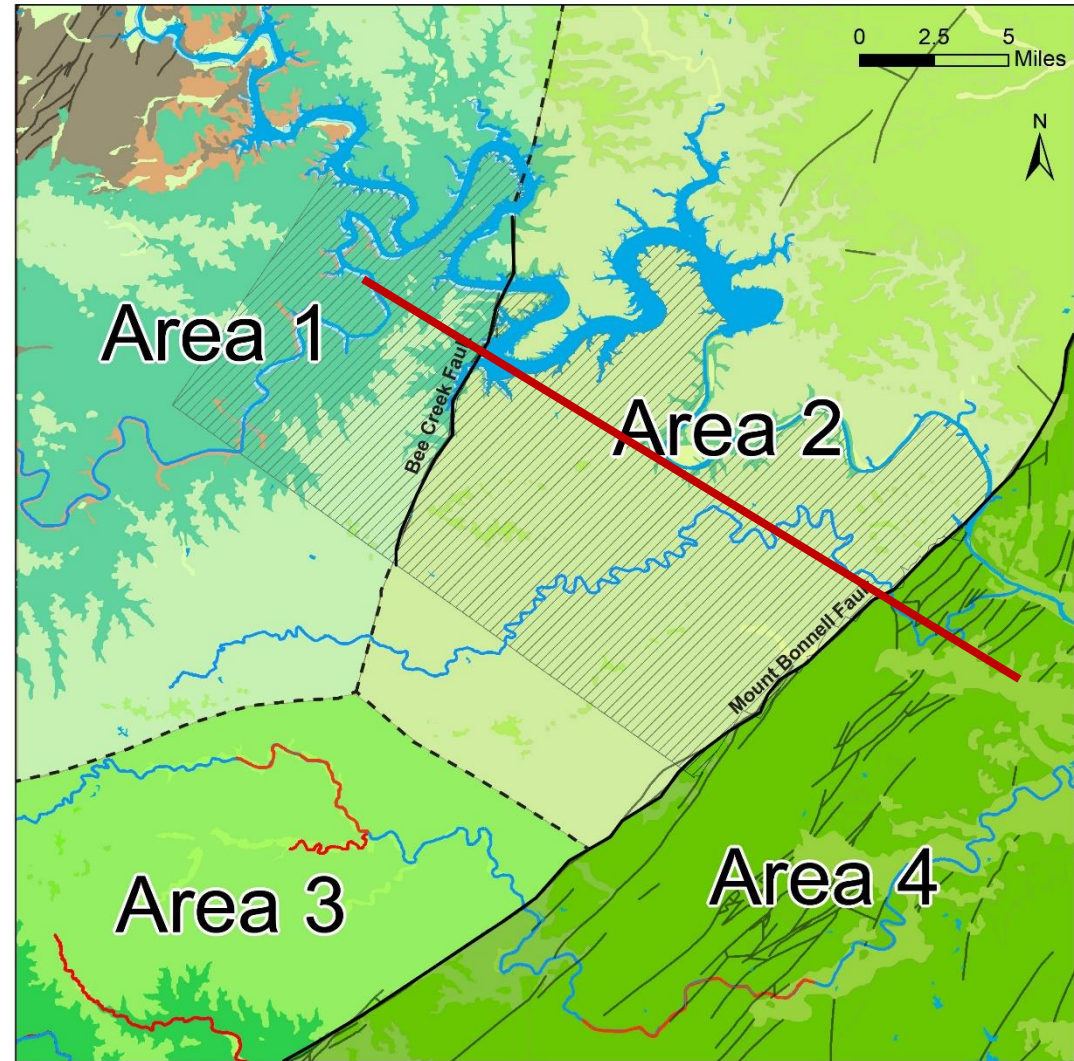
Questions?

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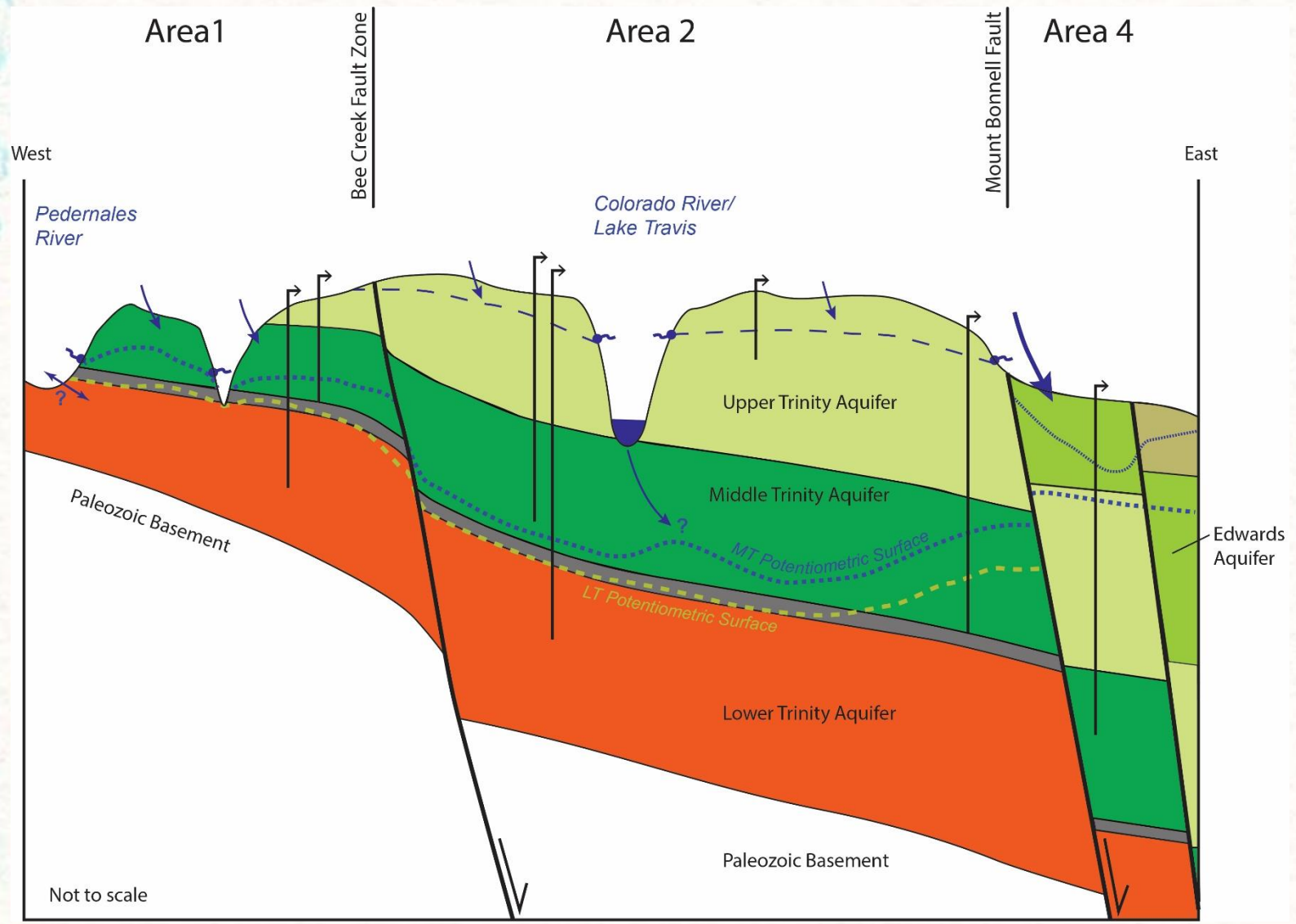
www.bseacd.org/TravisCo

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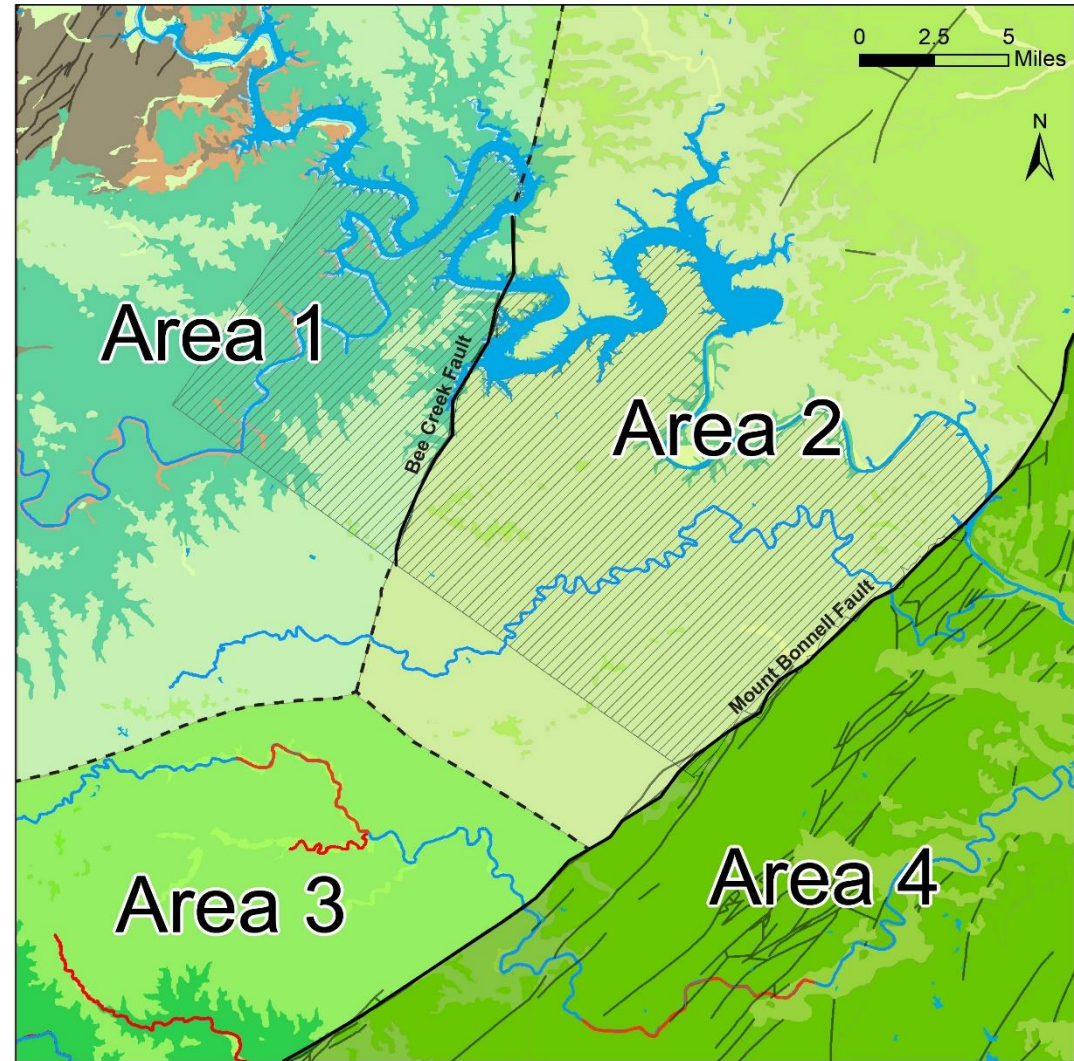


Schematic Summary Cross Section



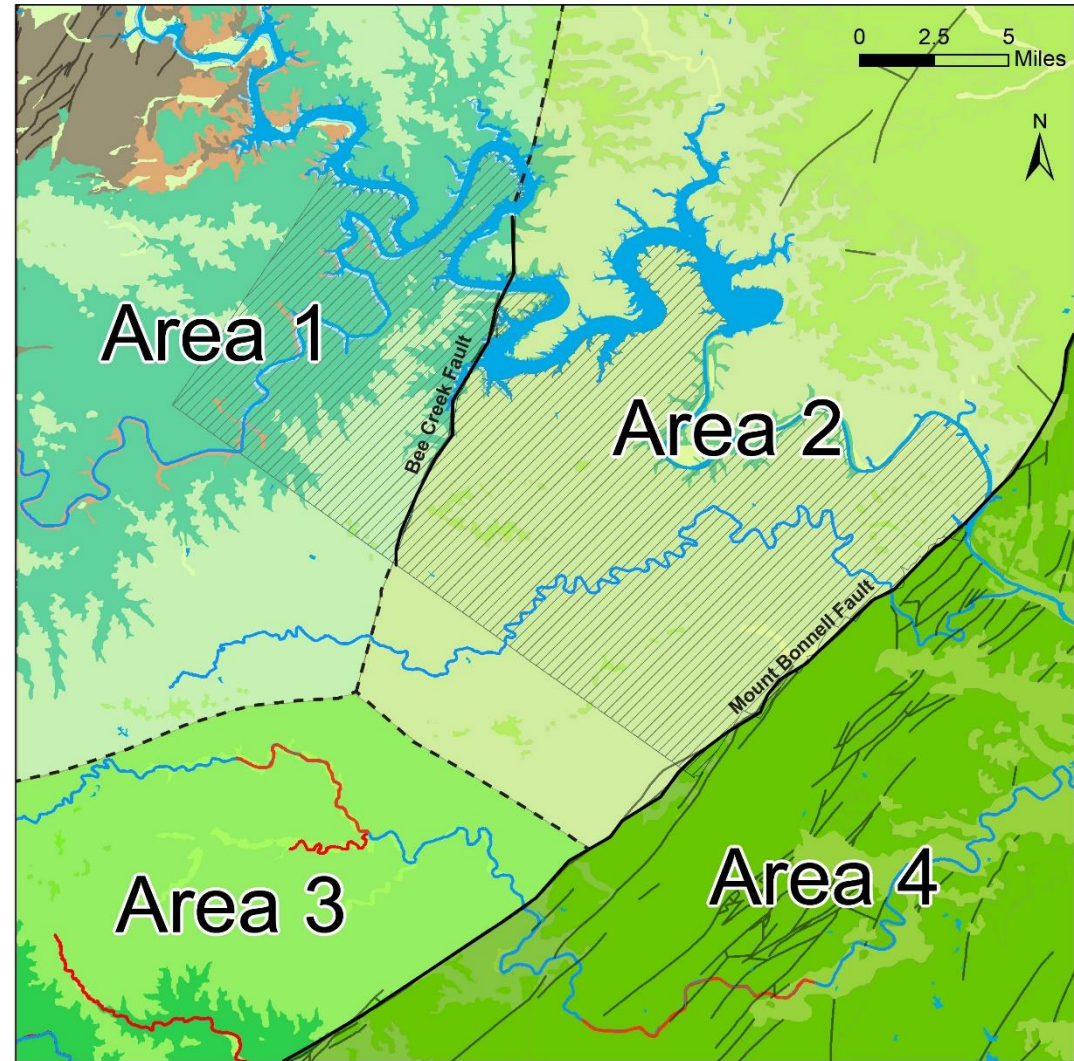
Area 3

- Unconfined
- Recharge zone
- Generally fresh water
- Surface-groundwater interaction
- Karstic and fracture (secondary) porosity
- Pumping impacts JWS



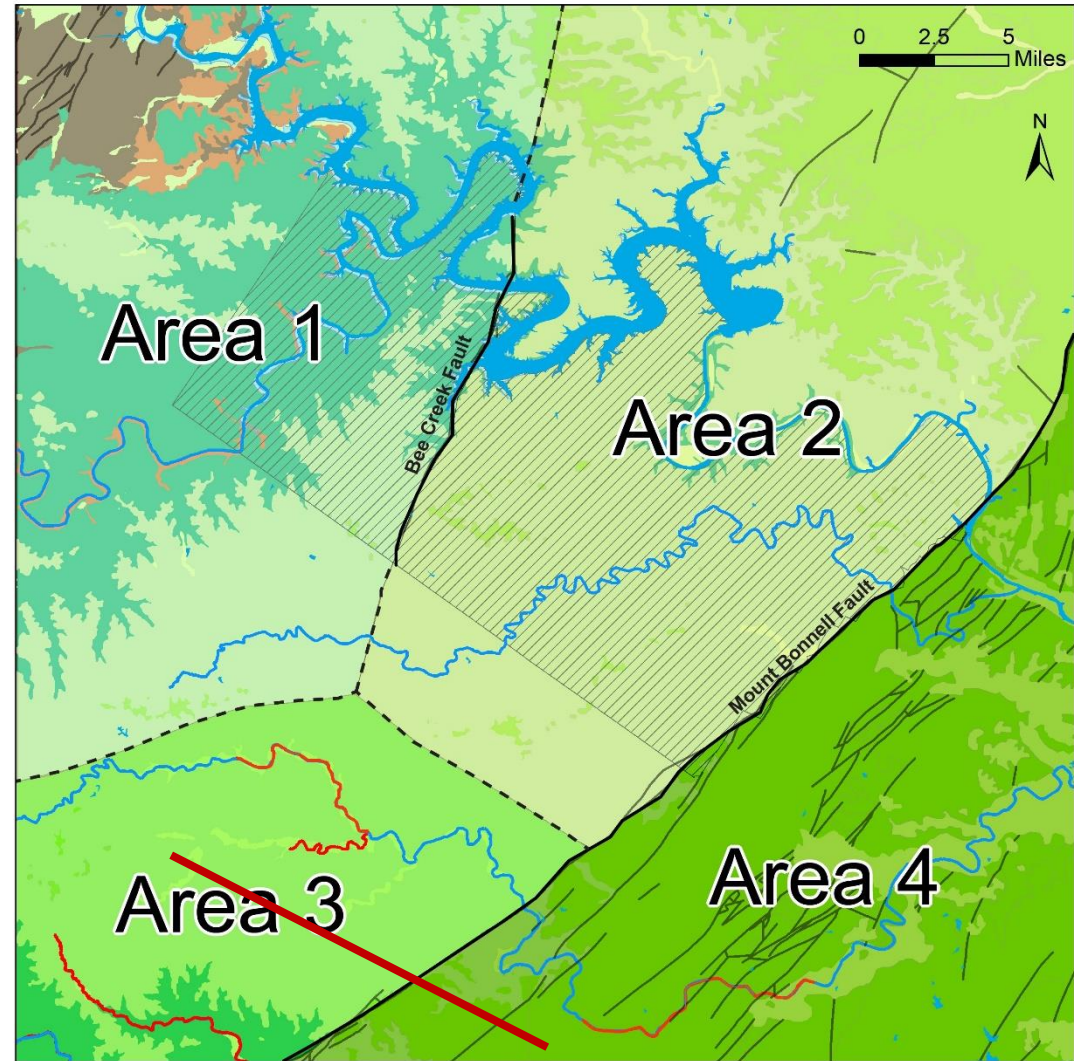
Area 4 (Trinity only)

- Confined
- Fresh to brackish
- No surface-groundwater interaction
- Matrix and secondary (fracture, karstic) porosity
- Middle Trinity has local declining trends
- Mount Bonnell appears to be a flow boundary starting about Hays-Travis boundary.
- Sparse data for Lower Trinity



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