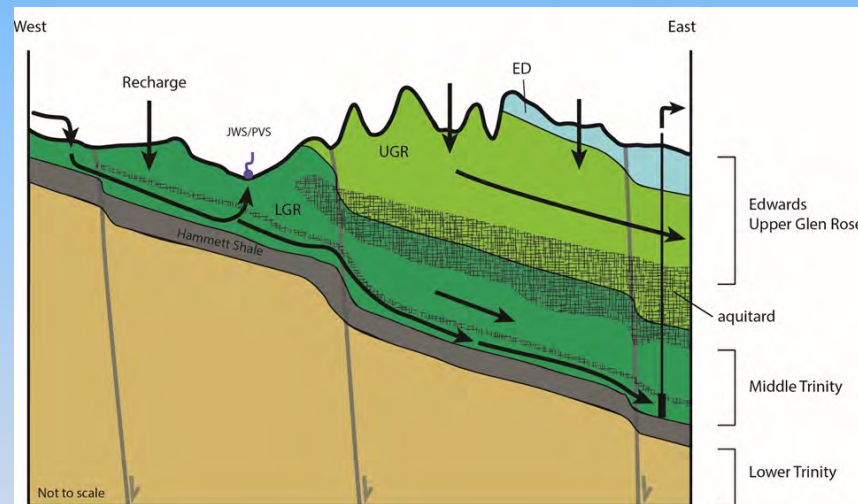


An Evolving Conceptual Model of the Middle Trinity Aquifer, Hays County, Central Texas



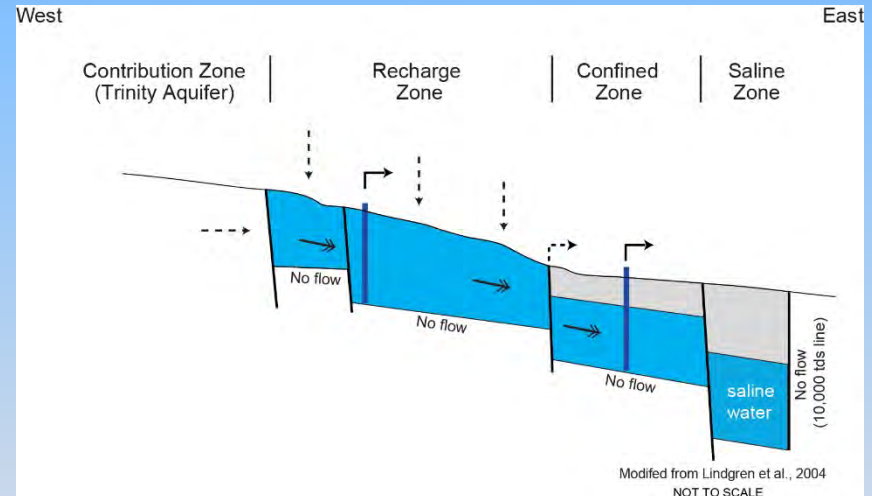
**B.B. Hunt (BSEACD), B.A. Smith (BSEACD), M.O. Gary (EAA),
A.S. Broun (HTGCD), D.A Wierman (TSU)**

**Geological Society of America
South Central Meeting
San Antonio, Texas
March 2017**

Conceptual Model

- Description of the groundwater flow system
 - Geometries
 - Hydrostratigraphy
 - Recharge/Discharge
 - Flow paths
- Key step prior to numerical modeling, interpreting aquifer tests

Example: Edwards Aquifer



Middle Trinity Aquifer



Lower Glen Rose, “Narrows” on
Blanco River

- Water supply
- Provides baseflows
- Surface water ecology
- Source of recharge to Trinity and Edwards aquifers

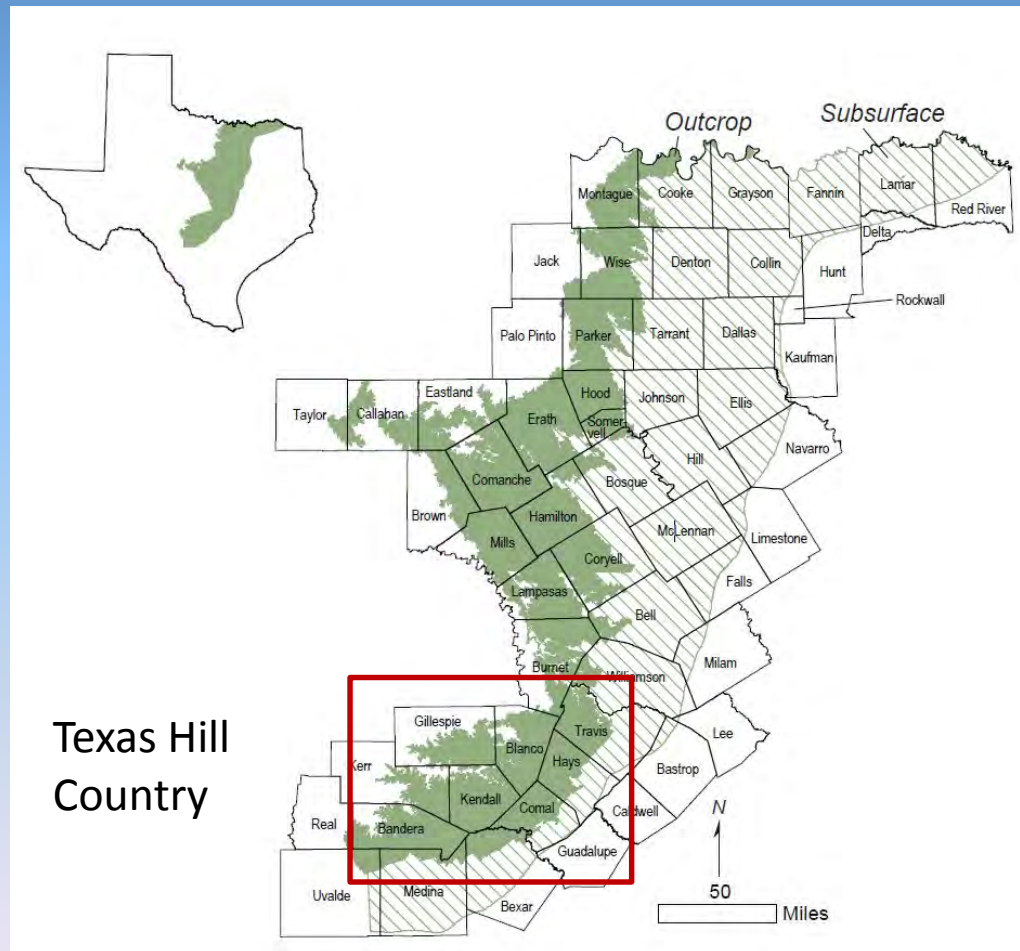
Middle Trinity Aquifer



Lower Glen Rose, “Narrows” on
Blanco River

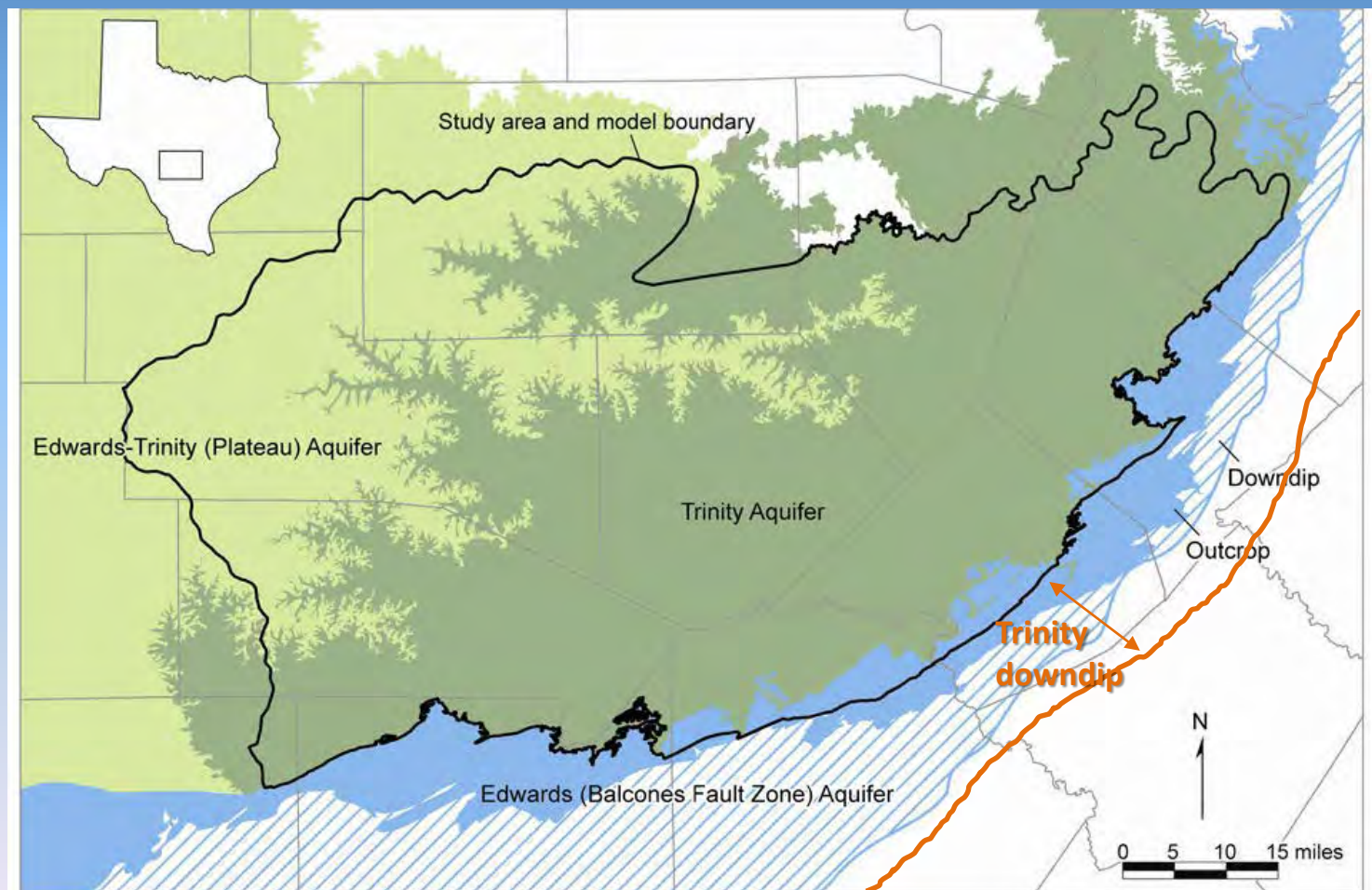
Previous conceptual and numerical models are inadequate for current needs.

Trinity Aquifer



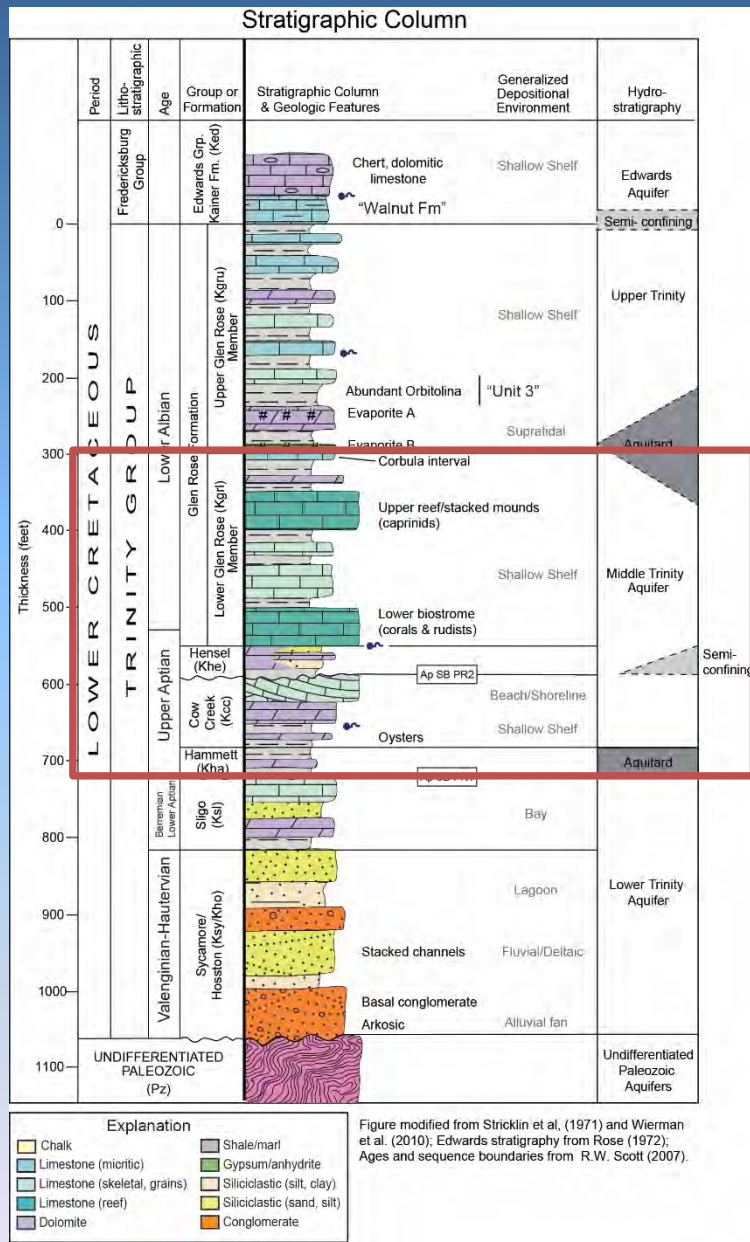
TWDB Aquifers of Texas
George et al., 2011

Major Aquifers



TWDB Report 377,
Jones et al., 2011, modified from
Mace et al, 2000

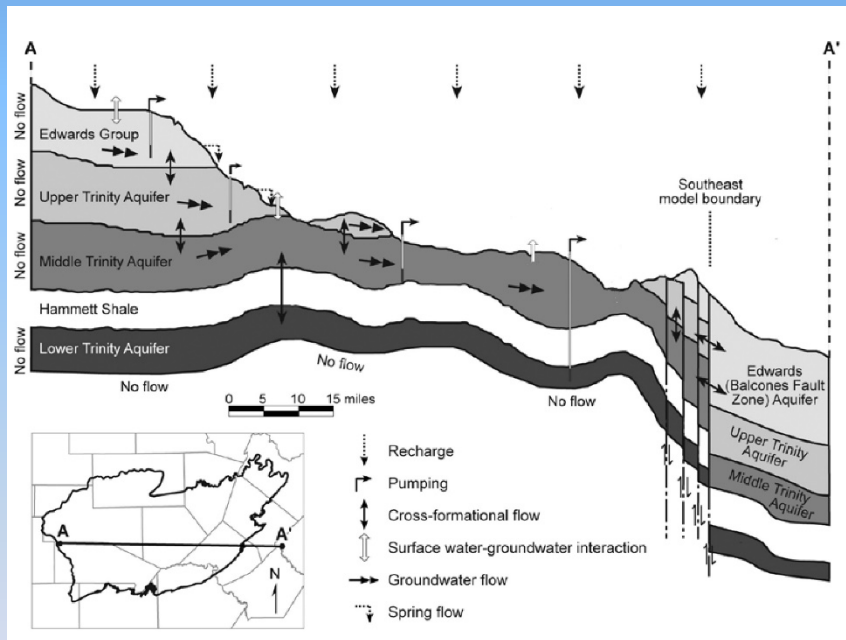
Hydrostratigraphy



Middle Trinity Aquifer

- Lower Glen Rose
- Hensel
- Cow Creek

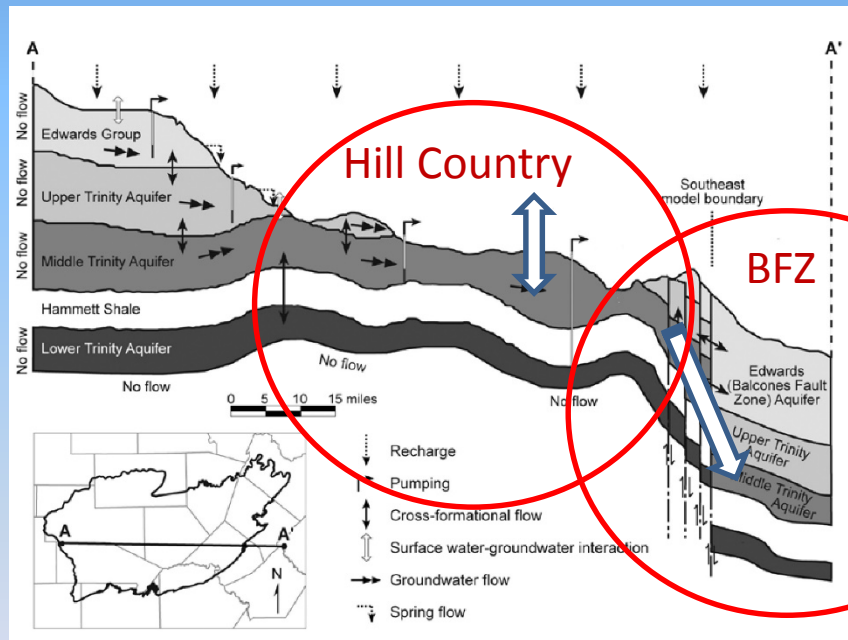
Previous Middle Trinity Conceptual Model (Hays County)



- Diffuse recharge
- Surface and groundwater interaction limited
- Middle Trinity in BFZ not included

TWDB Report 377, Jones et al., 2011
modified from Mace et al., 2000.

Working Middle Trinity Conceptual Model (Hays County)

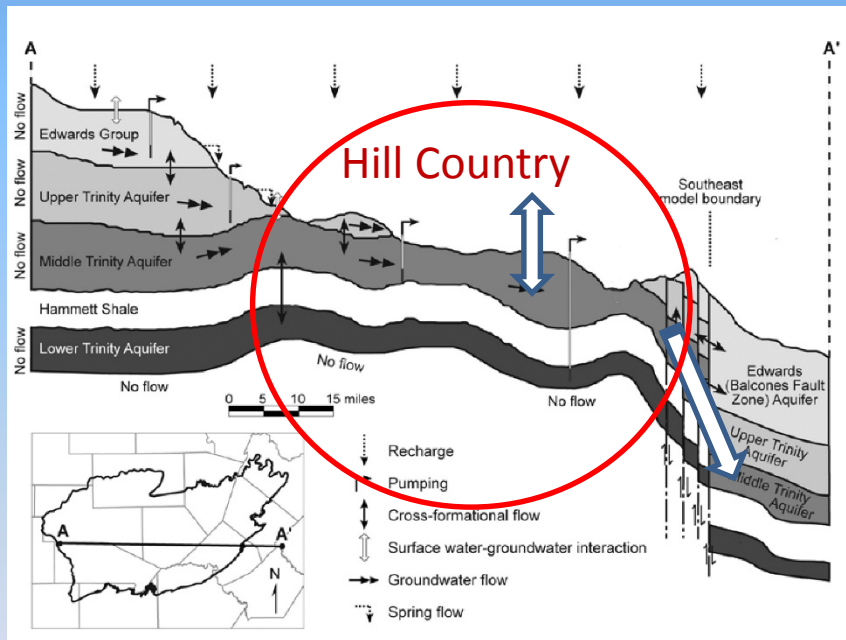


Two interconnected systems

1. Hill Country Middle Trinity Aquifer
2. BFZ Middle Trinity Aquifer

TWDB Report 377, Jones et al., 2011,

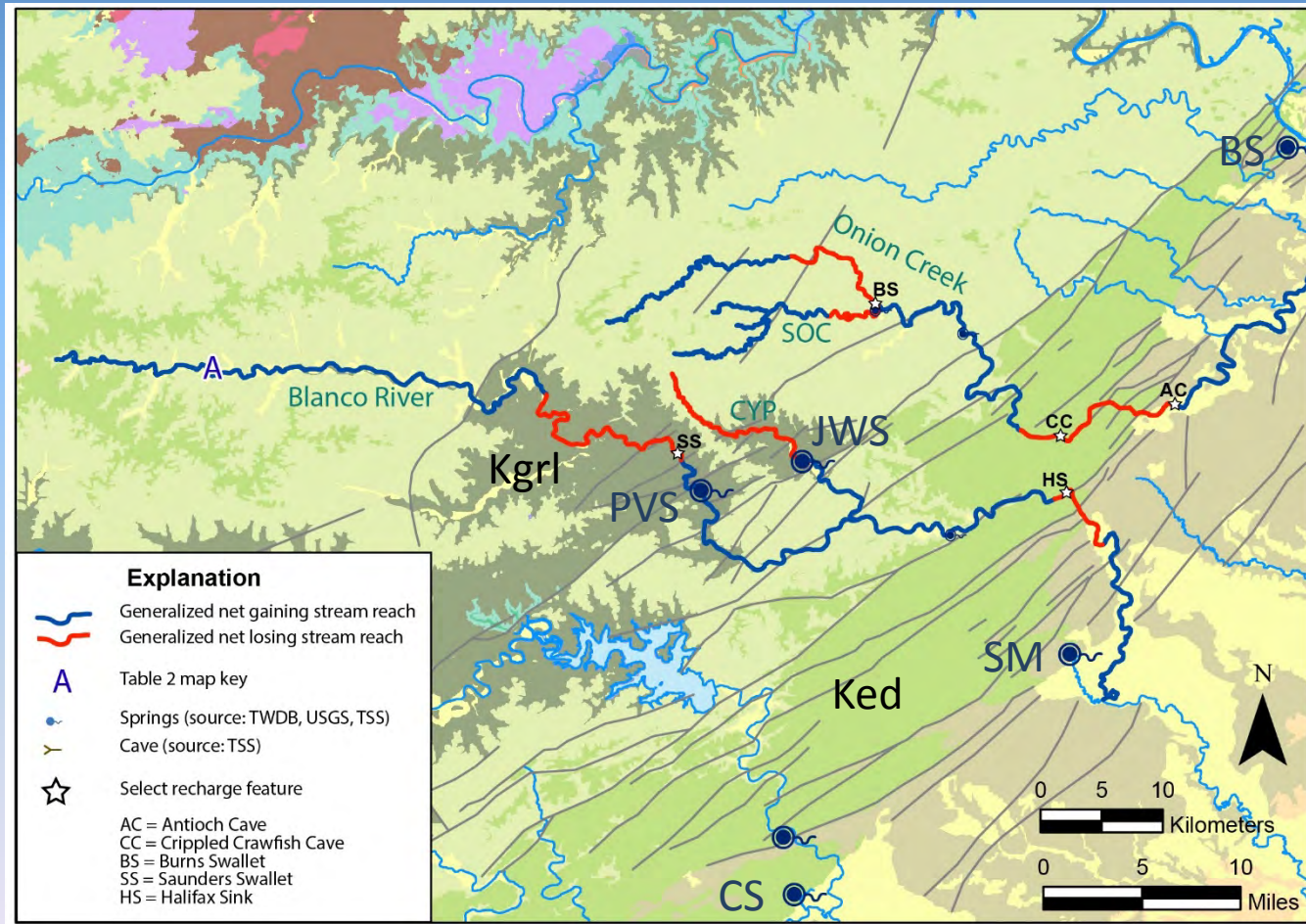
Hill Country Middle Trinity Aquifer



TWDB Report 377, Jones et al., 2011,

- Karstic (caves, springs)
 - similar to Edwards in places
- Surface-groundwater interaction significant
- Conduit to diffuse flow
- Relatively fresh and young water

Generalized Flow Loss Map



Discrete Karst Recharge

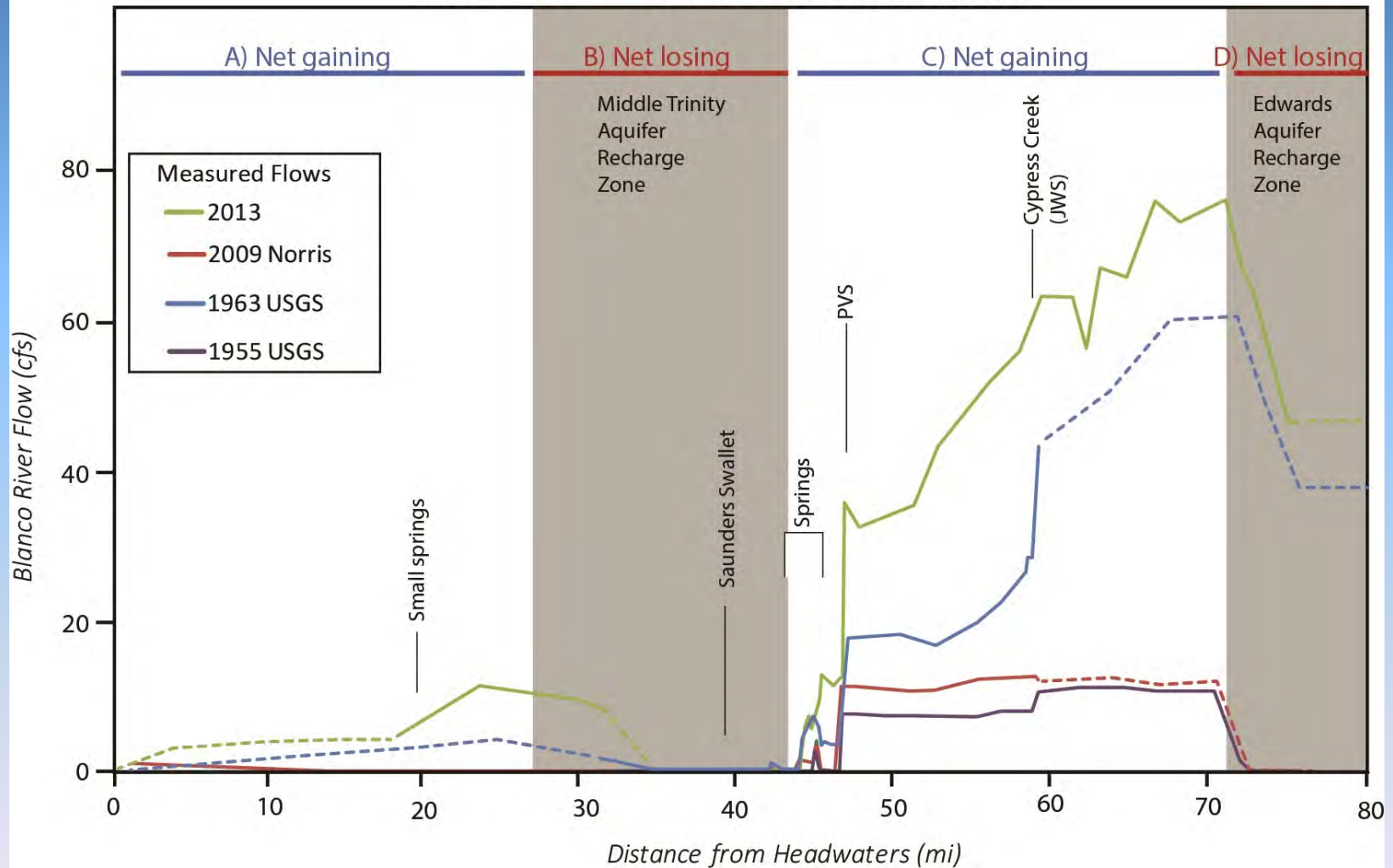


Saunders' Swallet in Cow Creek, "Dry"
Blanco River

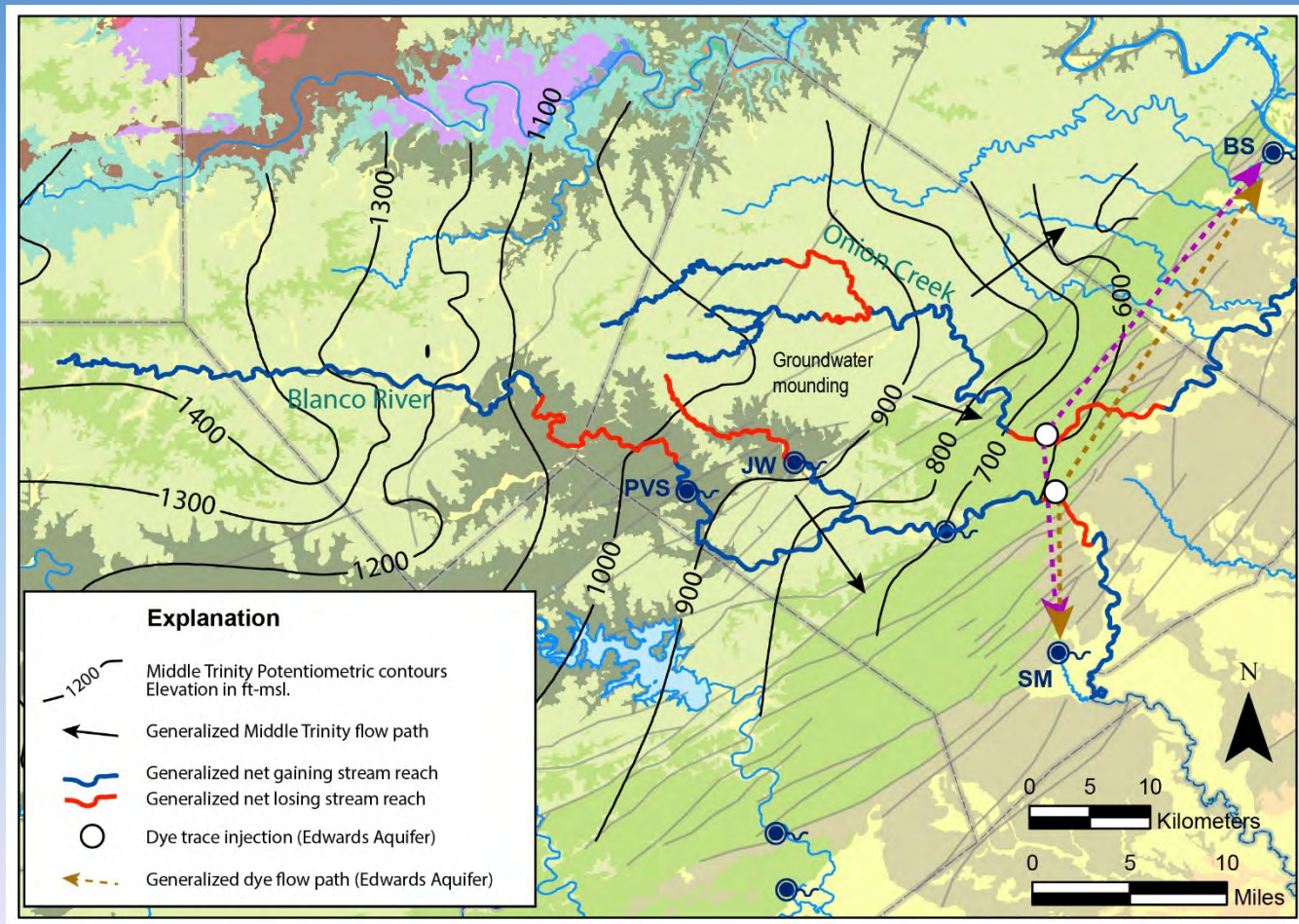


Burns Ranch Swallet, base of Upper Glen Rose,
Onion Creek

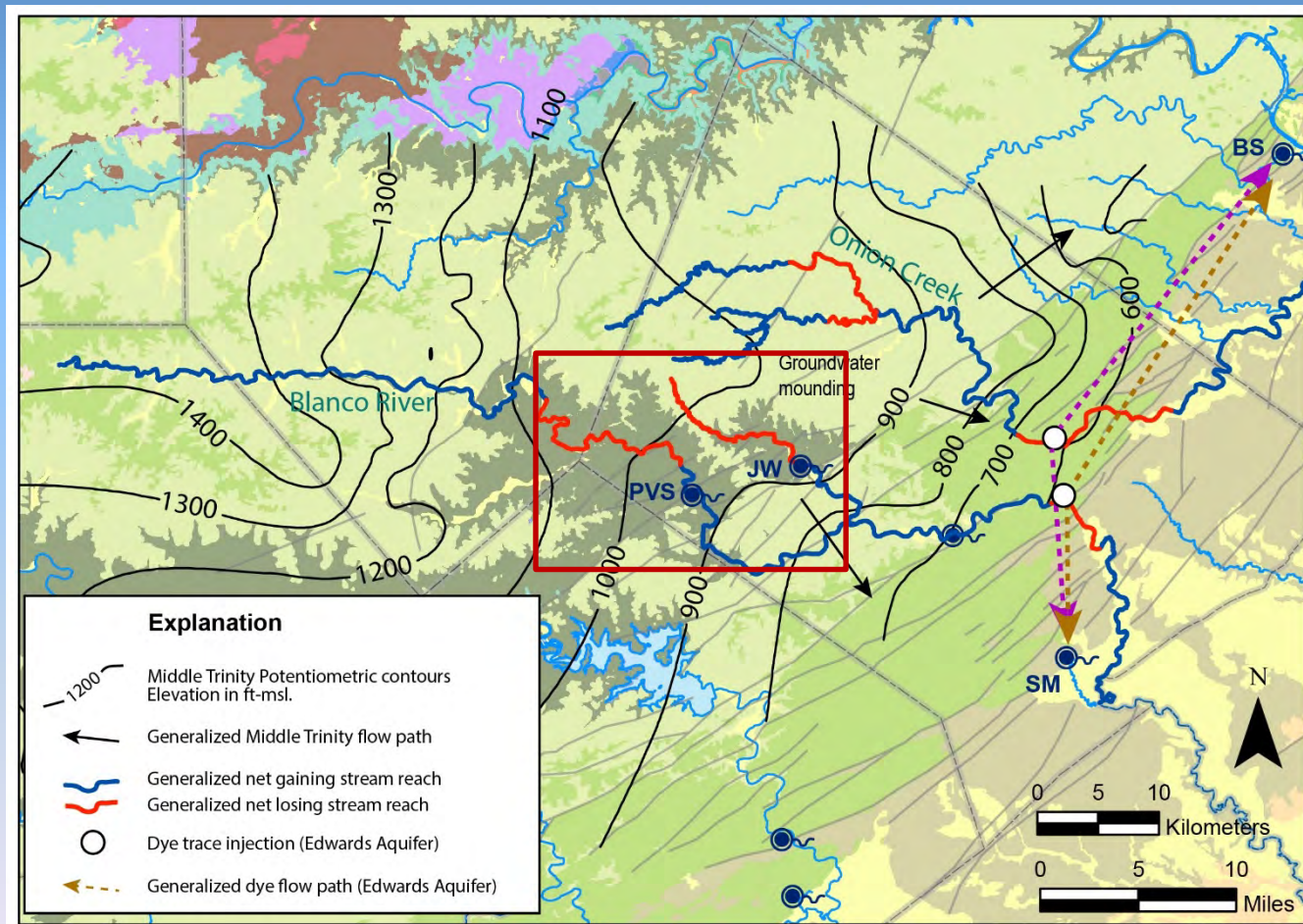
Blanco River Distance-Flow Hydrograph



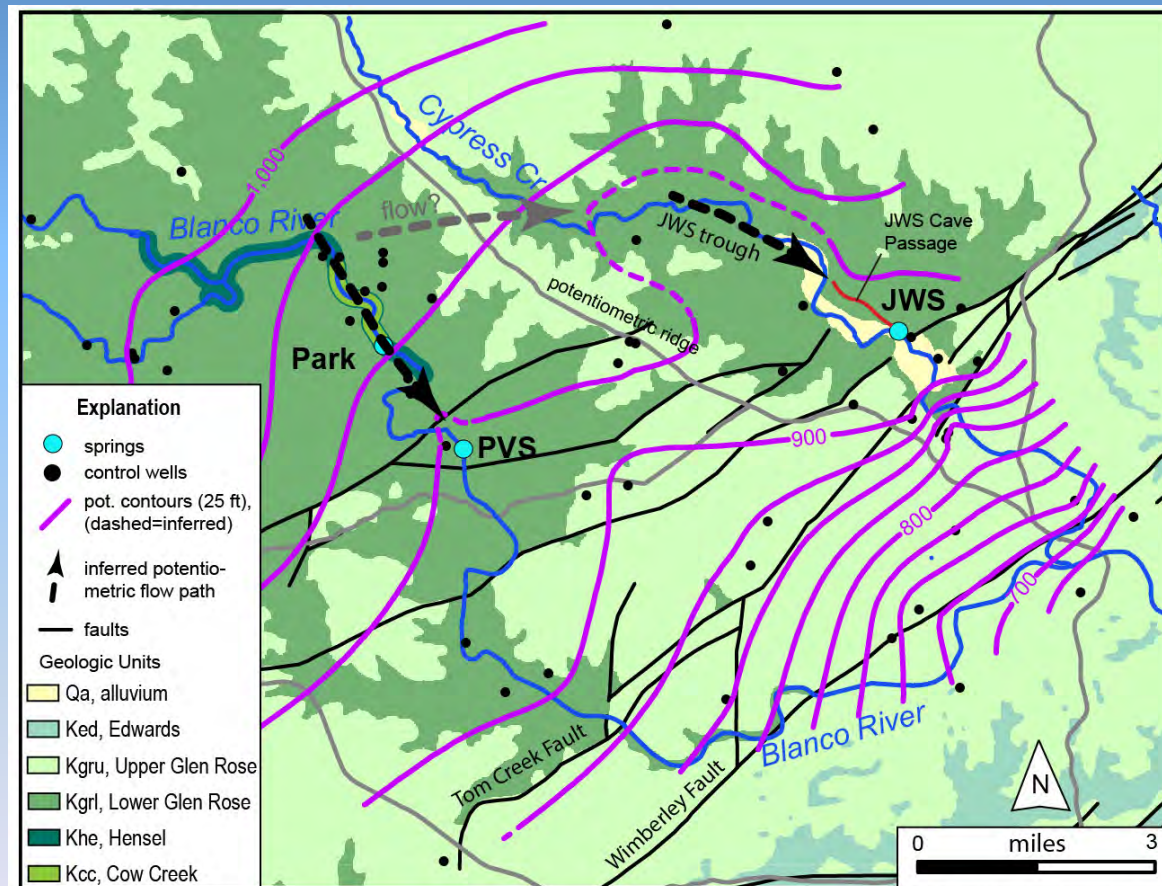
Middle Trinity Groundwater Flow



Middle Trinity Groundwater Flow



Middle Trinity Groundwater Flow Blanco Valley



Basemap data from TWDB: Major Aquifers of Texas and Major Rivers; USGS: Geologic Atlas of Texas

Watson et al., 2014

Springflow

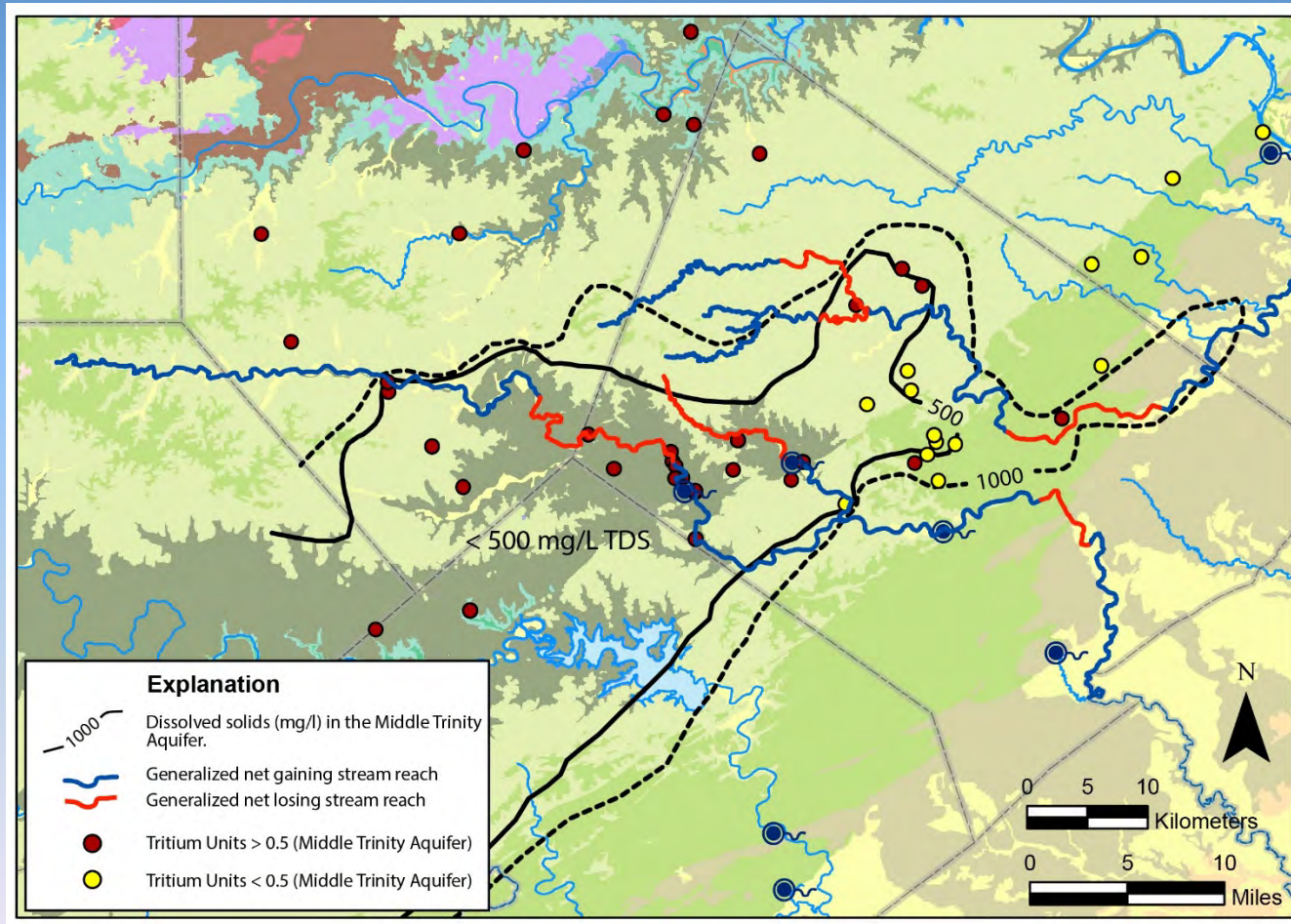


Jacob's Well Spring

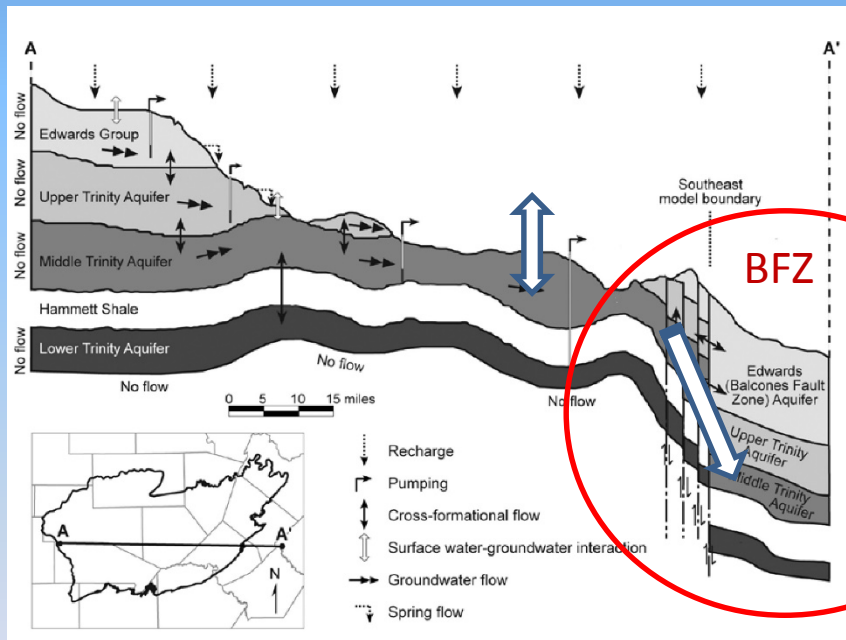


Pleasant Valley Spring

Middle Trinity TDS and Tritium Map



BFZ Middle Trinity Aquifer



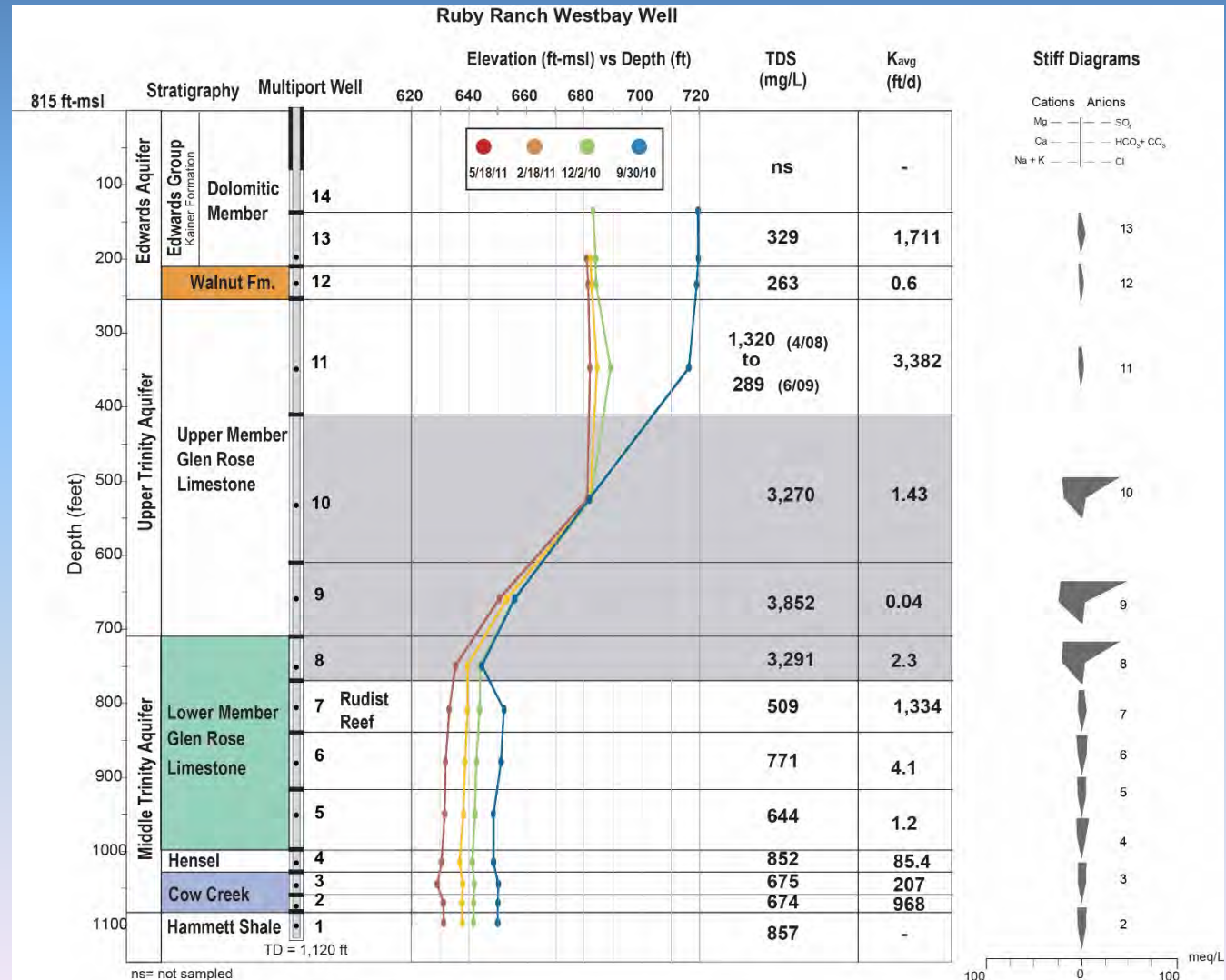
- Deeply confined
- Recharge MT is lateral
- Discharge is unknown
- Fracture and diffuse flow
- Relatively older and variable quality water

TWDB Report 377, Jones et al., 2011,

Multipoint Monitor Wells

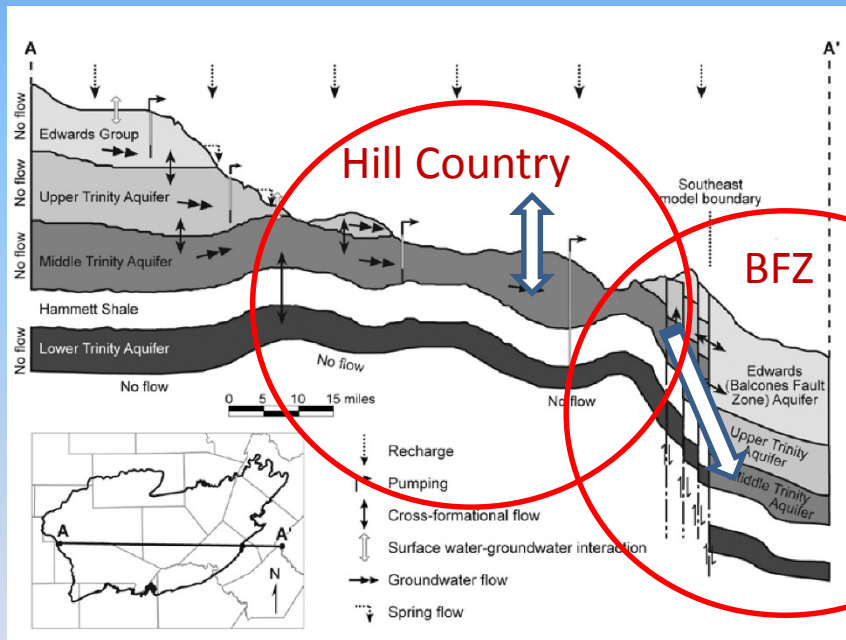
Edwards and top
Upper Trinity are
one hydrologic
unit.

Edwards Aquifer
and Middle
Trinity not in
hydrologic
communication.



From Hunt et al., 2016

Interconnection?

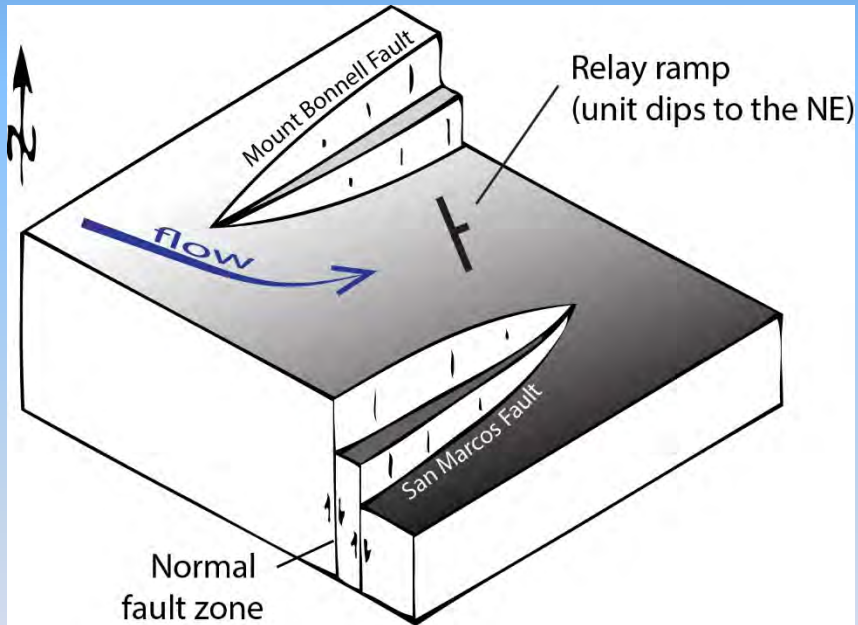


TWDB Report 377, Jones et al., 2011,

Structures perform two functions:

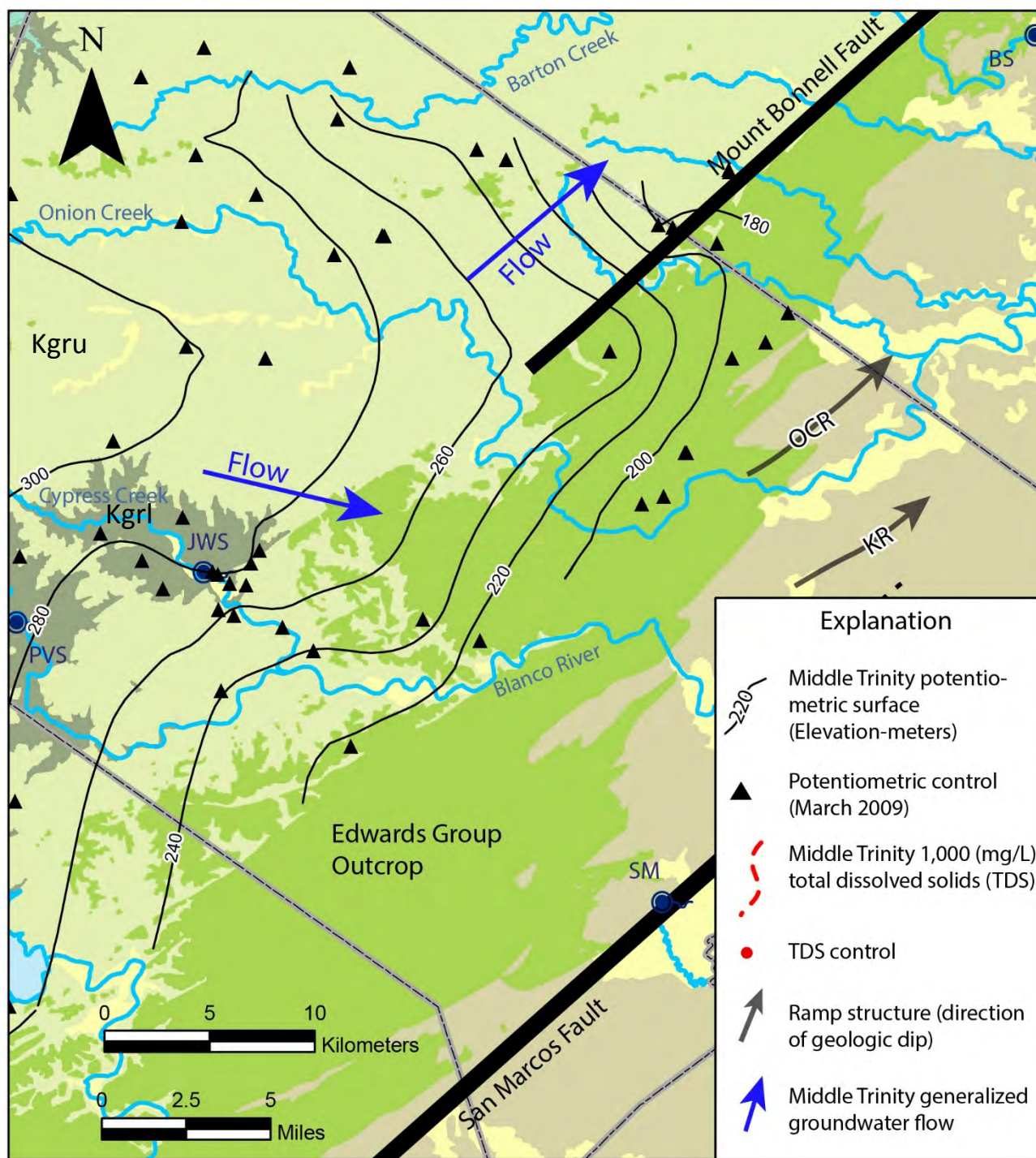
1. Barriers to flow
2. Enhance flow or provide mechanism for lateral flow (juxtaposition or relay ramps)

Relay ramps (transfer zone)

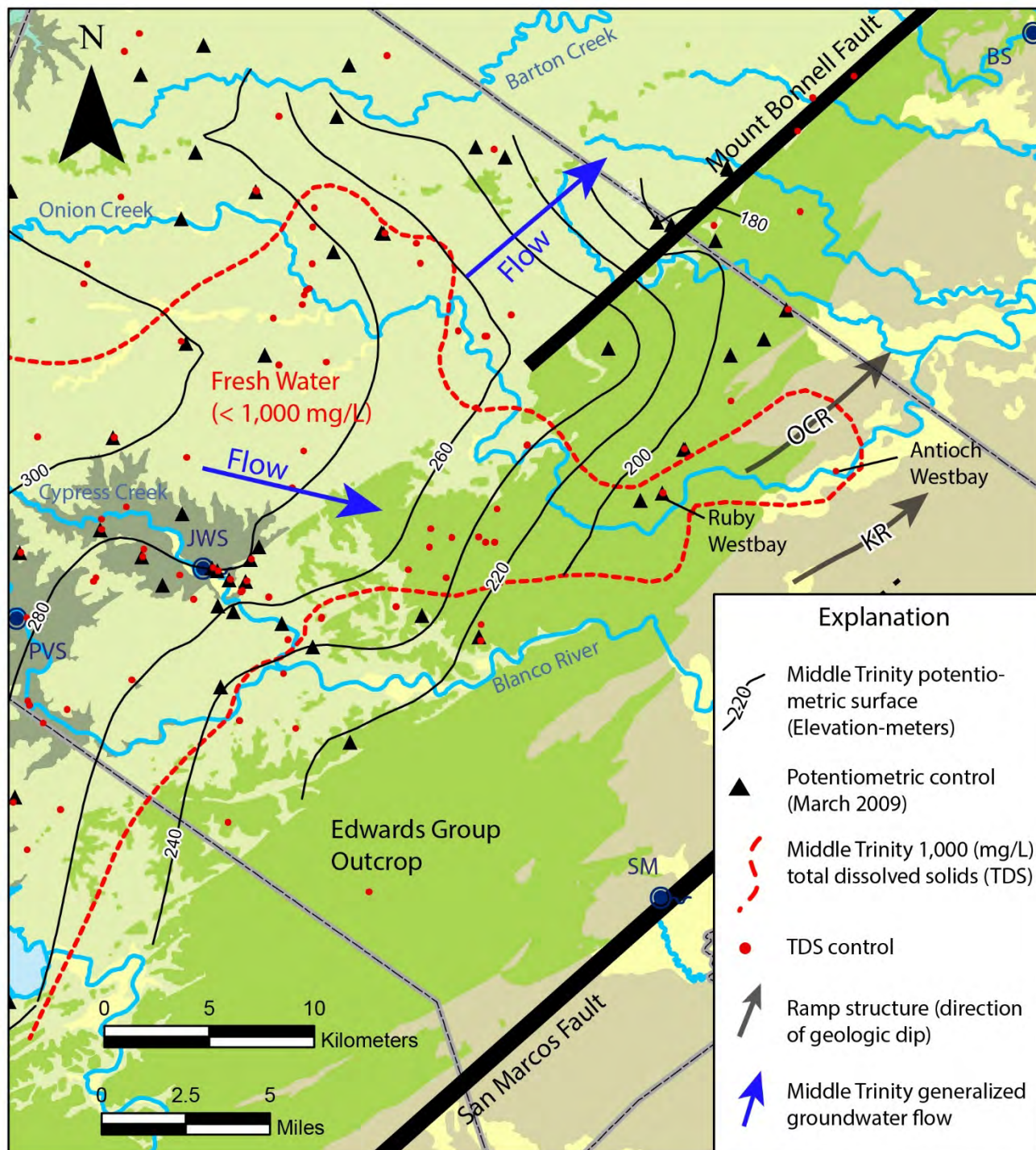


Mechanism for lateral continuity of units within a normal fault zone

Hunt et al., in review; Modified from Grimshaw and Woodruff, 1986

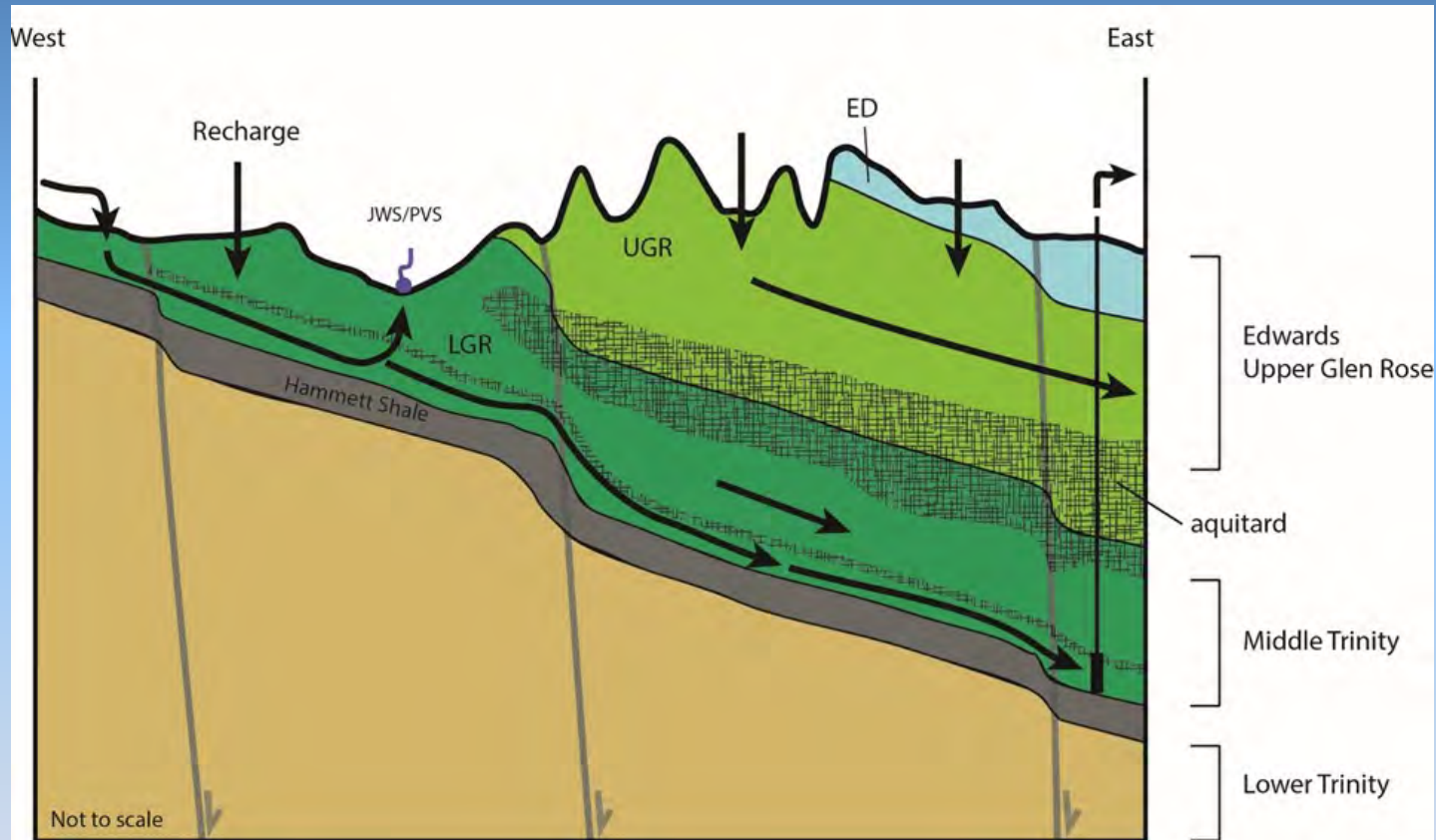


Middle Trinity Aquifer Flow



Middle Trinity Aquifer Flow

Working Conceptual Model



Hill Country Middle Trinity

- Karstic (caves, springs)
- Surface-groundwater interaction significant
- Conduit to diffuse flow
- Relatively fresh and young water

BFZ Middle Trinity

- Deeply confined
- Recharge MT is lateral
- Discharge is unknown
- Fracture and diffuse flow
- Relatively older and variable quality water

Future Work

Continue to refine and quantify the conceptual model in a collaborative effort through:

- Analyses of recent multiport and hydrogeologic data;
- Other GCD's and entities
- EAA's inter-formational flow study;
- TWDB conceptual model grant (SWRI).

Thank You!

Agencies

- TWDB
- EAA
- BSEACD
- HTGCD
- CoA
- TSU
- UT Austin
- Hays County
- Travis County (Vicky Kennedy)
- TPWD (Chad Norris)

Individuals

- Many land owners, including:
 - Halifax Ranch (Bill Johnson)
 - Burns Ranch
 - Burnett Ranch (Ed Pope)
 - Woods Ranch

Lower Glen Rose

