Stakeholder Input Meeting
Proposed Brackish Groundwater Production Zones for the Southern Portion of the Trinity Aquifer

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April 29, 2026

TEXAS WATER DEVELOPMENT BOARD

Outline

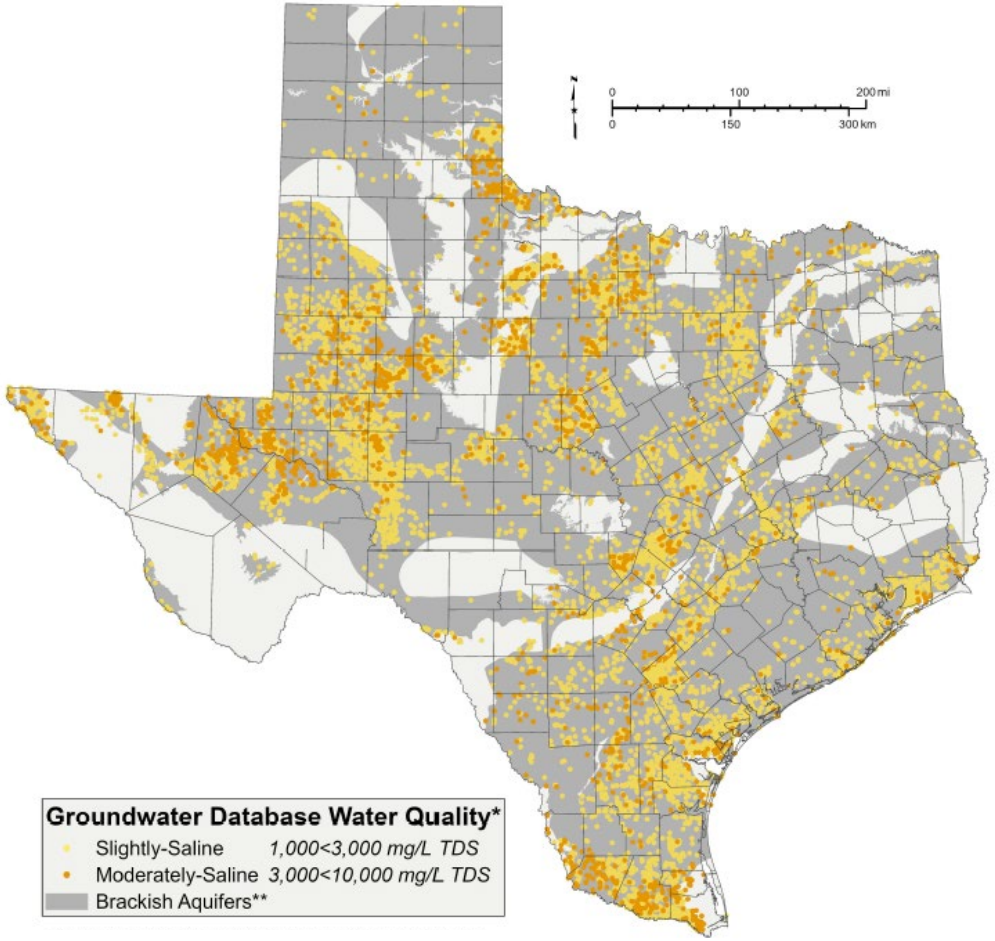
- BRACS Overview:
  - What BRACS does
  - Why we designate BGPZs
  - Zone criteria
  - Completed studies and BGPZ status maps
  - BGPZ workflow and the injection well tool
- Southern Trinity BGPZs:
  - Hydrogeologic boundaries
  - Freshwater buffers
  - Production volumes
  - Salinity maps with faults, buffers and exclusions
- Next steps
- Q&A

What is brackish groundwater?

Groundwater salinity classification	Total dissolved solids concentration (milligrams per liter)
Fresh	0 to 999
Slightly saline	1,000 to 2,999
Moderately saline	3,000 to 9,999
Very saline	10,000 to 34,999
Brine	Greater than 35,000

brackish

Brackish groundwater characterization in Texas



Brackish Resources Aquifer Characterization System (BRACS)

Map and characterize the brackish aquifers of the state in detail* using existing geophysical well logs and available aquifer data.

- ✓ Data mining
- ✓ Interpret stratigraphy and lithology
- ✓ Water well aquifer determination
- ✓ Map salinity zones
- ✓ Calculate in-place storage volumes
- ✓ Evaluate aquifers for zones (BGPZs)

Why we designate BGPZs (TWC 16.060)

The board shall undertake or participate in research, feasibility and facility planning studies, investigations, and surveys as it considers necessary to **further the development of cost-effective water supplies** from seawater or brackish groundwater desalination in the state.

Shall include:

- identification and designation of local or regional brackish groundwater production zones in areas of the state with moderate to high availability and productivity of brackish groundwater that can be used to **reduce the use of fresh groundwater**
- determination of the amount of brackish groundwater that the zone can produce over a 30-year period and a 50-year period without causing a significant impact to water availability or water quality
- recommendations regarding reasonable monitoring to observe the effects of brackish groundwater production within the zone

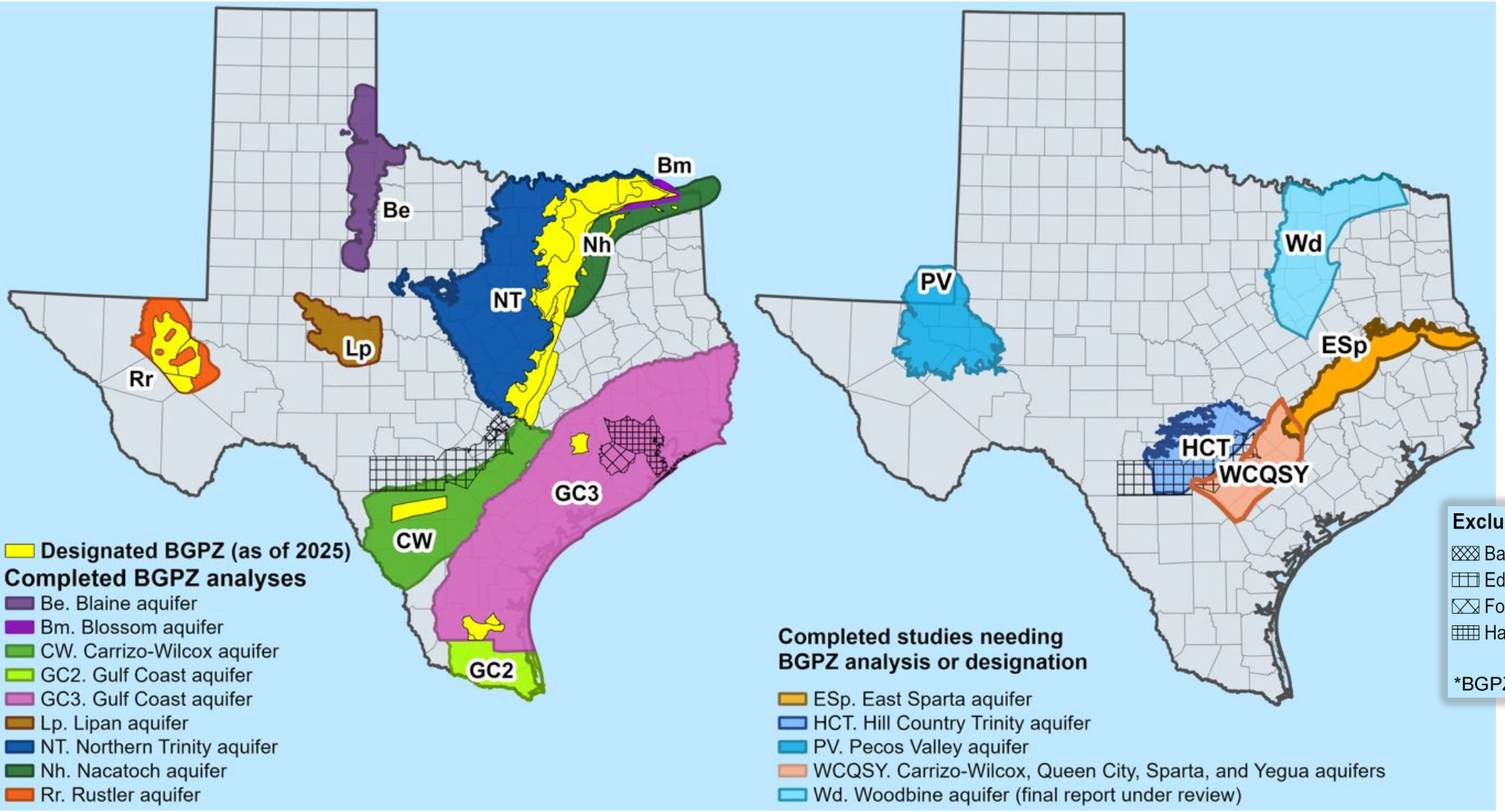
Zone criteria

- Zones must be separated by hydrogeologic barriers sufficient to prevent significant impacts to existing fresh groundwater users
- Zones must protect select groundwater well uses, specifically: domestic, agricultural, and public supply

They cannot be located in:

- existing brackish groundwater use areas
- injection or waste disposal well impact areas
- excluded Districts
- areas with fresh groundwater <1,000 mg/l total dissolved solids

Completed studies and BGPZ analyses

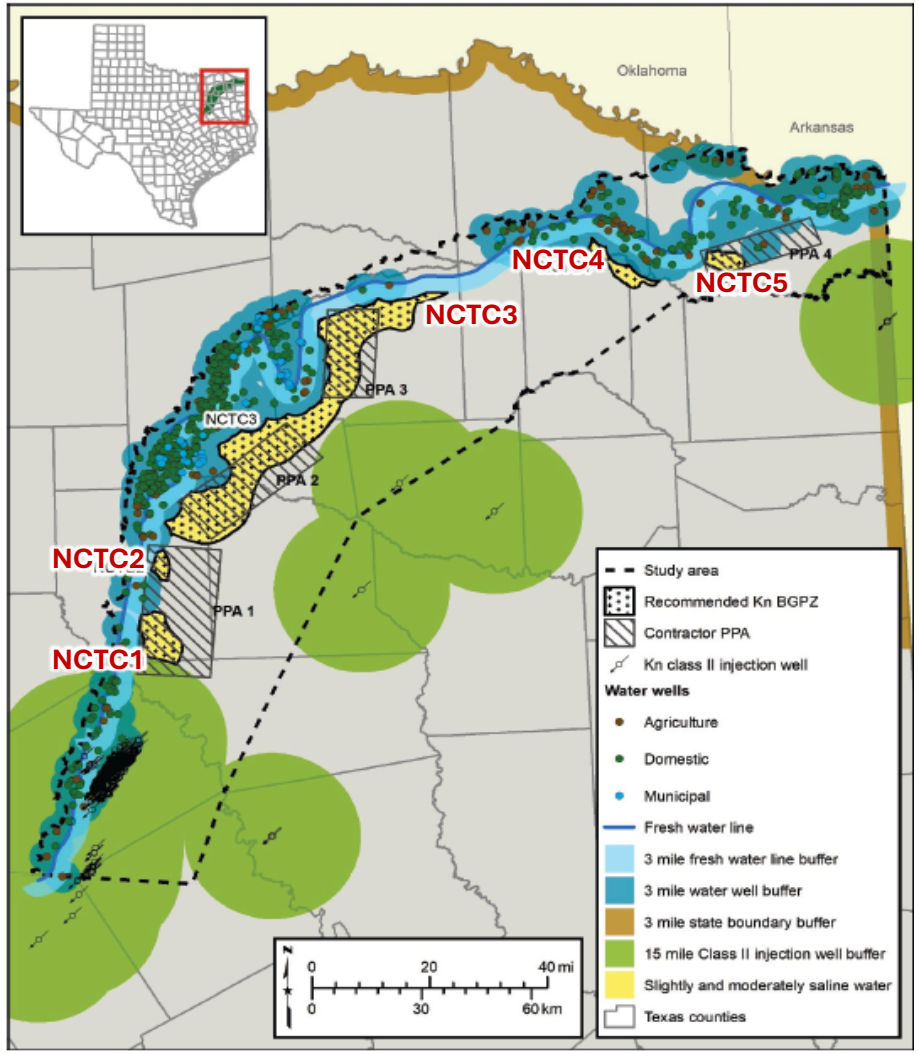


Excluded Districts

- Barton Springs/Edwards Aquifer Conservation District
- Edwards Aquifer Authority
- Fort Bend Subsidence District
- Harris-Galveston Coastal Subsidence District

*BGPZ = Brackish groundwater production zone

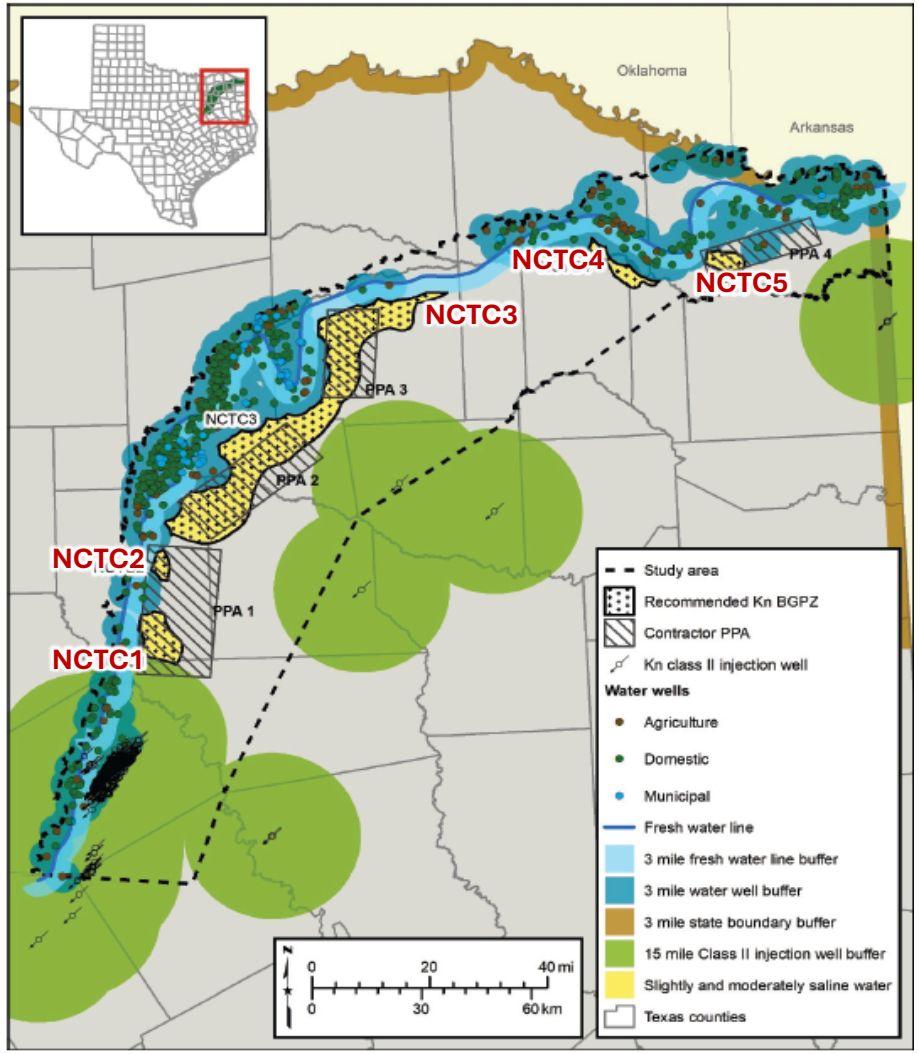
BGPZ analysis workflow



Update point files, gather GIS data files

- 10,000 mg/L TDS contour, stratigraphy rasters, aquifer determination table from the brackish study
- Updated water well point files (GWDB, SDRDB)
- Updated Class II injection well point files
- Any other available Class injection well point files
- Aquifer properties
- Administrative boundaries
- Aquifer exemptions

BGPZ analysis workflow: buffers and exclusions

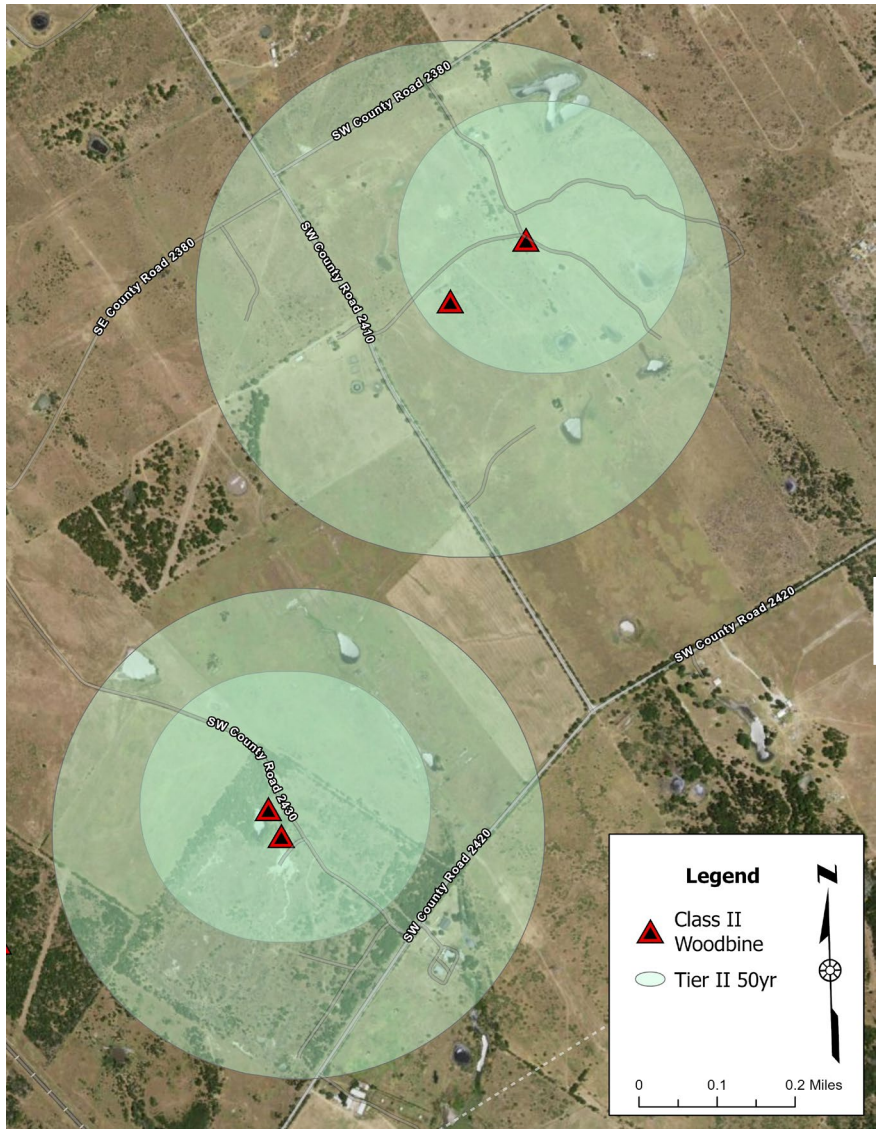


Determine buffers, and exclude wells

- Administrative areas (state line)
- Ag, domestic and municipal use well buffers
- Class II use injection well tool (variable buffer)
- Class III, IV, V, and VI injection wells (if available)
- Verify Class I wells are >10,000 mg/L very saline
- Check for aquifer exemptions

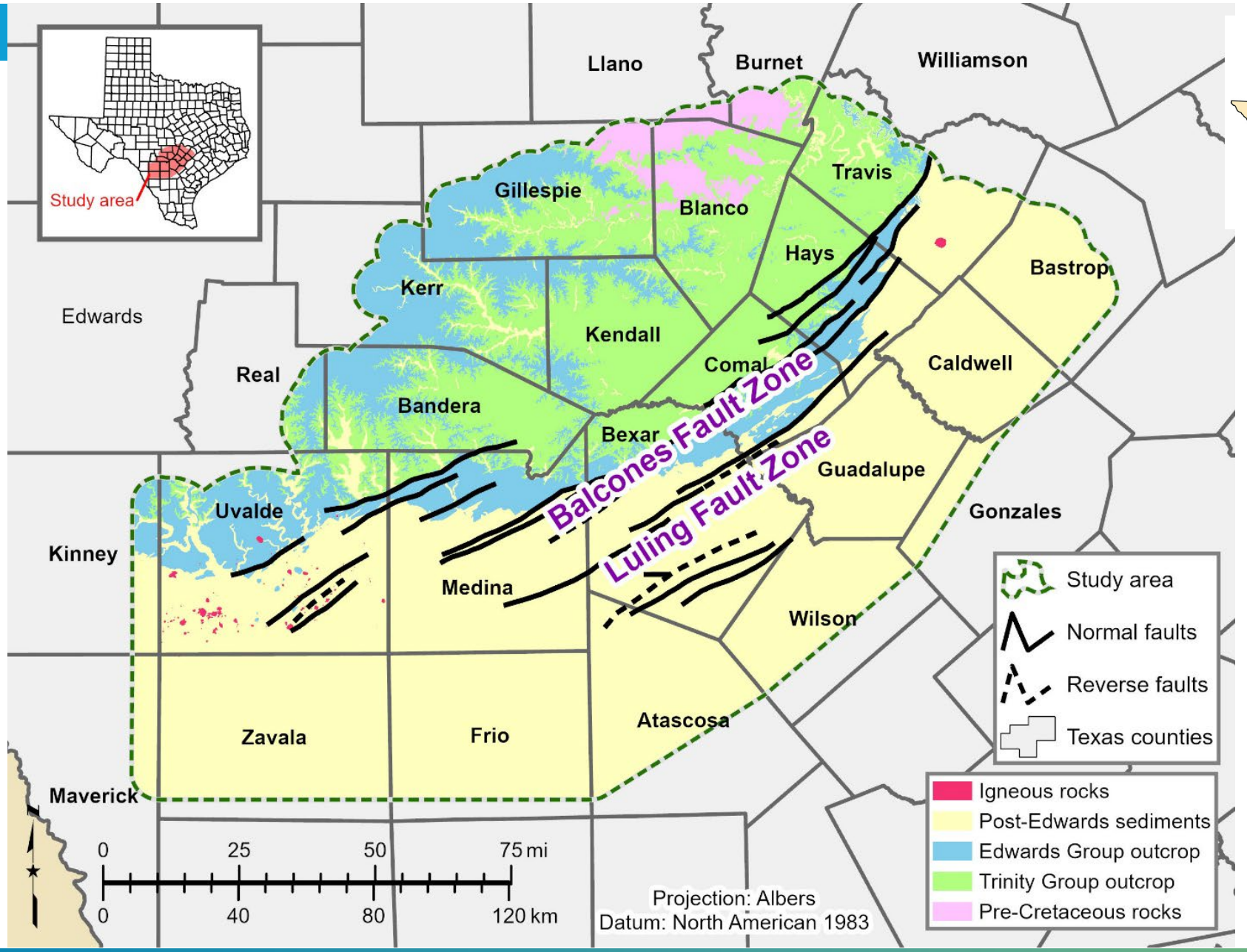
Once these steps are completed, leftover areas are considered as potential production areas to be modeled.

Injection well buffers

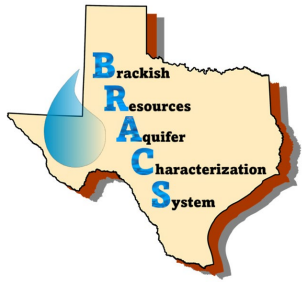


Year	Event
2015	Identification of brackish groundwater production zones added to TWC Section 16.060 (HB 30)
2015	Requirement to complete brackish studies in six specific aquifers, with proposed BGPZs (HB 30)
2016-2019	Agency applies 15-mile buffer to injection wells in six contract studies and designate 31 BGPZs
2020	Contract executed for injection well buffer tool to refine injection buffers
2022	Injection buffer tool delivered
	well buffer tool upgraded internally

Study area map



Stratigraphic Column



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			

Trinity Aquifer

★ proposed zones

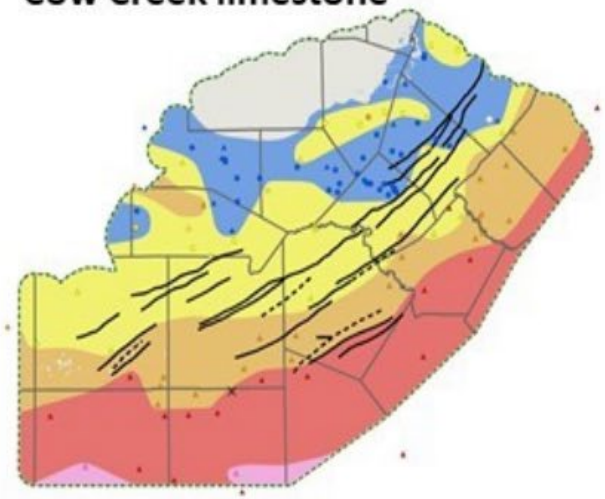
Southern Trinity

Lower Glen Rose limestone

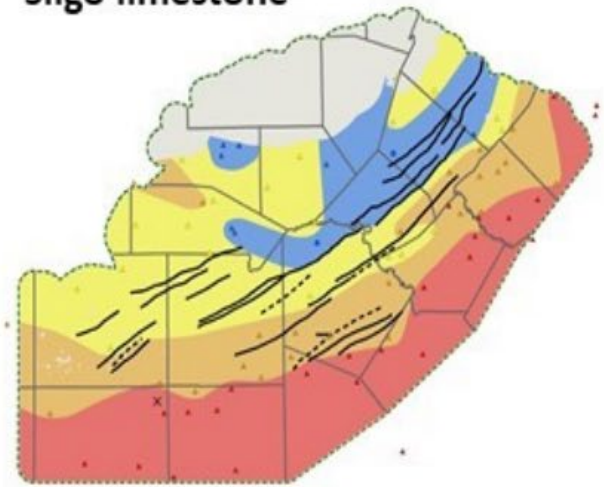
Upper Glen Rose limestone

Hensell sandstone

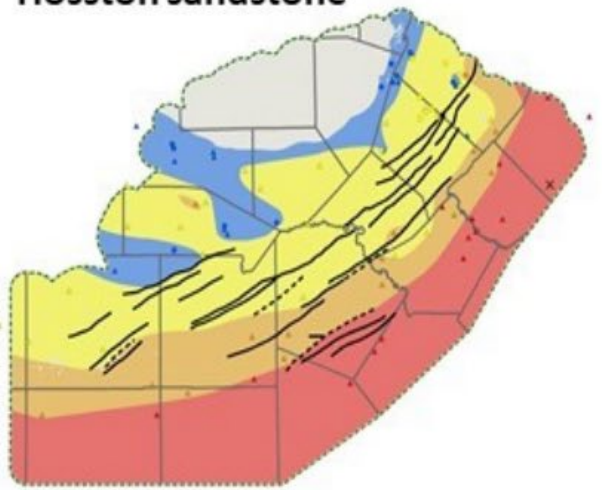
Cow Creek limestone



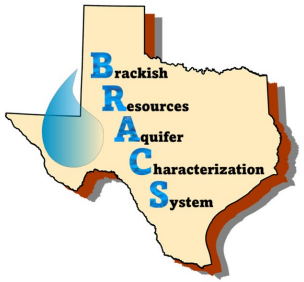
Sligo limestone



Hosston sandstone



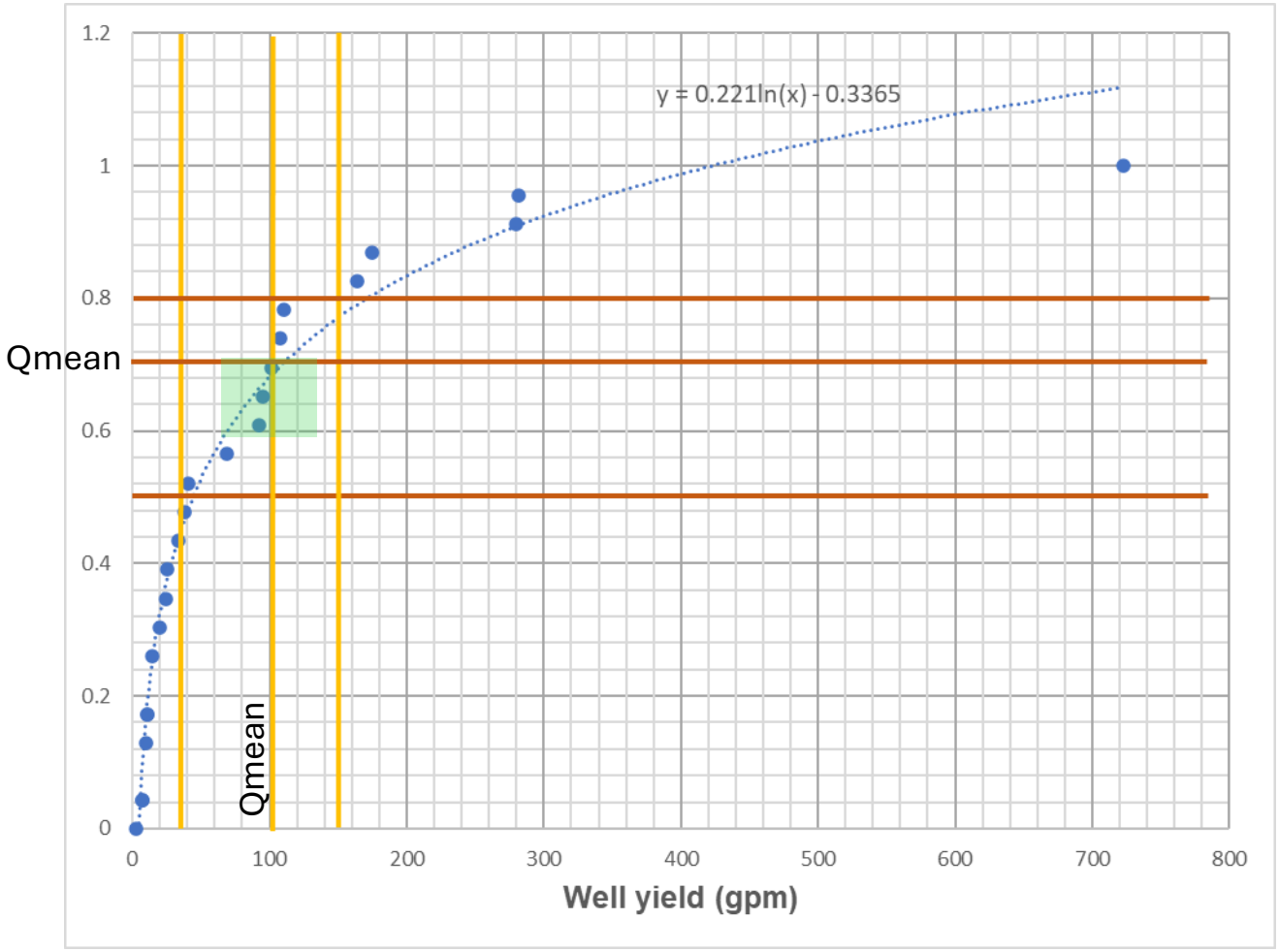
Freshwater buffers



- Three freshwater buffer distances were calculated: Upper, middle, and lower Trinity buffers vary from 5.5 to 6.5 miles
- Buffers were applied to existing fresh and brackish groundwater wells (for domestic, agricultural, and public supply use only)
- Buffers were applied to the excluded administrative areas (EAA and BS/EACD), and the northern portion of the Trinity Aquifer
- For yield, we created a probability plot of existing aquifer test yields and used values in the 60 to 70 percent range
- For transmissivity and storativity, we used median values compiled from aquifer tests from the freshwater portion of the aquifer
- The freshwater buffer is based on the 50-year drawdown and moderate to high production rates
- The buffers were calculated using the Cooper-Jacob approximation of the Theis equation

Lower Trinity well yield

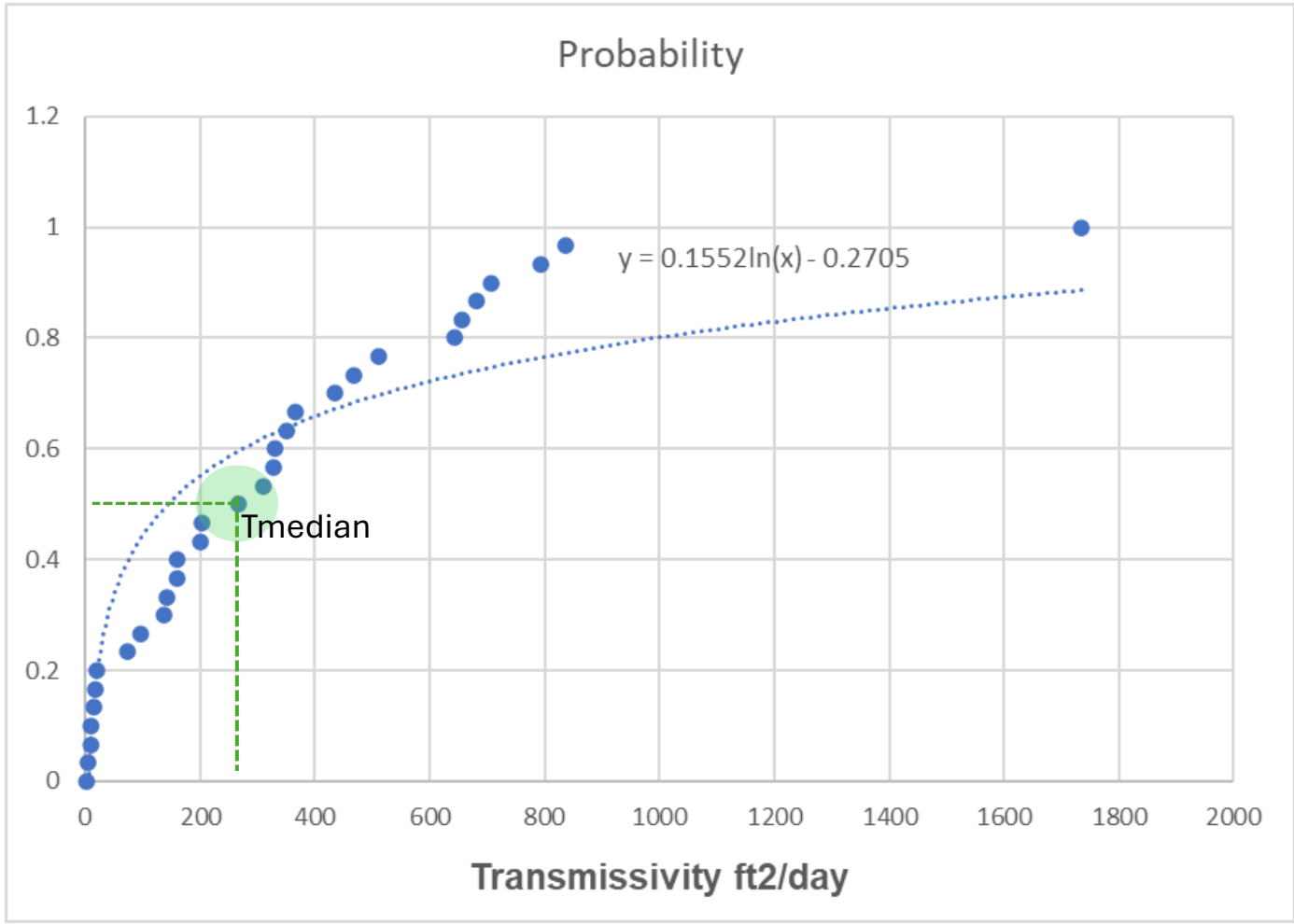
Well yield	Probability
3	0
7	0.043
7	0.043
10	0.13
11	0.173
11	0.173
14	0.26
20	0.304
24	0.347
25	0.391
33	0.434
38	0.478
41	0.521
69	0.565
92	0.608
95	0.652
101	0.695
108	0.739
110	0.782
164	0.826
175	0.869
280	0.913
282	0.956
723	1



QMean	102
QSigma	152
Qmedian	39.5

Lower Trinity transmissivity

Transmissivity	Probability
1	0
4	0.033
9	0.066
10	0.1
14	0.133
17	0.166
20	0.2
74	0.233
95	0.266
136	0.3
142	0.333
159	0.366
160	0.4
201	0.433
204	0.466
267	0.5
311	0.533
329	0.566
330	0.6
351	0.633
365	0.666
434	0.7
468	0.733
511	0.766
642	0.8
657	0.833
681	0.866
706	0.9
792	0.933
837	0.966
1735	1



T mean	344
T sigma	358
Tmedian	267

Production Volumes

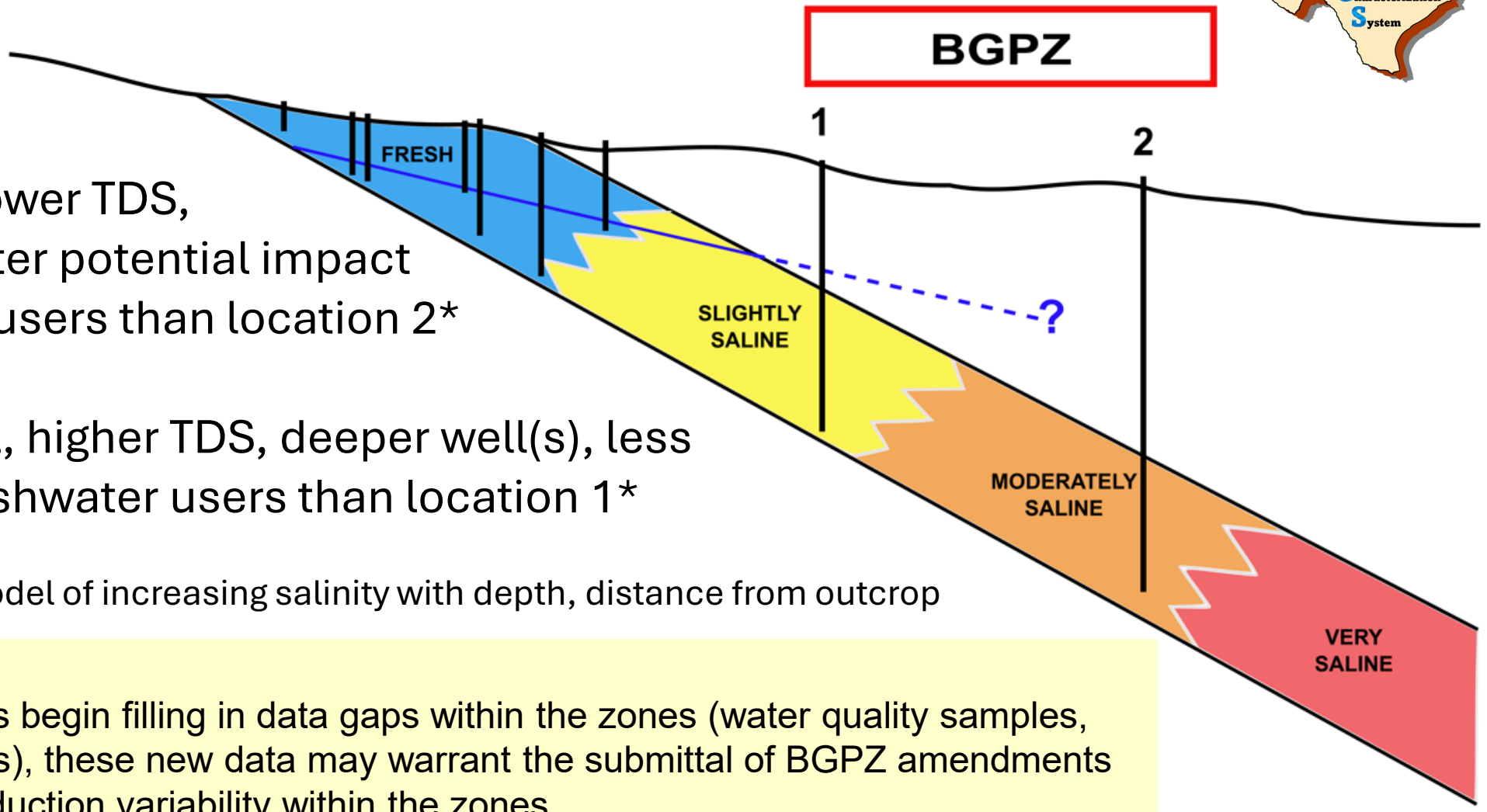
- We used a 20-foot drawdown to limit production to a 1 to 4 percent drop in hydraulic head to prevent significant impact to existing excluded use wells closest to the proposed brackish groundwater production zones
- The conservative estimate assumes:
  - that brackish production will be located near the up-dip edge of the proposed zone, and
  - that no known physical hydrogeological isolation exists between fresh groundwater users and brackish groundwater production zones
- In the report tables, the BGPZ production volumes were tabulated by zone and split by county and river basin to align with regional water planning standards.

BGPZ location variability and data gaps

Well(field) location 1:
Updip edge of BGPZ, lower TDS, shallower well(s), greater potential impact on existing freshwater users than location 2*

Well(field) location 2:
Downdip edge of BGPZ, higher TDS, deeper well(s), less potential impact to freshwater users than location 1*

*assumes simplest salinity model of increasing salinity with depth, distance from outcrop



Data gaps:
When local exploratory efforts begin filling in data gaps within the zones (water quality samples, water levels, and aquifer tests), these new data may warrant the submittal of BGPZ amendments to update properties and production variability within the zones.

Scenario summary tables

Hydrologic unit	Production period (years)	Tranmissivity (ft2/day)	Storitivity (no units)	Production rate (gpm)	Drawdown buffer (miles)	Drawdown (feet)	minimum head (feet)	
Upper Trinity	30	601	0.00017	150	4	20	500	★
Upper Trinity	50	601	0.00017	150	5.5	20	500	
Middle Trinity	30	232	0.00015	75	5	20		★
Middle Trinity	50	232	0.00015	75	6.5	20		
Lower Trinity	30	267	0.00032	100	4.5	20		★
Lower Trinity	50	267	0.00032	100	6	20		

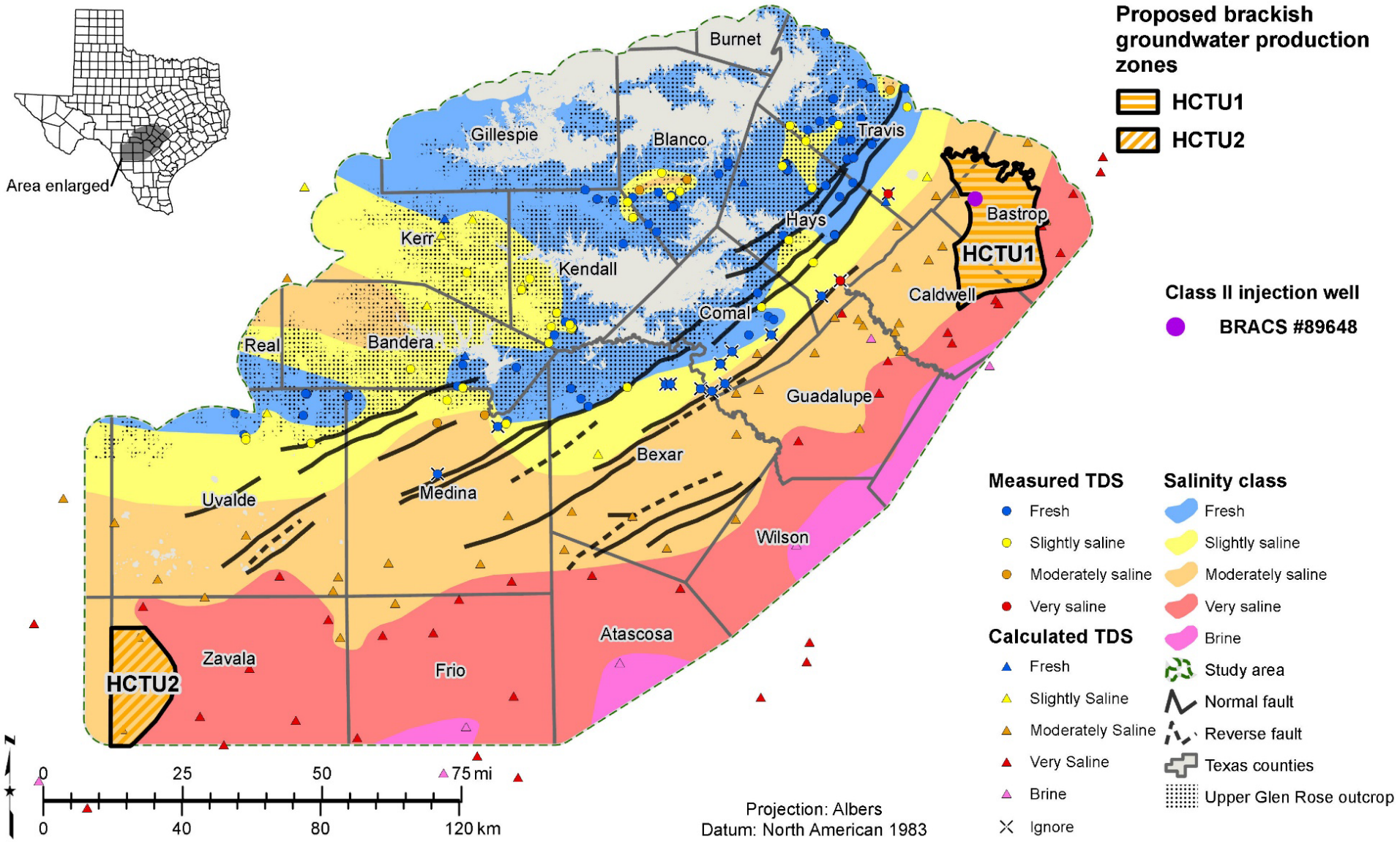
Hydrologic unit	Production period (years)	Tranmissivity (ft2/day)	Storitivity (no units)	Production rate (gpm)	Drawdown buffer (miles)	Drawdown (feet)	minimum head (feet)	
Upper Trinity	30	601	0.00017	300	11	25	500	✖
Upper Trinity	50	601	0.00017	300	14	25	500	
Middle Trinity	30	232	0.00015	150	10.5	25		✖
Middle Trinity	50	232	0.00015	150	13.5	25		
Lower Trinity	30	267	0.00032	200	9	25		✖
Lower Trinity	50	267	0.00032	200	12	25		

Zone production volumes

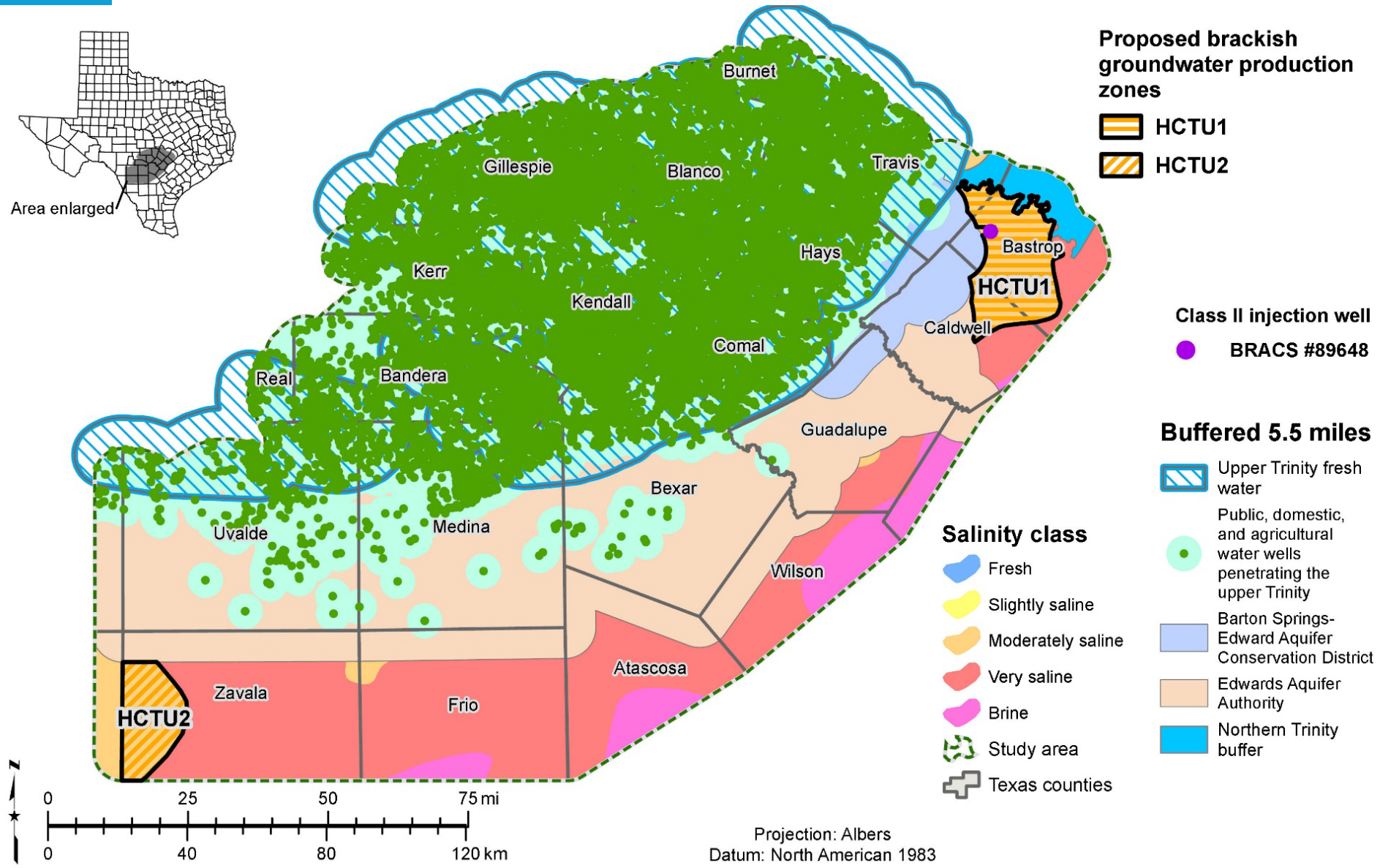
All volumes are in acre-feet

BGPZ	Annual	30-year	50-year
HCTU1	1,679	50,412	84,024
HCTU2	835	25,081	41,803
HCTM1	2,699	80,699	134,476
HCTL1	5,238	156,844	261,374
Total	10,451	**313,036**	**521,677**

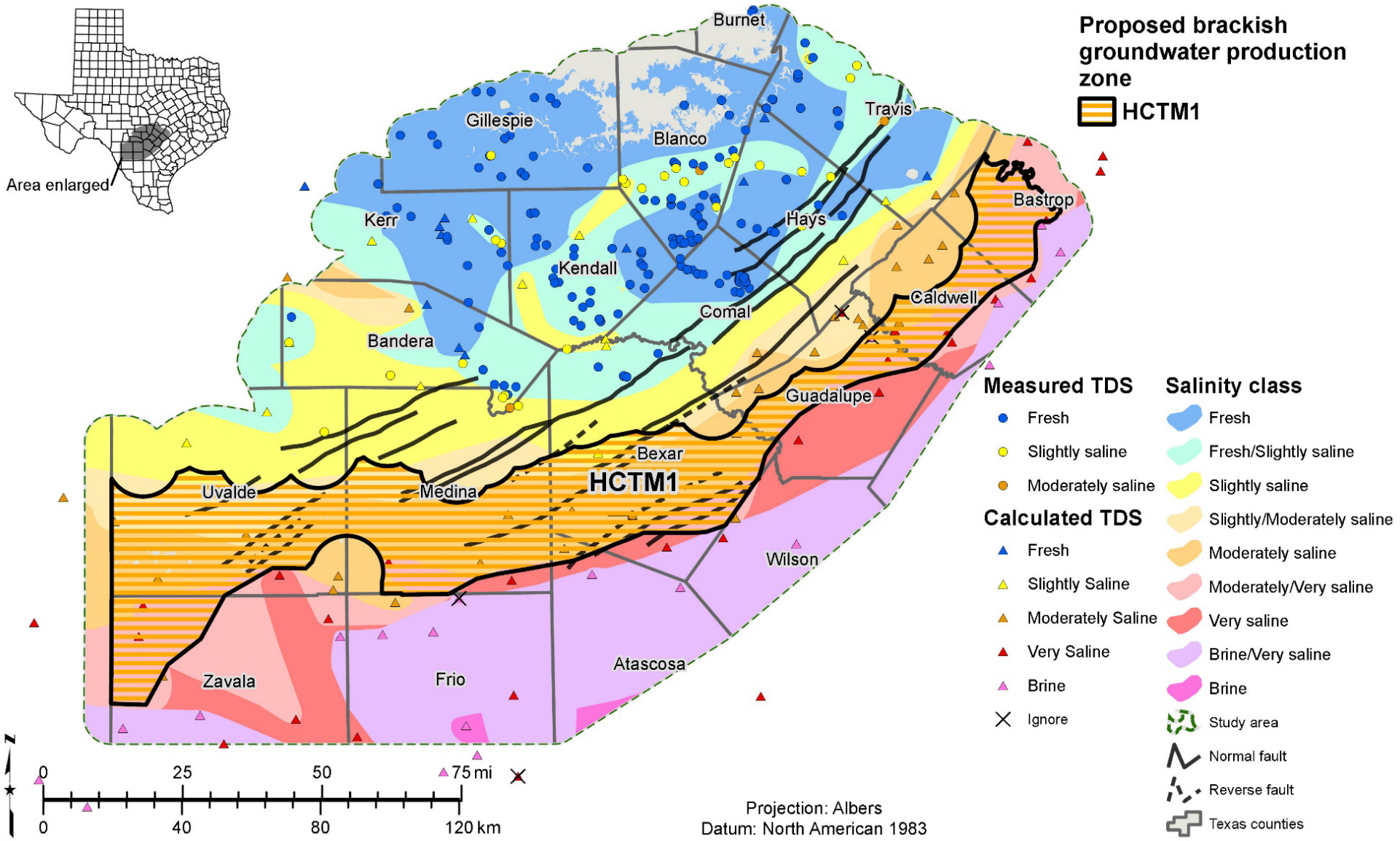
Upper Trinity



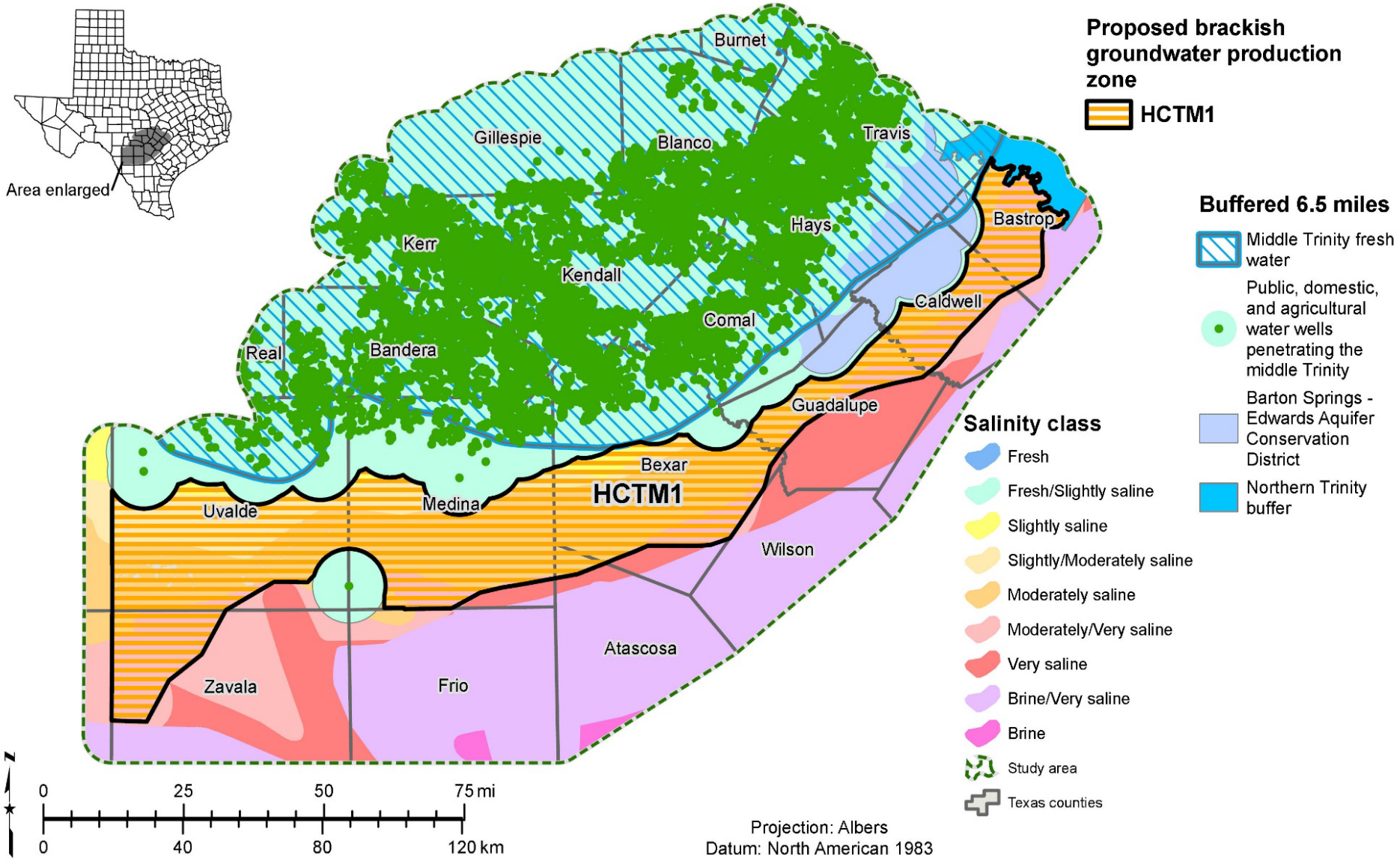
Upper Trinity exclusions



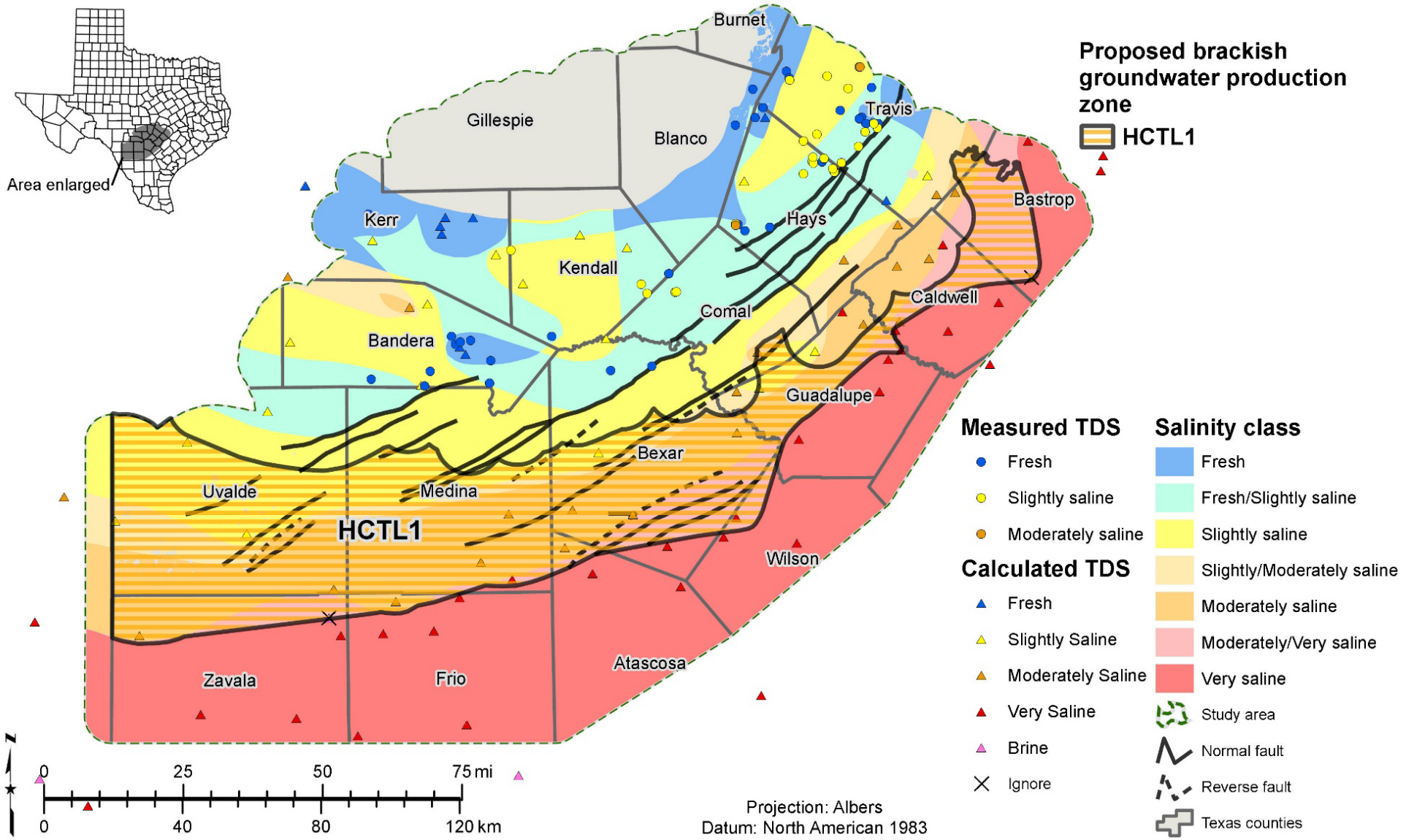
Middle Trinity



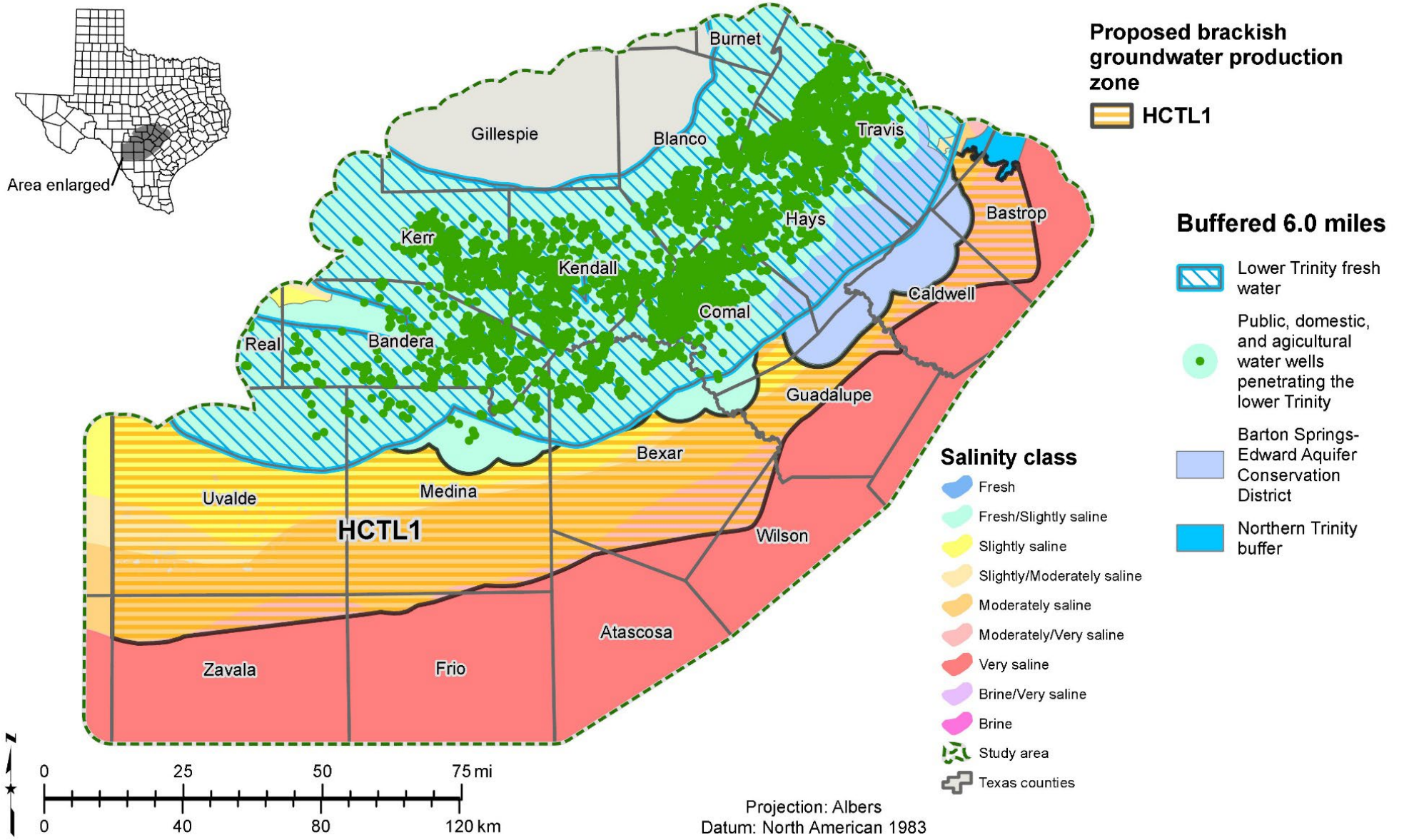
Middle Trinity exclusions



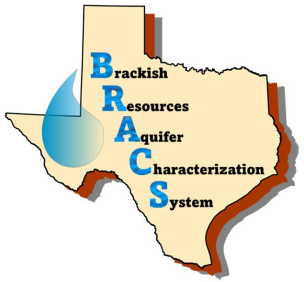
Lower Trinity



Lower Trinity exclusions



Next steps



- Revisit anything that needs to be addressed based on your feedback
- Written comment period for the draft OF report 25-01 closes on May 8th

  Request copy of draft OF report and/or send comments to:
  Kristie.Laughlin@twdb.texas.gov

- Prepare Board memo summarizing BGPZs
- Board considers the recommendation to designate BGPZs

Questions?

BRACS Study link:
https://www.twdb.texas.gov/groundwater/bracs/studies/HillCountry_Trinity/index.asp

Parameters used to model drawdown for production zone wells

Parameters	HCTU1	HCTU2	HCTM1	HCTL1
Well yield per well (gallons per minute)	152	152	76	99
Storage coefficient (storativity)	0.00017	0.00017	0.00015	0.00032
Transmissivity (feet^2/day)	601	601	232	267
Transmissivity (gallons per day/foot)	4,496	4,496	1,735	1,997
Specific yield	0.054	0.054	0.108	0.120
Buffer distance: Calculated radius (miles) from well pumping for 50 years where drawdown equals 20 feet	5.5	5.5	6.5	6
Area of proposed brackish groundwater production zone (acres)	122,520	207,632	1,864,035	2,369,788
Area of single buffer distance circle (acres)	60,821	60,821	84,949	72,382
50-year single well cumulative production (acre-feet)	12,250	12,250	6,150	8,000
30-year single well cumulative production (acre-feet)	7,350	7,350	3,690	4,800
Annual single well cumulative production (acre-feet)	245	245	123	160