Groundwater Science for Sound Policy

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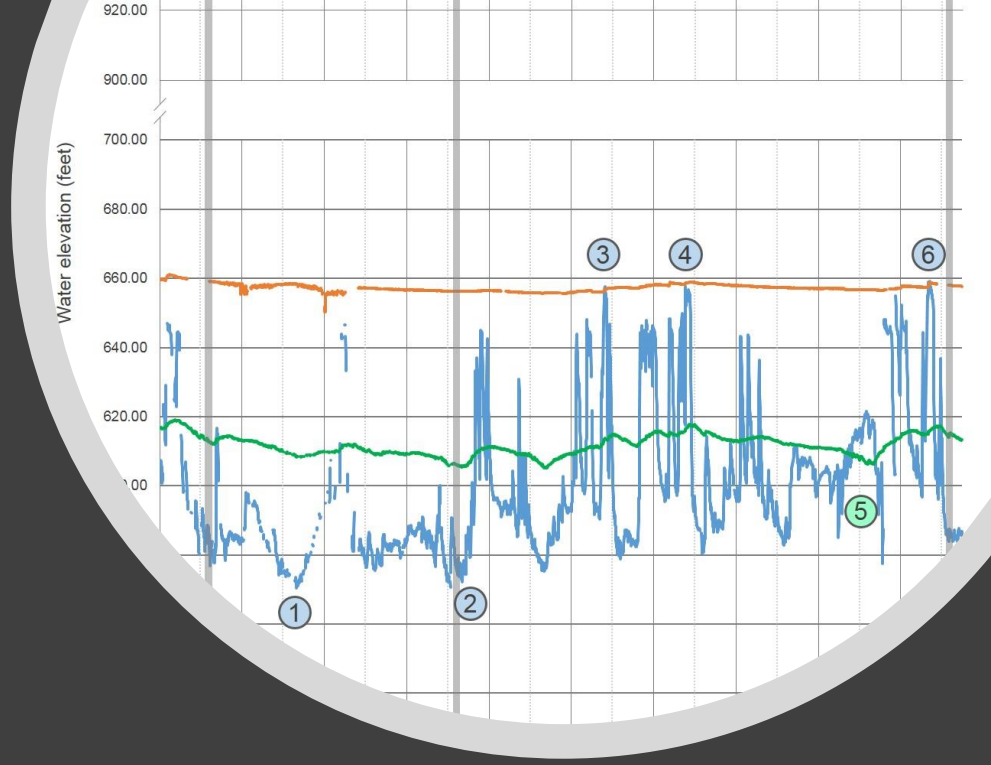
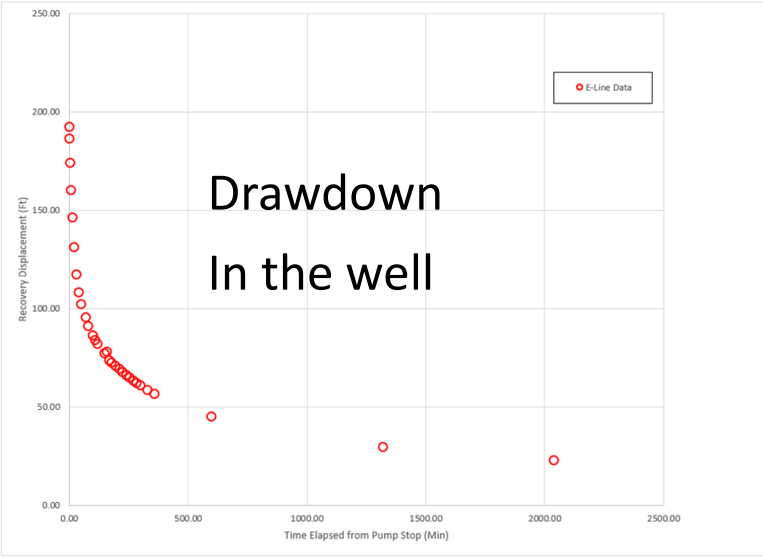


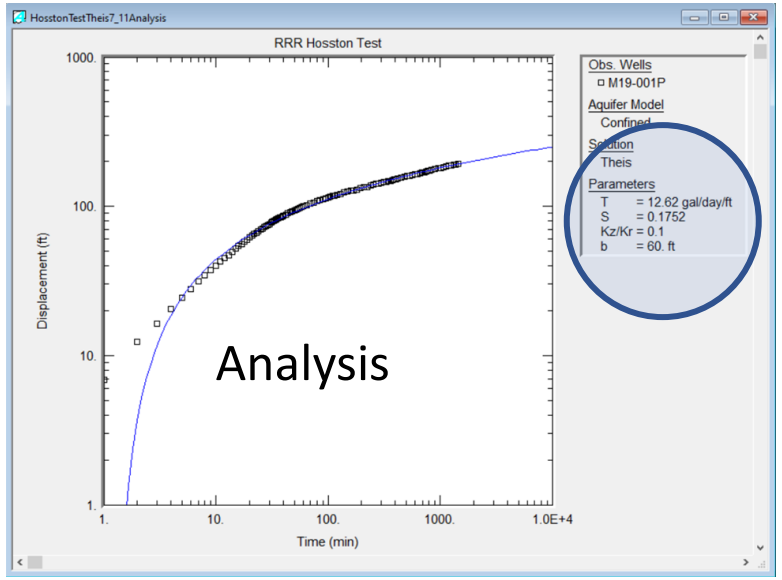
Groundwater Science for Sound Policy

Purpose: Show how data and understanding (science) can aid management (policy)

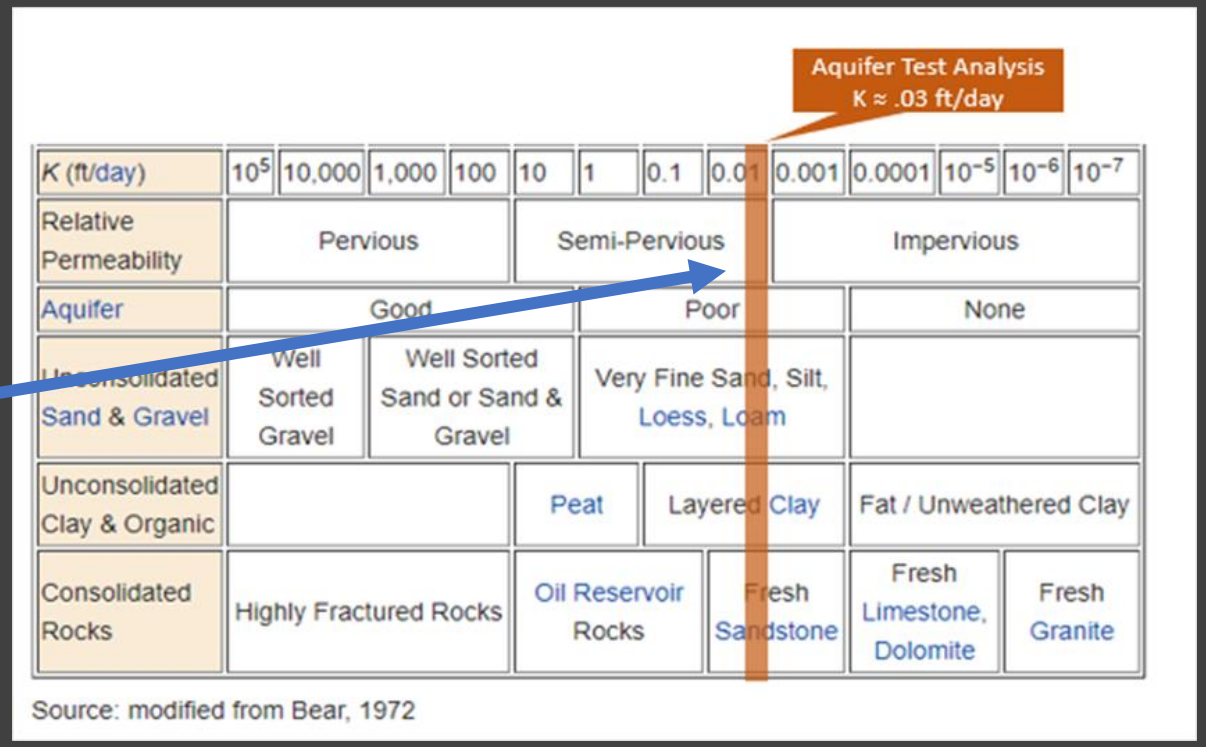
Aquifer Tests	New Data Permitting Better models
Synoptic Water Levels and Monitor Wells	Patterns for Planning
New Ideas	Acoustics/WellIntel eDNA

Aquifer Tests: what are they?

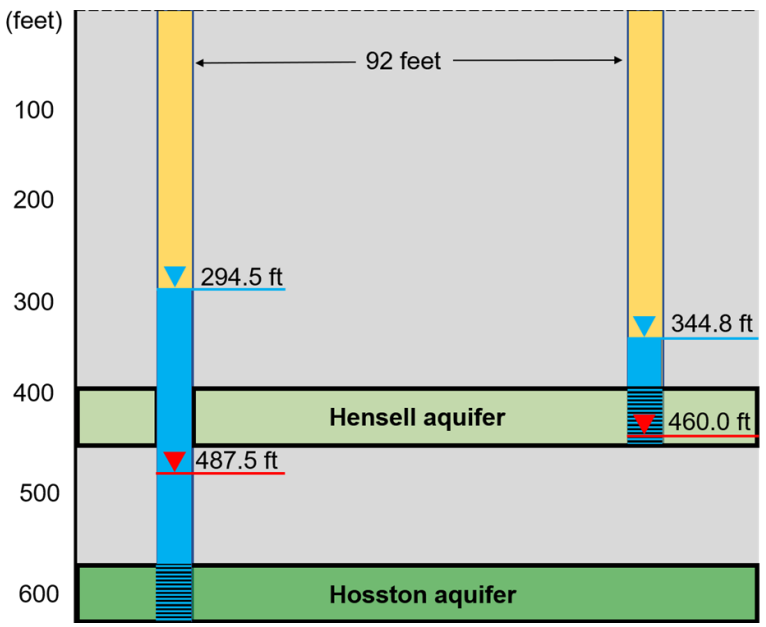


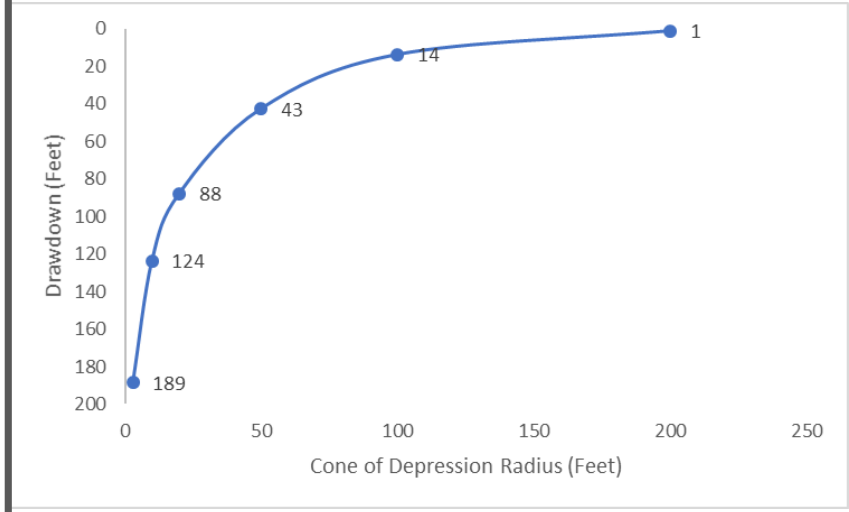


New
(site specific)
Data!



Source: modified from Bear, 1972





Permitting: Drawdown in well and nearby

Models

Middle Trinity Aquifer Characteristics

Input Data

Site	Aquifer Test	GAM
R. S. Materials	15 gpm	
Middle Trinity	T = **1800 gpd/ft**	T = 547 gpd/ft
River Ridge Ranch	7 gpm	
Middle Trinity	T = **56 gpd/ft**	T = 629 gpd/ft

Models

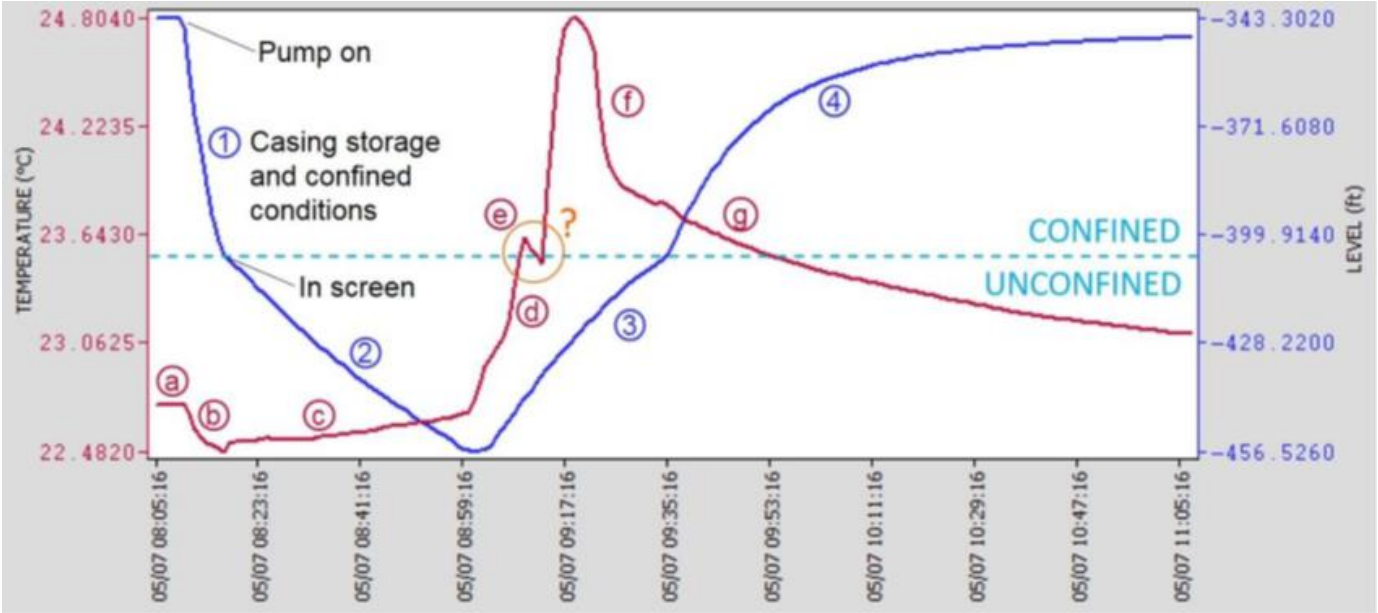
Lower Trinity Aquifer Characteristics

Input Data

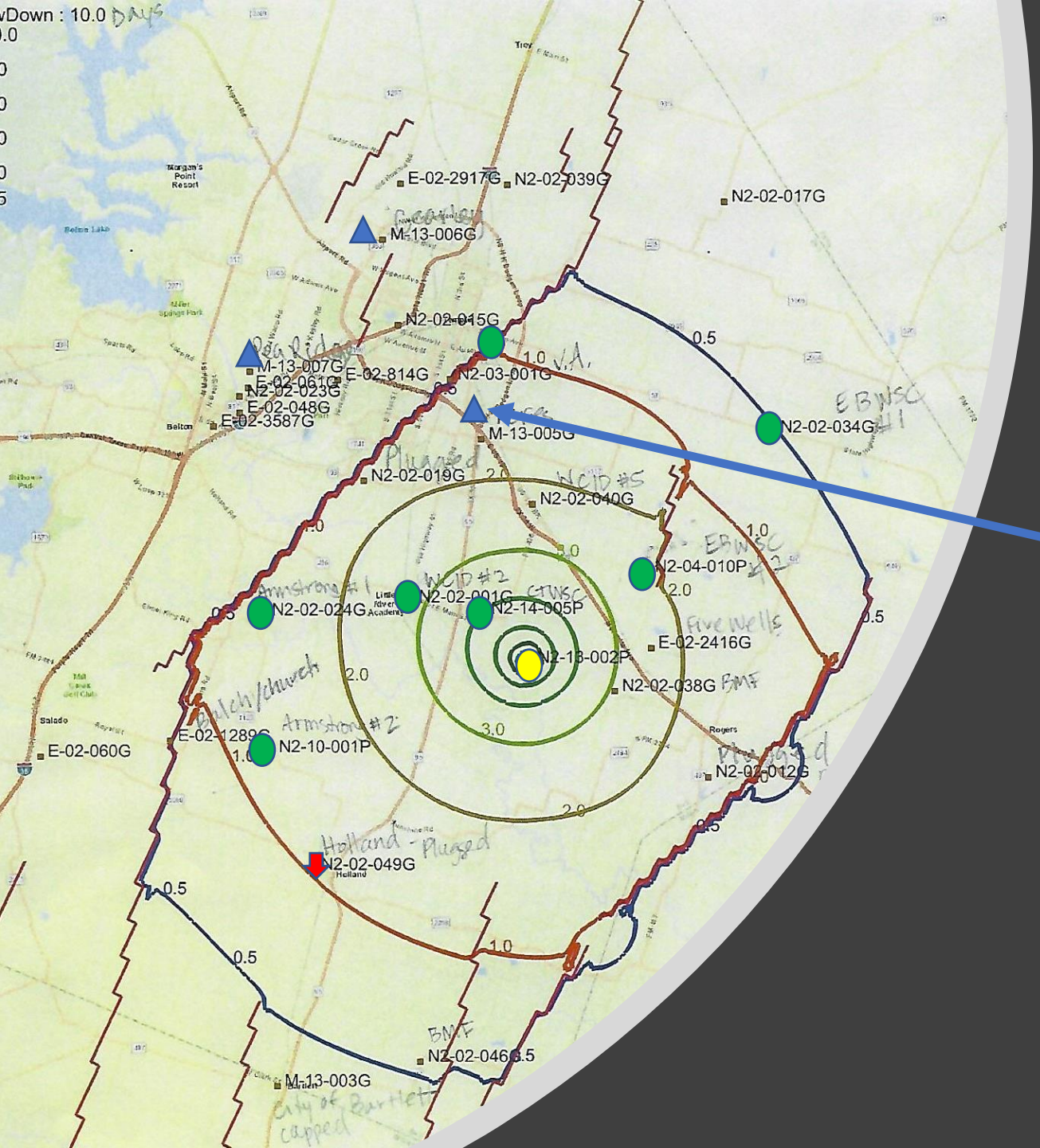
Site	Aquifer Test	GAM
River Ridge Ranch	3.25 gpm	
Lower Trinity	T = **12.6 gpd/ft**	T = 9,361 gpd/ft
Oasis LLC	1120 gpm	
Lower Trinity	T = **200,000 gpd/ft**	T = 163,335 gpd/ft

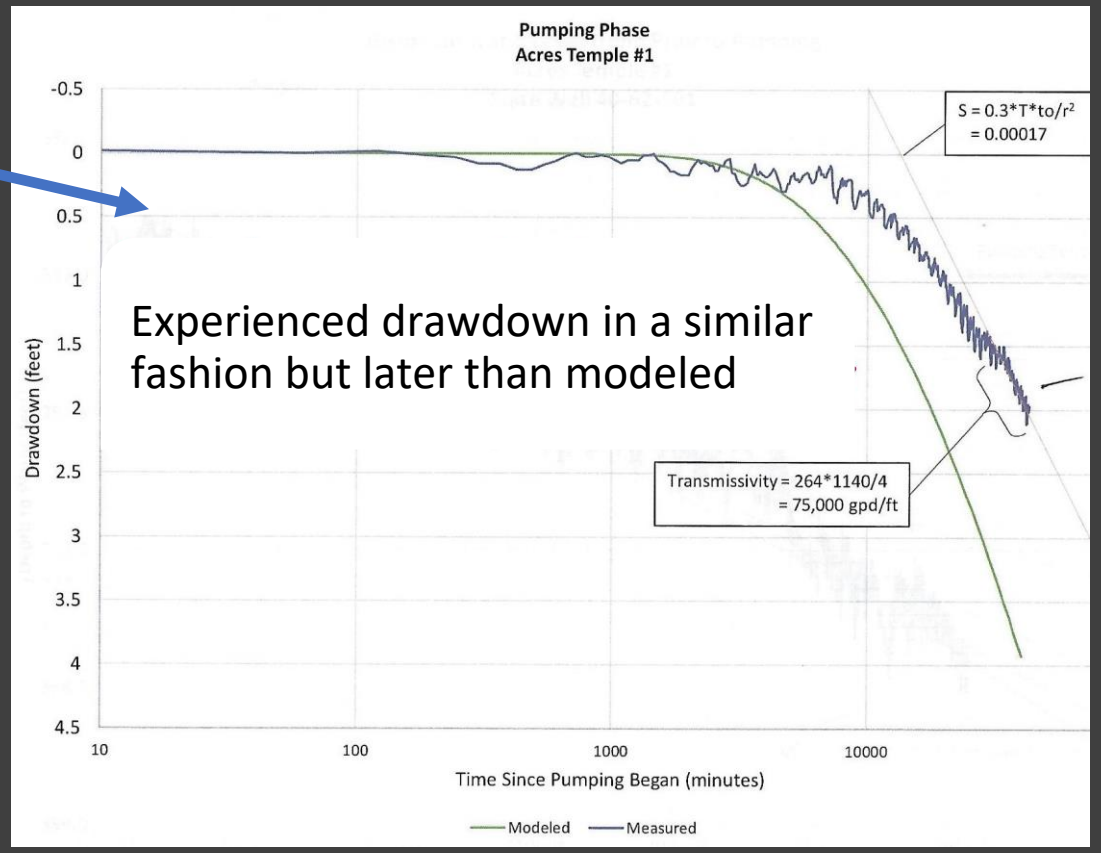
Lesson from an Aquifer Test?

- Well production 11 gpm?
- Pumped at 7 gpm
- Pumped-off in 56 minutes
- From confined – unconfined



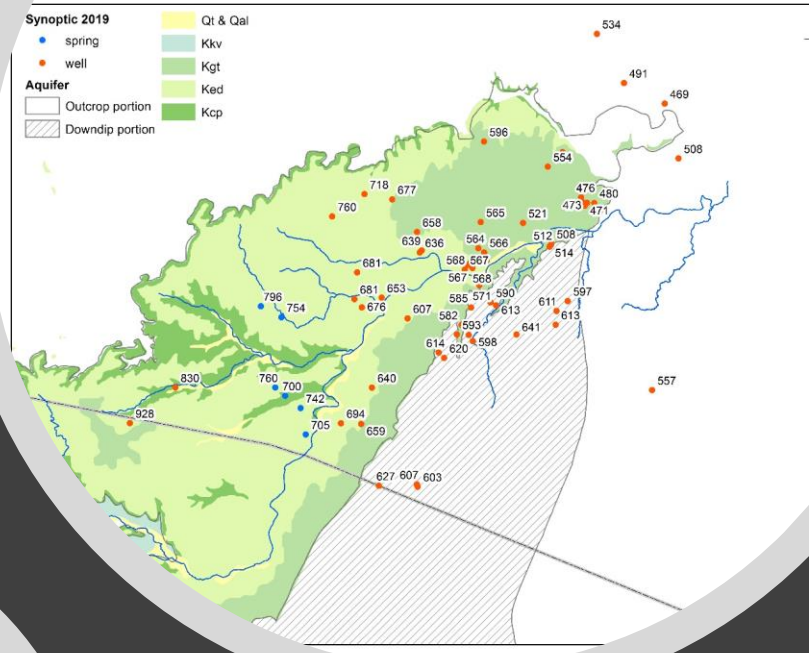
Lesson from a 30-day aquifer test

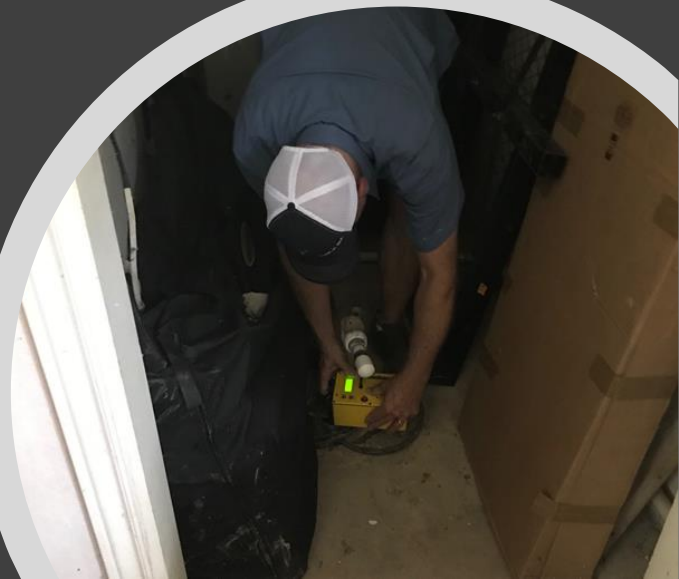




Synoptic (snapshot) Studies Edwards Aquifer

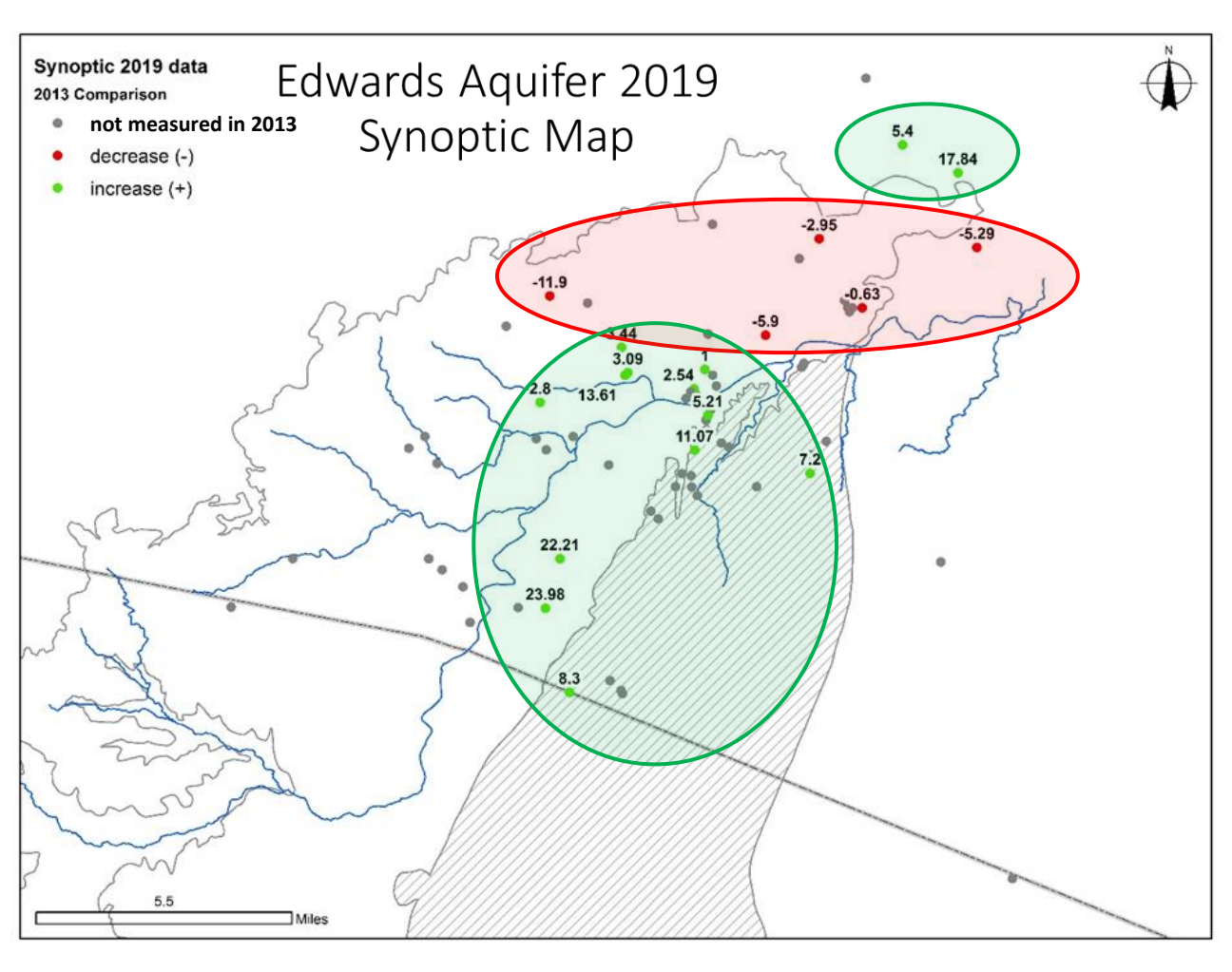
- 2010 before drought
- 2013 after drought
- 2019 after wet period





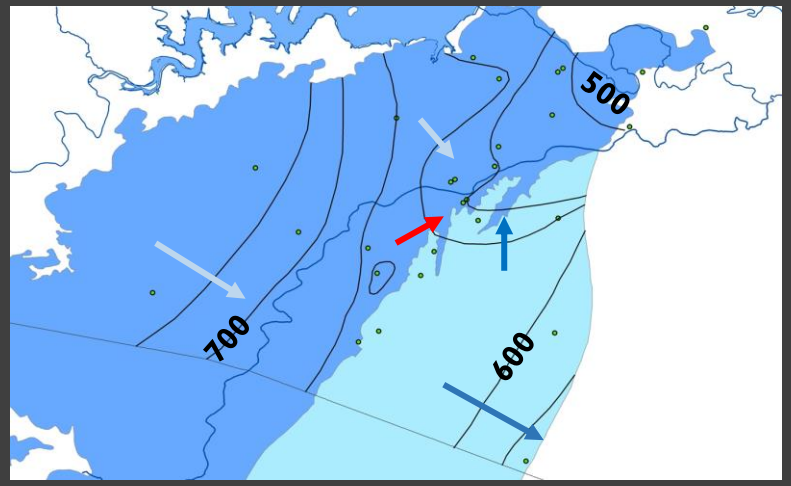
Decreased water levels

Increased water level

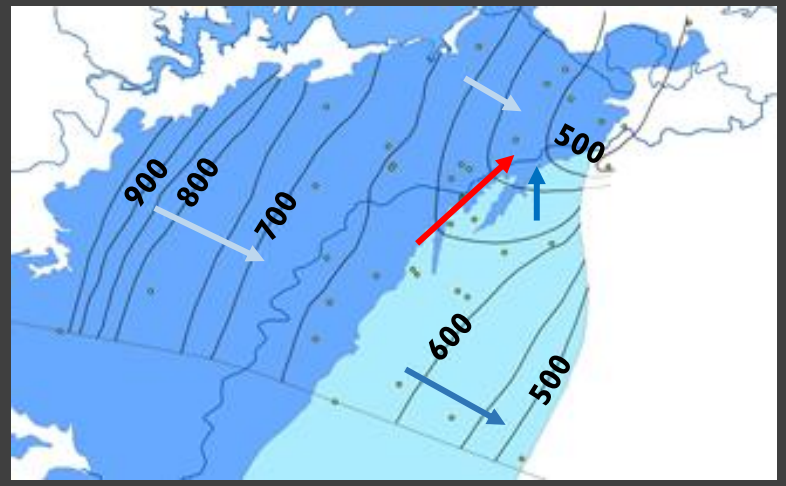


Edwards Aquifer Synoptic water levels

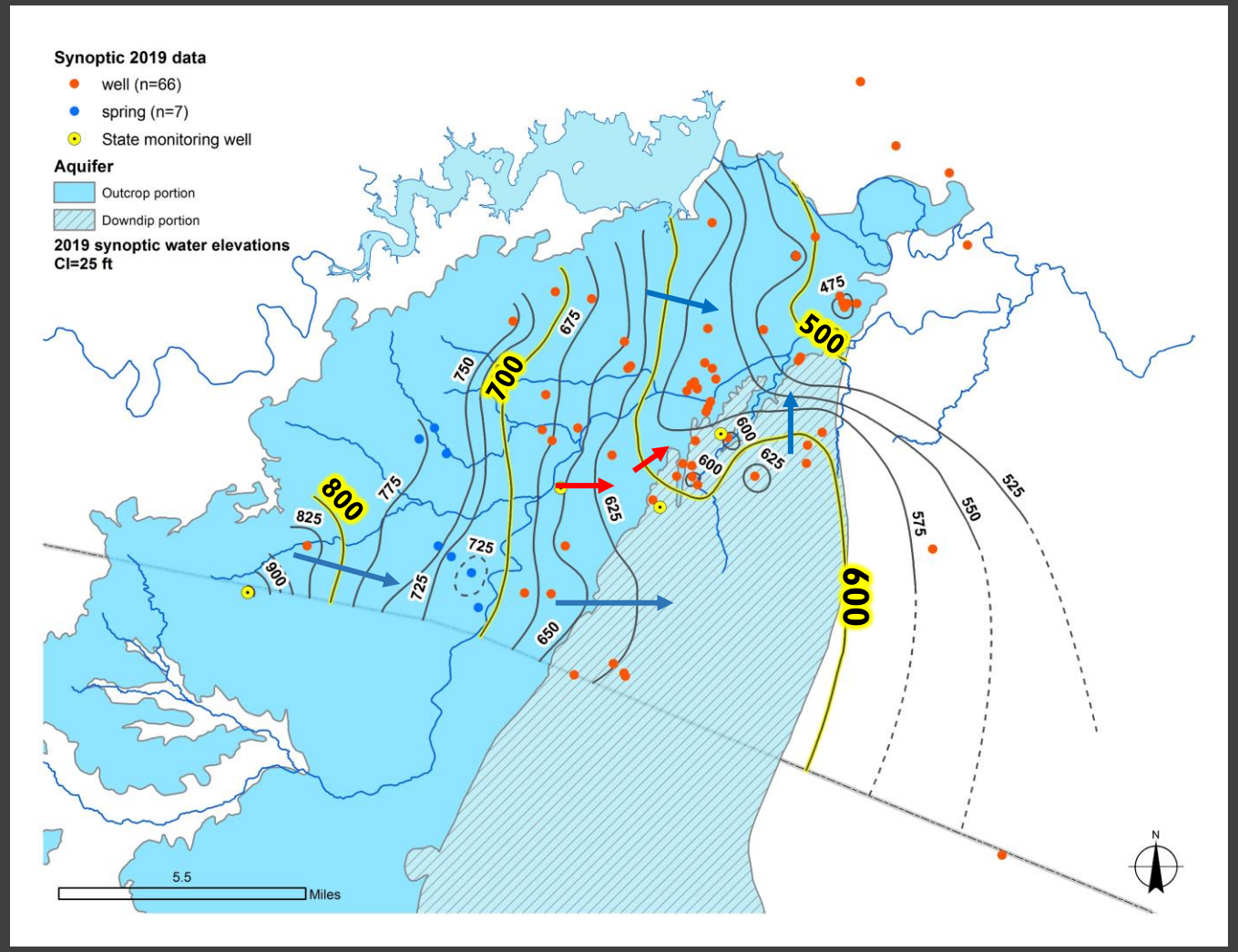
2010 synoptic



2013 synoptic



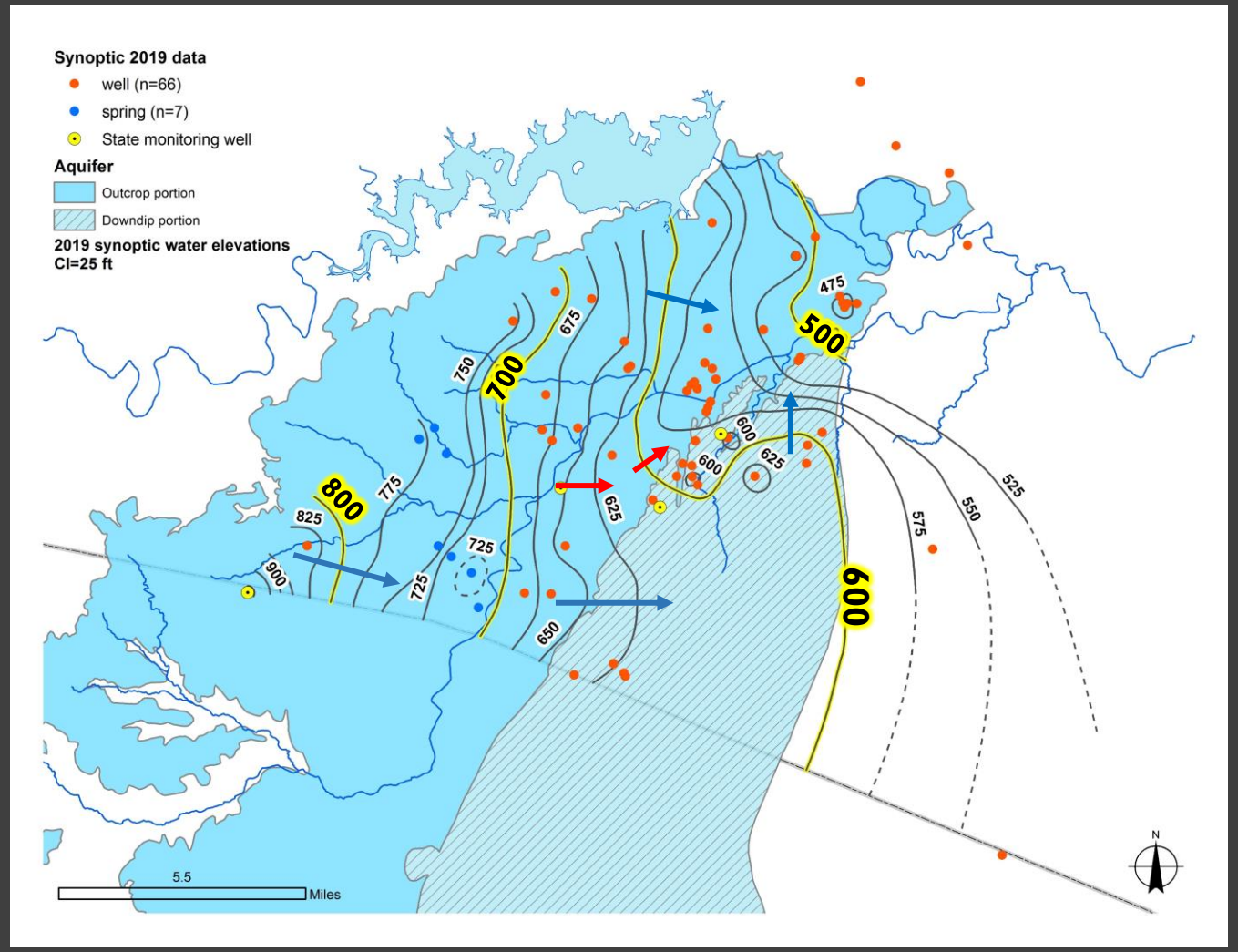
2019 synoptic



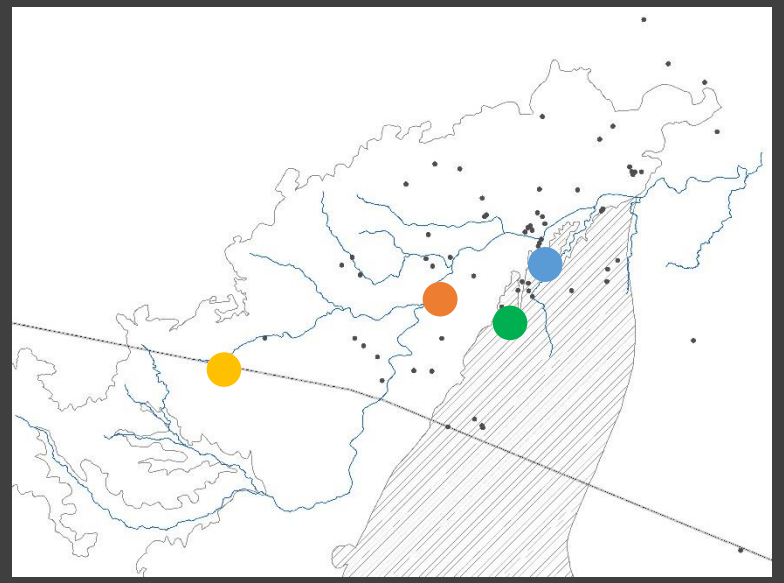
Edwards Aquifer Synoptic water levels

- Higher water levels in general.
- More deflection to the North
  - more data
  - higher water levels
  - increased extraction
  - rain patterns
- Spring data are difficult to compare
  - different scale
  - less accurate level data
- Far southwest?

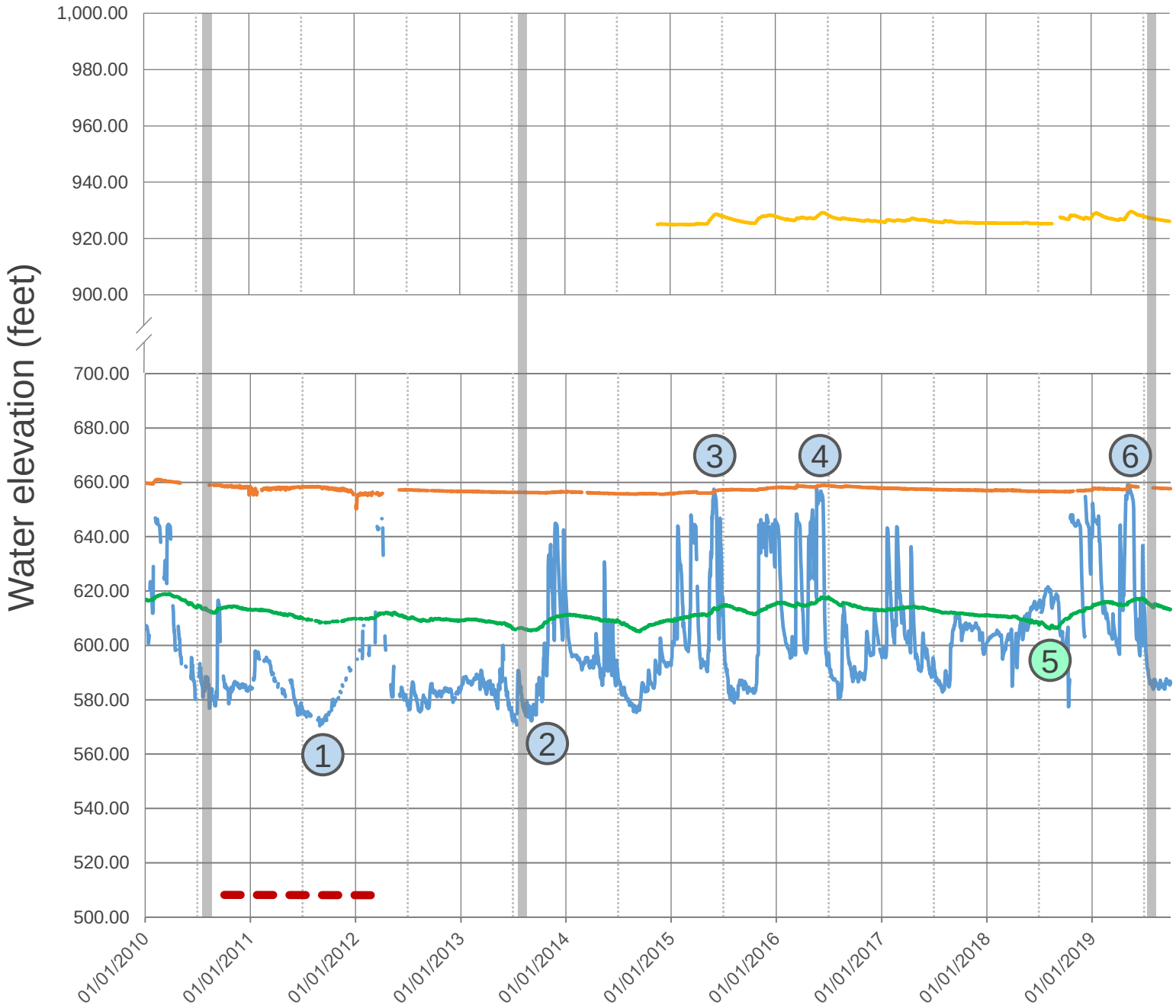
2019 synoptic

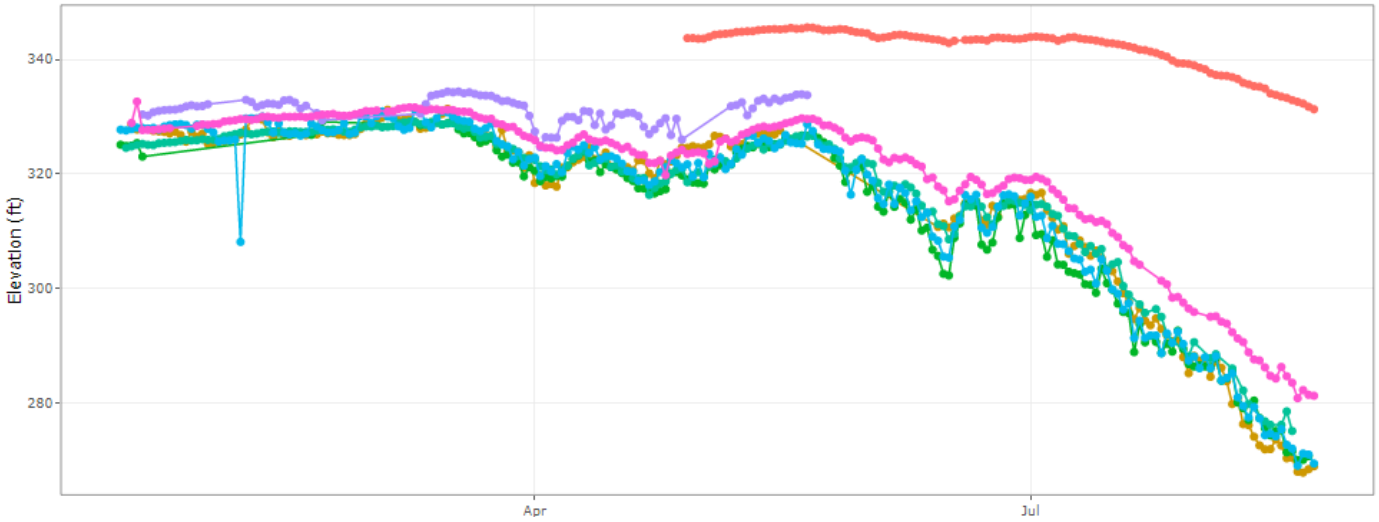


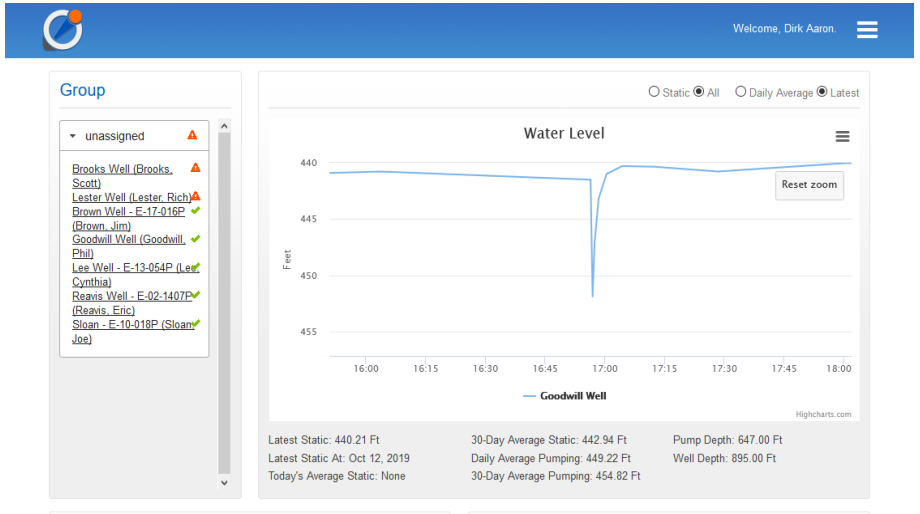
Monitor wells



Salado cemetery (5804628)
Patt's Crossing (5804702)
Rest Stop (5804816)
Gault Site (5803702)
Synoptic measurement
2011 Drought



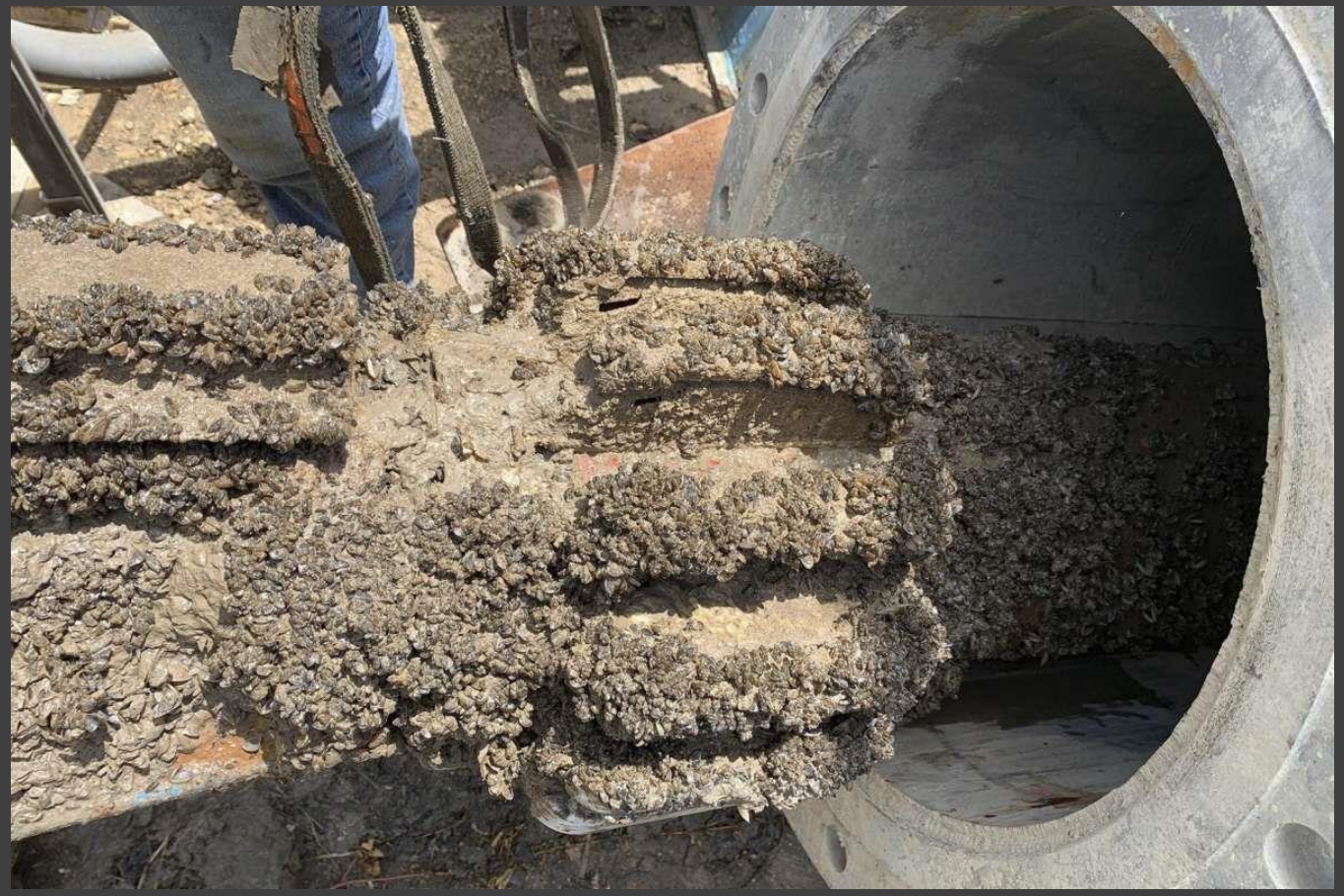




Acoustics/WellIntel

Zebra Mussels: Invasive nuisance

"Feb 11, 2019 - AUSTIN (KXAN) Austin Water Director Greg Meszaros apologized to customers Monday after five days of smelly water, caused by dead zebra mussels. Meszaros said Austin Water crews flushed their system of the smelly water over the weekend."



Zebra mussels encrust water intake structure

Sampling parameters

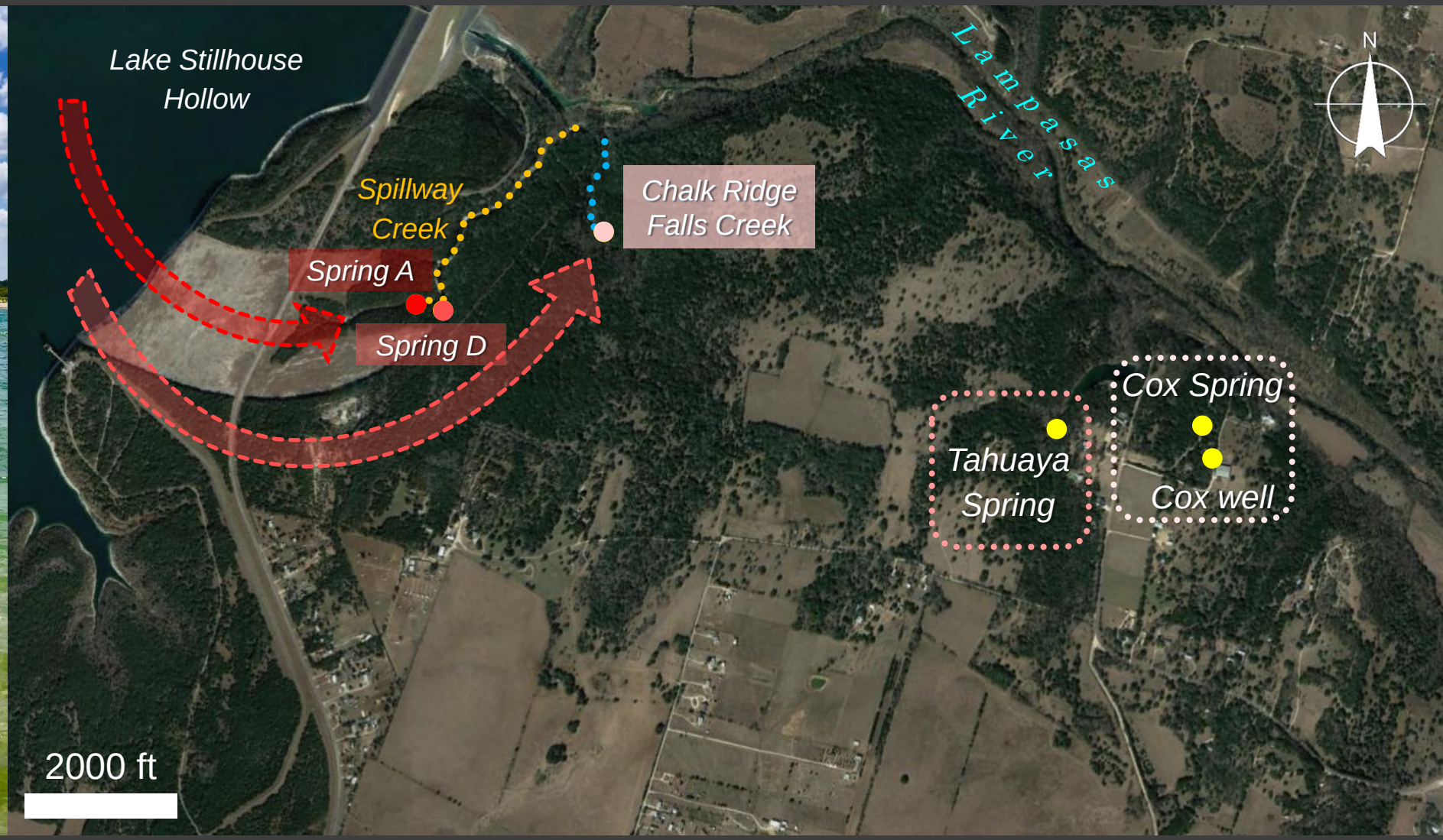
- eDNA
  - Genetic material that is collected from an environmental sample (e.g. soil, water, snow, air)
  - Detection can indicate presence
  - Filtered at 80 µm and 36 µm
- Flow measurements
- Water chemistry (temperature, SC, ions, stable isotopes)

Field sampling

Lab analysis

Hypotheses

1. Greatest to least influence:
   A > D > CR > Tahuaya > Cox
2. Affected: Sps A and D; CRF Creek
   Unaffected: Tahuaya (and Cox)
3. High water levels, more influence?



Summary

Spring A is definitely affected

Sample Sites	Flow	Ions Low Flow	Ions High Flow	Isotopes Low Flow	Isotopes High Flow	eDNA Low Flow	eDNA High Flow
Stillhouse Res. *(Positive control)*	N/A	N/A	N/A	N/A	N/A	Yes	Yes
Spring A	Yes	No?	Yes	No	Yes	Yes	Yes
Spring D	Yes	maybe	Yes	maybe	maybe	No	No
Chalk Ridge Cr.	Yes		Yes	maybe	maybe	maybe	N/A
Tahuaya Sp	maybe	maybe	Yes	No	maybe		Yes
Cox Spring	Yes		maybe		maybe		
Cox Well	N/A		maybe		maybe	N/A	N/A
Big Boiling Sp. *(Negative control)*	No		No			No	No

Conclusions

Groundwater Science aids sound policy :

- Better permits
- Better models
- Better monitoring
- More understanding

Better management

Questions?