Groundwater Availability Studies: A Necessary but Limited Perspective

2025 South-Central GSA

Conway, Arkansas

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Hamilton Pool
By Dave Wilson

Bureau of Economic Geology

Travis County

Talk Outline

I. Concepts

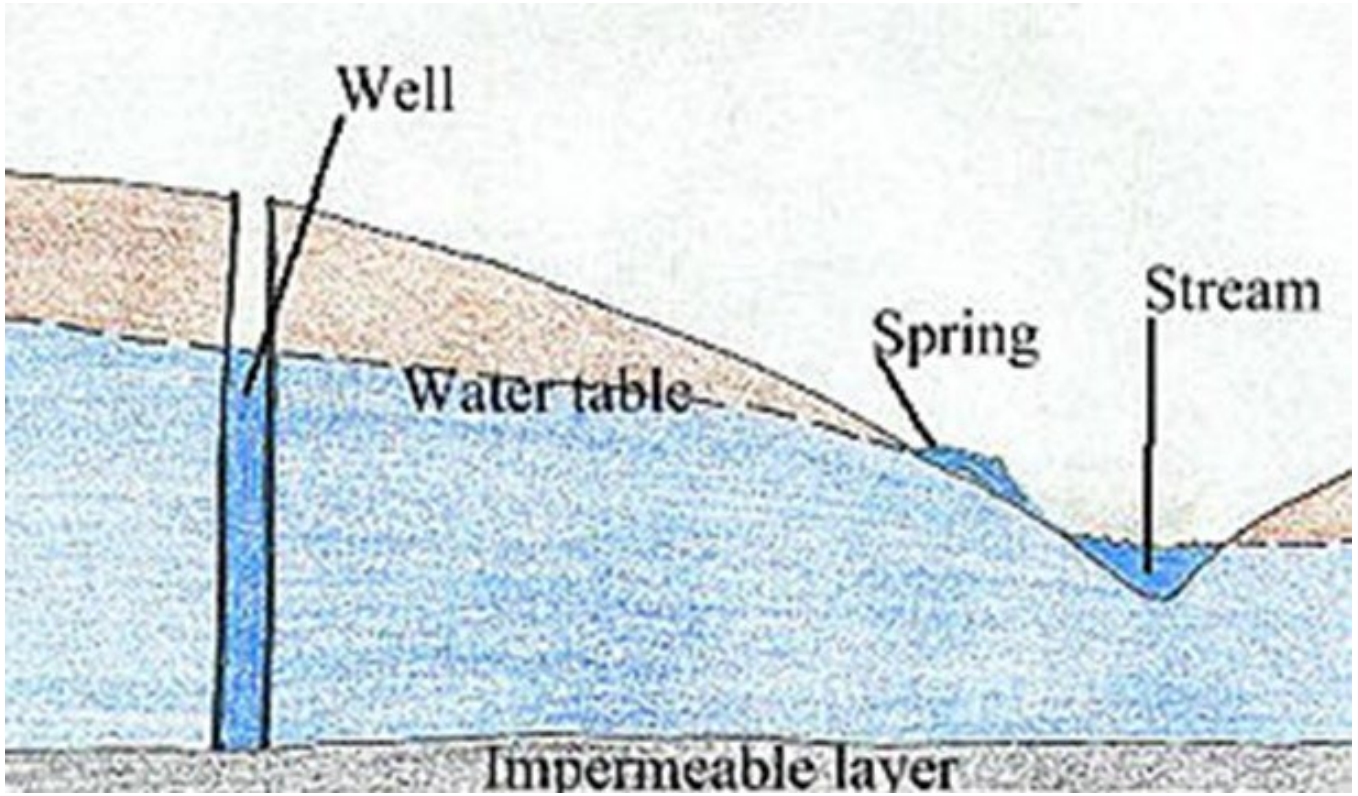
- Source of water to wells
- Availability vs Sustainability

II. Setting

III. Case Study

IV. Take Away

“All water discharged by wells is balanced by a loss of water somewhere”



(1) Storage—expressed as water levels

(2) Capture

A. Decrease in springflow

B. Increased recharge (e.g. a river)

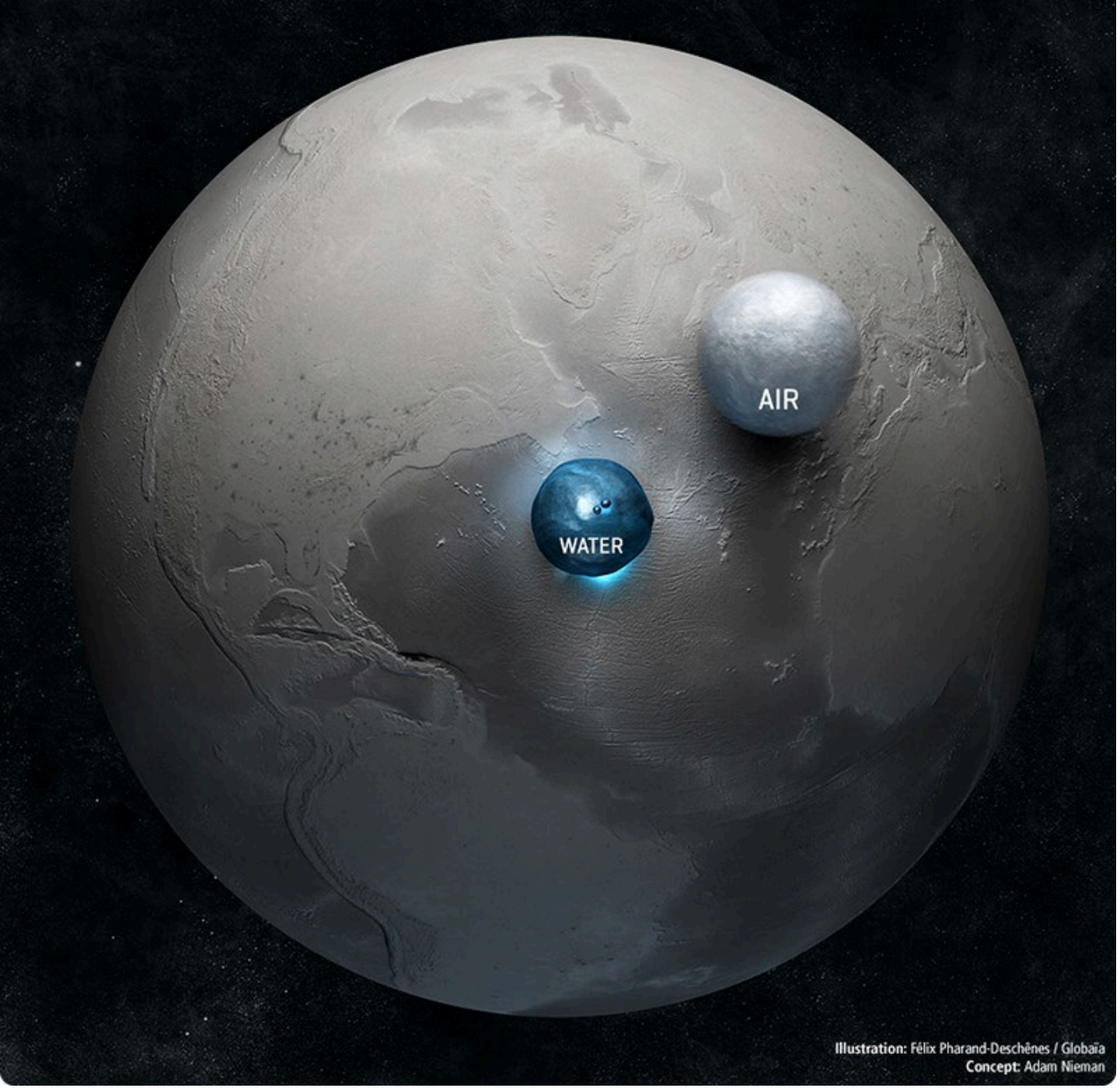
C. V. Theis, 1940, “The source of water derived from wells: Essential factors controlling the response of an aquifer to development,” Civil Eng., Vol. 10: pp. 277–280.

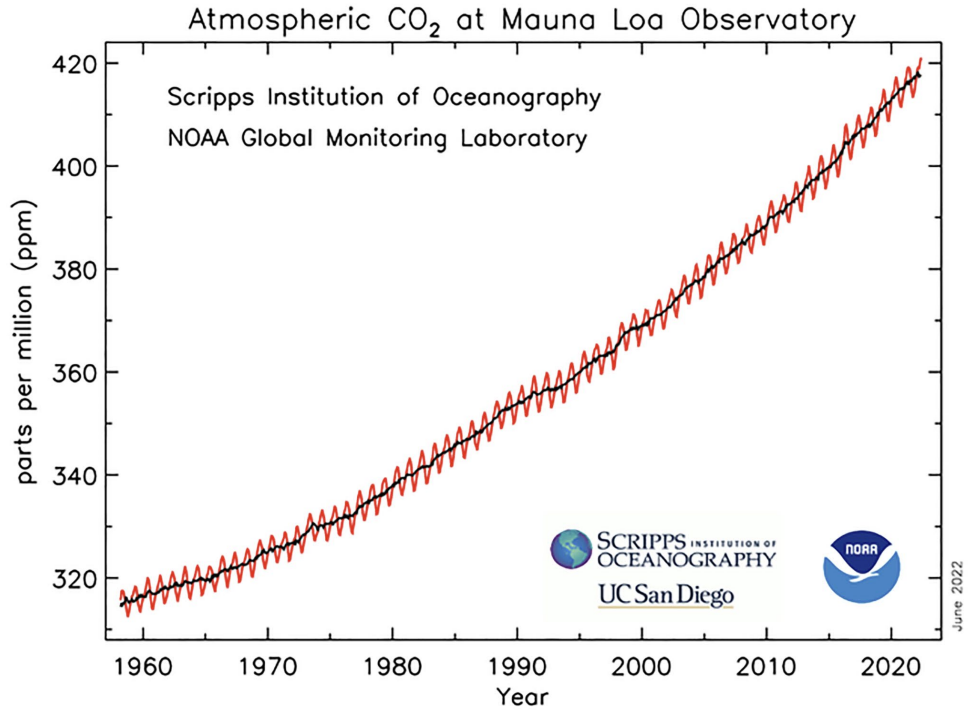
West Texas: Comanche Springs

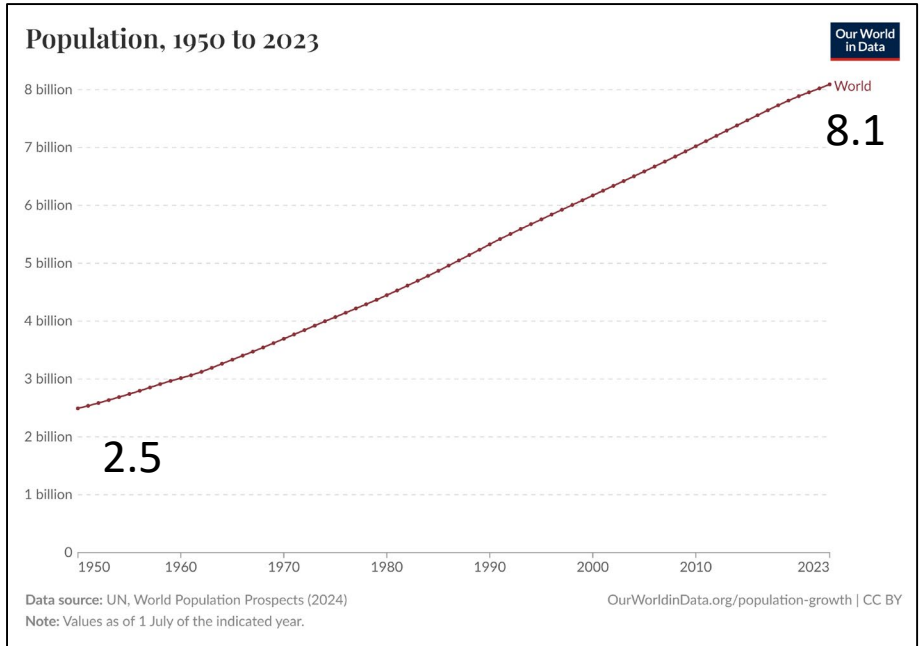
1920s

2013

Texas Observer
Dylan-Baddour


AIR
WATER
Illustration: Félix Pharand-Deschênes / Globaïa
Concept: Adam Nieman


Atmospheric CO_2 at Mauna Loa Observatory
Scripps Institution of Oceanography
NOAA Global Monitoring Laboratory
parts per million (ppm)
420
400
380
360
340
320
1960
1970
1980
1990
2000
2010
2020
Year
SCRIPPS INSTITUTION OF OCEANOGRAPHY
UC San Diego
NOAA
June 2022

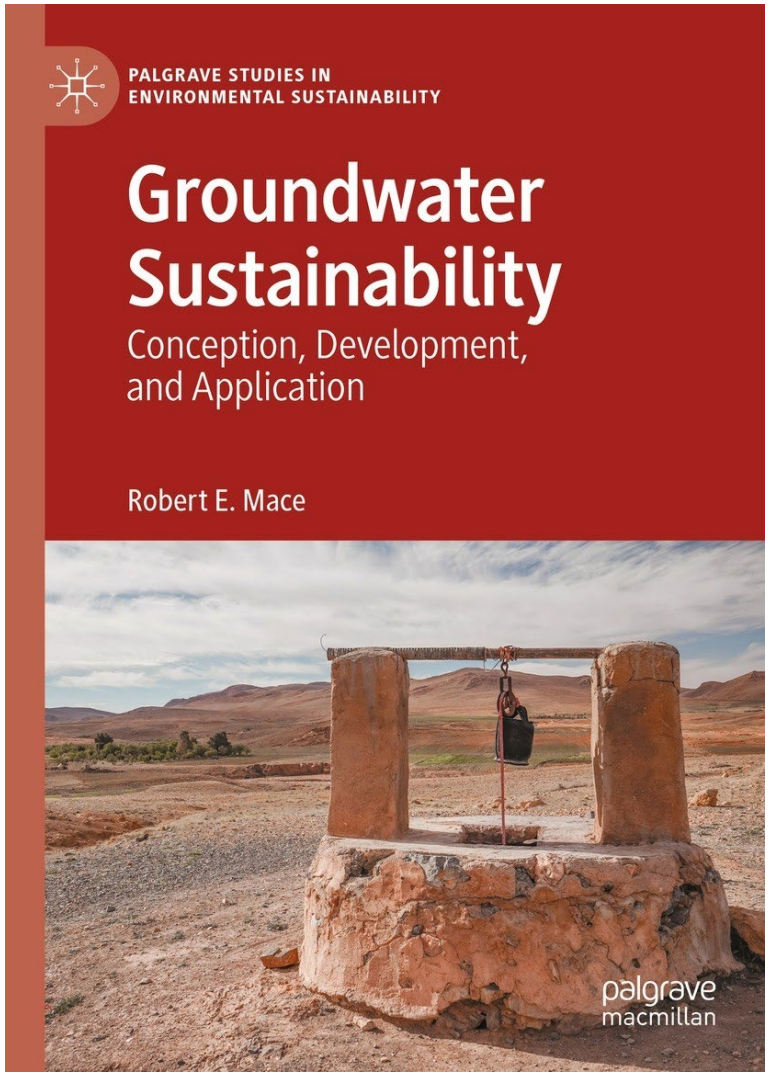

Population, 1950 to 2023
Our World in Data
8 billion
7 billion
6 billion
5 billion
4 billion
3 billion
2 billion
1 billion
0
World
8.1
2.5
1950
1960
1970
1980
1990
2000
2010
2023
Data source: UN, World Population Prospects (2024)
Note: Values as of 1 July of the indicated year.
OurWorldinData.org/population-growth | CC BY

Concepts

Sustainability
(Sustainable Yield)

vs

Groundwater Availability



Sustainable Yield

Safe [sustainable] yield is the rate at which water can be withdrawn from an aquifer without producing an **undesired result** (Todd, 1959)

- Policy term

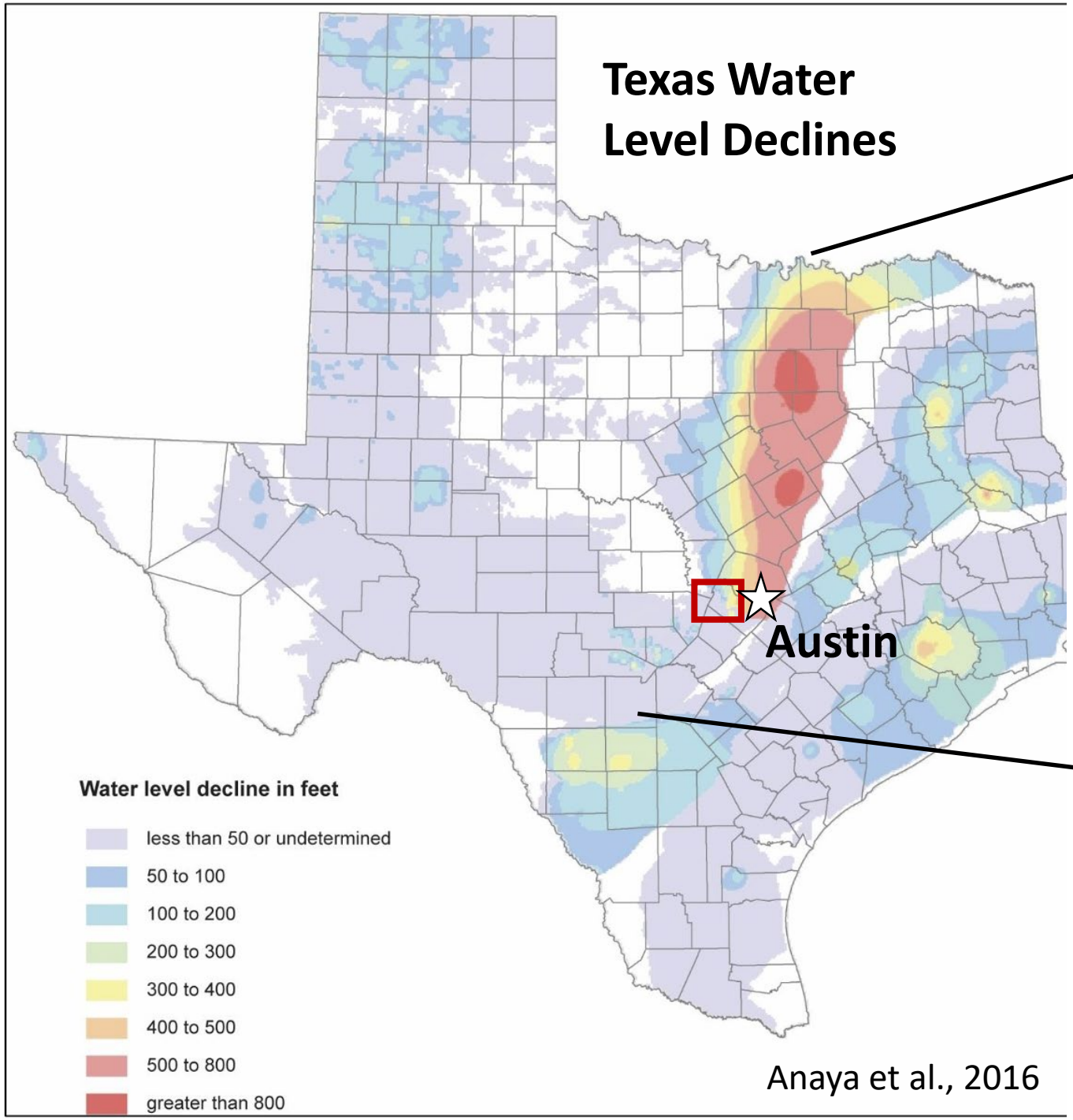
- Dry springs
- Dry wells
- Water quality
- Impacts to species/environment

Groundwater Availability

- State and county permitting.
- Localized studies (not regional)
- Demonstrate (quantify) sufficient supply for “long-term” demand (< 30 yrs)
  - 24-hr pump tests; analytical models
  - Change in storage (water levels)
  - Springs generally not considered

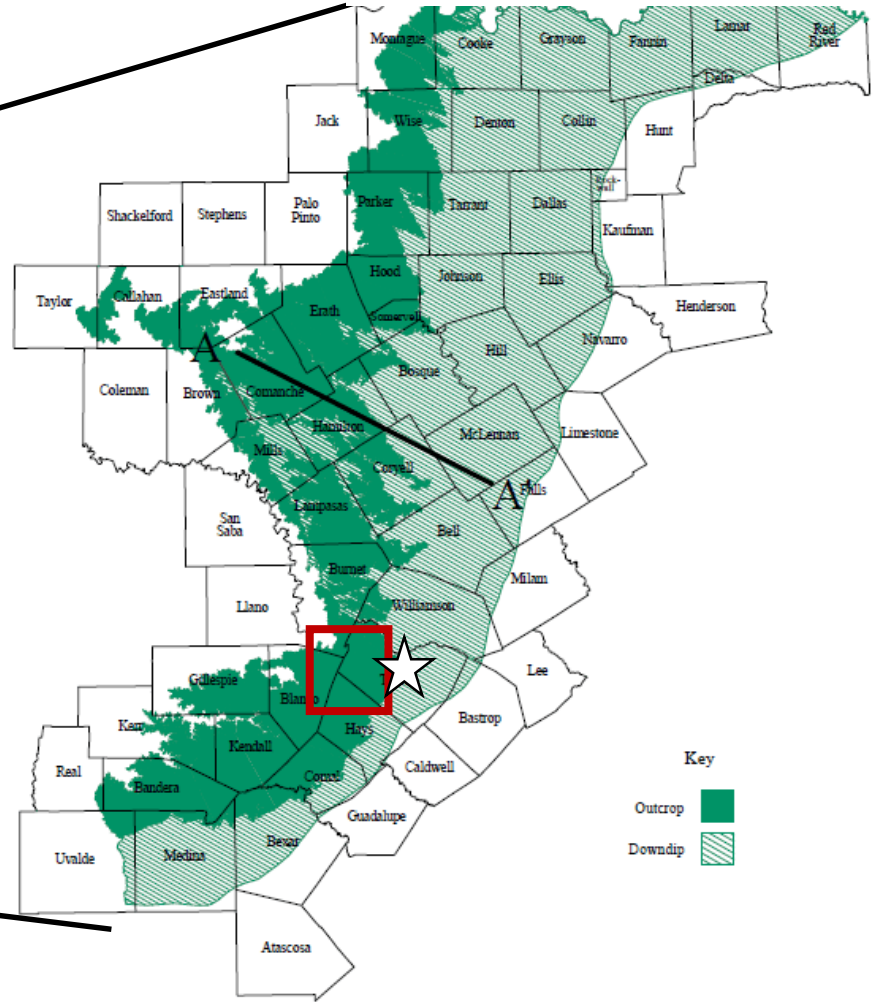

Setting
Hamilton Pool
Mike Holp: June 27, 2016

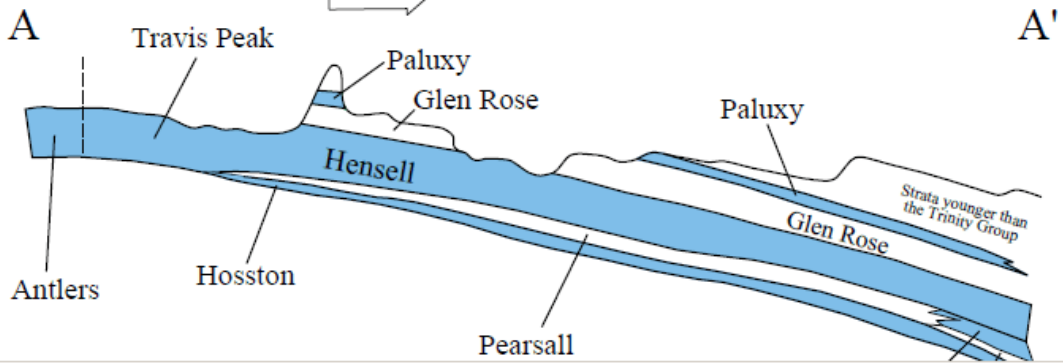
Texas Water Level Declines



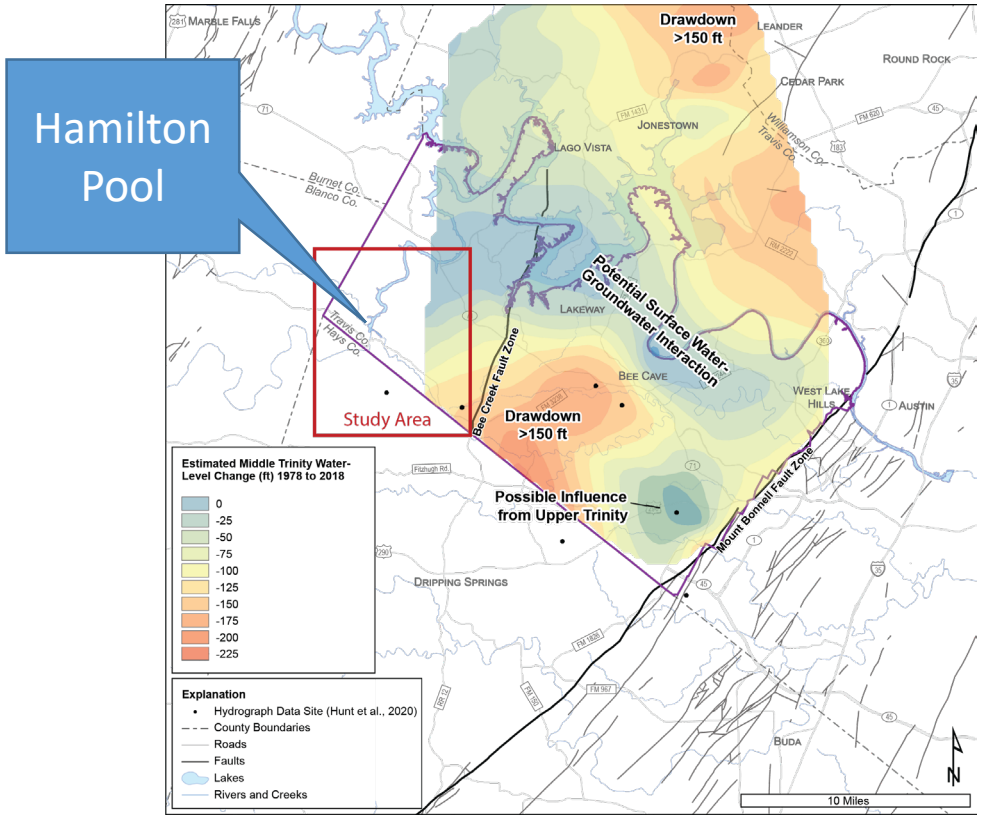
Anaya et al., 2016

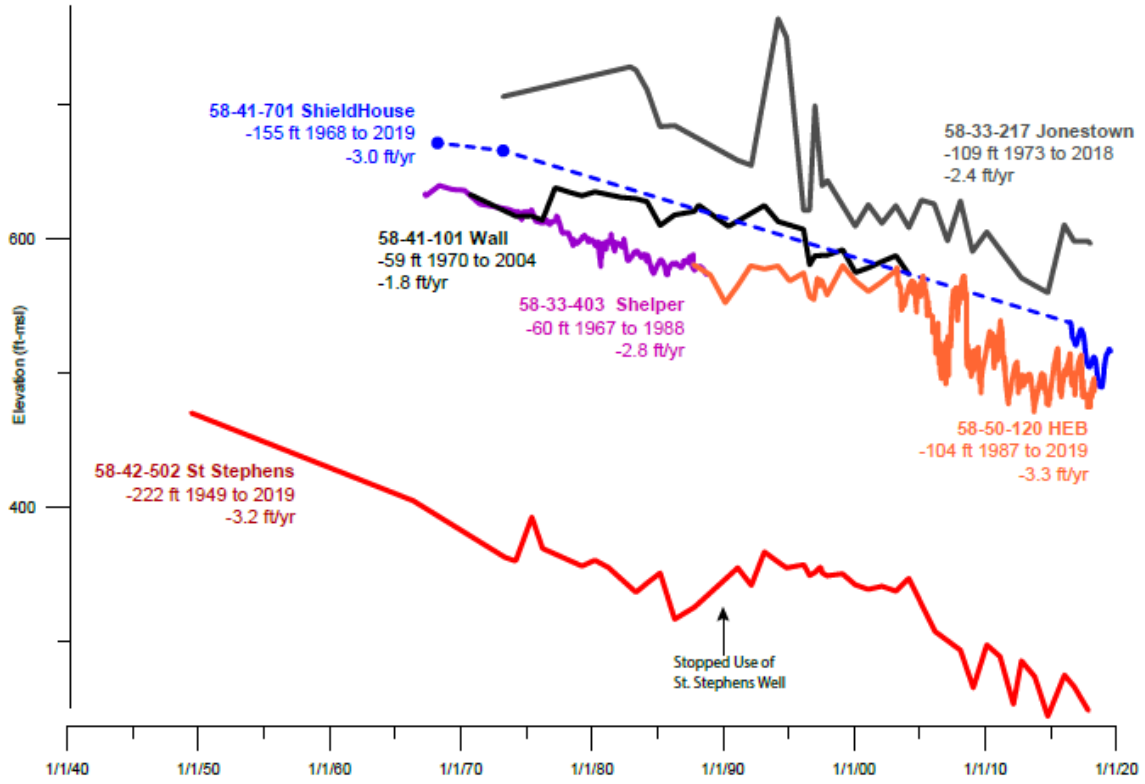
Trinity Aquifer





Groundwater Depletion



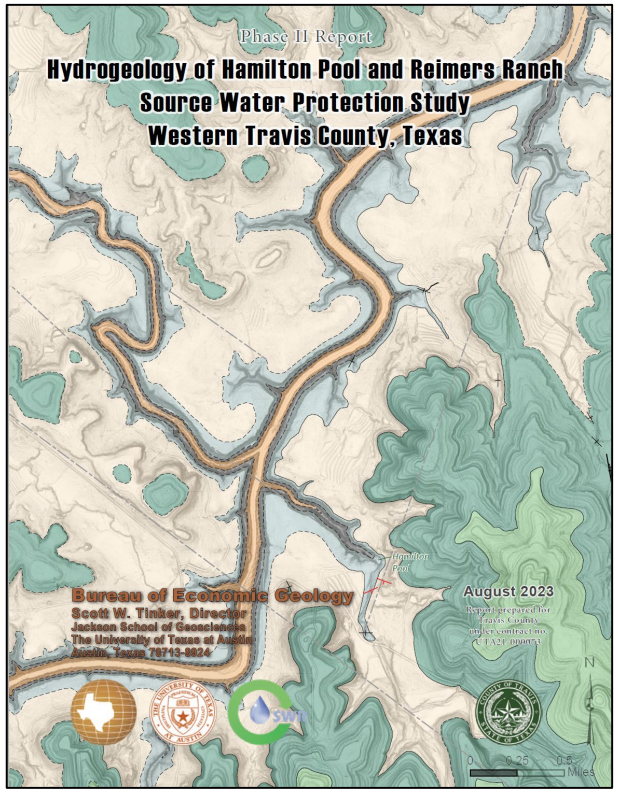


Water-Level Changes in the Lower Trinity Aquifer from Spring 1978 to Fall 2018.

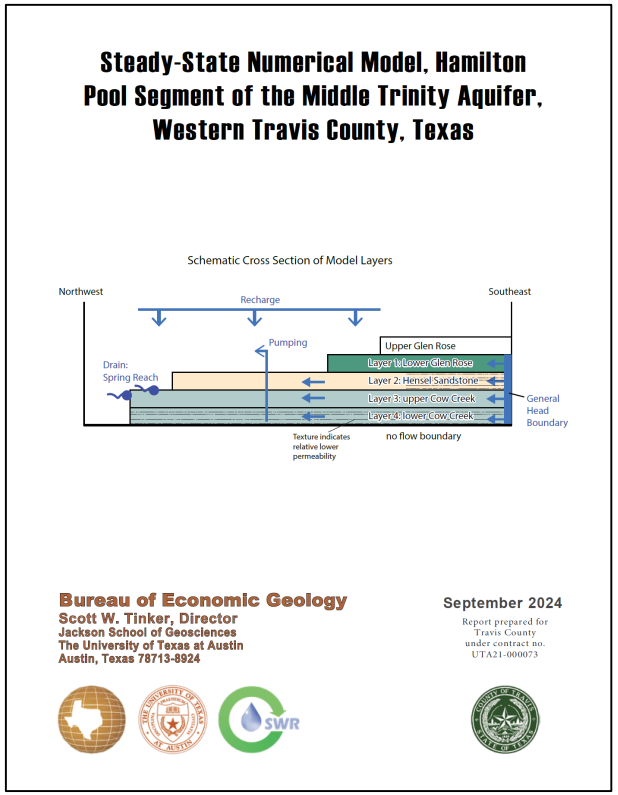
Source: Hunt et al., 2020

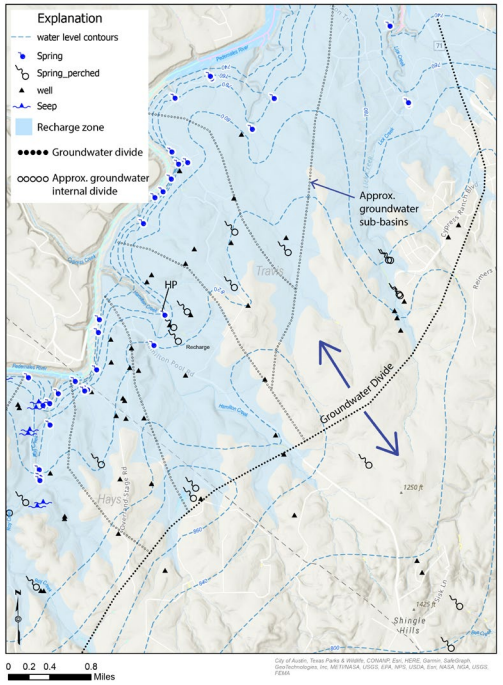
Hamilton Pool Source Water Study

2023



2024

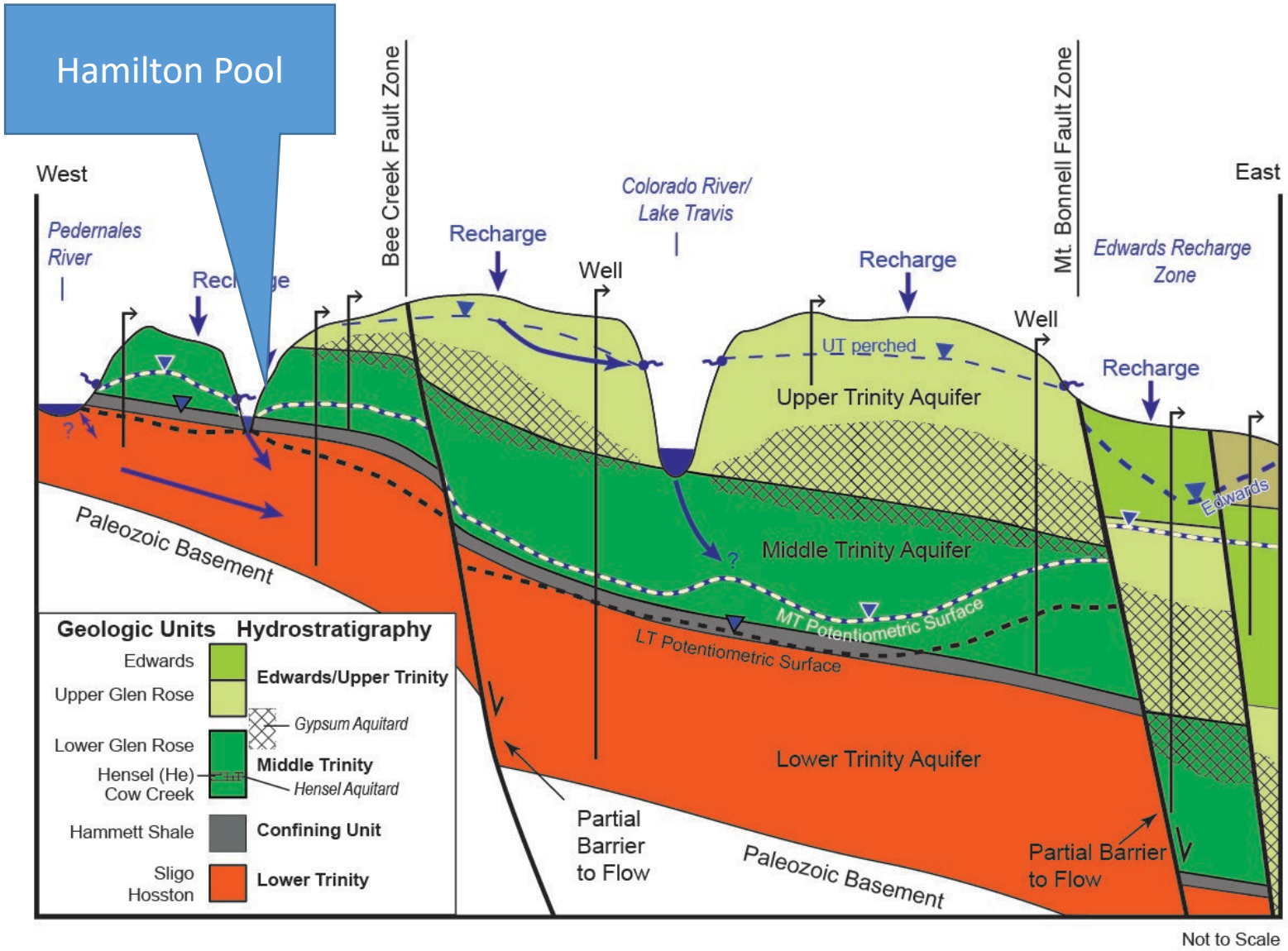




Bureau of Economic Geology

https://dataverse.tdl.org/dataverse/hamiltonpool

Conceptual Model

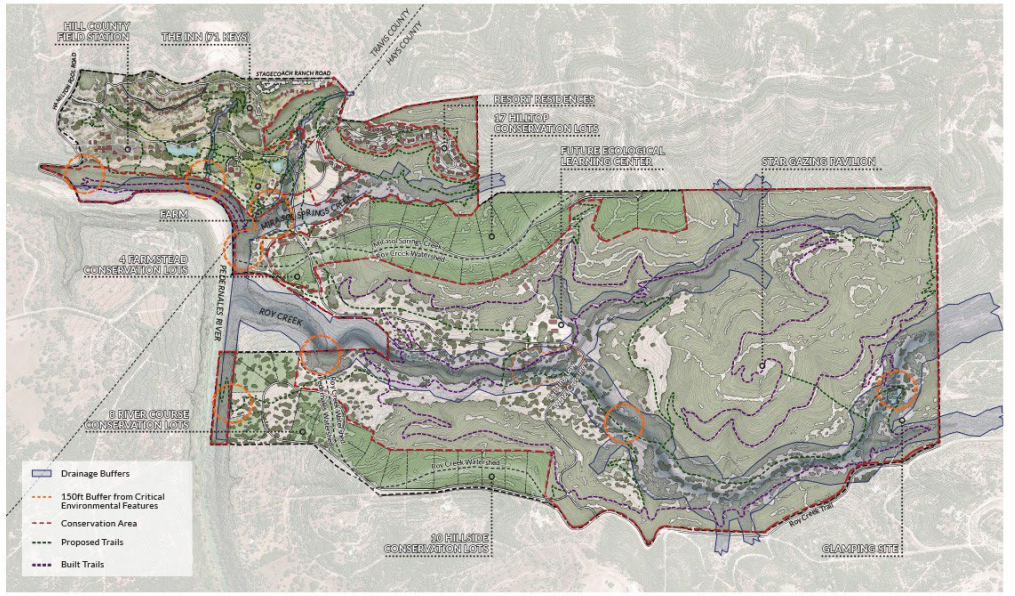


Hunt et al. 2020

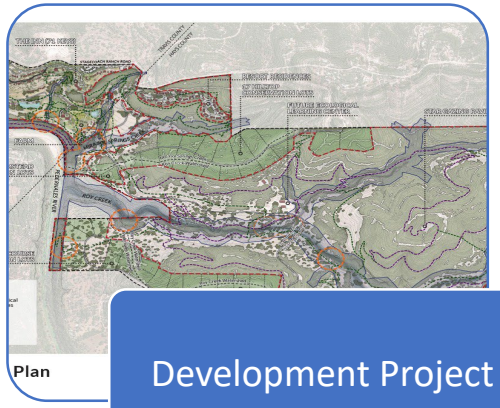
Case Study

"Mirasol Springs will set a new standard for environmentally focused Hill Country development."

Hamilton Pool

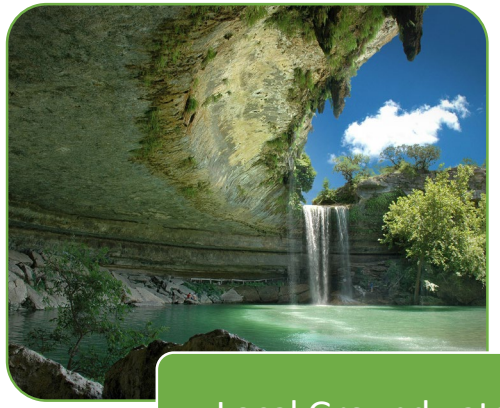


General Texas Groundwater Permitting Process



Development Project

County & State Groundwater Availability Assessments

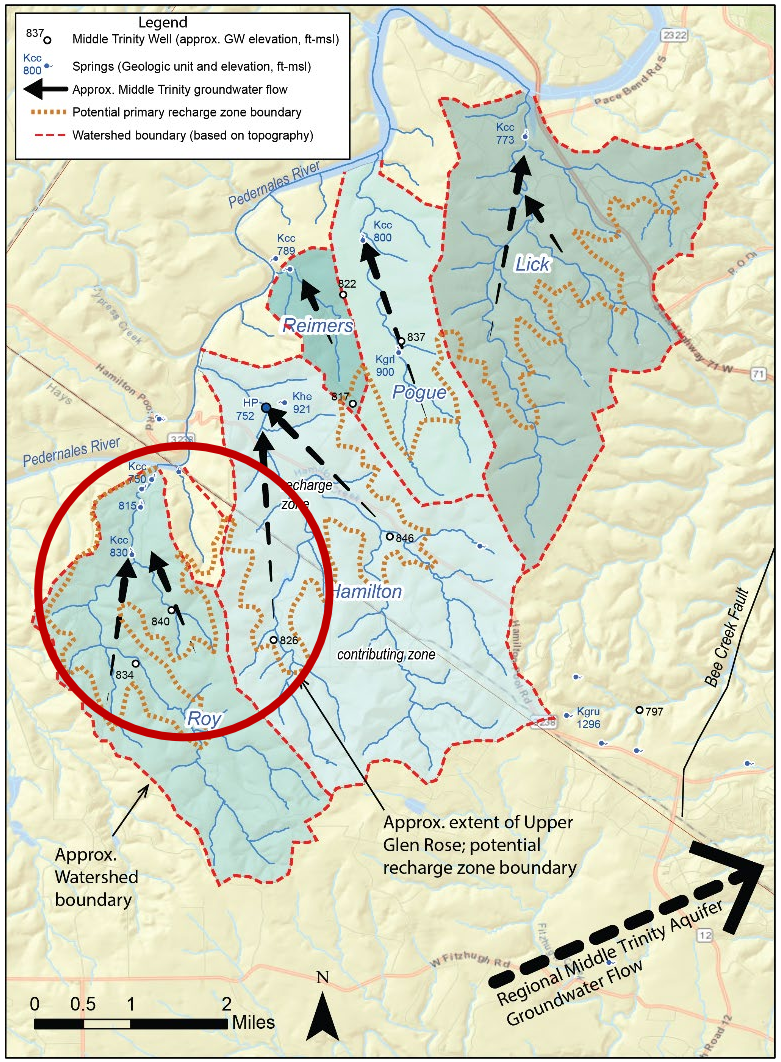


Local Groundwater Conservation District

Fight for the Waterhole- Frederic Remington (1903)

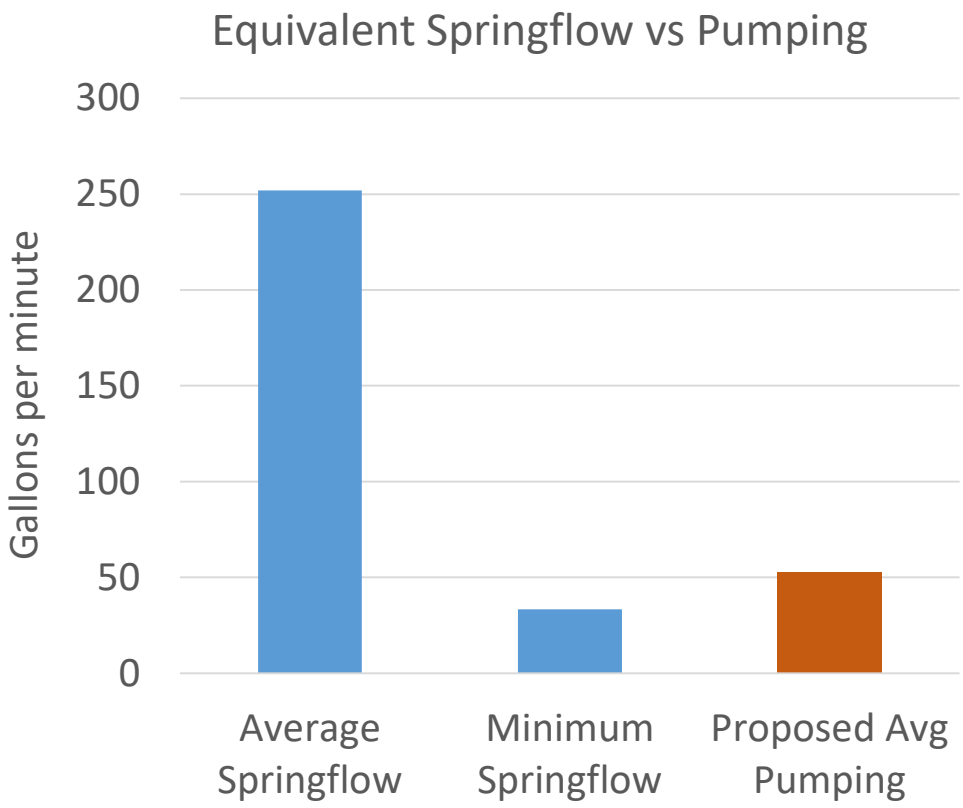
Capture will be the source of water for wells

Mirasol wells



Elevations subject to revision

Brian B. Hunt, P.G.
July 2021



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- **Dry springs**
- **Dry wells**
- Water quality
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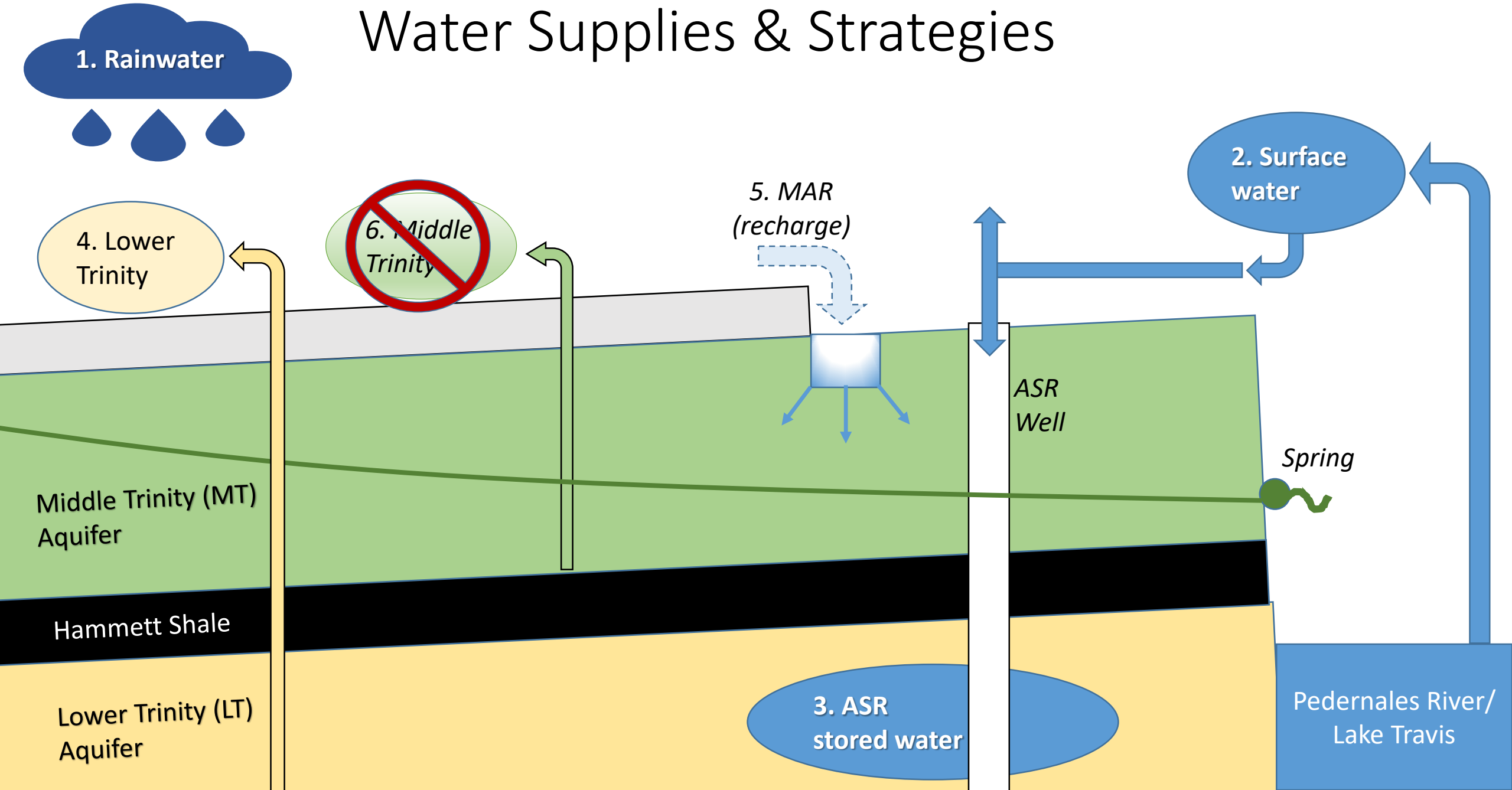
Water Supplies & Strategies

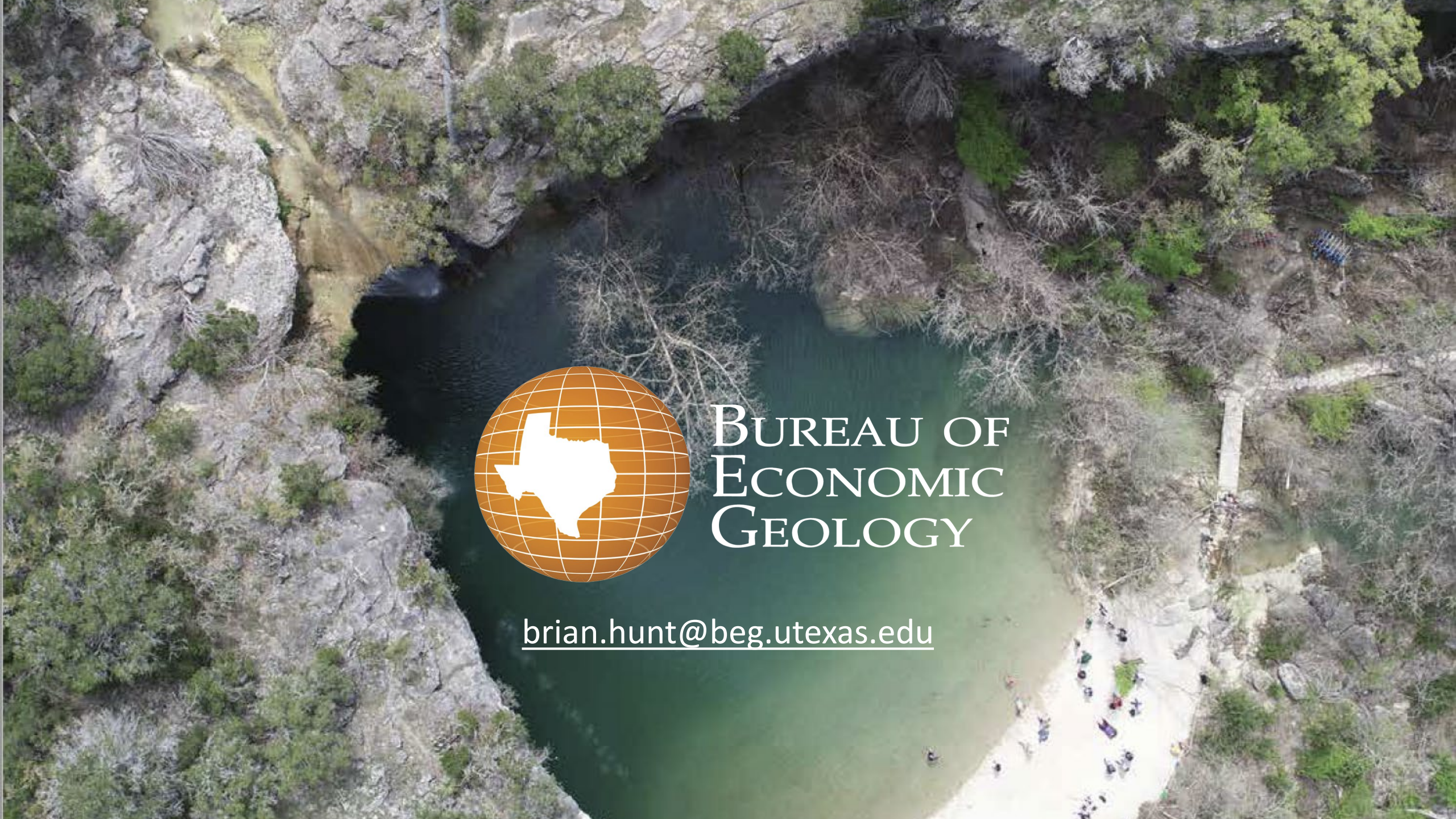


Take Away:

1. **Source Characterization:** Differentiate between groundwater sources from storage versus capture.
2. **Sustainability Focus:** Prioritize long-term sustainability over short-term availability. Explore alternative supplies when sustainability is compromised.
3. **Regional Collaboration:** Effective management requires coordinated efforts among state, county, groundwater conservation districts (GCDs), and stakeholders.

Challenges:

- Legal Framework: Texas law does not recognize groundwater as a common pool resource.
- Economic Valuation: Groundwater is cheap!



BUREAU OF ECONOMIC GEOLOGY

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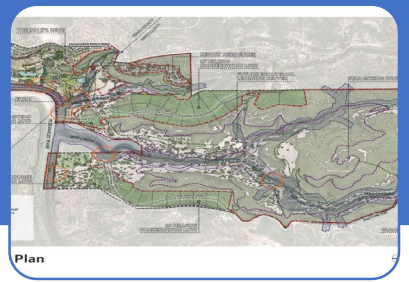
Acknowledgements

- Travis County Commissioners
- Travis County Transportation and Natural Resources
- SWTCGCD Board
- University of Texas at Austin, Bureau of Economic Geology
- Well owners and stakeholders
- Neighboring GCDs
- Hamilton Pool Stakeholder Process
- Mirasol

Recommended Process

Development Project



Local Groundwater Conservation District

(Sustainable Yield)

County & State Groundwater Availability Assessments

Traditional Groundwater Availability Studies

GROUNDWATER AVAILABILITY STUDY

MIRASOL SPRINGS DEVELOPMENT
24601 Hamilton Pool Road
Travis & Hays County, Texas

May 17, 2021

Prepared for:

MIRASOL SPRINGS, LLC
4143 Maple Ave., Ste 400
Dallas, Texas 75219

Prepared by:

GEOLOGIC SERVICES, LLC

Geology

May 17, 2021
Revised July 7, 2021