

# Groundwater and Surface Water in Texas

**Robert E. Mace**, Ph.D., P.G.

Meadows Center for Water and the Environment  
Texas State University

*presented to*

Texas Waters Webinar!

*yapping from beautiful*

San Marcos, Texas; May 29, 2018

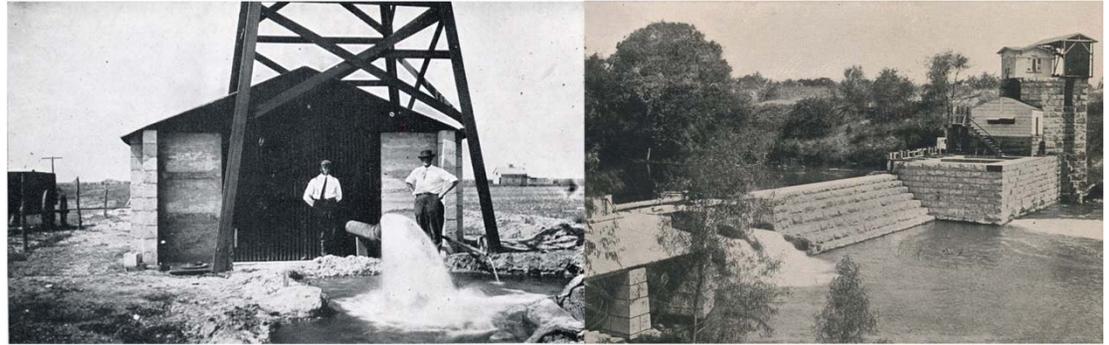


There is no life without water. Because without water, there is no coffee. And without coffee, I'll kill you all.



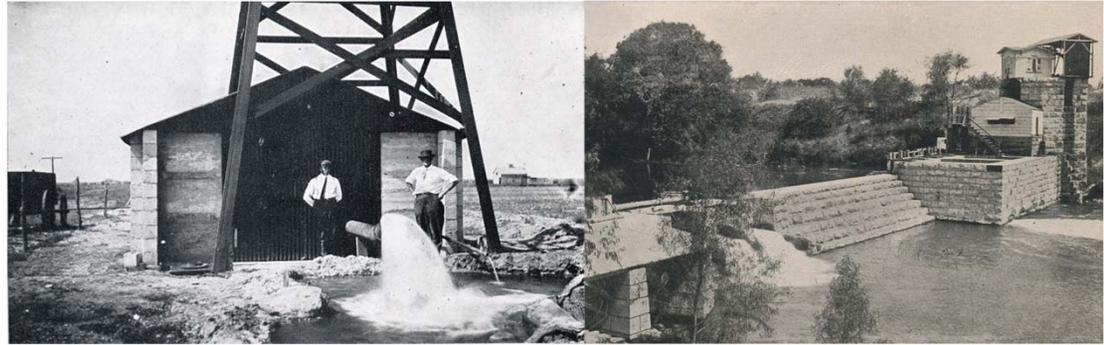
someecards  
user card

# outline:



- **Water in Texas!**
- **Capturing Water in Texas!**
- **Water Management in Texas!**
- **Resources!**

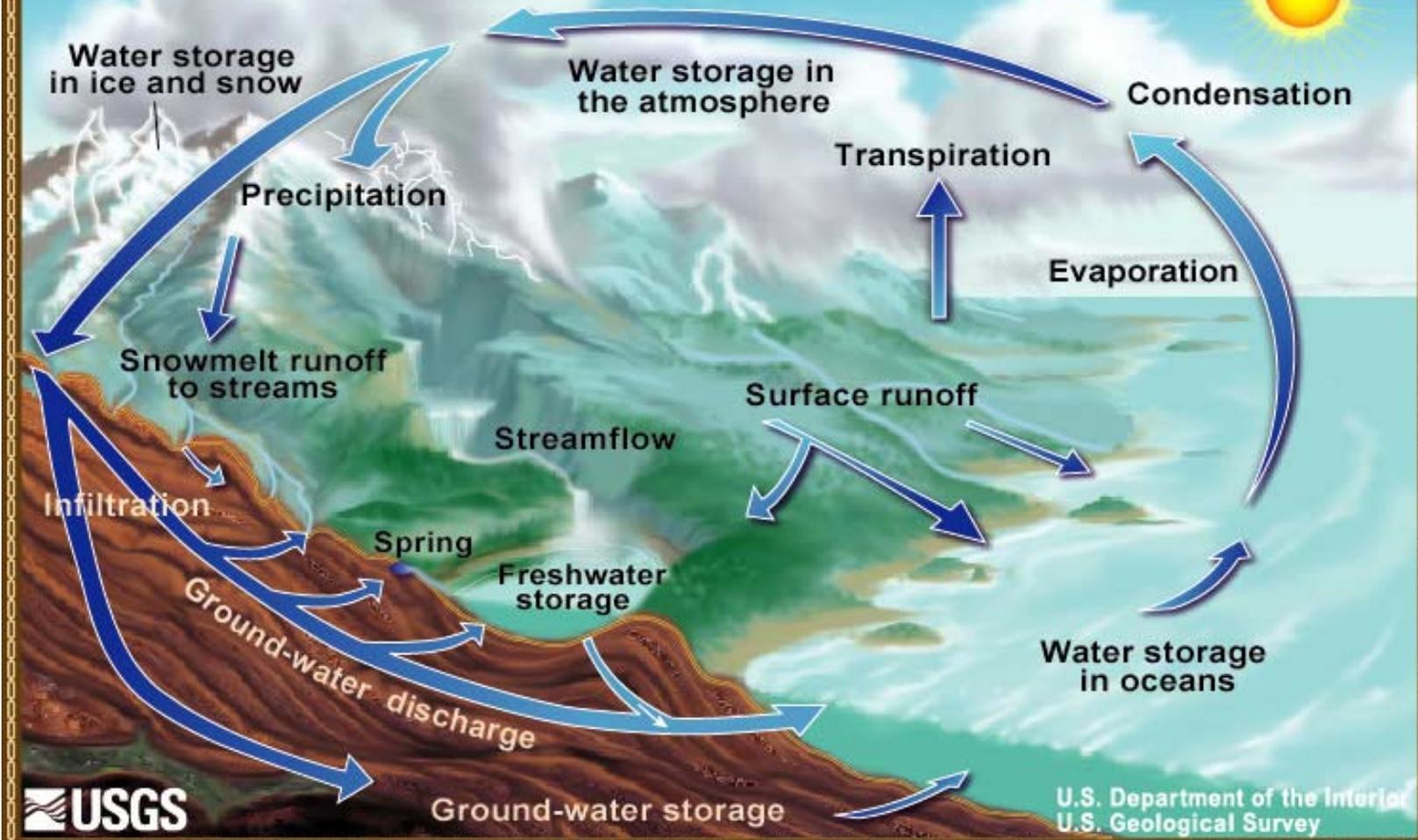
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# Question 1

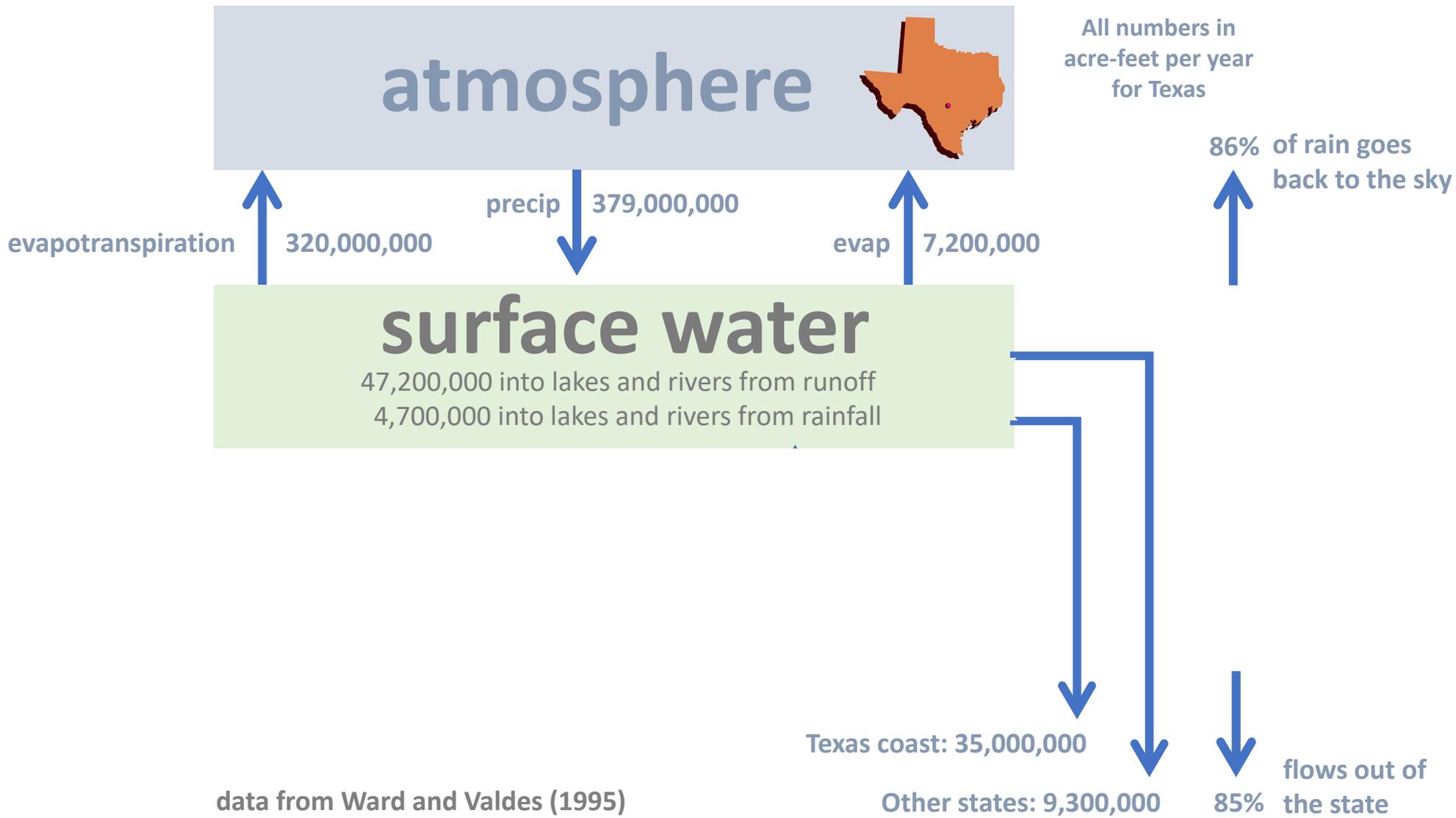
# The Water Cycle

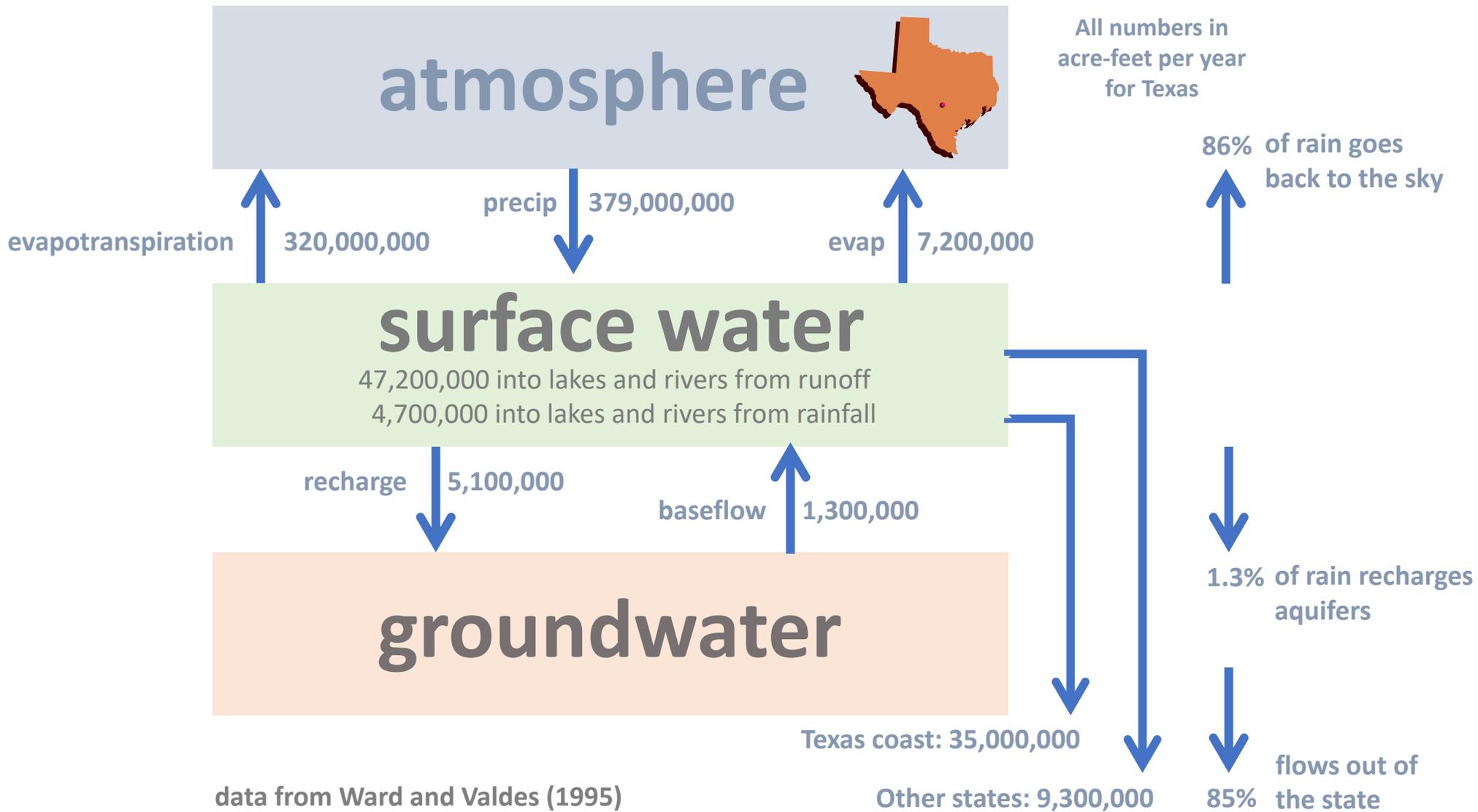


U.S. Department of the Interior  
U.S. Geological Survey

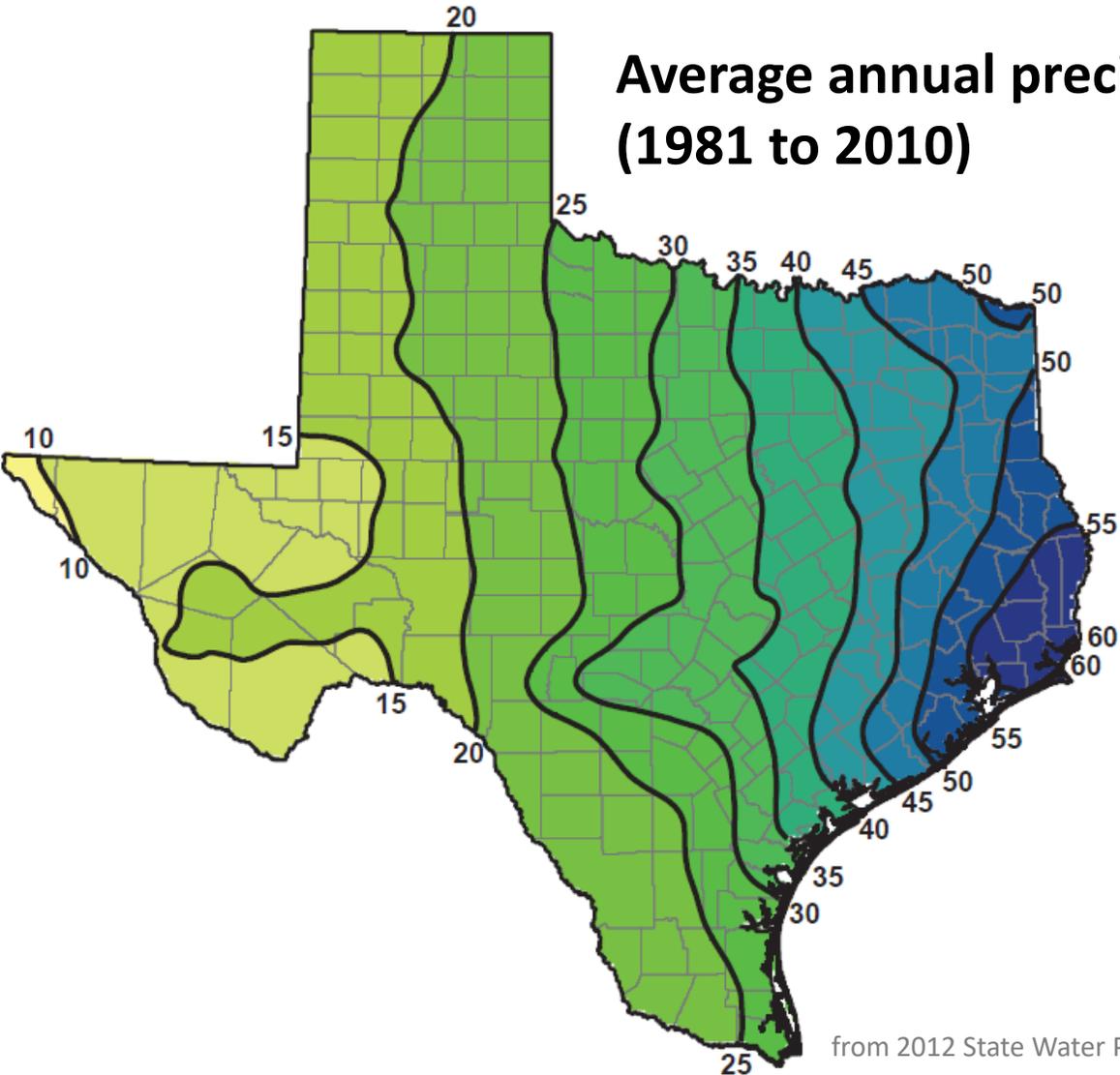


data from Ward and Valdes (1995)



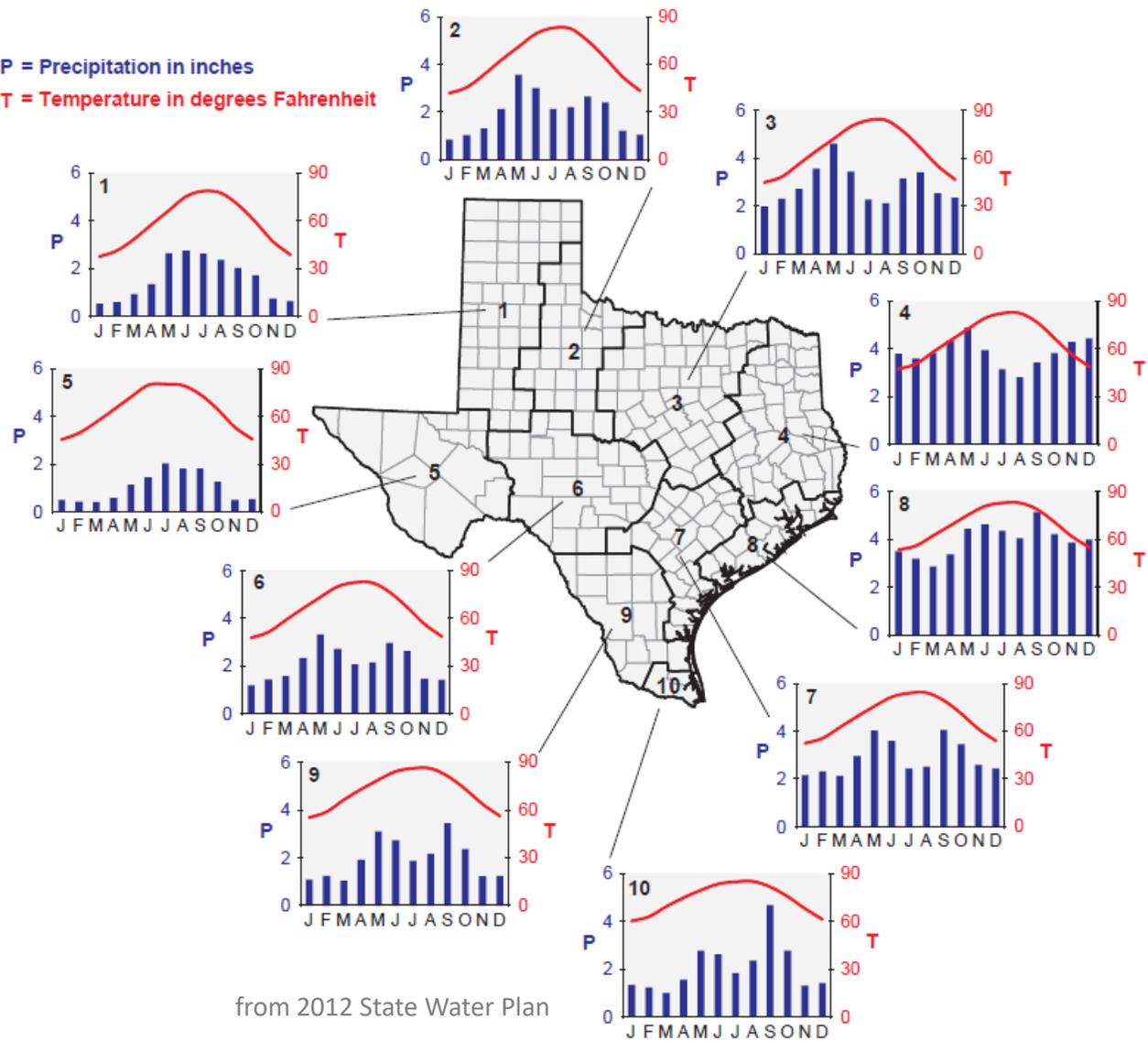


# Average annual precipitation (1981 to 2010)



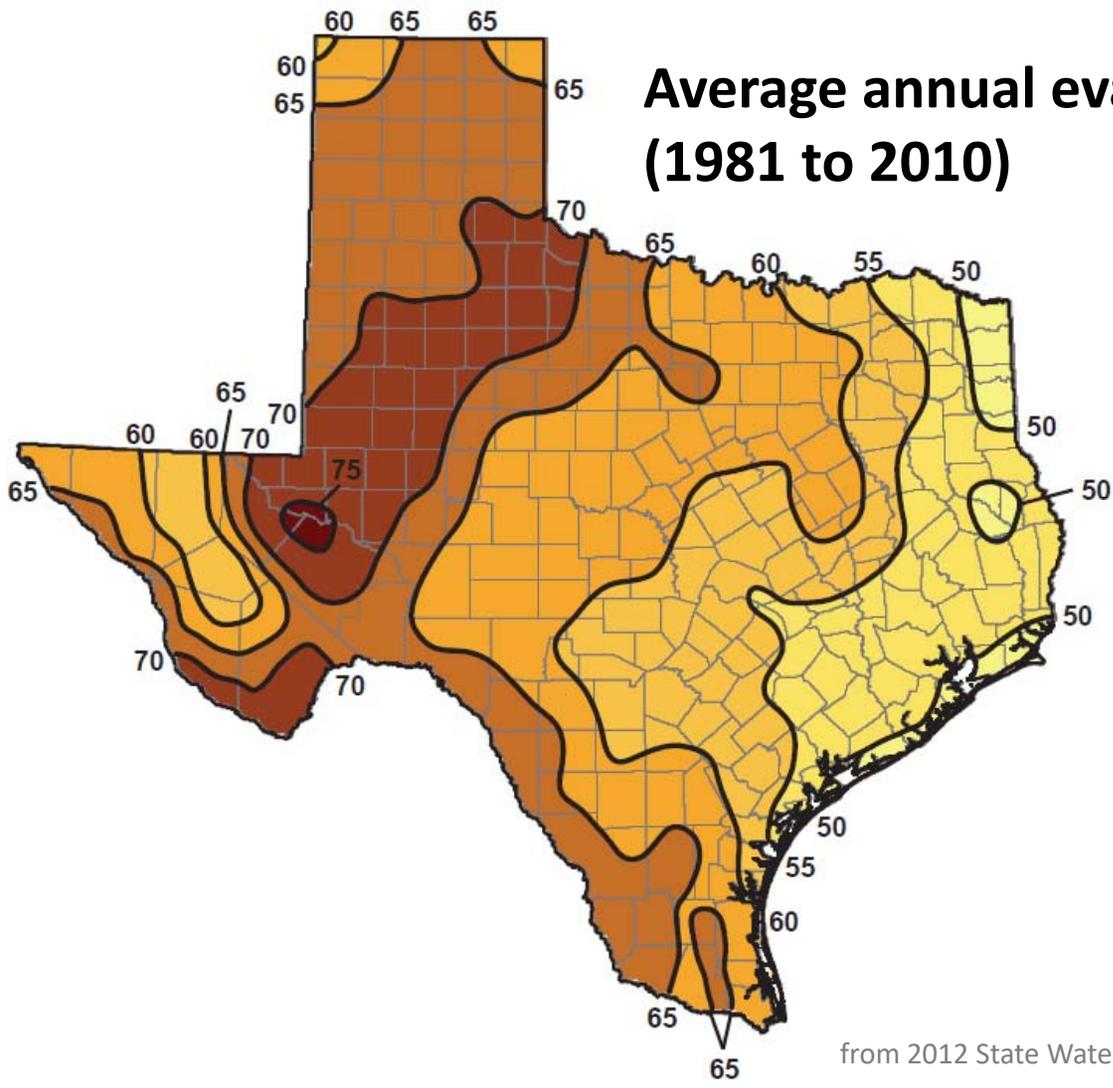
from 2012 State Water Plan

P = Precipitation in inches  
 T = Temperature in degrees Fahrenheit



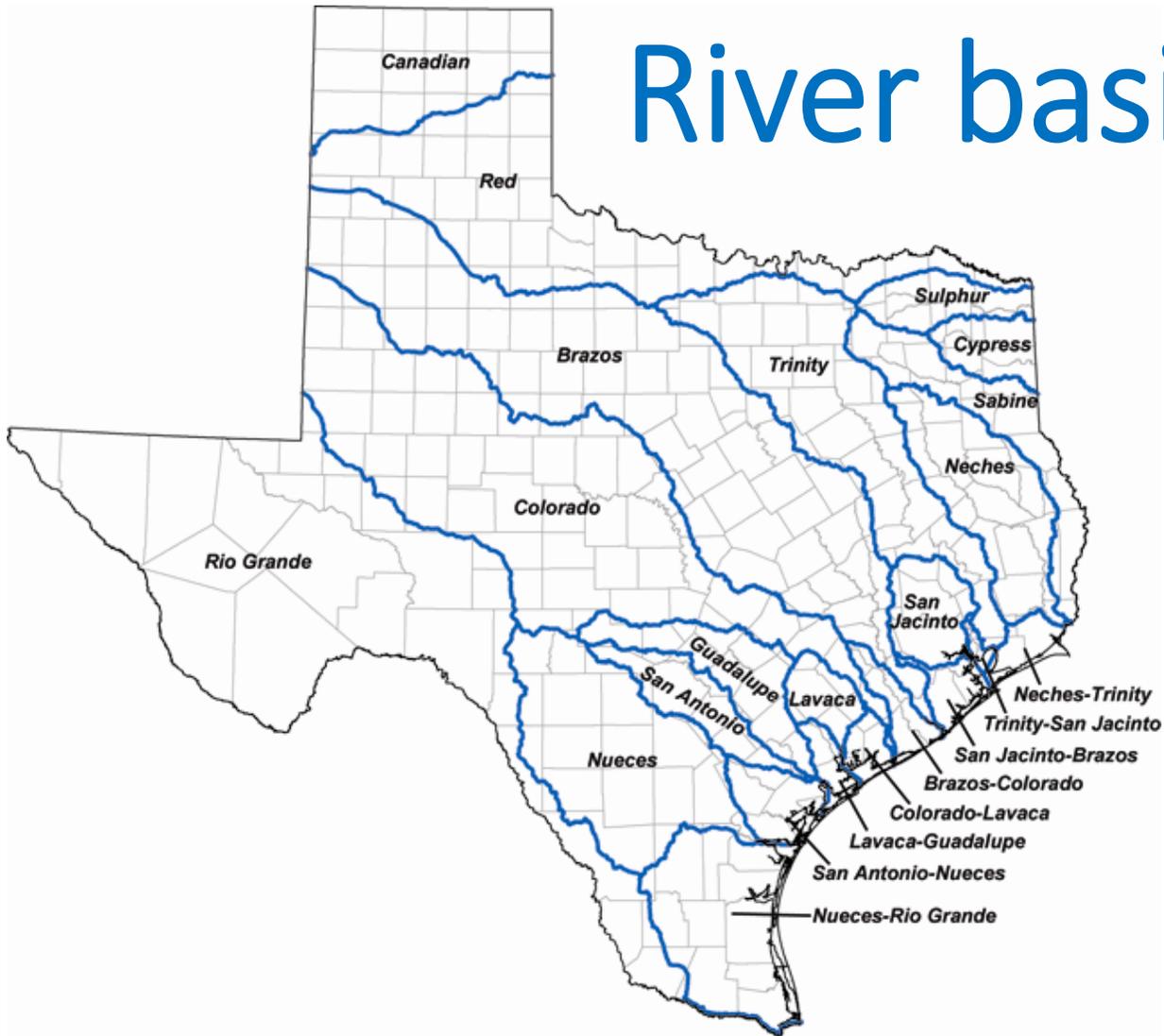
from 2012 State Water Plan

# Average annual evaporation (1981 to 2010)

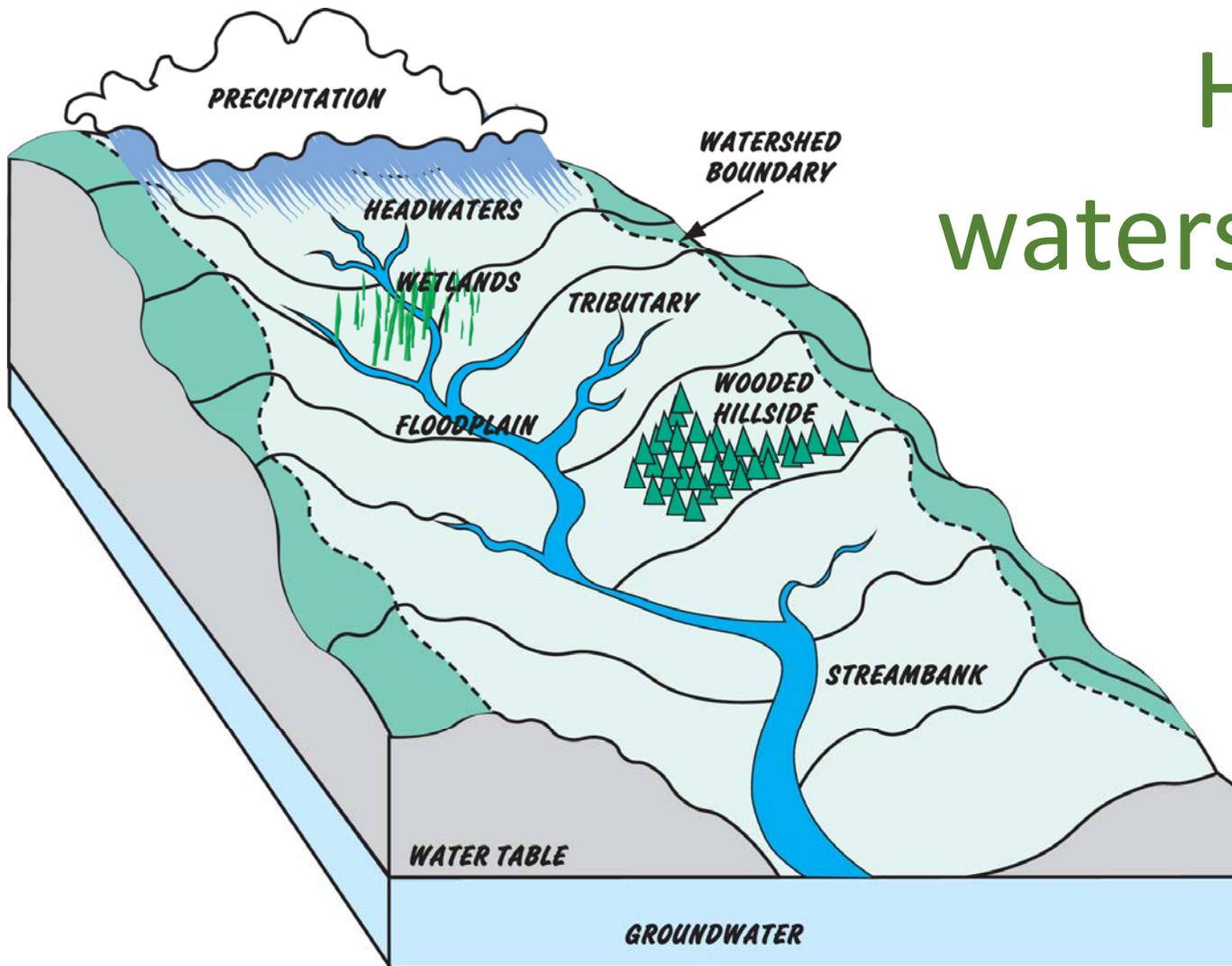


from 2012 State Water Plan

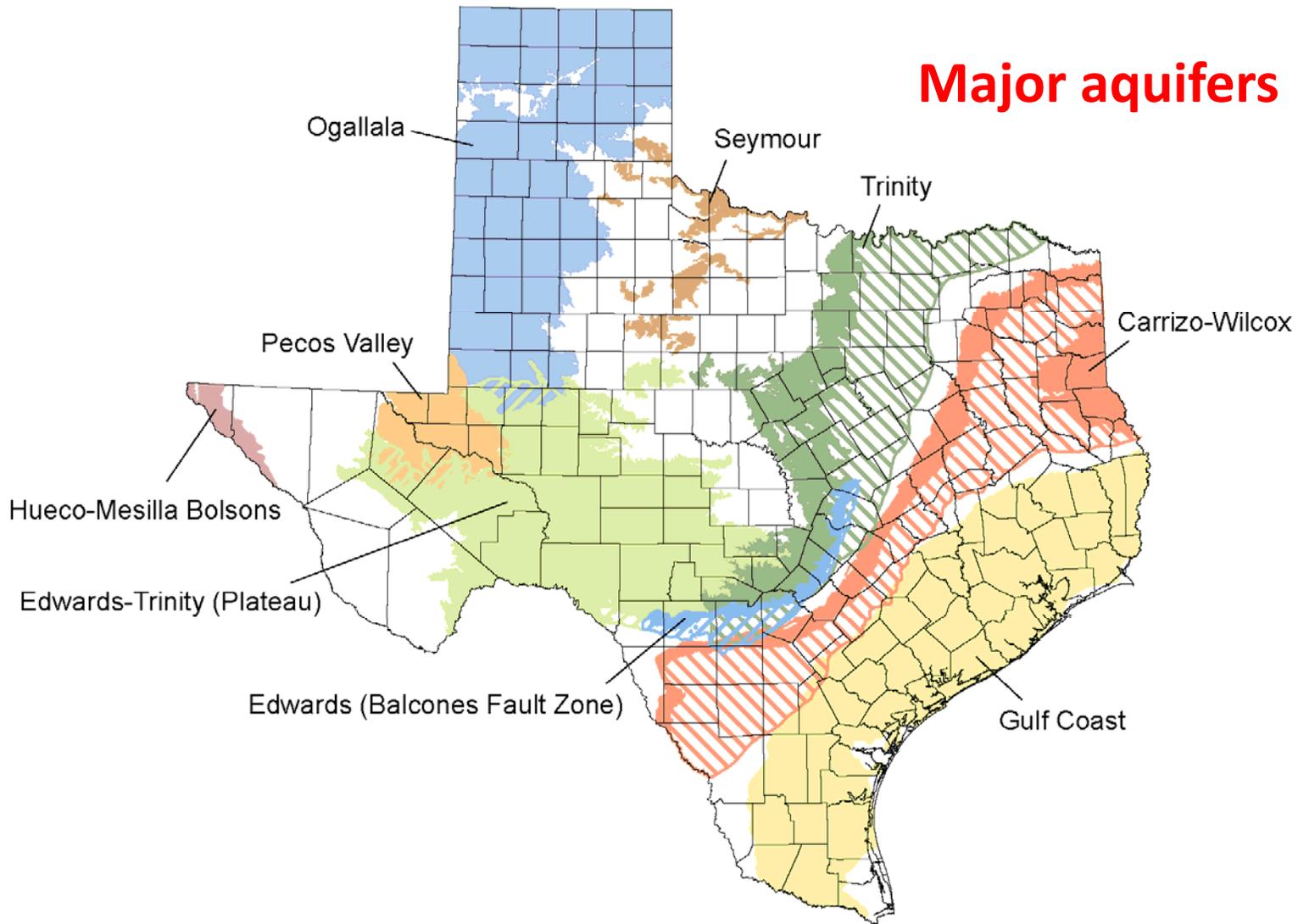
# River basins



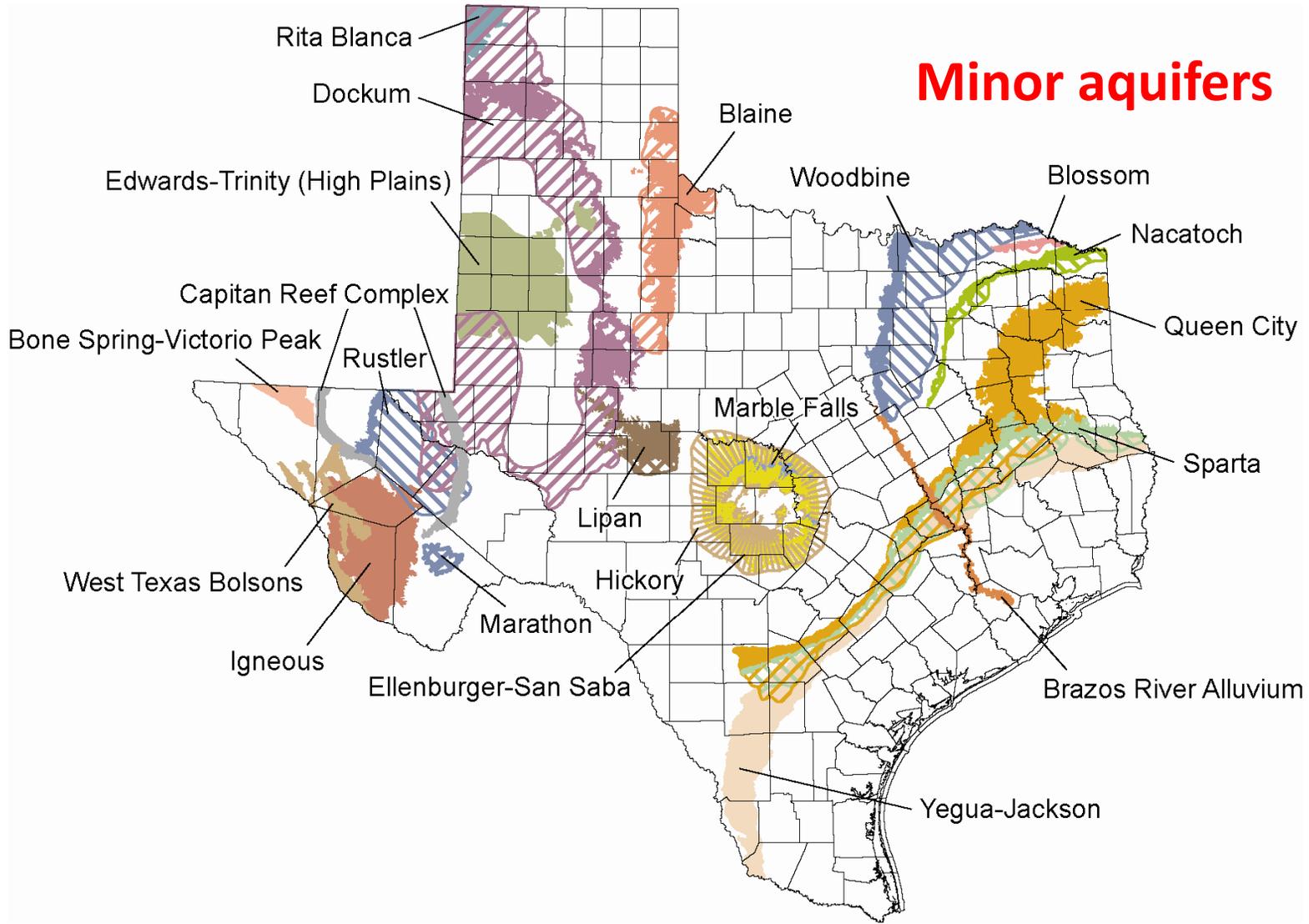
# How a watershed works



# Major aquifers



# Minor aquifers

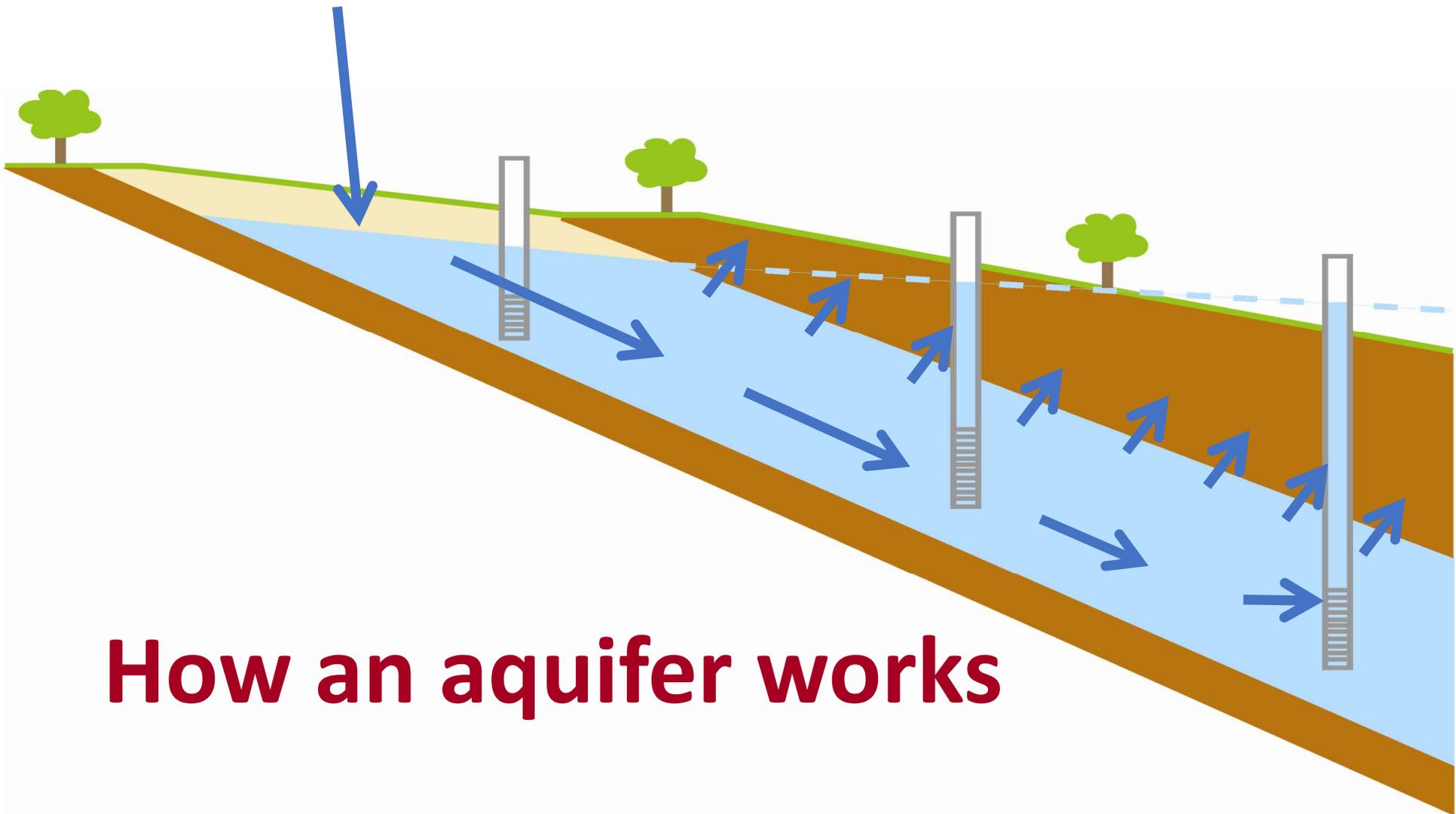




**Hickory Aquifer, sandstone**



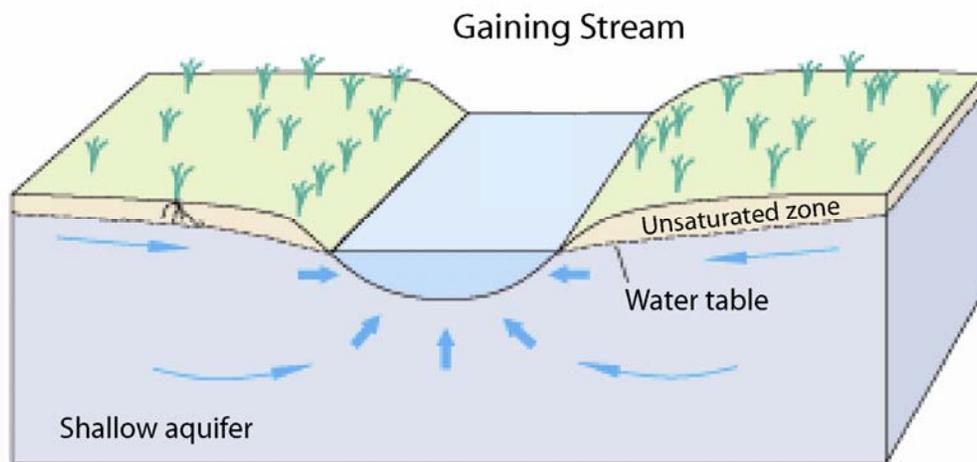
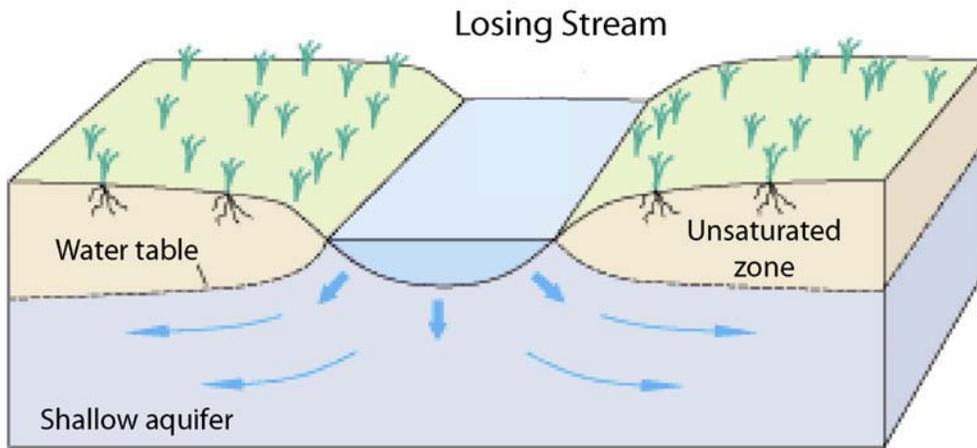
**Edwards-Trinity (Plateau) Aquifer, limestone**



**How an aquifer works**

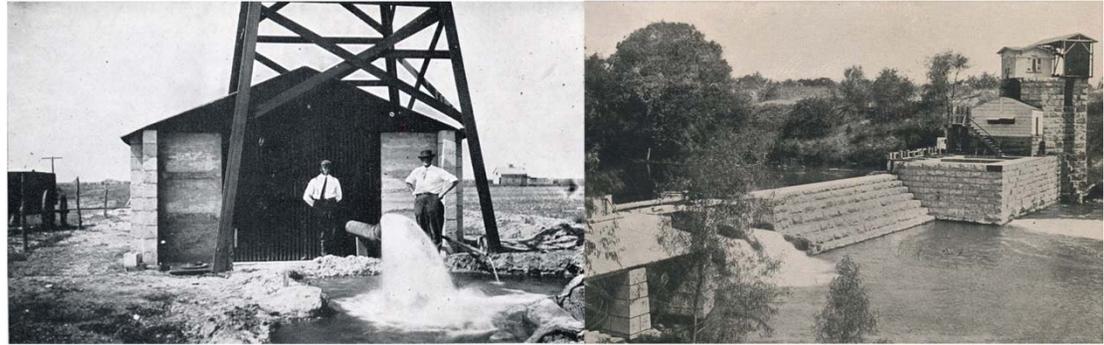
# Question 2

# surface water/ groundwater interaction





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# Surface-water features in Texas

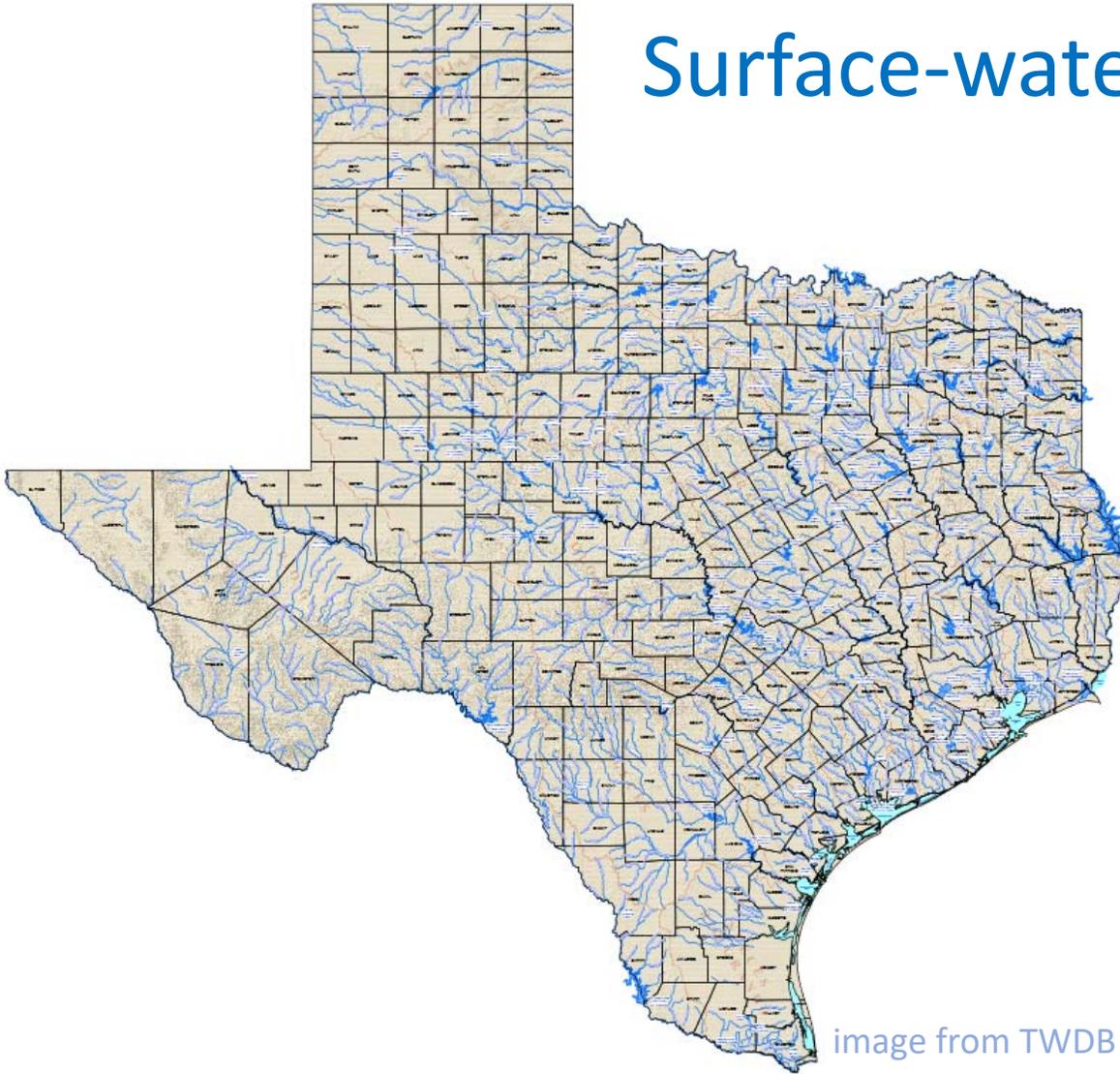


image from TWDB

# Intake structure at Lake Meredith

March 2008





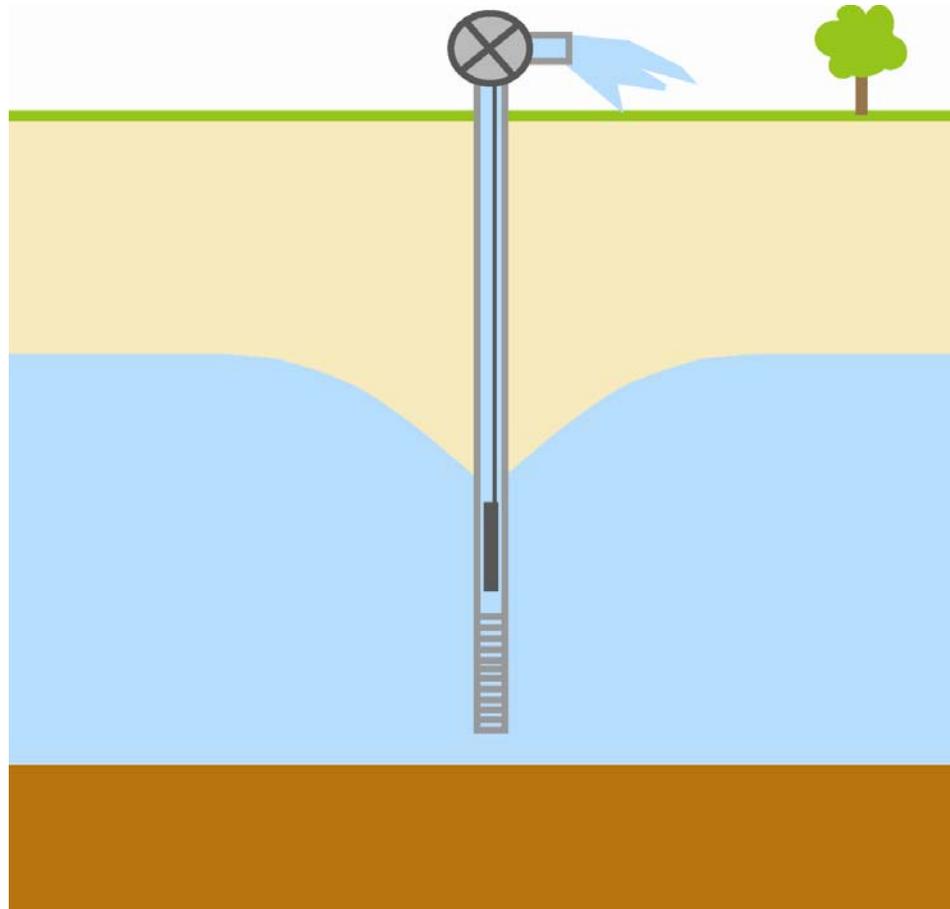
San Felipe Spring - 3rd Largest In Texas - Del Rio, Texas

6-P-120

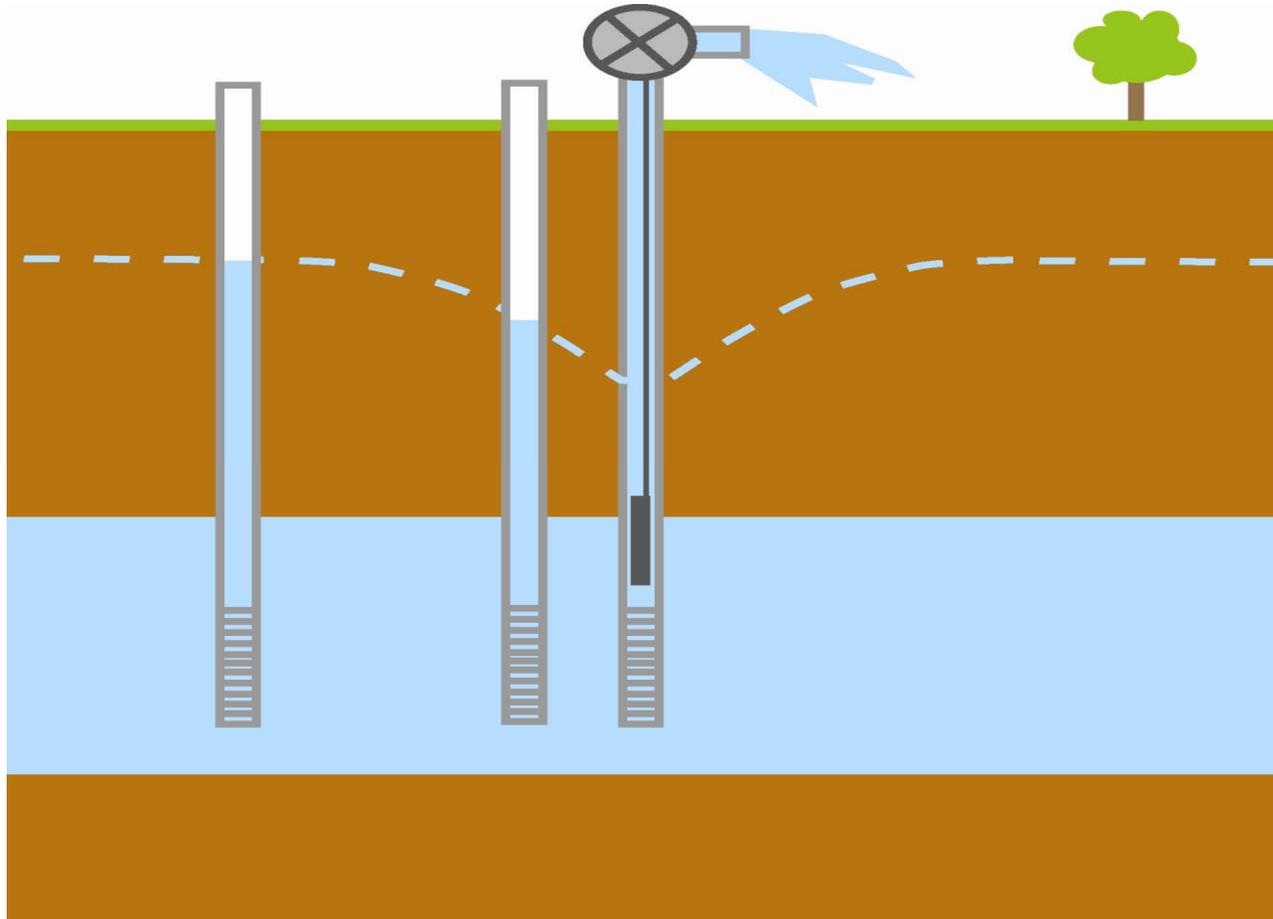


McDonald Irrigation Well, 1200 Gallons per Minute, Hereford, Texas.

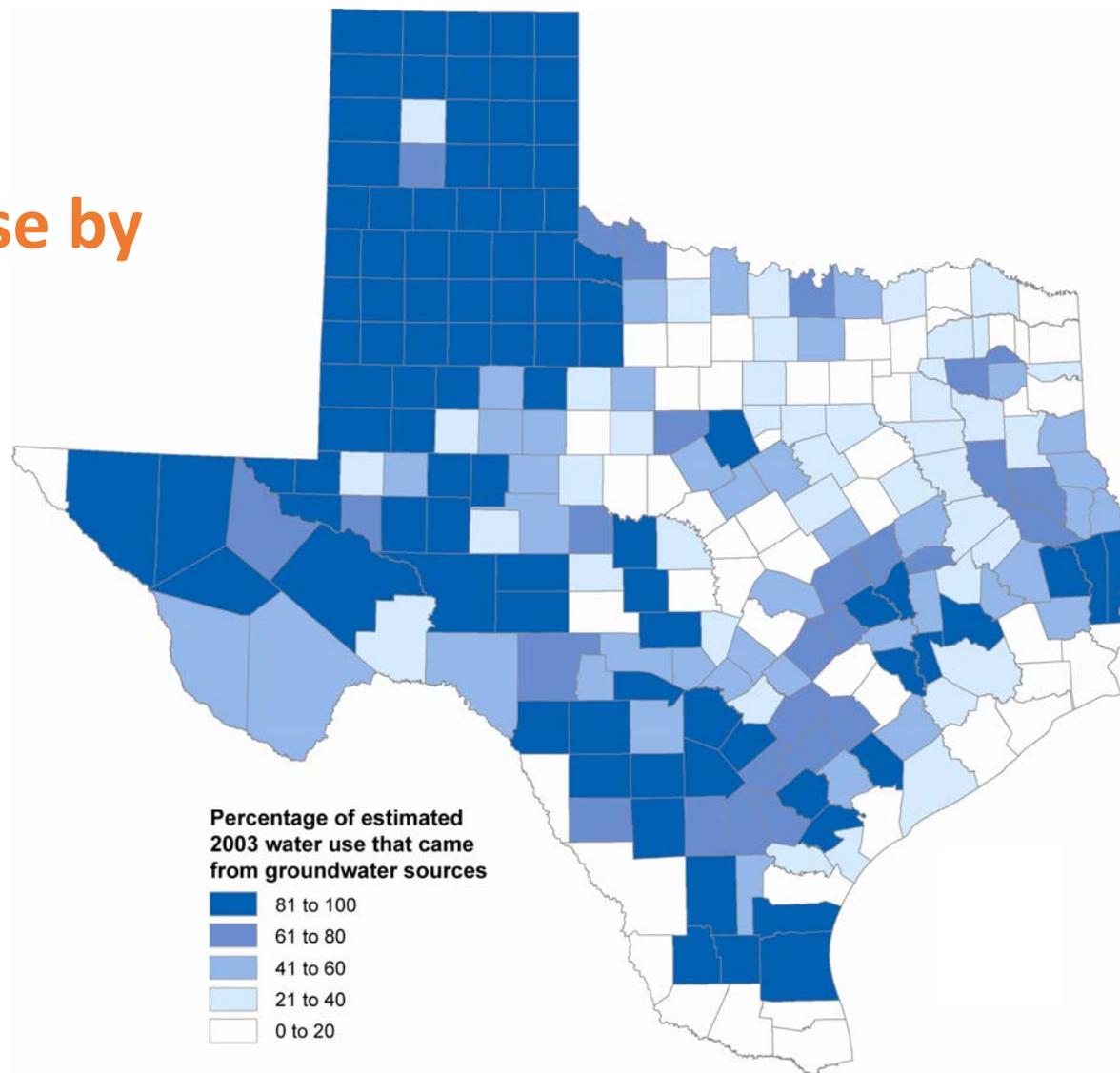
# pumping a well



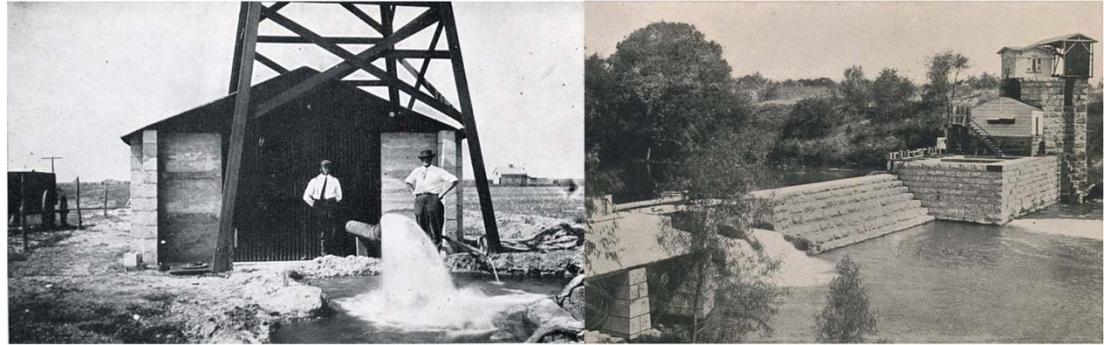
# pumping a well: confined



# relative groundwater use by county



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# Question 3



You own the rain!

and the overland flow!

Surface water is owned by the state.

Groundwater is owned by the landowner.

Both are subject to regulation.\*

\* Some argue that groundwater is now exempt from regulation.\*\*

\*\* But they're wrong.\*\*\*

\*\*\* Probably...



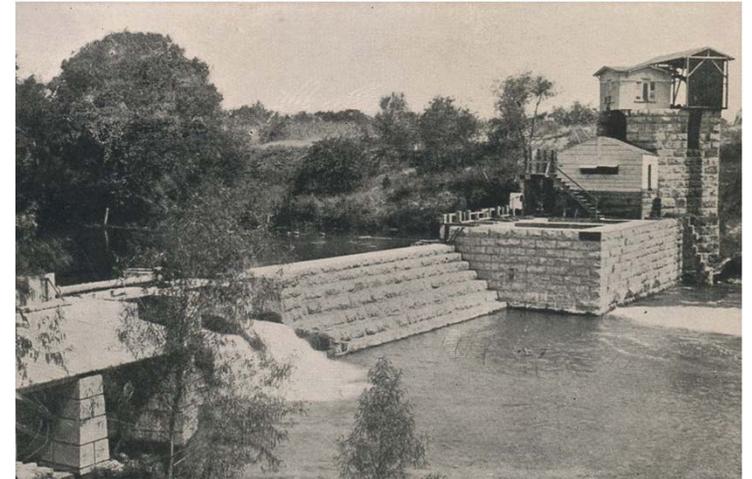
*Discussing Water Rights, A Western Pastime*



**Land surveys in Austin's Colony along the Navidad and Brazos rivers**

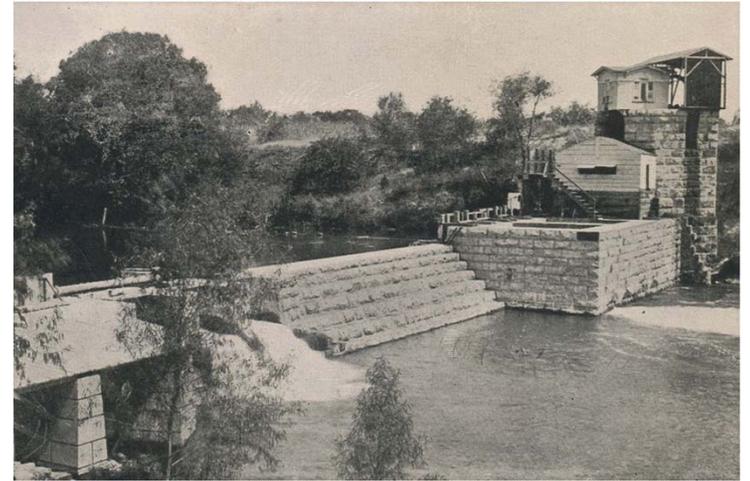
# Surface Water

- Owned by the state
- Exempt uses:
  - Domestic and livestock
  - 200 acre-feet stock tanks
  - Wildlife management
  - Emergency use
  - Some others...



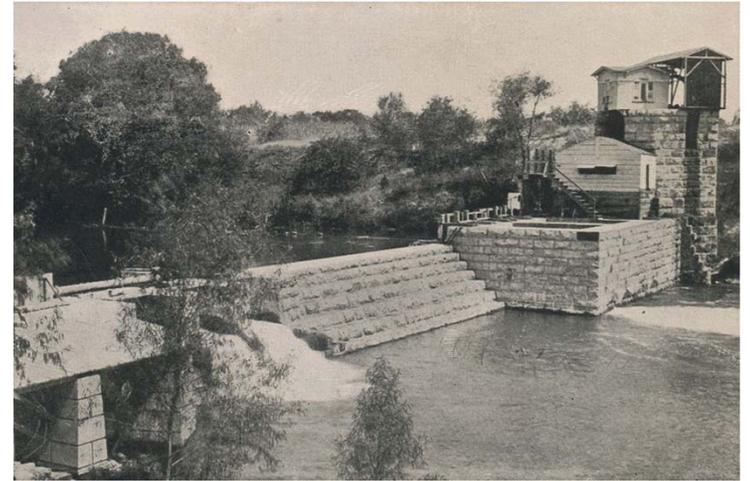
# Surface Water

- Rights (in time)
  - Perpetual rights
  - Limited-term rights
    - Term permits
    - Temporary permits
- Rights (in place)
  - Impoundment right
  - Diversion (run-of-river) right
    - Diversion point
- Superior Rights
  - Limited riparian rights



# Surface Water

- Having a right doesn't mean you always have water!
- First in time = First in right
- TCEQ for permits
- Usufructable (you can sell your right!)



TCEQ = Texas Commission on Environmental Quality

# Rule of Capture

1904

No. 74. Derry Printing Co., Stationers, Printers and Binders, Dallas-1903. CLASS 2.

No. No. 1333, 5th Dist  
No. 1333

W. A. East  
Appellant's Petitioner in Error.

vs.

H. T. C. R. Co.  
Appellee's Defendants in Error.

From the District Court of Grayson Co.

Applied for by Mesley & Epstein Attorneys  
for Appellant on the 13<sup>th</sup> day of Janu  
1903 and delivered to Mesley & Epstein  
on the 30<sup>th</sup> day of January 1903

Edmund  
Clerk District Court Grayson County.

Filed in Court of Civil Appeals, at Dallas  
the 2<sup>nd</sup> day of April 1903  
George Blair Clerk.  
Court of Civil Appeals - 5th - Supreme District of Texas.

*5th Dist*  
*Filed in Grayson Co Court*  
*May 18 1904*  
*F. J. Edwards Clerk*  
*By Jellison Deputy*  
*Appealed reversed*  
*Dist Ct Grayson Co*  
*April 13 1904*

...so secret, occult and concealed...

# Question 4

# Groundwater conservation districts 1949



## Powers of a groundwater conservation district

In general, districts may:

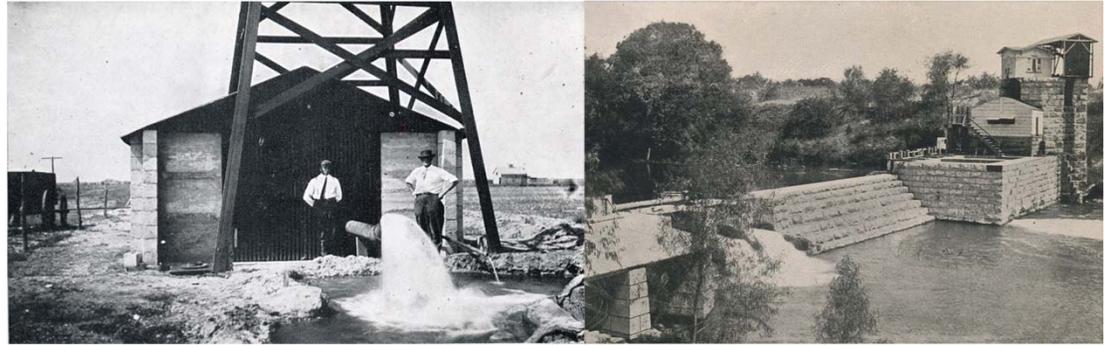
- register wells
- regulate well spacing
- regulate pumping

To know the powers:

- Chapter 36, Texas Water Code
- enabling legislation
- amendments to enabling legislation
- rules

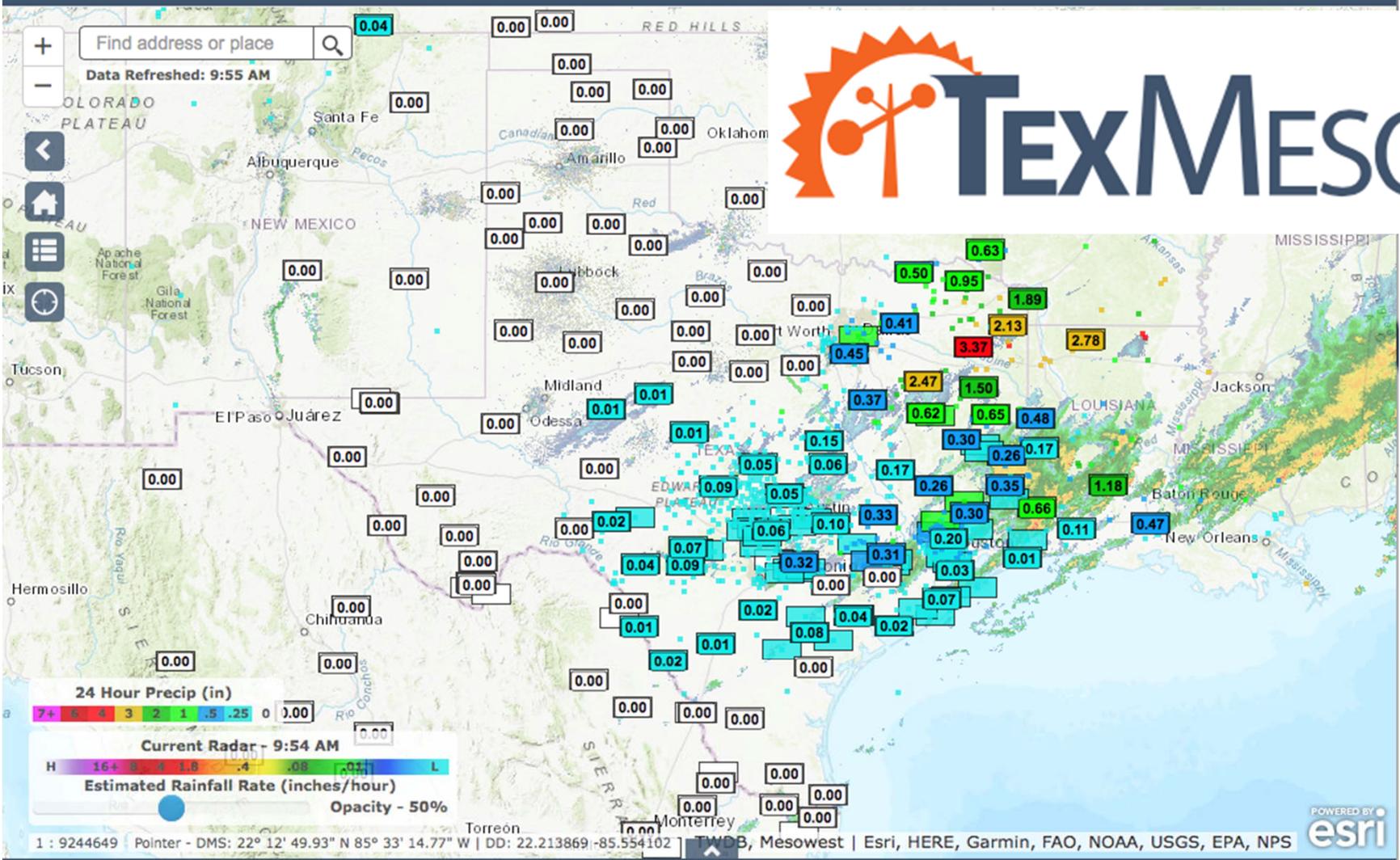


# outline:

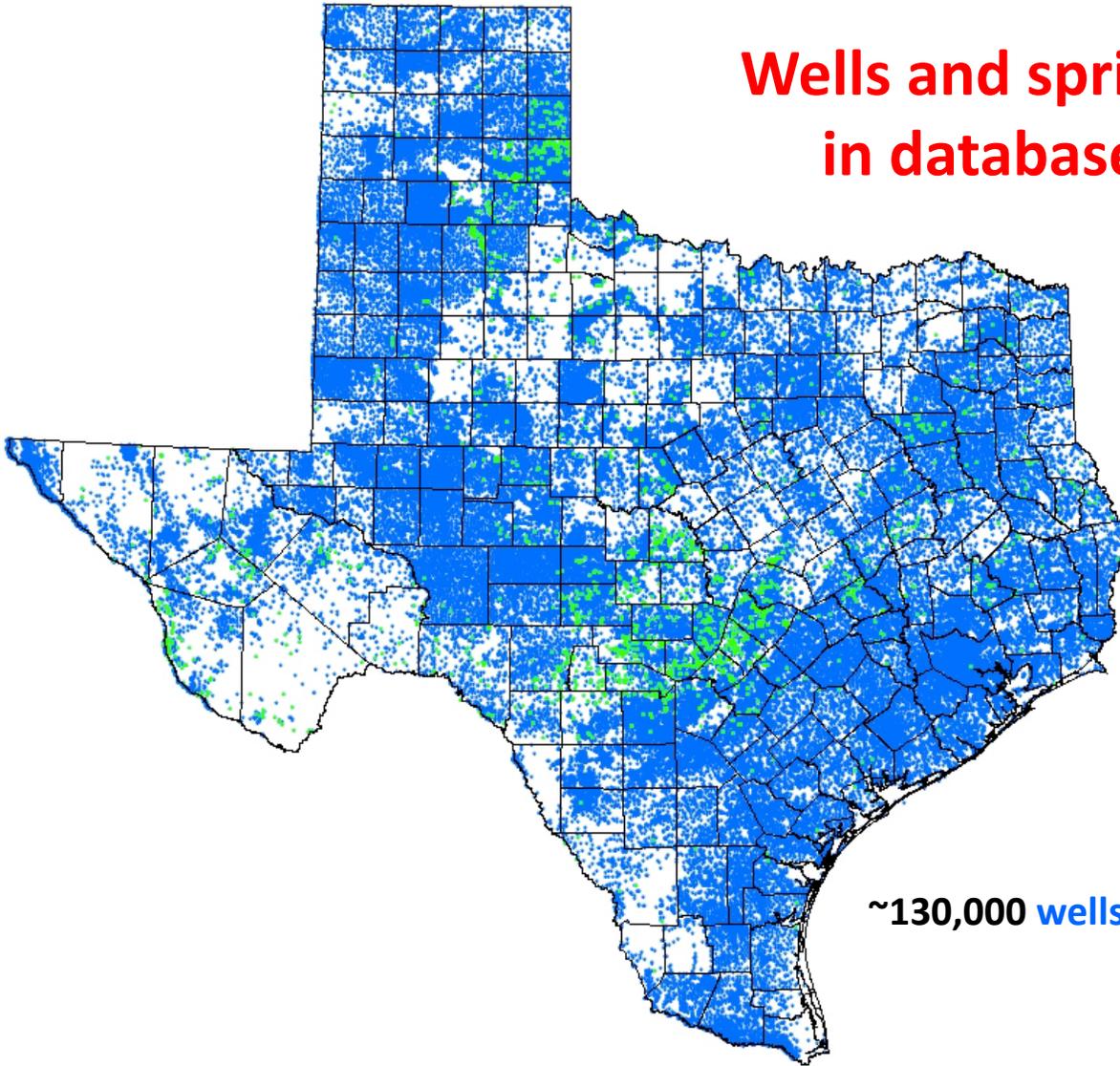


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# TEXMESONET



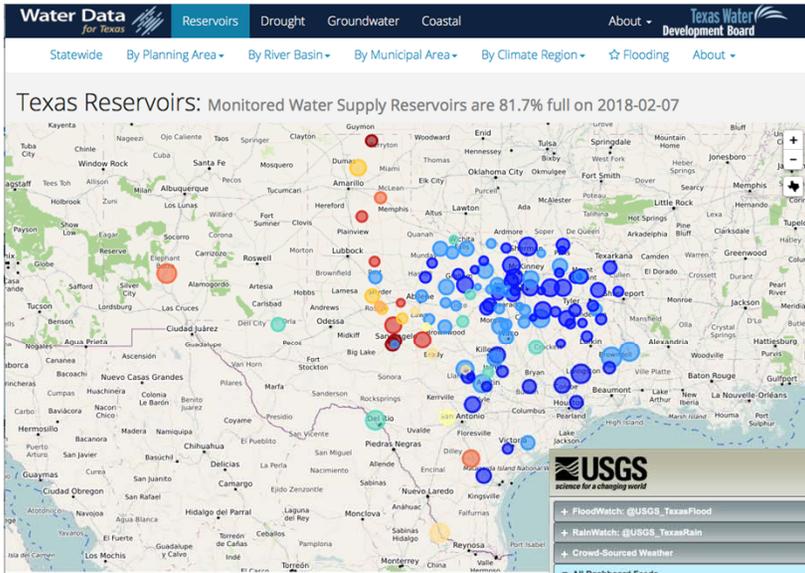
## Wells and springs in database



**WATER DATA**  
Interactive

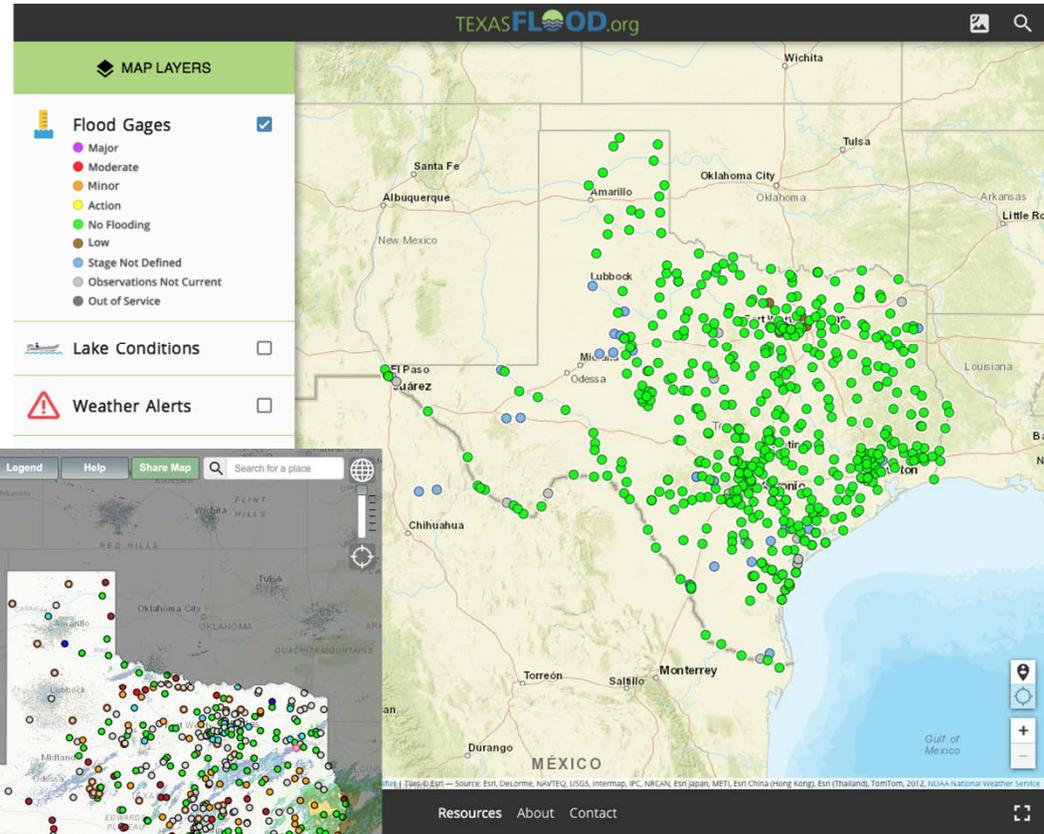
<http://www.twdb.texas.gov/mapping/>

~130,000 wells and spring



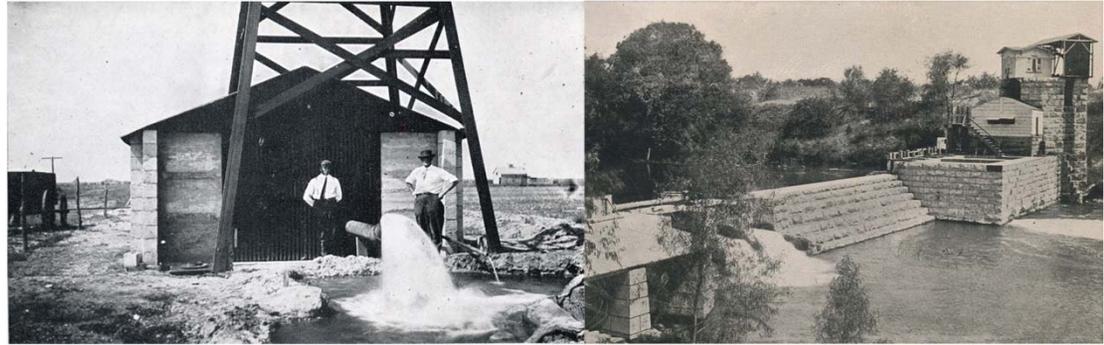
<https://waterdatafortexas.org>

<https://txpub.usgs.gov/txwaterdashboard>



<http://texasflood.org>

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Texas State University

(512) 245-6021

rem142@txstate.edu

@MaceatMeadows