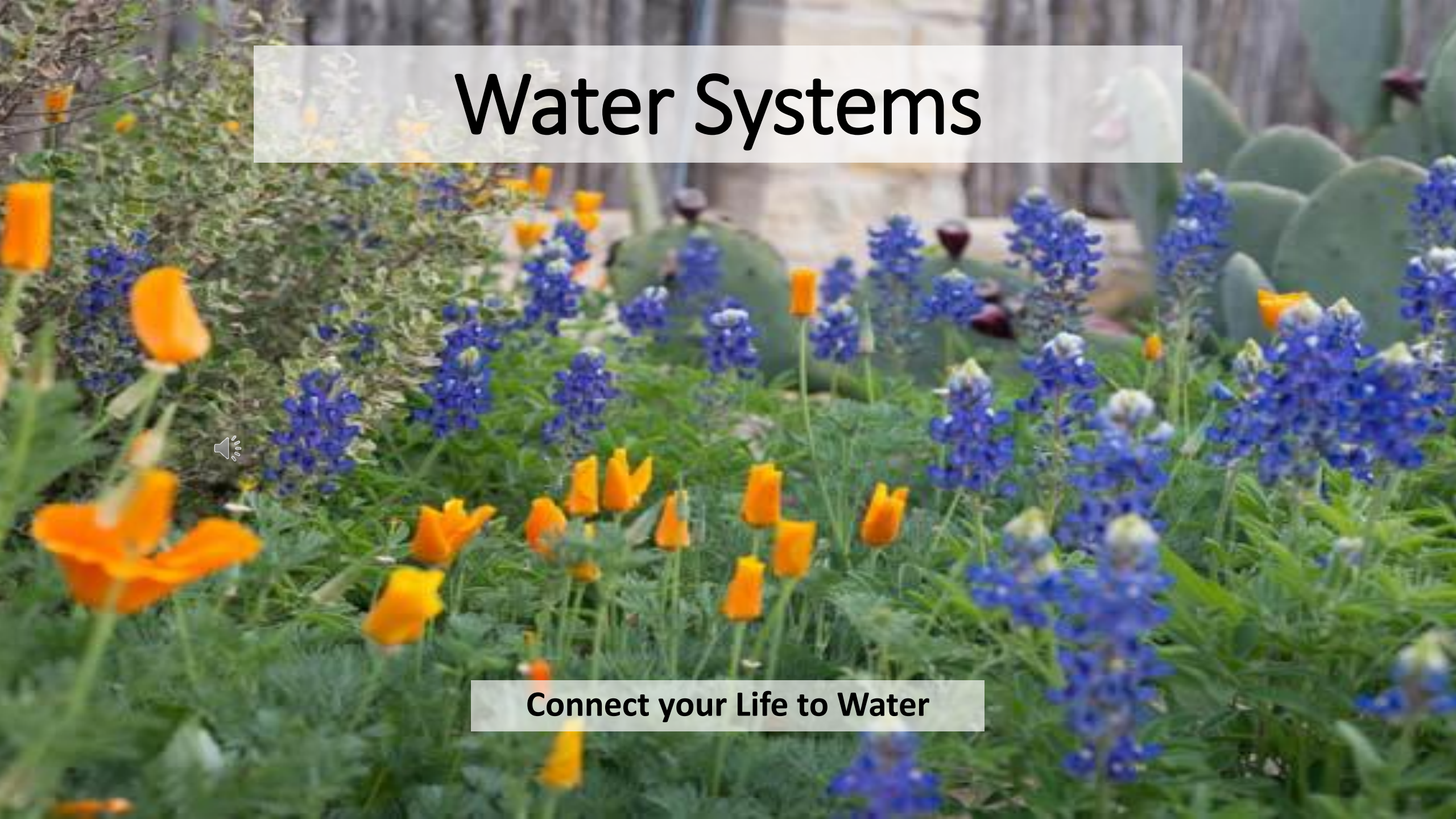
Water Systems

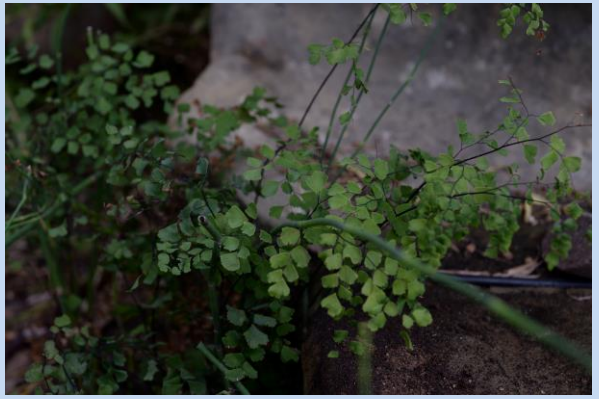


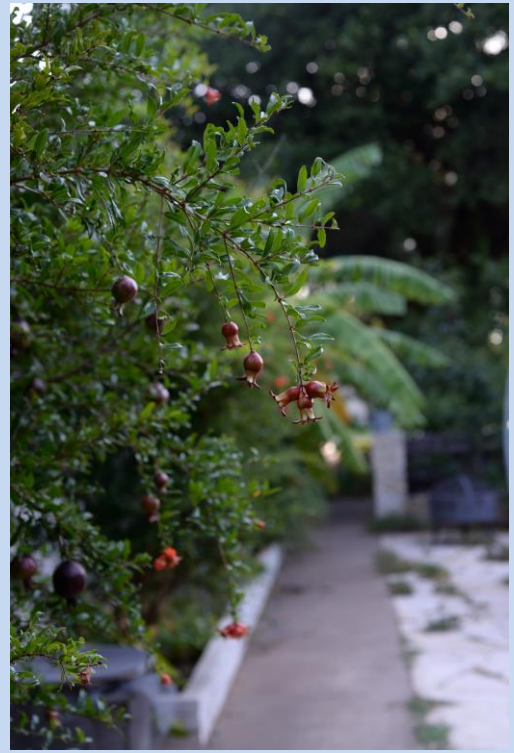
Connect your Life to Water

Emmy's Earth: Water Systems

Goal: **Alter the urban hydrologic cycle** by reducing highly erosive flows, returning water to the land, reducing the need for supplemental water and increasing water available for life. On this landscape, I use:

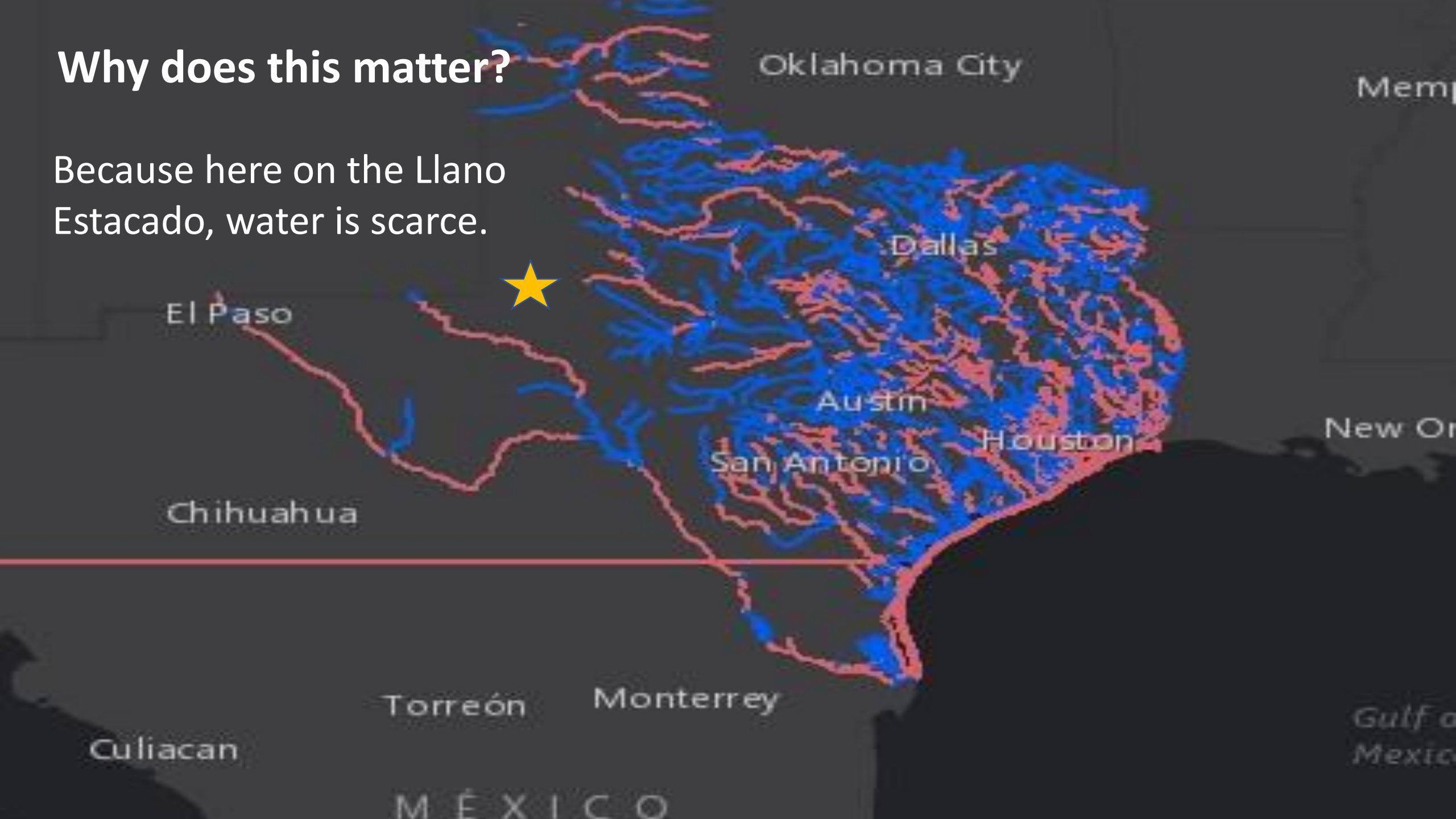
1. active and passive RWH,
2. French drains,
3. laundry to landscape graywater
4. house water reuse,
5. air conditioner condensate collection,
6. small RWH features,
7. efficient irrigation: drip irrigation, appropriate watering, rain sensor, and
8. appropriate plant selection with no turf.





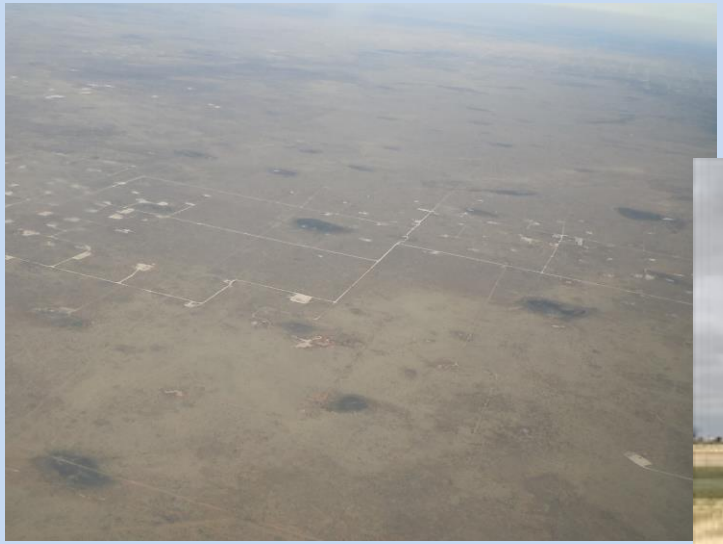
Why does this matter?

Because here on the Llano Estacado, water is scarce.



How did our land function?

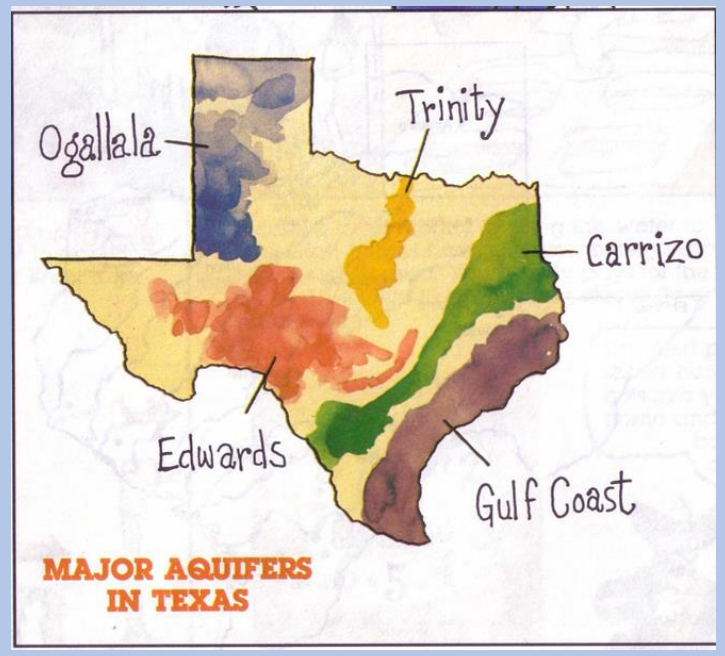
- Shortgrass prairie ecosystem
- Very limited rainfall which is stored in the rich soil
- In a rain event, playas filled and held water which then recharged the aquifer.



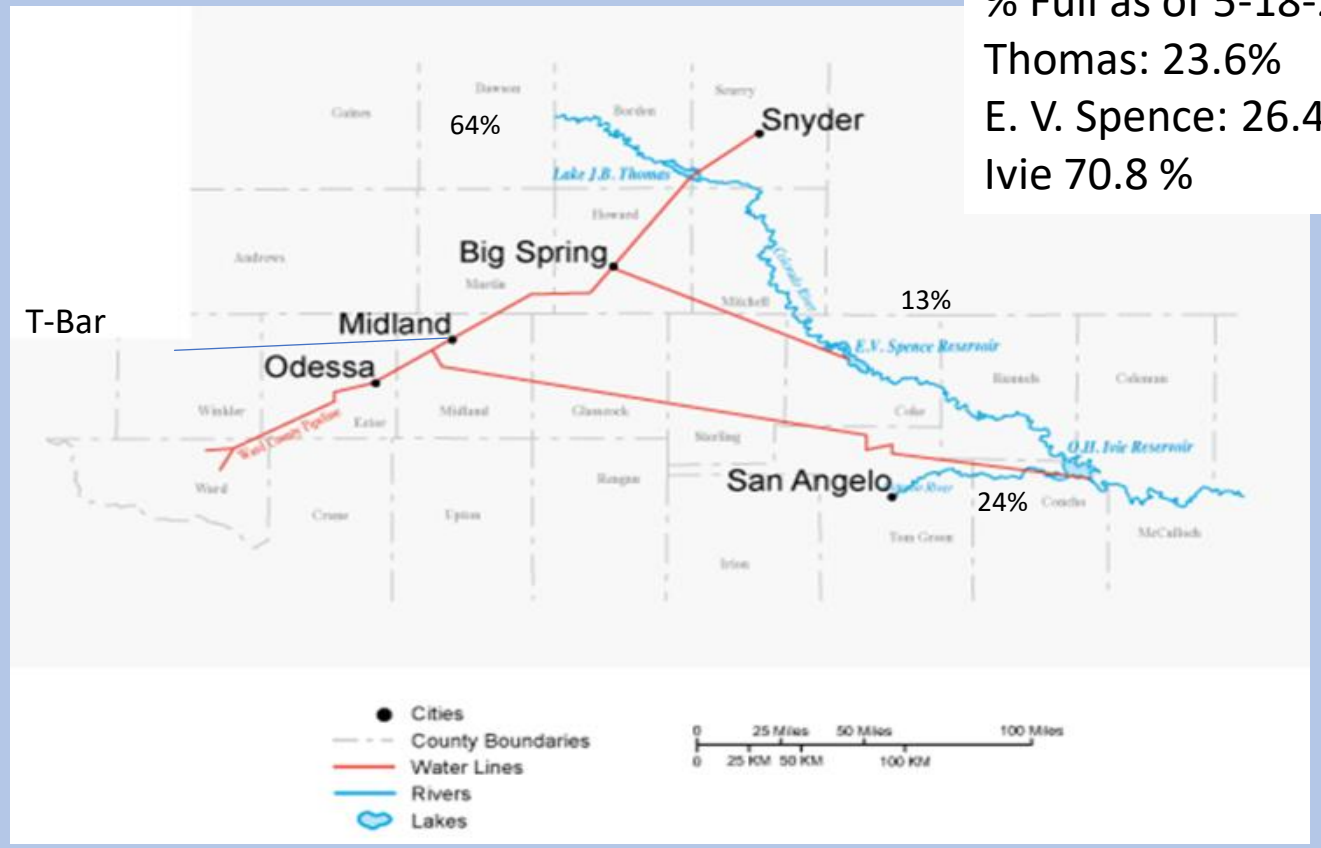
But our needs and relationship to water has changed!

Our water comes from far away…

- Half of our water comes from surface waters like lakes and reservoirs which are each about 100 miles away.
- Half of our water comes from our aquifers one of which is the Ogallala



% Full as of 5-18-2020
Thomas: 23.6%
E. V. Spence: 26.4%
Ivie 70.8 %



Ogallala Aquifer

“Managed depletion”

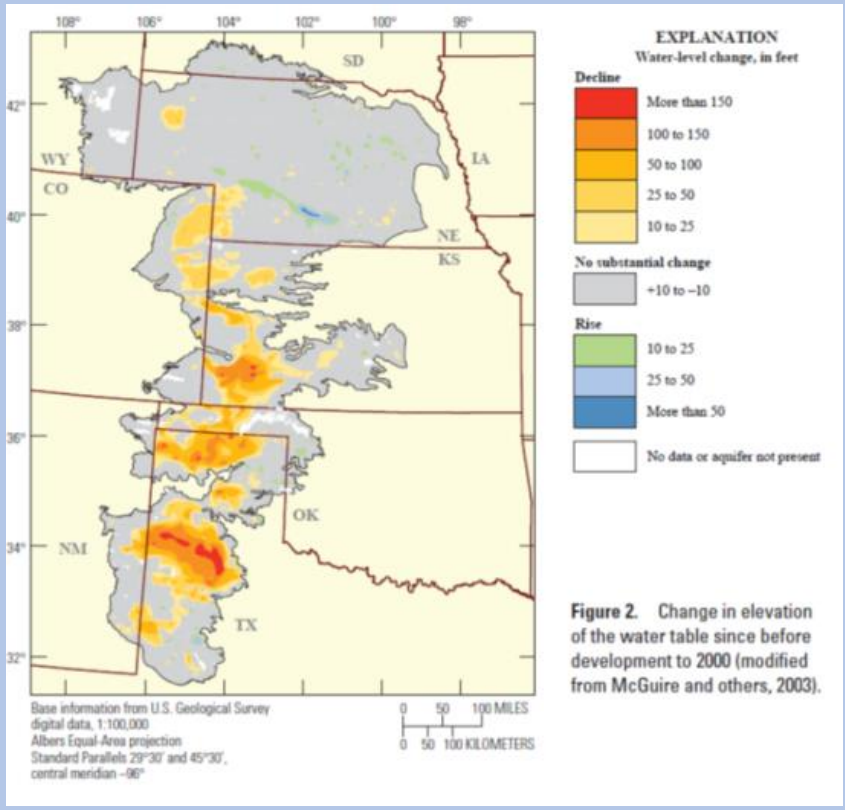
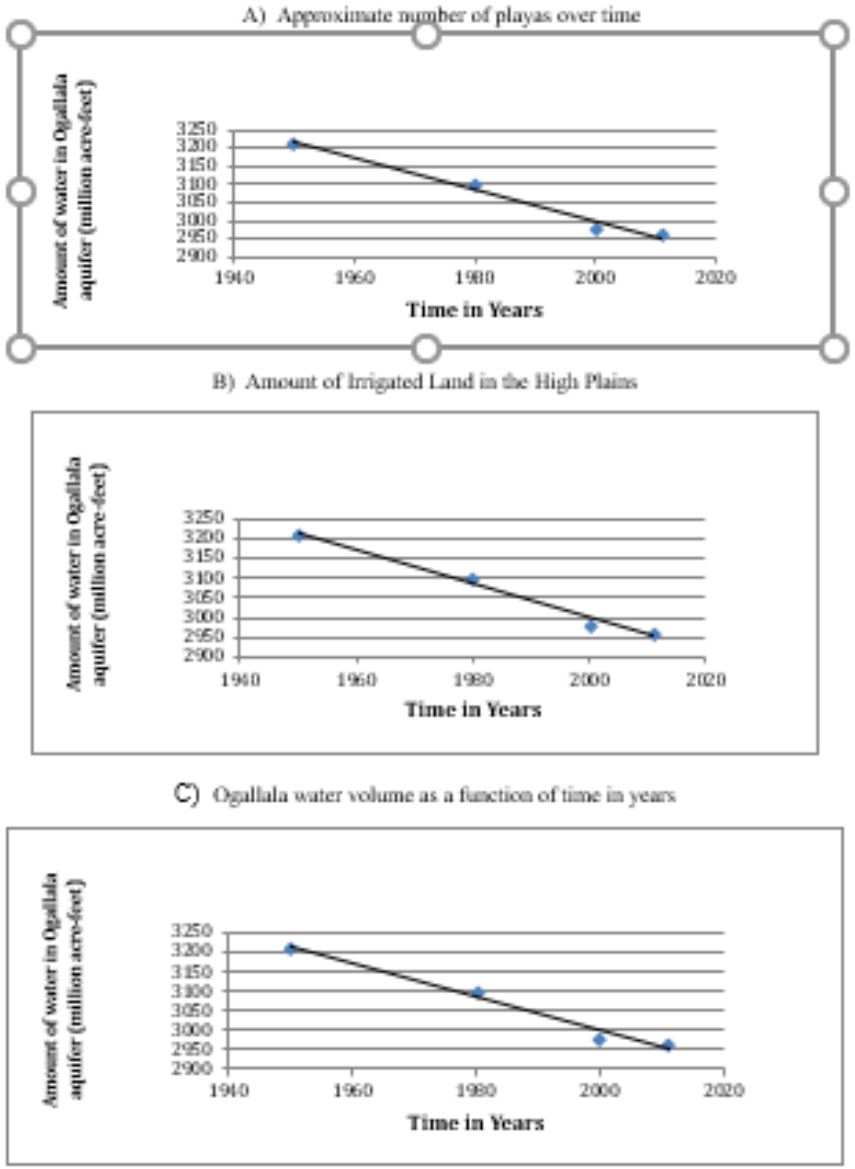


Figure 2. Change in elevation of the water table since before development to 2000 (modified from McGuire and others, 2003).

Gurdak, J.J., and Roe, C.D., 2009https://pubs.usgs.gov/circ/1333/pdf/C1333.pdf



- Historically, playas recharged the Ogallala but 85% of our playas have been greatly altered
- Modern irrigation techniques are drawing down the Ogallala 8 times faster than it can be recharged.
- The High Plains over the Ogallala is the “bread basket” of America.

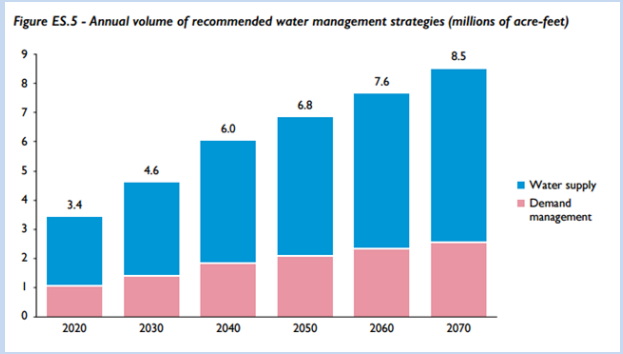
I-20 Wildlife Preserve. 2014. Environmental Systems Resource Management Docent Training Manual p. 32

Water has become an invisible, cheap commodity instead of a life-renewing, resource that we all depend on.

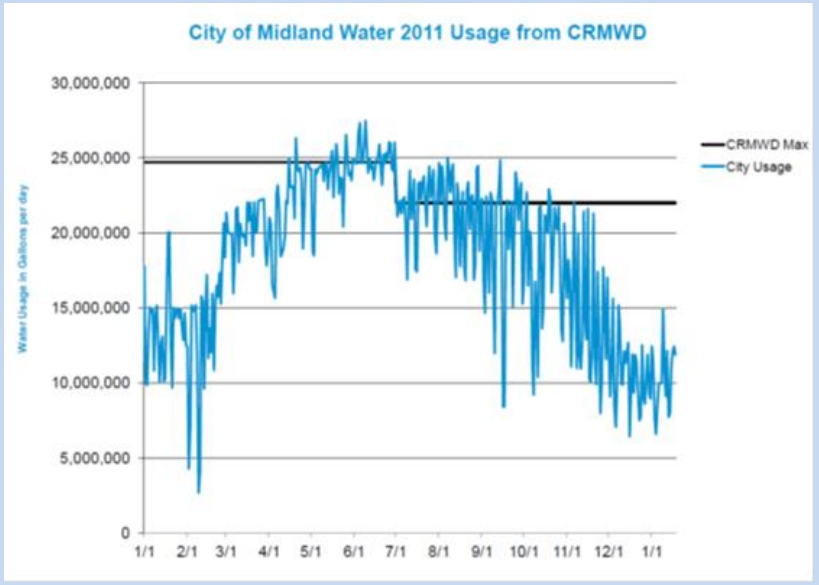
Statewide

To some, this resource is not invisible!

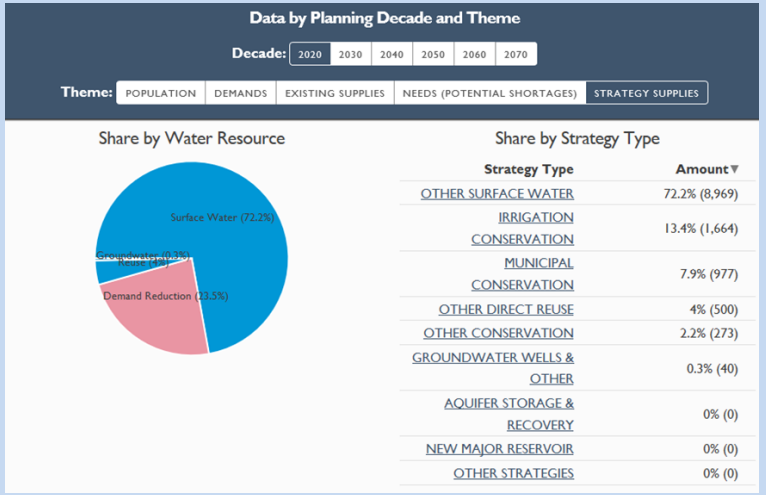
Midland County



TWDB. 2017. State Water Plan Interactive
https://2017.texasstatewaterplan.org/statewide



Even during the drought of 2011, Midland could not limit its water use to the maximum amount allotted by the Colorado River Municipal Water District.



https://2017.texasstatewaterplan.org/county/Midland

Council to vote on $261 million water deal

Purchase would be part of agreement with San Angelo, Abilene

By Stewart Doreen, MRT.com/Midland Reporter-Telegram Published 8:55 pm CDT, Monday, May 11, 2020

https://www.mrt.com/news/article/Council-to-vote-on-261-million-water-deal-15262933.php

In these places, conservation is a fact of life…

- Bermuda
- El Paso, TX
- San Antonio, TX
- Big Spring, TX
- Tucson, AZ
- St. Louis, MO
- Clovis, NM

St. Louis, MO

Water

Setting the Stage for the Future

El Paso, TX

El Paso is the site of the world's largest inland desalination plant. This plant represents a forward-looking strategy in water supply — not only for a region but also for a world that is increasingly challenged by short supplies of fresh water.

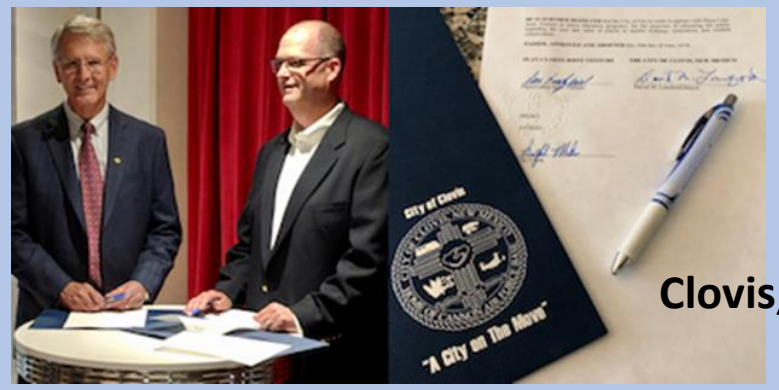
A joint project of El Paso Water Utilities and Ft. Bliss, El Paso's desalination facility can produce up to 27.5 million gallons of fresh water daily (MGD) making it a critical component of the region's water portfolio. Using a previously unusable brackish groundwater supply, the Kay Bailey Hutchison Desalination Plant is creating a new supply of water - water from water.

In addition to providing a supply of fresh water, the facilities provide other important benefits.

- The facilities serve as a model and center of learning for other inland cities facing diminishing supplies of fresh water.
- The water pumped to the desalination plant protects El Paso's and Ft. Bliss' fresh groundwater supplies from brackish water intrusion by capturing the flow of brackish water toward freshwater wells.
- This desalination process not only removes salts, but also is the most comprehensive water treatment technology available, removing other potential pollutants from the water.
- The facilities augment existing supplies to make sure El Paso and Ft. Bliss have sufficient water for growth and development for 50 years and beyond.

The desalination facilities have the ability to increase El Paso Water Utilities' fresh water production by approximately 25%, based on current demand, and include a state-of-the-art desalination plant, a learning center, groundwater wells, transmission pipelines, storage and pumping facilities and the disposal of concentrate, the residual that remains after the desalination process.

Bermuda



Clovis, NM

Texas Leads The Way With First Direct Potable Reuse Facilities In U.S.

By Laura Martin
@LauraOnWater

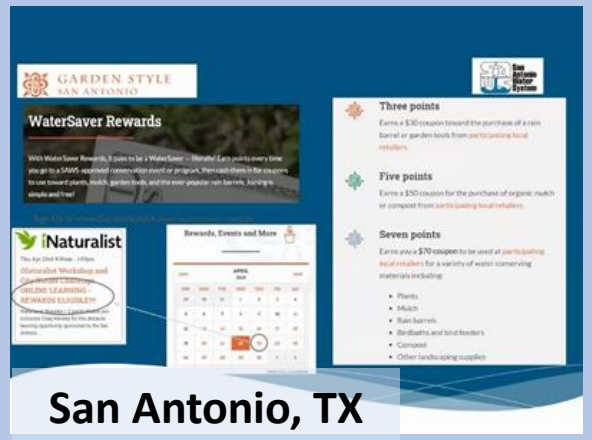
Big Spring, TX

Severe drought prompts both Big Spring and Wichita Falls to recycle wastewater effluent for drinking water use. Will others follow suit?

When John Grant and his team in Big Spring, Texas, initially decided to build the first-ever direct potable reuse (DPR) facility in the U.S., they weren't trying to make history.

In fact, Grant, the general manager for the Colorado River Municipal Water District (CRMWD), wasn't even aware that there are only a handful of facilities worldwide that utilize DPR— the process of reusing treated wastewater as drinking water without an environmental buffer.

The CRMWD was simply looking to provide clean, safe water for the district's consumers in Odessa, Big Spring, Snyder, and Midland during the region's worst drought in decades.



San Antonio, TX

Tucson, AZ

Directing and retaining rainwater for landscape use to support plant growth and **reduce municipal water for irrigation**

Images courtesy of Brad Lancaster, harvestingrainwater.com

My Journey Moving Towards an Onsite Water Harvesting Landscape

- 1974-77: Learned the importance of water in Bermuda and Bahamas,
- 1981: Moved to Midland
- 1997: Put up first gutters and 2 small 40-gallon RWH tanks
- 2003: became a Master Gardener and started xeriscaping
- 2004: backyard native plants
- 2005: front yard natives; drip irrigation throughout yard

So, what did we learn up to 2005?

- We were enjoying the color and life water brings to a landscape
- We needed more tanks to support our rainwater feature and to hold all the rainwater we collected!
- Water still ran into the street and in a large rain event.
- We needed more water in the backyard native bed

2009: We added:

- Four more rainwater harvesting (RWH) tanks
- Air conditioner condensate
- Laundry to landscape system

Laundry to Landscape

- Uses washing machine water to water
- Non-edible plants
- 18" below ground level
- Inspected by city
- Waters the backyard native bed

2012: Added front patio, kitchen garden and more RWH tanks

But… we still couldn't hold all the rainwater we collected, and the overflow routinely flooded the backyard.

2014: Attended the Land and Water Summit in New Mexico and learned that I could use the land to store water and "plant the rain" in my landscape!

What I learned is that earthworks! I could use the land itself in the form of basin, berms, swales, and French drains to store water onsite!

And when I looked, I could see examples all around me

..And there are many advantages!
Onsite RWH helps to:

- conveys, collects and infiltrates water into our existing soil and vegetation which acts like a sponge
- increasing plant productivity that may also provide food production and/or wildlife habitat
- **mimics local pre-development hydrology and creates green infrastructure which can recharge aquifers**
- reduces need for secondary surface water and groundwater resources

Let no drop of water leave your land: Plant the rain!

Finally, an answer to my flooding problem!

The soil is now the “sponge”!

…and in the front yard…

Large patio functions as a collecting surface and rainwater is moved directly into a kitchen garden.

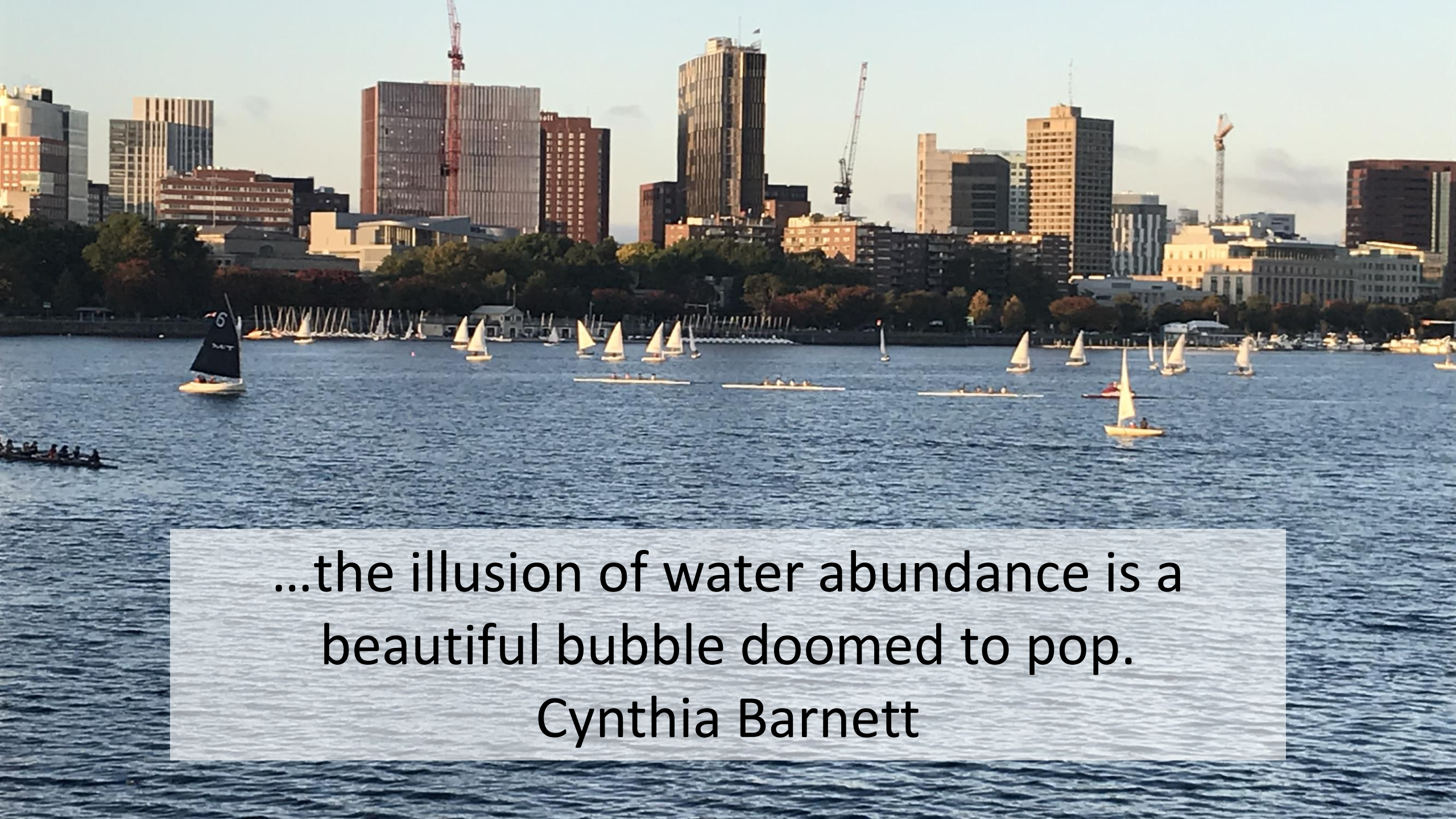
Native plants in the patio slow the runoff.

Slow, Spread, and Infiltrate

Make thoughtful observations then evaluate and retool

2018: Last place to plant the rain!

But is it good enough? All my guttered collecting surfaces gather 6000 gallons in a 1” rain; my total irrigation area requires 4880 gallons for a 1” irrigation.



…the illusion of water abundance is a beautiful bubble doomed to pop.
Cynthia Barnett