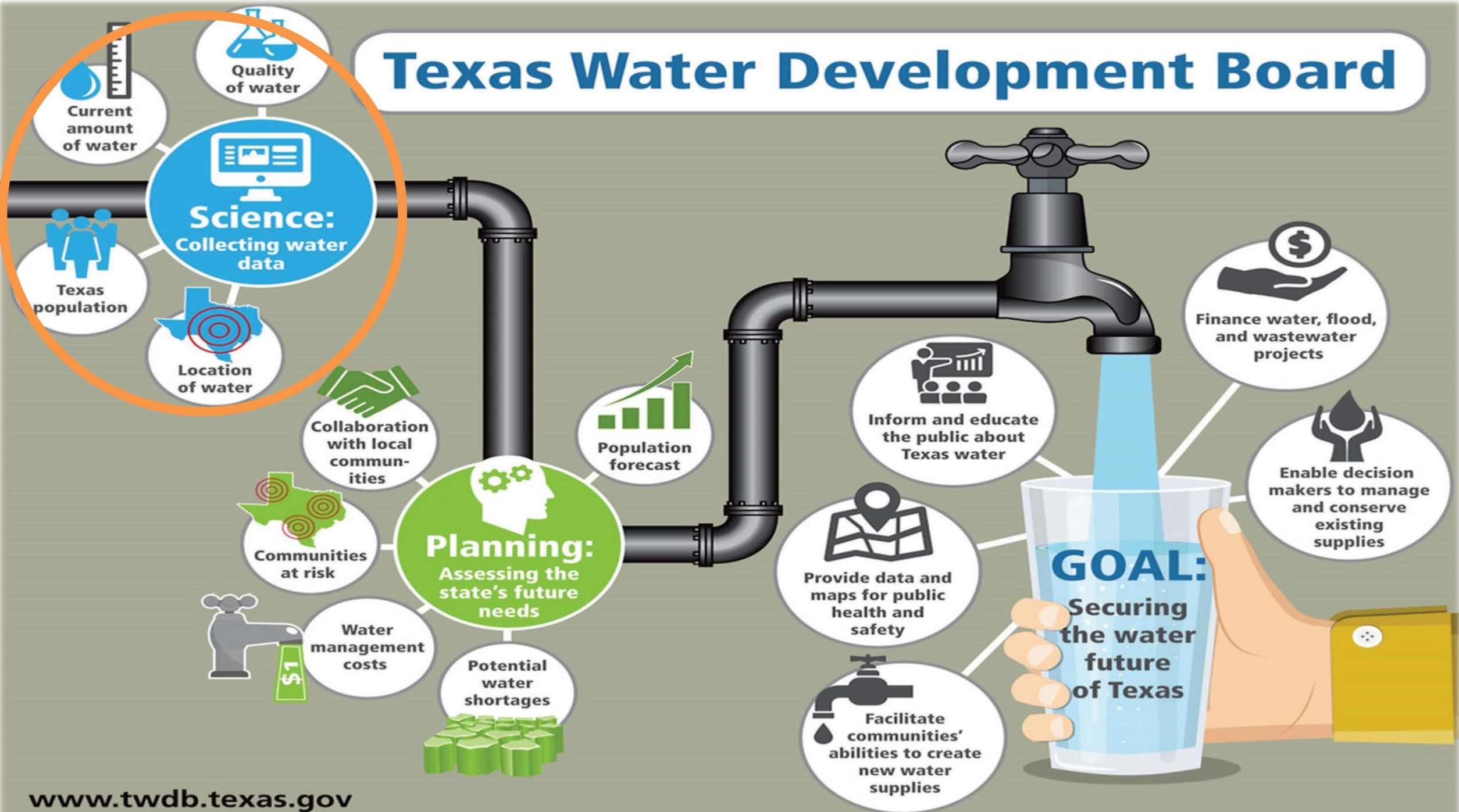


Planned alternative water supply technologies utilizing the karst aquifers of Texas

Andrea Croskrey, P.G.
ASR & AR Team Lead
Texas Water Development Board

9th USGS KIG Workshop
October 22-24, 2024
Nashville, TN

Texas Water Development Board



Offices

Water Science & Conservation

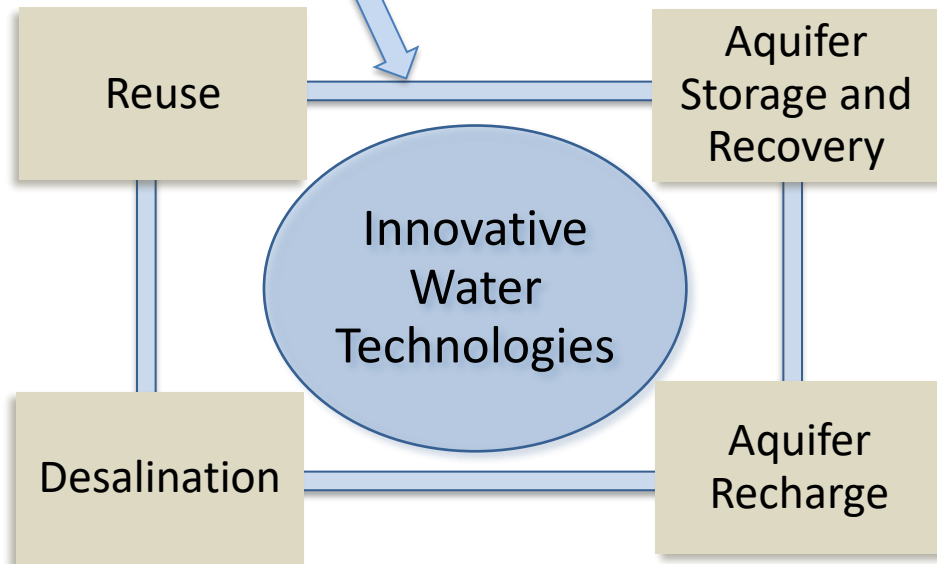
Water Supply & Infrastructure

Operations & Administration

Texas Geographic Information Office

Planning

Finance

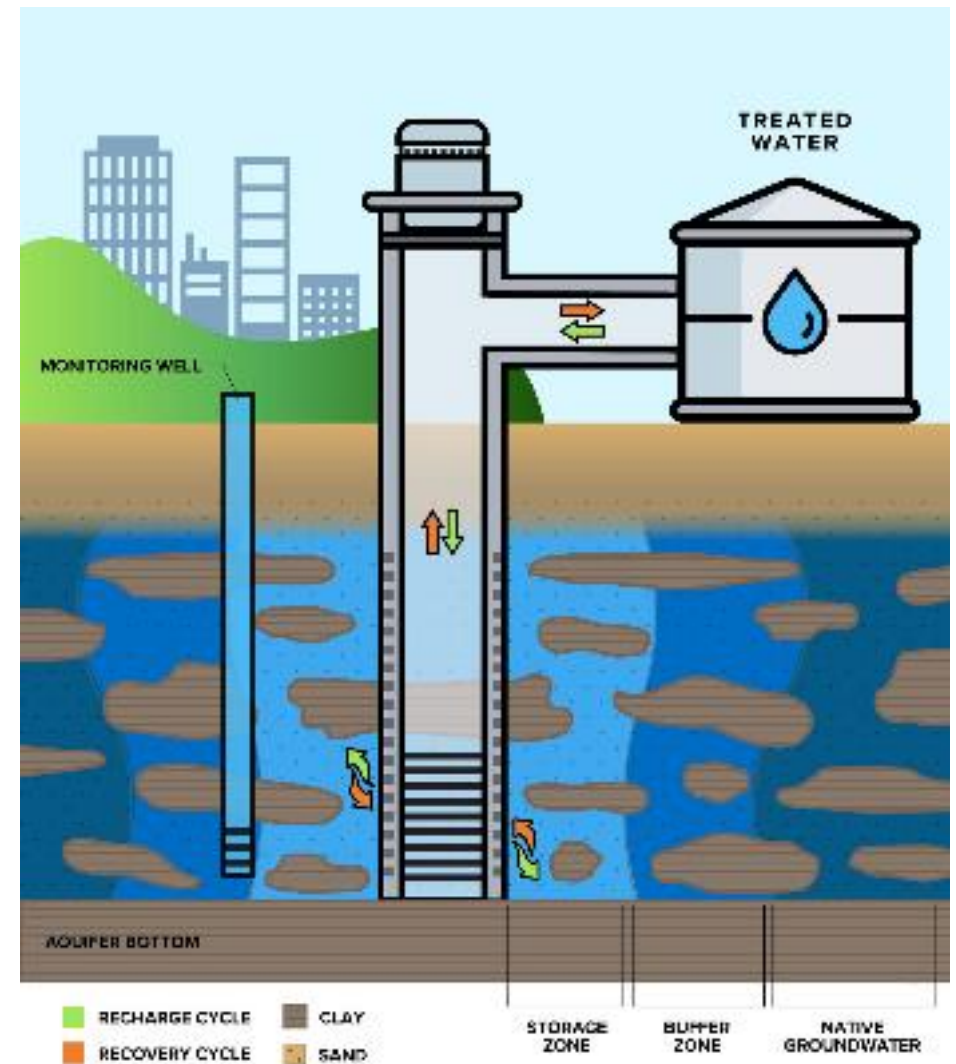


IWT goal:

Advance and promote the development and use of alternative water supplies in Texas.

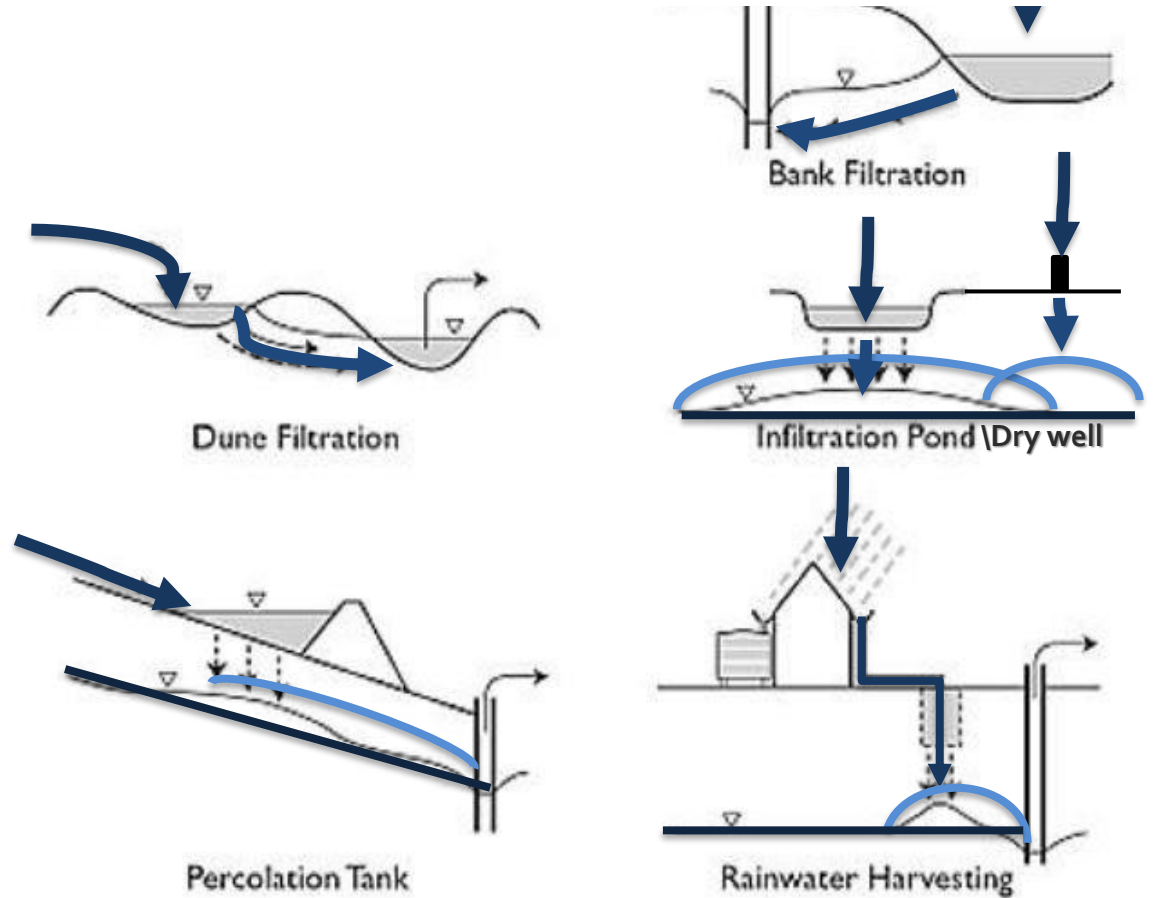
Aquifer storage & recovery (ASR)

- Using **the same well** for both **injection** and **recovery** of stored water
- Used for drought and emergency supply, seasonal storage
- Some benefits over surface reservoirs
- “A water savings account”
- Why ASR?
 - Drought and emergency supply
 - Seasonal storage
 - Benefits over surface reservoirs



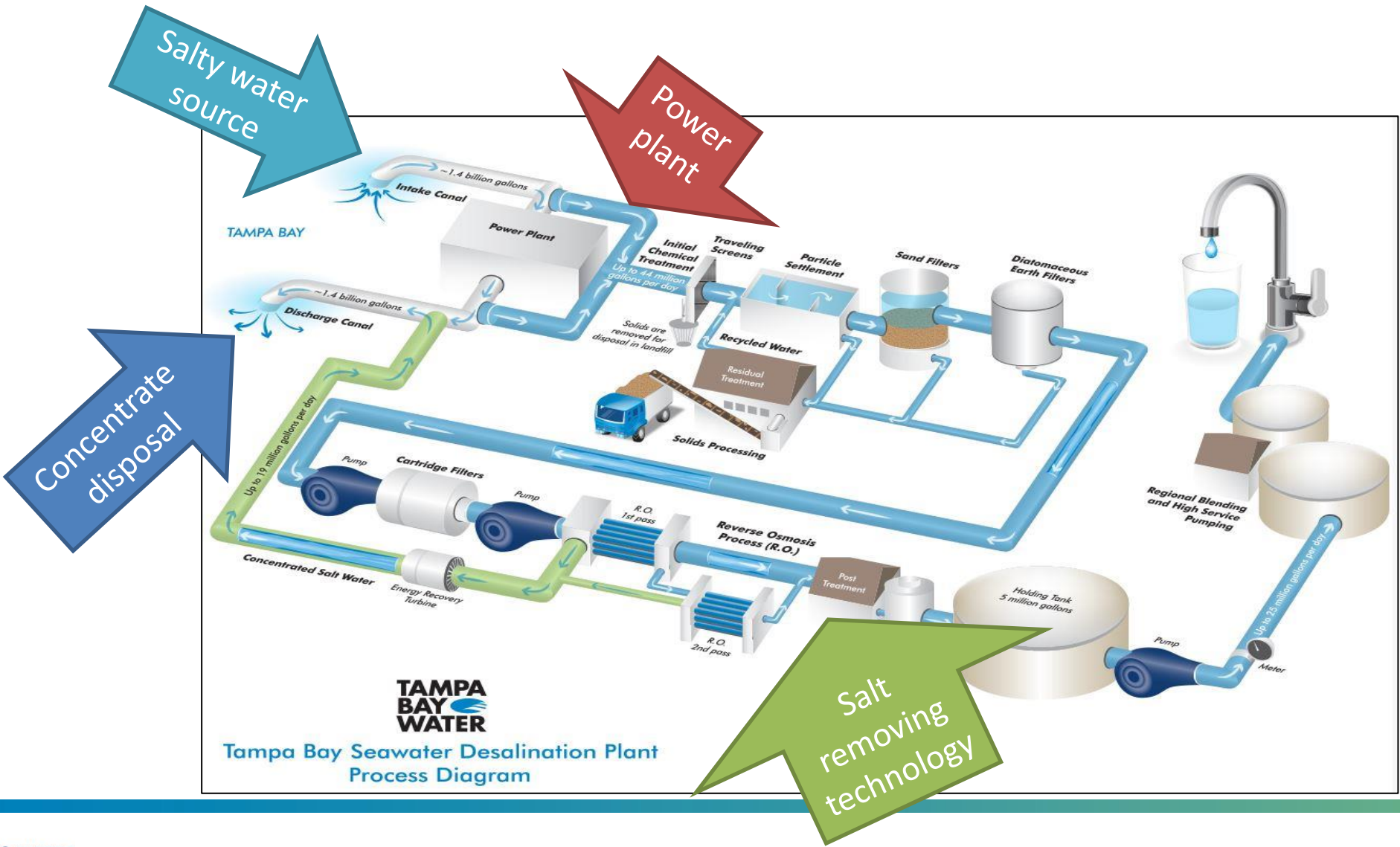
Aquifer recharge (AR)

- Controlled recharge of an aquifer through various methods:
 - Spreading methods
 - Induced bank infiltration
 - Channel modification or diversion
 - Runoff harvesting
 - Reclaimed water reuse
- Sometimes called “Managed Aquifer Recharge” or (MAR)



Most common MAR techniques (Gale and Dillon 2005) ASR: Aquifer Storage and Recovery; ASTR: Aquifer Storage Transfer and Recovery

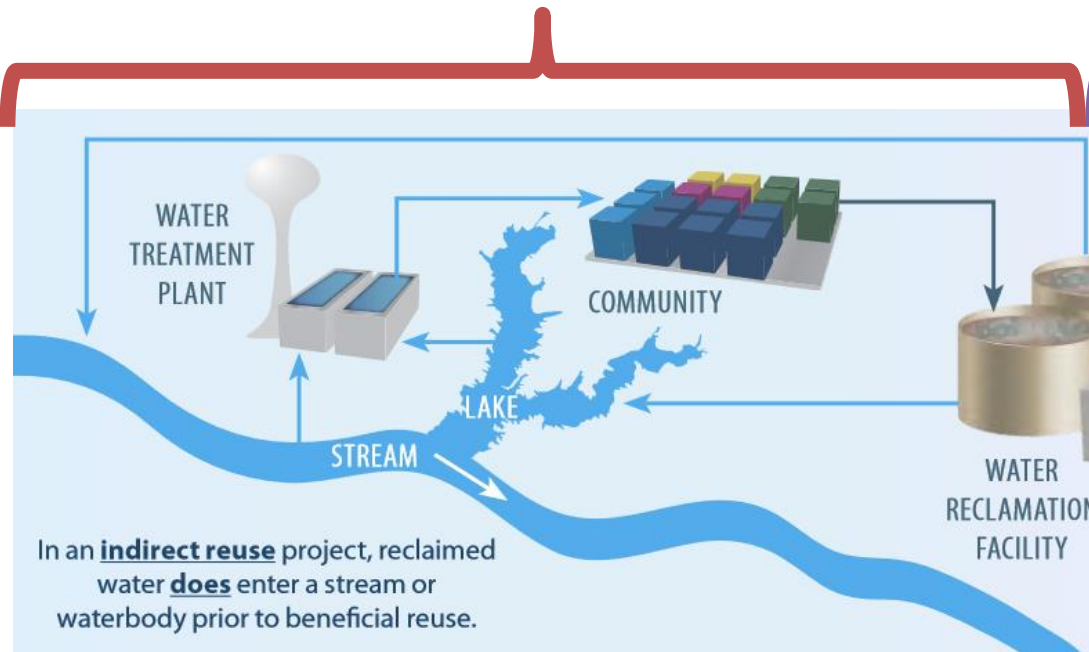
Desalination



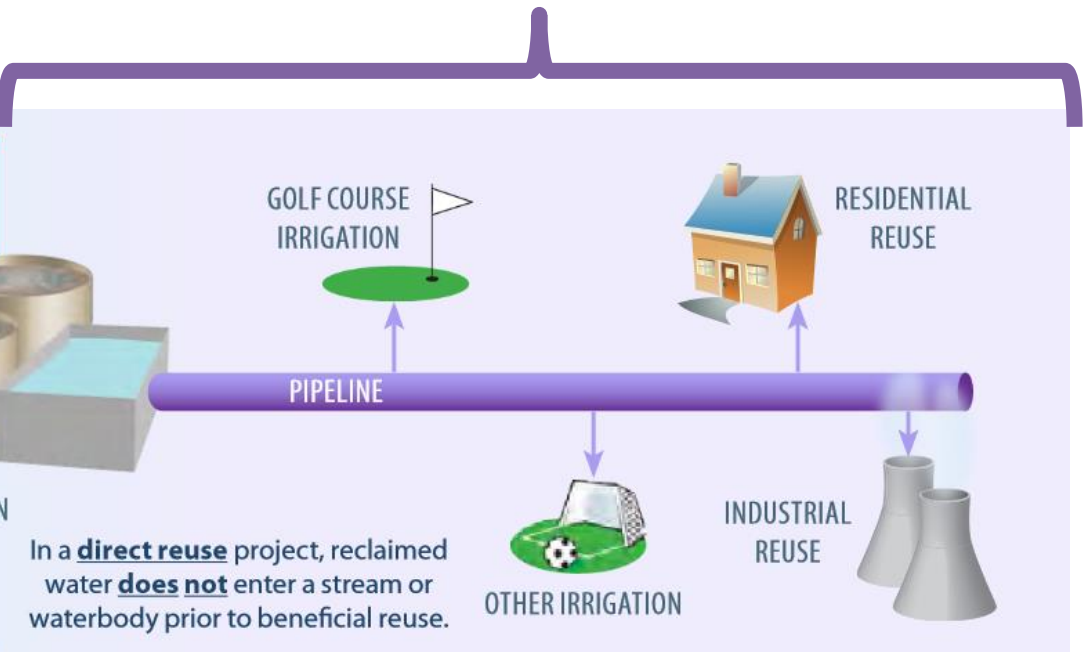
2 Types of Water Reuse

BASED ON INTENDED USE

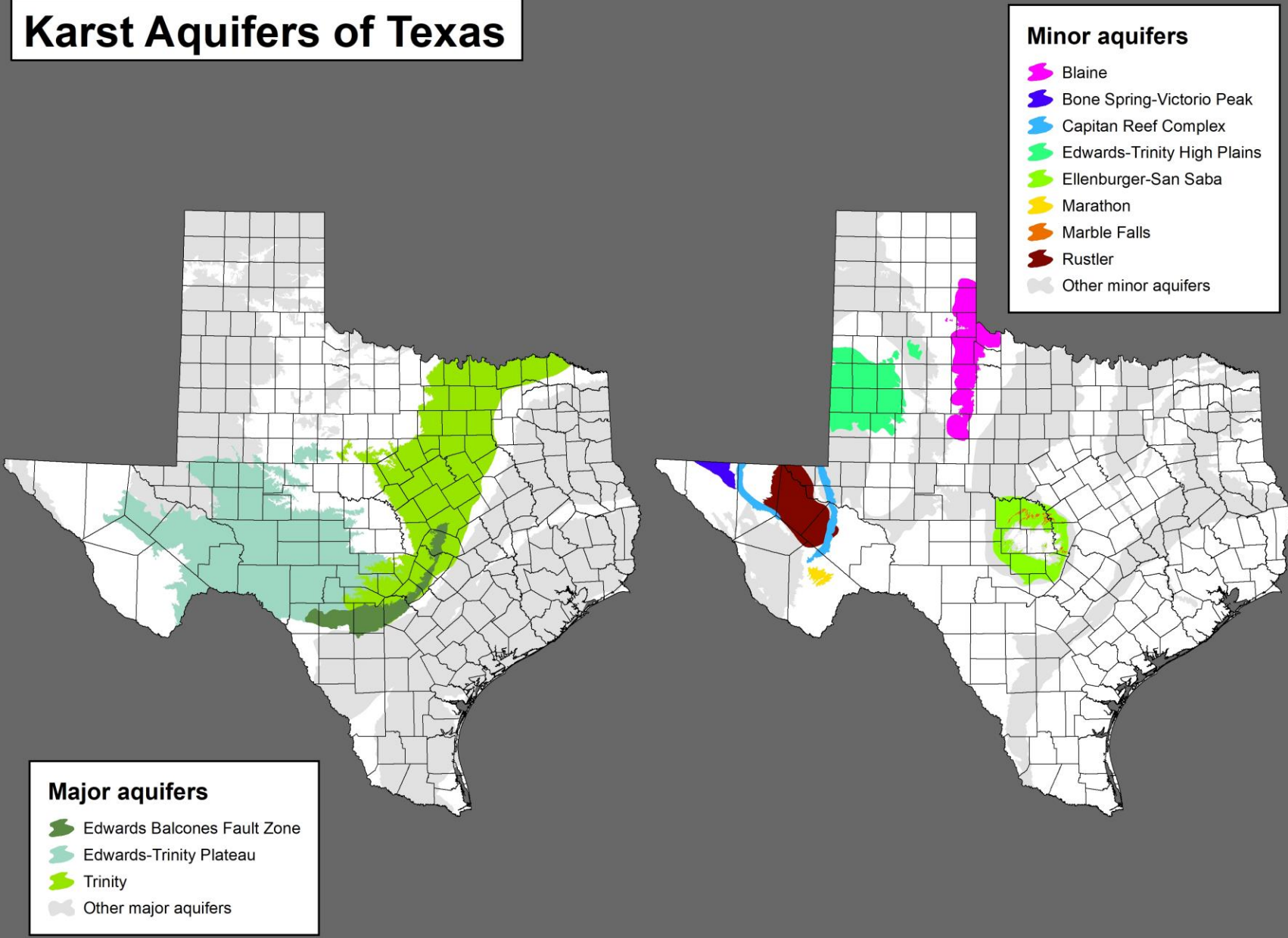
Indirect



Direct

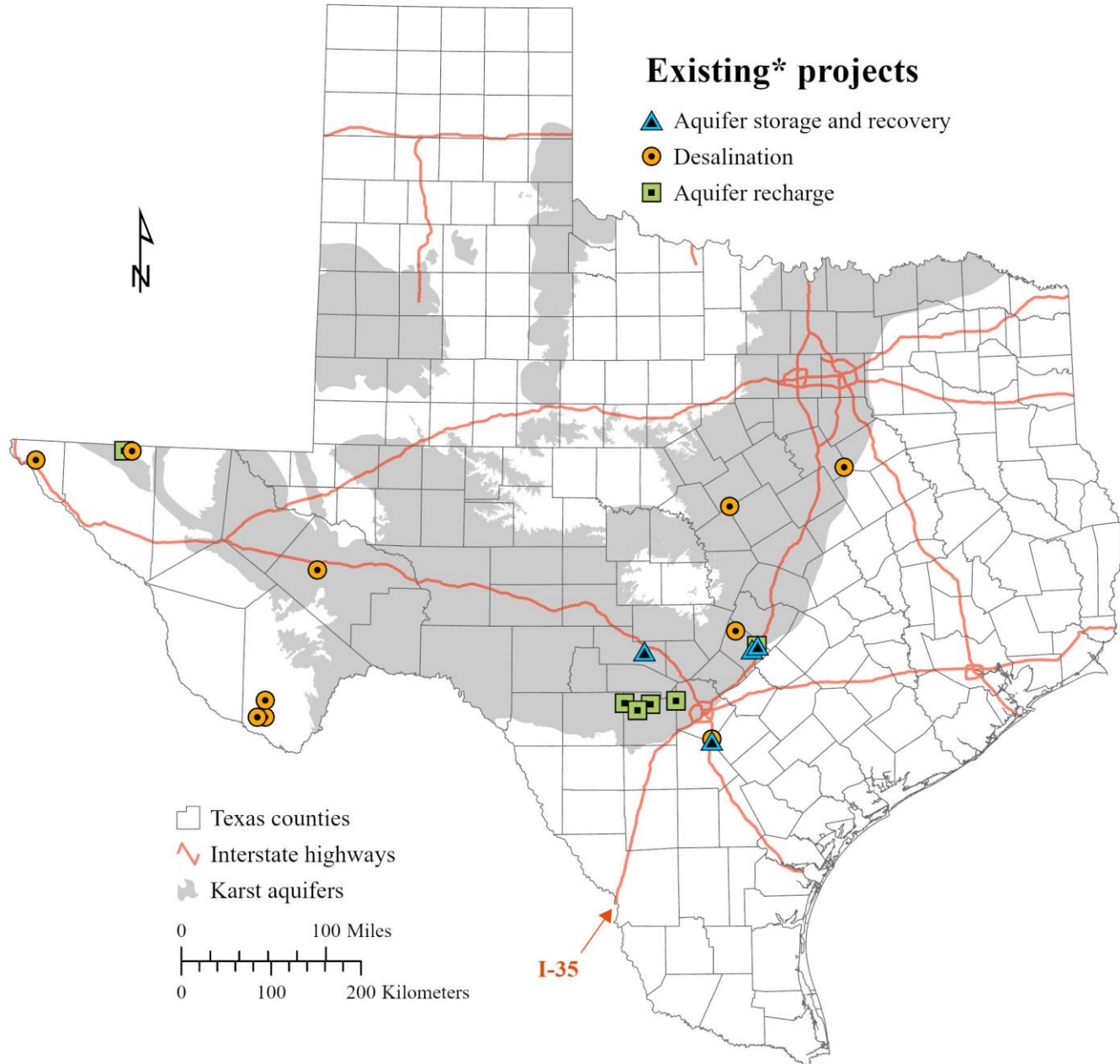


Karst Aquifers of Texas

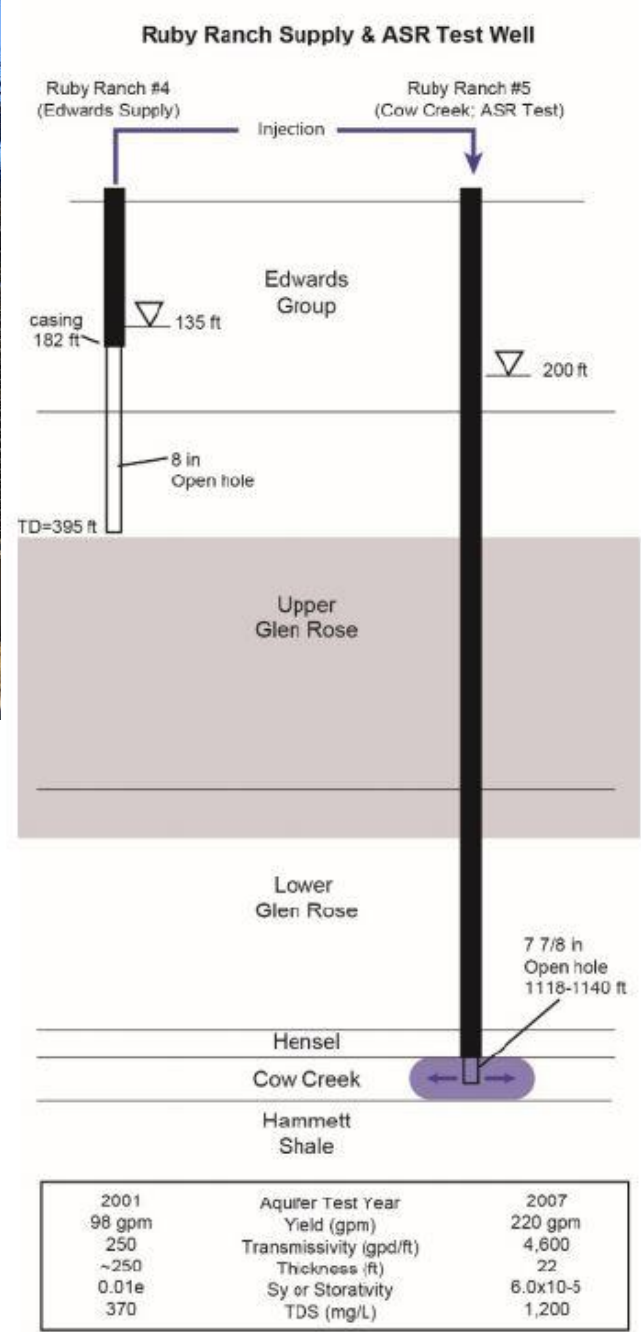


- Major and minor aquifers of Texas are productive aquifers designated by TWDB
- There are “other” aquifers in the state that exist and could be locally important
- Of Texas’ 31 major and minor aquifers, 11 contain karstic zones.

Karst-related Alternative Water Supply Projects in Texas



- Existing projects using TX karst aquifers:
 - 4 ASR
 - 8 desal
 - 6 AR
 - No known reuse projects
- Mostly Cretaceous Edwards and Trinity but also:
 - Bone Spring - Victorio Peak aquifer (AR & desal)
 - Fusselman and Montoya formations, (desalination concentrate disposal)



Dams helping to build up aquifer water reservoir

Monday, February 26, 1979

This year's rains added to the water supply in the Edwards aquifer through the Creech North. The year's rains added to the water supply in the Edwards aquifer through the Creech North. The year's rains added to the water supply in the Edwards aquifer through the Creech North.

Other sites
Site 8, northwest of Site 11, also is under construction and could be finished this year.

Notice of the grant was sent to Dr. Thomas Hester, head of the department, Thompson said. Two dams have been completed in the area.

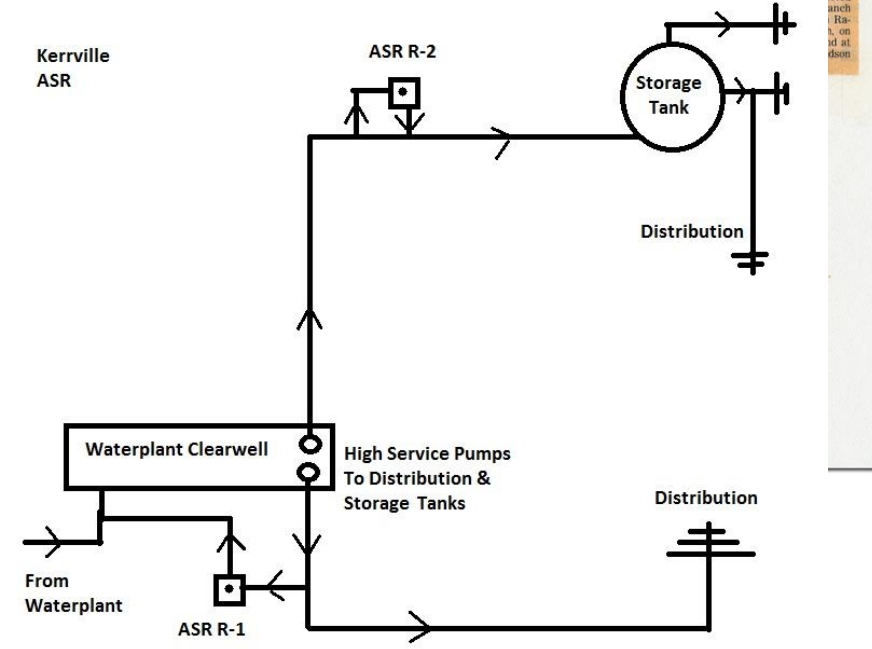
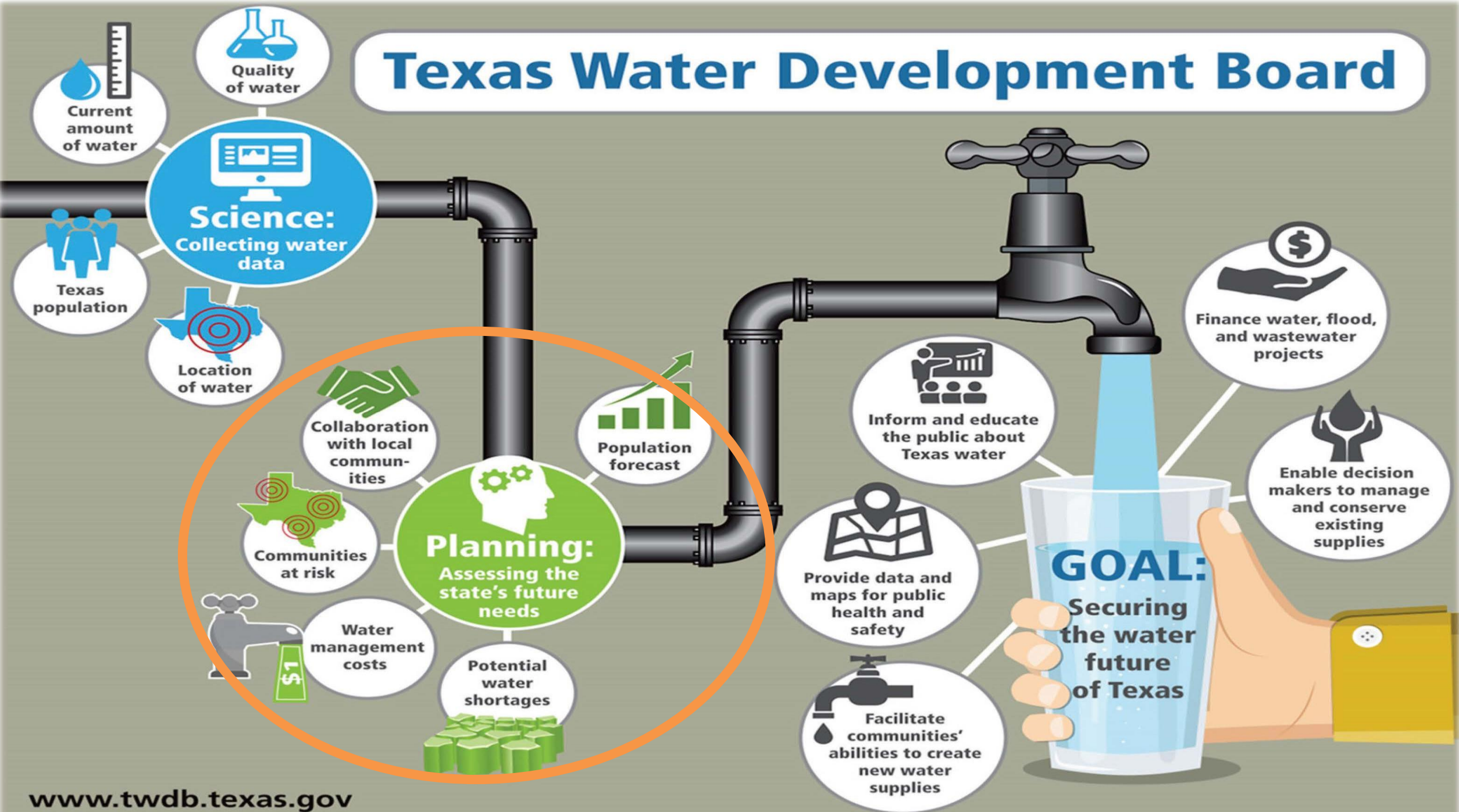


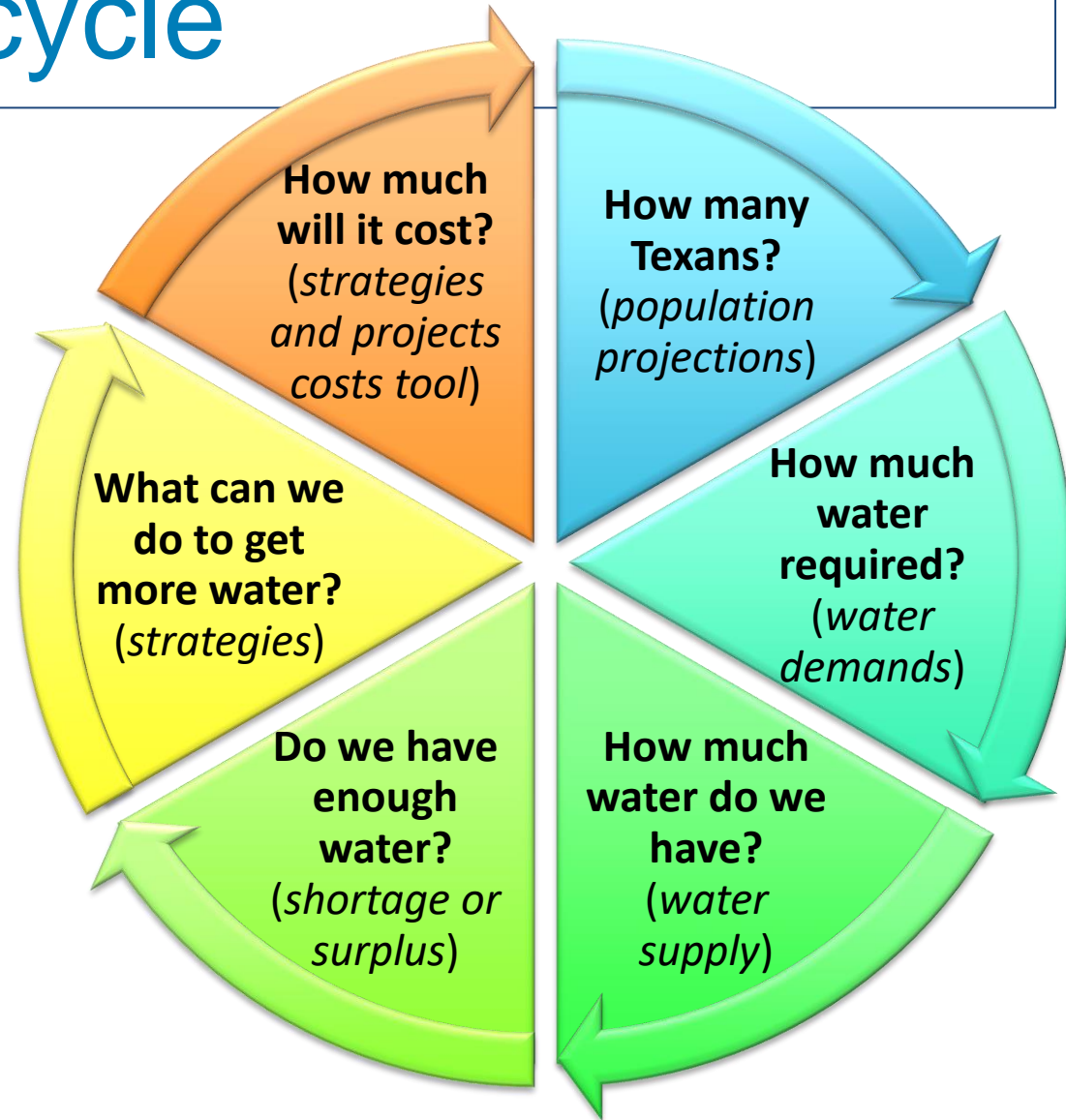
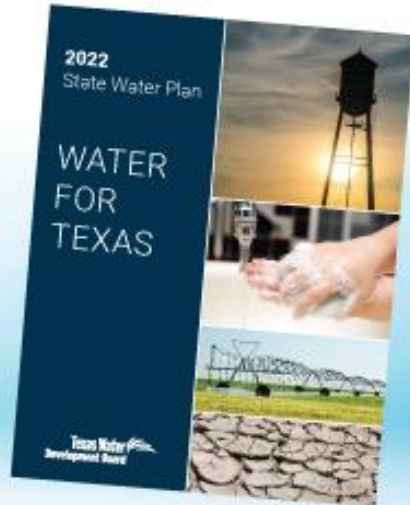
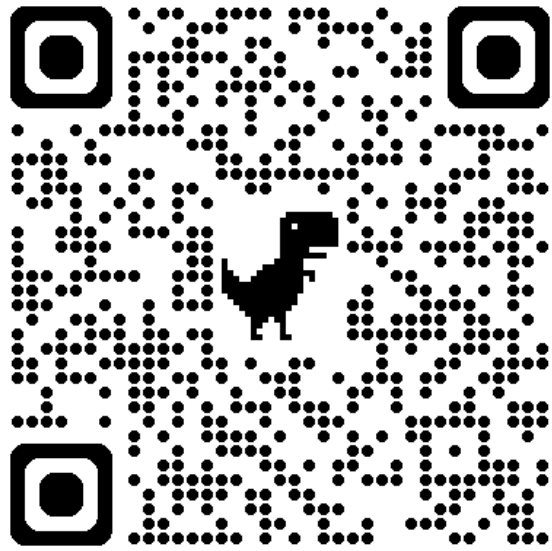
Figure 2. Schematic diagram of the RRWSC ASR system. Figure from Smith et al., 2017.

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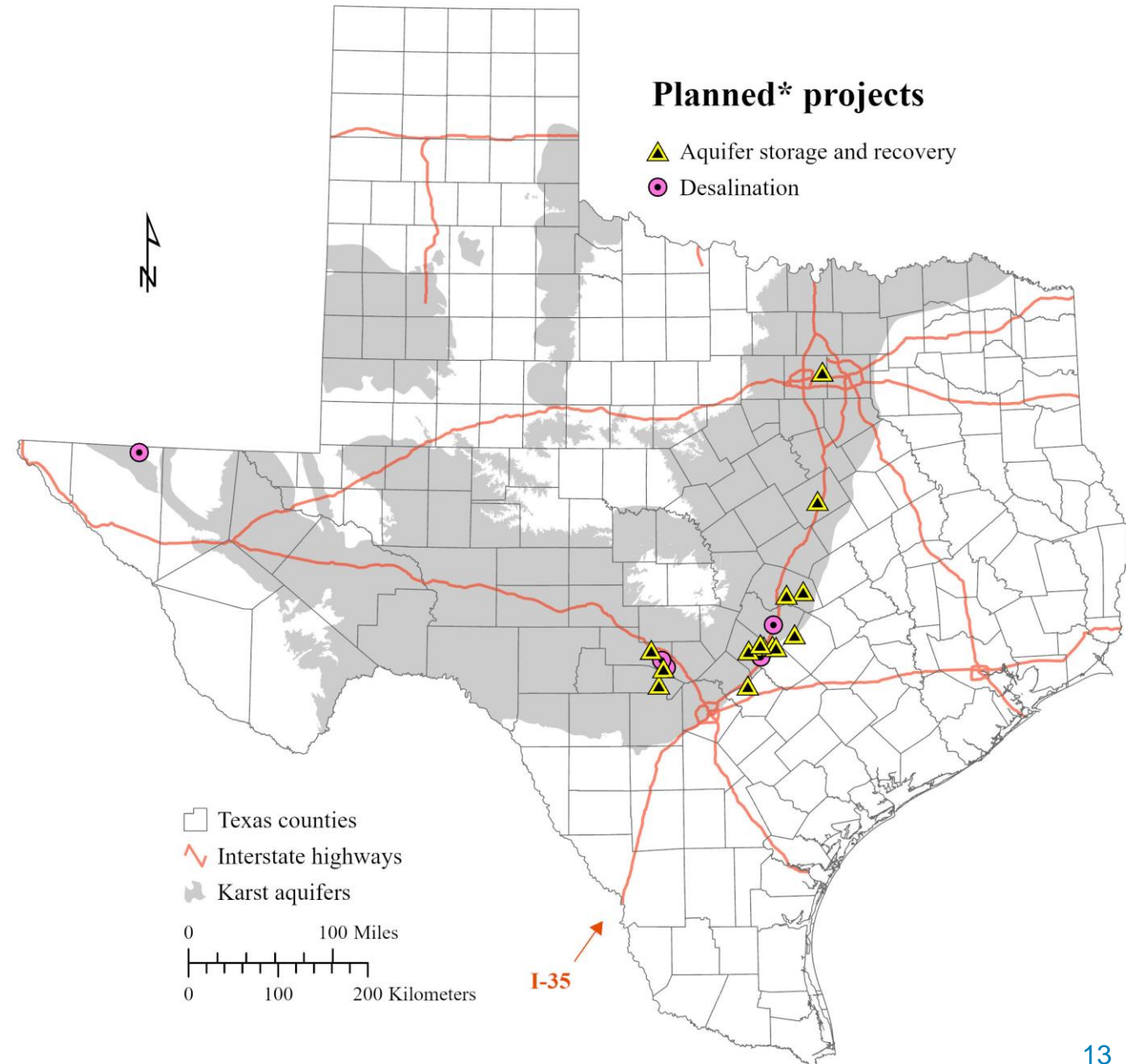
Water Planning, a 5-year cycle

2022 State Water Plan

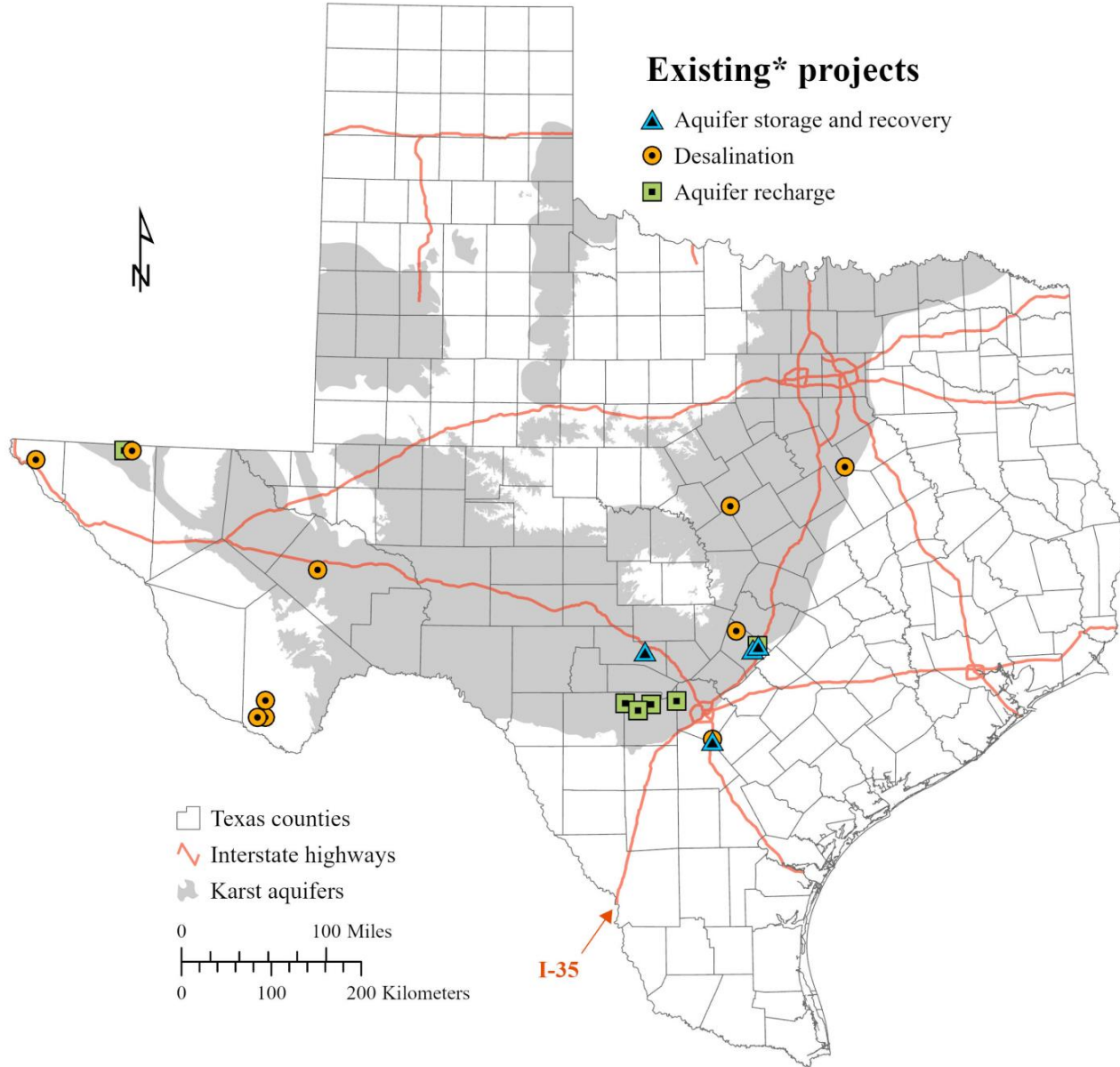


Karst-related Alternative Water Supply Projects in Texas

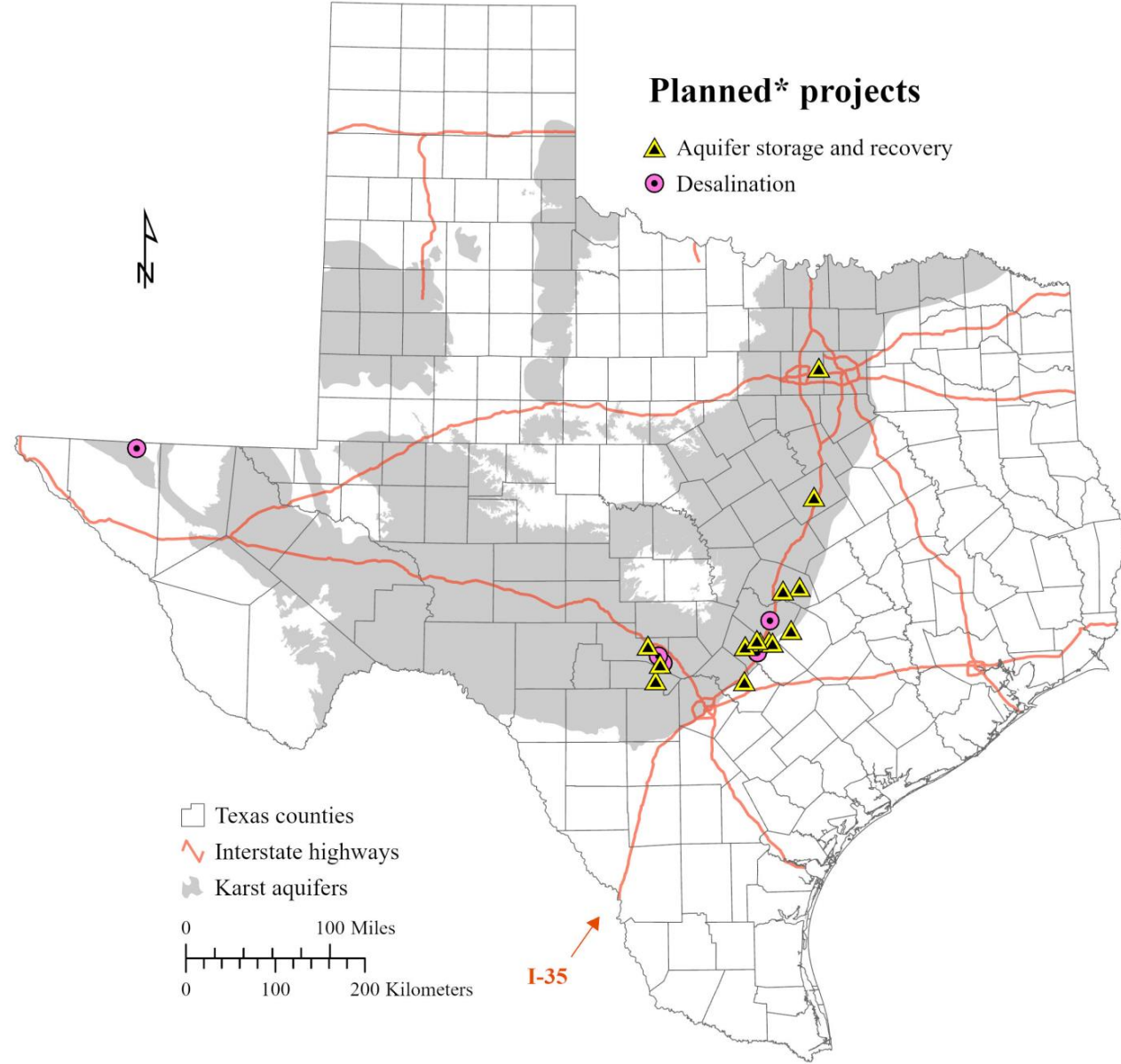
- 2022 State Water Plan recommended projects in karst aquifers:
 - 14 ASR
 - 5 desalination
 - 0 AR
 - 0 reuse
- All in Cretaceous Edwards and Trinity except for 1 in Bone Spring - Victorio Peak aquifer
- There are additional projects not in the 2022 SWP



Karst-related Alternative Water Supply Projects in Texas



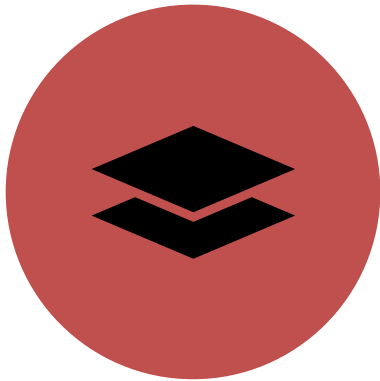
*known as of April 2024



Texas State Mapping System

*map only includes recommended water management strategies from the 2022 State Water Plan

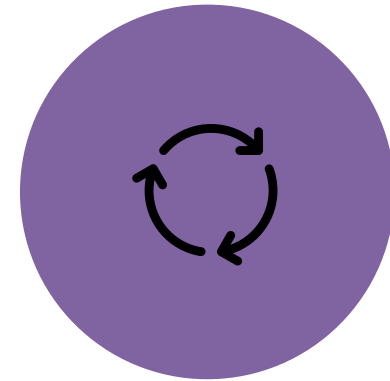
The intersection of alternative water supply technologies and karst aquifers



STRATA FOR STORAGE



SOURCE WATER SUPPLY



INFLUENCES
HYDROLOGIC CYCLE

Special considerations

- High transmissivities
- Fast velocities
- Large productivity
- Biogeochemical complexities
- Ecology

Questions for attendees

Collapse related to ASR or AR?

Stygobitic ecology and ASR or AR?

Bio studies when exploratory drilling?

Karst aquifers, preserve v. infrastructure?

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<http://www.twdb.texas.gov/innovativewater/index.asp>

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Stay connected:

