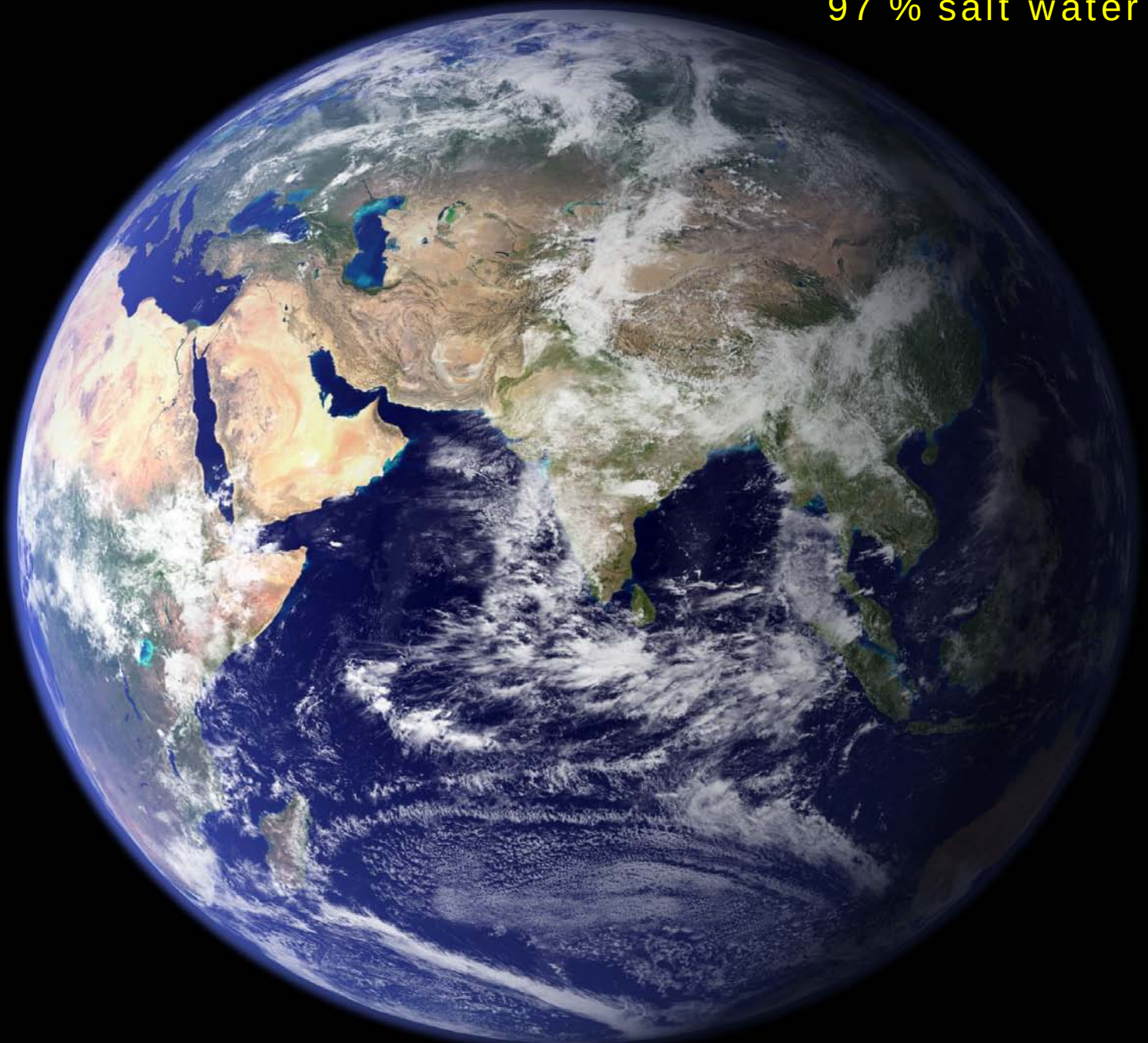
Managing Amarillo’s Water Future

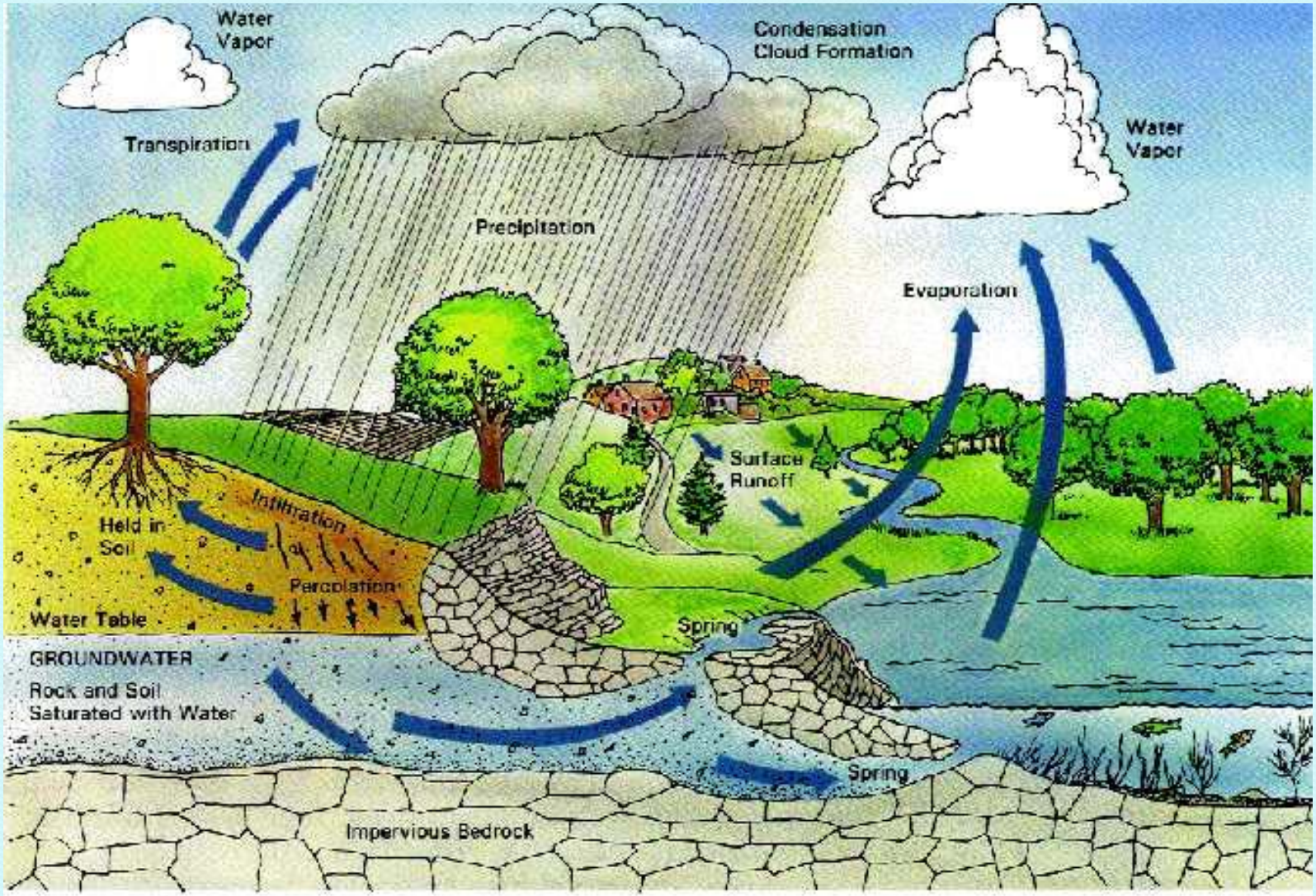
CITY OF AMARILLO® UTILITIES

The Future of Water in Amarillo and the Texas Panhandle

Earth, the Watery Planet - Over 310 million cubic miles.
97 % salt water



The Natural Hydrologic Cycle



The Human Hydrologic Cycle

Human Factors affecting the cycle

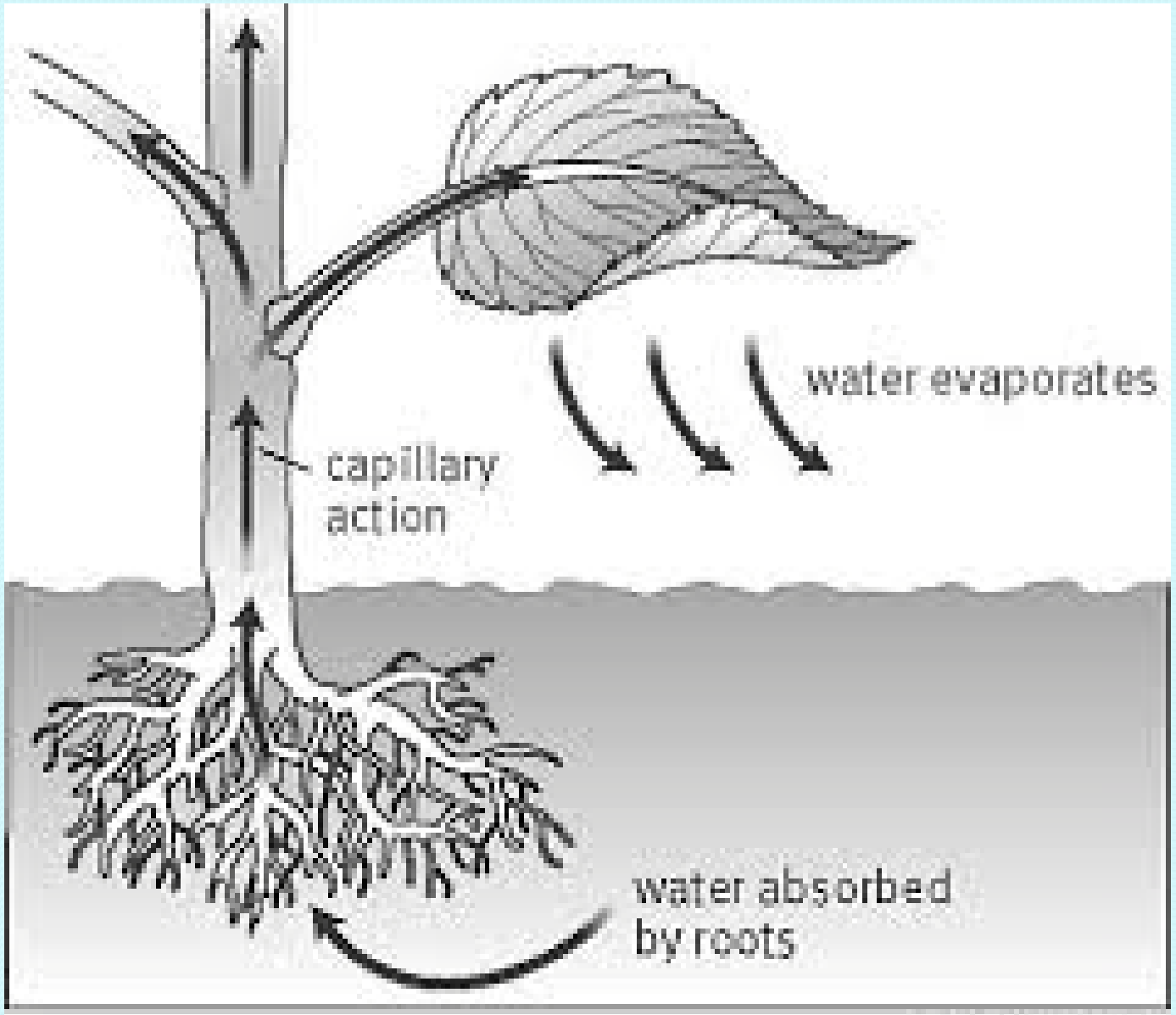
Negative impacts:

1. **Population growth.**
2. **Water consuming technologies**
3. **Water consuming "conveniences"**
4. **Water for "aesthetic" uses**
5. **Just plain "waste"**

Positive impacts:

1. **Clean up the water we mess up!**
2. **Conservation**
3. **Wastewater effluent re-use**
4. **Other alternative sources**

Irrigated Croplands Water Usage



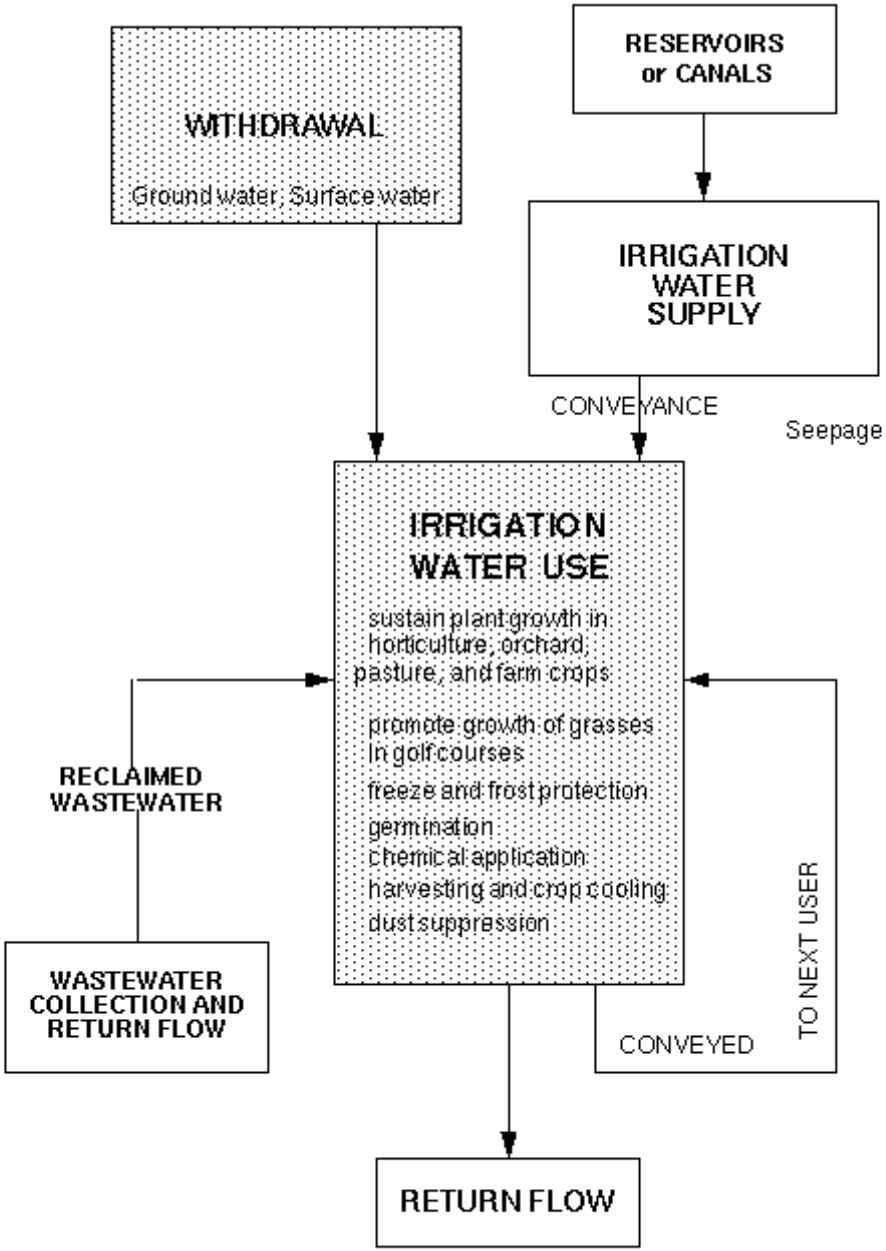
The <u>annual</u> Evaporation rate for Bushland is 60 – 70 inches. The following "high" rate years represent "drought" years.

- 1954 112 inches
- 1957 83 inches
- 1964 96 inches

Imagine how 2011 looked!

Ingredients for high rate of Evaporation:

- High ambient temperature
- low humidity
- High windspeed



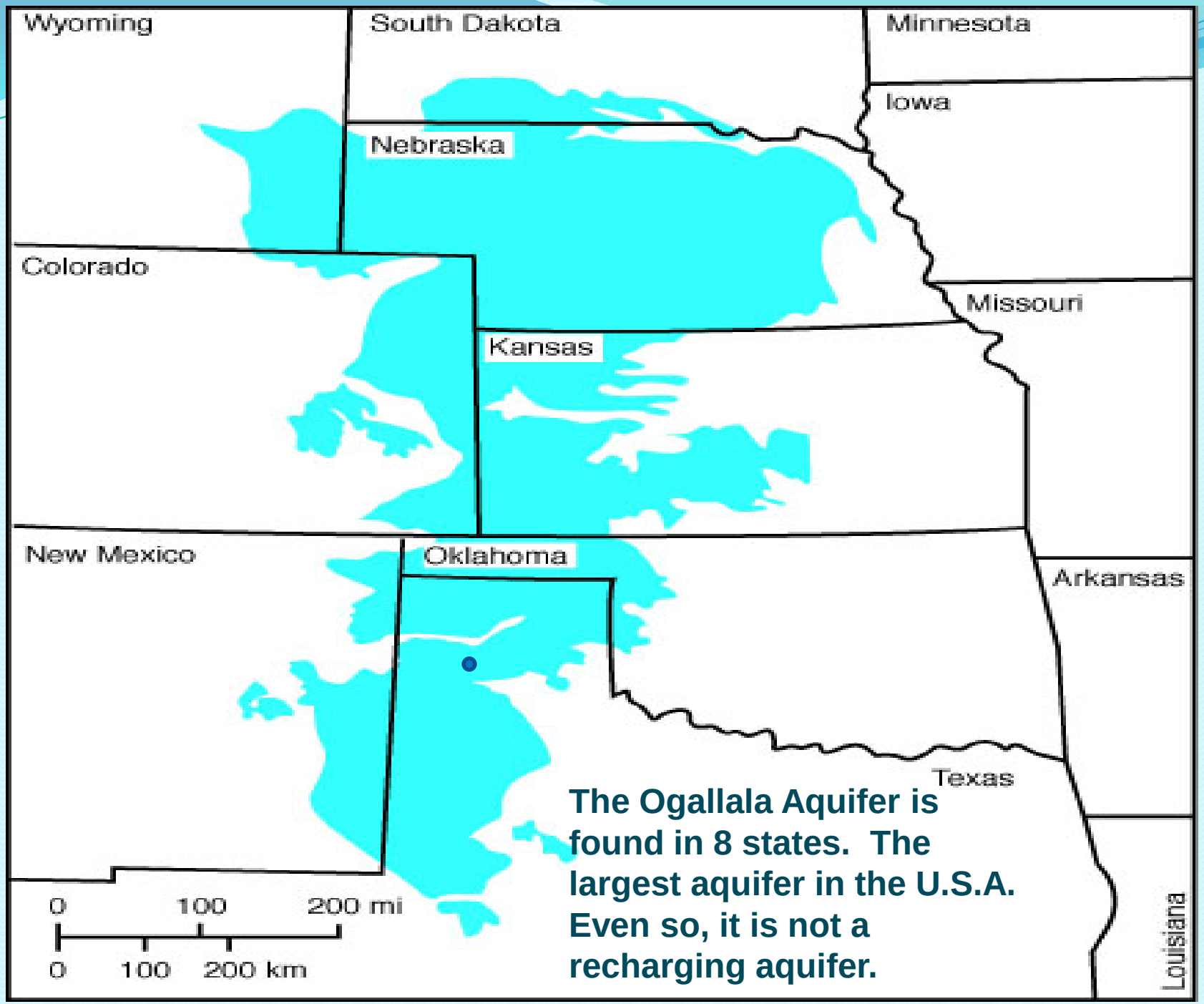
Consumptive use occurs as (1) evaporation from open reservoirs and conveyances and during application to plants, (2) evapotranspiration during plant growth, (3) product incorporation.

Transpiration Illustrated

Amarillo is a Growing City
Growth Creates More Water Demand

How do we meet this growing demand???

Current Water Sources



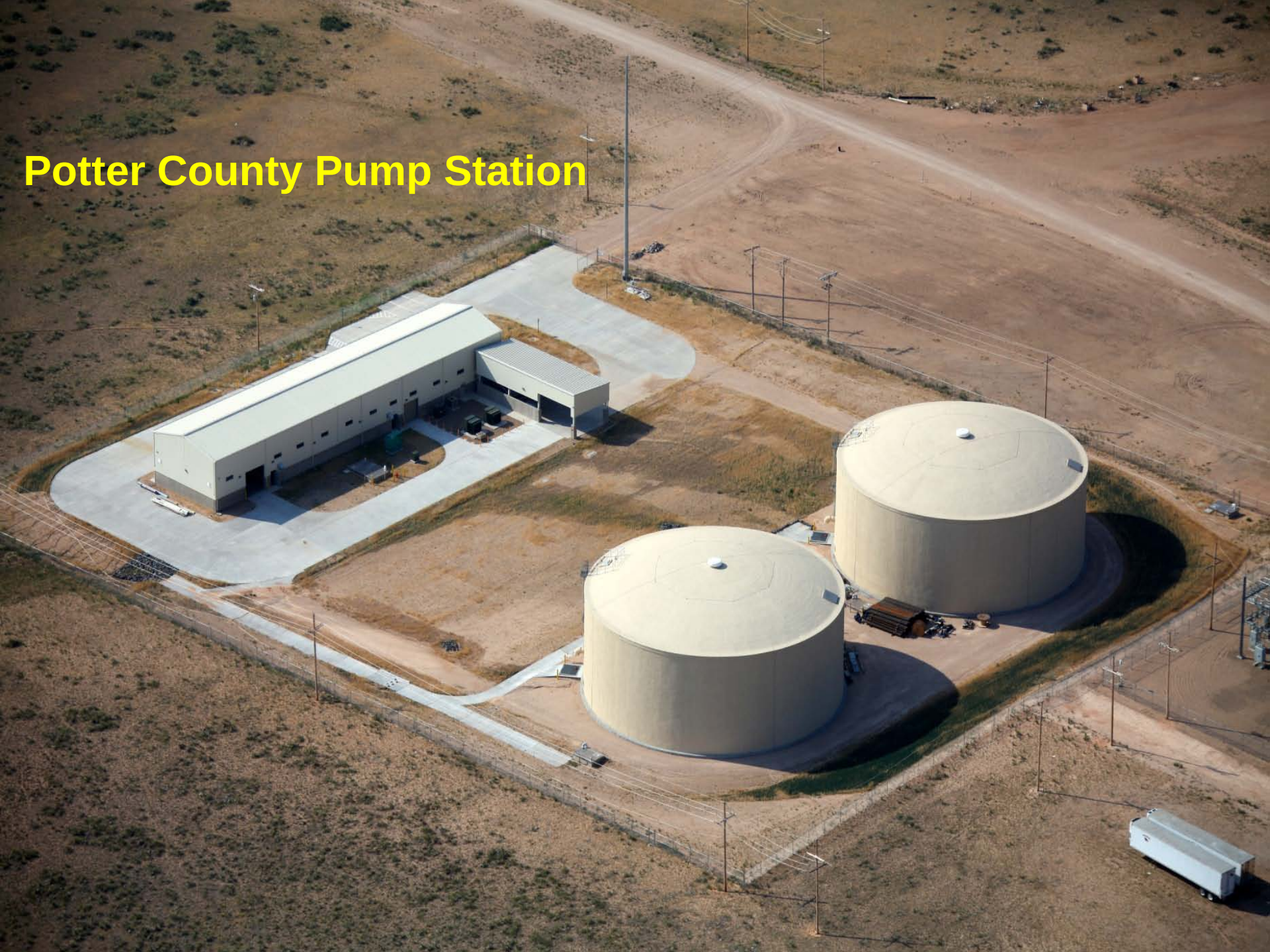
The Ogallala Aquifer is found in 8 states. The largest aquifer in the U.S.A. Even so, it is not a recharging aquifer.

Groundwater Sources
1927 City Lake pump station
Ogalla and (some) Santa Rosa

Carson County Well Field
About 35 MGD well field capacity

One of 41 wells in this well field

Potter County Wellfield
Well No. 501
1,100 gpm
Began production Sept. 2011


Potter County Pump Station

•Amarillo : Water, Weather and Growth.

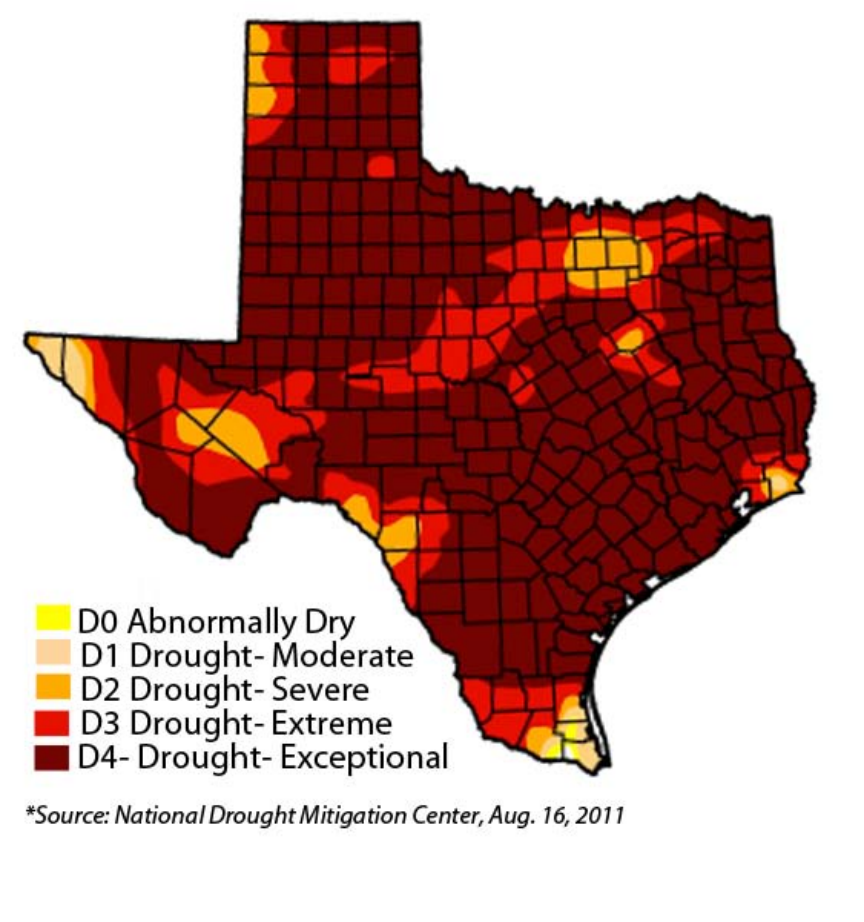
1. Water – until 1967 Amarillo's only water source was Ogallala groundwater.
   In **1967** Lake Meredith was placed in service.
2. Weather - Annual average rainfall is just under 20 inches.

   Recent rainfall:

   2011 = 7.01 inches.
   2012 = 12.33 "
   2013 = 15.20 "
   2014 = about 18 inches "
3. Growth – since the 1960's, Amarillo has grown steadily at approximately 1% per year . Current population is around 196,000.

Lake Meredith
In the “good times”

Then Came 2011 !!



Lake Meredith, in the depths of the drought.
Intake structure – out of the water

Planning the Panhandle Water Future

Water in the Panhandle is a "finite resource".

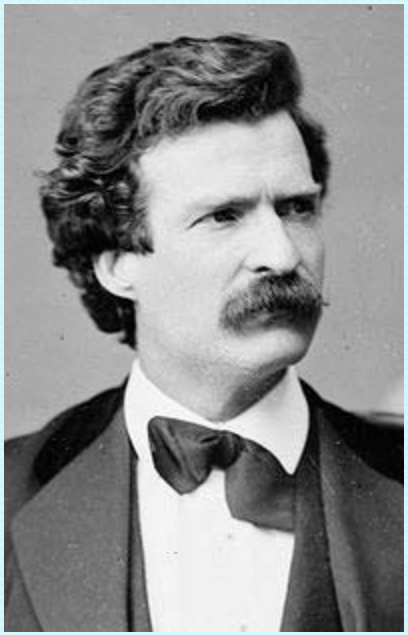
Finite = "Limited", the opposite of 'infinite'.

"One does not know the value of water until the well runs dry!"

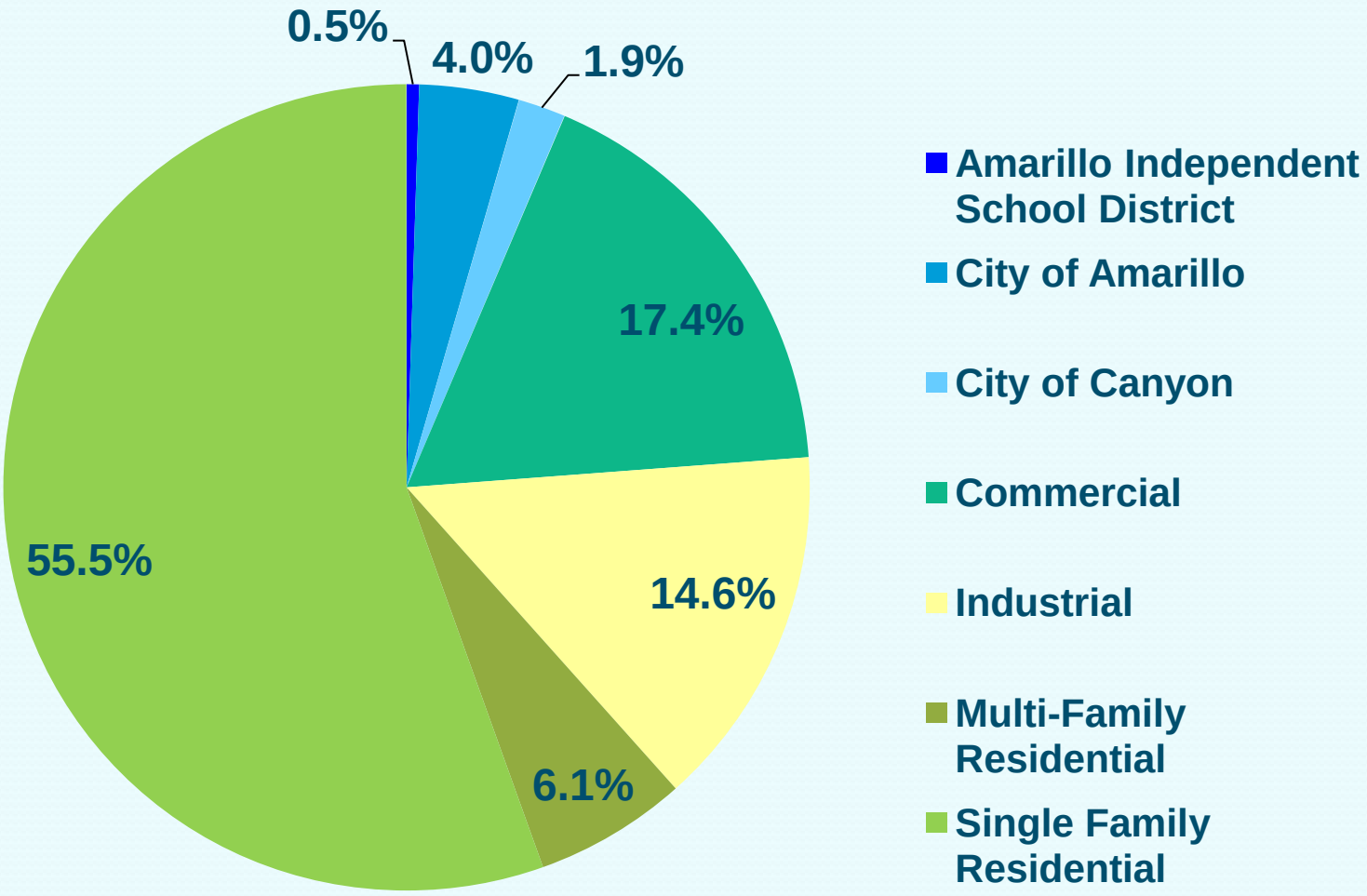
(Attributed to Mark Twain, but not certain.)

"Whiskey is for drinking, water is for fighting over."

(Definitely by M. Twain)



Water Use Categories – 2011 by Customer Category



Residential irrigation

Agricultural Irrigation

So, we are "competing" for water in several respects.

- **Ag irrigation 89% of Panhandle usage.**
- **Cities 6 % " " "**
- **Industry 5% " " "**

We are also competing with evapotranspiration, and drought periods, which is considerably more than the usage categories above.

Row-Furrow Irrigation

Irrigated Corn Crop:
1.0 acre of corn requires about
0.5 million gallons(18 inches)
of water to grow a crop.
Center Pivot Technique

Center Pivot Circles: aerial view

Oil well pump jack – Petroleum industry

WATER USE Category Petroleum Industry
Oil Refinery : Borger, TX

Water Use Category
CAFO

Each grown cow requires about 12-13 gallons water per day

Water Use Category - CAFO

Water Use Category – Corporate Dairy Farm "milking parlor"

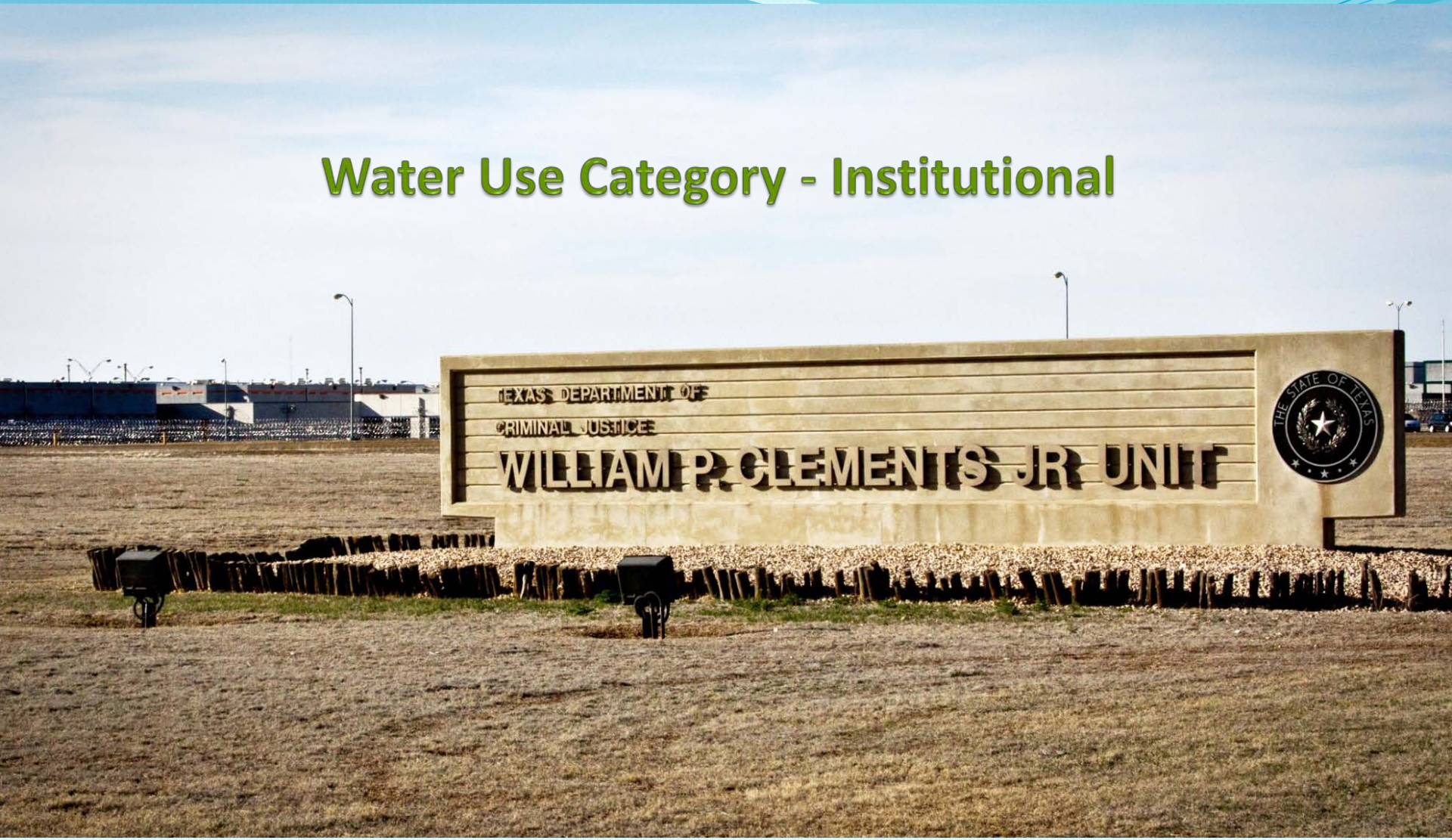
Water Use Category – Steam Electric Generation

Uses more than 20 X as much effluent as fresh water

Water Use Category - Industry

4.3 Million gallons per day

Water Use Category - Institutional



TDCJ - Clements & Neal Units

374,393,000 gallons - 1.05 million gallons per day

Water Use Category - Industry

Owens – Corning fiberglass

177,190,000 gallons – 485,400 gpd

Water Use Category - Industry

ASARCO Copper Refinery

68,810,000 gallons – 188,500 gpd

Water Use Category - Institutional

BSA Health Services

73,526,000 gallons – 201,400 gpd

City of Amarillo
About 300 million Gal. per year

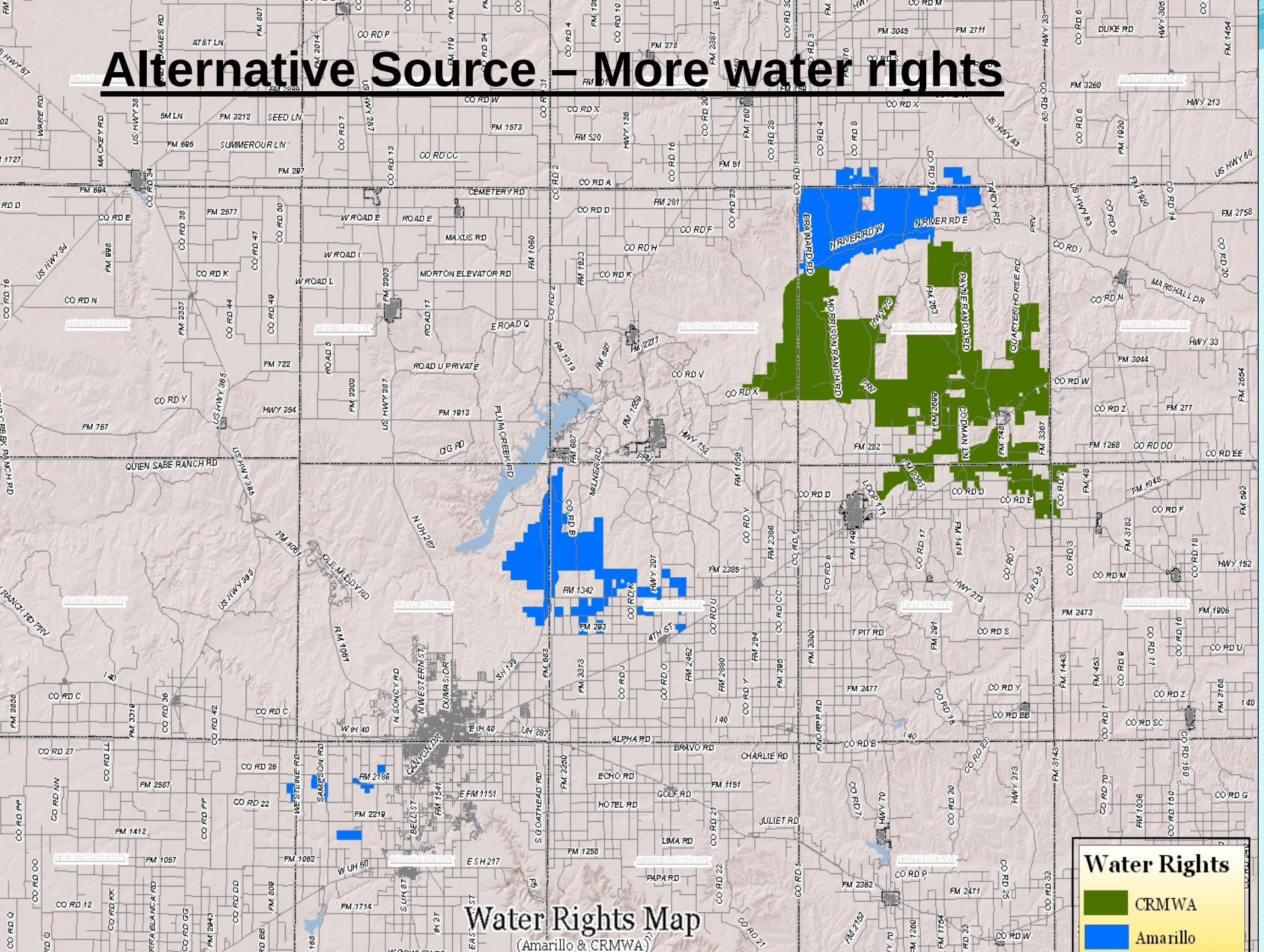
Water Use Category is Institutional

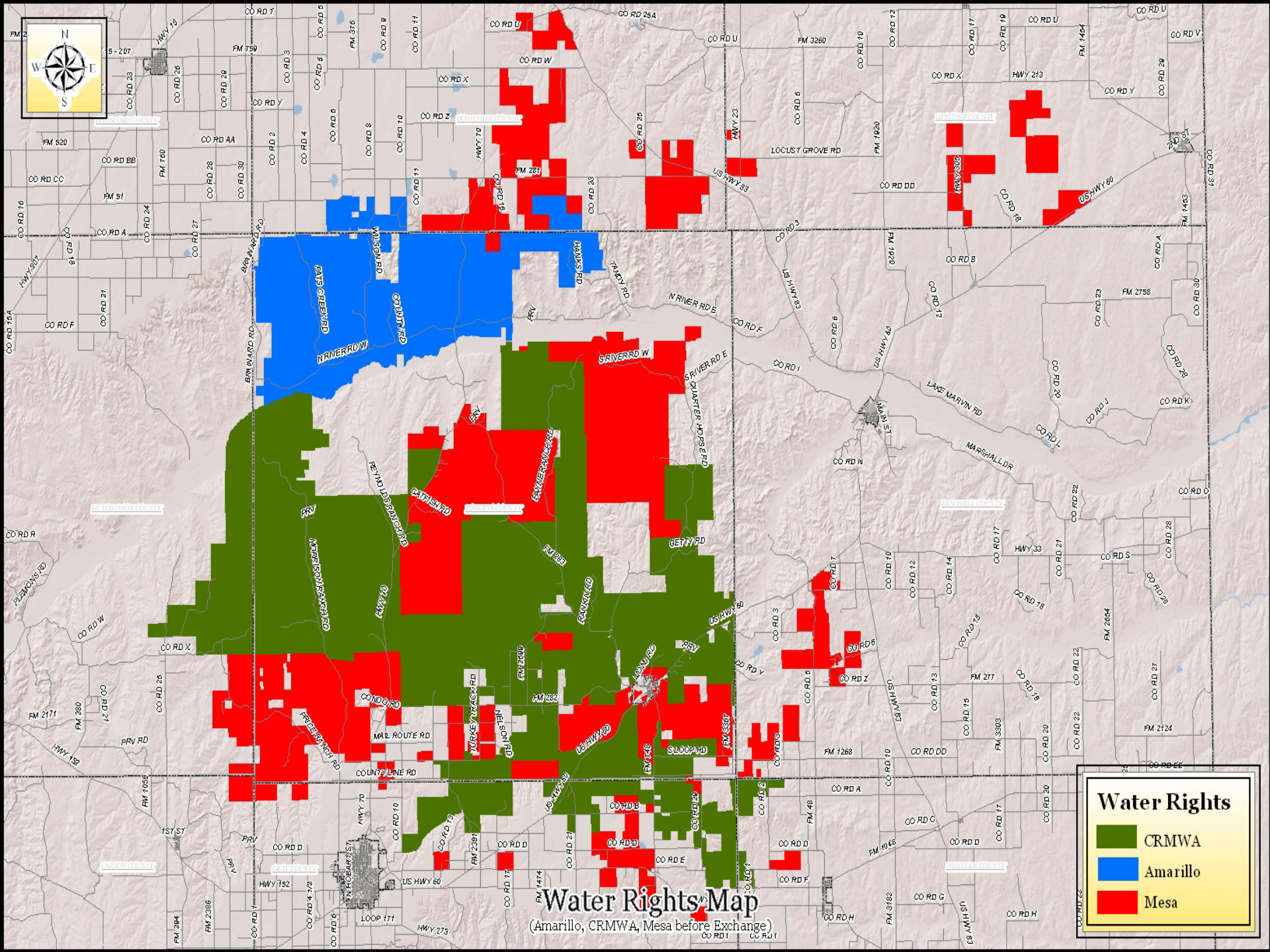
How do we prepare for the future??

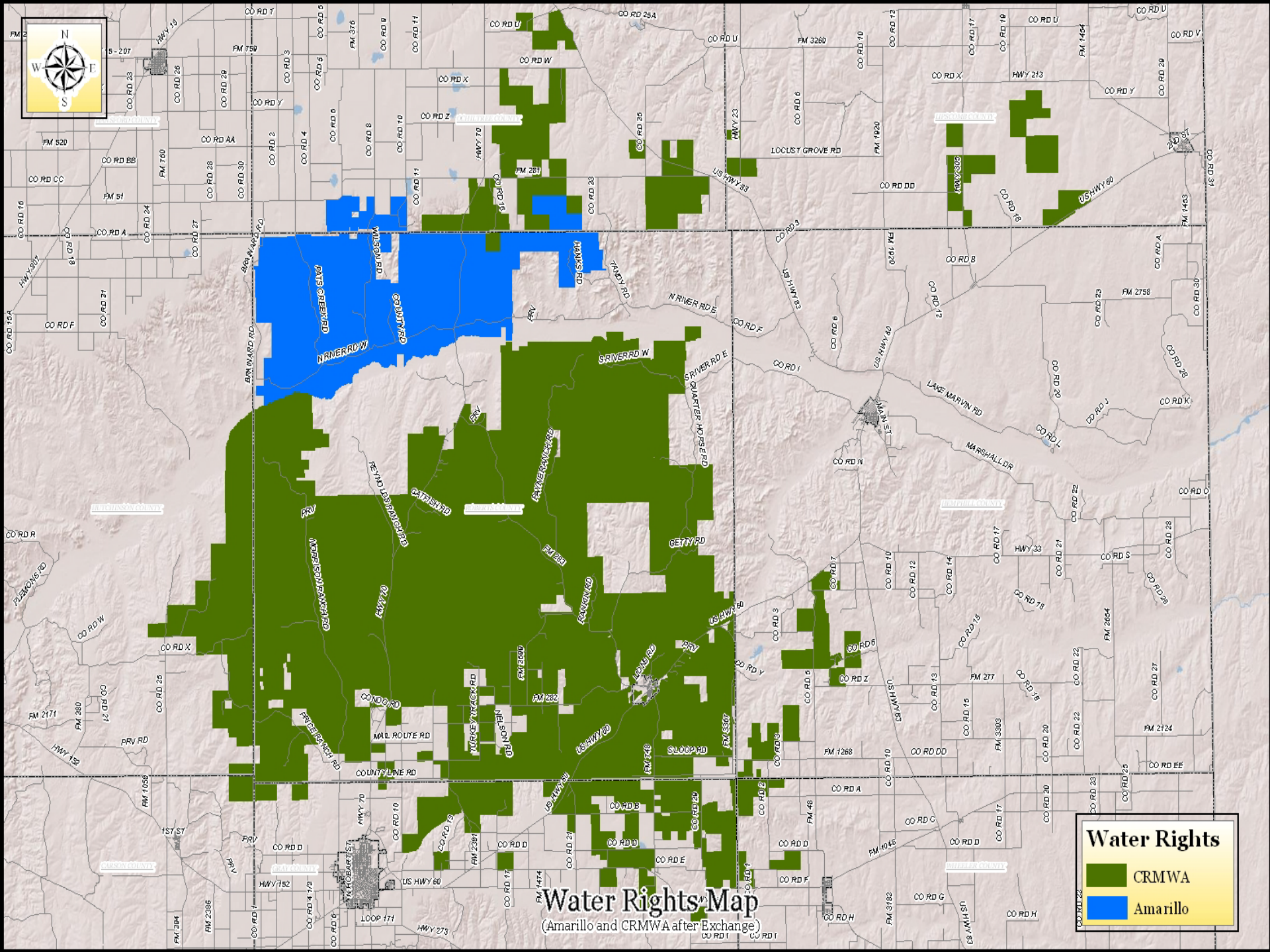
We need more water sources…right??

Well, we do have more sources!!
The best, most available, “Source” is Conservation.

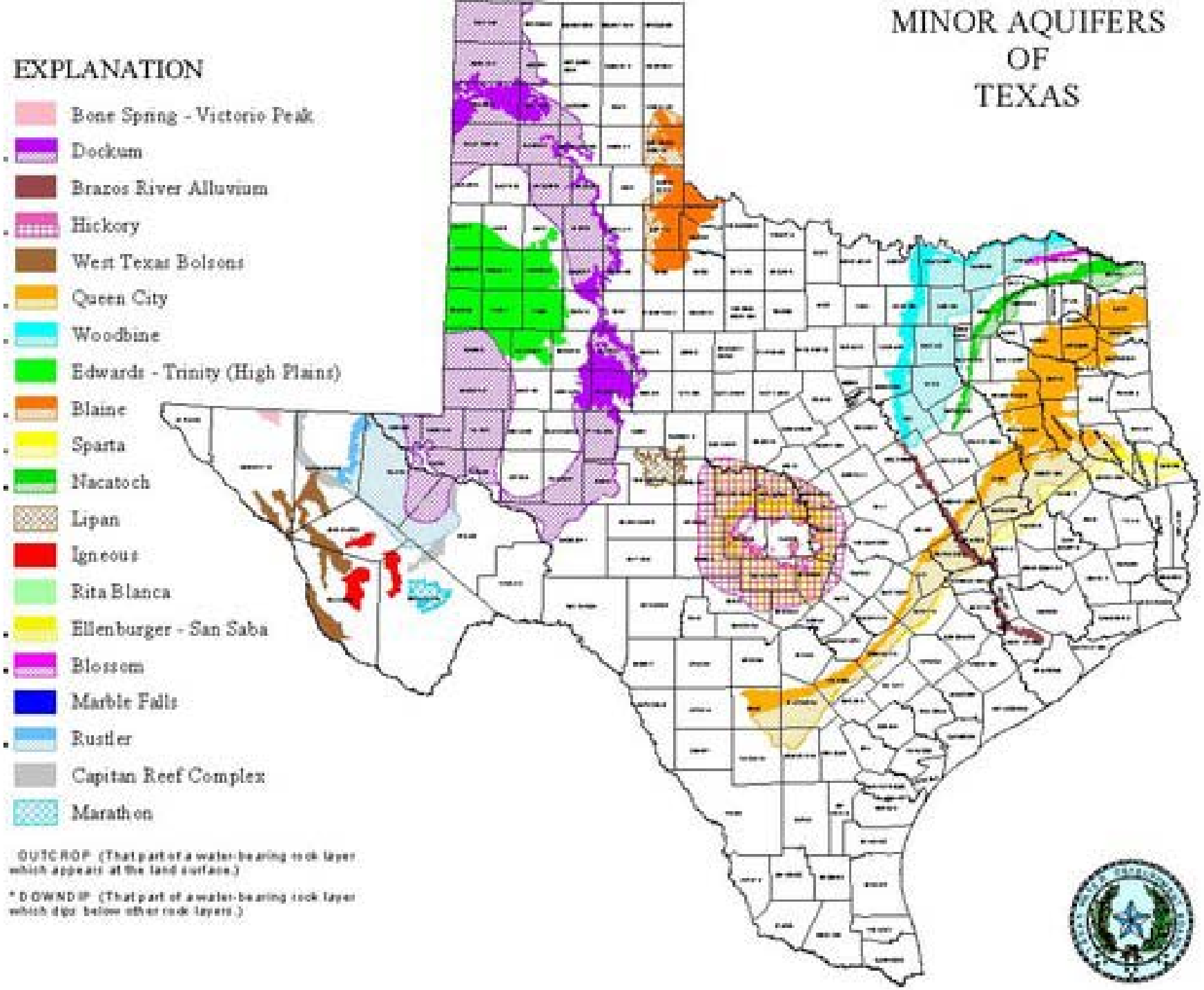
Alternative Source – More water rights




Water Rights
CRMWA
Amarillo
Mesa
Water Rights Map
(Amarillo, CRMWA, Mesa before Exchange)


Water Rights
CRMWA
Amarillo
Water Rights Map
(Amarillo and CRMWA after Exchange)

MINOR AQUIFERS OF TEXAS



Reclaimed Water

Another Conservation Approach

Another water "source"

Every Drop Counts.

City of Amarillo • www.amarillo.gov

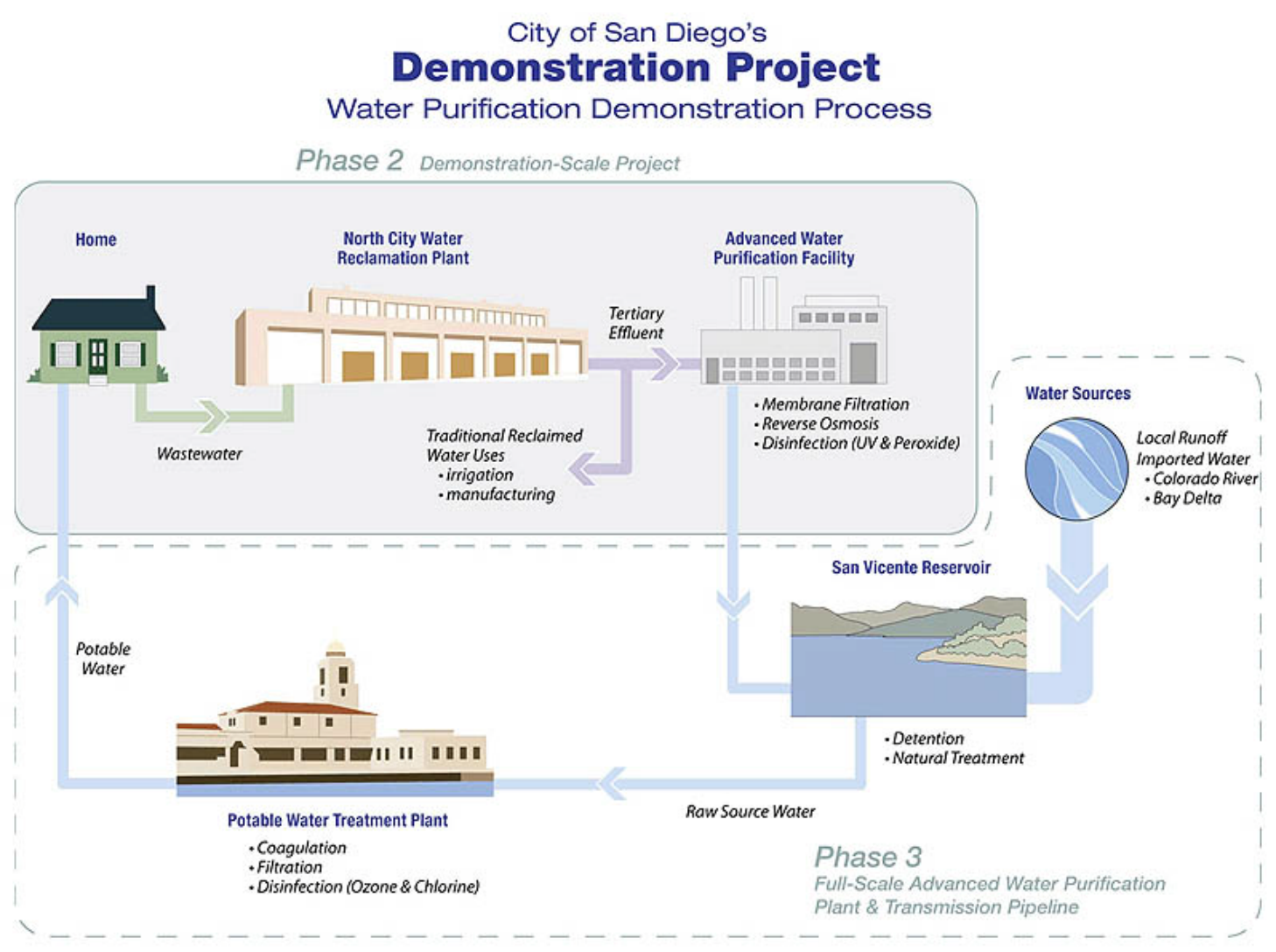
Reclaimed Water Pumps.
Hollywood Rd. WWTP
Pumping to Excel Energy power plants

Conserve !!

Every Drop Counts.

City of Amarillo • www.amarillo.gov

Next Alternative Source?
Indirect or direct Potable Re-use



End of Program

Are there any Questions Or Comments?