What goes down must (mostly…) come up:
Aquifer Storage and Recovery in Texas

Robert E. Mace, Ph.D., P.G.
Texas Water Development Board

presented at

The 36th Annual Oklahoma Governor's Water Conference and Research Symposium

Norman, Oklahoma; December 2, 2015

The following presentation is based upon professional research and analysis within the scope of the Texas Water Development Board's statutory responsibilities and priorities but, unless specifically noted, does not necessarily reflect official Board positions or decisions.

Texas Water Development Board

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

1910

TEXAS BOARD OF WATER ENGINEERS

R. M. Dixon, Chairman
H. A. Beckwith, Member
O. F. Dent, Member

BULLETIN 5701

ARTIFICIAL-RECHARGE EXPERIMENTS AT MCDONALD WELL FIELD, AMARILLO, TEXAS

By

E. A. Moulder and D. R. Frazor,
Hydraulic Engineers
United States Geological Survey

Prepared in cooperation with the Geological Survey,
United States Department of the Interior,
and the
City of Amarillo

January 1957

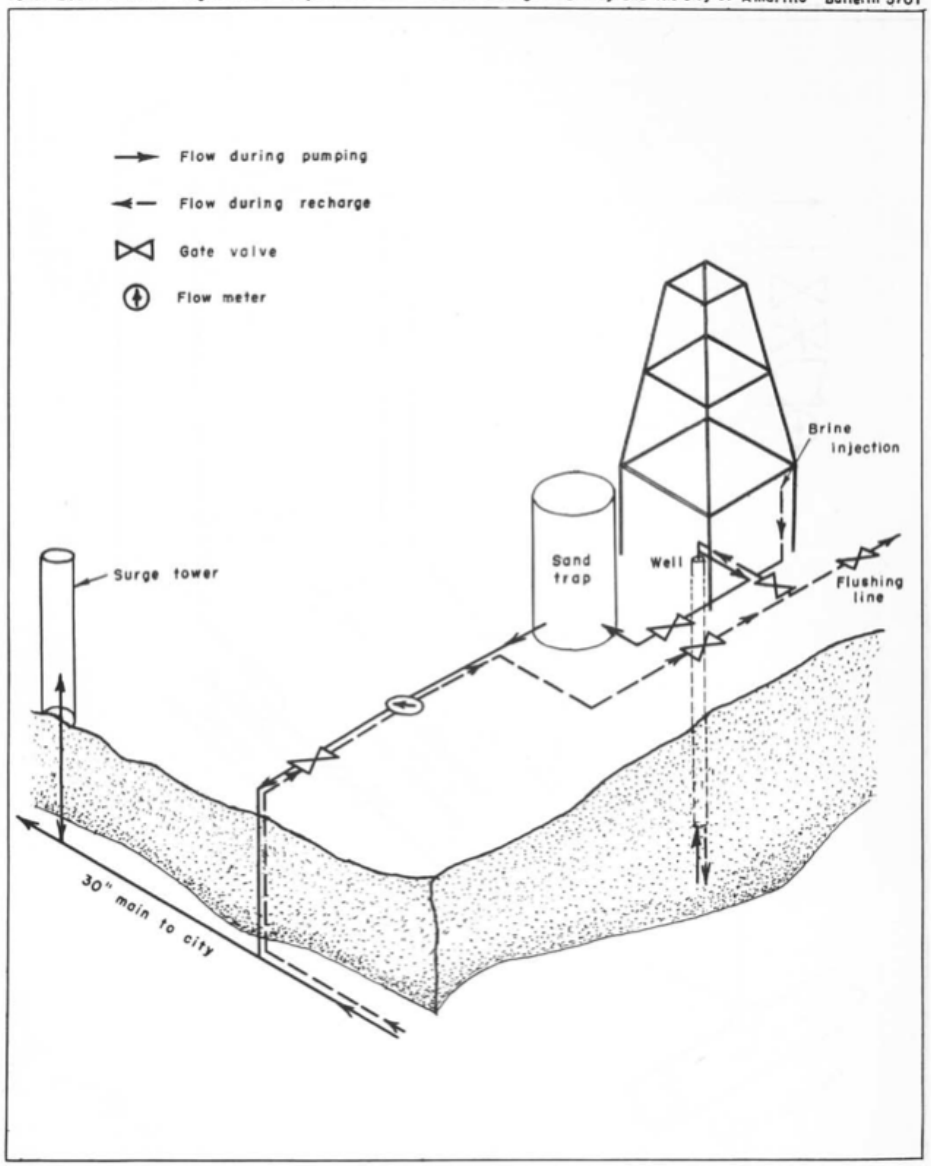
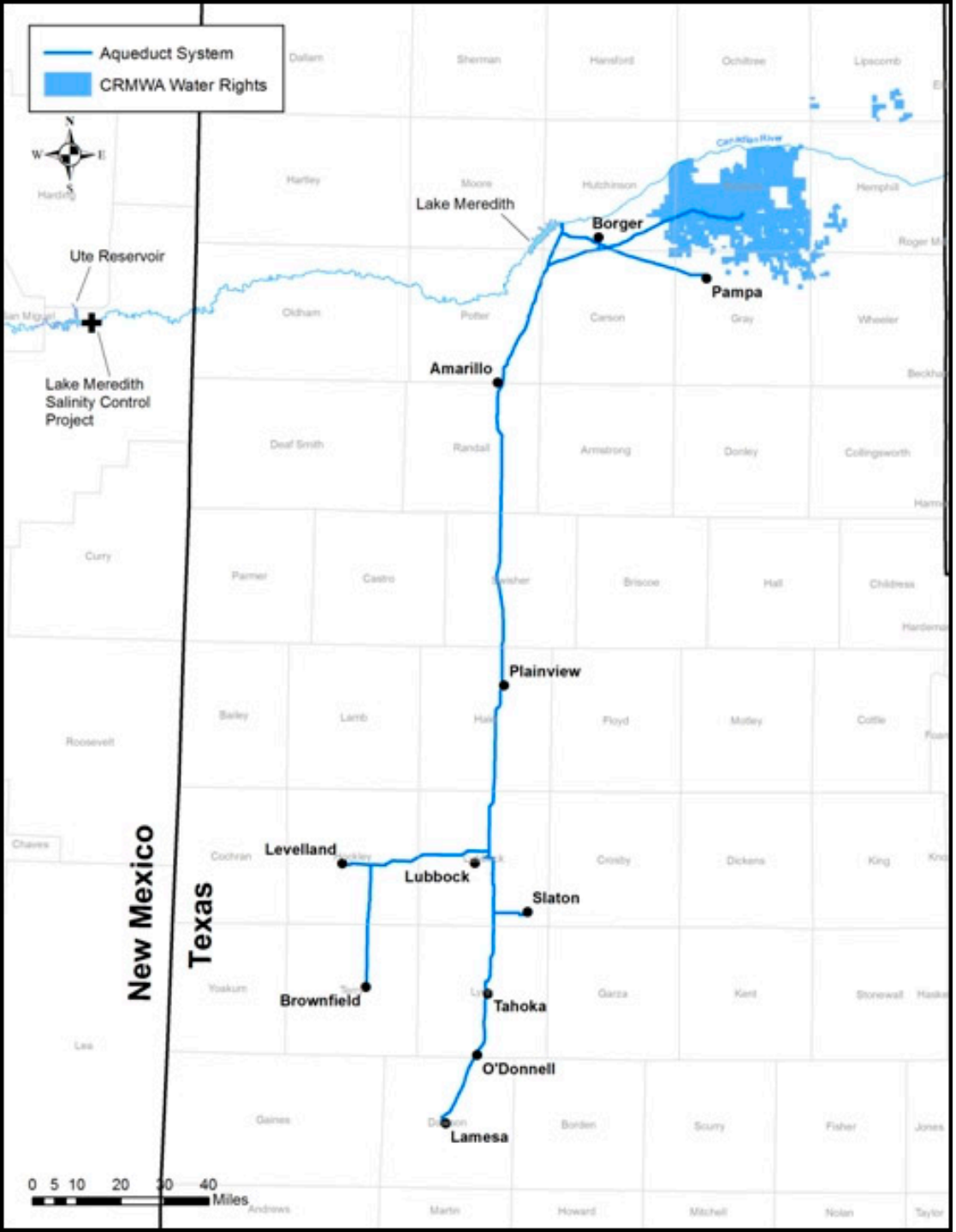


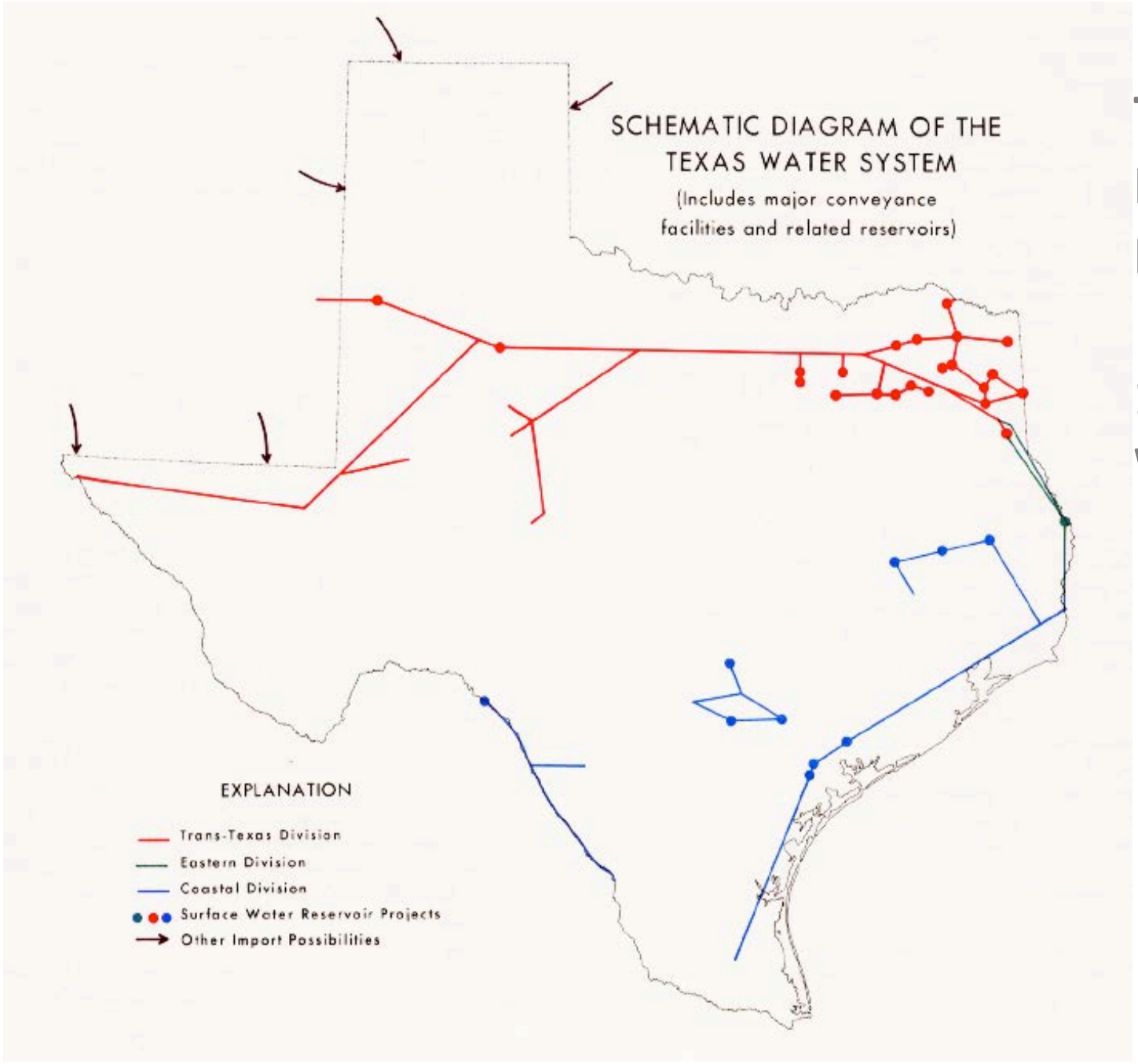
FIGURE 3.-Schematic drawing of distribution lines at recharge well.

1954 - 1957



“good ole boy” ASR off the Canadian River Municipal Water Authority’s pipeline

1960s



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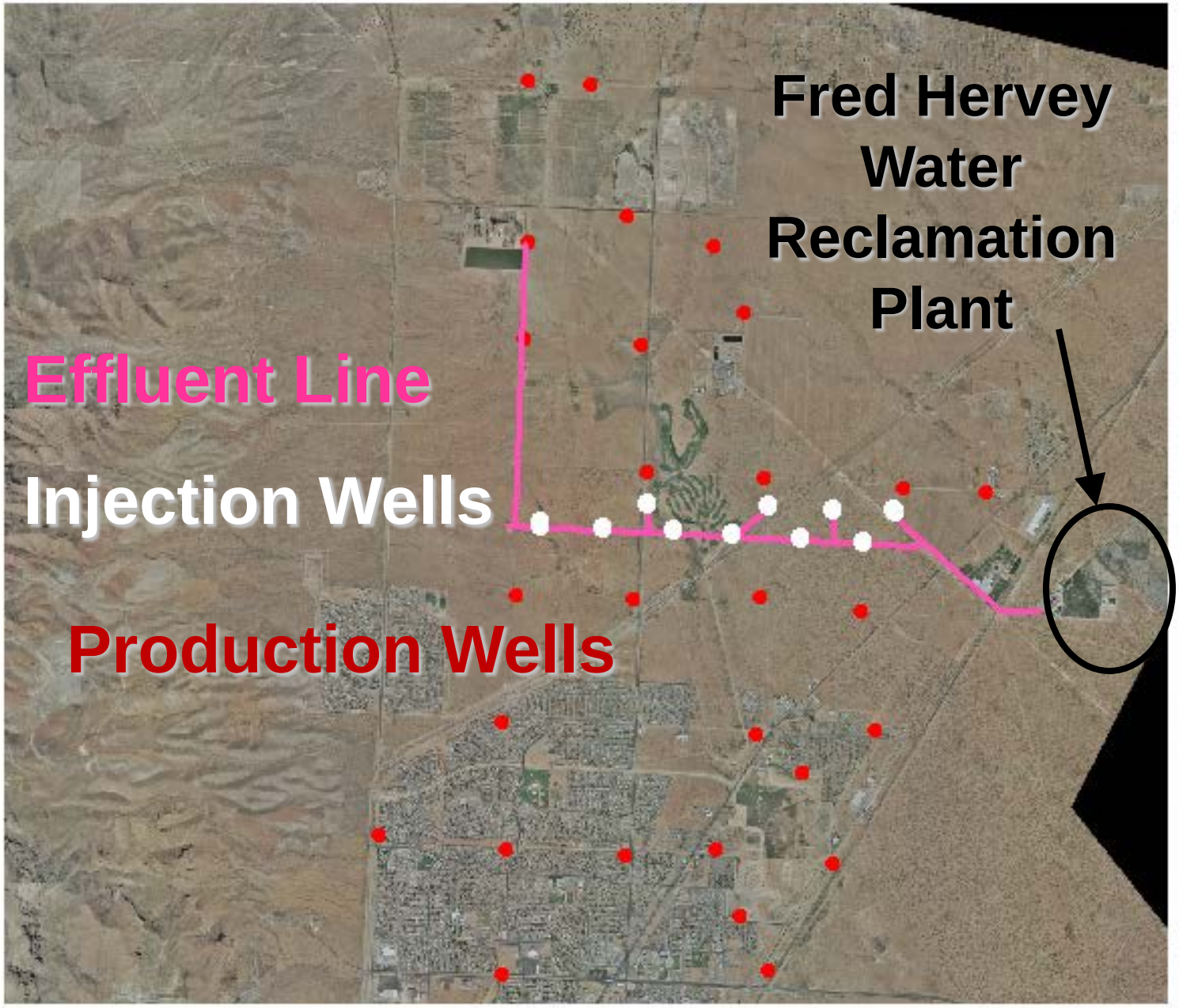
1968 State Water Plan

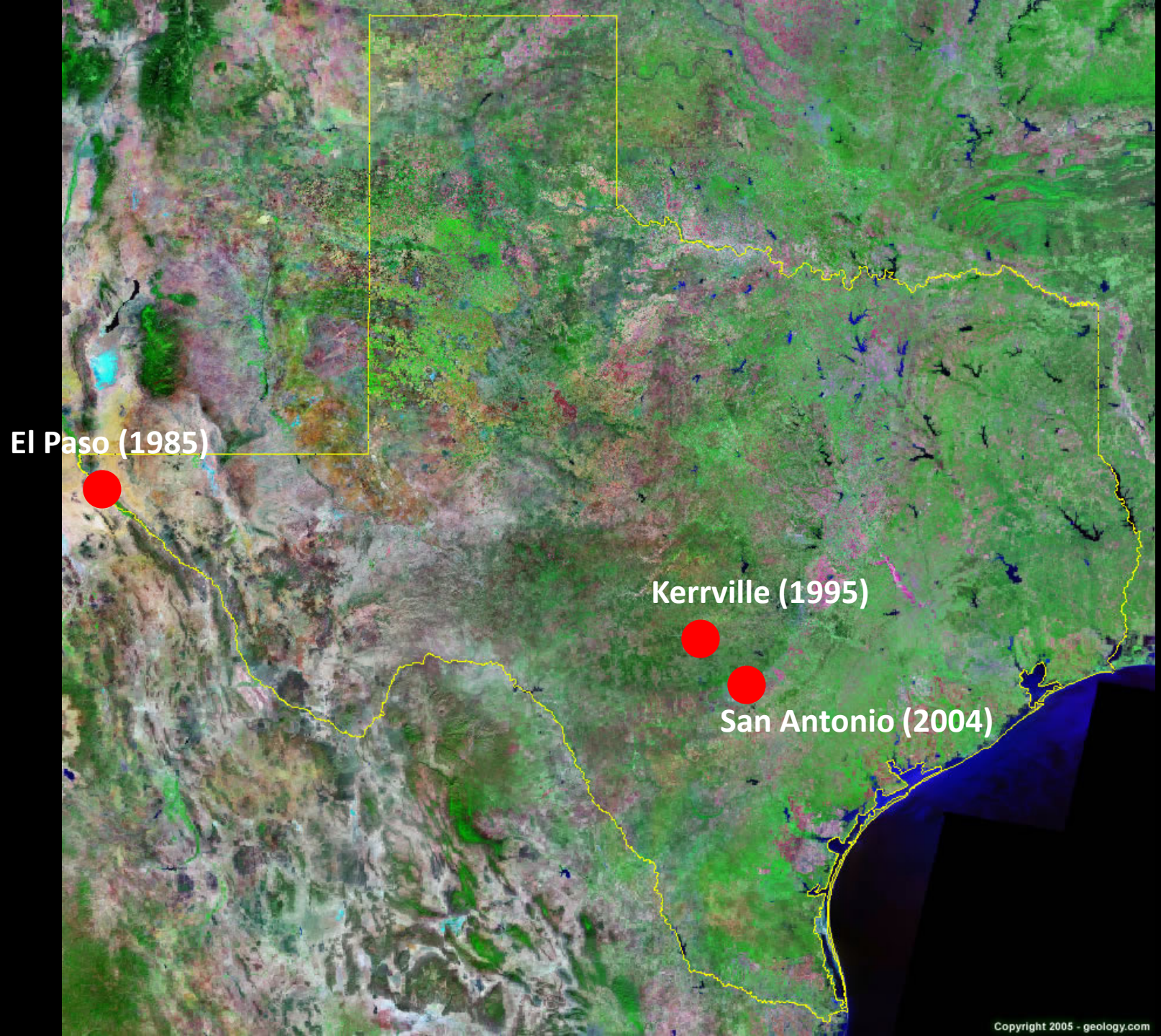
Effects of Artificial Recharge on the Ogallala Aquifer, Texas

United States Geological Survey Water-Supply Paper 2251

Figure 21. Recharge operations, showing details of pressure recharge system, Dunlap site.

1984


Fred Hervey
Water
Reclamation
Plant
Effluent Line
Injection Wells
Production Wells
N
0
1
2
3
4
5 Miles
1985

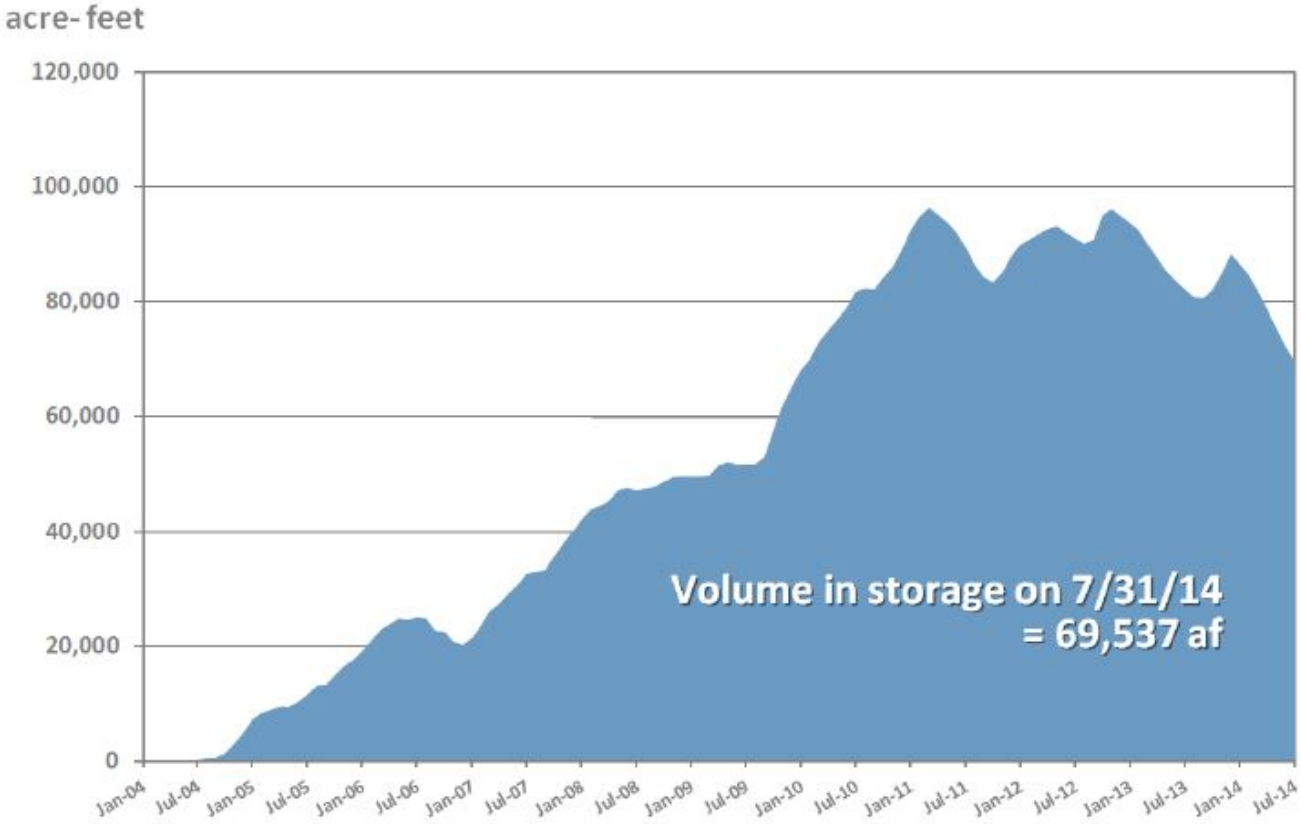

El Paso (1985)
Kerrville (1995)
San Antonio (2004)
Copyright 2005 - geology.com

House Bill 1989, 74th

- Authorized use of Texas Water Development Board funds for aquifer storage and recovery
- Authority not used until 1996-1997 when four feasibility studies were funded with ~$900,000 of state funds
  - ASR feasible at all sites, including in San Antonio
- Allowed state water (surface water) to be placed underground

1995

San Antonio's project

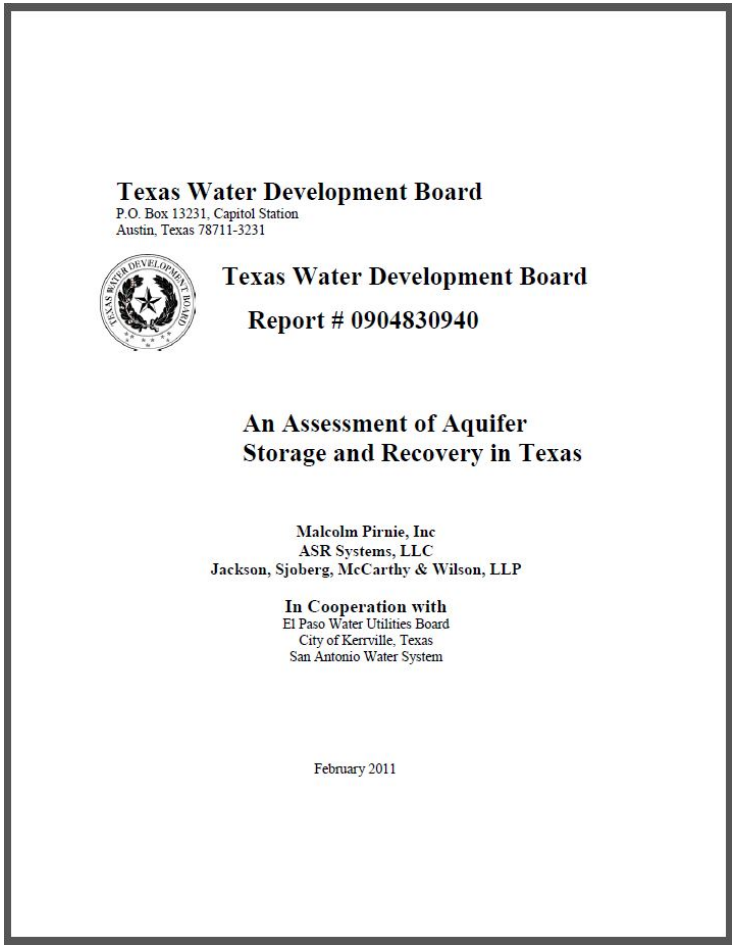


Source: San Antonio Water System 2014.

Figure 2. **Twin Oaks Aquifer Storage and Recovery facility's cumulative storage from 2004 to 2014 (af = acre-feet).**

2004

Why isn't there more ASR in Texas?



Texas Water Development Board
P.O. Box 13231, Capitol Station
Austin, Texas 78711-3231

Texas Water Development Board

Report # 0904830940

An Assessment of Aquifer Storage and Recovery in Texas

Malcolm Pirnie, Inc
ASR Systems, LLC
Jackson, Sjoberg, McCarthy & Wilson, LLP

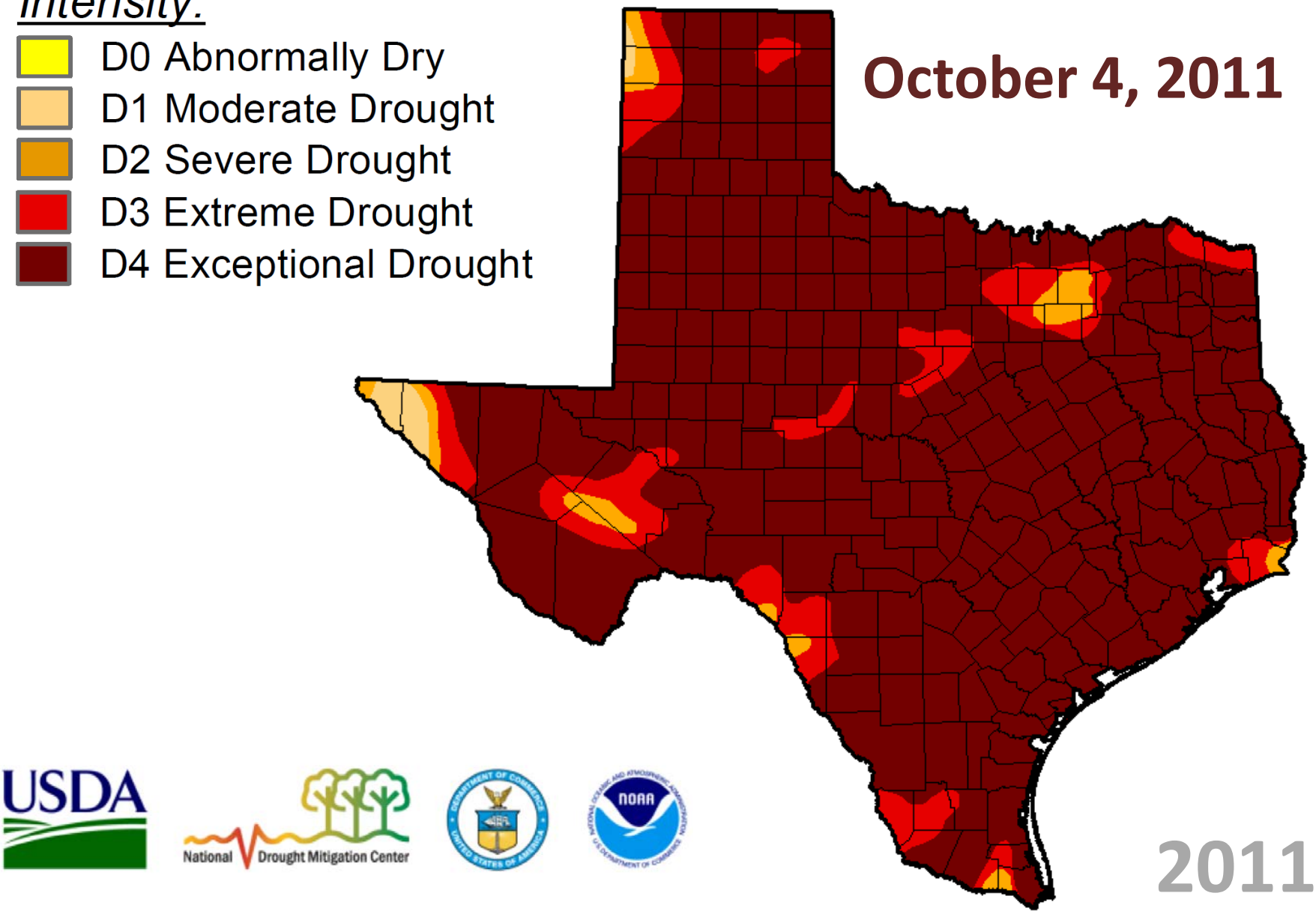
In Cooperation with
El Paso Water Utilities Board
City of Kerrville, Texas
San Antonio Water System

February 2011

Primary concerns:

- Ability to recover stored water
- Quality of recovered water
- Cost effectiveness
- Potential for others to recover the stored water

2011


Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought
October 4, 2011
USDA
National Drought Mitigation Center
NOAA
2011

Let's make better use of our water resources

MANAGED AQUIFER RECHARGE

How Texas can maximize water resources by adopting aquifer recharge strategies for water supply storage and for water management flexibility

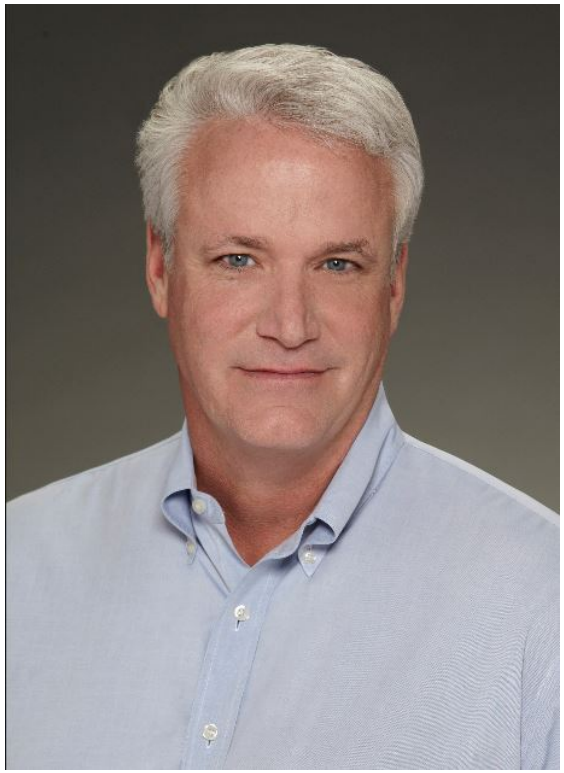
TEXAS (ASR)

Aquifer Storage Recovery

American Ground Water Trust – July 24, 2013, Austin, Texas

NORRIS CENTER, Austin • Northcross, 2525 West Anderson Lane, Ste. 365, Austin, TX 78757

2013



State Rep. Lyle Larson

Co-authors: Lucio III, Workman, Fallon, Villalba
Senate sponsor: Charles Perry; co-sponsor: Creighton

Leadership in Water Resources for Texas

House Bill 655, 84th

- **Cleaned up archaic language**
- **Permitting with Texas Commission on Environmental Quality, not local groundwater conservation district**
- **Can be permitted by rule or general permit**
- **Regional management goals (desired future conditions) do not apply to ASR project**
- **Allows a loss of injected water**
- **Can pull out what you put in (minus a predetermined loss)**
- **Reporting requirements**
- **Budget rider for $1 million for demonstration and feasibility projects**

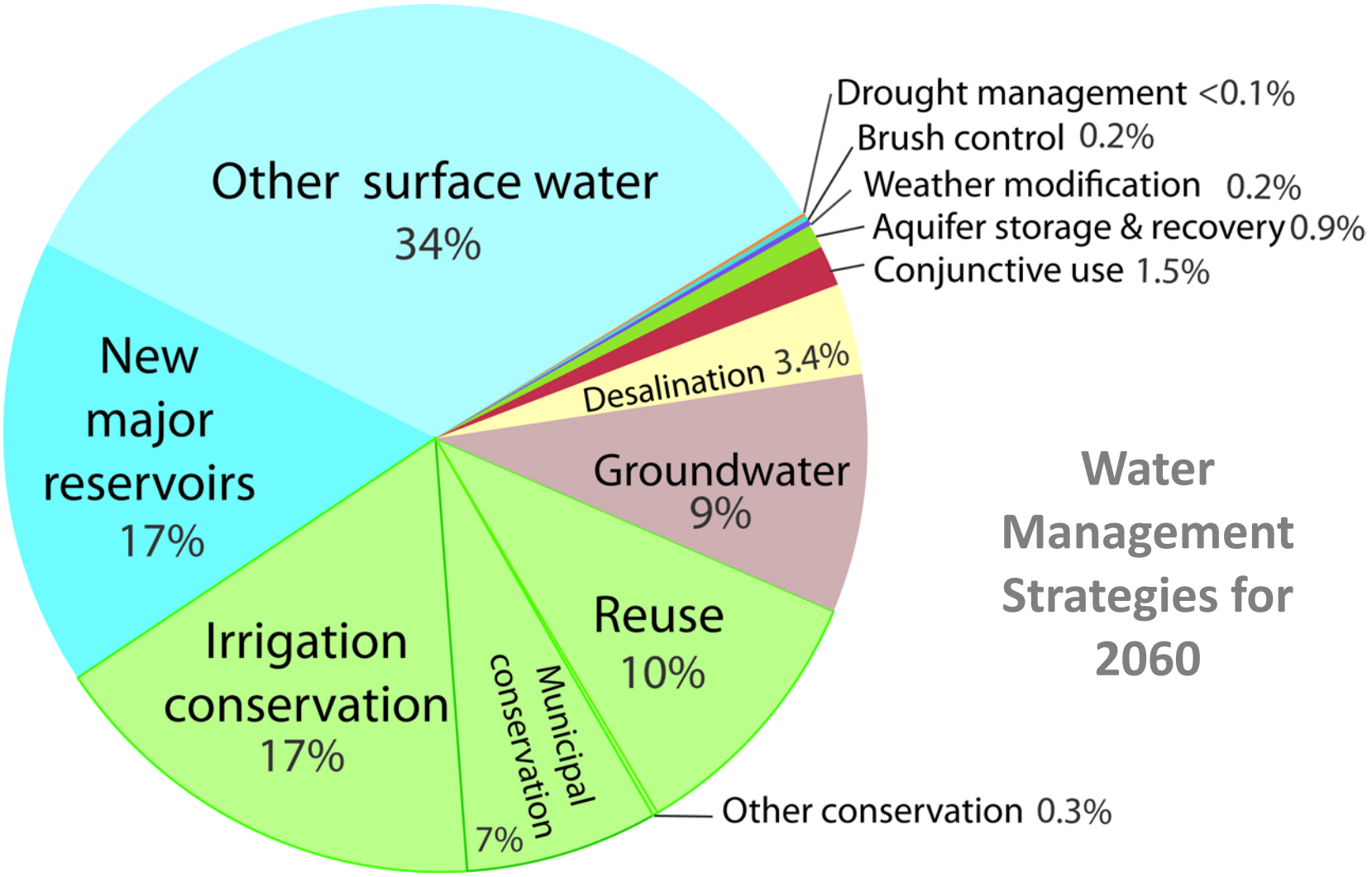
2015

WATER FOR TEXAS 2012 STATE WATER PLAN

2012 Water for Texas

TEXAS WATER DEVELOPMENT BOARD

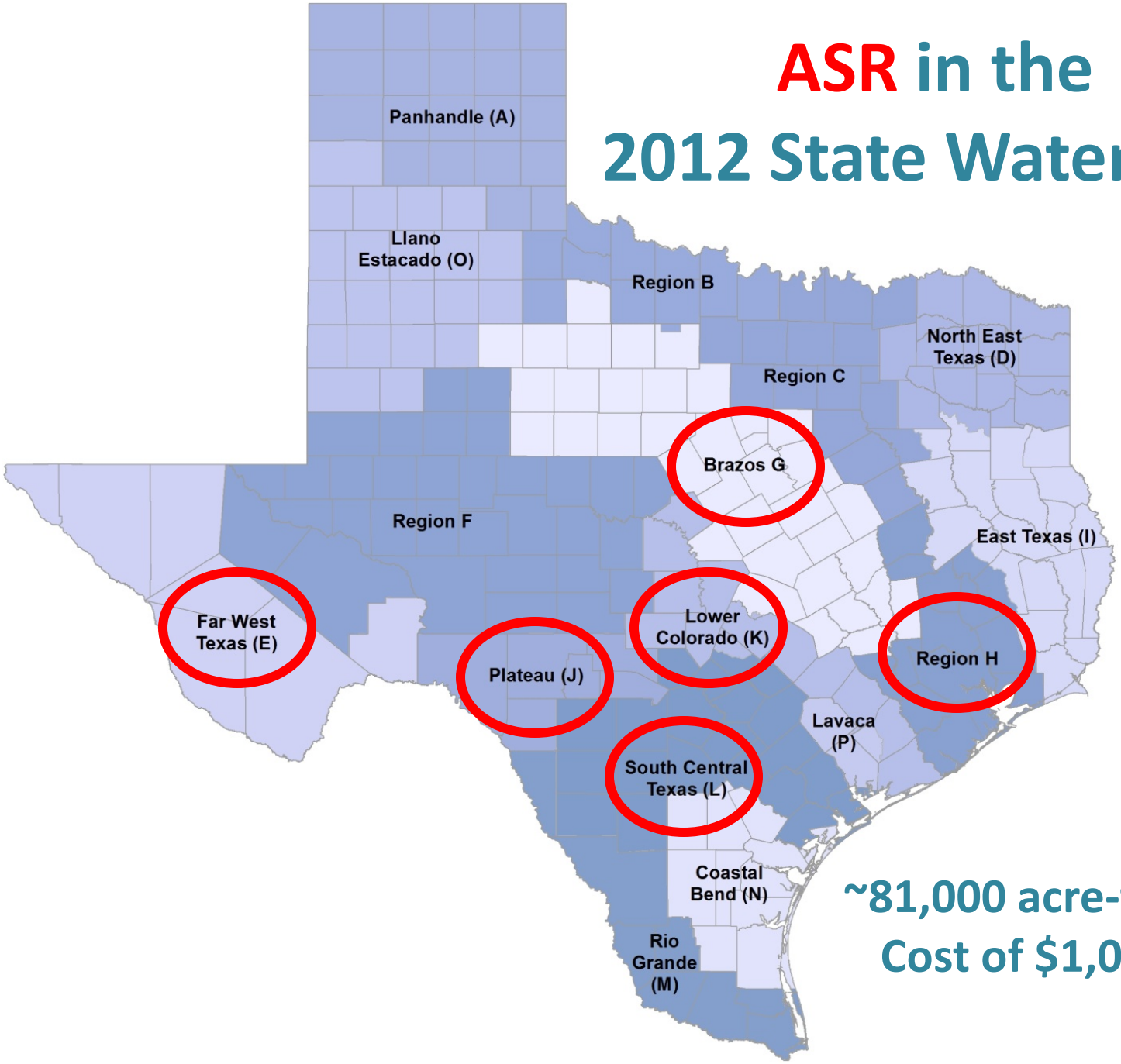
What can we do?



Water Management Strategies for 2060

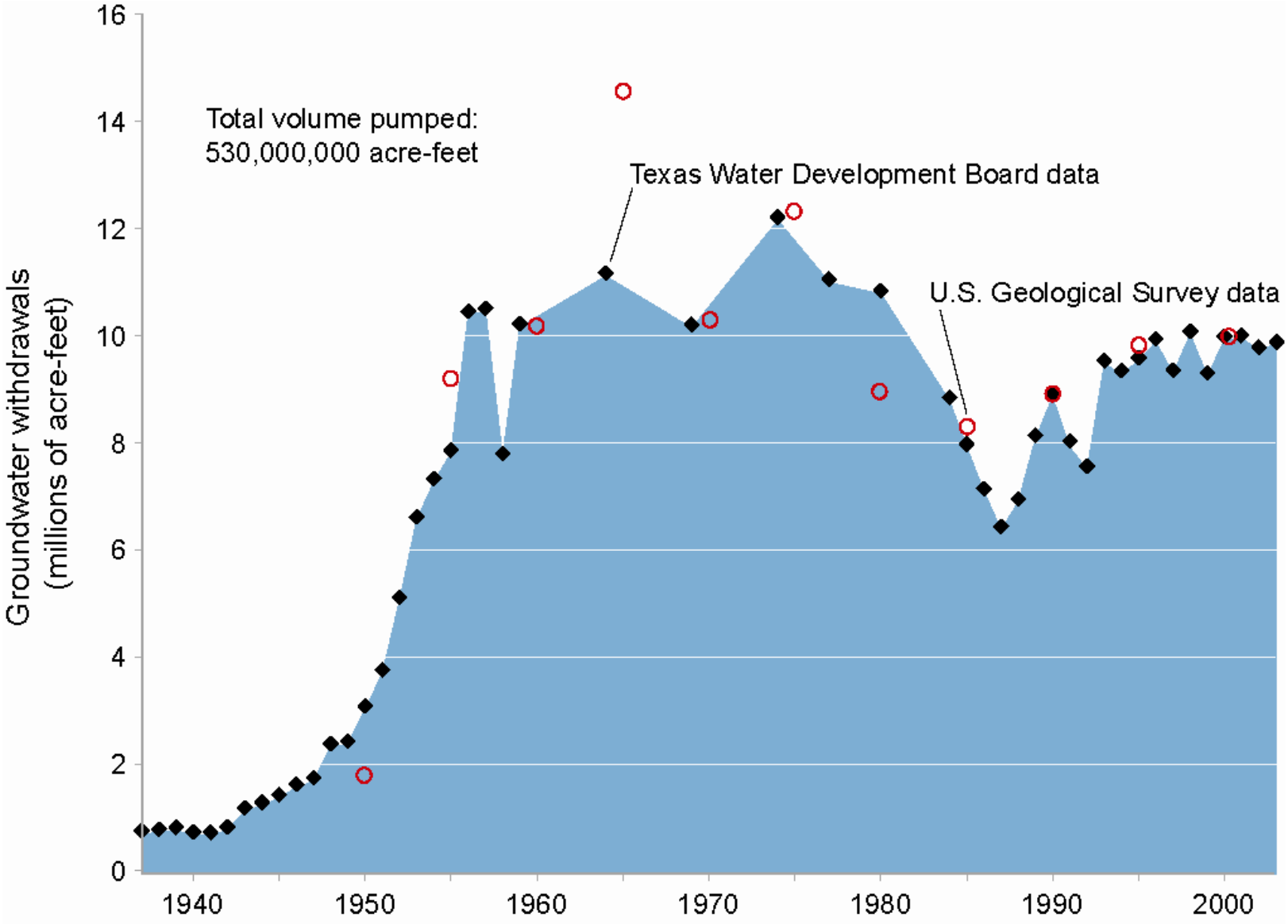
data from the 2011 regional water plans summary

ASR in the 2012 State Water Plan

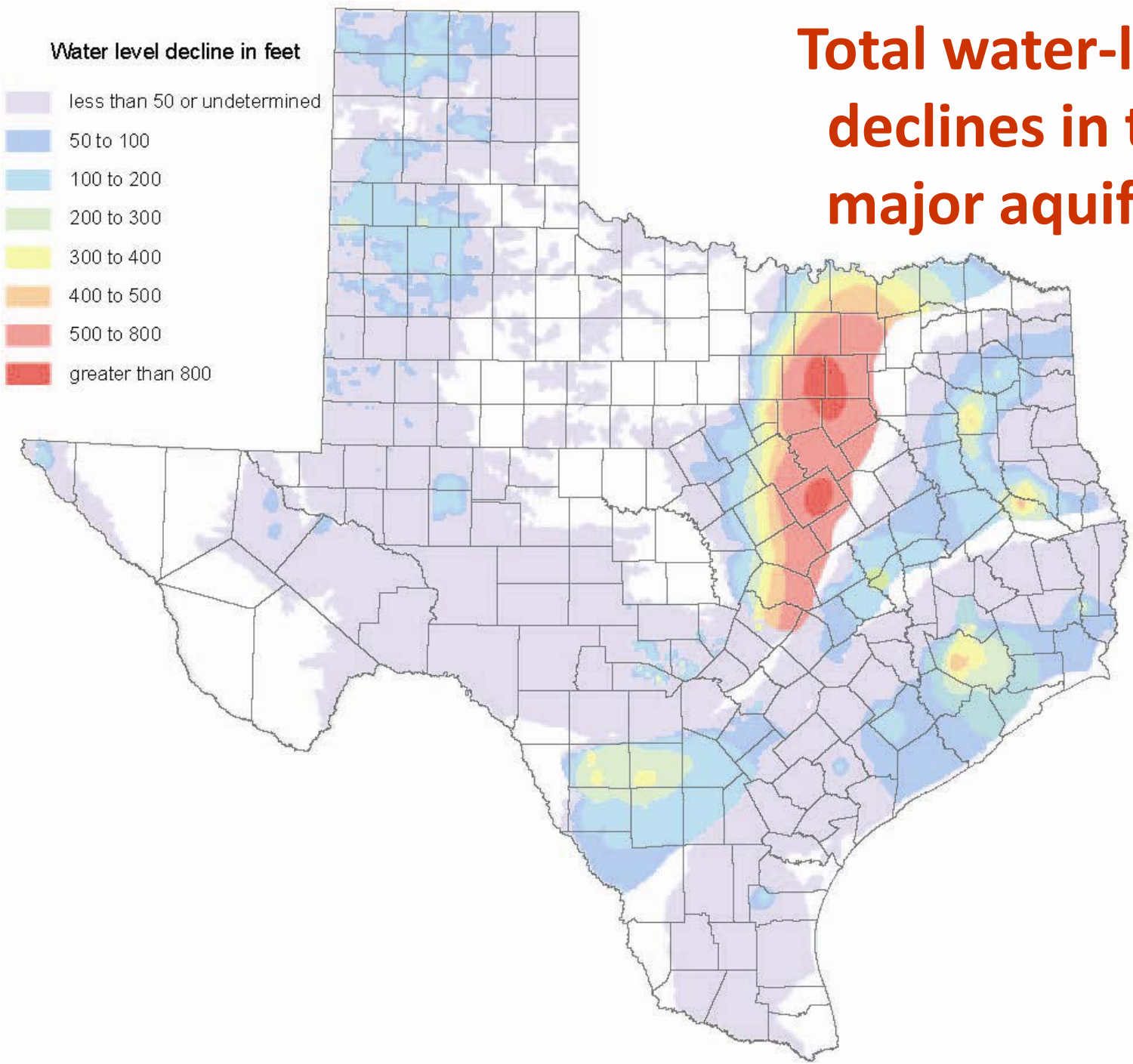


~81,000 acre-feet by 2060
Cost of $1,035,000,000

groundwater use in Texas (1937 to 2003)



Total water-level declines in the major aquifers



To conclude:

- **ASR is a great tool to conjunctively manage water resources**
- **Remove unnecessary requirements and restrictions**
- **Create incentives to get the water flowing**

Questions?

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