Horizontal: An Innovative Water Supply Well

Texas Alliance of Groundwater Districts
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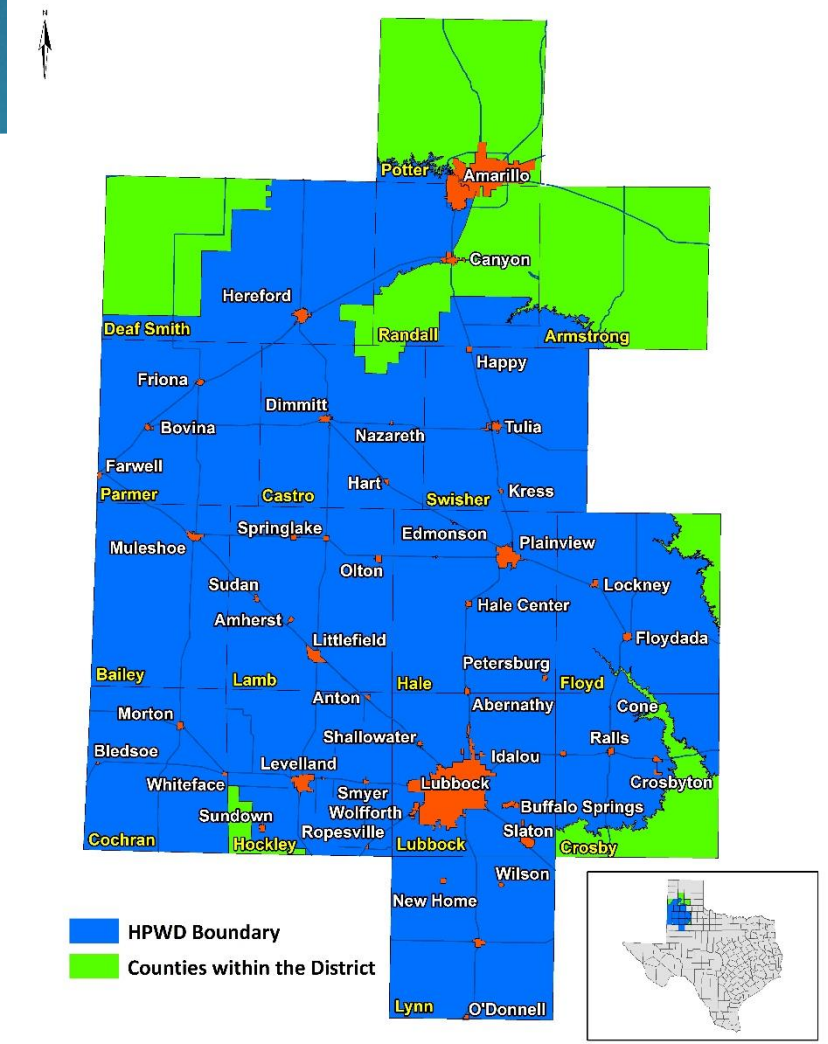
JASON COLEMAN, P.E.
GENERAL MANAGER
HIGH PLAINS WATER DISTRICT

HPWD: The Beginning

- 1949: Texas Groundwater District Act passes
  - Recognizes "individual ownership of underground water"
  - Authorizes State Board of Water Engineers to designate underground water reservoirs and subdivisions of the same
  - May exercise powers and functions for conserving, preserving, protecting, and recharging underground water; enforce rules to prevent waste; require permits for drilling of water wells; provide for the spacing of wells and regulate production to minimize drawdown; require records for the drilling and equipping of water wells; perform surveys of the underground reservoir; develop plans and carry out research projects
- 1951: Voters agree to formation of the District
- 1953: First rules adopted
- Mission: Protect, preserve and conserve groundwater within the District boundaries

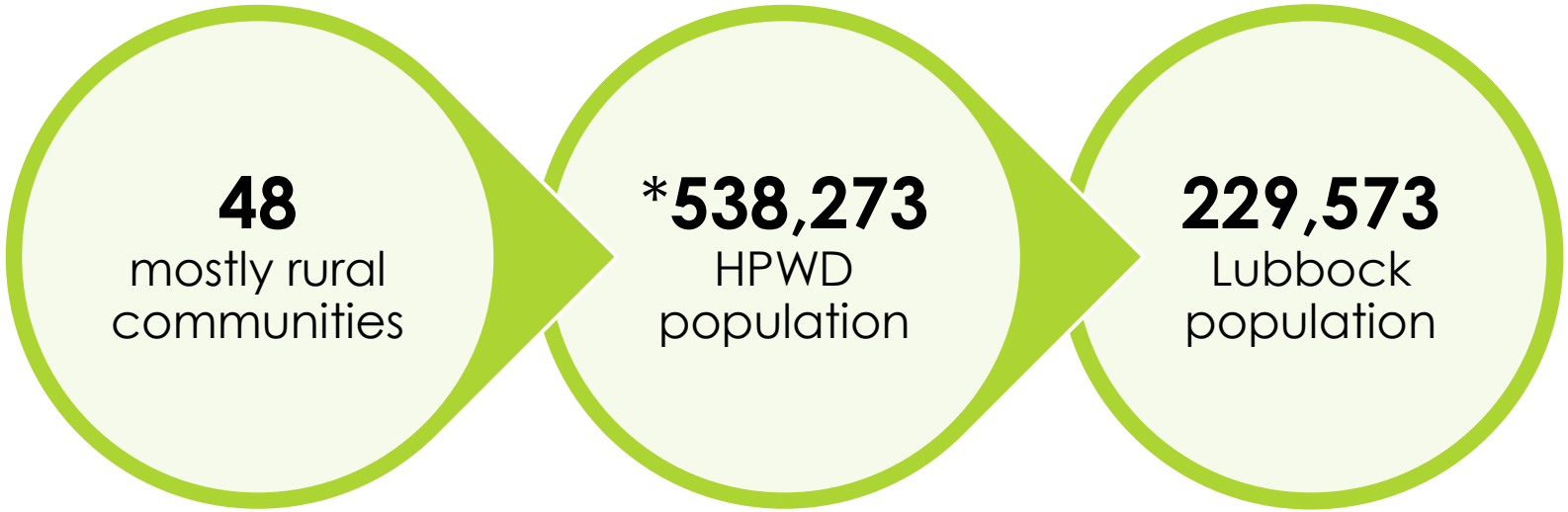
HPWD: Background

- Current Service Area approx. 7.5 million acres
- Numerous annexations have added to the HPWD boundaries
- 90+ confirmed groundwater conservation districts in Texas
- Chapter 36 of the Texas Water Code
- HPWD is funded by ad valorem taxation.
- 2017 tax rate $0.0069 per $100 valuation.
- FY 2018 budget $2.8 million



HPWD Overview- Demographics

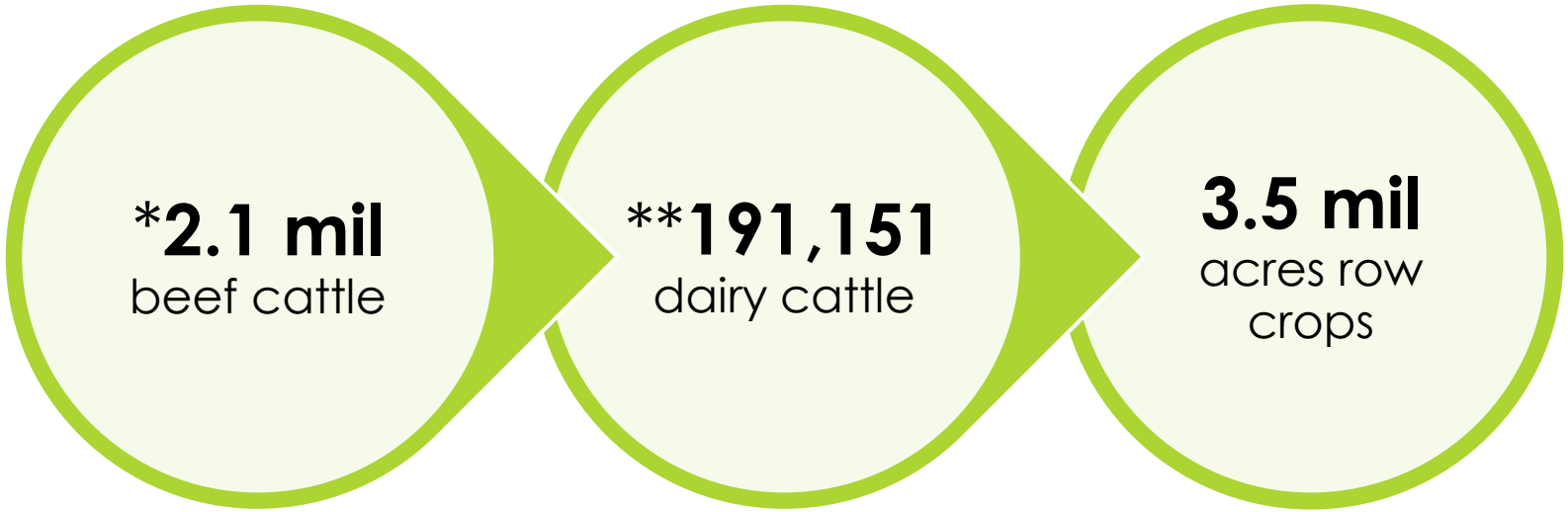
- Service area includes all or portions of 16 counties



*Source: U.S. Census Bureau

HPWD Overview- Industries

- Agricultural industries



*Source: 2012-2017 Llano Estacado Regional Water Plan (Texas Cattle Feeders)
**Source: Milk Market Administrator

HPWD: Background

- HPWD has issued over 50,000 permits
- Adopted well spacing and production rules
- Studies on recharge, minor aquifers, irrigation management
- Decades of annual water level measurements
- Participated in regional water planning
- Created hydrologic maps of water table elevation, base of aquifer, saturated thickness, water level changes
- Conservation education

Xcel Energy: The Location

Xcel Energy: The View

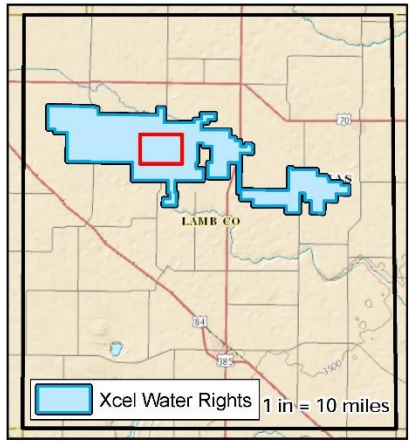
Photos from atop the boilers at Tolk Station

Xcel Energy: Adaptation

- Hydrologic study conducted in 1949
- Continued purchase of water rights (~52,000 acres)
- Expansion to 80+ water supply wells
- Combined water usage approx. 14,000 ac-ft per year
- Recycling technology
- Reclaimed water from Lubbock (Jones Station)
- Miles of pipelines—approximately 25 miles from east to west
- Declining well yields
- Ogallala saturated thickness averages 40 feet in the area near Plant X

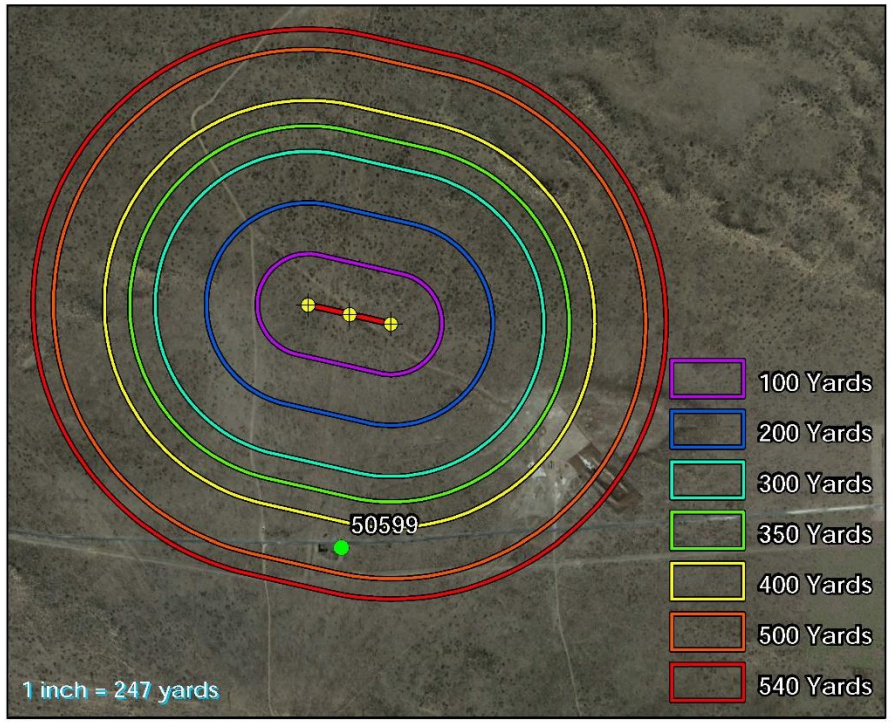
Horizontal Well: The Innovation

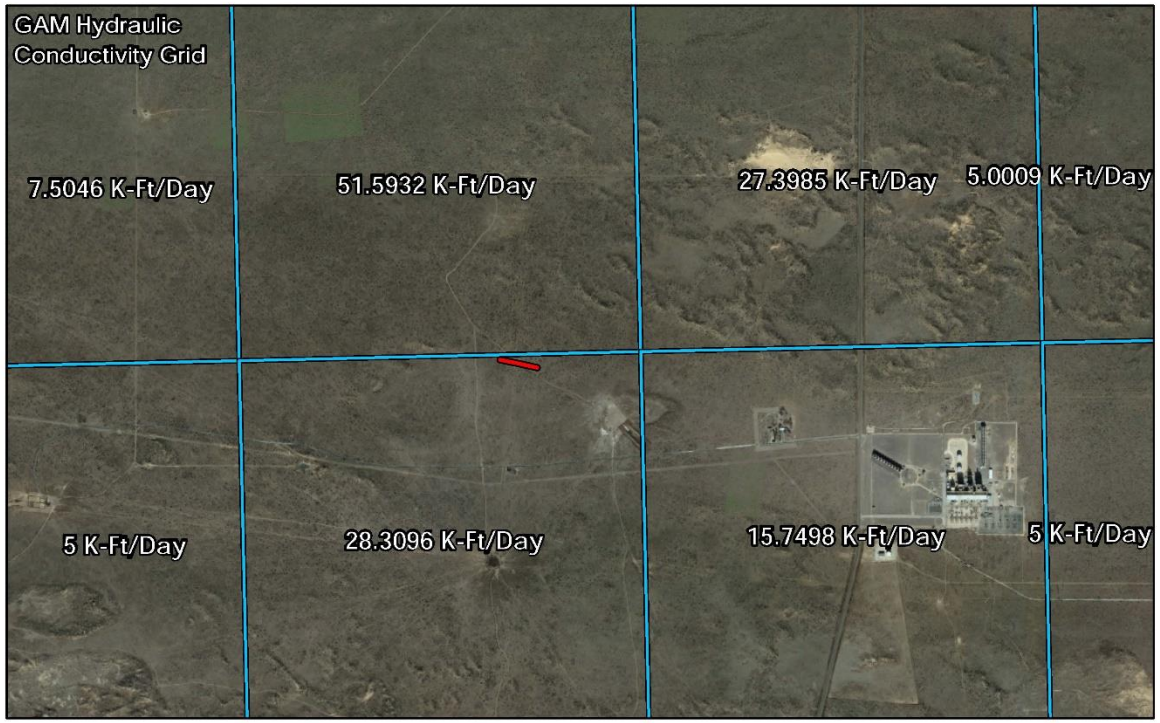
- November 2016—background, modeling and concept shared with HPWD staff
  - 500 feet of horizontal screened section
  - Comparison to multiple vertical wells
  - Uncertain of success
- Meeting with board members January 2016
- Permit issued in January 2016, applying existing rules in creative manner. Agreement to install monitoring wells.
- HPWD communication with county advisory committees
- Collaboration with Xcel communication staff
- Evaluation of aquifer properties and likely effects



HPWD

Xcel Energy





Horizontal Well: The Monitoring Locations

Horizontal Well: Since Construction

- Entry to exit distance is about 2,300 feet
- Screened section is about 195 feet below land surface
- Uses 2 pumps (combined capacity of about 700 gpm)
- Constructed of 12 inch casing
- Screened section is 10 inch wire
- Well development is critical
- Continuously operated
- All 4 monitoring wells exhibit ~6 feet of drawdown
- Maintenance?
- Sedimentation?

Big Questions/Challenges

- How do we respond to "unconventional" thinking and creativity? More rules?
- Are people in your district engaged and educated?
  - Board of Directors
  - County residents
  - District staff
- How well do you know your aquifers?
- What is next?
  - Desalination
  - Aquifer storage and recovery
  - Minor aquifer development
- What are the thoughts of other water users?
- How well do we communicate?
- What can we learn from this?
- As existing water supplies decline, innovative projects will be more prevalent
- Flexibility helps address unconventional ideas and projects
- Innovation and creativity drive adaptation and resiliency

Conclusion

"Creativity is a way of living life, no matter our vocation or how we earn a living"- Madeleine L'Engle