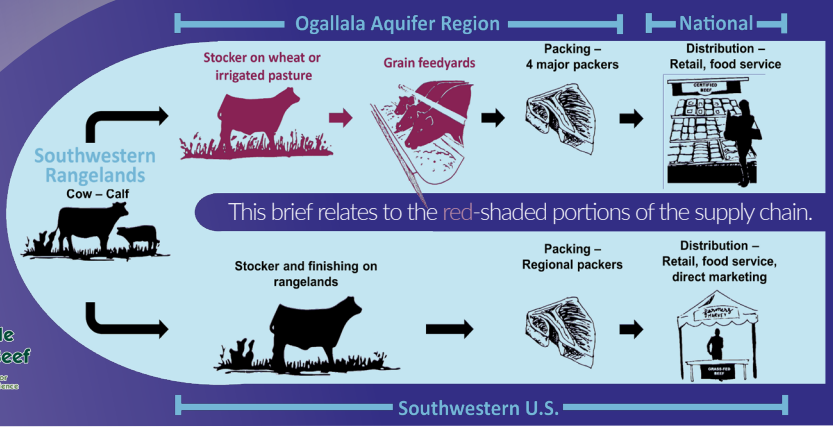
Sustainable Southwest Beef Project

Beef Brief:

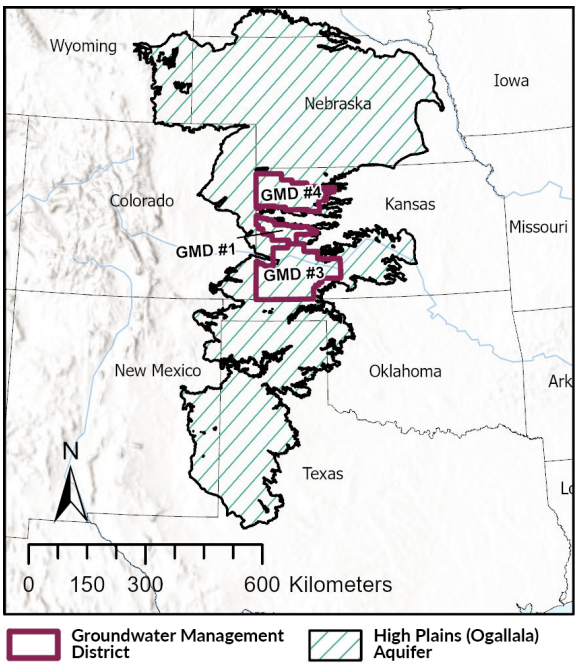
A NEW NORMAL FOR IRRIGATED AGRICULTURE TO SUSTAIN THE OGALLALA AQUIFER



The Background

The Ogallala Aquifer underlies 45 million hectares, providing water for approximately 1.9 million people and supporting the robust agricultural economy of the US Great Plains. Beef is the dominant commodity, with Texas, Oklahoma, and Kansas - major destinations for cattle from ranches of the arid Southwest - representing 35% of the nation's cattle sales. Concentrated feeding operations in this region import grains from other regions and rely on irrigated agriculture for Ogallala-grown feeds and forages. Water in the Ogallala Aquifer has been severely depleted, particularly in the southern end. Continuing with business-as-usual water withdrawals puts the aquifer, and the agricultural economy that is built upon it, at risk.

- Land values in the Ogallala Aquifer region of Kansas are $3.8 billion greater than they would be without the aquifer resource.
- Ag sales from eight western Kansas counties overlying the aquifer accounted for $4.7 billion, or about one-third of agricultural revenue in the entire state in 2013.
- The aquifer increased animal sales by $2.4 billion annually in Kansas, and increased the number of cattle on feed by 2.4 million head.



Groundwater management districts (GMD) overlying the Ogallala aquifer in Kansas have implemented water policy innovations not available in other Ogallala states.

Policy Alternatives:

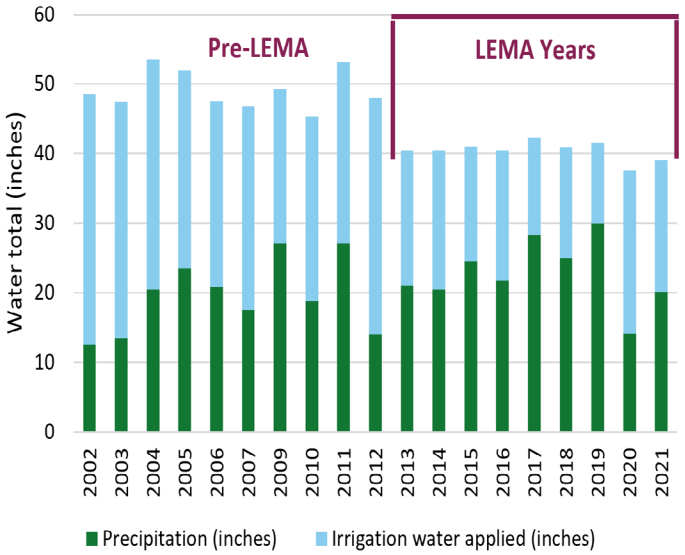
The State of Kansas passed legislation allowing two flexible solutions to reduce groundwater extraction while supporting productivity and economic viability : 1) Local Enhanced Management Areas (LEMA) to be established by groundwater management districts and 2) water conservation areas (WCA) to be established by individual water right holders through agreements with the State Engineer. Water allocations are reduced in exchange for increased flexibility such as multi-year water allocation, banking of unused water for future years, and changes in location or use of allocated water. Participants also receive technical and often financial assistance to adopt water conserving technologies and management systems (see table).

Innovations to Conserve Water

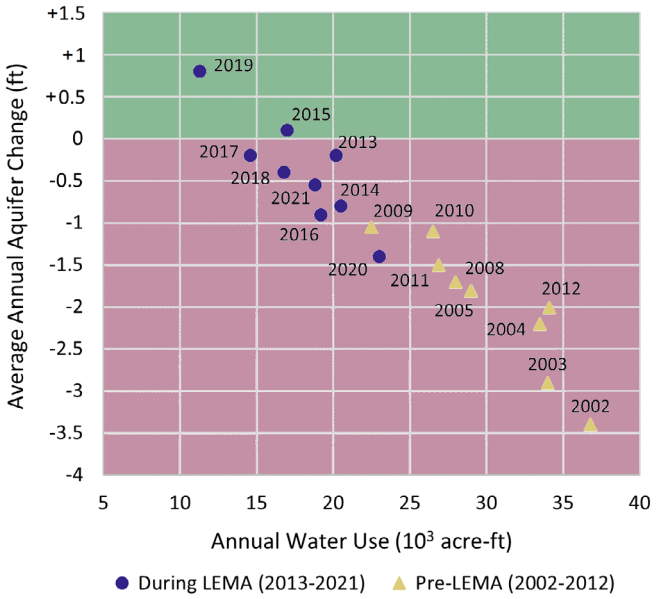
Technology	Management
Soil water monitoring	Drought and heat tolerant varieties
Low energy precision application (LEPA)	Water conserving crop species
Mobile drip Irrigation	Soil health management
Low elevation spray (LESA)	Spectral crop monitoring
Precision application	Irrigation scheduling
Variable rate irrigation	Deficit irrigation

The first LEMA was established in January 2013. From 2013-2017, the LEMA area used 116% less water per unit area compared to farms surrounding the LEMA boundary. Producer-reported data showed that cash flow per unit area or per unit water applied was higher in the LEMA compared to the surrounding area for corn, sorghum, and wheat. Even more encouraging, irrigators enrolled in these innovative programs have conserved more water than their conservation goals while maintaining economic viability at the farm level and adequate production to sustain the value-added agribusinesses and jobs in the region.

Based on promising results of minimal groundwater decline during the first LEMA period, LEMA-based approaches are continuing or expanding. Reduced pumping of 27-33% relative to the 2009– 2016 average was determined as a tangible goal to stabilize aquifer levels in western Kansas.



In the first LEMA area, pumping per unit area for a given amount of precipitation was about 30% lower during LEMA years (2013-2021) compared to pre- LEMA years (2002-2012). Data from Sheridan 6 established by GMD #4.



As annual water use declined, the groundwater decline in the LEMA area was also reduced. Data from Sheridan 6 established by GMD #4.

Policy Recommendations:

Demonstrated water conservation successes in Kansas show a path toward a "new normal" for irrigation in the Ogallala Aquifer region. Water managers and policy makers in Kansas and other states and districts should capitalize on the value of increased flexibility such as multi-year allocations, water banking for subsequent years, and shifting water across multiple water rights or uses on a farm to encourage irrigators to accept reduced allocation. These flexibilities could enhance sustainability of the vibrant agricultural economies reliant on the Ogallala aquifer. Creative government and private–public partnerships should support adoption of innovative technologies and management as end-users chart a new normal for irrigated agriculture to sustain this critical aquifer resource and the vibrant beef sector that is an economic engine for the Southern Plains and Southwest regions.

> **"What's the conscious decision we want to make *now* about our future for that part of the state?"** - Earl Lewis, Kansas Department of Agriculture Chief Engineer, Division of Water Resources.

For more information please visit southwestbeef.org

Source: Steiner, J.L.; Devlin, D.L.; Perkins, S.; Aguilar, J.P.; Golden, B.; Santos, E.A.; Unruh, M. Policy, Technology, and Management Options for Water Conservation in the Ogallala Aquifer in Kansas, USA. Water 2021, 13, 3406. https://doi.org/10.3390/w13233406

GMDs figure base and layer sources: ESRI; Garmin; Food and Agriculture Organization of the United Nations; National Oceanic and Atmospheric Administration; United States Geological Survey; U.S. Environmental Protection Agency; National Weather Service; Kansas Department of Agriculture, Division of Natural Resources.

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