

# ECONOMIC & POLICY IMPLICATIONS OF WATER WITHDRAWALS



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THE  
LEADERSHIP  
GROUP  
ENCOURAGED:



- Multidisciplinary
- Multistate
- Multi-university

COLLABORATION

# ACCOMPLISHMENTS



- Completed approximately 80 different project objectives over 20 years
- Trained numerous Master's and Ph.D. students
- Published many papers, posters, and Extension Publications
- Presented at numerous professional, industry, and other invited events

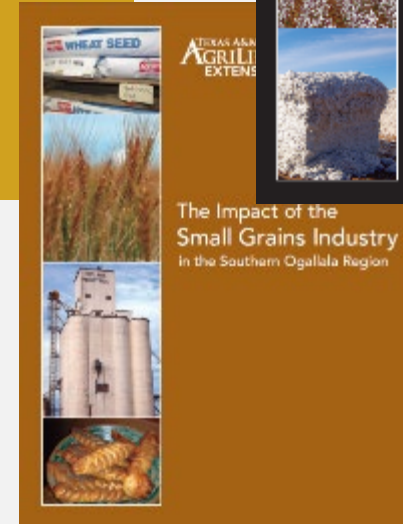
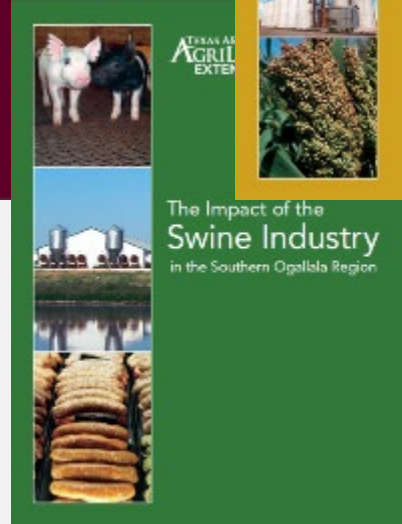
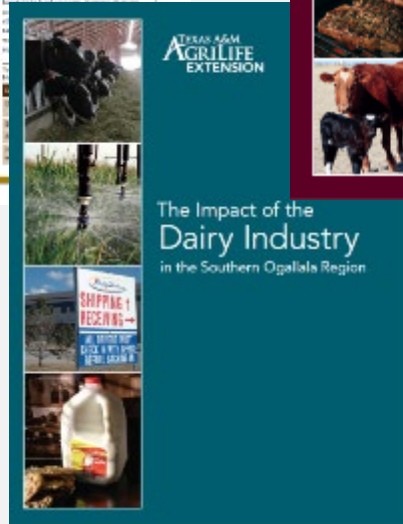
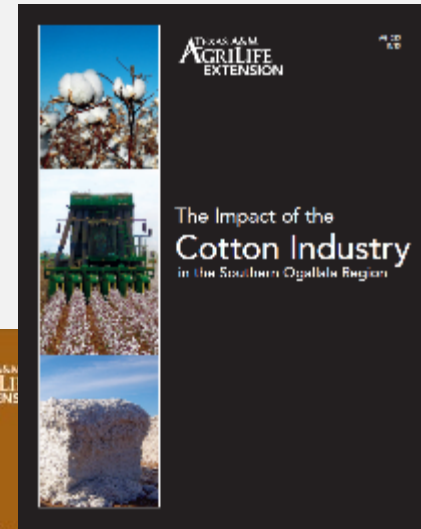
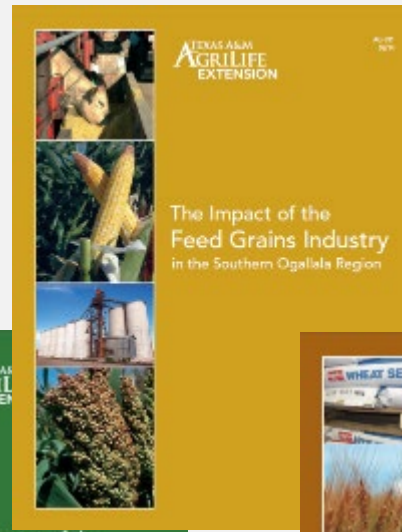
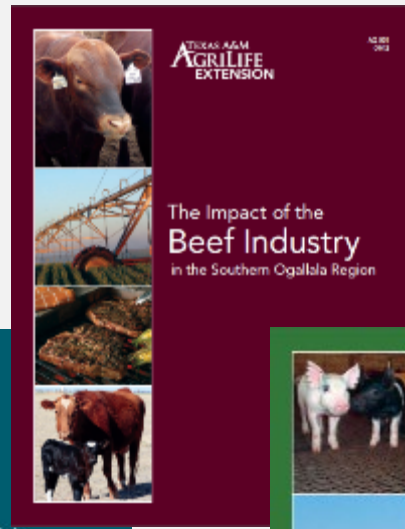
➤ FOCUS ON OUTREACH

# TEAM DYNAMICS

- Identify objectives collectively
- Seek guidance from the leadership team
- Work on projects together
- Meet in-person twice a year
- Work with other OAP researchers
- Split funds evenly between institutions so that the focus is on the work!



**THE IMPACT OF AGRICULTURAL  
INDUSTRIES IN THE SOUTHERN  
OGALLALA REGION**



- How can we get the biggest bang (\$\$) per unit of water?
- Implementing Conservation Policies is TRICKY

# WHICH GROUNDWATER DEPENDENT INDUSTRIES DO WE NEED TO PROTECT

- Based on 2018 IMPLAN data, compared to crop production in Finney County:
  - The beef sectors employs 11.36 times as many people; generates 11.64 times as much output (revenue); and generates 5.42 times as much value added (profit)
- Guerrero et al. (2012) suggests that, accounting for only the direct water use, dairies are high-value users of water generating over \$93,000 per acre-ft.
- Guerrero et al. (2013) suggests that, accounting for only the direct water use, the beef industry is a high-value user of water generating over \$165,576 per acre-ft.
- Based on 2022 KSU extension budgets, corn production in Southwest Kansas generates \$970 per acre-ft.

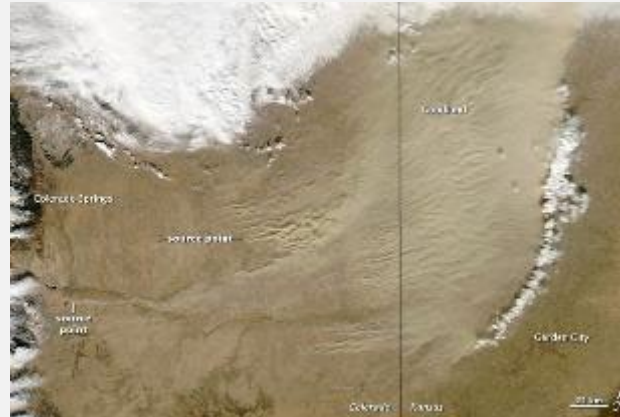
# OAP COLLABORATION

- Golden, B. “Economic Impact of Water Conservation.” Presentation to Water Innovation Systems and Education (WISE) Tour. Montezuma, Kansas March 23, 2023.
  - Golden, B. “Economic Impact of Water Conservation.” Presentation to The Kansas House of Representative’s Water Committee. Topeka, Kansas January 26, 2023.
  - Golden, B. “Economic Impact of LEMAs.” Presentation to Groundwater Management District #1 Annual Meeting. Scott City, Kansas February 28, 2023.
  - Golden, B. and B. Guerrero, “Economic Impact of the Sheridan #6 LEMA.” Midwest Feeders Inc. LEMA Informational Meeting. February 12, 2024.
  - Guerrero, B. “Water Availability and Policy Concerning Crop, Livestock, and Meat Production.” International Livestock Congress, Houston, TX. February 28, 2024.
  - Guerrero, B., B. Golden. “Regional Economics: Insights and takeaways from the Kansas LEMA program.” 2024 Colorado Master Irrigator, Yuma, CO. March 4, 2024.
  - Current OAP project: Evaluate and update water use and regional economic impact estimates of fed beef and the beef processing industry in the Southern Ogallala Region.
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- **The OAP has been at the forefront at providing cutting edge collaborative research to address the issue**



# TRANSITIONS TO DRYLAND

# A FUTURE PROBLEM: TRANSITIONING TO NON-IRRIGATED PRODUCTION



Approximately 20% of the irrigated cropland in Finney County will have to convert back to pasture

# OAP COLLABORATION

- Golden, B., and B. Guerrero. “The Economics of Local Enhanced Management Areas in Southwest Kansas.” Universities Council on Water Resources Journal of Contemporary Water Research and Education. 162(December 2017):100-111. [http://ucowr.org/files/Journal/Issues/162/162\\_Golden\\_and\\_Guerrero.pdf](http://ucowr.org/files/Journal/Issues/162/162_Golden_and_Guerrero.pdf)
- Deines, Jillian & Schipanski, Meagan & Golden, Bill & Zipper, Samuel & Nozari, Soheil & Rottler, Caitlin & Guerrero, Bridget & Sharda, Vaishali. (2020). Transitions from irrigated to dryland agriculture in the Ogallala Aquifer: Land use suitability and regional economic impacts. Agricultural Water Management. 233. 10.1016/j.agwat.2020.106061.
- Golden, B. “Ag Finance Risks of Irrigated Cropland Over the Ogallala Aquifer.” Invited paper for the Federal Reserve’s National Agricultural Credit Conference, Dallas, Texas October 8, 2019.
- 3/26/2023 met with Kansas NRCS leadership to discuss possible programs to address the problem
- Collaboration with RegenAg project.
- Current OAP Project: Conduct a survey of producers’ water uses and risk attitudes toward adoption of new practices.
- Current OAP Project: Meta-synthesis of literature in economics and agronomics on ‘climate-smart’ influences on aquifer drawdown.
- **The OAP has been at the forefront at providing cutting edge collaborative research to address the issue**

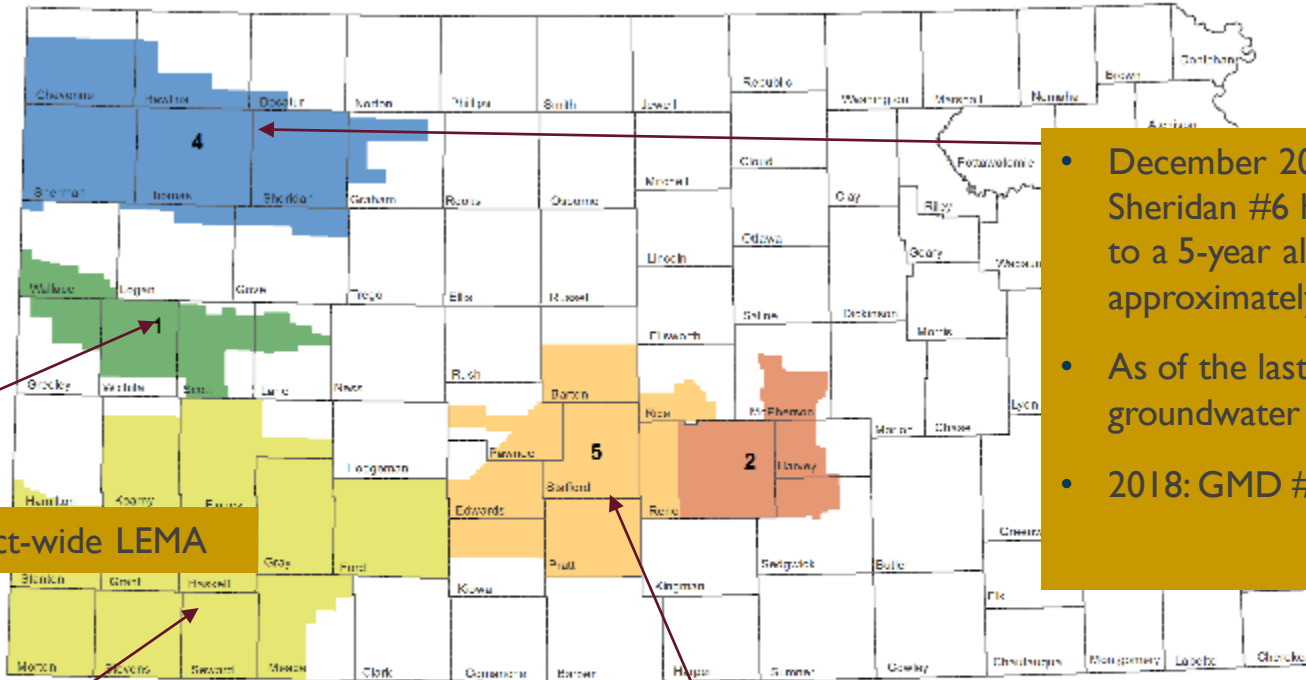
PRODUCER-INITIATED  
GROUNDWATER CONSERVATION  
IN KANSAS

## BACKGROUND OF LOCAL ENHANCED MANAGEMENT AREAS (LEMAS)

- LEMAs are proactive, producer initiated, and locally designed water conservation strategies for a specific geographic area.
- Once approved by the Chief Engineer, the LEMA plan becomes law.

# GROUNDWATER MANAGEMENT

## Groundwater Management Districts in Kansas

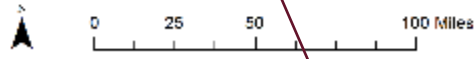


- December 2012: The first approved LEMA (the Sheridan #6 high priority area) restricted producers to a 5-year allocation of 55 inches per acre, which is approximately 20% less than historic use.
- As of the last KGS report they have reduced groundwater use by 34%.
- 2018: GMD #4 Implemented a district-wide LEMA

- 2022: GMD #1 Implemented a district-wide LEMA

■ Western Kansas GMD #1  
 ■ Equus Beds GMS #2  
 ■ Southwest Kansas GMD #3  
 ■ Northwest Kansas GMD #4  
 ■ Big Bend GMD #5

Disclaimer - Features on this map represent conditions as of the date of the map and are subject to change. The user is referred to specific policies, regulations, and/or orders of the Chief Engineer.



Kansas Department of Agriculture  
Division of Water Resources  
July 24, 2017

Water Conservation Areas are also reporting large reductions in groundwater Use.  
Garden City Company 22.9%; T&O Farms 42.6%

- 1/1/2025: 30% reduction in parts of GMD 5 (DWR has asked the OAP economic team to help compile an economic impact study)

# OAP LEMA COLLABORATION

- Golden, B., J. Peterson, and D. O'Brien. "Potential Economic Impact of Water Use Changes in Northwest Kansas." Kansas State University Agricultural Experiment Station and Cooperative Extension Service. Staff Paper No. 08-02 February, 2008.
- Amosson, S., L. Almas, B. Golden, B. Guerrero, J. Johnson, R. Taylor, and E. Wheeler-Cook. "Economic Impacts of Selected Water Conservation Policies in the Ogallala Aquifer." Kansas State University Agricultural Experiment Station and Cooperative Extension Service. Staff Paper No. 09-04 June, 2009
- Golden, B., and B. Guerrero. "Monitoring the Impacts of Sheridan County 6 Local Enhanced Management Area Supplemental Report for 2013 – 2019." Report to the Kansas Water Office, 2020.
- Golden, B., and Johnson, J. (2013). Potential economic impacts of water-use changes in southwest Kansas. *Journal of Natural Resources Policy Research*, 5(2-3), 129-145.
- Golden, B., and B. Guerrero. "The Economics of Local Enhanced Management Areas in Southwest Kansas." *Universities Council on Water Resources Journal of Contemporary Water Research and Education*. 162(December 2017):100-111. [http://ucowr.org/files/Journal/Issues/162/162\\_Golden\\_and\\_Guerrero.pdf](http://ucowr.org/files/Journal/Issues/162/162_Golden_and_Guerrero.pdf)

# CONCLUSIONS

- LEMA was successful in reducing groundwater use and helping the aquifer approach sustainability.
- Minimal cash flow impacts
- Producers are satisfied with the economic consequences, as they have maintained their water use reductions.
- The experiences of producers within the Sheridan #6 LEMA have provided the motivation and confidence necessary to expand the LEMA concept to all of GMD#4 & GMD#1.
- The knowledge of how irrigated crop producers reacted to conservation policies in this case scenario can be helpful to producers, stakeholders, and researchers in other areas faced with diminishing supplies.
- **The OAP has been at the forefront at providing cutting edge collaborative research to address the issue**



## ACKNOWLEDGEMENTS

Since 2003, the Ogallala Aquifer Program (OAP) has provided federal funding to a research consortium for numerous research projects on water conservation. The program includes U.S. Department of Agriculture's Agricultural Research Service (ARS), Kansas State University, Texas A&M AgriLife Research and Texas A&M AgriLife Extension Service, Texas Tech University and West Texas A&M University.



THANK YOU