

Kansas

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Introduction

The Ogallala aquifer is the largest, most economically important groundwater source in Kansas, and is the primary water source for western and south-central Kansas. It consists of the Ogallala aquifer in western Kansas, and the Great Bend aquifer and Equus Beds in south central Kansas. The High Plains aquifer is heavily developed, particularly for irrigation, with most of the Ogallala portion in long term, serious decline. Projections of how many more years the aquifer will support a particular level of withdrawal indicates large areas that have less than 25 to 50 years at current usage rates. Some regions in Haskell County may have a decade or less of large scale withdrawals. Widespread significant conservation measures must occur to extend the useful life of the aquifer.

State policy regarding water management is guided by the Kansas Water Appropriation Act which asserts that water in the State of Kansas is dedicated to the use of the people of the state, with the state charged to manage that resource. As such, surface and groundwater can be appropriated for beneficial use of that water, without waste, if that use does not cause impairment of an existing, more senior water right and does not unreasonably affect the public interest.

A water right does not constitute ownership of such water, only the right to use it for beneficial purposes. The date of a water right, and not the type of use, determines the priority to divert and use water at any time when supply is not sufficient to satisfy all water rights.

Science and Data

The pressing question driving ongoing research in Kansas is determining the aquifer response to reductions in pumping. Hydrologic models have been developed for most of the Ogallala-High Plains aquifer in the state. The hydrologic models help define the current water budget, and allow future management scenarios to be projected. Research on drought tolerant and low water crops, crop water management, and irrigation systems assist farmers as they transition to less available irrigation water. Economic models also provide guidance on transitions to less water use that have the least impact at the farm level and regional economy.

Kansas has very good data on water use, with all water right owners other than domestic required to submit an annual water use report. Additionally, the State has identified long-term trends through annual winter measurements of water levels in about 1,400 groundwater wells. Index wells have been placed throughout the Ogallala region to monitor real time aquifer conditions daily, capturing conditions when the aquifer is most stressed during the pumping season. Drillers' well logs, annual water use, and water levels are all available to the public online. The Kansas Geological Survey has a Master Well Inventory that assembles data from several agency databases. The accessibility of the data and its presentation in the online High Plains aquifer atlas is valuable in developing an awareness of conditions. Additional data on recharge and the spatial variability of the aquifer would further improve knowledge of the conditions.

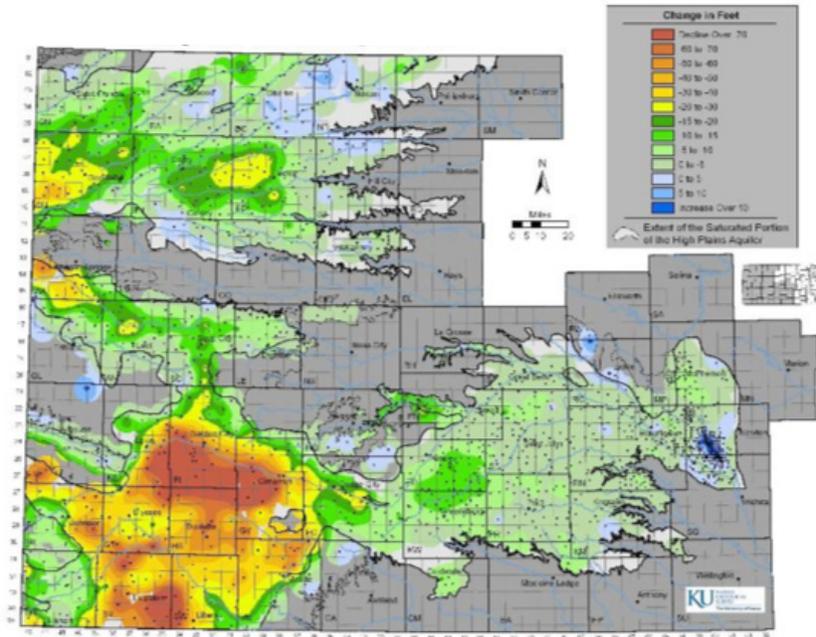


Figure 1: Interpolated Water Level Change, Kansas High Plains Aquifer, Average 1996-1998 to Average 2015-2017.

Policy

Recognizing the Ogallala-High Plains aquifer is the largest, most economically important ground water source in Kansas, many programs, policies, and individual management decisions have been directed towards conserving and extending the useable life of this resource. Examples of such activities include the development of Local Enhanced Management Areas (LEMAs) and Water Conservation Areas (WCAs), establishment of water banks, improved crop insurance, increased compliance and enforcement and implementation of various water conservation programs such as Water Transition Assistance Program (WTAP) and Conservation Reserve Enhancement Program (CREP).

Essentially all of the Ogallala and Great Bend Prairie aquifers, and most of the Equus Beds aquifer, are closed to new water right appropriation. Additionally, water users in the closed areas no longer risk abandonment of a water right for non-use.

Since 2012, the LEMA option allows a locally developed groundwater conservation

plan to be proposed within a Groundwater Management District (GMD). If recommended by the GMD and ordered by the Chief Engineer, the conservation measures have the force of law. LEMA has the potential to be highly effective due to local commitment to its success, and GMD and state support in its implementation. The first approved LEMA, in Sheridan County, has a nearly 20% water conservation goal. A new district-wide LEMA was approved for GMD#4 on March, 1 2018. Additional discussions are occurring in localized areas in Southwest GMD#3.

In April 2015, Kansas Governor Sam Brownback signed into law a bill allowing for Water Conservation Areas (WCAs), a simple, streamlined, and flexible tool that allows any water right owner or group of owners the opportunity to develop a management plan to reduce withdrawals in an effort to extend the usable life of the Ogallala-High Plains aquifer. To date, more than 14,000 acres of irrigated land has been enrolled in a WCA.

In 2016, Kansas Department of Agriculture-Division of Water Resources (KDA-DWR) increased penalties for over pumpers. The

penalties increase in severity with the number of offenses; the fourth offense is a water right revocation. Meter tampering or intentionally falsifying information may result in a water right suspension or revocation.

There are several state and federal programs for groundwater conservation in Kansas. The state funded WTAP pays water right owners in targeted areas closed to new water rights to permanently dismiss all or a portion of their water right. The Upper Arkansas River CREP is a state-federal program that pays irrigators to permanently transition acreage out of irrigated production, and temporarily into grass or another conservation practice. To date, more than 110 state CREP contracts on more than 18,000 acres have been approved by the State of Kansas. These contracts have resulted in the permanent retirement of nearly 40,000 acre-feet of annual water appropriation.

The Mobile Irrigation Lab, KanSched, and Crop Water Allocator are Kansas State University (K-State) Research and Extension products to help producers available make the most efficient, economic use of their crop water. Natural Resources Conservation Service's (NRCS's) Environmental Quality Incentive Program (EQIP) and Regional Conservation Partnership Program (RCPP) provide producers assistance to implement water conservation practices. Groundwater management districts are also using locally generated funds to offer financial assistance for irrigation management technology.

In partnership with USDA's Risk Management Agency, a federal crop insurance program has been developed in Kansas for limited irrigated crops, currently not covered by (fully) irrigated or dryland crop insurance. Production tables for corn and soybeans have been developed for expected reduction in yields with various cuts to irrigation water applied.

A water bank is a market based program to provide water conservation and move water rights away from critical decline areas to areas of need, through long term leases of water rights. A water bank has been established in Big Bend GMD#5.

Producer Practice

Water Technology Farms are three year pilot public-private partnerships where irrigation technology is demonstrated, related research is conducted on the field scale and water conservation is supported. New irrigation technologies, management techniques, and cropping patterns can be tested on a larger scale on these farms. They are also an opportunity for agronomy research to be conducted by the Kansas State Research and Extension office of southwest Kansas.

Water Technology Farms have been valuable in expanding the conversation and education of producers and decision makers on water conservation in areas overlying the depleting Ogallala aquifer. To date 12 Water Technology Farms have been developed in Kansas.

Many Kansas producers over the Ogallala are wondering if their current irrigation systems and management practices are the best in what they could use to reduce their water use. Many irrigators have changed their thinking from highest crop yield to highest return on investment – the most profit on a crop with less water and other input costs. Influencing this thinking is an analysis of water use versus water level declines that show attainable levels of reduced irrigation can greatly extend the useful life of the aquifer. They are looking at better applicators (e.g. mobile drip irrigation (MDI), low elevation spray application (LEPA) nozzles, irrigation scheduling tools (e.g. soil moisture sensors and KanSched) and management practices (e.g. circular planting, cover crop rotation and high planting rates) that they could integrate in their operation to increase water use efficiency while maintaining economic viability.

Although not all of these technologies are showing significant improvements in their crop yields (which is consistent with research plot results), just by using them some producers have significantly reduced their water use for their whole farm operation (e.g. T&O Farms used less than 76% of their WCA allocation through the use of technology). The use of technology has increased producer awareness

of using water wisely and allowed them to capitalize on the occasional rainfall events.

Reducing water use while minimizing economic impacts is key to the success of water conservation programs in Kansas. The Sheridan County LEMA is a great example of how irrigators adjusted crop selections and rotations to ensure minimal to no impacts to their net return. Relative to their neighbors outside the LEMA boundary, irrigated crop producers within the boundary of the LEMA:

- Reduced total groundwater use by a statistically significant 25.7%

- Reduced irrigated corn acreage by a statistically significant 22.9%

- Increased irrigated grain sorghum acreage by a statistically significant 400.8%

- Increased irrigated wheat acreage by a statistically significant 87.2%

Producer reported data for the 2013 through 2016 crop year indicate irrigated corn producers within the LEMA boundary used 23.1% less groundwater, yielding 1.2% less corn as compared to irrigated corn producers

outside the LEMA boundary. Somewhat surprisingly, irrigated corn producers within the LEMA boundary reported 4.3% more cash flow than their higher yielding counterparts outside the LEMA. The producers that grew irrigated grain sorghum inside the LEMA boundary applied an average of 4.1 inches per acre, 60.5% less groundwater, yielded 13.8% less grain, but generated 59.9% more cash flow than their counterpart outside the LEMA.

The economic result suggests that, given the certainty of groundwater use reductions, producers are able to implement strategies to maintain returns and apply less groundwater. On February 17, 2017, GMD#4, at the request of producers in the Sheridan County LEMA, submitted a request to the Division of Water Resources to extend the Sheridan County LEMA. On August 24, 2017, the Chief Engineer accepted the extension proposal for the period 2018 to 2022. This suggests that producers within the Sheridan County LEMA believe they can mitigate any negative economic consequences associated with reduced groundwater use and that benefits of groundwater conservation outweigh the costs.

