A LONG-TERM VISION FOR THE FUTURE OF WATER SUPPLY IN KANSAS

Developed based upon input from the citizens of Kansas

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CALL TO ACTION: PURPOSE AND NEED FOR A LONG-TERM VISION FOR THE FUTURE OF WATER SUPPLY IN KANSAS

Looking back through history, specific generations have become known for key achievements, traits and ideals. Stereotypes are broadly applied across the United States but what about us? What will this generation of Kansans be remembered for? It could be for putting personal politics and differences aside, rolling up our sleeves and working together to ensure future generations of Kansans have a reliable source of water to fuel our state's economy.

In October 2013, Governor Brownback issued a call to action to his Administration to develop a 50-Year Vision for the Future of Water in Kansas stating, "Water and the Kansas economy are directly linked. Water is a finite resource and without further planning and action we will no longer be able to meet our state's current needs, let alone growth."

> *"Water and the Kansas economy are directly linked. Water is a finite resource and without further planning and action we will no longer be able to meet our state's current needs, let alone growth."* ***– Governor Sam Brownback***

The writing is on the wall and if we don't act today, our future is bleak. The Ogallala Aquifer is declining faster than it is recharging. Reservoirs, which are critical water storage structures for much of our state, are filling with sediment. At this rate, with no changes in the next 50 years, the Ogallala will be 70 percent depleted and our reservoirs will be 40 percent filled with sediment.

The multi-year drought has brought water issues to the forefront; we must plan for the future now.

Since issuing the call to action in October, a Vision Team comprised of the Kansas Water Office, Kansas Department of Agriculture and Kansas Water Authority, embarked on a one-year mission to seek input from water users, compile data, conduct research and chart a path forward.

Governor Brownback's Administration, and most importantly the citizens of Kansas, have responded to his call to action and have developed a Vision to ensure a reliable future water supply. If we remain united and committed to implementing the strategies defined in this Vision, future generations will look back on the work we do and say that's the generation of Kansans who worked together to protect and conserve the state's water resources today and for the future.

SUMMARY OF VISION DEVELOPMENT PROCESS

Following is a summary of the year-long process employed to develop the Vision.

October 2013	Governor issues Call to Action to develop Vision
November 2013	Vision Team assembled to outline plan of action for Vision development
December 2013 - March 2014	Stakeholder outreach to receive input on Vision, Mission, Goals and Action Items
April 2014	Initial stakeholder input shared and feedback received during leadership workshop
April – June 2014	Additional stakeholder outreach conducted to continue to receive input; KWA Meeting
June 2014	Based on input received, Vision Team developed Preliminary Discussion Draft
July 2014	Statewide water vision public input tour with twelve listening sessions
August 2014	KWA provides feedback on Discussion Draft; Online survey released for additional feedback
September - October 2014	Additional stakeholder outreach to receive feedback; Vision Team developed Second Draft of Vision
November 2014	Second Draft of the Vision for the Future of Water Supply presented at Governor's Water Conference

STATE OF THE RESOURCE

Measuring progress towards meeting the Vision requires a firm understanding of the current conditions of the state's water resources. A brief overview of the current conditions of our state's water resources and a description of how water is used and managed in the state is included below. Supporting graphics and maps are provided in the Condition Atlas at the end of this document.

Kansans use approximately four million acre-feet of water annually. Statewide, irrigation is the largest water user, accounting for 80-85 percent of all water diverted in most years. Municipal use is the second largest water use category. Approximately 90 percent of all water used in Kansas is pumped from ground water sources.

Kansas water resources are ground water dominated in the western half of the state and surface water dominated in the eastern half. Climate is a significant factor in this variability, with semi-arid conditions, low precipitation and limited surface water in western Kansas. There are aquifers in eastern Kansas; however, they are generally more limited in extent and yield than the aquifers in western Kansas.

Both weather and climate exhibit a great deal of variability in Kansas. This may be the case over several days, from year-to-year and over a multi-year period. Perhaps the most striking example of this variability is the periodic recurrence of drought conditions in Kansas. Due diligence in protecting water resources and adapting to future climate variability will be important to maintaining and improving quality of life and the state's economy.

State policy regarding water management is guided by the Water Appropriation Act which asserts that water in Kansas is dedicated to the use of the people of the state, with the state charged to manage the system of water rights. As such, surface and ground water can be appropriated for beneficial use, without waste, if that 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. In addition, Kansas has four Native American Tribes. Each is afforded a Tribal Reserved Water Right Reserve Water Rights by the federal government, which is linked to the creation of each tribal reservation. Although none of these rights have currently been quantified, the future management and use of our water resources must take into account these rights, which are likely to have the most seniority in the state.

The Kansas Water Plan is one of the primary tools used by the State of Kansas to address current water resource issues for future needs. The Kansas Water Office, in coordination with local, state, federal and interstate partners updates the Kansas Water Plan every 5-years. Water resource issues addressed in the Kansas Water Plan extend beyond water supply and include goals and priorities such as improving our state's water quality and improving recreational opportunities available to our citizens. The Kansas Water Plan will serve as the implementation plan for the Vision, providing 5-year milestone events to measure success towards achieving the Vision.

HIGH PLAINS AQUIFER

The High Plains aquifer underlies the western and south central portions of Kansas. It is one of the world's largest aquifers and underlies portions of eight states from South Dakota to Texas and New Mexico. About 27 percent of the irrigated cropland in the United States overlies the High Plains aquifer. In Kansas, the aquifer consists of the hydraulically interconnected Ogallala aquifer in the west, the shallower and geologically younger Great Bend Prairie and the Equus Beds aquifers in south central Kansas and the associated alluvial aquifers.

The Ogallala portion of the High Plains aquifer is the primary source of water in western Kansas for all uses and is heavily developed, primarily for irrigation. Most of the Ogallala-High Plains aquifer is closed to or restricted from additional development. The aquifer has been over-appropriated in many regions and, in localized areas, water quality is deteriorating. Projections of how many more years the aquifer will support a particular level of withdrawal indicates many large areas that have 50 years or less at current usage rates.

Recognizing that the 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), establishment of water banks, increased compliance and enforcement and implementation of various water conservation programs such as the Water Transition Assistance Program (WTAP) and Conservation Reserve Enhancement Program (CREP).

The Groundwater Management Act (GMD) Act, enacted in 1972, provided five locally developed GMDs the flexibility to adopt management practices based on local hydrologic conditions. The purpose of the Act was to preserve basic water law doctrine as established by the Water Appropriation Act while establishing the right and responsibility of local water users to determine their future with respect to ground water use.

RIVER-RESERVOIR SYSTEMS

Kansas has several major rivers, but few natural lakes. Many reservoirs, large and small, have been constructed to control flooding and store water for beneficial use. Major rivers in Kansas include the Arkansas, Kansas and Neosho. The state's largest river, the Missouri River, forms the northeast border and provides significant potential for addressing Kansas' future water demands. Twenty-four large reservoirs were constructed by the federal government in Kansas, the oldest being Kanopolis (1948) and the youngest three being El Dorado, Big Hill and Hillsdale (1981). The primary authorized purpose for reservoirs built by the U.S. Army Corps of Engineers (Corps) at the time of their construction was flood control. Irrigation water supply along with flood control was a primary use for those reservoirs constructed by the U.S. Bureau of Reclamation. Other authorized uses, which vary by reservoir, include municipal and industrial water supply, water quality, recreation and navigation support.

Kansas has purchased water supply storage in 14 federal reservoirs. Water from this storage is accessible via contract for municipal, industrial and irrigation use. These reservoirs are an important source of water supply in Kansas, providing water in some manner to approximately two-thirds of the citizens of the state. Nearly 60 percent of the energy produced in Kansas relies on storage in our reservoirs. The state's population growth projections indicate Kansans will be increasingly reliant on the reservoirs.

There are many challenges to managing reservoir supplies, such as: protecting the reservoirs from losing storage from sedimentation, identifying a method to pay for additional storage as well as operation and maintenance costs, increasing storage at key reservoirs to regain storage already lost to sedimentation and reducing or eliminating the Corps releases of water from Kansas River reservoirs to support navigation on the Missouri River. This is a practice of marginal benefit to the nation and detrimental to Kansas interests. Actions currently underway to secure, protect and restore reservoir water supply include watershed restoration and protection activities such as streambank stabilization, reallocation of storage and removal of sediment through dredging.

VISION STATEMENT

Vision:

Kansans *act on a shared commitment to have the water resources necessary to support the* ***state's social, economic and natural resource*** *needs for* ***current and future generations****.*

- At every point in the Vision development process, the Water Vision Team has been reminded the key to a reliable, long-term water supply is rooted in every Kansan understanding the importance of the state's water resources.
- The Vision statement calls on every Kansan, as stakeholders, to not only commit to ensuring a reliable water supply but also to act on that commitment.
- The Vision attempts to make clear water is necessary for human-health and welfare as well as environmental stewardship and our economic well-being.
- The Vision is also based on the concept that water is not only important for today but also for our future as a state.

MISSION STATEMENT

Mission:

***Provide Kansans** with the framework, policy and tools, **developed in concert with stakeholders**, to manage, secure and protect a reliable, long term statewide water supply while balancing conservation with economic growth.*

Since the Vision calls on all Kansans to be committed to their water resources, the state of Kansas is called on in the mission to provide Kansans everything they need to act on that commitment.

GUIDING PRINCIPLES

Following are four guiding principles that directed the development of the Vision document. These guiding principles will continue to serve as precepts for the implementation of the action items.

1. Locally driven solutions have the highest opportunity for long term success. Therefore, the intentional focus of the action items presented in the Vision are to provide the necessary tools and support to allow for greater flexibility and management of water resources at the local level.

2. Policies and programs should not unintentionally penalize those who have already demonstrated good stewardship with the state's water resources.

3. Voluntary, incentive and market-based water conservation and land management activities are the preferred tools for ensuring a reliable statewide water supply.

4. Action is necessary now to ensure a reliable supply into the future.

IMMEDIATE PRIORITY ACTION ITEMS

During the development of the Vision, two action items rose to the top as critical activities necessary to ensure the successful implementation of all other actions in all theme areas. The following action items will be initiated immediately:

1. Improve coordination on water related issues with the state's primary water related agencies through the **creation of the Governor's Water Resources Subcabinet** at the Executive level with additional regular agency collaboration to implement joint activities.

2. Establish a Blue Ribbon Task Force to develop a balanced, affordable and sustainable method to provide financing for water resource management and protection, including alternatives that utilize public and private partnerships.

NEED FOR LEADERSHIP

In order to accomplish the Vision, Mission, Goals and Strategies, leadership is necessary at every step in the process.

The best strategic plans are not likely to be successful if they are not carefully developed and effectively communicated to those with the power to implement them. Implementing the Vision will require leadership and cooperation with stakeholders across the state and the diligence to make the correct choices and wise investments in our state's water resources. Providing a reliable water supply for Kansas will be a big challenge in the years ahead, but if stakeholders work together to implement the strategies and recommendations described in the Vision, future generations of Kansans will have water for tomorrow.

KEYS TO SUCCESS

Keys to successful implementation of the Vision include:

1. Clear definition of the resource conditions and issues.
2. Agreement among the majority of stakeholders on the goals Kansas and its citizens are trying to achieve. The goal setting process in this document calls upon Kansans to meet, discuss and determine the goals for their region. The leadership of the Kansas Water Authority is critical to the development of these goals and must hold stakeholders accountable in meeting them.
3. While goals are important and the appropriate tools need to be readily available, stakeholders need to have the flexibility and freedom to meet the goals and use the tools.
4. Review and evaluate progress toward achieving the Vision in a timely manner to determine if further action is needed.

5. Leadership at the local level is the most critical. Local decision makers must listen to their constituents while at the same time balancing the future needs of their communities.

THEMES AND STRATEGIES TO ACHIEVE THE VISION

This section includes the themes, strategies and action items identified during the vision development process.

EXPLANATION OF SECTION

Following are a series of actions and strategies designed to achieve the vision, mission and regional goals.

The strategies are arranged in four themes:

- Water conservation
- Water management
- Technology and crop varieties and
- Additional sources of supply

Within each theme, three to five specific strategies are identified.

While many strategies are applicable to the whole state, some are specific to one or more distinct regions. Each action item is categorized into one of four applicable regions:

- Statewide
- Ogallala-High Plains Aquifer
- Reservoirs or
- Other Regions

For example, an action item in the Water Management theme recommending assessment of the Kansas River alluvial aquifer is unique to northeast Kansas and is therefore characterized as an "Other Regions Action Item."

Within each strategy, action items are identified and categorized in Phases according to the priority for implementation.

- Phase I action items are the highest priority and will be initiated, but not necessarily completed, during the first year of this draft of the Vision
- Phase II action items will be initiated within five years
- Phase III action items are longer-term and may require additional research, development and stakeholder coordination before the action item can be initiated

THEME AND STRATEGY OVERVIEW

WATER CONSERVATION

- Strategically emphasize information and education regarding the importance of water and water conservation practices
- Implement additional or enhanced water conservation policies and practices
- Reduce barriers and increase development of locally driven conservation and management plans
- Encourage conservation planning in economic development and business recruitment
- Increase adoption of watershed practices that reduce future water supply loss

WATER MANAGEMENT

- Modify reservoir operations and downstream targets to most efficiently operate reservoirs for water supply
- Improve interstate cooperation so that Kansans' water needs are met and protected
- Increase the regionalization of water supply to improve long-term water supply reliability
- Evaluate changes to the Kansas Water Appropriation Act and Rules and Regulations to promote better balance between efficient water use and economic benefit
- Evaluate and improve state agency coordination and collaboration

TECHNOLOGIES AND CROP VARIETIES

- Promote irrigation efficiency technologies
- Increase utilization of less water intensive crop varieties
- Implement research-based technology aimed at better understanding our state's water supply
- Develop career and technical education programming related to water resource management and technology to build the needed workforce

ADDITIONAL SOURCES OF SUPPLY

- Restore water supply lost to sedimentation through dredging and other in-lake sediment management techniques
- Allow for the transfer of water supplies between basins where feasible and cost effective
- Evaluate the sources and potential uses of lower quality water

- Secure all available storage at federal reservoirs including reallocating storage where such actions are possible
- Increase other sources of available storage for water supply

WATER CONSERVATION

STRATEGICALLY EMPHASIZE INFORMATION AND EDUCATION REGARDING THE IMPORTANCE OF WATER AND WATER CONSERVATION PRACTICES

STATEWIDE ACTION ITEMS

PHASE I

1. Appoint a task force to develop a multi-phased educational proposal for target audiences of K-12, community leaders and media to promote local conservation decisions. Existing educational efforts, programs and activities should be incorporated as appropriate. Ideas to be considered by the task force include:

    - Develop a Best Management Practice (BMP) conservation guide for communities building on existing resources and success stories

    - Implement community facilitation programs, with partners like K-State Research and Extension (KSRE), to develop ownership for local conservation decisions

    - Design and implement a statewide curriculum for K-12 on water conservation, building on current resources and knowledge such as Project WET and integrate water conservation into science curriculum, by working with partners such as the Kansas Association of Conservation and Environmental Education (KACEE) and the Kansas Department of Education

    - Develop additional activities within youth and adult organizations such as 4-H and the KSRE system to educate others and promote youth activities related to water conservation

2. Conduct drought simulation exercises to educate the public and identify gaps in conservation efforts

    - Incorporate drought simulation efforts into state hazard planning and seek funding and support for efforts from partners such as the U.S. Department of Homeland Security (DHS), National Integrated Drought Information System (NIDIS) and National Oceanic and Atmospheric Administration (NOAA)

3. Create a long-term commitment to water conservation education by designating responsibility for water conservation public information and outreach within agencies of the Water Resources Sub-Cabinet

   - Develop continual media plans and message maps related to water conservation and the importance of local engagement to be implemented by multiple partners through all aspects of traditional paid, earned and social media

4. Provide greater information and decision making tools to evaluate the economic impacts, both short-term and long-term, of reduced water use

5. Enhance educational programming specifically for state legislators as well as other state officials, the Congressional delegation and local policy makers

6. Develop a proposal for a program to provide Extension Groundwater Specialists, to be located in western Kansas, to help water users develop and implement management strategies that will lead to enhanced water management and long term sustainability of the economy in western Kansas. This program would be modeled after the extension Watershed Specialist program.

PHASE II

1. Hold annual public meetings in each water resource planning region, highlighting the current ground water, surface water and water storage situations

2. Consider holding a "Kansas Water Day" statewide experience with activities that highlight the value and importance of a reliable, long-term water supply

3. Implement state-wide marketing and educational strategies focused on general consumers/citizens

   - Model a state-wide water conservation outreach campaign on effective campaigns with the goals of reinforcing the value of water and reducing water consumption

   - Incorporate information on the relationship of water conservation to energy conservation in educational efforts

IMPLEMENT ADDITIONAL OR ENHANCED WATER CONSERVATION POLICIES AND PRACTICES

STATEWIDE ACTION ITEMS

PHASE I

1. Develop a rewards and recognition program for successful Kansas conservation activities

    - Develop recognition and incentive systems to identify and reward communities, individuals, businesses and industry that implement local conservation best management practices successfully. This could include the creation of a private "water audit" certification program such as Leadership Energy and Environmental Design (LEED) to identify individuals achieving highly efficient water use and conservation

PHASE II

1. Ensure agency coordination assists in the promotion of regional drought and water conservation planning and acknowledges the significance of sound planning for community and state resiliency to the impacts of climate variability

    - Educate communities about importance of regional planning

    - Simulate exercises to test regional plans at least every five years

    - Ensure water conservation is properly evaluated as an alternative for water supply when providing financial assistance

2. Develop rate structure tools for local governments to use as example opportunities to promote more efficient water use

    - Share information on effectiveness of rate structures and conservation including recent work done by local water suppliers (such as Wichita)

    - Encourage communities to design bills to break down the individual cost components for the water (infrastructure, chemicals, labor, et cetera)

3. Increase the identification and repair of aging public water supply infrastructure. Encourage communities to maintain and manage local public water supply systems

4. Encourage local communities, through education and shared examples from successful communities, to consider developing and measuring water use reduction targets when appropriate

5. Evaluate state-owned facilities for water conservation effectiveness and develop standards for new state construction or renovation

PHASE III

1. Consider use of standards for water efficiency for state building construction, renovation and operation such as LEED

REDUCE BARRIERS AND INCREASE DEVELOPMENT OF LOCALLY DRIVEN CONSERVATION AND MANAGEMENT PLANS

STATEWIDE ACTION ITEMS

PHASE I

1. Develop financial and non-financial incentives to encourage additional irrigation water conservation. Non-financial incentives could include state policy changes to afford irrigators with greater water use flexibility to aid in achieving conservation goals on less water intensive crops or cropping densities

2. Coordinate with USDA Risk Management Agency (RMA) to address crop insurance policies that disincentive water conservation, such as limited irrigation

OGALLALA-HIGH PLAINS AQUIFER ACTION ITEMS

PHASE I

1. Increase support and promotion of Local Enhanced Management Areas (LEMAs)

    - Provide greater support to local entities in LEMA development and management

    - Target water conservation incentives, including existing cost share program and new incentives, to established LEMAs to support implementation of lower water consumption actions

2. Establish corrective controls that allow flexibility based on local average reasonable use within the LEMA statute so not to penalize those who have already demonstrated reduced water use

3. Expand the LEMA concept so a proposal can come forward to the Chief Engineer from either GMDs, directly from local water right holders or other entities such as county conservation districts

ENCOURAGE CONSERVATION PLANNING IN ECONOMIC DEVELOPMENT AND BUSINESS RECRUITMENT

STATEWIDE ACTION ITEMS

PHASE I

1. Coordinate with the Kansas Department of Commerce and Kansas Department of Agriculture Marketing Division to consider incentives to recruit businesses and focus economic development on businesses that value water conservation, use water efficient technologies and reduce the removal of water from the state

    - Encourage value added processing within Kansas by providing financial or water right credit incentives to dairies and feedlots

PHASE II

1. Develop tangible incentives for businesses to conserve water

PHASE III

1. Evaluate development of option for local economic development entities to obtain an appropriation of water or an existing water right without a specific point of diversion or place of use to protect the potential water needs of a business being recruited to their area. The appropriation would have a reasonable time limit applied for the startup of a proposed project

2. Create a “Blue Premium” program that businesses can use to market themselves and their water conservation efforts

3. Coordinate economic development efforts designed to recruit business and industry committed to water reuse or utilization of lower quality water

INCREASE ADOPTION OF WATERSHED PRACTICES THAT REDUCE FUTURE WATER SUPPLY LOSS

STATEWIDE ACTION ITEMS

PHASE II

1. Evaluate programs that offer long term conservation as a tool for preserving healthy landscapes

2. Update the state plan for the comprehensive control of salt cedar and other non-native phreatophytes

RESERVOIR ACTION ITEMS

PHASE I

1. Prioritize and implement targeted funding in priority watersheds by working with local, state and federal conservation programs and partnerships

   - Utilize existing groups such as conservation districts and KSRE to promote programs and initiatives

   - Build on the success of Watershed Restoration and Protection Strategy (WRAPs) plans and engage expertise of stakeholder leadership teams

   - Increase utilization and adoption of BMPs by working with local leaders

   - Target construction and maintenance of watershed structures that provide the highest sediment reduction in priority watersheds through Watershed Districts

2. Increase communication and interagency coordination on existing and planned streambank restoration projects to define interagency priorities for streambank projects and promote the channeling of resources to the highest priority areas. Build upon the existing outreach and education efforts already underway to promote streambank restoration projects.

3. Develop a detailed monitoring strategy to assess current and ongoing sediment inflow into public water supply reservoirs

- Prioritize basins that will need assessment
- Identify all components of the monitoring strategy, including bathymetry and inflow stream sediment monitoring network
- Define a strategy to identify particular sub-basins that contribute the most significant loading rates

4. Develop a strategy to overcome hurdles with federal permitting for new conservation practices and structures to decrease the sediment load from entering water supply reservoirs

5. Evaluate the existing state, federal and private technical and financial resources and policies and programs available for streamside vegetation conservation and identify gaps to secure and protect riparian buffers in priority watersheds above water supply reservoirs.

PHASE II

1. Continue and enhance support of research of Best Management Practices (BMPs)

- Focus additional resources to assure installed BMPs are maintained
- Develop a BMP guide that is geared for urban and rural communities that also addresses economic benefits of conservation
- Develop or utilize existing research to quantify the financial impact of in-field soil loss to agriculture and the impacts to water supply storage

2. Develop a budget to identify costs associated with monitoring, assessment and program implementation on a watershed-by-watershed basis

PHASE III

1. Evaluate the changes in sediment accumulation in public water supply reservoirs

OTHER REGIONS ACTION ITEMS

PHASE I

1. Develop and implement a sediment and nutrient reduction Conservation Reserve Enhancement Program (CREP) in watersheds above targeted federal reservoirs and watersheds with excessive nutrient runoff. This program would serve to support ongoing efforts to address the Kansas Nutrient Reduction Strategy developed by KDHE, KWO, KDA, and KDWPT.

WATER MANAGEMENT

MODIFY RESERVOIR OPERATIONS AND DOWNSTREAM TARGETS TO MOST EFFICIENTLY OPERATE RESERVOIRS FOR WATER SUPPLY

RESERVOIR ACTION ITEMS

PHASE I

1. Coordinate with U.S. Army Corps of Engineers through tabletop exercises and workshops on a plan to improve operational efficiency of water supply reservoirs

2. Evaluate the level of minimum releases from Clinton, Pomona, Melvern and Hillsdale Reservoirs

3. Invest in research and development efforts of improving testing capabilities in reservoirs and rivers to allow a more advanced notice of potential water quality issues and coordinate with the U.S. Army Corps of Engineers in operation of the reservoirs to minimize conditions for algae blooms and avoid downstream impacts.

PHASE II

1. Assess the most suitable locations for the formation of additional Water Assurance Districts and/or Special Access Districts, in areas not currently served by Districts, to expand and improve coordination of the use of available supplies from Kansas reservoirs

2. Assist in the formation of special access districts and additional Water Assurance Districts, where appropriate and one does not already exist

3. Evaluate improved operational efficiencies at the state's reservoir irrigation districts

4. Evaluate Minimum Desirable Streamflow (MDS) targets based on updated data and needs where determined that changes would improve water management

5. Modify target flows on the Kansas River to save water stored in Tuttle Creek, Milford and Perry Reservoirs

6. Reduce minimum releases and modify schedules at Clinton, Pomona, Melvern and Hillsdale Reservoirs to increase water supply yield

PHASE III

1. Change reservoir operations to bypass sediment during high-flow events while maintaining downstream water quality and flood control

2. Evaluate appropriate level of drought risk at each reservoir and consider pros and cons of selectively increasing or decreasing risk at certain lakes

OTHER REGIONS ACTION ITEMS

PHASE II

1. Develop background information necessary to assess future operation and management changes of the Kansas River basin reservoirs and their relationship to downstream surface water and ground water resources

   - Evaluate alternative targets that meet downstream customer needs and perform comprehensive performance assessment of downstream Kansas River Water Assurance District customers' intake at various river stages to ensure intakes have sufficient access to flow at alternative target flow

   - Improve characterization of the Kansas River alluvial aquifer including installing and monitoring observation wells

   - Develop a stream-aquifer model of the Kansas River alluvial aquifer from Junction City to the junction with the Missouri River to examine the effect of scenarios of future development and management on ground water and river water levels

   - Evaluate potential effect of scenarios of future development and management on water quality conditions, recreation and wildlife and habitat

IMPROVE INTERSTATE COOPERATION SO THAT KANSANS' WATER NEEDS ARE MET AND PROTECTED

STATEWIDE ACTION ITEMS

PHASE I

1. Develop a long term strategy for representing Kansas in interstate water issues that best serves Kansas and its citizens

    - Routinely coordinate interstate water issues within Kansas water agencies to ensure the state is best represented

    - Improve opportunities for local stakeholders to engage in and provide input on interstate water issues

    - Host regularly scheduled public meetings to connect stakeholders with policy makers and those involved with advising and making interstate decisions

2. Ensure Kansas interstate water compacts are monitored and enforced and build upon existing working relationships with other compact states

3. Host a Governor's Summit among the Ogallala Aquifer states to develop a regional vision with a focus on cooperative efforts and common goals across the states (Planning initiated in Phase I, to be held in Phase II)

4. Work with other states to address federal water related policy proposals that have negative impacts on the region

PHASE II

1. Develop additional agreements with other states to support interstate cooperation on water management

RESERVOIR ACTION ITEMS

PHASE I

1. Coordinate with other states that have federal reservoirs with water supply storage to influence national policy which supports local needs

OTHER REGIONS ACTION ITEMS

PHASE I

1. Host a Governor's Summit between the Missouri River states to collaborate on river and reservoir management issues (Planning initiated in Phase I, to be held in Phase II)

PHASE II

1. Consider hosting a Governor's level discussion with neighboring states targeted at developing viable solutions to interstate debates and common issues if needed

2. Consider the options for identifying existing funds to be earmarked for interstate litigation

INCREASE THE REGIONALIZATION OF WATER SUPPLY TO IMPROVE THE LONG-TERM WATER SUPPLY RELIABILITY

STATEWIDE ACTION ITEMS

PHASE II

1. Conduct planning workshops to highlight successful case studies on development of regional water systems that provide examples of various approaches for implementation
2. Enhance public water supply planning assistance, including technical and engineering reviews of preliminary water supply proposals
3. Identify and recommend changes needed to state statutes and regulations that impede or prohibit regionalization and partnerships
4. Identify public water supplies with a single source of supply and, where appropriate, provide planning and financial assistance to develop secondary sources
5. Provide planning and financial assistance to water systems to facilitate interconnection opportunities among water supply systems to help address drought vulnerability
6. Require preliminary engineering reports to include regionalization alternatives when new water supplies are under consideration
7. Seek and promote opportunities for regional economic development and regional water supply planning to be developed based on water resource boundaries
8. Work with emergency and public water supply funding agencies to encourage proactive development of secondary sources by limiting or prohibiting funding for single source entities during an emergency

EVALUATE CHANGES TO THE KANSAS WATER APPROPRIATION ACT AND RULES AND REGULATIONS TO PROMOTE BETTER BALANCE BETWEEN EFFICIENT WATER USE AND ECONOMIC BENEFIT

STATE ACTION ITEMS

PHASE I

1. Develop a water right violation and enforcement process that is more transparent as well as consistent and is included in Rules and Regulations

    - Increase enforcement and implement more stringent fees and penalties for over pumping and other violations. This action will include a regulatory change with full comment period

2. Limit the movement of a point of diversion greater than 300 feet in areas where the source is ground water and resource is declining unless the applicant of the change application can demonstrate hydrologic analysis or pump test results, that the new, proposed location does not adversely affect any current authorized nearby wells, including domestic wells. This change will include a regulatory change with full comment period

3. Allow for the leasing of water rights to develop authority for the full beneficial use of the resource while protecting senior water rights

4. Develop flexibility options for stockwater, municipal and industrial uses to improve management and evaluate current consumptive use regulations to ensure they are being applied properly

PHASE II

1. Explore opportunities to establish Water Banks to promote trading of water amongst water right holders

- Create a model to run “mock banks” to test the banking concept for a specific geographic area

- Reduce barriers against and develop incentives for additional water bank creation

2. Evaluate the water conservation potential and economic impacts of approving applications for reasonable quantity rather than maximum and eliminate perfection and certification process

OTHER REGIONS ACTION ITEMS

PHASE I

1. Administratively close additional areas of the state to new appropriations where already fully allocated

2. Propose legislation to modify Multi-Year Flex Account (MYFA) statute to allow roll forward of unused water when a water right holder re-enrolls into another five-year flex account

3. Use the U.S. Geological Survey Model (USGS) to evaluate recharge values in Equus Beds Groundwater Management District No. 2 (GMD#2) to determine if areas are currently over appropriated and should be closed to new appropriations

EVALUATE AND IMPROVE STATE AGENCY COORDINATION AND COLLABORATION

STATEWIDE ACTION ITEMS

PHASE I

1. Consider options for more effective organization of water related roles and responsibilities at the state agency level or identify ways to promote greater efficiency and continued collaboration between agencies within the current structure

2. Develop stronger working relationships between local and state entities through improved communication, streamlined collaboration and realigned water cooperative strategies

3. Improve customer service approach of the state's water agencies by simplifying and streamlining processes and procedures to make them more customer friendly and easier to understand, prioritizing agency resources to better serve water right holders and other citizens, and utilizing stakeholder input to improve service activities

PHASE II

1. Encourage discussions between local entities to evaluate local efforts and organizational structures

2. When feasible, locate state employees at field offices or other locations where they are closer to those they serve and move processes to local offices

3. Where possible synchronize permitting between agencies on specific projects

TECHNOLOGY AND CROP VARIETIES

PROMOTE IRRIGATION EFFICIENCY TECHNOLOGIES

STATEWIDE ACTION ITEMS

PHASE I

1. Identify most efficient system technologies for use by Kansas irrigators by working with irrigation system and water management technology manufacturers, Kansas State University (KSU), crop consultants, ground water management districts (GMDs) and others

2. Ensure appropriate irrigation efficiency technology and irrigation management practices are eligible under the Environmental Quality Incentives Program (EQIP) by working with USDA Natural Resource Conservation Service (NRCS)

3. Ensure appropriate irrigation efficiency technology and irrigation management practices are eligible under the state's Water Resources Cost-Share Program

4. For emerging irrigation technologies, consider application for USDA's Conservation Innovation Grant funding to accelerate technology transfer and adoption of promising technologies

5. Determine optimum plant development stages for most efficient water application opportunities by collaborating with the seed industry, KSU, crop consultants and others

6. Demonstrate various technologies at KSU Agricultural Experiment Stations

PHASE II

1. Develop incentives and recognition programs for entrepreneurs based in Kansas who develop irrigation efficient technologies

    - Work with local economic development and rural development experts to encourage local investment in irrigation technology

2. Explore opportunity and feasibility of developing a state-led innovation grant program to encourage the advancement of next-generation irrigation technology and associated entrepreneurial enterprises

3. Help farmers and ranchers understand and implement available technologies and production practices that reduce water consumption with minimal negative economic impacts or increased economic value

OGALLALA-HIGH PLAINS AQUIFER ACTION ITEMS

PHASE I

1. Establish a Technology Outreach Taskforce to assist in the working model development and implementation of the field scale demonstrations

2. Showcase, on a field scale, the latest technologies in irrigation infrastructure, irrigation water management, soil moisture measurement, conservation tillage, automation, telemetry and other agronomic practices aimed at reducing irrigation water use

PHASE II

1. Develop Water Technology Farms at locations throughout the Ogallala-High Plains Region, targeting Local Enhanced Management Areas (LEMAs) by working in concert with irrigation technology manufacturers and the irrigation research community

- Determine what risk on Water Technology Farms can be mitigated by Risk Management Agency (RMA) and consider other funding to cover any uninsured risk assumed by landowner/operator for participating in Water Technology Farms

  - Work with equipment manufacturers and dealers in a public-private partnership to provide the equipment to participating landowners/operators

INCREASE ADOPTION OF LESS WATER INTENSIVE CROP VARIETIES

STATEWIDE ACTION ITEMS

PHASE I

1. Form a collaborative stakeholder team to set sorghum research priorities and develop research and funding strategy and present strategy to potential funding partners, including the Kansas Legislature
2. Ensure crop insurance policies do not discourage use of alternative, specialty and cover crops
3. Collaborate with crop consultants and other agricultural advisors to support farmers interested in less water intensive alternative crop production
4. Encourage state universities to expand engagement in development of teaching, research and extension programs related to less water intensive crop varieties
5. Improve adoptability of feed wheat, along with other alternate crops, through marketing, commodity segregation, research and education
6. Encourage producers to consider all aspects of agronomic management systems when trying to make water efficient decisions

PHASE II

1. Identify ways to create new and strengthen existing markets for less water intensive crops, including specialty and alternative crop varieties
2. Promote development of markets for alternative crops with a focus on value-added agriculture such as livestock feed and biofuels
3. Develop a strategy that supports research on the role of less water intensive forage and grasses such as triticale
4. Partner with and support public and private entities focused on development of drought

resistant corn and related advancements

5. Provide needed research and education that leads to increased adoption of cover crops to reduce field soil loss while improving overall soil health

6. Implement sorghum research funding mechanism based on a public-private partnership (Perhaps similar to Wheat Genetics Resource Center (WGRC))

    - Address sorghum research needs such as yield, stalk strength, silage density, nutritional value to livestock, weed control and ability to be used for biofuels production

    - Consider pursuit of grant funds (National Science Foundation (NSF)) or multi-state partnerships for initial sorghum research start-up efforts

PHASE III

1. Implement research in order to increase select pesticide resistance for sorghum and cotton along with drought resistant corn production

OTHER REGIONS ACTION ITEMS

PHASE I

1. Address policy issues that limit the growth of cotton in Kansas

    - Identify potential statutory or regulatory changes

    - Encourage U.S. Department of Agriculture and U.S. Environmental Protection Agency regulatory approval of Enlist Duo™ Cotton for Kansas for the 2016 planting season

    - Support additional pesticide product and seed variety development that improves opportunities for cotton growth in Kansas

2. Evaluate profitability, prices and water use of alternative crops

3. Strengthen the use of Driftwatch™ by growers of sensitive crops and pesticide applicators

PHASE II

1. Develop recommendations based on research related to corn and cotton rotation
2. Incorporate supporting technology advancements for cotton production such as weed control systems

IMPLEMENT RESEARCH-BASED TECHNOLOGY AIMED AT BETTER UNDERSTANDING OUR STATE'S WATER SUPPLY

STATEWIDE ACTION ITEMS

PHASE I

1. Continue to further develop and disseminate information about the state's water resources, including additional data, maps and reports and improve understanding of the Ogallala-High Plains Aquifer as an aid to water management in western Kansas

2. Expand adoption of on-line water use reporting system so customers are better served and information is readily available

3. Share research findings broadly with Kansas citizens to improve understanding of our state's water resources

4. Annually coordinate with university researchers regarding the Vision for the Future of Water Supply in Kansas to ensure future collaborative research supports the successful implementation of the Vision

PHASE II

1. Build economic assessments into water management research wherever feasible

2. Develop a Ground and Surface Water Model Maintenance Team dedicated to continual maintenance of hydrogeologic computer models to ensure models are current, defendable and ready for use at all times

3. Maintain state-wide stream gaging network to continue to provide near real-time information about stream and river levels. Evaluate the pros and cons of a state maintained stream gaging network

4. Share research findings broadly with Kansas citizens to improve understanding of our state's water resources

5. With local water management Districts, develop on-line water availability tool that could be used by individuals, organizations, local

entities and consultants to evaluate potential water development or management projects.

PHASE III

1. Encourage multi-disciplinary approaches (eg. agricultural sciences, economics, engineering, legal, public policy, etc.) to research-based technology to increase success of adoptable solutions

2. Establish "shovel ready" collaborative research proposals that implement the Vision towards which funding could be directed as grant and other funding opportunities arise

RESERVOIR ACTION ITEMS

PHASE II

1. Collect sediment cores at federal water supply reservoirs to document continuing rates of sediment deposition

   - Sediment core results would be compared with sonar derived water storage changes to develop the most accurate assessment of reservoir changes possible

   - Sediment core samples could also be used to identify past and present sources of sediment from watersheds to assess and improve the effectiveness of erosion control measures

2. Ensure digital data such as Geographical Information Systems (GIS) and the data repository at the Data Access and Support Center for water systems is available and maintained for all rural water districts, groundwater management districts and communities in Kansas

PHASE III

1. After a minimum of 10 years from the previous survey, collect and compare sediment cores at federal reservoirs to assess changes in rates of sedimentation and, where appropriate and necessary, repeat bathymetric surveys

2. Collect data through operation of water quality monitors and suspended sediment sampling at each Kansas federal water supply reservoir in two year rotations until each reservoir has

been assessed

OGALLALA-HIGH PLAINS AQUIFER ACTION ITEMS

PHASE I

1. Expand observation well network in the High Plains Aquifer

PHASE II

1. Evaluate driller's logs and require the submission of test well data to better characterize the Ogallala-High Plains Aquifer

2. Develop long-term research and business plans to allow farmers and local communities to prepare for successful transition to dryland farming

OTHER REGIONS ACTION ITEMS

PHASE II

1. Develop map for eastern Kansas, similar to the Estimated Usable Lifetime of the Ogallala Aquifer, that shows municipalities and other public water suppliers at greatest risk today, in the immediate future or in the long-term of having insufficient water supplies to serve area's needs

DEVELOP CAREER AND TECHNICAL EDUCATION PROGRAMMING RELATED TO WATER RESOURCE MANAGEMENT AND TECHNOLOGY TO BUILD THE NEEDED WORKFORCE

STATEWIDE ACTION ITEMS

PHASE I

1. Utilize agricultural education and 4-H to encourage young people to develop agricultural programs using water efficient technologies and less water intensive crops or crop varieties through recognition and incentive programs

2. Develop models for the inclusion of water conservation into the agricultural education curriculum, including classroom, supervised agricultural experience and FFA activities

3. Encourage the development of community college, technical programs and university programs to prepare the future workforce to work in irrigation efficiency technologies and with necessary expertise in less water intensive crops and crop varieties

PHASE II

1. Consider further development and support of water related academic programs at the state universities, community colleges and technical schools, including majors, minors and certificates

2. Integrate more education on less water intensive crops in university undergraduate and graduate programs for agronomists, animal scientists, grain scientists and agricultural economists

3. Develop educational material and programs to be included with the community college and career and technical education systems

4. Develop a career and technical education certificate to be offered in Kansas high schools

ADDITIONAL SOURCES OF SUPPLY

RESTORE WATER SUPPLY LOST TO SEDIMENTATION THROUGH DREDGING AND OTHER IN-LAKE SEDIMENT MANAGEMENT TECHNIQUES

RESERVOIR ACTION ITEMS

PHASE I

1. Conduct workshops with state and federal agencies and local stakeholders on data collection and research findings and discuss impacts, benefits and feasibility of implementing alternatives

2. Remove and dispose up to three million cubic yards of sediment from John Redmond Reservoir

PHASE II

1. Collect data and conduct analysis of modifications to the geometry and operations of John Redmond Reservoir to increase the passage of sediment through the reservoir

   - Collect sediment cores from John Redmond Reservoir, suspended sediment samples in lake and downstream on the Neosho River and lake flow and outflow data

   - Develop computer model to simulate the hydrodynamics and sediment transport for John Redmond Reservoir. Use the model to assess the impact of modification scenarios on sedimentation and water supply storage

2. Analyze and evaluate feasibility of sediment transport and hydrosuction sediment removal at Tuttle Creek Reservoir to reduce stored sediment while maintaining downstream flood control and water quality

PHASE III

1. Complete in-lake dredging at John Redmond Reservoir, modifying the reservoir geometry to encourage sediment bypass

ALLOW FOR THE TRANSFER OF WATER SUPPLIES BETWEEN BASINS WHERE FEASIBLE AND COST EFFECTIVE

STATEWIDE ACTION ITEMS

PHASE I

1. Eliminate statutory prohibition to use drinking water State Revolving Loan Fund (SRF) funds for water transfers and identify other state policies which unnecessarily limit transfers
2. Review opportunities to increase utilization of the Missouri River to meet Kansas' needs while recognizing and protecting the existing users
3. Communicate and collaborate with neighboring states on potential water transfers

PHASE II

1. Complete evaluation of large water transfers including legal, environmental, economic and technical issues
2. Review use of right-of-ways for use by water transfer infrastructure

PHASE III

1. Identify suitable areas and ability to transfer water to areas of need

RESERVOIR ACTION ITEMS

PHASE I

1. Develop interconnected water storage computer model for all eastern Kansas basins with federal water supply reservoirs

PHASE III

1. Update mid 1980s Kansas Water Office plan to interconnect reservoirs across multiple basins to move water to higher demand and increase overall yield

2. Evaluate opportunities to connect reservoirs to improve overall management and serve as a hydrologic conduit and where appropriate implement system to transfer high flows to increase system yield

EVALUATE THE SOURCES AND POTENTIAL USES OF LOWER QUALITY WATER

STATEWIDE ACTION ITEMS

PHASE I

1. Compile inventory of lower quality waters, including type, quantity and location, as well as, an assessment of potential uses and contaminants contained in water. Lower quality waters include treated wastewater effluent, grey water, stormwater runoff, oil and gas flow back and produced water, brackish surface and ground water and other waters with elevated levels of contaminants

- Identify all barriers that may exist to allow the use of lower quality waters
- State and local laws, regulations, guidelines and policies
- Review irrigation supplements to wastewater and current calculations that impact the consumptive use at the facility
- Utilize USGS model to determine the effect of chloride remediation activities in the Equus Beds Aquifer
- Ensure that cost-share incentives are available for stockwater users to adopt reuse technology

PHASE II

1. Identify best treatment technologies for lower quality water for various beneficial uses

- Determine research needs that exist for technology developed specific to Kansas waters
- Partner with irrigation equipment manufacturers and agronomists to develop equipment technology capable of utilizing lower quality water suitable for irrigation
- Address water quality implications with delivery systems and potential/risk for cross contamination, including implications to National Pollution Discharge Elimination

System (NPDES) Permits and Minimum desirable stream (MDS) flow designations

2. Consider incentives for the oil and gas industry which encourage the use of produced water

3. Expand assessment of the water quality and physical characteristics of aquifers containing brackish ground water

4. Pursue opportunities to recycle and reuse appropriated stockwater

    - Investigate opportunities to build programs or regulatory procedures to promote efficiencies

5. Develop an education/training strategy through the implementation of pilot projects, in partnership with public water suppliers and other water users, to demonstrate the potential uses of lower quality water

SECURE ALL AVAILABLE STORAGE AT FEDERAL RESERVOIRS INCLUDING REALLOCATING STORAGE WHERE SUCH ACTIONS ARE POSSIBLE

RESERVOIR ACTION ITEMS

PHASE I

1. Develop a plan to address future use storage in Milford, Perry, Big Hill, Clinton and Hillsdale Reservoirs; including the collection of revenue to call future use storage into service in Clinton and Hillsdale

PHASE II

1. Address items identified in hydrologic adequacy evaluations at Kanopolis Reservoir and implement pool raise. Evaluate feasibility of filling v-notch to create additional water supply storage
2. Complete feasibility study at Lovewell Reservoir
3. Coordinate with city of El Dorado on a plan to address future use storage in El Dorado Reservoir
4. Evaluate availability of water quality storage in Elk City reservoir for water supply in trade for storage at Big Hill
5. Reallocate future use water supply storage to water quality storage at Milford and Perry Reservoirs and initiate calling remaining portion of future use storage into service

PHASE III

1. Increase pool elevations and reallocate storage at Council Grove Reservoir
2. Initiate calling future use storage into service at Clinton, Big Hill and Hillsdale Reservoirs
3. Reallocate water quality and other storage to water supply storage at Melvern, Pomona and Fall River Reservoirs

INCREASE OTHER SOURCES OF AVAILABLE STORAGE FOR WATER SUPPLY

STATEWIDE ACTION ITEMS

PHASE II

1. Within municipal systems, develop methods to use locally collected stormwater and increase adoption of on-site or individual storm water collection through activities such as rain barrels and rain gardens

2. Review of policies limiting capture of urban stormwater runoff and reuse in areas where capture may serve as an additional source of supply without impairing water quality

3. Evaluate opportunities for additional managed sub-surface or aquifer storage within Kansas

4. Consider the development of rural water districts in areas where domestic ground water supplies have been depleted or are unusable

5. Increase collection of agricultural on-site rainwater collection

    - Inventory existing farm ponds and look for opportunities to utilize funding for further development and remediation

    - Evaluate existing rain lagoons and opportunities to utilize collected water in lieu of ground water sources

PHASE III

1. Evaluate need for additional on-site collection and use

2. Evaluate use of Department of Transportation right-of-ways for water supply storage and implement where feasible

3. Implement urban stormwater runoff capture and reuse in areas where such storage and reuse may serve as an additional source of supply without impairing water quality

RESERVOIR ACTION ITEMS

PHASE II

1. Develop larger on-site storage for irrigation and stockwater with potential funding assistance

2. Identify additional small multipurpose reservoirs that can be built and determine their feasibility

PHASE III

1. Construct additional Multi-Purpose Small Lakes (MPSL) reservoirs that have been identified as needed and feasible

2. Identify off stream storage sites that will limit sedimentation and evaporation loss

3. Identify additional large reservoir sites and evaluate costs, limitation and overall benefits (including economic) of new large reservoirs and secure suitable sites from development

4. Implement design and construction of off-stream storage if determined feasible

OGALLALA-HIGH PLAINS AQUIFER ACTION ITEMS

PHASE I

1. Encourage research on the rate and volume of water moving from playas to the Ogallala-High Plains Aquifer; quantify the levels of restoration needed and enumerate the average amount of water deposited annually in playas

ECONOMIC ANALYSIS

As stated by Governor Brownback during his Call to Action, "Water and the Kansas economy are directly linked." Recognizing the significance of this connection, the Vision will be accompanied by a complete economic analysis of the role of water in Kansas and how its use can best benefit the Kansas economy. Following is a description of the components and timeline for completion of the economic analysis.

WATER CONSERVATION

Policy makers should ensure that stakeholders have the best possible tools available in order to make decisions regarding water conservation. At first glance, water conservation seems to imply reductions in short term income. However, alternate sources of income in the short term as well as increased certainty in long term incomes may partly or wholly offset any short term losses.

IMPACT ANALYSIS

In order to extend the economic life of the aquifer and maintain the economic base of the region, water conservation alternatives will be evaluated. Economic analyses will be conducted to estimate the impacts to producers, the regional economy and hydrologic impacts to the Ogallala aquifer associated with a variety of water conservation policies. The economic impact of drought will be assessed with cooperation from the National Oceanic and Atmospheric Administration (NOAA) and the National Integrated Drought Information System (NIDIS).

DECISION MAKING TOOLS

Results from the impact studies and current research on limited irrigation economics will be utilized to create decision-making tools for stakeholders. These tools can quantify short versus long term costs and benefits. This ensures that stakeholders are well informed when considering policy alternatives to affect the entire area or make decisions in their businesses. These tools will also assist stakeholders in developing water rate structures that provide an economic incentive to conserve water.

These studies and tools will also be used to create educational materials on water conservation practices. Materials will be geared toward specific stakeholders highlighting the potential economic benefits of conservation.

VALUE OF WATER

Calculations of incomes, expenses and net income generated per acre-foot of water use for crops, dairy and cattle have been estimated and will continue to be refined. These calculations will be expanded to include other sectors.

Determining the value of water allows policy makers to consider alternatives such as water trading among users, sectors or even basins if policies allow water rights holders to do so. Market structures allowing for trading amongst users will also be evaluated.

WATER CONSERVATION OUTREACH

Public outreach based on the environmental as well as economic benefits of water conservation will appeal to a broader audience, increasing effectiveness.

WATER MANAGEMENT

A full economic analysis on the value of water to the Kansas economy will be conducted. This study will draw from previous, current and future research. Breaking down water strengths and challenges by region within the state and the value of water to each region will aid in regional planning.

TECHNOLOGY AND CROP VARIETIES

An evaluation of the economic cost and benefits of water saving technologies will be conducted. Studies on the profitability of alternative crops, new varieties and dry land versus irrigated returns will continue to provide stakeholders accurate information. These studies will aid stakeholders in making decisions to maximize the return from their limited water resource.

ADDITIONAL SOURCES OF SUPPLY

Studies that evaluate the economic costs and benefits of dredging versus other conservation practices that reduce soil erosion and gully formation will be expanded. Determine the feasibility of allowing interbasin water transfers based on the value of water and its importance to regional economies. The costs and benefits of constructing new reservoirs and other sources such as lower quality water will be evaluated.

ECONOMIC ANALYSIS TIMELINE

CURRENT STUDIES

- Value that irrigation water adds to the local and state economies
- Income, expense and net income generated from an acre-foot of water
- Long-term supply and demand for water in all basins
- Costs and benefits of various sediment management strategies

FUTURE STUDIES - PHASE I

- Impact analysis on policy alternatives
- Decision making tools
- Water conservation outreach

FUTURE STUDIES - PHASE II

- Economic analysis of value of water in Kansas, by region
- Decision making tools

MEASURING SUCCESS WITH A REGIONAL APPROACH

Establishing goals will allow Kansans, by region, to define their future water needs and provide a benchmark for determining success. The road to setting the regional goals will include identification of regional goal leadership teams, facilitated public outreach and review by the Kansas Water Authority. Following is the proposed schedule and process for developing the regional goals of the Vision.

DEFINING REGIONAL PLANNING AREAS (*NOVEMBER - DECEMBER 2014*)

Regional Planning Areas will be developed to represent the varied and unique water resource conditions that exist throughout the state. The map found on the following page represents draft Regional Planning Areas and is subject to further refinement based on public input.

The Regional Planning Areas were developed based on three criteria: regional hydrology, common issues and interests and existing regional water management entities.

The western planning areas are based first on the primary Ogallala Aquifer areas in Kansas recognizing that many of the activities and common interest follow county boundaries.

Issues in eastern Kansas are mainly surface water and reservoir related. As such, the draft Regional Planning areas are based on surface water hydrology as shown by watershed basins.

The central portion of the state is divided up on a combination watershed, county and groundwater management district boundaries. For the north central region, many of the primary issues surround either Bureau of Reclamation reservoir or surface and alluvial ground water management. The Equus Beds-Walnut Region combines both ground water and surface water and is based primarily around common interests and issues. The south central planning region has communities with similar issues and approaches.

Preliminary feedback on the proposed Regional Planning Areas collected during the 2014 Governor's Conference on the Future of Water in Kansas will be used to refine the areas. Final area boundaries may be refined during the full goal setting process.

IDENTIFYING REGIONAL GOAL LEADERSHIP TEAMS (*JANUARY 2015*)

For each Regional Planning Area, up to an eleven-person Regional Goal Leadership Team will be identified to represent various water resource categories. A chair of each Regional Goal Leadership Team will be identified by the Kansas Water Authority. The role of the team is to participate in the public scoping process in their region, develop draft goals for their region based on public input and available resource condition information and present the draft goals to the Kansas Water Authority.

PUBLIC OUTREACH (*FEBRUARY – MARCH 2015*)

A minimum of one public outreach event will be hosted in each of the Regional Planning Areas. During each event, water resource conditions unique to the region will be shared by members of the Vision Team and Kansas Water Authority. A trained facilitator will be provided for each event to assist in the discussion and process towards developing potential regional goals. Each member of the five-person Regional Goal Leadership Team will attend the outreach events in their region to hear first-hand and participate in the discussion. Notes from each event will be posted on-line.

DEFINE REGIONAL GOALS AND PRESENT TO KWA (*APRIL – MAY 2015*)

Each Regional Goal Leadership Team will meet to review the feedback received during the public outreach events and develops draft goals for their regions. Teams will present the proposed draft regional goals to the Kansas Water Authority. The Kansas Water Authority will provide advice towards the further development of the regional goals.

PUBLIC COMMENT (*JUNE – JULY 2015*)

All draft regional goals and the corresponding Kansas Water Authority advice will be posted on-line for public comment for a minimum of 30 days.

INCORPORATE REGIONAL GOALS INTO VISION (*AUGUST 2015*)

The Kansas Water Authority will review feedback received during the public comment period and make decisions on the regional goals. Finalized regional goals will be incorporated into the Vision for the Future of Water Supply in Kansas.

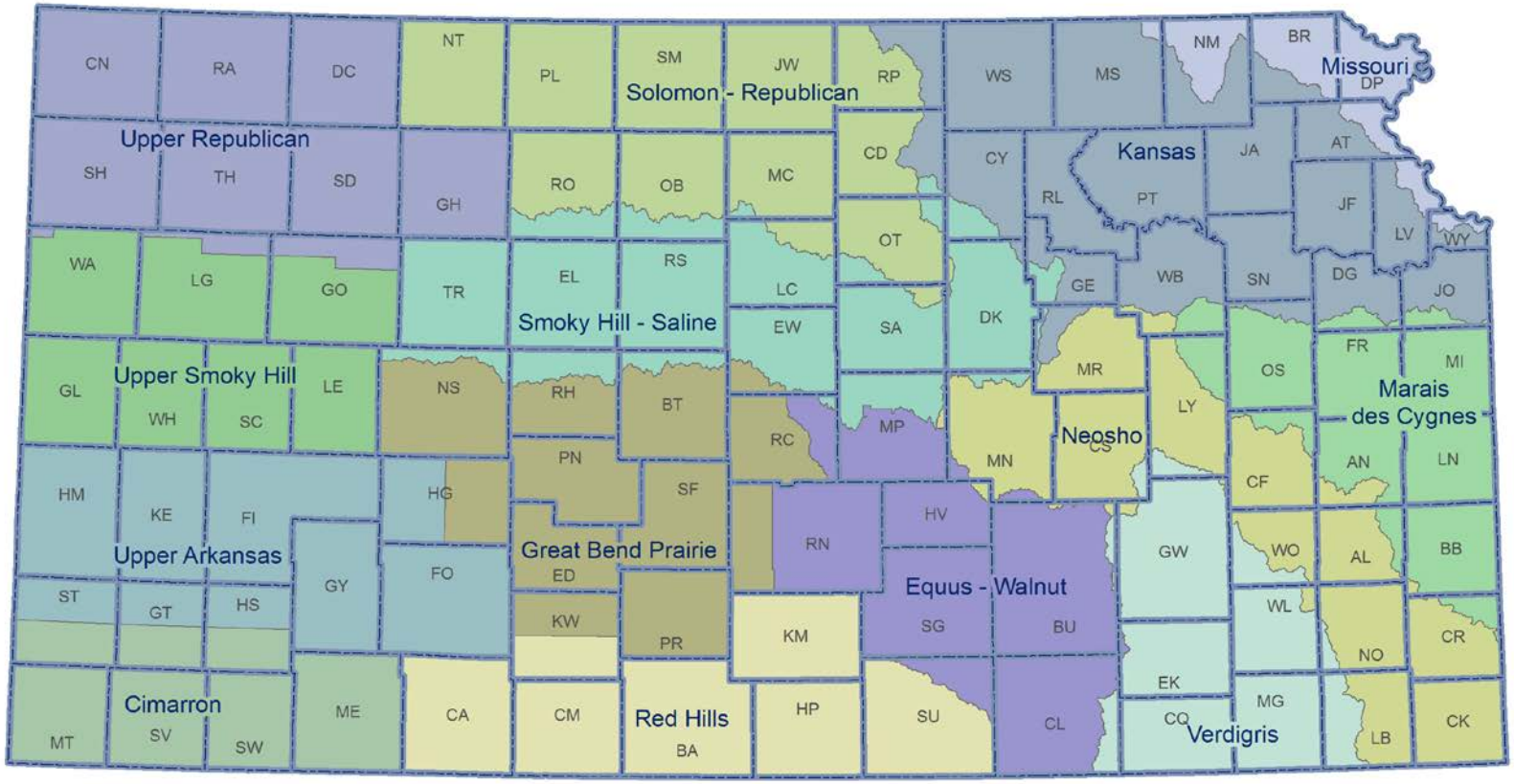
PRESENT REGIONAL GOALS TO GOVERNOR AND LEGISLATURE (*NOVEMBER 2015 - JANUARY 2016*)

The final Regional Goals will be presented at the 2015 Governor's Water Conference and to the Governor and Kansas Legislature during the 2016 Legislative Session.

ANNUAL REVIEW (BEGINNING IN JANUARY 2017)

Following the first year of the goal setting process and annually thereafter, the Kansas Water Authority will evaluate progress towards meeting milestones and overall goals and will assess the need for further action. Annual public meetings will be held in each water resource planning region, highlighting the current ground water, surface water and water storage conditions. Additionally, progress towards achieving the goals will be assessed through the Kansas Water Plan every five years.

DRAFT REGIONAL PLANNING REGIONS



BE THE VISION

Throughout the Vision stakeholder outreach process the Vision Team identified many Kansas municipalities, industries and individuals who have previously or are currently taking actions such as implementing water conservation practices and policies or adopting water efficient technologies to ensure their future water supply reliability. These Kansans are living the strategies included in this Vision today. Below are just a few examples of "Be the Vision" Kansas communities, companies and individuals.

OWENS CORNING

Owens Corning, the Fiberglas manufacturing processor in Kansas City, is one example of an industry that has successfully implemented water conservation practices. Owens Corning has been a water intensive process over the recent decades. In addition to significant city water consumption, well water was readily and inexpensively available and was used for many things including non-contact cooling of chemical storage tanks. Since well water was considered cheap and effective it was utilized for a multitude of uses around the facility for cooling, washing and for "insurance" in a few applications.

The Kansas City plant water reduction journey began about a decade ago when some very rough data was used for a study. Owens Corning then began setting some targets for water reduction across the company as it focused on reducing its "footprint."

The first large water reduction project focused on eliminating the non-contact cooling of chemical tanks. A chiller system was installed as a tank cooling function and as a result well water usage was reduced by nearly one million gallons per day. In 2011 they also incorporated two additional water focused projects which dropped the well water consumption fairly dramatically. As a result of these three steps, the plant water usage significantly declined from approximately one million gallons per day to an approximate 225,000 gallon per day usage rate.

Following the changes, the plant also decided to establish a small unofficial "water team" to focus on a very detailed mapping of water consumption for both city and well water usage. The first task was to understand where water loss was occurring to address each specified area. The largest usage was in the area of well water and they installed additional meters for more daily data collection from existing meters to create a detailed water map of the plant. It was quickly determined that closed loop water systems could easily be a hidden culprit of some of the large water usage issues. After addressing the closed loop systems, more significant water reductions were made in 2011. Owens Corning ended the year with a daily usage of approximately 60,000 gallons of well water per day.

In 2012, through more focused efforts, they again cut this number in half. Their data collection showed they were doing well overall except for some upset conditions that could occur on a weekend or over a period of time when it would go unnoticed.

In 2013, in addition to spot projects that reduced water consumption, they also installed a system of water meters on the well pumps, city water meters, sewer outfall meters and at a number of "key" users throughout the plant. All of these meters have been connected through a central computer along with alarm limits. When a series of alarms hit, it will direct the appropriate people to the area to address the item. This system is now being tested. Any alarms will trigger a system of email alerts to a team as well as to the appropriate people on duty in the plant at that time. This alert system will close the loop on these upset conditions and help eliminate instances that have occurred and resulted in large scale water waste in the past.

All of these dedicated conservation efforts have led to Owens Corning being recognized within the local, state and national communities for water reduction, as well as other environmentally focused projects. An additional bonus to the conservation efforts has led to large reductions in both the water and sewer costs to the facility.

FORT RILEY

In April of 2011, Fort Riley received the honor of being selected by the Army as one of eight Net Zero Water Pilot installations. The Net Zero Pilot installations are serving as test beds for the Army to identify lessons learned and best practices to reduce water consumption that can be implemented across all Army installations. Net Zero installations have ambitious goals including reducing water use intensity by 50 percent by 2020.

Fort Riley, in partnership with faculty and research students from Kansas State University (K-State), has been developing innovative projects with the Environmental Protection Agency's Office of Research and Development (ORD) to reduce water consumption. One project will use a Membrane Bio-Reactor to "mine" sewer water and treat it for reuse at the Installation Vehicle Wash Facility. While the reuse project may not represent a significant quantity of water compared to the total amount of water consumed at Fort Riley, the project may open other opportunities for reuse at the Fort and may serve as a template for portable facilities for treated reuse in deployment zones such as Afghanistan.

In another project, the Fort is implementing a community based social marketing campaign to encourage water conservation by targeting specific water-using behaviors. A component of the campaign will include a post-wide survey developed by students in the K-State Sociology Department to assess knowledge and attitudes on water conservation.

Additional Net Zero activities employed at Fort Riley include installation of low-flow showerheads, toilets and water faucets as well as conversion from traditional turf grasses to drought resistant Zoysia varieties on the Fort's golf course fairways.

In 2013, Kansas Governor Sam Brownback issued a call to action to his administration to develop a 50-Year Vision for the Future of Water in Kansas. Recognizing that water and the Kansas economy are directly linked, the Vision will identify strategies needed to ensure a reliable future water supply to support a growing Kansas population and economy. The Department of Defense (DoD) is one of the largest employers in Kansas. A solid state and federal partnership is essential to ensure Fort Riley and the other Kansas' DoD installations have the long-term water supply necessary to be successful in Kansas.

CITY OF HAYS

Many communities in Kansas have successfully reduced water consumption through systems upgrades and investment in water conservation programs. The City of Hays is one example of a Kansas municipality that is successfully implementing a variety of water conservation practices and policies.

In 1991, during a moderate drought, the City of Hays ran out of water. Existing sources could not keep up with daily demand. Short-term measures such as higher rates and watering restrictions were put in place. At this time, a desperate search for additional supply had begun. After a few years of searching, it became clear to the city additional water sources were a great distance from Hays and very expensive to develop.

After discovering that additional supply would not be easy, the City of Hays began examining its water usage and chose to invest in conservation programs. More than $275,000 was spent incentivizing the purchase of low-flow toilets and over 7,000 shower heads were given away to water customers. The city also spent in excess of $140,000 to incentivize the purchase of high-efficiency washing machines. Regulations were put in place prohibiting outdoor watering during the heat of the day, when a good portion is lost to evaporation, as well as prohibiting water runoff from a property due to improper irrigation. Significant investments were made in effluent water reuse as well. Currently, Hays irrigates several baseball, softball and soccer fields with effluent water as well as the Fort Hays Municipal Golf Course and Bickle-Schmidt Sports Complex. The city decided because of economic development, large water users would not be sought out.

The results of these efforts and investments were striking. Hays now uses less water than they did in the 1970s. In 2013, Hays used 2,200 acre feet of water, down from a peak of 3,600 acre feet in 1993. However, city commissioners and staff were not content to ride the wave of past successes. In 2010, city staff was tasked with taking Hays' water conservation efforts to the

next level. To do this, Hays had to look west to cities in the desert southwest and arid mountain west for examples

The successful showerhead replacement program was overhauled and reintroduced. Comprehensive toilet and urinal replacement programs were rolled out and incentive programs were implemented to encourage property owners to replace cool-season turf with drought-tolerant landscaping. The city created several demonstration gardens to show residents drought-tolerant landscaping not only saves water but can also be aesthetically pleasing.

In early 2014, the Hays City Commission adopted the Green Building Code which mandates the use of water-efficient fixtures and best practices for all new construction as well as significant remodels. The Green Building Code also requires smart irrigation controllers and efficiently-designed landscape systems upon installation. The city commission also adopted a comprehensive overhaul of its landscaping regulations. Limits were put in place on the amount of turf and overall area that can be irrigated and mandatory xeriscaping is required.

Hays/Ellis County is the only significant population center in Kansas that has inadequate local water supply. They know they must keep an eye to the future to ensure adequate water is available.

MCCARTY FAMILY FARMS, LLC

Kansas is home to 29 large-scale dairies. McCarty Family Farms, LLC is one example of a Kansas dairy focusing on the role of water conservation in their operations. Almost 15 years ago McCarty Family Farms moved from Pennsylvania to Rexford, KS, to allow their family to fulfill their dairy farming dream. Today, they have three dairy farms in western Kansas. While much of their philosophies regarding their commitment to their cows, people and the land have stayed the same since their family began milking in 1914, they have made many changes to take better care of their cows and natural resources.

Transitioning from a farm milking 150 cows in a water abundant area to a herd of over 7,000 head in a water scarce area required the McCarty Family to adapt their management style to accommodate the climate of western Kansas. Maximizing cow comfort and productivity while minimizing water use was a challenge the McCarty Family was not accustomed to facing but realized it was one that could be overcome with the right mindset, practices and partnerships.

Water supply issues in Kansas have impacted the thought process of the McCarty family in many ways. First and foremost, conservation of water as well as the maximization of productivity of each gallon pumped is a paramount thought on all of the McCarty family's operations. This has led to utilizing less water intensive crops (i.e. sorghum) to feed their herds, reexamining how they do business (i.e. condensing milk) to even where they focus their growth.

In 2010 they began their partnership with the Dannon Company and the McCarty family began construction of a condensed milk processing plant at the Rexford Dairy site. While it took eight months to build and a significant financial investment, the McCarty Family found it has been the right decision.

The decision to build the state-of-the-art milk processing plant was based on a multitude of benefits not only for them but also the Dannon Company, consumer and other stakeholders. First, the McCarty-Dannon relationship, with the processing plant as its keystone, served as a means of creating stable prices for both parties in an otherwise volatile market. This coupled with additional benefits such as reduced environmental impact, increased traceability, single source product streams and increased consumer connection for the McCarty Family led to a very unique and innovative business relationship.

The plant has allowed the extraction of more than 14 million gallons of water from the milk each year and more than 39,000 gallons every day. This has led the McCarty Family to not only operate the milk processing plant but increase the herd size on site by 500 head and use less water than before. The extracted water is reused for animal and crop care, including cow cleaning and irrigation, helping move the dairy closer to becoming a water-neutral operation. Water is even removed from the milk before it is shipped to Dannon, ensuring all water stays in western Kansas and at the dairy. Because the milk is condensed, there has also been a 75 percent reduction in the number of trucks and amount of fuel required to haul milk from the farm.

McCarty Family Farms have made it their motto to live to improve their environment, the communities they live in as well as be as progressive as possible when it comes to conserving their water resources. As a result of the management practices, their farms earned an environmental review certification by Validus and were named the 2013 Innovative Dairy Farmer of the Year. They know their business survival is dependent on the communities they live in and often say when their communities grow and prosper, they do as well. Most recently they were one of three dairies in the United States to win the U.S. Dairy Sustainability Award by the Innovation Center for U.S. Dairy.

NATIONAL COOPERATIVE REFINERY ASSOCIATION (NCRA) AND CITY OF MCPHERSON

Cooperative water supply and conservation planning among a municipality and their local businesses can result in mutual long term benefits to an area's economy and the natural resources. The benefits of this type of cooperative planning are illustrated through the National Cooperative Refinery Association (NCRA) and the City of McPherson.

For the past several years, NCRA and the city of McPherson have been studying their local water challenges. The challenges the refinery has been encountering center on the quality and

quantity of water available to them. The city of McPherson and NCRA use ground water from the Equus Beds aquifer which is the principal source of fresh and usable water in south central Kansas. The aquifer underlies portions of a four-county area. Both entities have noticed the aquifer located within the boundaries of the McPherson Intensive Groundwater Use Control Area (IGUCA) has been declining on average approximately one foot annually for the last 10 years. The quality of water has declined due to a plume, contributing elevated levels of calcium and chloride, in the immediate area. NCRA utilizes its water to provide steam and cooling water for its process units so the contaminants must be removed prior to use in their systems.

In order to provide a sustainable water source for its refinery, NCRA first reviewed alternate sources of water. Due to its location, the only sources of water available are those from the aquifer. Any surface water available is at least 30 miles away which was determined unfeasible to transport. Another source that was investigated was secondary effluent water from the McPherson wastewater treatment facility. This source was found to be a viable and acceptable source. An agreement was reached with the city of McPherson to provide approximately 700 gallon per minute of reclaimed wastewater to NCRA. Infrastructure for the collection and transport of the water to the refinery had to be constructed. This installation is nearing completion and is expected to be functional by September 2014.

Another water source that was investigated was the east chloride water. This option is water from the aquifer that is currently part of a remediation project to “clean up” a chloride plume in the aquifer. Studies have shown the primary source of waters high in chloride from the contamination plume is oil brine from an oil field discovered in the 1930s. Elevated levels of chlorides and calcium from the contamination plume are not compatible with the refinery’s current treatment technology. A new water treatment facility is now being built and it has been estimated that 700 gallon per minute of this water will be utilized in the future once constructed.

The final piece that needed to be addressed for NCRA was the water quality of the current water sources and the new alternate sources. To address the quality demands of the produced water, NCRA designed a treatment process to meet these stringent requirements. The process has been engineered and is currently being constructed. The estimated completion and startup of the facility is spring 2015. The water treatment facility will consist of microfiltration, nanofiltration and reverse osmosis technology. The process was designed to be efficient and will include a “backwash” reuse system that will reuse some water within the newly designed water treatment facility.

Once completed, NCRA is expecting to reduce water usage from the aquifer by about 1400 gallons per minute or about two million gallons per day. One of the new water sources will be the east chloride “plume” water, so remediation of the aquifer water will still be taking place but now as a result of implementing technology, the water will be used instead of wasted.

The city of McPherson also has similar sentiments regarding a sustainable water source for its customers. In addition to selling reclaimed wastewater to the refinery, McPherson has also worked to reduce the local aquifer demand. In the early 1990s the Board of Public Utilities purchased four irrigated farm quarters in the immediate vicinity of the city's well field and placed the water rights in the Division of Water Resources Water Right Conservation Plan. In 1994 an additional quarter was purchased. Recently the board decided to remove the irrigation equipment because of unsustainable pumping rates. McPherson has found these steps have reduced the local aquifer demand by approximately 500 acre feet per year.

McPherson and NCRA believe the new plant and water sources will provide a long term source of reliable water while being a good steward to the environment. The construction of the new water treatment plant and facilities will cost NCRA over $60 million, but it has been deemed necessary and appropriate in order to provide the McPherson community, refinery and surrounding area with a sustainable water source.

SHERIDAN-6 LOCAL ENHANCED MANAGEMENT AREA (LEMA)

A guiding principle of the Vision for the Future of Water Supply in Kansas is locally driven solutions have the highest opportunity for long term success. The Sheridan-6 Local Enhanced Management Area (LEMA) is on example of a success locally driven water conservation plan.

In 2001 the State Water Plan called for water management practices that would extend and conserve the life of the Ogallala Aquifer. Groundwater Management District No. 4 (GMD#4), which encompasses areas of 10 northwest counties. Farmers and area residents knew something must be done to address the declines in the ground water sources if they wanted to continue to have viable communities and industry. The GMD#4 board chose to implement recommendations determined by two state-appointed committees to update their Revised Management Plan which led to establishing the district's High Priority Areas (HPAs).

Sheridan-6 (SD-6), 99 square miles in Sheridan and Thomas counties, was one of the determined HPAs. Initial conversations and community meetings in SD-6 began in November of 2008. It was determined there was an overwhelming desire from attendees to preserve the natural resource of water for economic sustainability in the SD-6 HPA and provide an opportunity for continued sustainability.

Changing a mindset can seem almost impossible sometimes, but the GMD#4 Board of Directors and staff worked extensively with community members explaining the severity of the water declines in their area. The community was urged to be a part of their own solution, for their own benefit and that of the future generations. Through numerous meetings and discussions over the next four years, the SD-6 LEMA proposal was created by the locals.

The SD-6 LEMA requires that all water rights therein (non-domestic) entered into a five-year plan to use nearly 20 percent less water to slow Ogallala Aquifer declines. It allows an annual average of 11 inches/ acre or 55 inches over a five year period giving producers the flexibility on when to use their crop water.

In April 2012, the LEMA Bill (SB 310) was passed into law and the SD-6 Enhanced Management Proposal was submitted in July 2012. The GMD #4 then received approval notice from Kansas Department of Agriculture-Division of Water Resources in August and was followed by two public hearings and an independent hearing officer's report to the Chief Engineer October 2012. The Final LEMA Order of Designation was signed on April 17, 2013.

Now after having a full year of data, GMD#4 and SD-6 is proud to share the first year of the LEMA was successful. The annual average irrigation water applied was 10.29 inches/acre or 20,775 acre feet for irrigation and other uses; below the use goal of 22,800 acre feet. Water level declines as measured in January of 2014 were at 0.47 feet, lower than the previous five years, when annual declines in the LEMA area ranged from 0.96 to 2.00 feet.

While some producers applied up to 18 inches/acre due to the drought, most worked to adjust to less irrigation with increased water management, shifts in crops, planting density or acres. Rains in June were timely, helping farmers to have reportedly near normal production levels. Insurance for limited irrigated crops was available through USDA Risk Management Agency, a first time for this option.

This is the first locally developed and legally binding conservation plan made in the Ogallala High Plains Aquifer with many hopes it will be replicated across the region and even in other states. This leading example has been featured in several publications across the nation as well. The LEMA has sparked a tremendous increase in dialogue for others, emphasizing the importance of local problem solving, involvement and education.

SUPREME FEEDERS

While stock water use represents less than one percent of the total statewide reported water use, water conservation at a feedyard plays a role in a region's water supply conditions and can result in efficiencies and cost savings at the operation. An example of Kansas feeder successfully implementing water conservation activities is Supreme Feeders.

A couple years ago Supreme Feeders, Kismet, KS, received a letter from the Kansas Department of Agriculture-Division of Water Resources saying they had over-used their annual water allocation and needed to be in compliance by the next year. Supreme Feeders immediately wanted to begin cutting back on water usage as much as possible throughout the entire yard.

After evaluating areas of usage, they looked to easier solutions they could address first. Their first step was to look at their washing system. They chose to wash the equipment and roll stock fewer times per month while still maintaining cleanliness. Second, while a safe and healthy environment is key to the feedlot, they determined they could wash the hospital and processing barns fewer times per month in order to conserve, while still maintaining a safe standard. Third, they began to wash their water tanks biweekly, whereas, they had been washing the tanks every week. Once the easier conservation options had been implemented, the feedlot began researching other alternatives for more efficient water management and conservation practices they could execute.

The research presented staff with examples from JBS Five Rivers Cattle Feeding, LLS, a Colorado feedyard. JBS uses a water filtration system that filters the over flow from their water tanks to conserve water. Supreme Feeders contacted JBS about the filtration system and was invited to come examine the system and learn how it could fit their specific needs.

Supreme Feeders chose to replicate the same system at their feedyard. They chose to run a six inch underground drain line for each section of pens to send all the over flow water to a collection point. After collected, the reclaimed water is pumped to the treatment building to a set of filters and a UV light which clears the water of any particles and pathogens it may contain. This filtered process results in clean water, free of harmful bacteria and safe for the cattle to drink and reuse throughout the feedyard.

The decision to implement the system meant Supreme Feeders didn't have to reduce the feedyard capacity approximately 68,000 head. They have found it to be a good experience and encourage other feedyards to consider implementing this system in their own operations. In November of 2013 they invited several feedlots, the Kansas Livestock Association and other entities to a field day to feature the system and what they had learned regarding their water management practices. They shared with attendees the cost to treat the water was minimal in comparison to hauling water or decreasing the number of cattle to feed.

The reclamation system has been running for more than a year now and the recycled water accounts for approximately 20 percent of the feed yard's total usage. Supreme has found they are using less than their appropriated amount by about 200 acre-feet. Supreme Feeders has saved more than 90,000,000 gallons of water since implemented and has found they are now pumping 20 percent less water from their water wells. This has proved to be a great example of a future conservation measure that didn't mean an inventory reduction for the feedyard.

FIRSTWATER AG, INC

Water where you need it is a concept entrepreneurs in Kansas such as FirstWater Ag make a reality for producers in agricultural water use and crop production environments. With

knowledge and experience in systems for water conservation and efficiency on irrigation machines, FirstWater Ag was formed in Atwood, KS in 2013.

The customized zone control irrigation systems at FirstWater Ag gives producers greater control and precision in the application of water by creating individually controlled watering zones and times along the length of an irrigation machine. This allows producers to treat variable parts of the field with different amounts of water. The FirstWater Ag zone control system dates back to commercialization in 2001 when it was first used on the market and has been a pioneering leader in this technology. The system can be retrofit onto virtually any brand or any age of center pivot or lateral irrigation machine. With past systems installed in many states more precise control of irrigation water can benefit many different geographies and production environments.

FirstWater Ag customized zone control irrigation system can address many factors for producers such as topographic variability, overlapping pivots, chemigation and fertigation applications, waste water or livestock effluent application through irrigation, different soil types and capacities, water runoff, bogging down or getting stuck in wheel tracks and simply avoiding water, chemicals or fertilizers in ponds, grass, roads, creeks or other non-crop areas.

The systems are built around a controller that is installed at the pivot or lateral. The controller can tie into the speed of the machine as well as the control of sprinkler zones that are grouped together. In settings where zones are desired, control valves are placed on each sprinkler point along the span with multiple valves/sprinklers controlled together in a zone. Up to 48 zones can be installed along the length of the space and with a GPS signal, the controller can change the action of those every 1 degree of change in the machine angle. This creates potential for more than 17,000 individually defined water areas in a full center pivot field.

University of Georgia research has shown water savings of 8-20 percent annually all while producing equal or better crop yields and reducing pumping costs. A FirstWater Ag system in a field during the winter of 2013 is projected to cut irrigation water use by 25% and save an estimated 40 million gallons per year in just one field.

Producers, crop consultants and other trusted agronomic advisors have the tools and freedom to define the watering prescriptions for their specific fields having the best knowledge of those circumstances. In addition to control of applied irrigation water, FirstWater Ag is bringing forward a multi-probe soil moisture sensing system that will create significant synergy in water management approaches allowing growers to not only see which parts of their field may be wet or dry, but then to verify the effect of the watering prescriptions they apply.

FirstWater Ag places a high value on relationships with customers and partners in finding ways to work together in managing water more efficiently. Tools and strategies will continue to be

developed that meet the needs of irrigated producers as well as steward the Ogallala-High Plains aquifer and all other water resources.

Wenstrom Farms

Wenstrom Farms is one of many examples in Kansas of how the adoption of irrigation technology combined with land management can results in significant water savings. Richard and Jane Wentsrom's farm sits on the Great Bend Prairie Aquifer near Kinsley, KS. Raising irrigated corn and soybeans with some alfalfa and small amount of wheat over the limited water resource, they know the extreme importance of irrigation scheduling.

As far back as the 1970s, Richard began gathering data and monitoring water use. He started implementing computer software programs starting in 1980, before many farmers even had computers. Richard was known as one of the first large-scale irrigators who used soil-based irrigation scheduling techniques but was also an early adopter of climatic- or Evapotranspiration (ET)- based irrigation scheduling.

He knew that irrigation scheduling is one of the keys to saving water and more than 20 years ago, began using a computerized irrigation scheduling system with 24 center pivots on his 4200 acre farm. Wenstrom soon realized significant savings as the system he used took into account temperature, humidity, wind, rainfall and other climate data to determine when and how much water should be applied at any given time. The system also enabled him to play out various scenarios for the center pivot to ensure highest efficiency.

He found built-in flexibility in the program which helped him to see the value in identifying the correct speed for the pivots to help be most efficient; a critical piece that continues to set his irrigation scheduling system apart from others, even contemporary systems.

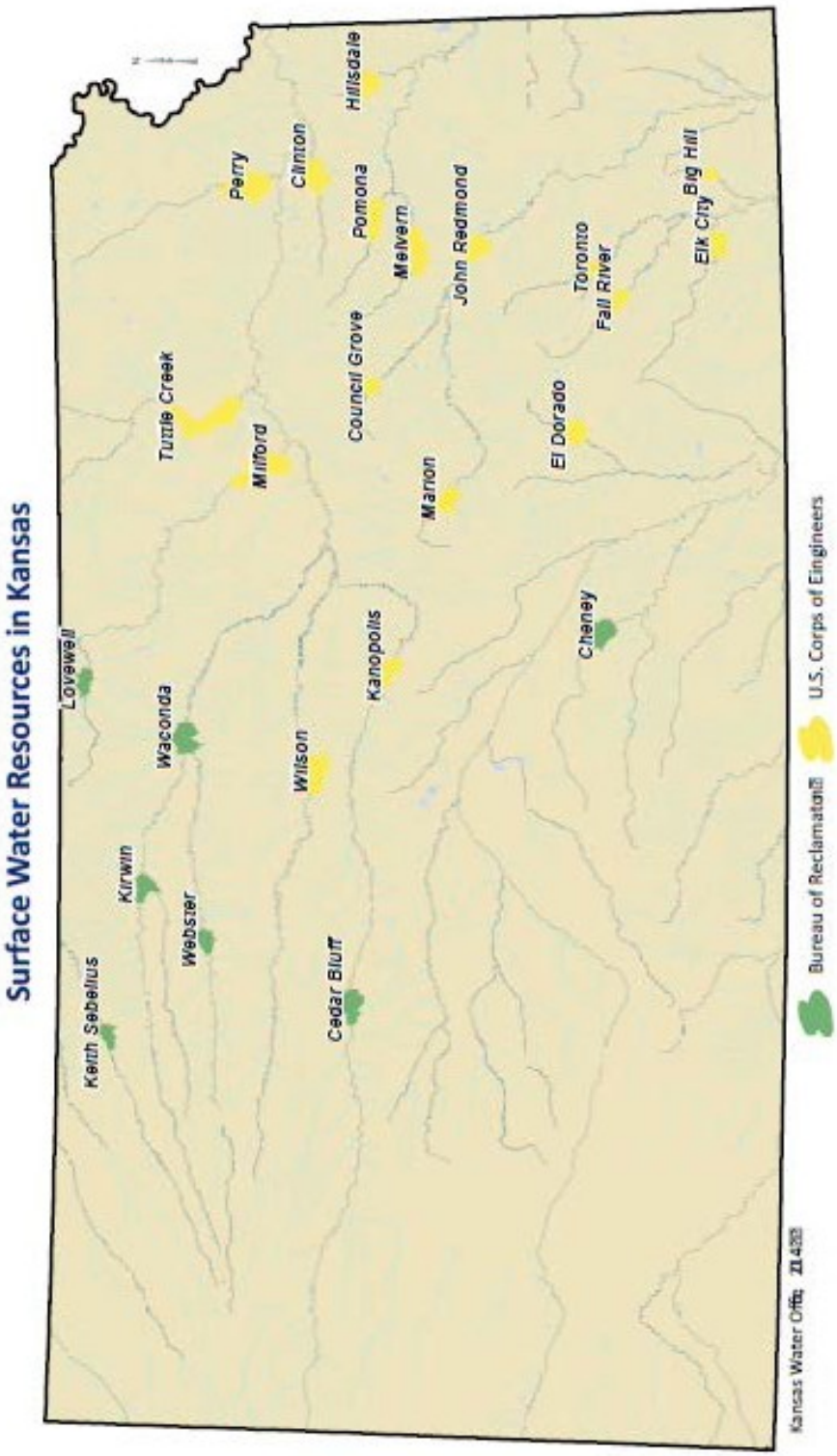
He promotes irrigation scheduling saves water, energy, and money with estimates of up to 35 percent savings in water and energy. Wenstrom estimated that his system saved between 20-30 acre feet of water per pivot compared to irrigation regimes that didn't use scheduling in the 1980s. Fuel savings for the 24 center pivots were in the range of 500-600 million cubic feet of natural gas per year.

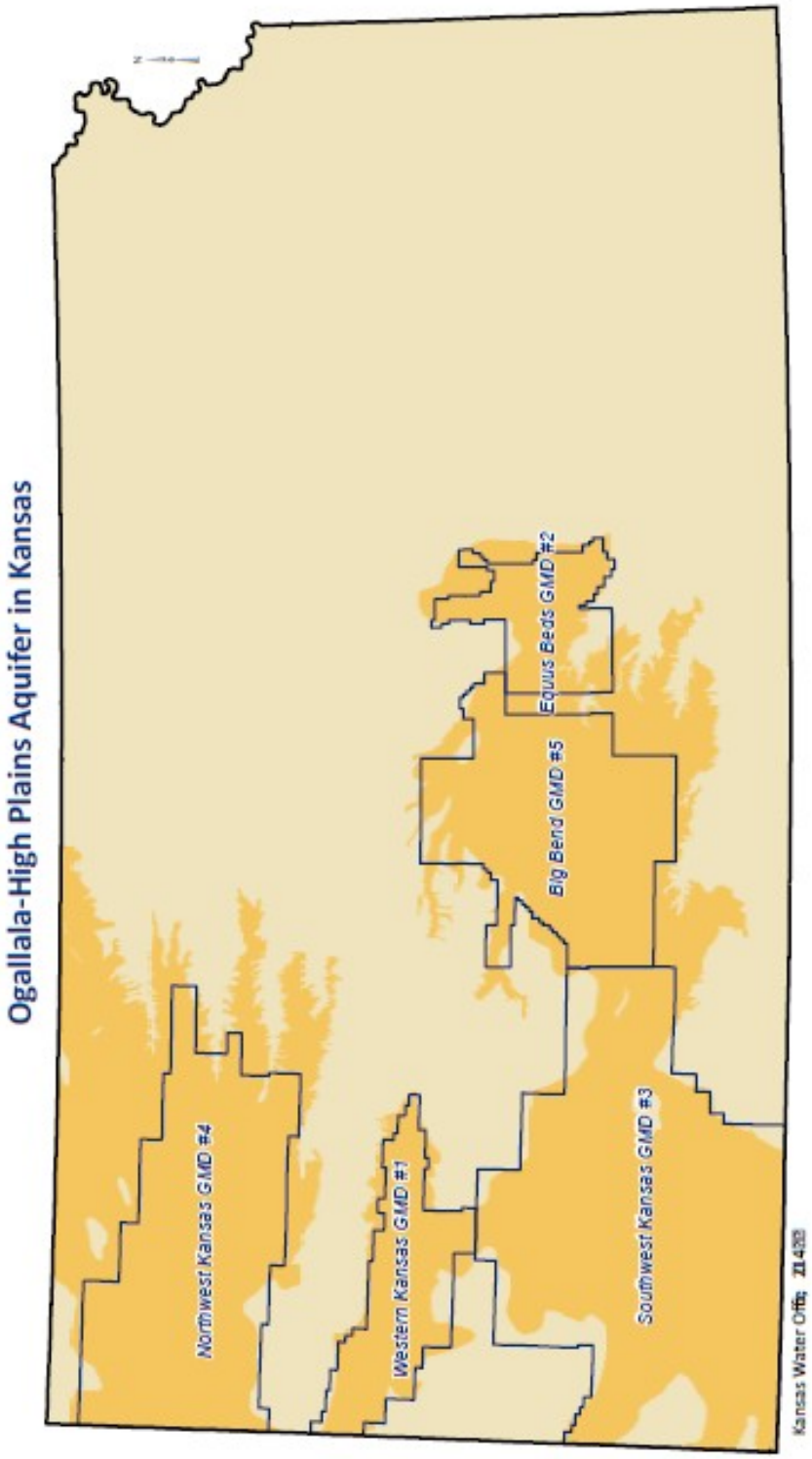
The examples set at Wenstrom Farms has led to him being board president of The Water Protection Association of Central Kansas (Water PACK), an organization with members consisting of ag producers and related businesses from six south-central counties who serve as a proactive voice for irrigated agriculture in the area. Richard is also one of the producers to participate and conserve water in the Central Kansas Water Bank. Recently Wenstrom Farms was named a model innovator for the Climate+Energy Project.

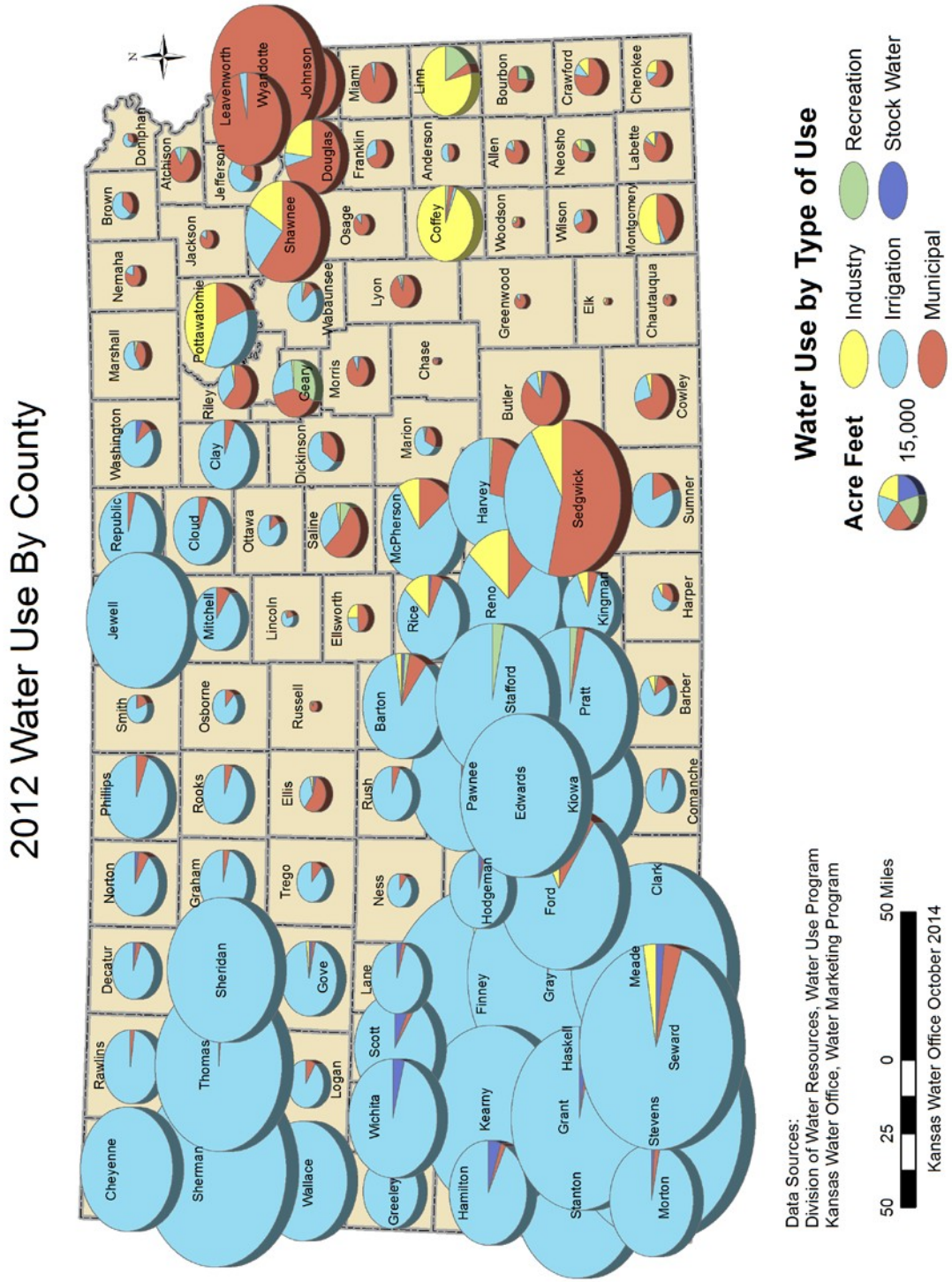
Richard has seen different techniques work for different people. For farmers who irrigate, they do so with the intention of producing high yields. He knows his irrigation scheduling impacted yields but also reflects the values of resource conservation and good stewardship which runs deep in Kansas.

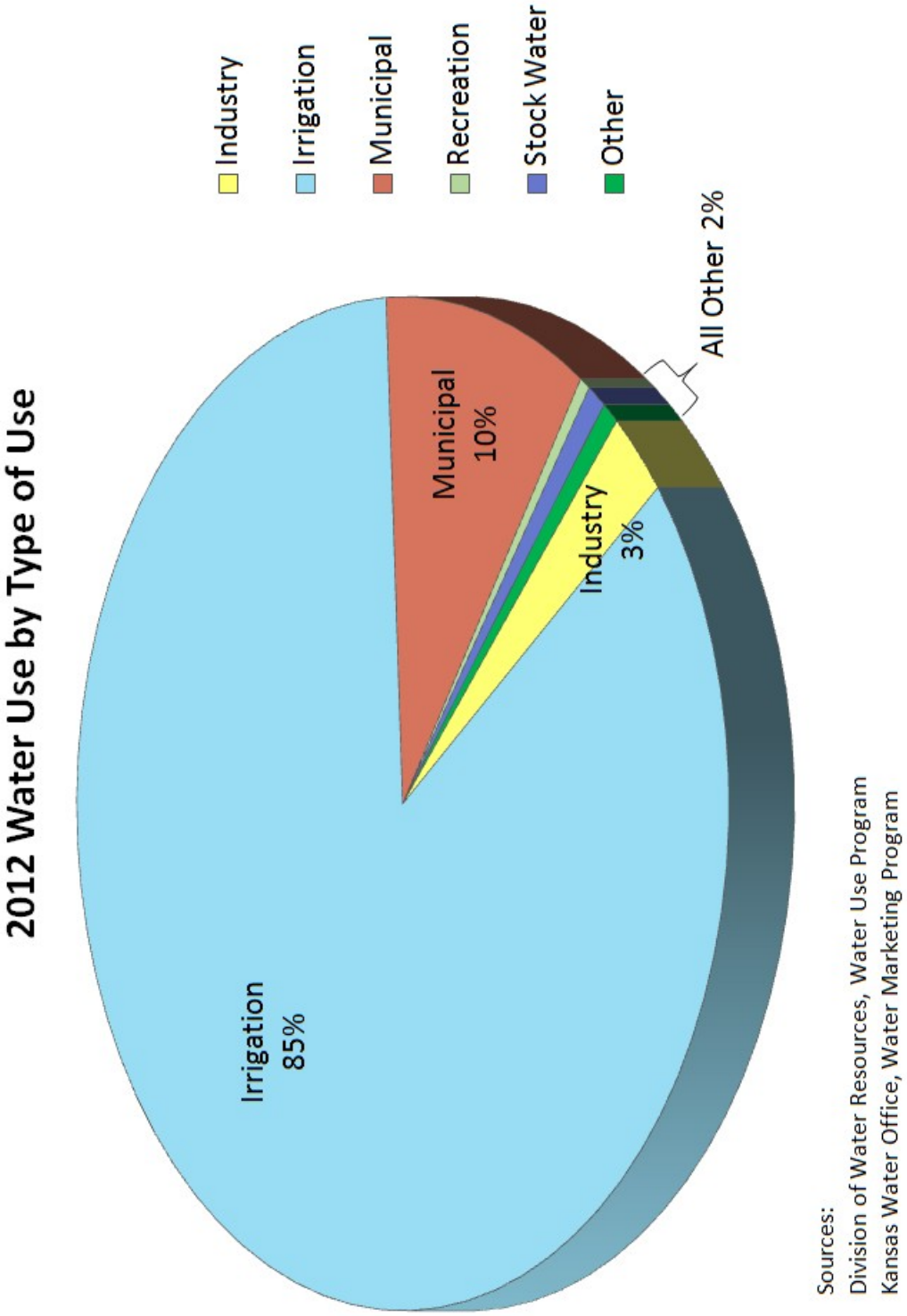
CONDITION ATLAS

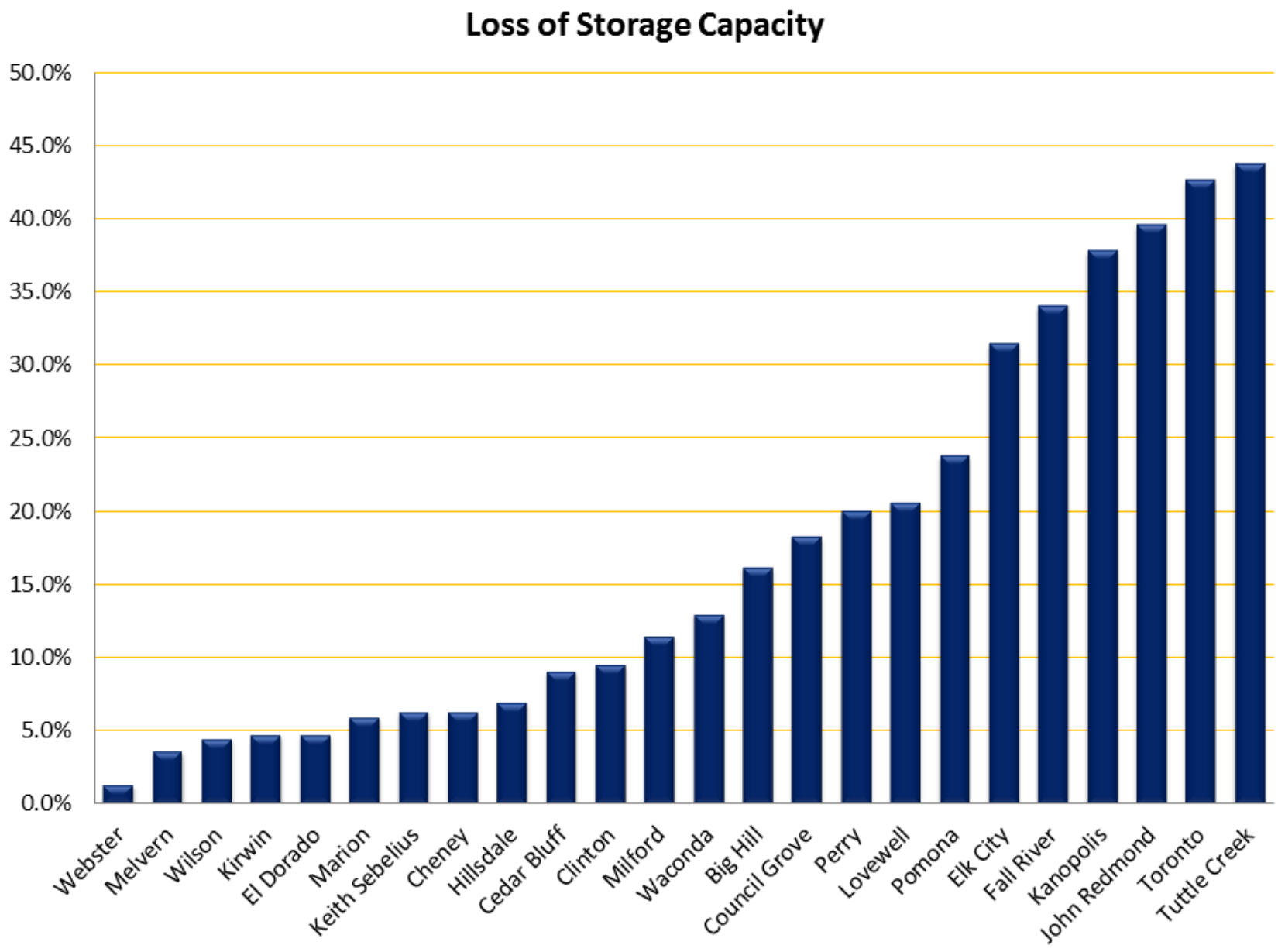
Following are several maps and figures that reflect water use, sedimentation and storage capacity in the state's federal reservoirs and the estimated usable lifetime and storage in the Ogallala-High Plains Aquifer in Kansas. An additional on-line tool will be developed to allow Kansas citizens to review information specific to their region.

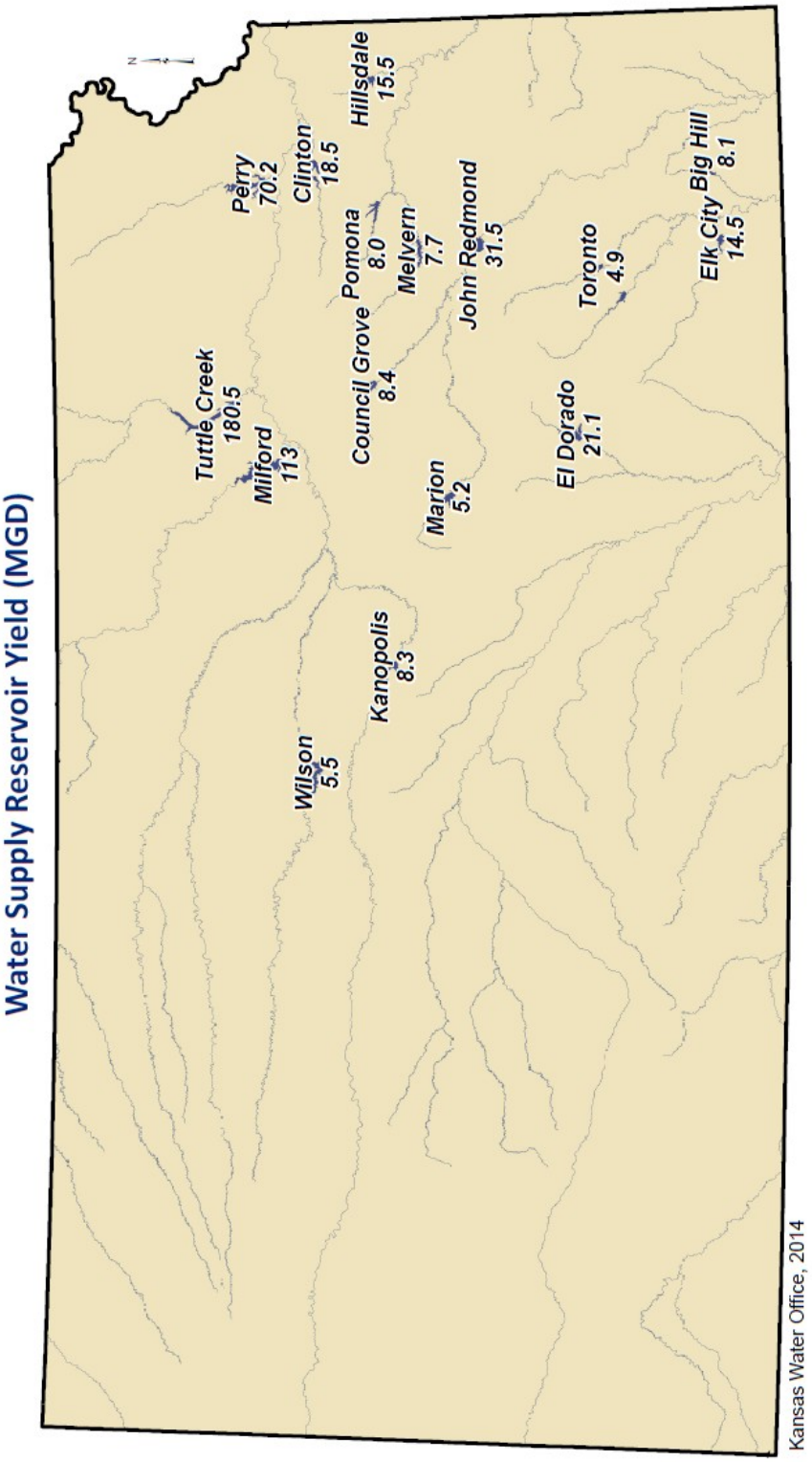

Surface Water Resources in Kansas
Hillsdale
Clinton
Perry
Pomona
Melvern
John Redmond
Big Hill
Elk City
Toronto
Fall River
Tuttle Creek
Milford
Council Grove
El Dorado
Marion
Lovewell
Waconda
Wilson
Kanopolis
Cheney
Kirwin
Webster
Cedar Bluff
Keith Sebelius
Kansas Water Office
Bureau of Reclamation
U.S. Corps of Engineers

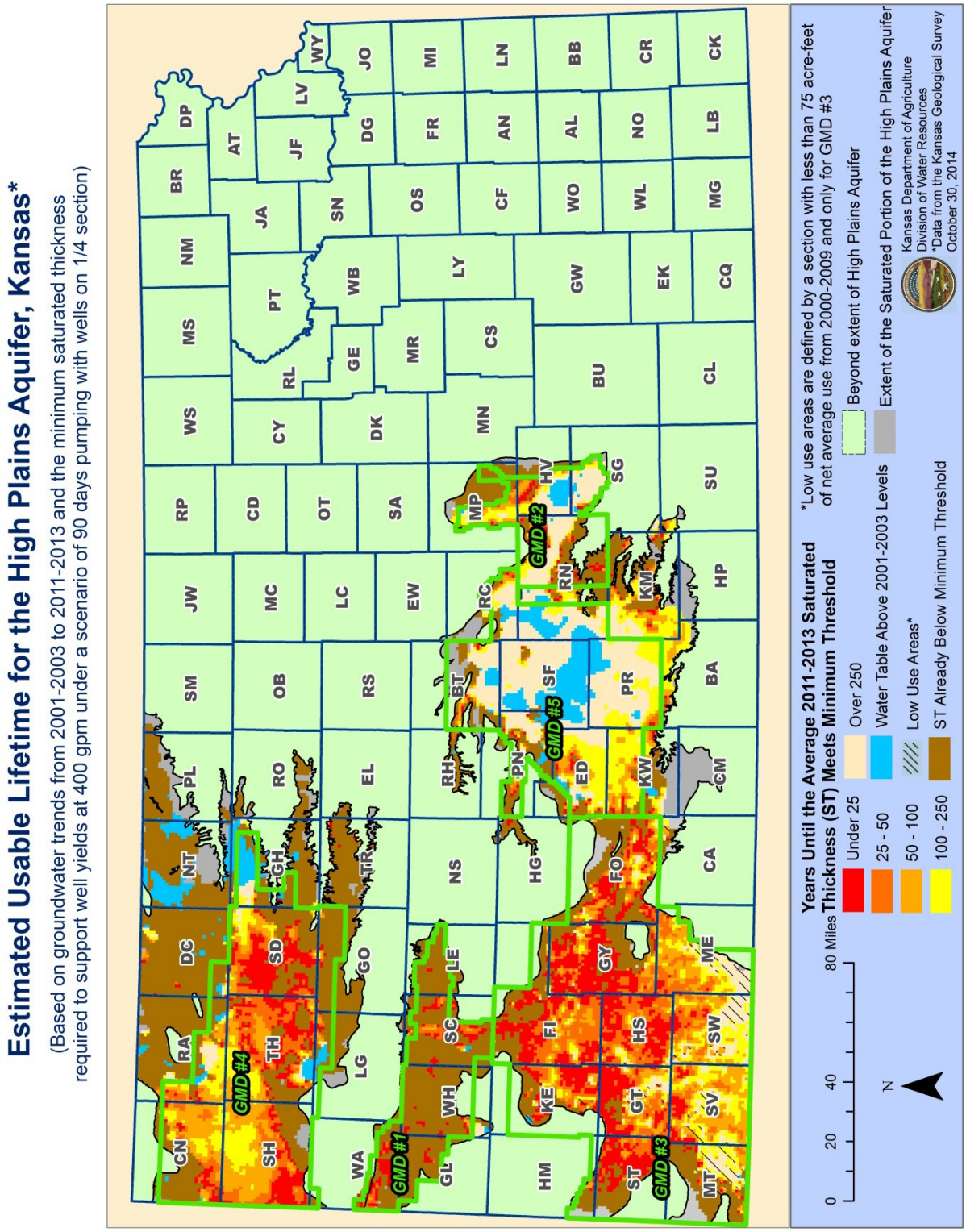

Ogallala-High Plains Aquifer in Kansas
Northwest Kansas GMD #4
Western Kansas GMD #1
Big Bend GMD #5
Equus Beds GMD #2
Southwest Kansas GMD #3
Kansas Water Offi

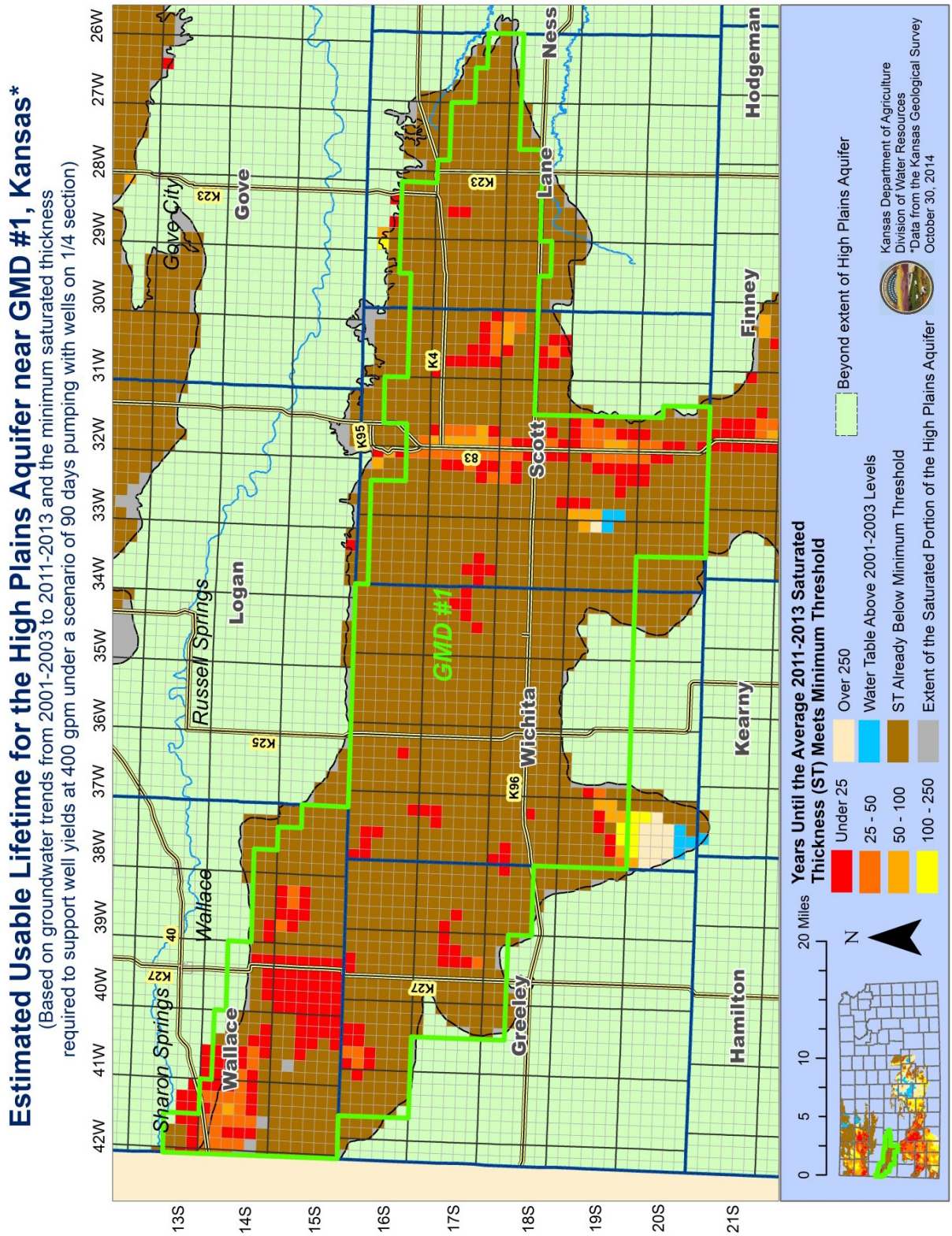

2012 Water Use By County
Water Use by Type of Use
Acre Feet
15,000
Industry
Irrigation
Municipal
Recreation
Stock Water
Data Sources:
Division of Water Resources, Water Use Program
Kansas Water Office, Water Marketing Program
50 25 0 50 Miles
Kansas Water Office October 2014
N
Cheyenne
Rawlins
Decatur
Norton
Phillips
Smith
Jewell
Republic
Washington
Marshall
Nemaha
Brown
Doniphan
Sherman
Thomas
Sheridan
Graham
Rooks
Osborne
Mitchell
Cloud
Clay
Riley
Pottawatomie
Jackson
Atchison
Jefferson
Leavenworth
Wyandotte
Johnson
Wallace
Logan
Gove
Trego
Ellis
Russell
Lincoln
Ottawa
Saline
Dickinson
Geary
Shawnee
Wabaunsee
Greeley
Wichita
Scott
Lane
Ness
Rush
Barton
Rice
Ellsworth
McPherson
Marion
Morris
Osage
Douglas
Franklin
Miami
Hamilton
Kearny
Finney
Hodgeman
Pawnee
Stafford
Reno
Harvey
Butler
Chase
Lyon
Coffey
Anderson
Linn
Bourbon
Allen
Neosho
Crawford
Cherokee
Stanton
Grant
Haskell
Gray
Ford
Edwards
Kiowa
Pratt
Kingman
Sedgwick
Greenwood
Woodson
Wilson
Montgomery
Labette
Morton
Stevens
Seward
Meade
Clark
Comanche
Barber
Harper
Sumner
Cowley
Elk
Chautauqua

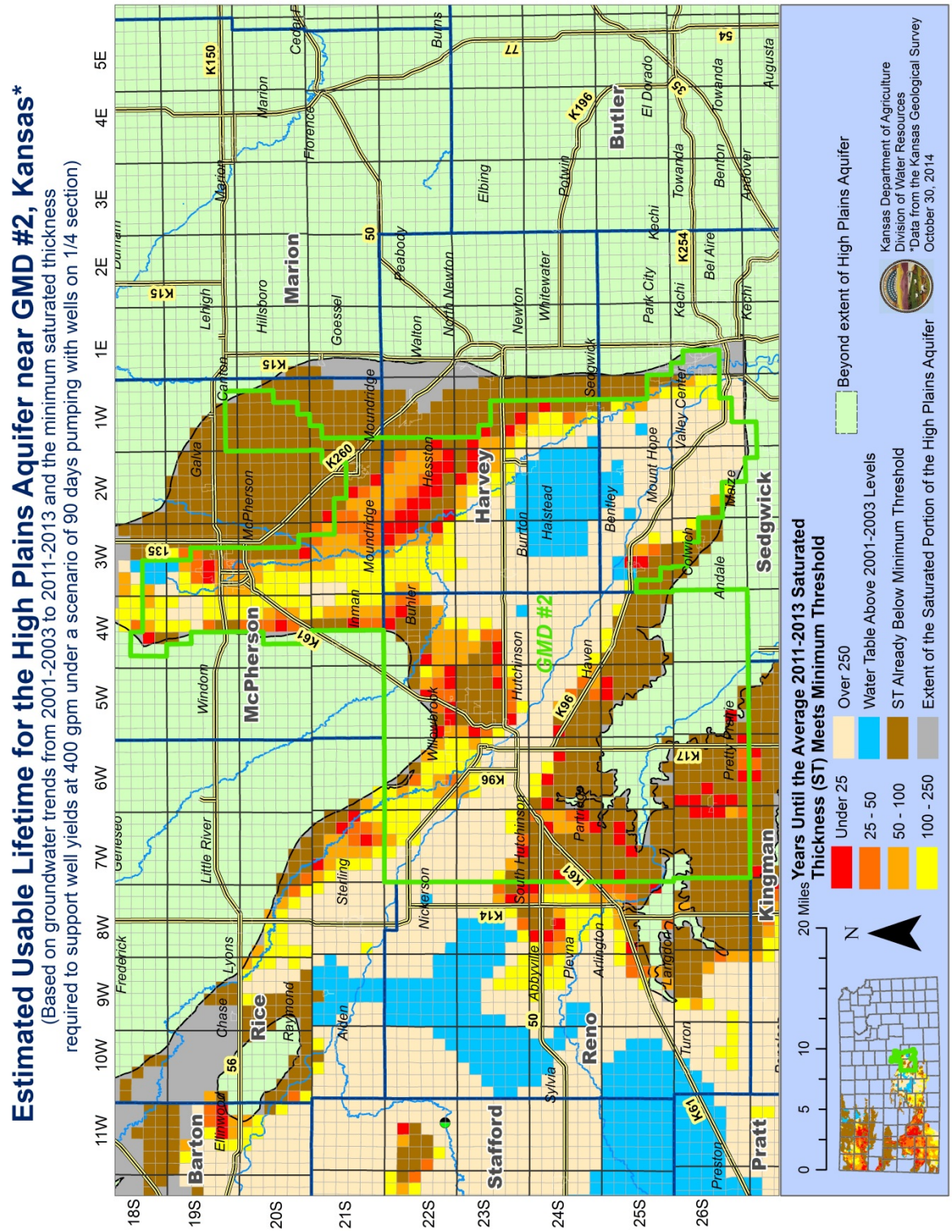

2012 Water Use by Type of Use
Irrigation
85%
Municipal
10%
Industry
3%
All Other 2%
Industry
Irrigation
Municipal
Recreation
Stock Water
Other
Sources:
Division of Water Resources, Water Use Program
Kansas Water Office, Water Marketing Program

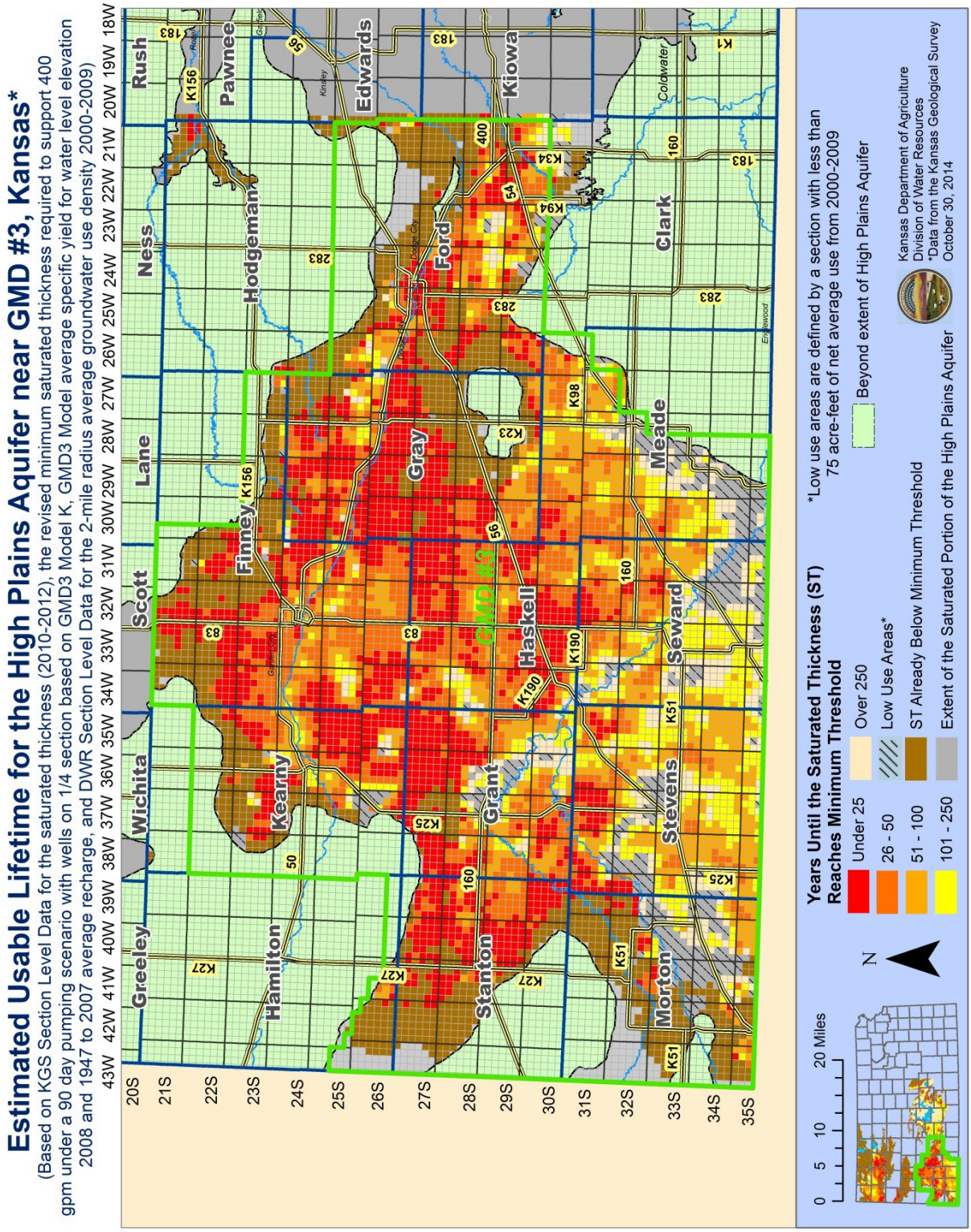

Loss of Storage Capacity
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
Webster
Melvern
Wilson
Kirwin
El Dorado
Marion
Keith Sebelius
Cheney
Hillsdale
Cedar Bluff
Clinton
Milford
Waconda
Big Hill
Council Grove
Perry
Lovewell
Pomona
Elk City
Fall River
Kanopolis
John Redmond
Toronto
Tuttle Creek

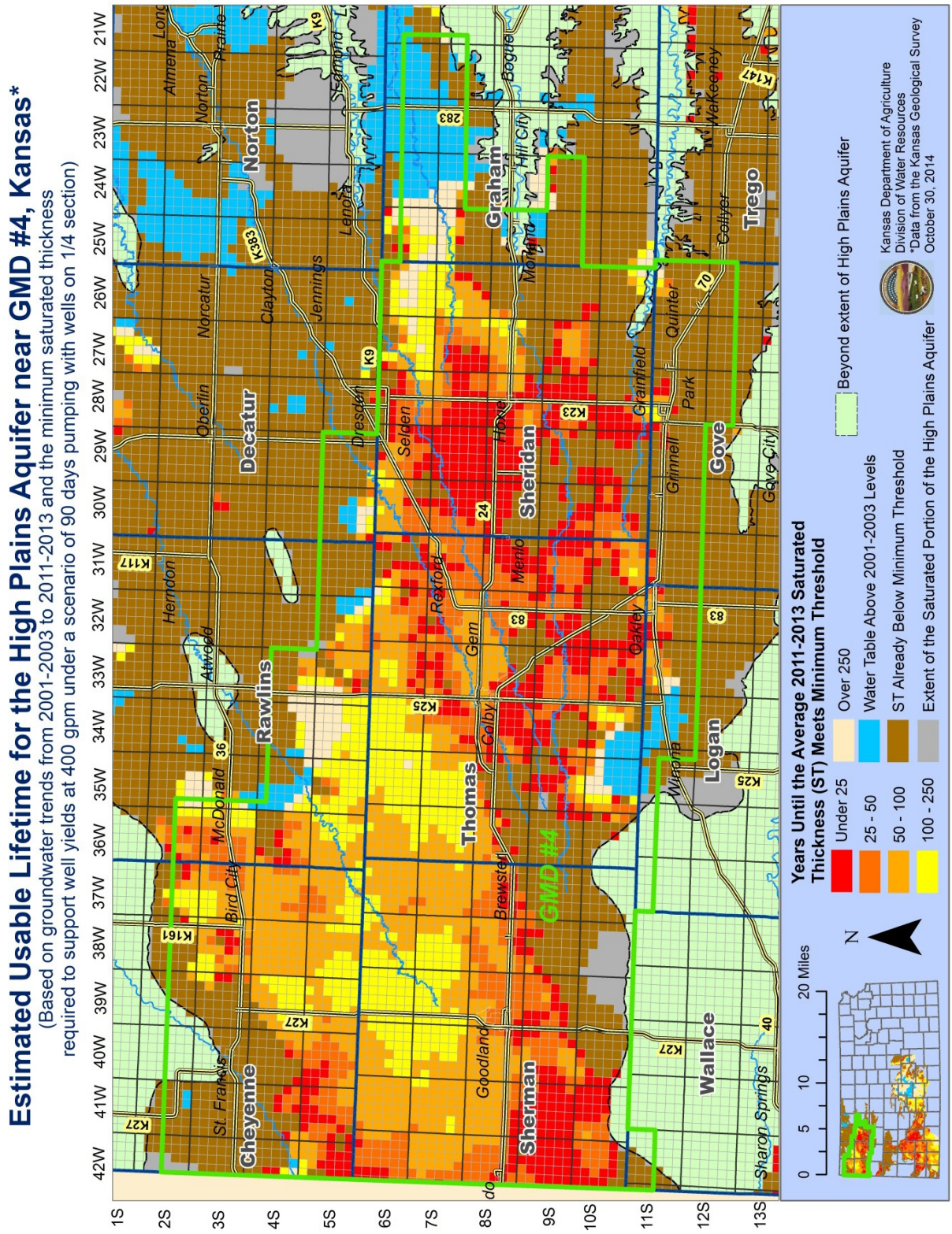

Water Supply Reservoir Yield (MGD)
Tuttle Creek
180.5
Milford
113
Perry
70.2
Clinton
18.5
Hillsdale
15.5
Wilson
5.5
Kanopolis
8.3
Council Grove
8.4
Pomona
8.0
Melvern
7.7
Marion
5.2
John Redmond
31.5
El Dorado
21.1
Toronto
4.9
Elk City
14.5
Big Hill
8.1
Kansas Water Office, 2014

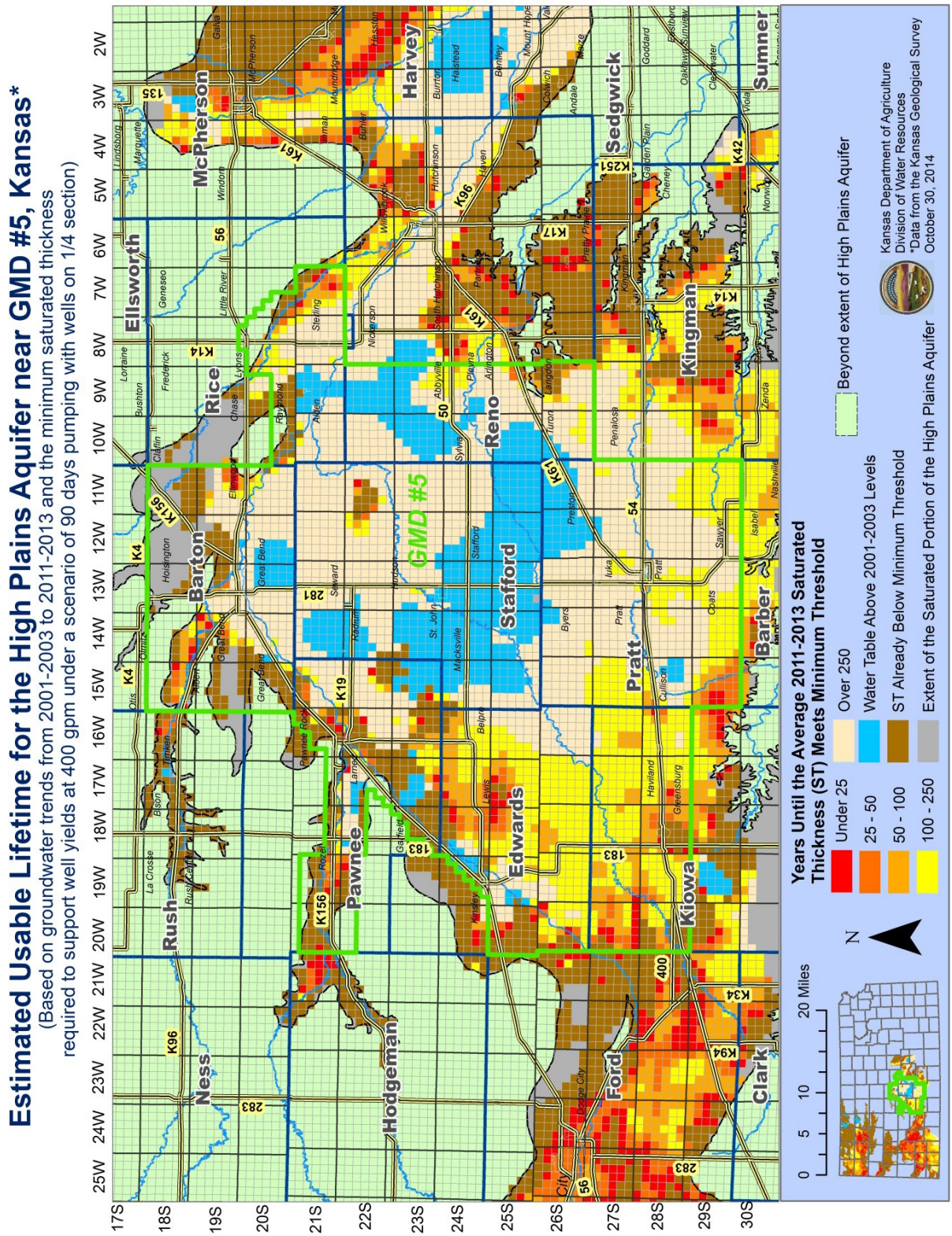

Estimated Usable Lifetime for the High Plains Aquifer, Kansas*
(Based on groundwater trends from 2001-2003 to 2011-2013 and the minimum saturated thickness required to support well yields at 400 gpm under a scenario of 90 days pumping with wells on 1/4 section)
Years Until the Average 2011-2013 Saturated Thickness (ST) Meets Minimum Threshold
Under 25
25 - 50
50 - 100
100 - 250
Over 250
Water Table Above 2001-2003 Levels
Low Use Areas*
ST Already Below Minimum Threshold
*Low use areas are defined by a section with less than 75 acre-feet of net average use from 2000-2009 and only for GMD #3
Beyond extent of High Plains Aquifer
Extent of the Saturated Portion of the High Plains Aquifer
Kansas Department of Agriculture
Division of Water Resources
*Data from the Kansas Geological Survey
October 30, 2014
0
20
40
80 Miles
N
GMD #1
GMD #2
GMD #3
GMD #4
GMD #5


Estimated Usable Lifetime for the High Plains Aquifer near GMD #1, Kansas*
(Based on groundwater trends from 2001-2003 to 2011-2013 and the minimum saturated thickness required to support well yields at 400 gpm under a scenario of 90 days pumping with wells on 1/4 section)
Sharon Springs
Wallace
Russell Springs
Logan
Gove City
Gove
Greeley
Wichita
Scott
Lane
Ness
Hodgeman
Finney
Kearny
Hamilton
GMD #1
K27
K25
K96
K95
K4
K23
83
40
42W
41W
40W
39W
38W
37W
36W
35W
34W
33W
32W
31W
30W
29W
28W
27W
26W
13S
14S
15S
16S
17S
18S
19S
20S
21S
0
5
10
20 Miles
N
Years Until the Average 2011-2013 Saturated Thickness (ST) Meets Minimum Threshold
Under 25
25 - 50
50 - 100
100 - 250
Over 250
Water Table Above 2001-2003 Levels
ST Already Below Minimum Threshold
Extent of the Saturated Portion of the High Plains Aquifer
Beyond extent of High Plains Aquifer
Kansas Department of Agriculture
Division of Water Resources
*Data from the Kansas Geological Survey
October 30, 2014


Estimated Usable Lifetime for the High Plains Aquifer near GMD #2, Kansas*
(Based on groundwater trends from 2001-2003 to 2011-2013 and the minimum saturated thickness required to support well yields at 400 gpm under a scenario of 90 days pumping with wells on 1/4 section)
Years Until the Average 2011-2013 Saturated Thickness (ST) Meets Minimum Threshold
Under 25
25 - 50
50 - 100
100 - 250
Over 250
Water Table Above 2001-2003 Levels
ST Already Below Minimum Threshold
Extent of the Saturated Portion of the High Plains Aquifer
Beyond extent of High Plains Aquifer
GMD #2
Kansas Department of Agriculture
Division of Water Resources
*Data from the Kansas Geological Survey
October 30, 2014
0 5 10 20 Miles
N
Barton
Rice
McPherson
Marion
Harvey
Butler
Sedgwick
Kingman
Stafford
Reno
Pratt


Estimated Usable Lifetime for the High Plains Aquifer near GMD #3, Kansas*
(Based on KGS Section Level Data for the saturated thickness (2010-2012), the revised minimum saturated thickness required to support 400 gpm under a 90 day pumping scenario with wells on 1/4 section based on GMD3 Model K, GMD3 Model average specific yield for water level elevation 2008 and 1947 to 2007 average recharge, and DWR Section Level Data for the 2-mile radius average groundwater use density 2000-2009)
Rush
Pawnee
Edwards
Kiowa
Ness
Hodgeman
Ford
Clark
Lane
Finney
Gray
Meade
Scott
Wichita
Kearny
Haskell
Seward
Greeley
Hamilton
Grant
Stevens
Stanton
Morton
GMD #3
Years Until the Saturated Thickness (ST) Reaches Minimum Threshold
Under 25
26 - 50
51 - 100
101 - 250
Over 250
Low Use Areas*
ST Already Below Minimum Threshold
Extent of the Saturated Portion of the High Plains Aquifer
*Low use areas are defined by a section with less than 75 acre-feet of net average use from 2000-2009
Beyond extent of High Plains Aquifer
Kansas Department of Agriculture
Division of Water Resources
*Data from the Kansas Geological Survey
October 30, 2014
0 5 10 20 Miles
N


Estimated Usable Lifetime for the High Plains Aquifer near GMD #4, Kansas*
(Based on groundwater trends from 2001-2003 to 2011-2013 and the minimum saturated thickness required to support well yields at 400 gpm under a scenario of 90 days pumping with wells on 1/4 section)
Years Until the Average 2011-2013 Saturated Thickness (ST) Meets Minimum Threshold
Under 25
25 - 50
50 - 100
100 - 250
Over 250
Water Table Above 2001-2003 Levels
ST Already Below Minimum Threshold
Extent of the Saturated Portion of the High Plains Aquifer
Beyond extent of High Plains Aquifer
Kansas Department of Agriculture
Division of Water Resources
*Data from the Kansas Geological Survey
October 30, 2014
GMD #4
Cheyenne
Rawlins
Decatur
Norton
Graham
Sheridan
Gove
Trego
Logan
Thomas
Sherman
Wallace
0 5 10 20 Miles
N


Estimated Usable Lifetime for the High Plains Aquifer near GMD #5, Kansas*
(Based on groundwater trends from 2001-2003 to 2011-2013 and the minimum saturated thickness required to support well yields at 400 gpm under a scenario of 90 days pumping with wells on 1/4 section)
GMD #5
Ellsworth
McPherson
Harvey
Sedgwick
Sumner
Rice
Barton
Rush
Ness
Reno
Stafford
Pawnee
Edwards
Hodgeman
Pratt
Kingman
Kiowa
Ford
Clark
Barber
Years Until the Average 2011-2013 Saturated Thickness (ST) Meets Minimum Threshold
Under 25
25 - 50
50 - 100
100 - 250
Over 250
Water Table Above 2001-2003 Levels
ST Already Below Minimum Threshold
Extent of the Saturated Portion of the High Plains Aquifer
Beyond extent of High Plains Aquifer
Kansas Department of Agriculture
Division of Water Resources
*Data from the Kansas Geological Survey
October 30, 2014
0 5 10 20 Miles
N

VISION TEAM AND RESOURCES

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RESOURCES

For more information about the Vision and to provide additional feedback, visit:

http://www.kwo.org/50_Year_Vision/50_Year_Vision.htm

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