2018 Kansas Water Authority Annual Report to the Governor and Legislature

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Kansas

Water Authority

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Governor Brownback and Members of the 2018 Kansas Legislature,

On behalf of the Kansas Water Authority (KWA), I am pleased to provide our 2018 Annual Report. This year's report highlights people, implementation, progress and plans for the coming year.

This past year focused on completion of Phase I Action Items and continuing Phase II in each of the four themes for the *Long-Term Vision for the Future of Water Supply in Kansa*s (Vision). Each of the 14 Regional Advisory Committees (RACs) are diligently working to implement action plans to achieve priority goals and educate others on water issues. Funding became an even sharper focus as the first recommendation of the Blue Ribbon Funding Task Force for Water Resource Management (BRFTF) is to restore the $8 million in statutory funding ($6 million State General Fund (SGF) and $2 million Economic Development Initiatives Fund (EDIF)). The 2017 legislature took action to partially restore the SGF and appropriated $1.2 million. However, more needs persist, and the State Water Plan Fund (SWPF) has not been fully funded from statutory sources since 2008.

Despite funding limitations, I'm proud to report we have been successful where possible. This past year of the more than 250 action items contained within the Vision, more than 70 percent are in active stages of implementation. The education portion of the Vision has also been in motion with the initiation of the research portion of the public awareness campaign. Several of these items are showcased in this Annual Report. However, completion of many of these action items and initiation of the larger scale action items cannot be executed without additional funding.

We are at a critical turning point for water in our state. As our Vision for water states, "*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*." Success stories are being shared as better practices are being implemented all across the state. We are calling for all Kansans to join us in this effort. The KWA is embracing its leadership role in the state to responsibly and effectively manage both existing and new revenues to address the most important water issues we face. The KWA understands that finding additional revenue is difficult in these times. However, there is "no time BUT the present." We must be proactive in addressing our water resource now. If we wait to address the issues once the crisis occurs, it will be too late. It's time to commit to taking it to the next level. It's our foremost responsibility to future generations to appropriately invest in our water infrastructure.

I know we have the right people and the right organizations and structures in place to take on the task of creating a lasting water future for the state of Kansas. But it will take all of us, acting on a shared commitment and claiming the responsibility to ensure Kansas and this resource is better for both current and future generations. Throughout this Report, we highlight the people, cities, businesses, and others who are meeting this challenge with action. But frankly we are barely scraping the surface of what must happen. It will take more effort, more people, and more resources to get where we need to be. On behalf of the Authority, we invite you and each Kansan to join us in this process, and be part of the larger effort to secure our water future.

The KWA looks forward to working with you this session as we continue to address Kansas water resource priorities, funding and implementation of the Vision.

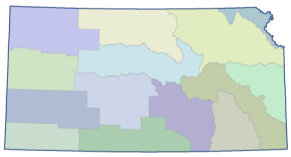
Gary Harshberger, Chair
Kansas Water Authority

Vision for the Future of Water Supply in Kansas

It's been four years since Governor Sam Brownback called for a Vision to address Kansas' water supply issues. The public input process involved more than 600 meetings across the state and more than 15,000 Kansans. The final version of the Vision was presented in January, 2015. Regional goals were developed based on priority, and action items to implement these goals were also developed. However, continued Vision implementation will be limited without increased funding for water projects, activities, and education in Kansas. As of this publication, of the more than 250 action items contained within the Vision, more than 70 percent are in active stages of implementation.

October 2013	Governor Brownback issues call to action to develop 50-Year Water Plan
Dec. 2013-January 2015	Public outreach, 14 regions developed, statewide Vision completed
April – Oct. 2015	Regional goals developed and Regional Advisory Committees (RACs) formed
Jan. – Nov. 2016	RACs develop and present regional action plans for public input, Blue Ribbon Funding Task Force (BRFTF) develop and present Vision funding recommendations & Communication/Education Coordination Team develop and present recommendations
January 2017	KWA recommendations to Governor and Legislature for FY18 & FY19 SWPF & BRFTF revenue recommendation
Ongoing	Implementation of approved action plans: RACs begin implementation phase; Kansas Water Plan updated to integrate Vision action items

The Vision remains a living document that will continue to evolve to meet the needs of Kansans. Ongoing interactions and meetings with stakeholders and the public will ensure the Vision continues to meet the water needs of all Kansans.



Throughout the report, maps indicate the regions where the implementation actions are taking place, or will take place in the future.

The BRFTF was formed November 2015, and met seven times during 2016 to evaluate overall financial needs to implement the Vision and potential funding sources. The culmination of that effort resulted in a report issued January 11, 2017. The Task Force came to the consensus that roughly $55 million in annual funding is needed for full implementation of the Vision.

The Task Force recommended that 1/10 of 1 percent of existing sales tax revenue be dedicated to the State Water Plan Fund, indicating their support for a broad-based funding source to benefit all Kansans and their water resources. Another recommendation was that until a larger funding source is secured, there should be the immediate fulfillment of the $8 million in statutory demand transfers from the State General Fund (SGF) and the Economic Development Initiatives Fund (EDIF). Multiple stakeholders supported this proposal throughout the legislative session. The KWA took formal action to support this report in December 2016. The legislature partially implemented this recommendation with appropriation of an additional $1.2 million during the 2017 session.

Kansas Water Authority Recommendation

The KWA recommends an additional $600,000 in FY2018 and full restoration of the SGF and EDIF transfers in FY2019. The enhancement requests for FY2018 and FY2019 are listed below, and are detailed in subsequent pages of this report.

KWA SGF/EDIF Budget Enhancement Request FY2018 & FY2019

Water Conservation	FY2018	FY2019
Vision Strategic Education Plan		$500,000
Watershed Conservation Practice Implementation		$1,800,000
Streambank Stabilization		$1,000,000
Milford Lake Watershed RCPP Project	$200,000	$200,000
Water Management		
Harmful Algae Bloom Pilot	$400,000	$500,000
Contamination Remediation		$400,000
Interstate Water Compact Compliance		$100,000
Water Structures Inspections		$200,000
Technology and Crop Varieties		
Telemetry		$850,000
Irrigation Technology		$1,000,000
Water Technology Farms		$250,000
Vision Implementation Research		$500,000
Additional Sources of Supply		
Waters Leaving the State Evaluation		$200,000
Equus Beds Chloride Plume Project		$500,000
FY2018 & FY2019 Enhancement Request Total	**$600,000**	**$8,000,000**

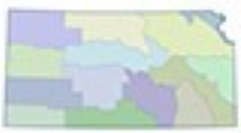
Vision Strategic Education Plan - FY2019: $500,000

The need for additional education and outreach regarding Kansas' water resources was a recurring theme heard statewide during the Vision public outreach process. There are many existing water-related education programs available for both youth and adults, but the central message is that a coordinated educational resource is lacking and should be used to better connect Kansans to their water resources. With this in mind, a team comprised of professionals from the areas of K-12 education, youth programs, media and communication, county and local government, municipalities, agriculture, and industry, developed the Education and Public Outreach Supplement to the Vision.

Vision Strategic Education Plan Needs
Education Coordinator
Statewide Campaign Development
Campaign Execution/Advertising Grants
Educational Materials

KWO staff at a water festival for youth.

This Supplement sets forth implementation of an education plan that builds upon existing efforts and leads to the development of new statewide programs focusing on water resources. These efforts should begin at the kindergarten level, develop into secondary education, prepare students to go into the workforce in a water related field at the university level, and continue to provide information to the general public and key stakeholders in our state. The ultimate goal is to raise awareness of water issues within the state and increase the knowledge of those working within water-related careers. The funding for implementation of the Vision Strategic Education Plan would be utilized to further implement Phase I Action Items identified in the Education and Public Outreach Supplement Section of the Vision.



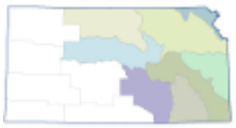
Watershed Conservation Practice Implementation - FY2019: $1,800,000

Watershed conservation practice implementation within priority watersheds is necessary to protect water supply storage and improve water quality in streams and reservoirs across Kansas. Conservation practice implementation can be either structural, technological or management actions to control non-point sources of pollution. Conservation practice implementation has been shown to provide the most cost effective means of addressing these issues.

Riparian buffer strips along the edge of a field are one example of a watershed conservation practice.

Structural conservation practices which can be utilized to reduce sediment and nutrient runoff in watersheds above water supply sources in Kansas include but are not limited to terraces, grassed waterways and buffer strips. Water storage is being diminished over time due to reservoir sedimentation and water quality is being impacted in both streams and reservoir by nutrient runoff, potentially resulting in harmful algae blooms, taste and odor issues with drinking water, and impacts to recreation in Kansas.

Currently funding is available from both federal sources, through the Natural Resources Conservation Service (NRCS) and at the state level through the existing State Water Plan Fund. To meet Vision and Regional goals, significant additional funding for watershed conservation practice implementation will provide further cost share opportunities for producers within targeted areas.



Streambank Stabilization - FY2019: $1,000,000

Streambank stabilization continues to be a key component in the reduction of sediment entering our water supply reservoirs. The Kansas Department of Health and Environment (KDHE), the Kansas Department of Agriculture (KDA), and the Kansas Water Office (KWO) coordinate efforts and resources in order to accomplish streambank protection work to reduce erosion and sedimentation in the watersheds above our highest priority reservoirs. In order to complete projects in the most efficient and cost effective manner, the group operates from pooled funding. Funds available through agency programs for streambank protection projects are targeted to priority areas and administered by this collaborative team. The Kansas Forest Service, Kansas Department of Wildlife, Parks, and Tourism, local conservation districts and local Watershed Restoration and Protection Strategy (WRAPS) groups are also important to the success of this process.

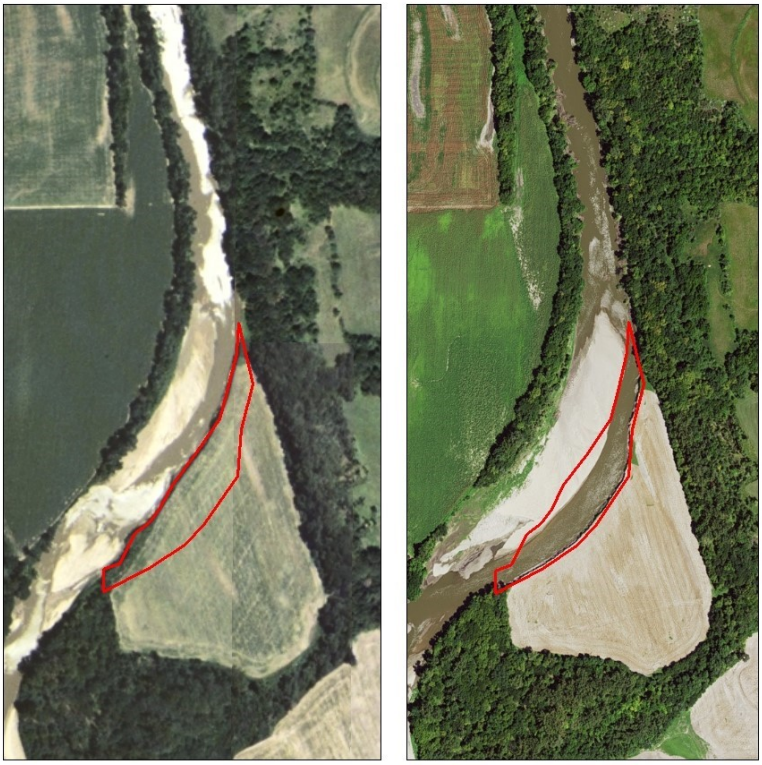
*Estimates indicate **nine** streambank stabilization projects completed in 2017 will reduce the sediment load by **30,000 tons** per year.*

Streambank stabilization efforts continue to be concentrated in the three priority Kansas watersheds above Federal reservoirs: the Big Blue/Little Blue Rivers above Tuttle Creek Lake; the Delaware River above Perry Lake; and the Neosho/Cottonwood Rivers above John Redmond Reservoir. In 2017, construction was completed for stabilization of nine streambank sites achieving an estimated sediment load reduction of 30,000 tons per year.

Construction is underway for five sites above Tuttle Creek Lake and five sites above Perry Lake, and engineering design of 13 new sites has been initiated above John Redmond and Tuttle Creek Reservoirs.

The table below shows the progress that has been made in these three watersheds, as well as the amount of work that remains.

Priority Watershed	Sites Previously Addressed	Sites Remaining	
		Number	Est. of sediment reduction—tons/yr
John Redmond	33	332	450,891
Tuttle Creek	96	215	514,871
Perry	35	46	70,025
Total	164	628	1,035,787

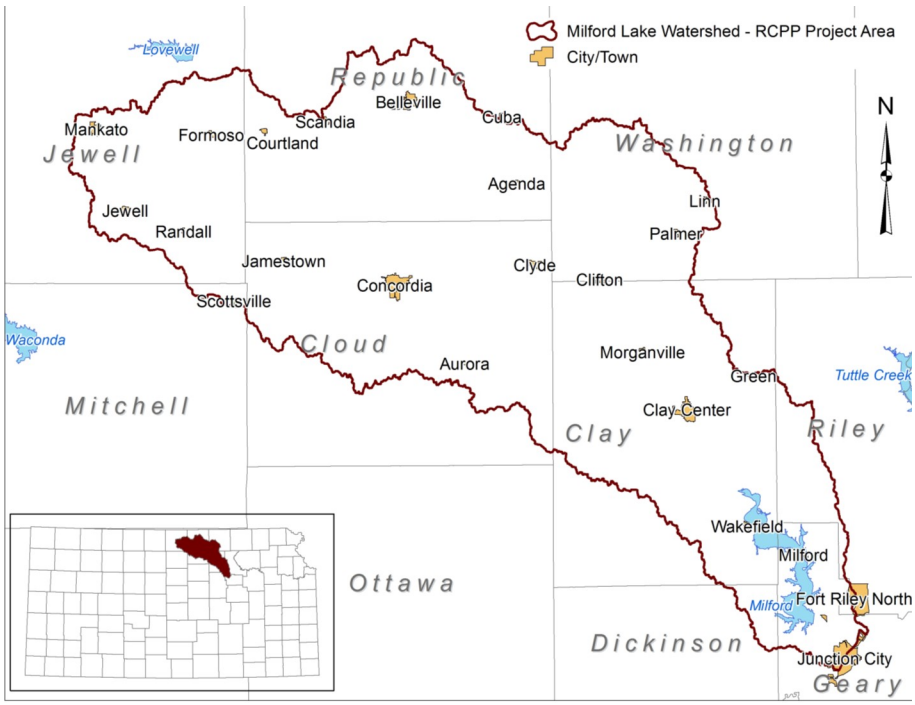


2003 Aerial Photo

2015 Aerial Photo

On the right is aerial photography of an actively eroding streambank along the Big Blue River above Tuttle Creek Lake. The site, located in Marshall County, is 1,470 feet long, and is contributing an estimated 13,680 tons of sediment per year to Tuttle Creek Lake. The red line highlights the land lost to erosion over the course of 12 years. Aerial mapping is used to identify and monitor sites pre– and post-stabilization. This site has been identified, but not completed.

Milford Lake Watershed RCPP Project - FY2018: $200,000; FY2019: $200,000



The Regional Conservation Partnership Program (RCPP) is a NRCS initiative which encourages partners to join efforts with producers to increase the restoration and sustainable use of soil, water, wildlife and related natural resources on regional or watershed scales. Through the program, NRCS and partners help producers install and maintain conservation activities in selected project areas through existing NRCS conservation programs. Partners leverage RCPP funding in project areas and report on the benefits achieved. The KWO, serving as the lead partner on behalf of more than 20 additional project partners, was notified of a potential award of $2,800,000 in NRCS investment to establish a RCPP project to address water quality concerns in the Milford Lake watershed.

Runoff within the Milford Lake watershed in Kansas is a source of nutrient loading contributing to aquatic conditions which promote formation of harmful algae blooms (HABs) within the lake. This RCPP project will look to implement conservation practices within the Milford Lake watershed to decrease nutrient runoff, thus decreasing the introduction of new nutrient loading contributing to the formation of HABs in the lake. Additional benefits from project implementation include decreased sediment runoff entering surface waters, improvements to fish and wildlife habitat and improved plant productivity. Funding provided for this project will be utilized to provide the KWO partnership contribution to this proposal, leveraging this funding along with other partnership contributions to receive more the $2.8 million in funding from NRCS for conservation practice implementation and producer technical assistance. The proposed funding level would be for a five year period to meet the full KWO contributions to the RCPP effort. The map above shows the target area for the proposed RCPP in detail.

Milford Lake Watershed RCPP Project Partners	
Acorns Resort	Kansas Corn Growers Association
City of Lawrence	Kansas Farm Bureau
City of Olathe	Kansas Forest Service
City of Topeka	Kansas Soybean Commission
City of Wakefield	National Sorghum Producers
Clay County	The Nature Conservancy
Clay Co. Economic Development Group	Riley County Conservation District
EcoPractices	Sustainable Environmental Consultants
Flagstop Resort & RV Park	Thunderbird Marina & RV Resort
Friends of the Kaw	Washington County Conservation District
Kansas Alliance for Wetlands & Streams	Westar Energy
Kansas Biological Survey	WaterOne of Johnson County

Kansas Department of Agriculture—Division of Conservation
Kansas Department of Health & Environment
Kansas Water Office
Kansas Department of Wildlife, Parks and Tourism

Harmful Algae Bloom Pilot - FY2018: $400,000; FY2019: $500,000

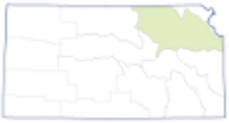
Funding for a HAB pilot project would be utilized by KDHE to investigate and demonstrate in-lake treatment options such as ultrasound, superoxide or other chemical treatments in the vicinity of the Clay County Park at Milford Lake. The objective of this pilot project is to assess the effectiveness in-lake treatment options and their ability to minimize the impact of HABs around the City of Wakefield.

Harmful Algae Bloom in Kansas

Approximately $350,000 of the requested $400,000 in FY2018 would be used for such demonstrations. These demonstrations could include, but are not limited to identified strategies such as sonar, additional circulation, phosphorus harvesting, etc. The remaining $50,000 would be utilized to develop a long-term HAB mitigation strategy for Milford Lake to evaluate the best mitigation practices throughout the United States and preferred long-term options for Milford and possibly other Kansas lakes impacted by HABs.

*26 bodies of water in Kansas were issued either a watch or warning for **HABs** in 2017.*

FY2019 funding would be used to either evaluate additional technologies, or begin implementation should one of those tested in FY2018 prove successful. Additional management actions are also being evaluated such as lake level and activities within the watershed.



Contamination Remediation - FY2019: $400,000

The KDHE Orphan Sites Program (OSP) uses SWPF for the evaluation, monitoring, and remediation of contaminated soil and groundwater sites when the responsible party is unknown or is unable to undertake the necessary action. The OSP was developed with the specific objective of providing a mechanism to address contaminated sites which fall outside the parameters of other clean-up programs. These sites, referred to as orphan sites, generally do not have other funding sources available for complete investigation and cleanup activities or performing long-term operations and maintenance actions. The program is also designed to address contaminated sites that have no responsible party in a timely manner to protect human health and the environment.

Drilling and installing one of six monitoring wells in Ingalls, KS

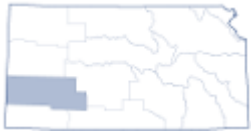
$400,000 of FY2019 funding is being requested to help with completion of investigation work on current inventoried sites within the program. Currently it is estimated an additional $3,000,000 is necessary to fully complete all investigation work for inventoried sites. Once investigation work is complete for all inventoried sites, additional funding will be needed to conduct remediation activities on the inventoried sites.

48 orphan sites are listed as "immediate need" by KDHE for evaluation of contaminants.

SGF & EDIF Transfer - Water Management

Interstate Water Compact Compliance - FY2019: $100,000

Kansas has an engineer and an environmental specialist stationed in Garden City to help monitor Colorado's compliance with the Arkansas River Compact. Requested funds would be used to hire an additional interstate water engineer position within KDA – Division of Water Resources (KDA-DWR) stationed in Garden City. It would be beneficial to Kansas water users to have more capacity to monitor Colorado actions in the basin. This positions would help monitor Colorado water laws, rules and regulations, on-ground management activities, and court decrees to ensure Kansas' interests in the Arkansas River are protected. They would help compile the Colorado water use records and other information needed to operate the hydrologic-institutional groundwater model that determines Colorado's compliance with the compact as well as interact with federal agencies on operations of their projects, proposed changes to those operations, and compact related issues.



Water Structures Inspections - FY2019: $200,000

The KDA would use the funds to hire an additional staff in Stafford and one in Parsons Field offices to review water structures plans and perform inspections of water structures, channel changes and stream obstructions. These positions would benefit Kansans by reducing travel time and thus increasing timeliness and efficiency of responding to complaints and issuing permits. The positions would perform professional engineering work, involving specialized activities of water resources engineering. The activities include independent review of complex engineering calculations and construction documents for dams, channel changes, stream obstructions, floodplain fills and levees in order to process water structure permits. The work includes field inspections of construction and completed projects, safety inspections, resolution of conflicts, and communication with landowners, contractors and other engineers.

SGF & EDIF Transfer - Technology & Crop Varieties

Telemetry - FY2019: $850,000

The KDA-DWR currently has approximately 20 telemetry units. These units have been key to studying and understanding complex well-to-well and aquifer interactions mostly in the central and western part of the state. The data collected from these units has been used to verify and augment other regular water level measurements and to develop reports on groundwater impairment. To further develop this program the KDA-DWR would hire staff to install and maintain the telemetry units with the additional funds. Telemetry would allow for remote observation of water right operations to increase management opportunities, study the effects of groundwater pumping on local aquifers and on neighboring wells in near-real time, and enhance enforcement in certain situations.

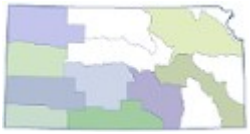
The proposed activities include installing about 450 telemetry units with a varying mix of water level transducers to measure the water level in the aquifer, and flow rate loggers to measure the pumping rate at the well. The telemetry units would transmit the data recorded from the water level transducers and the rate loggers to a website where the well owner and KDA-DWR would have access to the data to assist with better water management decisions.

Water Technology Farms - FY2019: $250,000

Water Technology Farms are public-private partnerships where irrigation technology is demonstrated, related research is conducted on the field scale and water conservation is supported. New irrigation technologies, management techniques and cropping patterns can be tested on a larger scale on these farms. They also provide an opportunity for agronomy, economic, irrigation, and technology evaluation through institutions such as Kansas State University and Northwest Kansas Technical College. Water Technology Farms have proven to be extremely valuable in expanding the conversation and education of producers and decision makers on water conservation in areas overlying the High Plains Aquifer.

WaterPACK/ILS Water Technology Farm Field Day

FY2019 funding would be utilized to continue to provide support for establishment of additional sites and maintenance of existing Water Technology Farms. Efforts are also underway with partners on development of a new type of Water Technology Farm where land management scenarios are evaluated for impacts to water quality conditions in eastern Kansas regions.



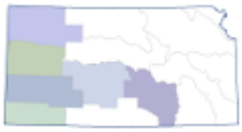
Irrigation Technology - FY2019: $1,000,000

Promotion of adoption of irrigation efficiency technologies and implementation of research-based technology for groundwater usage is being utilized across central and western Kansas to provide producers tools and resources to work to maintain crop yields while conserving regional groundwater resources for the future. The $1,000,000 requested for FY2019 would be utilized to provide incentives to landowners/operators in the Ogallala-High Plains Aquifer region for irrigation technology adoption.

Irrigation Technology through application in the Ogallala region

Funding provided for irrigation technology adoption would be targeted to irrigators located in Water Conservation Areas (WCAs) and Local Enhanced Management Areas (LEMAs) to assist those producers who are willing to conserve water while maintaining their bottom line.

Partners across the state play a large role in the deployment of irrigation technologies. GMD 1, in the initial year of their cost-share program, established 23 agreements for the installation of 63 soil moisture probes and another 11 agreements for 35 additional technologies, committing over $117,000 to promote increased irrigation efficiency in the area.



Vision Implementation Research - FY2019: $500,000

In an effort to promote state-wide collaboration and support of the research needs identified in the Vision, a state-wide research coordination effort has been underway with representatives of K-State Research and Extension, Kansas Geological Survey (KGS), Kansas Biological Survey (KBS), the University of Kansas, U.S. Geological Survey (USGS), KDA, KDHE and the KWO. The purpose of this group is to coordinate research needs and to facilitate statewide collaboration to support implementation of the Vision.

The Research Coordination Group will address three major areas, including harmful algae blooms, like these seen in Milford Lake.

In 2017, the group identified three major research areas on which to concentrate efforts at this time: Ogallala-High Plains Groundwater Depletion, Reservoir Sedimentation and Water Quality. Under each of these broad categories, the group has further identified specific focus areas in need of additional research. The areas that will be addressed first include irrigation and crop technologies, crop research, streambank stabilization effectiveness and harmful algae blooms. Beginning in mid-2017, small research coordination teams focusing on each of these areas were convened to meet and discuss the needs for future research. The objective of these meetings is to provide an opportunity for subject matter experts to work together to identify gaps in the research and existing data, determine what is needed to fill those gaps, foster better collaboration among the state's institutions, and maximize funding opportunities.

$500,000 of FY2019 funding is being requested to fund research and related activities as identified and prioritized by the research group/teams and approved by the Kansas Water Authority. In the chart below, there is more detail regarding priority study areas for the research coordination group.

Vision and Regional Action Plan Identified Research Needs

Ogallala-High Plains/ Groundwater Depletion	Reservoir Sedimentation	Water Quality
■ Efficient irrigation technologies ■ Sorghum Initiative ■ Water Technology Farms ■ Alternative, less water intensive crops/feeds ■ Optimum plant development stages for most efficient water application ■ Economics of water conservation ■ Aquifer characterization—index well expansion, groundwater model development/maintenance and modeling of stream-aquifer interactions, playa recharge	■ Effectiveness of Best Management Practices—streambank stabilization ■ In-lake studies—bathymetric surveys and in-lake sediment sampling ■ In-stream sediment & stream flow monitoring ■ Reservoir operations & sediment management	■ Harmful Algal Blooms (HABs)- Effectiveness & cost benefit of in -lake treatment options; changes to reservoir operations; experiments to understand bloom formation & toxicity ■ Nitrates - identification of sources, travel & remedial options ■ Inventory lower quality waters - type, quantity, location, potential uses & quality ■ Identification of barriers to allow the use/reuse of lower quality waters ■ Treatment technologies & water quality standards for reuse

Waters Leaving the State Evaluation - FY2019: $200,000

As an outcome of the Vision process, a gap in understanding of legal implications of large projects involving interstate waters was identified. In addition, the current statutory mechanisms under the Water Appropriation Act are not well suited to securing the legal right to the water while development of a large project is underway. S. Sub for HB 2059 proposed to address this particular issue during the 2016 session, but created unintended consequences. In response, the KWA seeks to have a study of these issues completed before significant statutory changes are made.

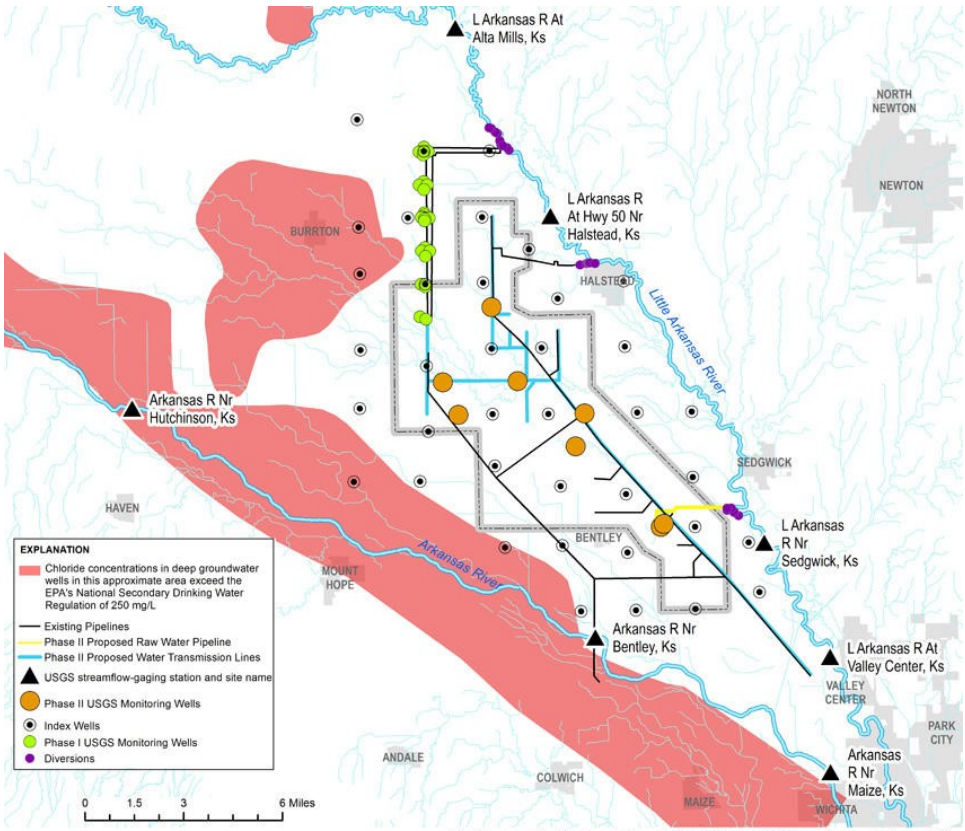
The major tenants of the study would include:

- 2016 S. Sub. for HB 2059, which sought to amend certain procedures for the appropriation of surface water that would otherwise leave the State of Kansas.
- The effect of large-scale transfers of interstate water supplies on Kansas' relations with the water rights and interests of Native American Tribes within the Missouri River Basin and Oklahoma.
- The legal and policy implications of large-scale transfers of interstate water supplies as they relate to the pursuit of effective and optimal methods of securing Kansas' ability to harvest Missouri River Basin higher flows.

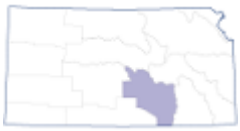
Equus Beds Chloride Plume Project - FY2019: $500,000

Chloride contamination within the Equus Beds Aquifer resulting from previous oil field production has resulted in areas of groundwater which are unsuitable for most uses. Remediation of areas of high chloride concentrations within the Equus Beds would help generate an additional water supply source as well as help protect and prolong the useable lifespan of groundwater wells around areas of chloride contamination.

The KWO will collaborate with the City of Wichita and other partners on the development of a plan to remediate the chloride contamination, manage the waste stream and identify potential uses. KWO and the City will seek funding from the Bureau of Reclamation and other partners on a phased approach that would ultimately develop the framework for a pilot treatment project within the Equus Beds Aquifer for the Burrton chloride plume impacting groundwater quality within the region, including Wichita's well field.

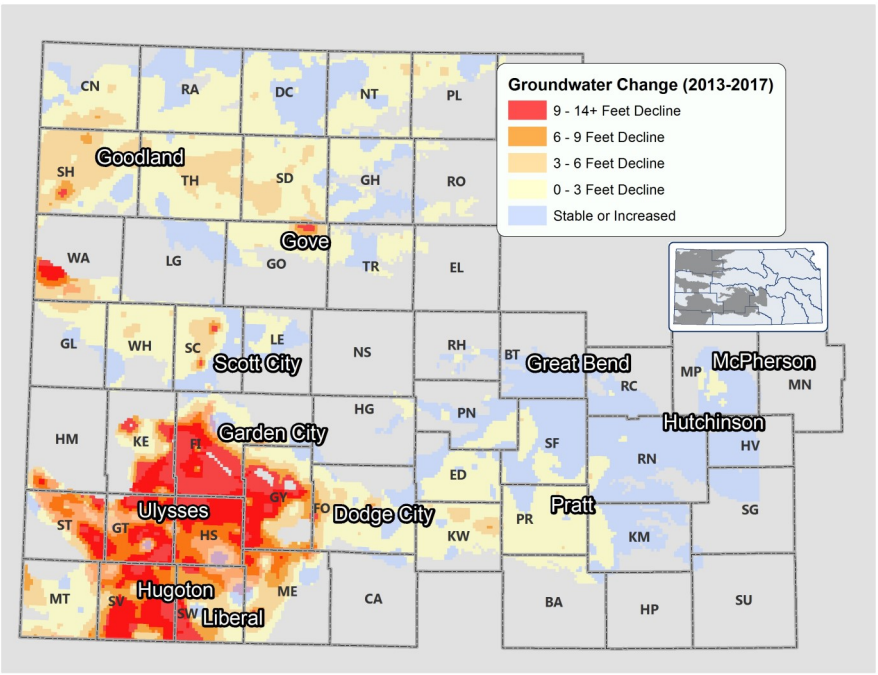


Chloride mapped by Ziegler and Others, 2010; Whittemore, 2007; and Myers and others, 1996

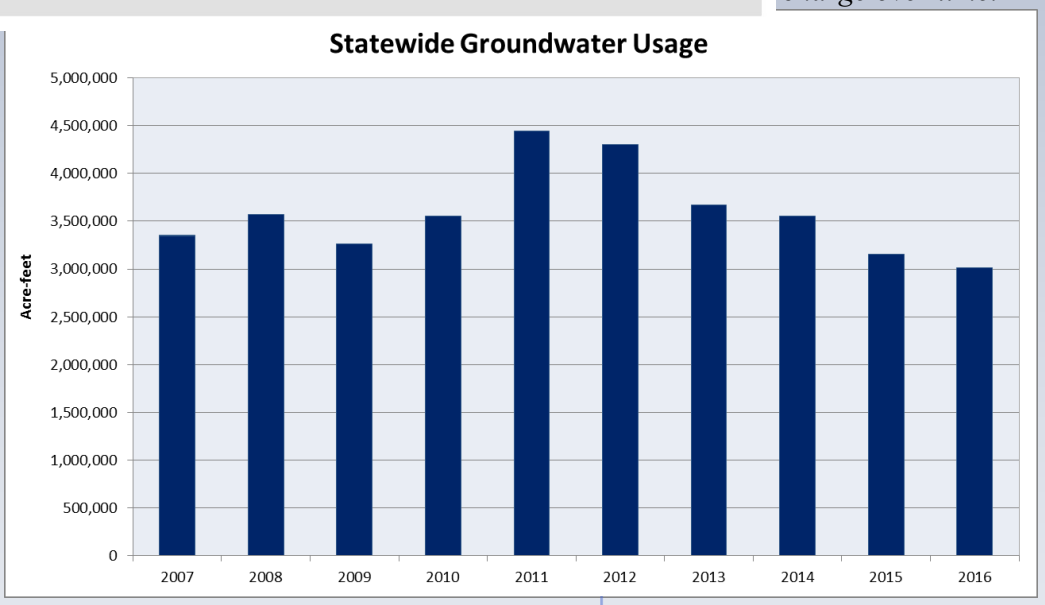


Measuring Success:

Groundwater Supply

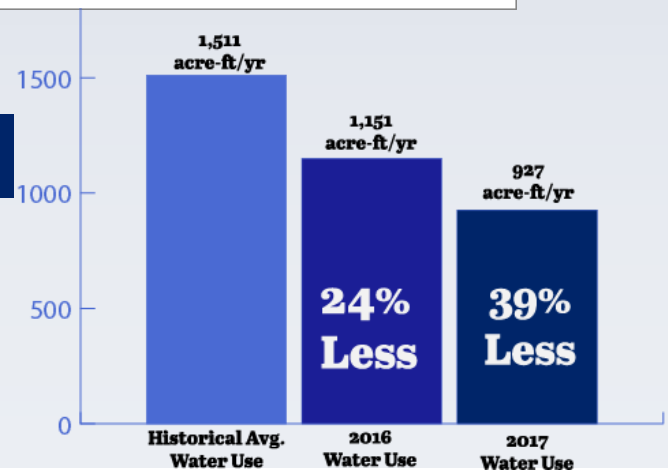


Efforts continue to take place to further develop and disseminate information about the state's water resources, including additional data, maps and reports to improve the understanding of the Ogallala-High Plains Aquifer as an aid to water management in western Kansas. Groundwater data collected by partners such as the Kansas Geological Survey (KGS), KDA–DWR and all five Groundwater Management Districts is compiled and analyzed to determine areas of groundwater decline or recharge over time.



T&O Farms WCA

T&O Farms, the first Water Technology Farm, and a WCA participant, continues to see success in their efforts to use less water while maintaining productivity and income.



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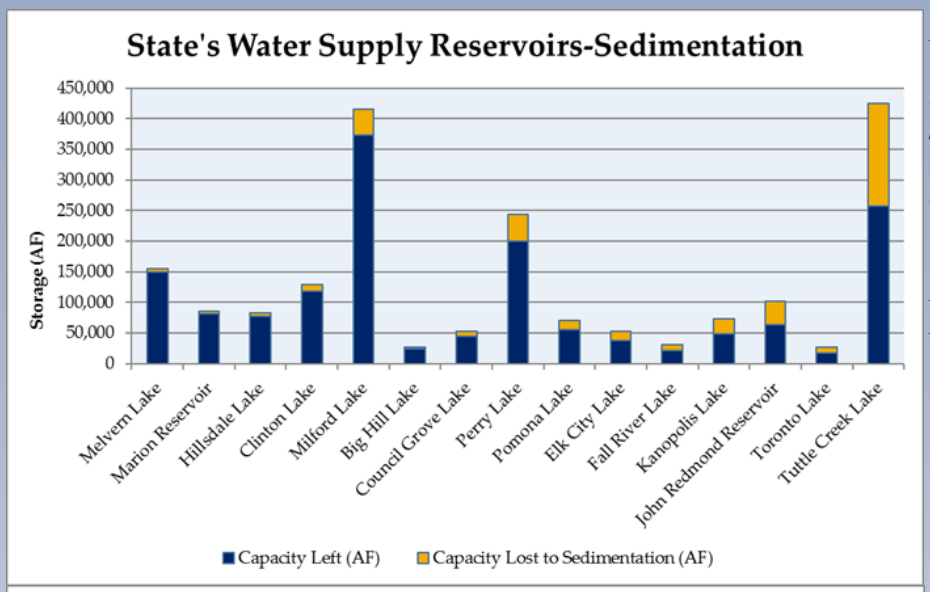
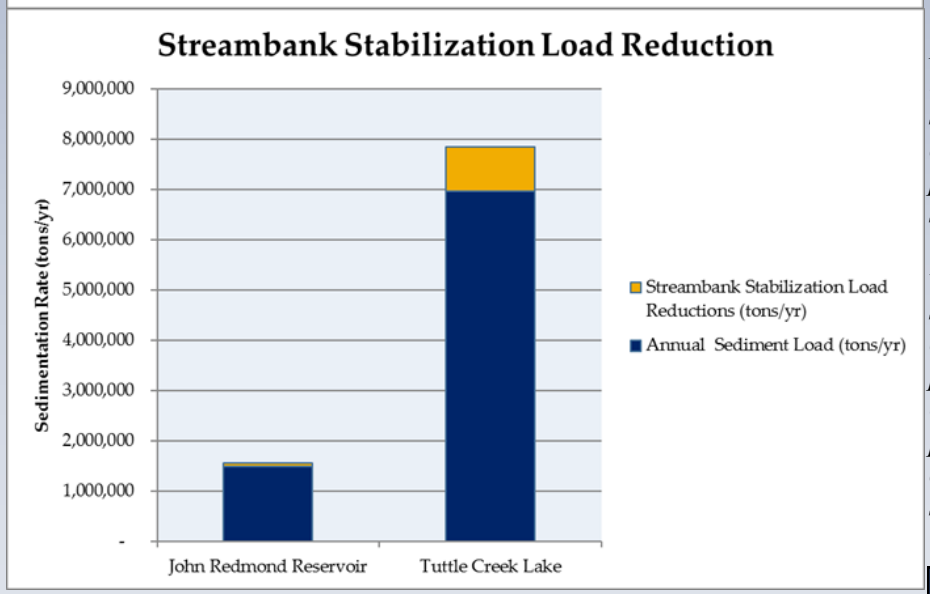


Reservoir sedimentation continues to decrease available water supply storage within reservoirs across Kansas. For federal reservoirs such as Kanopolis Lake, John Redmond Reservoir, Toronto Lake, and Tuttle Creek Lake, the amount of capacity lost is now approaching or exceeding 40 percent.



Efforts to prolong the usable lifespan of reservoirs such as these and others across the state are dependent up decreasing the sediment loads entering these reservoirs through work such as streambank stabilization and watershed conservation practice implementation. The graphs on the left illustrate the problem of sedimentation and progress made through streambank stabilization.

HABs continue to impact surface waters in Kansas, including reservoirs utilized for public water supply and recreational purposes. With HABs occurring on an annual basis for waters such as Marion Reservoir and Milford Lake, efforts will continue to be necessary to decrease watershed nutrient loading contributing to the formation of HABs as well as evaluation of in-lake treatment technologies which can be utilized to decrease the frequency and magnitude of HAB events.

Bodies of Water in Kansas affected by HABs	
2014	20
2015	22
2016	17
2017	26

Regional Perspective

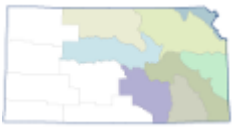
Reports for each of the 14 regions will be developed to evaluate water resource conditions. These reports also include an evaluation of implementation progress being made within each of the respective regions as well as discussion on future Action Plan implementation needs. The reports will be updated annually.

Watershed BMP Implementation Work

Within the *Vision for the Future of Water Supply in Kansas*, a Phase I action item notes the need to "prioritize and implement targeted funding in priority watersheds by working with local, state and federal conservation programs and partnerships" to help protect water supply storage and improve water quality in reservoirs across Kansas that provide water to municipal and industrial customers. Partnerships at all levels have had and will continue to play a role in implementation of conservation practices which reduce sediment and nutrient runoff from entering downstream water supply sources.

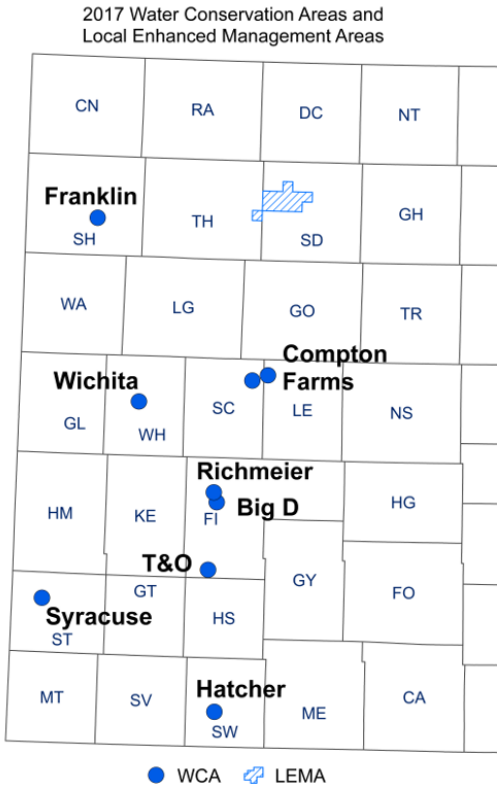
Watershed BMP implementation work has yielded edge of field load reduction estimates of more than 325,000 tons/yr for sediment and 165,000 tons/yr for phosphorus.
(As reported by KDHE in 2017)

At the state and federal level, State Water Plan funds administered through the KDHE and KDA – Division of Conservation (KDA-DOC) are used in conjunction with funding from the NRCS and the Environmental Protection Agency (EPA) to implement the majority of conservation practices within Kansas.



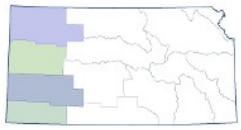
Water Conservation Areas

Water Conservation Areas (WCA), defined in statute in K.S.A. 82a-745, allow for increased voluntary measures to conserve water by allowing a landowner or group of landowners to develop their own water management plan for water conservation on their own land and submit it to the Chief Engineer of the KDA-DWR for approval. In return for overall water conservation, water right owners are allowed more flexibility in how they can use and manage their water over multiple years. WCAs are allowed in areas of the state where groundwater levels are declining or have excessively declined, where the rate of water withdrawal exceeds the rate of water being recharged, where a preventable waste of water is occurring, and where a deterioration of an area's water quality is occurring.



*Even with the current WCAs there is still less than **1 percent of total eligible acres** enrolled in the WCA program statewide.*

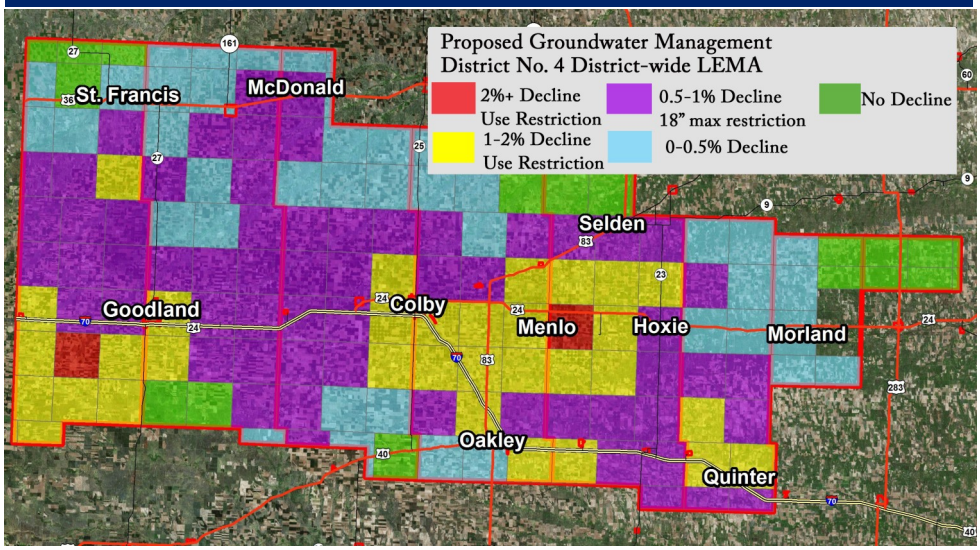
There are nine active WCAs in Kansas. Six of them were approved in 2017. These include Big D Farms and Richmeier Farms in Finney Co., Hatcher Land Co. LP in Seward Co., the Compton: Highway 4 Farm in Scott Co., the Compton: Lane County Farm, and the Wichita County WCA.



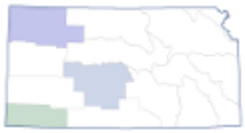
Local Enhanced Management Areas (LEMAs)

Currently within Kansas there is one active Local Enhanced Management Area (LEMA), the Sheridan-6 LEMA which covers 99 square miles in Sheridan County and a small portion of Thomas County. When initially established, the Sheridan-6 LEMA set a goal to limit water use to no more than 55 acre inches per recently irrigated acre covered by the water right over the five-year period of the LEMA beginning January 1, 2013 and ending December 31, 2017. Data collected by Groundwater Management District (GMD) 4 and analyzed by the KGS showed that the LEMA has seen notable reductions in the rate of water-level decline. In the decade prior to the establishment of the LEMA, the rate of decline in the area was approximately 23 inches per year. In the first three years of the LEMA, the rate of decline was reduced to around five inches per year. Successful efforts in conserving groundwater resources without causing economic hardship to Hoxie and the surrounding region had resulted in extension of this LEMA for another five years through 2022.

GMD 4 Proposed District-Wide LEMA



Discussions have also taken place during 2017 regarding the potential establishment of three other LEMAs in Kansas, one being a district-wide LEMA covering GMD 4, a potential LEMA in Big Bend GMD 5 which would help remedy the impairment to Quivira National Wildlife Refuge and water delivered to it from Rattlesnake Creek, and a potential LEMA within GMD 3 covering portions of Kearny and Finney Counties.



Hays Conservation Field Day

The City of Hays, in conjunction with the Smoky Hill-Saline Regional Advisory Committee (RAC), the City of Salina, and the KWO, hosted a Water Conservation Field Day on October 13, 2017. This event took place in support of implementation efforts relating to the Smoky Hill-Saline RAC's Regional Goal #4 Action Plan, which discusses ways to increase public water supply water use efficiency for suppliers within the region. One way they chose to accomplish this is through a municipal water conservation field day to increase awareness of existing water conservation measures in place and to share that information with interested stakeholders. Approximately 60 people attended. Municipal water conservation programs implemented by the City of Hays were highlighted throughout the day. These include a rebate program for high efficiency toilets and washing machines, free low flow shower heads, water smart landscaping programs, and a city ordinance that restricts outdoor water use from noon to 7:00 p.m. from June 1 - September 30.

Water efficient landscaping in Hays.

Drought Workshops

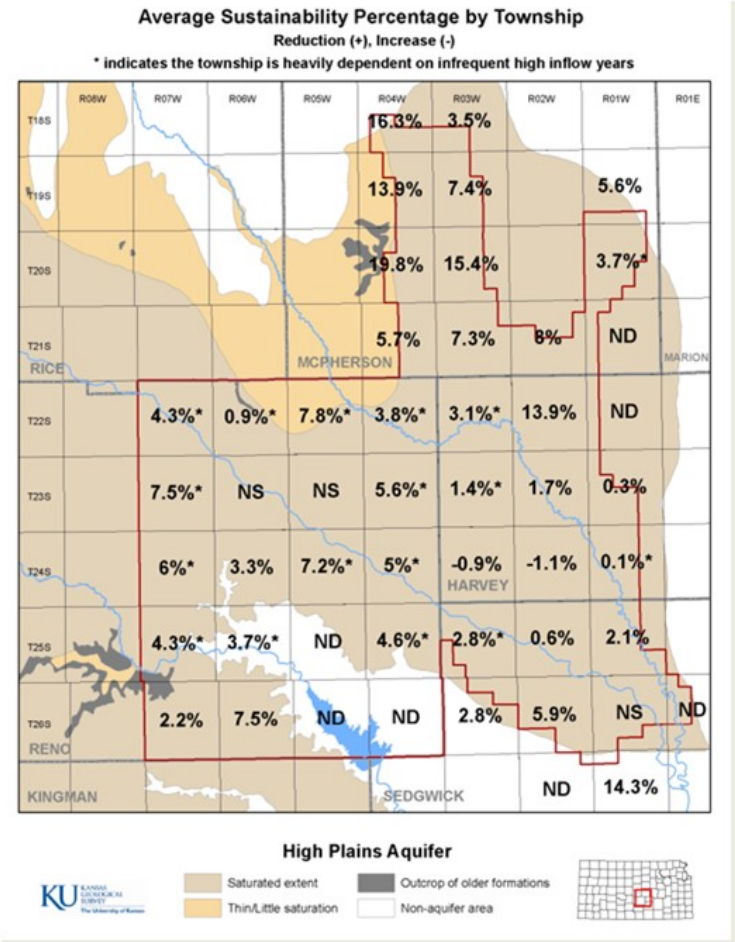
Last year a drought tournament was held in Emporia that was funded by the National Oceanic and Atmospheric Administration/Nation Integrated Drought Information System. The Tournament focused on a fictionalized watershed in eastern Kansas using the historic drought period of record. Selected teams chose combinations of measures to have simulated through the modeling in order to achieve the best result in terms of streamflow, reservoir level, and demands met. Building upon the tournament idea and further utilizing the model's capabilities, the Marais des Cygnes, Neosho and Verdigris RACs held a Drought Workshop on September 1, 2017.

The Drought Workshop was held at the Dwight D. Eisenhower Learning Center at the Wolf Creek Nuclear Power Plant. The watersheds that were used were not fictionalized, as they were in the Tournament, but used actual inputs into the Model that were region specific, including historic inflows, reservoir storage capacities, system demands and downstream target flows. The Model was used to run drought scenarios to show how the model can be used for region specific water planning and to achieve different RAC goals. Thirty-two individuals attended, including two legislators and participants from three states (Kansas, Missouri, and Oklahoma) as well as members from each of the RACs.

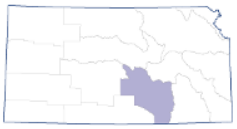
GMD 2/Equus Beds Sustainability Assessment

KWO partnered with Equus Beds GMD 2 (GMD 2) to provide funding support for the KGS to conduct a sustainability assessment within the Equus Beds Aquifer region. This project used an approach recently developed at KGS for assessing the prospects for sustainability in the High Plains Aquifer in Kansas.

The objective is to calculate the average annual pumping that would produce stable aerially-averaged water levels over a given area. This is calculated using the average annual water-level change and annual reported water use for an area.



KGS completed this work in early 2017 and shared the results with GMD 2 as well as the Equus-Walnut RAC. GMD 2 will utilize data developed through this assessment to evaluate safe yield for the region. The results of this assessment will also be utilized in support of expansion of groundwater modeling to cover all of GMD 2 as well as alluvial aquifer areas south of Wichita to near Belle Plaine.



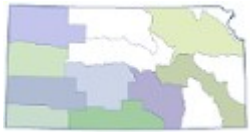
Water Technology Farms

During 2017, the KWO, along with a number of partners, expanded the Water Technology Farm concept beyond the original three farms to additional areas of the state, specifically where RACs have identified a need for water conservation and increased irrigation water use efficiency. These new farms included Circle C Farms near Healy and Hatcher Land and Cattle near Liberal.

*Big D Farms saw a 8 bu./acre increase on corn yields with **9 inches LESS water** applied.*

In addition, workforce development became a part of the Water Technology Farm concept during 2017. Working in partnership with the Northwest Kansas Technical College's newly developed Precision Agriculture program, 10 Water Technology Farm projects were developed through the school to allow students to gain real world experience installing, maintaining, and operating irrigation technologies on lands that local landowners have volunteered the use of to the program. With supplier partnerships, students had the opportunity to work with multiple types of soil moisture probes, pivot controls, irrigation scheduling systems and other water management tools.

Data obtained from the Water Technology Farms continues to show positive results. Big D Farms (Garden City Company & Dwane Roth Farm) saw an 8 bushel/acre increase on corn yields over traditional methods with almost nine inches less water applied than what neighboring fields applied. When discussing the value of the information obtained from his Water Technology Farm and how it can impact his management decisions, Dwane noted, "Now we are able to efficiently use less inputs, while maintaining or increasing production and profits. I've now seen what this technology can do, the data and results have never been so clear. This is what people can do to address their water situation."



Sediment Monitoring and Research

Within the *Vision for the Future of Water Supply in Kansas*, an action item notes the need to "develop a detailed monitoring strategy to assess current and ongoing sediment inflow into public water supply reservoirs", which will help with the continued development of effective sediment management strategies and target watershed management practices. Through interagency partnerships and coordination with multiple research partners, ongoing efforts continue to put tools in place, such as sediment monitoring gages, bathymetric surveys, and sediment coring, to monitor sediment entering water supply reservoirs and to evaluate the benefits of sedimentation reduction practices.

A continuing partnership between the USGS and the KWO allows continued maintenance and operation of suspended sediment monitors associated with existing streamgage locations on the Neosho River at Neosho

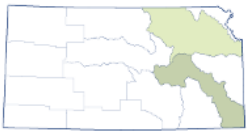
Continued on pg. 20

Sediment Monitoring and Research Continued:

Rapids, Burlington, Iola and Parsons. The gages and monitors provide near real time information regarding the concentration of sediment flowing in the river above and below John Redmond Reservoir. This information helps in planning practices that limit sedimentation.

Also this past year, the KWO entered into an agreement with the U.S. Army Corps of Engineers for the development of a comprehensive plan for the Kansas River Sediment Analysis and Transport Model. The sediment transport model is a key component in analyzing sediment management scenarios (i.e. sediment bypass at Tuttle Creek reservoir) and impacts to downstream infrastructure and ecological resources. The two-year agreement totals $186,000, with a projected total amount of $93,000 to be provided by the KWO as cash match and/or work-in-kind contribution. Major tasks which are part of this project include development of the sediment transport model, reservoir data collection and sample analysis, and technical workshops.

In addition to the above-mentioned studies and ongoing sediment monitoring, the KWO continues to coordinate with the KBS for new/updated bathymetric surveys, with surveys of Council Grove Lake and Marion Reservoir planned to be completed in FY2018. The new survey information will be compared to previous bathymetric surveys in order to estimate the total sediment accumulation, update the storage capacity tables, and calculate updated sedimentation rates for each reservoir. In addition to the two surveys, KBS also plans to collect sediment cores on Milford Lake in order to reconstruct historical HAB events. This information will be utilized to examine links between HAB events and specific changes in the watershed and/or environmental factors.



Vision Implementation - Additional Sources of Supply

Produced Water Pilot

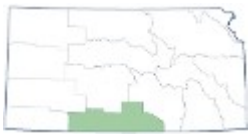
Funding for this project was made available through a Bureau of Reclamation Title XVI WaterSMART Grant that was received the end of September of 2017. This particular funding is designed for reusing an industrial by-product for the benefit of fish and wildlife or agricultural purposes. The grant will provide a means to operate the equipment necessary to treat the produced water and also periodic testing of the effluent.

A collection tank for a disposal well near Hardtner is the proposed site of the project.

This study has been developed as part of the *Vision for the Future of Water in Kansas* to find additional sources of water. The Red Hills Regional Goals include a goal of reducing the amount of freshwater used in oil and gas completion operations by four percent annually and to have 10,000 barrels per day of fresh water to be recycled from oil production.

The pilot test will be utilized to demonstrate the efficiency of the treatment system on produced oilfield water to reduce chloride and boron levels in the produced water to concentrations safe for irrigation, cattle watering or other beneficial uses.

Mobilization of the equipment would start in the spring of 2018. The final report based on data collection will include: analysis of data collected from input water, treated water, brine (reject) and sludge, as well as possible policy recommendations.



Lower Republican Activities

In 2017, the KWO continued forward with water improvement projects in the Republican River Basin. In continuation of a signed contract between Kansas Bostwick Irrigation District (KBID) and the KWO, KBID recently completed the first canal project. As of March 3, 2017, a total of 4.18 miles of open canal were eliminated and converted to 3.52 miles of buried PVC pipe. KBID began the second canal project in the fall of 2017. It is estimated that 2.99 miles of open canal will be eliminated and 2.17 miles of PVC pipe will be installed as its replacement.

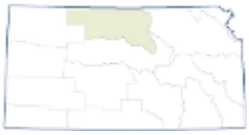
A reservoir feasibility study was completed by Burns & McDonnell which included four already identified multipurpose small reservoirs and contained the results of the geotechnical and water quality analysis, environmental studies and opinions of probable cost.

KGS completed a surface water modeling report. This completed simulation of the distribution of water resources under different management alternatives to optimize beneficial use by water rights in the basin. Preliminary results from the report indicate that each reservoir helps to reduce instances of water shortages in the basin. However, potential costs for a new reservoir led the stakeholder group to hold any further work on these sites.

4.18 miles of open canal were eliminated & converted to 3.52 miles of PVC pipe. It is estimated to ***save 894.6 acre-feet*** *of water annually.*

KGS will continue simulating water management scenarios within the basin, along with simulating climate scenarios and adding the fourth reservoir site from the Reservoir Feasibility Study to the model. Results from this contract are estimated to be finished by June 2018.

2017 also saw the creation of the Lower Republican Access District Steering Committee, made up of 8 producers who are affected when Minimum Desirable Streamflow (MDS) is administered on the Republican River. The Committee met three times in 2017 and is working closely with KWO and KDA-DWR to establish an Access District. The District would use water made available from changes made through Republican River Compact Administration. The next steps for the Steering Committee are to appoint a District Board and help craft legislation to establish authority for the District.



State Water Plan Fund Revenue Estimate

State Water Plan Resource Estimate	FY 2017 Actuals	FY 2018 Appropri-ated w/Carry Forward	FY 2018 Appropriated w/ carry fwd Supplemental Request	FY 2019 Appropriated	FY2019 Appropriated w/ Enhancement Request
Beginning Balance	$ 582,946	$ 718,547	$ 718,539	$ 139,503	$ 139,503
Adjustments					
Division of Budget—released PY Enc. Not recorded	702,377	-	-	-	
Release of Prior Year Encumbrance	$ 549,091	$ -	$ -	$ -	$
Reduced Resources	$ -	$ -	$ -	$ -	$
Other Service Charges	$ 28,255	$ 28,255	$ 28,255	$ 28,255	$ 28,255
Transfer to SGF - John Redmond Bond	$ (916,550)	$ (1,260,426)	$ (1,260,426)	$ (1,260,426)	$ (1,260,426)
Subtotal--Adjustments	**$ 363,174**	**$ (1,232,171)**	**$ (1,232,171)**	**$ (1,232,171)**	**$ (1,232,171)**
Revenues					
State General Fund Transfer	$ -	$ 1,200,000	$ 1,800,000	$ -	$ 6,000,000
Economic Development Fund Transfer	$ -	$ -	$ -	$ -	$ 2,000,000
Municipal Water Fees	$ 3,028,509	$ 3,028,509	$ 3,028,509	$ 3,267,271	$ 3,267,271
Clean Drinking Water Fee Fund	$ 2,724,051	$ 2,724,051	$ 2,724,051	$ 2,820,674	$ 2,820,674
Industrial Water Fees	$ 973,133	$ 973,133	$ 973,133	$ 1,120,701	$ 1,120,701
Stock Water Fees	$ 387,655	$ 387,655	$ 387,655	$ 464,256	$ 464,256
Pesticide Registration Fees	$ 1,359,410	$ 1,359,410	$ 1,359,410	$ 1,334,523	$ 1,334,523
Fertilizer Registration Fees	$ 3,491,049	$ 3,491,049	$ 3,491,049	$ 3,568,921	$ 3,568,921
Pollution Fines and Penalties	$ 152,205	$ 152,205	$ 152,205	$ 165,000	$ 165,000
Sand Royalties	$ 21,975	$ 21,975	$ 21,975	$ 45,000	$ 45,000
Total Receipts	**$ 12,137,986**	**$ 13,335,782**	**$ 13,935,782**	**$ 12,786,346**	**$ 20,786,346**
Total Available	$ 13,084,106	$ 12,822,158	$ 13,422,150	$ 11,693,678	$ 19,667,920
Less: Expenditures	$ 12,365,559	$ 12,401,343	$ 13,282,651	$ 11,579,930	$ 19,579,930
Ending Balance	**$ 718,547**	**$ 420,815**	**$ 139,500**	**$ 113,748**	**$ 113,745**

Revenue for the State Water Plan Fund is received from fees assessed to municipal, industrial and agricultural water-related users and includes a demand transfer from the State General Fund and Economic Development Initiatives Fund as shown in the table.

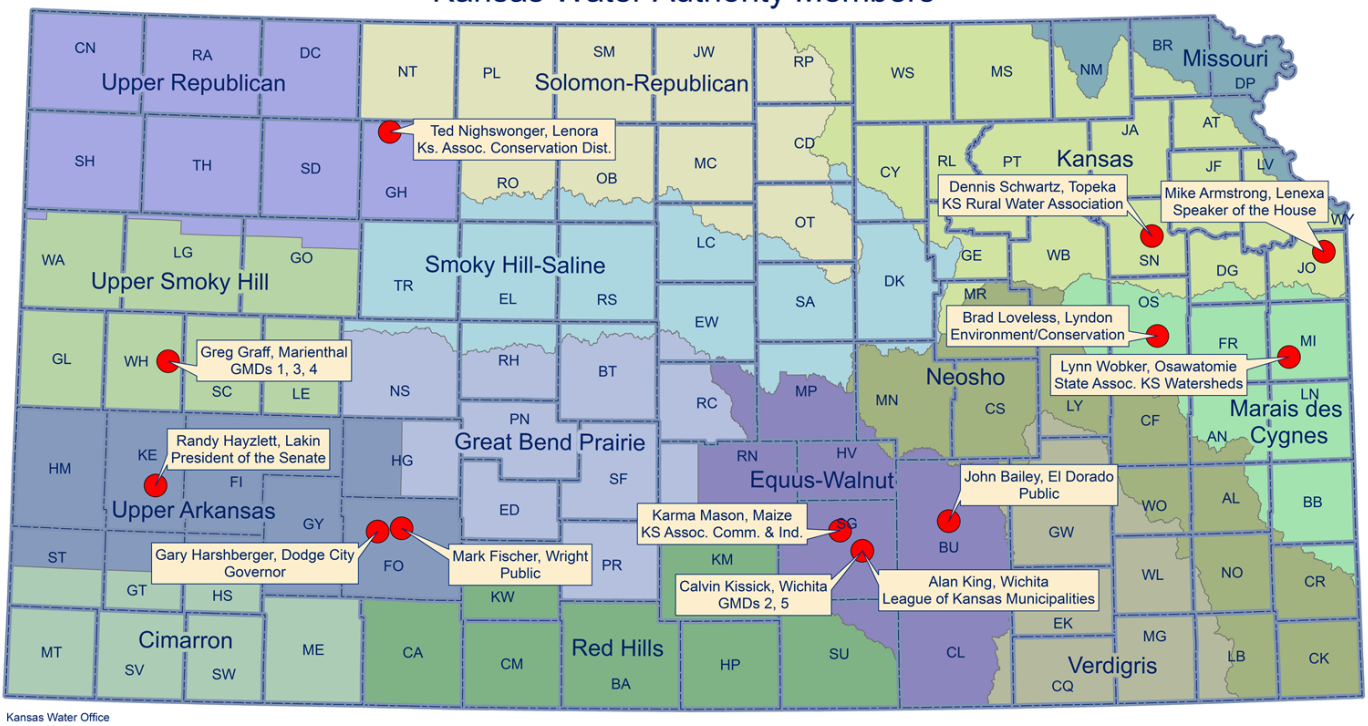
Source	Rate
Municipal Water Use	3 cents/1000 gal
Clean Drinking Water Fee	3 cents/1000 gal
Industrial Water Use	3 cents/1000 gal
Stockwater Use	3 cents/1000 gal
Pesticide Registration	$100/ Registration
Fertilizer Inspections	$1.40/ton
Pollution Fines and Penalties	Est. $150,000
Sand Royalty Receipts	$0.15 / ton
EDIF Transfer	$ 2,000,000
State General Fund Transfer	$ 6,000,000

Kansas Water Authority

State Water Plan Fund Expenditure Recommendations

Agency/Program	FY 2017 Actuals	FY 2018 Appropriated w/Carry Forward	FY 2018 Appropriated w/ Supplemental Request	FY 2019 Appropriated	FY2019 Appropriated w/ Enhancement Request
Department of Health & Environment					
Contamination Remediation	$ 654,094	$ 637,030	$ 637,030	$ 688,301	$ 688,301
TMDL Initiatives	$ 244,062	$ 250,364	$ 250,364	$ 276,307	$ 276,307
Nonpoint Source Program	$ 297,768	$ 245,540	$ 245,540	$ 298,980	$ 298,980
Watershed Restoration & Protection Strategy	$ 555,884	$ 555,000	$ 555,000	$ 555,884	$ 555,884
Total - KDHE	**$ $1,751,808**	**$ 1,687,933**	**$ 1,687,933**	**$ 1,819,472**	**$ 1,819,472**
University of Kansas - Geological Survey	**$ 26,841**	**$ 26,841**	**$ 26,841**	**$ 26,841**	**$ 26,841**
Department of Agriculture					
Interstate Water Issues	$ 451,841	$ 430,297	$ 430,297	$ 492,000	$ 492,000
Subbasin Water Resources Management	$ 781,007	$ 539,837	$ 539,837	$ 610,808	$ 610,808
Water Use	$ 107,488	$ 120,178	$ 120,178	$ 72,600	$ 72,600
Water Resources Cost Share	$ 2,041,642	$ 1,808,410	$ 1,808,410	$ 1,948,289	$ 1,948,289
Nonpoint Source Pollution Asst.	$ 1,866,556	$ 1,631,018	$ 1,631,018	$ 1,858,350	$ 1,858,350
Aid to Conservation Districts	$ 2,092,637	$ 2,000,000	$ 2,000,000	$ 2,092, 637	$ 2,092, 637
Watershed Dam Construction	$ 559,353	$ 528,157	$ 528,157	$ 550,000	$ 550,000
Water Quality Buffer Initiative	$ 179,893	$ 265,670	$ 265,670	$ 200,000	$ 200,000
Riparian & Wetland Program	$ 158,892	$ 135,546	$ 416,858	$ 152,651	$ 152,651
Water Transition Assistance Program/CREP	$ 178,572	$ 248,255	$ 248,255	$ 200,000	$ 200,000
Total - Department of Agriculture	**$ 8,417,881**	**$ 7,707,368**	**$ 7,707,368**	**$ 8,177,335**	**$ 8,177,335**
Kansas Water Office					
Assessment & Evaluation	$ 545,732	$ 594,023	$ 594,023	$ 450,000	$ 450,000
GIS Data Base Development	$ 112,306	$ 50,000	$ 50,000	$ -	$ -
MOU-Storage Operations & Maintenance	$ 302,071	$ 363,699	$ 363,699	$ 350,000	$ 350,000
Stream Gaging	$ 431,282	$ 350,000	$ 350,000	$ 431,282	$ 431,282
Technical Assistance to Water Users	$ 377,646	$ 421,474	$ 421,474	$ 325,000	$ 325,000
Kansas Alluvial	$ -	$ 100,000	$ 100,000	$	$ -
Bathymetric Study	$ -	$ 100,000	$ 100,000	$	$ -
Streambank Stabilization	$ 400,000	$ 1,000,000	$ 1,000,000	$	$ 1,000,000
Vision Strategic Education Plan	$	$	$	$	$ 500,000
Watershed Conservation Practice Imp.	$	$	$	$	$ 1,800,000
Milford Lake Watershed RCPP Project	$	$	$ 200,000	$	$ 200,000
Harmful Algae Bloom Pilot	$	$	$ 400,000	$	$ 500,000
Contamination Remediation	$	$	$	$	$ 400,000
Interstate Water Compact Compliance	$	$	$	$	$ 100,000
Water Structures Inspections	$	$	$	$	$ 200,000
Irrigation Technology	$	$	$	$	$ 1,000,000
Water Technology Farms	$	$	$	$	$ 250,000
Vision Implementation Research	$	$	$	$	$ 500,000
Telemetry	$	$	$	$	$ 850,000
Waters Leaving the State Evaluation	$	$	$	$	$ 200,000
Equus Bed Chloride Plume Project	$	$	$	$	$ 500,000
Total - Kansas Water Office	**$ 2,169,037**	**$ 2,979,196**	**$ 3,579,196**	**$ 1,556,282**	**$ 9,556,282**
Total State Water Plan Expenditures	**$ 12,365,559**	**$ 12,401,338**	**$ 13,282,651**	**$ 11,579,930**	**$ 19,579,930**

Kansas Water Authority Members



Kansas Water Office
August 2017

Kansas Water Authority Ex Officio Members

David Barfield
Division of Water Resources
KS Dept. of Agriculture

John Floros
Ag Experiment Station
KS State University

Rob Reschke
Division of Conservation
KS Dept. of Agriculture

Rolfe Mandel
KS Geological Survey

Robin Jennison
KS Dept. of Wildlife, Parks & Tourism

Nick Jordan
KS Dept. of Commerce

Edward Martinko
KS Biological Survey

John Mitchell
KS Dept. of Health & Environment

Jackie McClaskey
KS Dept. of Agriculture

Tracy Streeter
KS Water Office

Pat Apple
KS Corporation Commission

The Kansas Water Authority (KWA) consists of 13 voting members who are appointed by the Governor or Legislative Leadership. State agency directors serve as ex-officio members. KWA is statutorily within and part of the Kansas Water Office (KWO). The KWA is responsible for advising the Governor, Legislature and Director of the KWO on water policy issues and for approving the *Kansas Water Plan*, federal contracts, administration and regulations proposed by the KWO. The KWA provides the leadership to ensure that water policies and programs address the needs of all Kansans.

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.

- The Long Term Vision for the Future of Water Supply In Kansas

Kansas Water Office

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Kansas Water Authority