

Building Strong Collaborative Relationships for a Sustainable Water Resources Future:

STATE OF KANSAS

SUMMARY OF STATE WATER PLANNING

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The findings contained in this report are based on the information collected from the literature search and interviews for this initiative and should not be construed as an official Department of the Army position, policy or decision unless so designated by other official documentation.

STATE OF KANSAS

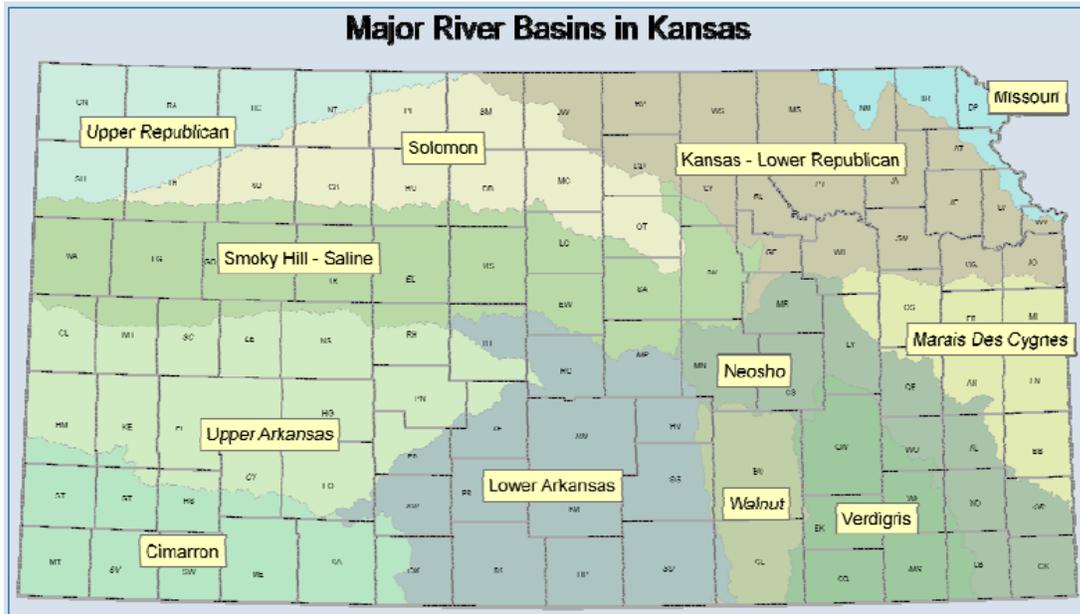


Figure 1. The State of Kansas has 12 Major River Basins Which Provide the Framework for State Planning

1. RESPONSIBLE STATE AGENCIES/REGIONAL ENTITIES

The Kansas Water Office (KWO) coordinates state water planning in conjunction with the Kansas Water Authority (KWA) <http://www.kwo.org/>

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The Division of Water Resources <http://www.ksda.gov/dwr/> which is located in the Kansas Department of Agriculture conducts a number of significant water resource management activities relating to the administration and management of water. The Division of Water Resources has 3 major sections: Water Administration, Water Structures, and Water Management Services.

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In addition, a number of other state agencies participate in and assist with the water plan preparation or implementation including: the Department of Agriculture, Division of Water Resources; the State Geological Survey; Kansas Department of Health and Environment, Division of Environment; the Department of Wildlife and Parks; the State Conservation Commission and all other interested state agencies. Once formulated, the Plan then becomes a useful tool for coordinated efforts in planning, implementation and operation of programs and activities to address water issues in the state.

2. STATE/REGIONAL WATER PLANNING STATUS

The State of Kansas has a comprehensive state water planning process which began in 1917. Legislative authority for the Kansas Water Plan is found in the State Water Resources Planning Act [Article 9, Chapter 82a, Kansas Statutes Annotated (K.S.A.)].

Over the years a number of important planning efforts have been accomplished. The State Water Plan Act of 1965 established a focus on planning, policy and coordination to ensure maximum beneficial use, control and development of water resources of the state. In 1974 the legislature passed the State Water Plan Storage Act which provided an important framework for future water planning. Since that time there have been several updates and revisions to Kansas's state water planning. In 1981 the Kansas Water Office and Kansas Water Authority were formally established and have led the state's planning efforts since that time.

Public meetings on the Kansas Water Plan 2009 update were held on December 4, 2008, December 10, 2008 and December 11, 2008.

As previously mentioned the KWO coordinates the water planning process in conjunction with the Kansas Water Authority. The Kansas Water Authority annually reviews and approves the *Kansas Water Plan*. The Authority, in turn, advises the Governor and Legislature on water issues to be considered for policy enactment.

The Authority's 24 members (13 appointed and 11 ex-officio) include representatives from diverse water use interest groups and leaders of the state's natural resource agencies as described below:

- Representative of the Governor
- Director of the Kansas Water Office
- Representative of Central Kansas Groundwater Management Districts
- Representative of Western Kansas Groundwater Management Districts
- Representative of Conservation and Environmental Issues
- Secretary of the Kansas Department of Agriculture
- Representative of the President of the Senate
- Representative of State Association of Kansas Watersheds
- Director of Division of Environment, Kansas Department of Health and Environment
- Secretary of the Kansas Department of Wildlife and Parks
- Director of the Agricultural Experiment Station KSU
- Representative of Small Municipal Water Users

- Representative of the Speaker of the House
- Representative of Kansas Association of Conservation Districts
- Chief Engineer of the Kansas Department of Agriculture, Division of Water Resources
- Representative of Large Municipal Water Users
- Representative of the General Public
- Secretary of Kansas Department of Commerce and Housing
- Representative of the General Public
- Administrative Officer of State Conservation Commission
- Representative of Industrial Water Users
- Chairperson of Kansas Corporation Commission
- State Geologist of Kansas Geological Survey
- State Biologist of Kansas Biological Survey

In addition, advice on priority water resource issues and policy development comes from Basin Advisory Committees (BACs) in each of the state's 12 river basins and other local stakeholders. The BACs provide the working link between the KWA and the public.

The committees:

- Advise the KWO and the KWA in identification of water-related problems, issues, and concerns within their basin.
- Advise the KWO and the KWA in the formulation of revisions to the Basin Plan for their basin.
- Advise the KWO and the KWA regarding the Kansas Water Plan implementation priorities and actions.
- Serve as a link to the public in the basin through interaction with various groups and individuals and communicate information on concerns and issues to citizens in the basin.
- Advise the KWO and KWA on policy issues under consideration for inclusion in the *Kansas Water Plan*.

3. WATER MANAGEMENT VISION AND GOALS

Goals and objective, and policies to achieve those goals are articulated in statute in the State Water Planning Act. In addition, in 1998, Kansas Water Authority adopted objectives for state water planning for the year 2010 and a couple years later, additional objectives for the year 2015. Those objectives address the water resource categories of Water Management, Water Conservation, Public Water Supply, Flood Management, Water Quality, Riparian and Wetland and Recreation, as well as public information and education and data and research.

The Kansas water planning process incorporates the three key state water plan characteristics mandated by the State Water Resources Planning Act (comprehensive, coordinated and continuous) into an adaptive planning approach which supports the ability of the decision-making process to be flexible in response to changing

current and future conditions and promotes adjustments from the current situation which do not foreclose future resource use options.

One of the primary goals of the Kansas Water Plan is to ensure the coordinated management, conservation and development of the water resources of the state. Kansas has projected water needs through 2040 and through the planning process seeks to ensure a sustainable and wise use of its water resources. Completion of the plan is based upon a comprehensive, watershed oriented approach to planning. The KWO emphasizes that: “the interconnections within the watershed that define the action of the hydrological cycle in that area must be considered in managing the water resources. The recharge areas where the surface conditions interact most readily with the water under the surface must be considered as part of the system defining the watershed”.

The Kansas Water Plan is one of the primary tools that are used to address current and future water needs and to coordinate local, state and federal actions. The State Water Plan Fund, which was created in 1989, is used to help implement the priorities and needs identified in the planning process.

4. SCOPE OF WATER RESOURCE PLANNING

The 2009 Kansas Water Plan has three volumes plus and Atlas, which can be found at <Http://www.kwo.org/Kansas%20Water%20Plan/SWP/State%20Water%20Plan.htm>

Volume I - Contains the Executive Summary; Organization of the Water Plan; Kansas Water Planning; Process and Purpose; Kansas Physiographic, Climate and Demographic Setting; History of Water Planning in Kansas

Volume II – Provides an overview of Statewide Management Categories and Policies: 2010 and 2015 Objectives; Water Management; Water Conservation; Public Water Supply; Water Quality; Flood Management; Wetland and Riparian Management; Water-Based Recreation; Data and Research; Public Information and Education; Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation Draft.

Volume III – Provides a summary of the twelve Kansas River Basin Plans - Cimarron; Kansas-Lower Republican; Lower Arkansas; Marais des Cygnes; Missouri; Neosho; Smoky Hill-Saline; Solomon; Upper Arkansas; Upper Republican; Verdigris and Walnut.

Kansas Water Plan Atlas – Contains statewide and basin-specific maps illustrating various resource conditions including aquifers, surface water, water use, major crops and livestock, and more.

Volume I and II of the State Water Plan focus on broader statewide or regional issues and Volume 3 focuses on specific basins characteristics, needs and issues. In general, Kansas Water resources are ground water dominated in the western half of the state and surface water dominated in the eastern half of the state. The state’s major rivers include the Missouri, Arkansas, Kansas and Neosho. The High Plains Aquifer, subdivided into the

Ogallala, Great Bend Prairie and Equus Beds aquifers, is the primary source of ground water.

The overall management of Kansas' ground and surface water fits into six broad categories:

1. River-Reservoir management
2. Stream reaches with established Minimum Desirable Streamflow;
3. Streams outside of Minimum Desirable Streamflow protected areas;
4. The Ogallala-High Plains aquifer
5. Ground water outside of the Ogallala-High Plains aquifer
6. Interstate water management

More information on each of these topics is available at

http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_II_Docs/Rpt_KWP_2008_Water_Management.pdf

Detailed river basin information is provided in Volume III of the State Water Plan which is organized by: 1) Basin Plan Description; 2) Basin Management Categories; and 3) Basin Priority Issues.

The *Basin Plan Descriptions* provide an overview of the individual basin characteristics.

The *Basin Management Categories* section provides an overview of basin issues by management category that in addition to the basin priority issues, usually addressed by an individual agency's program. The basin management categories include:

- Water Management
- Water Conservation
- Public Water Supply
- Water Quality
- Flood Management
- Water-Based Recreation
- Wetland and Riparian Management

The *Basin Priority Issues* summarize specific basin needs.

From a state wide perspective it appears that Kansas has an adequate overall water supply relative to future demand but a number of issues and resource management issues must be addressed to meet future needs. While the state is fortunate to have water resources for most existing and projected uses, water shortages have occurred in some locations and the state expects that trend to increase in the future as demands grow, as ground water declines continue where withdrawals exceed recharge, and as climate variability increases. A summary of the total statewide water resources does not capture the fact that water supplies and demands do not always match up spatially, temporally, or in

magnitude. In other words, the right amount of water may not be available when and where it is needed. More specific detail is provided below by river basin.

A brief summary of individual basin characteristics and needs was taken directly from the basin reports and is provided below. More information is available at http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/KWP_Volume_III.htm

Cimarron

There were an estimated 54,300 residents in this basin in the year 2000. According to the Kansas Division of Budget, the total population of the 14 counties that are contained in whole or in part by the Cimarron basin had a population of 104,067 in 2000. By 2040, the county population is projected to decrease to 101,257. In the past 40 years, two trends have dominated the state and the basin. Rural counties have lost population, sometimes more than 10 percent every decade. Urban counties, particularly in the greater Wichita area and Kansas City areas, are gaining population at an even greater rate.

A majority of the basin is closed or restricted for new water appropriations.

Basin Priority Issues:

- Management of the Ogallala-High Plains aquifer and associated alluvial aquifer is needed to reduce the rate of decline and to conserve the life of the aquifer.
- A portion of the Cimarron River is listed as critical habitat for the federally threatened Arkansas River Shiner, by the U.S. Fish & Wildlife Service.
- Salt cedars (Tamarisk), Russian olives and other invasive high water consuming vegetation are choking out native riparian habitat along the Cimarron River and other southwestern streams.
- Renewable fuel production is a growing issue in the Cimarron basin, where increased biofuel production provides economic opportunity.

Kansas-Lower Republican

The basin has the largest population of all the twelve major river basins and had an estimated 1,025,644 residents in the year 2000. The 2000 U.S. Census recorded 1,235,516 residents in the 25 counties contained either wholly or partially within the basin. This population is projected to grow to nearly 1,583,584 in the year 2040. This basin illustrates major demographic changes which are taking place in Kansas. In the past 40 years, two trends have dominated the state and the basin. Rural counties have lost population, sometimes more than ten percent every decade. Urban counties, particularly Johnson and Douglas, are gaining population at an even greater rate.

Basin Priority Issues:

- Increasing population and development in portions of the Kansas River basin, along with aging reservoirs and public water supply infrastructure indicates a need to evaluate the river/reservoir system capacity to meet future water supply needs in the basin.
- The Kansas River, often referred to as the Kaw, stretches 171 miles from its origin in Junction City to its confluence with the Missouri River and is the primary source of drinking water for many communities in northeast Kansas. Bed degradation on the Kansas River threatens water intakes, bridges and other manmade “hard points” along the river channel. Aquatic habitats in the river have been negatively impacted by channel degradation.
- The restoration and protection of watersheds, particularly those watersheds above public water supply reservoirs, is a priority in the Kansas-Lower Republican Basin. With growing urban populations within the basin, the restoration and protection of these watersheds and water bodies are of critical importance.
- There are five federal reservoirs in the Kansas-Lower Republican Basin. Four of these reservoirs are operated by the U.S. Army Corps of Engineers: Milford, Tuttle Creek, Perry and Clinton. The fifth, Lovewell, is operated by the Bureau of Reclamation, and is used primarily for irrigation. Milford, Tuttle Creek, Perry and Clinton are used for public water supply programs that serve numerous cities and rural water districts in the basin, primarily in the rapidly growing urbanized communities within the Kansas River corridor. These reservoirs are also managed by the Corps of Engineers for flood control, recreation and to support navigation in the Missouri River.
- A number of reservoirs and streams within the basin are experiencing water quality impairments. Fecal coliform bacteria and dissolved oxygen are the most prevalent stream impairments. Eutrophication (nutrient loading), pesticides and siltation are the primary water quality problems affecting reservoirs. Reservoir sedimentation is also a water quantity concern. As sediment accumulates in a reservoir’s multipurpose pool, the capacity for water supply storage is reduced.

Lower Arkansas

The basin has the second largest population of the twelve major river basins, with an estimated 641,000 residents in the year 2000. According to projections conducted using Kansas Division of Budget population data, the population in the 20 counties included as a whole or in part in the basin, is projected to grow to nearly 887,450 in the year 2040. Nearly all of this growth will be in Sedgwick and the surrounding counties. Major population centers include Wichita, Newton, Hutchinson, Wellington and part of McPherson.

This basin illustrates major demographic changes taking place in Kansas. In the past 40 years, two trends have dominated the state and the Lower Arkansas basin. Rural counties have lost population, sometimes more than 10 percent every decade. Urban counties, particularly in the greater Wichita area, are gaining population at an even greater rate.

Basin Priority Issues:

- Renewable fuel production is a growing issue in the Lower Arkansas basin, where increased biofuel production provides economic opportunity.
- Gas and oil production is the second largest industry in Kansas and is very important to the Lower Arkansas basin's economy. The growing industrial contribution to the basin's economy is also related to bioenergy production, primarily ethanol. As of May 2008, two ethanol plants are located in the basin in Pratt and Sedgwick Counties. Two additional ethanol plants are under construction in Sedgwick and Rice Counties. One biodiesel plant has been permitted for construction in Stafford County.
- The State of Kansas is seeking to better utilize reclaimed water as a valuable water resource. Water reuse is identified as a potentially important component of both wastewater management and water resource management in the Lower Arkansas basin.
- Projected sources of water supply are insufficient to meet projected demands in some areas of the Lower Arkansas River basin. Artificially recharging and conserving the existing supplies of the Equus Beds aquifer should be considered to meet future demands for water for Wichita and other users in the area, as well as to prevent degradation of the water quality of the aquifer by saltwater plumes.
- Another component of extending the future water supplies is ensuring the sustainability of water supply storage in Cheney Reservoir.
- Management solutions are needed to address water level decline rates, the achievement of sustainable yield, and the meeting of minimum desirable streamflows in the Rattlesnake Creek Sub-basin.
- The restoration of watersheds with impaired water quality and the protection of watersheds above public water supply reservoirs and ground water sources used for drinking water supplies are high priority in the Lower Arkansas Basin. Three main components guide watershed restoration and protection efforts; achievement of Total Maximum Daily Loads, development of Source Water Protection Plans, and restoration and protection of wetland and riparian areas.
- Water quality and related water resource issues are addressed through a combination of watershed restoration and protection efforts utilizing voluntary, incentive based approaches, as well as regulatory programs.

Marais des Cygnes

There were an estimated 125,000 residents in the basin in the year 2000 (KWO estimate). The 13 counties either partly or wholly located within the basin had a combined population of 761,561 in 2000 (U.S. Census) and projected population of 1,076,146 in 2040. Miami County, in the northern part of the basin, is poised for growth as urbanization of the Kansas City metropolitan area moves south. Miami County with a population of 28,499 in 2000 has a projected population of 41,917 in 2040. By contrast, Linn County in the lower basin had a 2,000 population of 9,606 and a projected 2040 population of 8,679.

Generally, counties associated with urban areas of Kansas City, Lawrence and Topeka to the north of the basin is projecting growth while other counties in the basin are expected to see population declines. Despite the continuing urban growth, the Marais des Cygnes watershed maintains a robust agricultural industry comprised of feed grain operations, grazing lands and confined animal feeding operations.

The Corps of Engineers operates three reservoirs in Marais des Cygnes basin: Pomona, Melvern and Hillsdale Lakes. Four State Multipurpose Small Lakes have been constructed in the basin including Bone Creek, Xenia, Cedar Creek and Little Sugar Creek.

Basin Priority Issues:

- Persistent flood damages in the Marais des Cygnes basin indicate a need for a comprehensive assessment of existing flood control infrastructure and storage to determine current status, mapping needs and opportunities for flood management actions in the future. In addition, development downstream of some small dams has resulted in changes in hazard class and necessitated upgrading of some structures.
- Increasing population and development in portions of the Marais des Cygnes basin along with aging reservoirs and public water supply infrastructure indicates a need to evaluate the river/reservoir system capacity to meet future water supply needs in the basin.
 - In 2007, KWO released updated Guidelines for Municipal Water Conservation Plans for use by public water suppliers. While the supply and demand analysis did include implementation of some conservation practices during drought, demand management could extend water supplies. Controlling water loss and enhancing treatment efficiency could further enhance demand management.
 - In 2008, KWO initiated the Reservoir Sustainability Initiative to conserve and potentially restore reservoir storage capacity and provide for long-term public water supply needs. Public water supply storage has been impacted by sedimentation in all the federal reservoirs in the basin. Maintaining this storage is critical to meeting future public water supply needs.
- The restoration and protection of watersheds, particularly those watersheds above public water supply reservoirs, is a priority in the Marais des Cygnes Basin. With growing populations in the northern portion of the basin and a corresponding increase in the demand for water, the restoration and protection of these watersheds and the reservoirs below them are of critical importance.
 - There are three federal reservoirs: Pomona, Melvern and Hillsdale, in the Marais des Cygnes Basin. All of these reservoirs are operated by the U.S. Army Corps of
 - Engineers. All three reservoirs are used for public water supply programs that serve numerous cities and rural water districts in the basin, primarily in the rapidly growing areas in the northeast portion of the basin influenced by the Kansas City metropolitan area. These reservoirs are also managed by the Corps of Engineers for flood control and recreation. Hillsdale and Pomona reservoirs and many streams within the basin are experiencing water quality impairments. Fecal coliform bacteria and low levels of dissolved oxygen are the most prevalent

stream impairments. Sedimentation and eutrophication (nutrient loading) are the primary water quality problems affecting reservoirs in this basin. Reservoir sedimentation is a major water quantity concern, particularly in reservoirs where the State owns storage for the water marketing program or an assurance district owns storage. As sediment accumulates in a reservoir's multipurpose pool, the capacity for water supply storage is reduced.

Missouri

There were an estimated 143,000 residents in the basin in the year 2000 (KWO estimate). According to the U.S. Census Bureau, the total population of the seven counties that are contained in whole or in part by the Missouri basin had a population of 284,011 in 2000. By 2040, the population of these counties is projected to increase by about 16 percent to 330,470. However, nearly all this increase is projected to occur in Wyandotte and Leavenworth Counties. The population in the remainder of the basin is projected to decrease by approximately 8 percent.

Wyandotte County is one of the most heavily developed areas of Kansas with very little agricultural land. Expanding retail, entertainment and residential development in the western portion of the county will likely result in conversion of any remaining open land in the coming years and affect adjoining areas of southern Leavenworth County. The Fort Leavenworth military installation and federal penitentiary along with the Lansing State Prison are major economic drivers in Leavenworth County. Private colleges are located in Leavenworth and Atchison and public community colleges are located in Highland and Kansas City, Kansas.

The Missouri River as it borders Kansas is greatly influenced by water releases from the six federal reservoirs located in Montana, North Dakota, South Dakota and Nebraska. Water releases from these reservoirs support commercial navigation and other downstream uses. Flows in the Missouri River are influenced by management of several mainstem reservoirs in Montana and the Dakotas. These reservoirs are operated by the U.S. Army Corps of Engineers for flood control, navigation and other purposes in accordance with the *Missouri River Master Manual*.

Basin Priority Issues:

- Lowering of the Missouri River bed in the reach bordering Kansas threatens water intakes, bridge abutments and other "hard points" along the river channel. Wildlife habitat in the river and along its banks has also been negatively impacted by channel degradation.
- A lack of access to water-based recreational resources in the Missouri Basin inhibits recreational activity and the associated economic, educational and stewardship benefits. The Missouri Basin does not contain the large federal reservoirs that support most water-based recreation in Kansas. There are two State Fishing Lakes managed by the Department of Wildlife and Parks plus 10 county and community lakes in the basin.

- Water quality is addressed through a combination of restoration and protection efforts utilizing voluntary, incentive-based approaches, as well as regulatory programs. The protection and restoration of watersheds draining to the Missouri River is a high priority in the Missouri Basin. With the urbanization of the southern part of the basin, protection and restoration of these watersheds has become more important.
- Many streams within the basin are experiencing water quality impairments. Fecal Coliform Bacteria and biological stressors are the most prevalent stream impairments. Sedimentation and eutrophication (nutrient loading) are the primary water quality problems affecting reservoirs in this basin.

Neosho

Major cities in the basin include, proceeding generally from northwest to Southeast, Hillsboro, Marion, Council Grove, Strong City, Emporia, Burlington, Iola, Chanute, Parsons, Oswego, Pittsburg, Galena, and Baxter Springs. There were an estimated 174,000 residents in the basin in the year 2000. The population of thirteen of the counties that have significant land area in the basin was 204,349 in 2000 and is projected to decline to 189,127 by the year 2040. No counties in the basin are expected to gain population during this time but the more rural counties are projected to lose proportionally more population than the counties having regional urban centers.

There are three federal reservoirs in the basin: Marion, Council Grove, and John Redmond. Coffey County State Fishing Lake provides cooling water for the Wolf Creek Nuclear Power Plant. All counties have state fishing lakes.

Basin Priority Issues:

- Increased understanding and adjustment of management of the Ozark Plateau aquifer and the Spring River system is needed to ensure a sustainable water supply for southeast Kansas.
- Evaluation of surface water supply, demand, management, and conservation, is needed to improve reservoir sustainability and provide adequate public water supply to meet long-term needs in the Neosho Basin. Increasing population and development in portions of the Neosho Basin along with aging reservoirs and public water supply infrastructure indicate a need to evaluate the long-term water system capacity to meet demands in the basin.
- Watershed Restoration and Protection efforts are needed to address a variety of water quality and water resource concerns such as achieving Total Maximum Daily Loads, Nutrient Reduction goals, development of Source Water Protection Plans, reduction of sedimentation in reservoirs and lakes, and protection or restoration of wetland and riparian habitats.

There are three federal reservoirs in the Neosho Basin: Marion, Council Grove, and John Redmond. All of these reservoirs are operated by the U.S. Army Corps of Engineers (Corps). All three reservoirs are used for public water supply programs that serve numerous cities and rural water districts. The reservoirs are also managed by the Corps

for flood control and recreation. All three reservoirs, and many streams and tributaries that connect them, are experiencing water quality impairments. Fecal coliform bacteria and low levels of dissolved oxygen are the most prevalent stream impairments. Sedimentation and eutrophication are the most prevalent reservoir and lake impairments. Reservoir sedimentation is a major water quantity concern, particularly in reservoirs where the state owns storage for the water marketing program, or where an assurance district owns storage. As sediment accumulates in a reservoir's multi-purpose pool, the capacity for water supply storage is reduced.

Loss of capacity in John Redmond Reservoir is the most pressing issue among the three reservoirs. Efforts are underway to determine the sources of sediment and to identify actions most likely to result in improvement in long term reservoir storage capacity.

Smoky Hill-Saline

The basin had a population of 156,161 in 2000. The population of the 32 counties that are entirely or partially in the Smoky Hill-Saline basin was 330,631 in the year 2000 and is projected to be 288,939 in the year 2040. Rural counties have lost population, sometimes more than 10 percent every decade.

Three large federal irrigation and/or flood control projects are located in the Smoky Hill-Saline Basin. Cedar Bluff Reservoir, a Bureau of Reclamation project, is located on the Smoky Hill River in Trego County. Wilson Lake on the Saline River and Kanopolis Lake on the Smoky Hill River are operated and maintained by the Corps of Engineers.

Basin Priority Issues:

- Management of the Groundwater Declines in the Smoky Hill River basin of the Ogallala-High Plains aquifer.
- Meeting Central Kansas Smoky Hill-Saline Regional Public Water Supply (Municipal and Industrial) Needs. Providing for the changing uses, demands and distribution of water use in the central part of the Smoky Hill- Saline basin to meet public water supply needs is a recognized need in the basin. Resource management to maintain economic stability and provide for economic growth is part of any considerations in management decisions.
- Efficient Management of the Smoky Hill River System, Kanopolis Lake and downstream for beneficial water uses. Efficient management of the resources related to the Kanopolis Lake and the Smoky Hill River below the reservoir is needed to meet the water needs under varying climatic conditions. Review of the available supply, expected demands and potential management scenarios to meet water appropriations and water marketing goals has been initiated. Comprehensive understanding and management of the system and water use are needed to balance the water releases from Kanopolis Lake and the additional demands for water in the basin. An approach that will allow the use of storage to meet contemporary needs, yet

respect the current commitments under contract, ownership, and appropriation rights that will work with current and local conditions is needed.

Solomon

There were an estimated 39,900 residents in the basin in the year 2000. The population of the 17 counties that are entirely or partially in the Solomon basin was 154,233 in the year 2000 and is projected to be 128,912 by the year 2040. The large discrepancy in estimated population and the counties total is due to the inclusion of Saline and Dickinson counties.

Basin Priority Issues:

- Long term management of the Ogallala-High Plains and alluvial aquifers to extend and conserve the life of the aquifer, while meeting areas needs.
- Solomon River water resources management by subbasins to stabilize hydrologic systems and improve reliability of water availability to water users.
- Increase water levels in Webster Reservoir for improved recreational opportunities.

Upper Arkansas

There were an estimated 128,500 residents in the basin in the year 2000. According to the Kansas Division of Budget, the total population of the 19 counties that are contained in whole or in part by the Upper Arkansas basin had a population of 171,733 in 2000. By 2040, the county population is projected to decrease to 163,207.

Basin Priority Issues:

- Management of the Ogallala-High Plains aquifer and alluvial aquifer is needed to reduce the rate of decline and to conserve the life of the aquifer.
- Reduction of ground water withdrawals is necessary to stabilize the hydrologic system in the Middle Arkansas Subbasin.
- Salt cedar (Tamarisk), Russian olive and other invasive high water consuming vegetation are choking out native riparian habitat along the upper Arkansas River and other western streams in Kansas.
- Renewable fuel production is a growing issue in the Upper Arkansas basin, where increased biofuel production provides economic opportunity.
- Interstate cooperation and management is needed to address poor quality surface water that is impacting or threatening public water supply wells along the Arkansas River corridor. Protection of the fresh ground water in the region is critical for municipal, industrial and agricultural uses.
- The restoration of watersheds with impaired water quality and the protection of watersheds ground water sources used for drinking water supplies and irrigation are high priority in the Upper Arkansas Basin.

Upper Republican

There were an estimated 28,480 residents in the basin in the year 2000. The population of the nine counties that are entirely or partially in the Upper Republican basin was 43,721 in the year 2000 and is projected to be 41,063 by the year 2040. In the past 40 years, two trends have dominated the state. Rural counties have lost population, sometimes more than 10 percent every decade. Urban counties are gaining population at an even faster rate. In the Upper Republican Basin, every county but Thomas has lost population in the past 40 years. Typical of this trend is Rawlins County, which had a population of 5,279 in 1960 and a population of 2,918 in 2000.

Basin Priority Issues:

- Long term management of the Ogallala-High Plains aquifer to extend and conserve the life of the aquifer.
- Planning and coordination is needed for the Republican River system in the Upper Republican basin for efficient water use, compliance with Republican River Compact and the beneficial use of Republican River Compact Settlement payments.

Verdigris

There were an estimated 103,000 residents in the Kansas portion of the basin in the year 2000 and the population is expected to decrease to around 78,527 by 2040 according to Kansas Water Office projections. No counties in the basin are projected to gain population.

Basin Priority Issues:

- The restoration and protection of watersheds, particularly those watersheds above public water supply reservoirs, is a priority in the Verdigris basin. The Verdigris and Caney rivers drain south into Oklahoma so interstate water quality issues are also important to ensure high quality water crossing the state line.
- There are four federal reservoirs: Fall River, Toronto, Elk City and Big Hill, in the Verdigris basin. All of these reservoirs are operated by the U.S. Army Corps of Engineers. All four reservoirs are used for public water supply programs that serve numerous cities and rural water districts in the basin. The reservoirs are also managed by the Corps of Engineers for flood control and recreation. Many streams within the basin are experiencing water quality impairments. Fecal coliform bacteria and low levels of dissolved oxygen are the most prevalent stream impairments. Reservoir sedimentation is a major water quantity concern, particularly in reservoirs where the State owns storage for the water marketing and water assurance district programs. As sediment accumulates in a reservoir's multipurpose pool, the capacity for water supply storage is reduced.
- Reservoirs, community lakes, and streams in the Verdigris basin provide water for municipal and industrial water supply, irrigation, recreation, and aquatic life. There is a need for a comprehensive management and conservation strategy by communities

within the basin to make efficient use of the water resource. The rural nature of the Verdigris basin led to many small communities developing their own water supplies, either from direct intakes on the major rivers and streams or from construction of individual community lakes.

- Persistent flood damages in the Verdigris Basin indicate a need for a comprehensive evaluation of existing flood control infrastructure and storage to determine current status, mapping funding needs, and opportunities for flood management actions and flood damage reduction in the future.
- Streams in Kansas are to meet water quality standards, support a healthy aquatic and riparian habitat, and maintain access to diversions for beneficial uses. The Verdigris River and associated tributaries have been having increasingly frequent occurrences of low flow conditions. Low flows have caused aquatic life stress and impaired water quality. Threatened and endangered species, especially mussels, in the Verdigris River system are impacted by these conditions.

Walnut

There were an estimated 95,925 residents in Butler and Cowley counties in the year 2000. According to the Kansas Division of Budget, the total population in these two counties is projected to increase to 129,243 by the year 2040. This basin illustrates major demographic changes that are taking place in Kansas. In the past 40 years, two trends have dominated the state and the basin. Rural counties have lost population, sometimes more than 10 percent every decade. While the population of Butler County is projected to increase by 36,756 by 2040, the population of Cowley County is projected to decrease by 3,441 during the same period of time.

Basin Priority Issues:

- The restoration and protection of watersheds, particularly those watersheds above public water supply reservoirs and lakes, is a priority in the Walnut Basin. With growing populations in the northern portion of the basin and a corresponding increase in the demand for water, the restoration and protection of these watersheds and the reservoirs below them are of high importance.
- El Dorado Reservoir and Winfield City Lake are the two major sources of stored water supply in the basin. El Dorado Reservoir is operated by the U.S. Army Corps of Engineers (Corps). The City of El Dorado manages all of the water stored for public water supply. El Dorado Reservoir is used for public water supply programs that serve numerous cities and rural water districts in the basin,
- primarily in the rapidly growing areas in the northwest portion of the basin influenced by the Wichita metropolitan area. It is also managed by the Corps for flood control and recreation. Winfield City Lake is owned and operated by the City of Winfield and is also heavily used for recreation. Reservoir sedimentation and eutrophication are major water quantity concerns. As sediment accumulates in a reservoir's multipurpose pool, the capacity for water supply storage is reduced.
- The western part of the Walnut and the eastern part of the Lower Arkansas River basins have experienced population growth at an increasingly high rate over the last

few years, resulting in increasing demands placed on existing water supplies. While surface water and ground water supplies are available to meet current and future (2050) demands in the area and are generally of good quality, supplies are not necessarily located in the immediate area of demand. A complete understanding of the capability of meeting future demand is needed. For water supply issues, it is necessary to evaluate the above concerns on a regional rather than a basin scale. For this issue, the region is defined as the five-county area that includes Butler, Cowley, Harvey, Sedgwick and Sumner counties. In order to improve sustainability and address the availability of adequate public water supply to meet long-term needs, evaluation of surface and ground water management and conservation, including supply and demand analysis and aquifer characterization are needed.

- Demographic shifts in the Walnut Basin are influencing land use patterns, water supply and distribution infrastructure, wastewater treatment and disposal, flood damage management, and natural and biological resources. The Walnut Basin is strongly influenced by demographic changes in the eastern portion of the Lower Arkansas Basin which is experiencing similar demographic impacts. Municipalities seek to guide development within their boundaries or designated growth areas to maximize efficiency of providing services. Unplanned rural subdivisions can challenge the provision of services when municipal boundaries reach rural water district boundaries.
- Persistent flood damages in the Walnut Basin indicate a need for a comprehensive evaluation of existing flood control infrastructure and storage to determine current status, mapping funding needs, and opportunities for flood management plans and flood damage reduction actions in the future.
- Increasing public access to the state's lakes, rivers and streams, and recognizing the associated economic, social, and quality of life benefits to be derived from fishing, boating and other water-related recreational activities is an objective of the Kansas Water Plan. The Walnut River is not open for public access under Kansas law. However, the river and its tributaries do present numerous opportunities for recreation including boating, hunting, hiking, fishing, wildlife viewing, and camping. The entire extent of current opportunities and access areas is unknown and opportunities to consolidate areas with access have not been evaluated.

5. PARTNERSHIPS, STAKEHOLDER, AND PUBLIC INVOLVEMENT

The Kansas Water Plan is developed under the following guiding principles.

Comprehensive

Comprehensive planning provides guidance for a wide range of water management, conservation and development issues.

Coordination

Hundreds of public and private organizations and thousands of individuals share the responsibility to manage the state's water resources. No single organization, acting alone

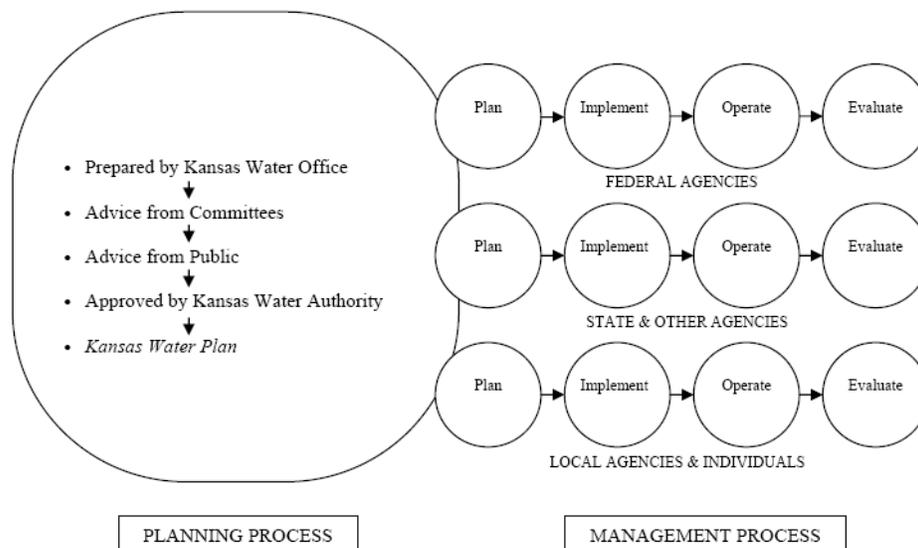
within the scope of its powers, can carry out programs to manage, conserve or develop the waters of the state. It is essential that organizations at all levels, local, state, federal and frequently other states, act in a coordinated fashion to achieve common objectives in water resource management.

Continuous

Continuous planning is the key to ensuring that the planning effort is an integral part of the state’s water management process. Once the Plan is formulated, programs are implemented and operated for a period of time and ultimately the program outcomes are assessed. Information from operating experience and assessment of the condition of the state’s water resources are used to modify and improve the Plan. Consequently, planning, by its nature, must be a continuous process, constantly adapting to new conditions and information. A plan set in concrete is an obstacle to effective management instead of a useful tool.

Stakeholder Process

As discussed in Sections 1 and 2 the State of Kansas involves a broad range of state, local, regional, federal, and non-governmental entities in the state planning process. The following schematic was taken from a description of their planning and implementation process and it highlights their overall approach to planning.



The State of Kansas indicates that the key to coordinated, comprehensive and continuous planning is the annual state water planning process which emphasizes public participation through basin advisory committees, public meetings and public hearings. The process applies to the revision of Kansas Water Plan policy and basin sections. The annual state

water planning process in Kansas is coordinated with numerous local, state and federal agencies, special interest groups and the public.

The Kansas Legislature directed stakeholder input in the water planning process. This is accomplished through public participation on basin advisory committees, and public meetings. Basin Advisory Committees are made up of citizens located within each of the 12 major river basins in the state. They provide advice on formulation and implementation of the basin sections of the Kansas Water Plan. Each committee has 11 members representing water use categories of municipal, other public water suppliers, domestic, irrigation, industry and recreation, as well as at-large members.

6. PLAN IMPLEMENTATION STRATEGY

The broad issues goals and benchmarks for the state and individual regions are summarized earlier in this document. Kansas does not currently have specific water management plan/alternatives to address local issues/water shortages or other problems that may develop. The state has identified targeted areas for stakeholder-based management strategies and voluntary incentive-based reductions. The state has regulatory authority to require reductions in use under certain conditions, such as impairment of senior water rights, water level declines, withdrawals in excess of recharge, etc. Municipalities and other water users will have to apply various strategies as appropriate for their situations. Some of this is already occurring. For example, existing water rights are regularly acquired and converted to other uses, often from irrigation to municipal, stockwatering, or industrial. Water conservation measures, utilization of saline water, and other strategies are anticipated to increase over time, as driven by needs and economics.

7. OUTCOMES AND ASSESSMENT PROCESS

Implementation of basin and state priorities is accomplished in part by the passage of legislation and through funding of specific programs or projects. The Kansas Water Plan serves as guidance to state agencies for preparation of budgets for implementation. Creation of the State Water Plan Fund in 1989 provided a dedicated source of revenue to supplement funding for implementation of the Kansas Water Plan. The Kansas Water Authority provides feedback at its June meeting on proposed expenditures by agencies represented on the Governor's Natural Resources Sub-Committee of the Cabinet for the upcoming legislative session in January. The Authority also provides further feedback prior to December 1 of each year, the Kansas Water Authority reports to the Governor and Legislature on actions necessary to implement the Plan, including legislation, coordination and appropriation of funds, especially from the State Water Plan Fund.

The KWO also produces a number of reports including identification of future issues that are not currently addressed. These may be identified in either policy or basin sections of the Plan. Each year the Kansas Water Authority reviews these items to determine if those issues should be considered for evaluation under the water planning process based on the following criteria:

- Involve the need for development of new policy as opposed to implementation of existing policy.
- Are not suitably addressed through existing programs or policies.
- Present a central need for policy definition as opposed to funding requirements.
- Are closely tied to some beneficial use of water.

Finally, KWO indicates that there is a need to increase funding for implementation of the state water plan. All options for increasing funding should be explored. A clear identification of what is needed and why, and a documentation of accomplishments of the funds currently received should also be developed.

8. NEEDS, CHALLENGES, AND CRITICAL PRIORITIES – INTERVIEW INSIGHTS

The Kansas Water Plan summary provides an overview of key statewide and basin needs, challenges, and priorities in the “Scope of Water Resource Planning” section. A brief overview of some of these topics is provided below.

In general, the rural areas of Kansas are losing population while more urban areas are gaining population, especially in eastern Kansas. About 6 counties statewide show growth others are stable or losing population. Currently about 60 percent the communities in Kansas have populations below 500 people so there are a significant number of small rural water systems.

About two thirds of the state depends on United State Army Corps of Engineers reservoirs for their water supply. Sedimentation of these reservoirs and others, and the corresponding loss of yield is a concern over the longer term. Finding replacement supplies is an important future need in some parts of the state.

The west side of the state is more arid and more dependent on groundwater. The east side has more precipitation but more growth. The energy water nexus is a key factor to address in water supply planning.

A summary of select needs, challenges, and priorities include:

- Sedimentation of reservoirs on the eastern side of the state especially with the growth in population.
- Kansas has completed broad planning and indentified needs and trends; many of the solutions have been identified and now the challenge is to implement the solutions.
- Funding is needed to implement the management strategies that have been identified.
- Channel degradation on the Missouri river and its potential impacts on waters supply intakes.
- Missouri River conflicts over navigation, recreation and endangered species. Conflict over navigational use of the Missouri River and operational releases from the three large reservoirs on the Kansas River has been detrimental to Kansas recreational uses.

- Groundwater declines in the western side of the state.
- Management of groundwater within a between states is challenge especially where other states have different law of policies.
- Water quality between upstream and downstream states.
- Developing political will via outreach and developing and understanding of the issues is tough especially given the long term nature of water resource issues and needs.
- Working with federal partners to get them to understand what the state needs and how they can help with without trying to taking over.
- Additional manpower, technical support and access to experts.
- Water conservation, demand management; it is difficult to instill the changes that are needed to achieve demand reductions.
- Federal agencies have different policies and guidelines that do not always match state needs or are difficult to identify or understand; it is good to access manpower and expertise of the Federal agencies but realistically is difficult to do.
- Federal programs and dollars frequently come with too many strings to make them desirable. Timelines are also a problem things need to be streamlined 5 years is too long to go through Federal planning and design process.

9. REFERENCES

Much of the language and information in this summary comes directly from reports published by the Kansas Water Office.

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