

# Kansas Water Plan

## 2010 & 2015 Objectives

Water Management Policy and Institutional Framework

Water Conservation Policy and Institutional Framework

Public Water Supply Policy and Institutional Framework

Water Quality Policy and Institutional Framework

Wetland and Riparian Management Policy and Institutional Framework

- *Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation*

Flood Management Policy and Institutional Framework

Water Based Recreation Policy and Institutional Framework

Data & Research Policy and Institutional Framework

Information & Education Policy and Institutional Framework

**Volume II**

*Cheyenne Bottoms*

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The Kansas Water Authority approved the following 2010 and 2015 objectives for the *Kansas Water Plan*. The objectives were first developed in 1998 and assessed in 2006. The [full assessment report](#) is available online.

- 1. By 2010, ensure that sufficient surface water storage is available to meet projected year 2040 public water supply needs for areas of Kansas with current or potential access to surface water storage.**

**2006 Assessment** - To identify potential future surface water shortfalls at the basin scale, the Kansas Water Office (KWO) projected surface water demands through: 1) population growth projections for municipal demand; and 2) non-municipal water use for the agricultural, industrial and commercial demand. Surface water supplies were also estimated for two sources: 1) federal reservoirs for water supply yield; and 2) natural flow. All projections are for a 2% drought scenario. Normal climatic conditions generate no supply/demand problems in Kansas basins heavily reliant upon surface water sources.

For the five basins reviewed under the prescribed 2% drought scenario the following results were found:

**Neosho Basin:** By as early as the year 2012, demand could exceed supply in the Neosho River corridor under prescribed drought scenarios. The primary issue in the basin is the rapid loss of storage for supply due to sedimentation of the federal reservoirs in the basin.

**Marais des Cygnes Basin:** By as early as 2017, demand could exceed supply in the basin under the prescribed drought scenario. However, if the remaining water supply in Hillsdale Reservoir was called into service, the Marais des Cygnes basin should have sufficient supply to meet demand into the next century. The primary issue in the basin is rapid increase in demand due to population growth.

**Kansas River Basin:** With only one-sixth of Perry Lake's and one-third of Milford Lake's water supply called into service, the projected water supply in the basin should be adequate to meet the substantial demand growth in the Kansas River corridor to 2050 under prescribed drought scenarios. When the remaining supply in storage is called into service, supply is adequate to meet projected demand to 2090. This basin appears to be the most robust of all the five basins reviewed.



Clinton Dam. Photo courtesy Kansas Geological Survey.

**Walnut Basin:** Demand in the upper end of the Walnut Basin is projected to increase due to population growth. Depending upon the source of supply selected to meet that anticipated growth, demand could exceed supply by as early as 2025 under a drought scenario. When adding in the supplies from the Lower Arkansas basin currently meeting demand in Butler County, supplies could be exceeded by demand in 2052.

**Verdigris Basin:** Water supply storage is rapidly declining in this basin due to the high sedimentation. Demand, however, is not projected to increase substantially. For the drought scenario, demand could exceed supply by 2070.

Additional demands for environmental needs, recreational uses both at the lake and downstream and many others are growing factors in surface water management and availability. The KWO is working with more advanced computer model simulations to develop additional information about the temporal and spatial issues of surface water availability and demand out to 2040.

- 2. By 2010, less than five percent of public water suppliers will be drought vulnerable.**

**2006 Assessment** -This assessment indicates that 133 of the 800 public water suppliers assessed, or 17 percent, were drought vulnerable in 2006. A basic source limitation was the most common reason for drought vulnerability.

Comparison of the drought vulnerable public water suppliers in 2000 and 2006 by river basin shows a significant increase in most western river basins (Lower Arkan-

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sas, Upper Arkansas, Cimarron, Smoky Hill-Saline and Solomon). Substantial declines were noted in the Kansas-Lower Republican, Verdigris and Walnut basins, with little overall change observed in the Marais des Cygnes, Missouri, Neosho and Upper Republican basins.

Persistent drought conditions in the western half of Kansas through the 1999–2006 time period exposed the drought vulnerability of many public water suppliers in that region. In eastern Kansas, many public water suppliers' drought vulnerability was resolved when more reliable water sources were tapped through public wholesale water supply districts. This 2010 objective has not been achieved on a statewide basis.

**3. By 2010, ensure that all public water suppliers have the technical, financial and managerial (TFM) capability to meet their needs and Safe Drinking Water Act requirements.**

**2006 Assessment** - Water system capacity is the ability to plan for, achieve, and maintain compliance with applicable drinking water standards. Capacity consists of three elements: technical, financial and managerial (TFM). Technical is the physical and operational ability of a water system to meet Safe Drinking Water Act (SDWA) requirements, including source water adequacy, infrastructure adequacy and the technical knowledge of system personnel. Financial is the ability of a water system to acquire and manage sufficient financial resources to comply with the SDWA requirements. Managerial covers the area of ownership accountability, staffing and organization, and the ability to conduct its affairs in a manner to comply with the SDWA.

In 2002 and 2005, Kansas Department of Health and Environment surveyed 876 community public water systems on their TFM capacity. A ranking system was developed for systems' capabilities, and priority rankings were made to target assistance based on survey responses.

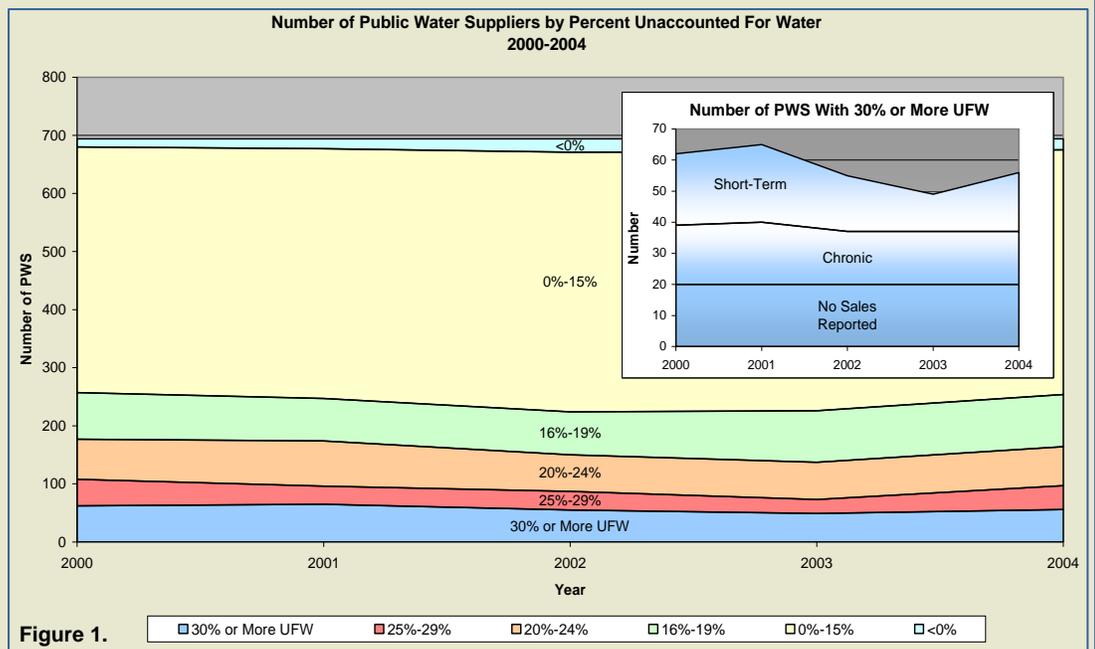
Comparison of average and extreme scores shows little difference in community water system capacity between 2002 and

2005. The number of high priority systems decreased four percent between 2002 and 2005, while the number of low priority systems increased by eight percent.

Technical capacity remains a challenge for a significant proportion of the 876 community water systems that responded to the 2005 Capacity Development Survey. Nearly one-third of these water systems scored less in technical capacity than in financial or managerial capacity.

**4. By 2010, reduce the number of public water suppliers with excessive unaccounted for water by first targeting those with 30 percent or more unaccounted for water.**

**2006 Assessment** - Unaccounted for water is the water a public water supplier diverted minus the metered amounts sold or distributed as free water. Figure 1 shows the number of public water suppliers by percent of unaccounted for water during 2000-2004. Of those that reported 30% or more unaccounted for water, 20 systems do not report customer sales, which may be due to a flat rate schedule, the distribution of large amounts of unmetered free water, or other problems. Roughly one-third of the systems with 30% or more unaccounted for water have chronic problems. Systems designated with chronic problems are those with 30% or more unaccounted for water for at least three of five years of the 2000-2004 period. Problems include failing infrastructure, large amounts of unmetered water use, lack of funding or a lack of desire to make needed re-



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pairs for recognized problems. The remaining systems with 30% or more unaccounted for water have short-term problems that are addressed quickly. Short-term problems include leaks, bookkeeping errors and system maintenance issues. Finally, there are a number of public water suppliers who report a negative percent of unaccounted for water. In other words, they appear to distribute more water than they produce or purchase due to bookkeeping errors or meter problems.

The combined total of systems with 30% or more unaccounted for water and those that report a negative percent unaccounted for water comprise 11% of all public water suppliers who report water use annually.

**5. By 2010, reduce the number of irrigation points of diversion for which the acre-feet per acre (AF/A) water use exceeds an amount considered reasonable for the area (amounts typically considered reasonable are 1.0 AF/A in eastern Kansas, 1.5 AF/A in central Kansas, 2.0 AF/A in western Kansas) and those that overpumped the amount authorized by their water rights.**

**2006 Assessment** - This assessment used the annual irrigation water use report data collected by the Kansas Department of Agriculture, Division of Water Resources. Statewide, irrigation points of diversion (PDs) that reported irrigation application rates above the recommended regional average declined from 1991 to 2005 (Figure 2). The greatest number of regional use exceedances occurred in 1991, with another peak in 2002; the fewest occurred in 1999.

**6. By 2015, conservation plans will be required for water rights meeting the priority criteria under K.S.A. 82a-733 and it has been determined that such a plan would result in significant water management improvements.**

**2006 Assessment** - This assessment report quantifies where, and by whom, irrigation and municipal water conservation plans are required.

As of August 23, 2006, there were 1,430 irrigation water rights in the state with irrigation conservation plans. 1,324 of the plans were required by the Kansas Department of Agriculture, Division of Water Resources (DWR). Another 93 plans were voluntarily submitted by water-right holders. Twelve plans were required by the Kansas Water Office. The requiring entity for one conservation

**Number of PD's Statewide Over the Recommended Regional Average Irrigation Application Rates**

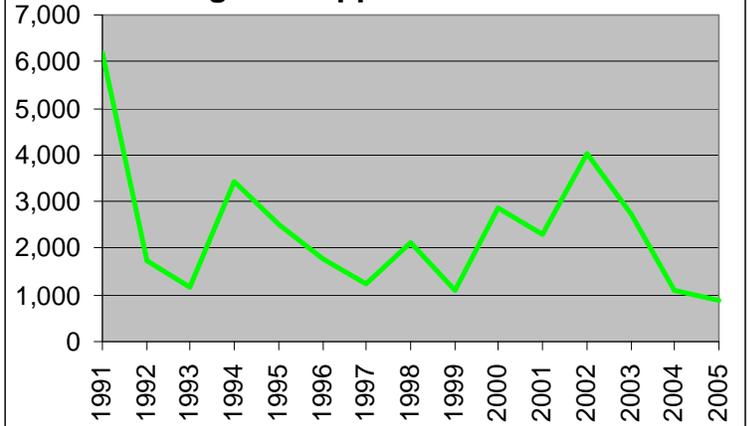


Figure 2.

plan could not be established from the DWR conservation database.

There were 614 public water suppliers with an approved municipal conservation plan as of December 31, 2008. Approximately fifteen reasons can trigger municipal conservation plans. Most plans are directed by State statute, such as Water Marketing, State Revolving Loan Fund, Multipurpose Small Lake Program or involvement with a water assurance district. One hundred seventy three (173) of the approved plans were required by DWR as part of general water right administration. One hundred and seven (107) were required under participation with the State Revolving Loan Fund. Eighty six (86) public water suppliers submitted voluntary water conservation plans.

**7. By 2015, all non-domestic points of diversion meeting predetermined criteria will be metered, gaged or otherwise measured under the authority of K.S.A. 82a-706c and K.S.A. 82a-1028(I). Criteria will include a minimal use requirement and priority area targeting.**

**2006 Assessment** - This assessment attempts to quantify where water flowmeters are required, who made the requirement and when those requirements were enacted. In 2004, 27,006 individual points of diversions were coded as diverting a measurable quantity of water in Kansas (Table 1). Of those, 21,489 individual points of diversions (79.57%) were coded in the Water Right Information System (WRIS) database as reporting a metered quantity at least once during that year.

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Table 1

Kansas Water Office Basin Name	Points of Diversion Reporting Water Diverted	Points of Diversion Coded as Reported a Metered Quantity	Percentage of Points of Diversion Recorded in WRIS as having a Meter
Cimarron	4,353	4,248	97.59%
Kansas-Lower Republican	2,064	1,632	79.07%
Lower Arkansas	5,044	4,258	84.42%
Marais des Cygnes	164	138	84.15%
Missouri	74	47	63.51%
Neosho	258	213	82.56%
Smoky Hill-Saline	2,823	1,675	59.33%
Solomon	1,550	701	45.23%
Upper Arkansas	8,257	7,451	90.24%
Upper Republican	2,244	995	44.34%
Verdigris	96	79	82.29%
Walnut	79	52	65.82%
<b>Total</b>	<b>27,006</b>	<b>21,489</b>	<b>79.57%</b>

Basins in the southwest areas of Kansas, which have mandatory meter requirements, also have the highest recorded meter percentages in the state. The Cimarron Basin ranks highest with over 97% of the points of diversion reporting a metered quantity of water, followed by the Upper Arkansas Basin, with over 90%.

**8. By 2010, reduce water level decline rates within the Ogallala aquifer and implement enhanced water management in targeted areas.**

**2006 Assessment** - Water level and site data was obtained from the Kansas Geological Survey for the Ogallala-High Plains aquifer consisting of 336,749 water level measurements from 4,707 sites. The Ogallala-High Plains aquifer was then divided into three areas due to the varying nature of the resources in northwest, west central and southwest Kansas.

**NORTHWEST KANSAS:** In the northwest Ogallala-High Plains aquifer area, as of 2005, there was no statistically significant change (error level = 0.05) in the rate of decline.

**WEST CENTRAL KANSAS:** There was no significant change (error level = 0.05) in the water level decline rate for the west central Ogallala-High Plains aquifer area.

**SOUTHWEST KANSAS:** There was no statistically discernable change in the rate of ground water declines for

southwest Kansas Ogallala-High Plains aquifer area (error level = 0.05).

**9. By 2015, achieve sustainable yield management of Kansas surface and ground water sources, outside of the Ogallala aquifer and areas specifically exempt by regulation. Sustainable yield management would be a goal that sets water management criteria to ensure long term trends in water use will move as close as possible to stable ground water levels and maintenance of sufficient stream flows.**

**2006 Assessment** - Water level and site data was obtained from the Kansas Geological Survey for the areas outside the Ogallala-High Plains aquifer consisting of 70,154 water level measurements from 1,997 sites. The measurement sites were then divided into areas representing the Equus Beds Groundwater Management Districts (GMD) 2 and Big Bend GMD5, due to the varying nature of the resource.

The relationship between the annual change in median water level, by region and by seasonal average Palmer Drought Severity Index, was used to assess the stated objective. Based upon this methodology, the data assembled for the 1981 through 2005 period indicates that sustainable yield has not yet been attained in either GMD5 or GMD2.

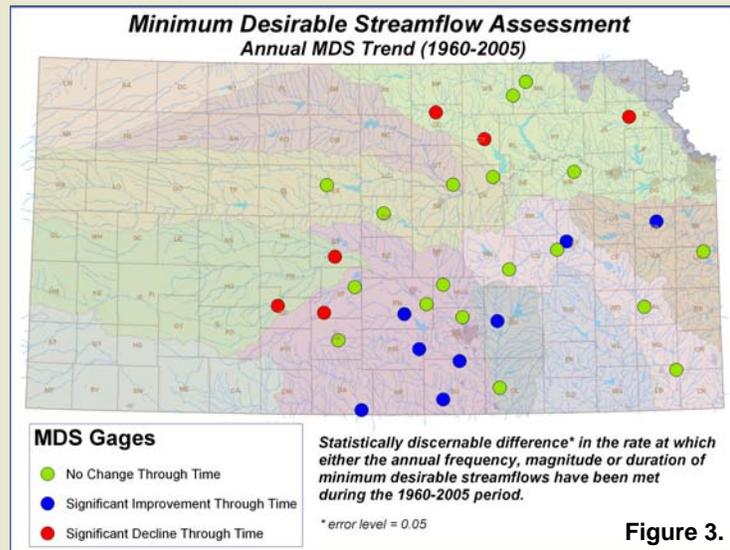
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**10. By 2015, meet Minimum Desirable Streamflow (MDS) at a frequency no less than the historical achievement for the individual sites at the time of enactment.**

**2006 Assessment** - The frequency, magnitude and duration for which Minimum Desirable Streamflow (MDS) was not met were compared for the pre-MDS years (1960 – 1983) to the post-MDS years (1984 – 2004). The data was analyzed to determine if a statistically discernible difference existed between the pre-and post-MDS periods. Additionally, the trend for the annual summarizations of the three components of flow was assessed. This assessment was used to determine whether there is a discernible trend in the annual frequency, magnitude or duration of MDS through time (1960-2005). Figure 3 illustrates the sites by trend.



**11. By 2010, reduce the average concentration of bacteria, biochemical oxygen demand, dissolved solids, metals, nutrients, pesticides and sediment that adversely affect the water quality of Kansas lakes and streams.**

**2006 Assessment** - See description under Objective 12.

**12. By 2010, ensure that water quality conditions are maintained at a level equal to or better than year 2000 conditions.**

**2006 Assessment** - A five-year (2006-2010) monitoring strategy submitted by Kansas Department of Health and Environment (KDHE) was approved by the Environmental Protection Agency in September 2005 and implementation began in 2006. A new component of the moni-

toring strategy is the Probabilistic Stream Monitoring Program (PSMP). The PSMP's goal is to provide statistically sound, unbiased information on the overall condition of streams and rivers in Kansas. The condition is measured using biological, chemical and physical parameter data collected at randomly selected monitoring sites. The KDHE intends to use PSMP to monitor 50 randomly selected sites each year for at least the next four years. The results of each year's sampling effort will provide a snapshot of the condition of streams and rivers in Kansas. The data collected by the PSMP will help determine the stream health at the time of the sampling. With time these snapshots will be used to find changes and trends in the stream water quality conditions.

By 2010, the KDHE PSMP will provide the necessary information to assess the quality of the surface water resource condition.

**13. By 2010, reduce the average concentration of dissolved solids, metals, nitrates, pesticides and volatile organic chemicals that adversely affect the water quality of Kansas ground water.**

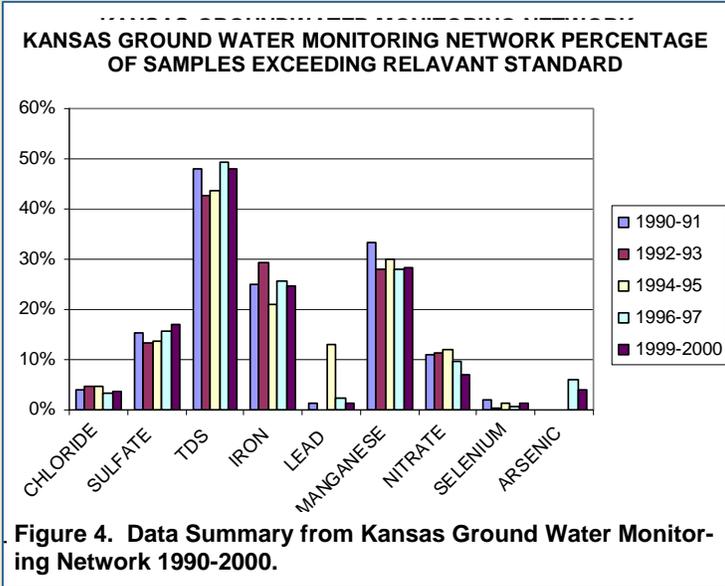
**2006 Assessment** - The Kansas Water Office prepared an assessment of the year 2000 conditions present in Kansas ground water using the KDHE Kansas Groundwater Quality Monitoring Network data through spring 2002. Kansas no longer maintains a statewide ground water quality monitoring program, and funding for the renewal of such an enterprise appears unlikely in the near future.

Some ground water quality data continues to be gathered by the KDHE through the efforts of its major regulatory bureaus. Many of these are primarily in the vicinity of some source of known or potential pollutant. Southwest Kansas GMD No. 3 has analyzed a comprehensive network of ground water monitoring wells within its 13 county area since 1988, but there is no comparable continuing monitoring network in other portions of the state.

Water quality analysis of treated water for public water supplies using ground water is the only source of statewide ground water data. For the period of 1990-2000 the state public water supply systems network analyses indicated that the Safe Drinking Water Act Standards, as indicated by the maximum contaminant levels (MCLs), were met in 90% percent of the samples from the monitoring network, and 89.5% of the wells. The secondary maximum contaminant levels (SMCL), which are recommendations only, are based on taste odor and other fac-

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tors. SMCLs were met in 44% of the samples and 42% of the wells.



**14. By 2010, reduce the vulnerability to damage from floods within identified priority communities and areas.**

**2006 Assessment** - This 2010 Objective has not been assessed. This objective needs to be reconsidered such that a meaningful, measurable parameter for judging progress in reducing vulnerability to flooding can be identified. The objective revision would include a new listing of priority communities and areas for assessment.

**15. By 2010, maintain, enhance or restore priority wetlands and riparian areas.**

**2006 Assessment** - Pasture/grass land is the dominant riparian [land use](#) type in Kansas, accounting for over 142,000 bank miles or roughly 38.2% of all land use types. Crop land is the second leading category with over 83,000 bank miles (22.3%) followed by forest land at over 67,000 bank miles (18%). These three land use types account for 78.5% of all the riparian land use bank miles in Kansas. If pasture/tree mix and crop/tree mix are included, these land use classifications account for over 97% of the state riparian land use total. Shrub/scrub, urban, urban/tree mix, barren land, and animal production areas account for only 2.12% of the state total. In general, the western basins have greater proportions of pasture/grass and crop land while the eastern basins have greater forest and mixed tree land uses.

This assessment provides a baseline of data to assess riparian conditions in the state and by basin. It must be noted that the assessment is based on 1991 data. A comprehensive Geographic Information System database needs to be established to consolidate and track all program information so that wetland and riparian projects in the state can be consistently added to the database to provide a current picture of the status of these efforts on improving riparian and wetland resources.

A proposal to develop a comprehensive, standardized process for identifying, assessing and prioritizing wetlands and vulnerable aquatic resources in the state is under review by the Natural Resources Subcabinet. The process would follow the federal Geographic Data Committees' Wetlands Mapping Standard. This would initiate a comprehensive database on wetlands.

**16. By 2010, increase public recreational opportunities at Kansas lakes and streams.**

**2006 Assessment** - The recreation objective was assessed by identifying three measurable recreational uses of Kansas water resources which could be quantified and comparing those uses in 2001 through 2005.

Measured recreational uses:

- 1) Private ponds or streams that Kansas Department of Wildlife and Parks has leased for public fishing. (Table 2)
- 2) Public access points (boat ramps) on navigable streams. (Table 3)
- 3) State park visitation. (Table 4)

Year	Sites	# Acres	# Stream Miles	Stream Access Sites	Counties
2001	158	1,293	88	2	48
2002	158	1,086	63	2	44
2003	188	1,245	95	3	42
2004	171	1,242	85	2	39
2005	179	1,215	83	2	41

River	2001	2005
Kansas	7	12
Missouri	3	6
Arkansas	8	10
<b>Total</b>	<b>18</b>	<b>28</b>

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**Table 4  
Kansas State Parks 2001 - 2005 Visitation Summaries**

Month	2001	2002	2003	2004	2005
Jan	151,974	182,002	195,371	171,404	159,715
Feb	161,161	212,794	168,902	182,192	244,410
Mar	360,378	295,157	326,810	341,540	348,123
Apr	642,466	616,177	524,489	461,364	458,125
May	1,293,529	1,259,660	1,199,571	1,046,647	869,985
Jun	1,276,032	1,263,360	1,214,552	1,019,273	1,165,976
Jul	1,206,832	1,382,920	1,302,122	1,110,529	1,041,273
Aug	891,958	898,009	870,743	936,474	670,839
Sep	673,255	871,102	655,561	655,301	619,466
Oct	359,316	418,969	364,580	446,562	379,807
Nov	294,425	279,258	211,198	224,205	250,451
Dec	213,494	258,697	240,531	206,970	178,602
<b>Total</b>	<b>7,524,820</b>	<b>7,938,105</b>	<b>7,274,430</b>	<b>6,802,461</b>	<b>6,386,772</b>

**17. By 2010, target data collection, research projects and data sharing activities to address specific water resource issues as identified in the Kansas water planning process and to support and guide state water resource program operations.**

This Objective was not assessed.

**18. By 2010, Kansas Water Office public information activities should be directed at ensuring the public is aware of the Kansas Water Plan and knows where and how to obtain current and reliable information on the status of water resources in Kansas.**

This Objective was not assessed.

**19. By 2010, provide educational activities to ensure that Kansans increase their knowledge and understanding of the State's water resources to enable them to make better personal and public decisions on water conservation, development and management.**

This Objective was not assessed.

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## Water Management Policy & Institutional Framework January 2009

### Overview

State policy regarding water management is guided by the Water Appropriation Act<sup>(1)</sup>, which states that water in the State of Kansas is dedicated to the use of the people of the state, with the state charged to manage that resource. As such, surface and ground water can be appropriated for beneficial use of that water, without waste, if that use does not cause impairment of an existing, more senior water right and does not unreasonably affect the public interest. A water right does not constitute ownership of such water. The date of priority of a water right, and not the type of use, determines the right to divert and use water at any time when supply is not sufficient to satisfy all water rights.

Overall, Kansas water resources are mature in development. Efficient management and expanded conservation are necessary to assure an adequate supply of water for the future. The development of new water resources is very limited. Most of the High Plains aquifer, the largest source of ground water in Kansas, and many of the alluvial [aquifers](#) are fully appropriated and restricted from new appropriations, either through a closure order by the Chief Engineer or by rule and regulation. A moratorium on new ground water appropriations from the Ozark and Springfield plateau aquifers in the southeast Neosho Basin is in place until 2010, to allow time to study the amount of development that is sustainable. This study was initiated in response to measured declines in the aquifer, increasing demands particularly in Missouri and water quality deterioration.



Arkansas River near Larned, 2002.  
Photo courtesy of Don Whittemore, Kansas Geological Survey

The majority of the state's streams are also fully appropriated, at least during the irrigation season from July 1

to September 30. Only the Kansas, Missouri, Little Blue and Spring rivers are still open to new appropriations for those months. There has also been a trend of reduced runoff and lower streamflow in basins during a multi-year drought, for comparable levels of precipitation, possibly related to changes in land use (an increase in impoundments and terracing) and/or an increase in ground water use. It is foreseeable that Kansas streams will eventually become fully appropriated year round.

In 2006, part of a multi-year drought, a number of Kansas rivers, including the Republican, Smoky Hill, Saline, Solomon, upper Kansas, middle Arkansas and Little Arkansas rivers, along with a number of tributaries, had historic low flows. Three reservoirs, Perry, Milford and Kanopolis, also had historic low water levels. These low hydrologic conditions occurred despite precipitation levels for water years 2000-2006 were above most previous multi-year droughts. Analyses by the U.S. Geological Survey indicate a decline in the median annual runoff during this recent drought.<sup>(2)</sup> Runoff is the amount of precipitation that contributes to stream flow. Watersheds most impacted by the 2000-2006 drought had a steady decline in the runoff to precipitation ratio over the past six drought periods (1938, 1954, 1965, 1979, 1990, 2004). Land use changes that improve the soil retention of precipitation are likely one reason for the reduction in runoff. Further study is planned to determine what the contributing factors may be. The change in the runoff precipitation ratio seen during droughts is a significant issue to address in management.

Minimum desirable streamflows (MDS) were made a part of the Kansas Water Appropriation Act in 1984.<sup>(3)</sup> MDS values were established to help protect flow for in-stream uses relative to fish, wildlife, water quality, recreation and downstream domestic and senior water rights. MDS is set on 23 streams at 33 locations. The Chief Engineer protects streamflows by administration of water rights junior to the MDS priority date of April 12, 1984.

Reservoirs in Kansas are another important component of water management. The state owns storage in 13 of the 24 federal reservoirs in Kansas. Most of the reservoirs are built in the eastern half of Kansas in areas where higher precipitation, increased runoff and lower evaporation rates make the lakes more sustainable. The reservoirs were built to serve multiple purposes, including flood control irrigation, fish/wildlife benefits, recreation, navigation and water quality. The state owned and municipal owned storage in the reservoirs provides pub-

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lic water supply for more than two-thirds of the state's population. State owned storage water is delivered to customers through a [Water Marketing Program](#) and a [Water Assurance Program](#). The state's population growth projections indicate Kansas will be increasingly reliant on the reservoirs. Challenges to using reservoir supplies include finding a method to pay for additional storage and the operation and maintenance costs, protecting the reservoirs from losing storage from sedimentation, increasing storage at key reservoirs to regain storage lost to sedimentation, and reducing or eliminating the U.S. Army Corps of Engineer's (Corps) releases of water for navigation on the Missouri River, a practice of marginal benefit to the nation and detrimental to Kansas.



Kansas River. Photo courtesy of Dennis Schwartz

Sustainable yield management became part of the fiscal year 2004 *Kansas Water Plan*. It is the goal of sustainable yield management to set criteria for development and use of water within a defined hydrologic system that ensures long term stability. It allows for reasonable short term ground water level and stream flow variation that does not exceed the system's natural ability to recover during wet periods, and protects against degradation of the environment.

The Chief Engineer, Department of Agriculture, Division of Water Resources, (DWR), has the authority and responsibility to administer water rights in Kansas. In addition to the authorities outlined in the Kansas Water Appropriations Act, the Chief Engineer also has administrative authorities under the Intensive Groundwater Use Control Act, (IGUCA)<sup>(4)</sup>, which were authorized by the Legislature in 1978. These authorities allow for additional flexible solutions to address water shortages.

Enforcement of current law and regulations are important and necessary. When possible, the state prefers to use voluntary, incentive based programs and education to increase conservation and reduce water consumption in areas of competition. Public input, through the state water planning process which directs state programs and actions, by local water users within Groundwater Management Districts (GMDs) which develop district management plans, by water assurance districts, and other stakeholder groups are keys to improving management of Kansas water.

### **Kansas Water Plan Guidance**

The Kansas Water Resources Planning Act<sup>(5)</sup> provides statutory authority for addressing water management in the *Kansas Water Plan*. This Act established long-range goals for the management, conservation and development of the waters of the state, including:

- The sound management both public and private, of atmospheric, surface and ground water supplies of the state.
- The development of sufficient supplies of water for beneficial purposes to meet the anticipated future needs of the people of the state.
- To have efficient, economic distribution of the water supplies of the state; and
- The coordination of water resource development with the development of other resources of the state.

### **Objectives**

- By 2010, reduce water level decline rates within the Ogallala aquifer and implement enhanced water management in targeted areas.
- By 2015, achieve sustainable yield management of Kansas surface and ground water sources, outside of the Ogallala-High Plains aquifer and areas specifically exempt by regulation. Sustainable yield management would be a goal that sets water management criteria to ensure long term trends in water use will move as close as possible to stable ground water levels and maintenance of sufficient streamflows.
- By 2015, meet minimum desirable streamflow at a frequency no less than the historical achievement for the individual sites at the time of enactment.

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### Management Categories

Management of Kansas ground and surface water fits into six 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; and
- 6) Interstate water management.

#### 1) River-Reservoir Management

Reservoirs are used, in part, to provide dependable water supplies in streams with highly variable flow. There are 24 federally constructed reservoirs within Kansas. The 1958 Federal Water Supply Act allowed storage space for municipal and industrial water supply to be included in federal reservoir projects if a nonfederal entity gave assurances that “expected future demands for the use of such storage will be made within a period of time which will permit payment of the costs allocated to such purposes within the life of the project.” The law also provided for long-term, low interest federal financing. An amendment to the Kansas Constitution, ratified in 1958, allowed the state to take advantage of the provisions of this federal law. Currently, the state owns storage in 13 Corps and U.S. Department of Interior Bureau of Reclamation (Bureau) reservoirs.

In 1985, the State of Kansas and the Corps entered into a memorandum of agreement. That agreement allowed the state to purchase additional storage in certain federal reservoirs. In return, the state agreed to obtain water reservation rights for water quality storage, and protect water quality releases from diversion by water right holders. In addition to marketing water from state owned storage, the state agreed to develop the Water Assurance Program to aide in the operation of the reservoirs as systems.

Management of rivers and associated federal reservoirs is becoming increasingly complex, as more limitations and demands are placed on the river-reservoir systems. To assist with decision making, hydrologic computer modeling has been developed or is underway for several river-reservoir systems: Neosho, Marais des Cygnes, Verdigris, Smoky Hill and Kansas river systems.



Clinton Reservoir. Photo courtesy Kansas Geological Survey.

#### Right to Store Water

Water reservation rights provide the legal authority to collect and store water in federal reservoirs. The Director of the Kansas Water Office (KWO) has authority to acquire a water reservation right on behalf of the state for water supply or water quality in reservoirs where the state controls storage.<sup>(6)</sup> The water reservation right for water supply is to be an amount sufficient to insure a yield from the reservoir for beneficial use, even during a drought having a 2% chance of occurrence with the reservoir in operation.

The water stored under the authority of a water supply reservation right is within the portion of the reservoir owned or controlled by the state and is for subsequent withdrawal or release. This stored water is available for use through the Water Marketing Program, Water Assurance Program or by mutual agreement between the state and federal government.

Water stored as authorized by the water quality reservation right is within the portion of the reservoir owned by the federal government. The use of this stored water is dedicated to maintaining streamflow for instream purposes of water quality; fish, wildlife and aquatic life support; recreation and general aesthetics.

#### Operations

There are several key factors that control and impact operation of a river-reservoir system. The Corps' regulation manuals dictate procedures in response to extreme conditions and provide the framework for day-to-day op-

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eration. Some manuals allow more operational latitude than others, such as seasonal lake level fluctuations. Lake level management plans, developed annually, have significant and visible effects at the reservoir and downstream. The most crucial component of river-reservoir management, requiring federal and state coordination, is during low flow conditions. state responsibilities include assessment of the downstream flow requirements to meet instream needs and water use demands. Meeting downstream demands requires much more attention than following the minimum release schedules.

### *Regulation Manuals*

An important aspect of the Corps' reservoir regulation manuals is that they are an appendix to a master manual. A master manual contains plans for system regulation of reservoir projects within a specified basin. The portion of the system controlled by the master manual within the state may be affected operationally by conditions outside the state. One of the most troublesome examples of full system operations is the evacuation of storage from reservoirs in the Kansas River basin for navigation purposes on the Missouri River.

During flood conditions the state has little or no involvement in operations. The Corps monitors and manages flood waters in the system according to procedures in the regulation manuals.

Minimum releases specified in the lake regulation manuals also play a significant role in management. Minimum releases, during climatic conditions ranging from normal to drought, affect streamflow and storage. The minimum release schedules were originally designed to meet a downstream flow need that may be insufficient or even unnecessary today. Some reservoirs have release schedules that vary from month to month, while some are constant year round. (Table 1)

### *Seasonal Lake Level Fluctuations*

The KWO is charged in the State Water Resource Planning Act<sup>(7)</sup> with negotiating and entering into agreements with the Corps and the Bureau regarding operation or releases of water from federal projects. Seasonal changes to the elevation of the top of the

conservation pool are developed annually and are known as lake level management plans.

Development of these plans includes public and stakeholder input. They are intended to increase the benefits to recreational users and increase wildlife and aquatic habitat while protecting the flood control, water supply and water quality purposes of the lake. It is important to note that the plans are developed for moderate system conditions.

Most plans include additional flood storage for high springtime flows but flood operation procedures are followed as specified in the regulation manual. Drought conditions may also warrant deviation from the plan. Large volumes of water are stored or evacuated as the conservation pool elevation changes and these operations have a significant impact on downstream flows.

Protection of water supply storage is essential and statutory limitations are in place for this purpose. Lack of suf-

Reservoir	<sup>1</sup>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Clinton		7	7	7	21	21	21	21	21	21	7	7	7
Milford	c	25	25	25	25	25	25	25	25	25	25	25	25
Perry	c	25	25	25	25	25	25	25	25	25	25	25	25
Tuttle Creek	c	100	100	100	100	100	100	100	100	100	100	100	100
Hillsdale		3	3	8	8	24	24	24	24	24	8	3	3
Melvern	c	20	20	20	20	20	20	20	20	20	20	20	20
Pomona	c	15	15	15	15	15	15	15	15	15	15	15	15
Kanopolis		10	10	15	20	30	50	50	50	50	25	15	10
Wilson		5	5	5	15	15	15	15	15	15	5	5	5
Council Grove		4	4	4	4	5	7	8	8	6	4	4	4
John Redmond		21	21	21	24	30	39	48	48	36	24	21	21
Marion		1	1	1	2.3	6.5	9	13.1	13.1	9	6.5	2.4	1
Big Hill	c	0	0	0	0	0	0	0	0	0	0	0	0
Elk City	c	5	5	5	5	5	5	5	5	5	5	5	5
Fall River		3	3	3	3	3	3	5	5	5	3	3	3
Toronto		3	3	3	3	3	3	5	5	5	3	3	3
El Dorado		5	5	5	7	8	12	13	13	11	7	5	5
Cheney	c	0	0	0	0	0	0	0	0	0	0	0	0
Lovewell	c	0	0	0	0	0	0	0	0	0	0	0	0
Cedar Bluff	c	0	0	0	0	0	0	0	0	0	0	0	0
Kirwin	c	0	0	0	0	0	0	0	0	0	0	0	0
Waconda	c	0	0	0	0	0	0	0	0	0	0	0	0
Webster	c	0	0	0	0	0	0	0	0	0	0	0	0
Keith Sebelius	c	0	0	0	0	0	0	0	0	0	0	0	0

**Table 1: Monthly minimum releases in cfs as specified by COE manuals to meet low flow or water quality requirements.**

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efficient surplus water has resulted in modifications to the desired pool elevations at Elk City and John Redmond lakes. Surplus water is defined as waters within the conservation water supply capacity committed to the State of Kansas, but not required to meet contractual obligations under the Kansas Water Marketing or Water Assurance programs. This storage may be used for pool management, streamflow maintenance or sold under short term contracts if it is found to be surplus. It also must be in the public interest and advance purposes of the State Water Resource Planning Act.<sup>(5)</sup>

Statute limits the amount of water that can be provided as surplus water in any one calendar year to 10% of the water supply yield capability, unless the Governor has declared an emergency that affects the public health, safety, or welfare. A report is prepared by the KWO each year for the Director to use as guidance in disposing of surplus waters for that calendar year.

value, water rights applied for after that priority date may have pumping restrictions imposed. Administration for MDS has occurred on a number of rivers, particularly during drought periods.

MDS protects flow for instream uses relative to fish, wildlife, water quality, general aesthetics, and downstream domestic and senior water rights. In developing MDS, a consideration was given to instream protection (fish and water quality), water availability, and future economic development. The Water Appropriation Act established MDS values to help protect flows in order to try to maintain the conditions that would have existed in 1984 and prior. When MDS is established on any watercourse the Chief Engineer shall withhold from appropriation that amount of water needed to establish and maintain MDS.<sup>(3)</sup>

There are MDS values established at 33 sites on 23 streams, monitored at U.S. Geological Survey gaging stations (Figure 1). The

purpose of MDS is to protect flow from depleted conditions as a result of extensive water appropriation. During severely dry conditions, MDS might not be achieved. There are two methods to help alleviate low flow conditions. For streams located below reservoirs that contain state owned storage, releases can be made to supplement low flow, including flows for spring fish spawns if water is held in the flood pool. The second method is MDS administration of water rights "junior" to the April 12, 1984 priority date. When the flow has been below statutory MDS for seven consecutive days, the Chief Engineer will determine if other conditions have been met and, if necessary, initiate ad-

ministration of those junior water rights granted after April 12, 1984.<sup>(8)</sup> There have been no new minimum desirable streamflows established since 1989.

### 3) Streams Outside of Minimum Desirable Streamflow Protected Areas

Most Kansas stream reaches lie outside of minimum desirable streamflow protection. The stream itself may have flow conditions that are too unreliable to establish a minimum desirable streamflow. In all of the state's streams, Kansas has a long term goal of "preserving, maintaining or enhancing baseflow for instream water

### Minimum Desirable Streamflow (MDS) Gages

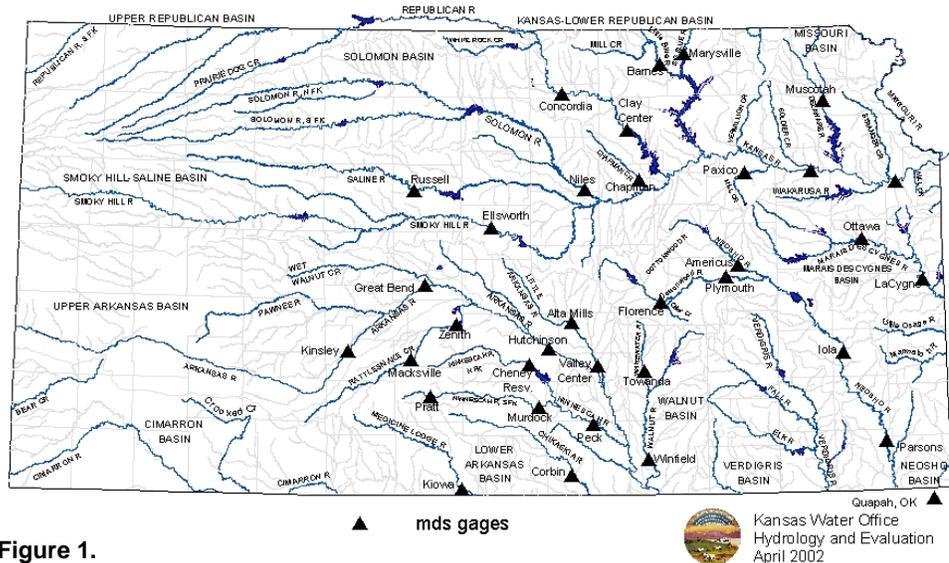


Figure 1.

Further development of triggers and forecasting capabilities to aid in the management of storage during drought is a goal of the KWO. Triggers related to drought severity will be extremely useful for protection of water quality storage and operation of the river-reservoir systems.

### 2) Stream reaches with established Minimum Desirable Streamflow (MDS)

Although not a water right, MDS is similar in that it has a priority date. That priority date is April 12, 1984, even though some actual MDS values were not established until 1989. When flows drop below an established MDS

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uses relative to water quality, fish, wildlife, aquatic life, recreation, general aesthetics, and domestic uses and for the protection of existing waters rights”.<sup>(9)</sup>

A number of Kansas streams have had a progressive reduction in median flow over the past four decades. The Cimarron, Upper Arkansas and Smoky Hill-Saline basins have had significant reductions in flow, where the dropping ground water level has resulted in reduced base-flow and land conservation measures have reduced runoff from rain and snowmelt. The streams in eastern Kansas have also had reduced flow, as streams become fully appropriated.

The Verdigris and Neosho basins have been studied for options to protect and enhance instream flow. In 2006, the DWR released the report *Instream Flow Assessment of the Neosho and Verdigris River Basins*. The study attempted to develop and apply a means of evaluating surface water availability in the basins, and to consider management options available to the State of Kansas that could protect and enhance instream flow. Water right appropriations are based on diversion of a specific quantity of water. State law does not support an instream water right. The report contains recommendations for necessary legislation if this concept were to be adopted.

#### 4) The Ogallala-High Plains Aquifer

**Vision:** Sufficient water resources in western Kansas to support healthy, economically strong communities and rural lifestyles, today and for future generations.

**Goal:** Conserve and extend the life of the Ogallala – High Plains aquifer.

The High Plains aquifer underlies western and south-central Kansas. It is composed of several hydraulically connected aquifers, the largest of which is the Ogallala. The Ogallala occurs in the western third of Kansas (Figure 2), an area that is semi-arid with limited surface water. The eastern extension of the High Plains aquifer is composed of younger sediments known as the Great Bend Prairie aquifer and the Equus Beds aquifer. Lying above the Ogallala Formation are Pleistocene and younger stream valley deposits that bear water; where these are connected to the underlying aquifer, they are considered part of the High Plains aquifer.

The Ogallala–High Plains aquifer is characterized by its overall low recharge rate. The aquifer is variable in the amount of water in storage as reflected in saturated thicknesses that vary from over 300 feet to less than 50 feet. The rate water moves through the aquifer, the depth to water and other variables also make the aquifer a complex system to manage in western Kansas.

In most locations, the Ogallala–High Plains aquifer is in decline with annual withdrawals far exceeding the average, annual recharge. Some areas of the aquifer are

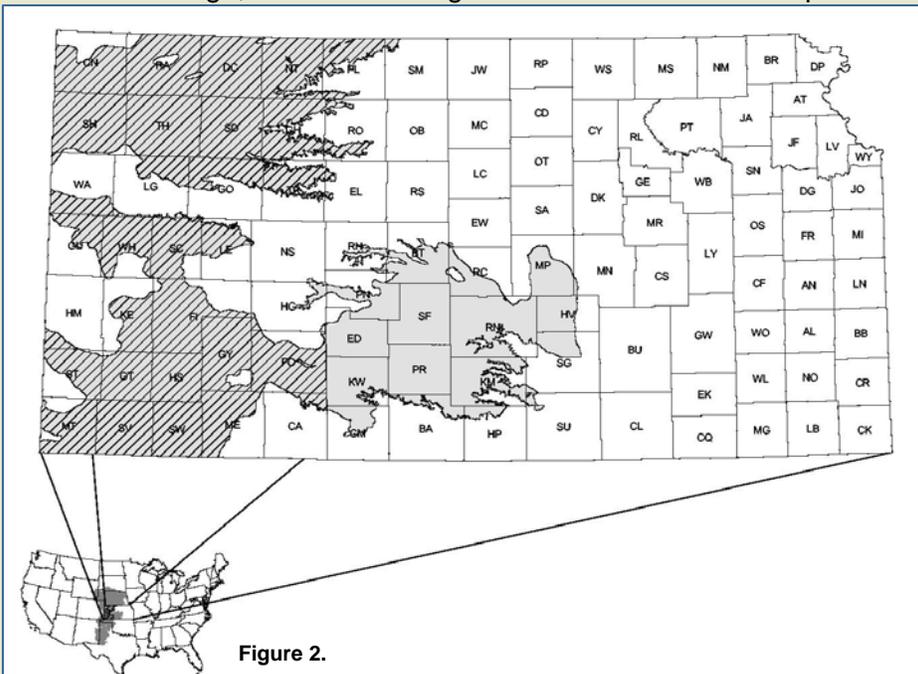


Figure 2.

now, or are projected to be within 25 years, too depleted to support widespread, high volume pumping. The lowering of the water table has resulted in reduced or total loss of baseflow to many reaches of the Arkansas, Solomon, Smoky Hill, Pawnee, and Walnut rivers.<sup>(10)</sup>

The Ogallala-High Plains aquifer is the dominant, often sole, source of water in western Kansas. It supplies over 90 percent of the water needs for cities, industries, domestic users, and irrigators in western Kansas. The Ogallala-High Plains aquifer is a key resource in the economy of western Kansas. Roughly 94 percent of the Ogallala - High Plains aquifer is used for irrigation, which in turns supports the livestock, meat packing, ethanol and other agriculture-related industries in Kansas.

The majority of the Ogallala-High Plains aquifer is under the management of Groundwater Management Districts (GMD):<sup>(11)</sup> Western Kansas GMD1, Southwest Kansas GMD3, and Northwest Kansas GMD4. The aquifer has

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been under intense management by the GMDs for over three decades. Each GMD is a political subdivision of the state, and share authority for managing the ground water with the DWR. The GMDs formed in the early 1970's to comprehensively manage the water resources, which had already been heavily developed.

There have been a number of programs and activities implemented to help conserve the ground water resources. The High Plains aquifer has had a reduction in the rate of decline over the past thirty years due to efforts made at the individual, GMD, state and federal levels. Several of these efforts are shown in Figure 3 and described in the programs segment at the end of the Management Section. Even with the improvements on slowing the decline rate, the aquifer is still declining.

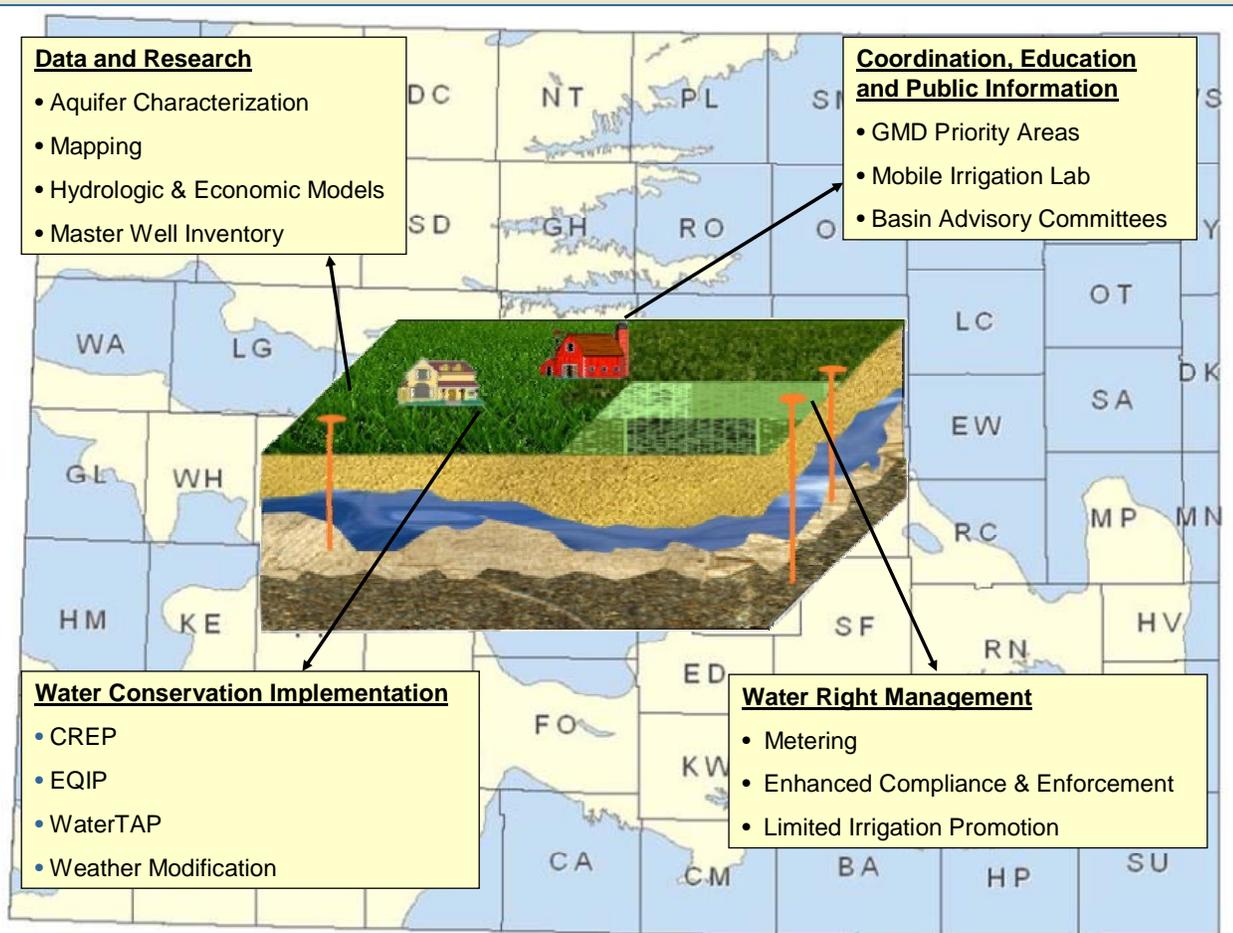


Figure 3.

In 2001, the recommendations for the Long Term Management of the Ogallala Aquifer in Kansas made by the Ogallala Aquifer Management Advisory Committee<sup>(12)</sup> were approved into the *Kansas Water Plan*. These are listed in the Active Policy Recommendation box.

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### Active Policy Recommendations

1. **Delineate the Ogallala aquifer into aquifer subunits to allow management decisions in areas of similar aquifer characteristics.** Each Groundwater Management District and the Division of Water Resources for areas of the Ogallala outside of Groundwater Management Districts, should delineate these subunits. The Kansas Geological Survey, Division of Water Resources, Kansas State University and Kansas Water Office should cooperate and assist through the water planning process.
2. **The Groundwater Management Districts and the Division of Water Resources should identify each aquifer subunit in decline or suspected decline and establish a water use goal to extend and conserve the life of the Ogallala aquifer.** Setting water use goals in aquifer subunits helps define the enormous challenge of managing this large, extremely valuable resource today and into the future. In areas where ample supplies remain, either no reductions will be necessary or modest reductions may be recommended. In a subunit with a rapid decline and a short estimated usable life-time, a more aggressive goal should be set. Assistance programs would be targeted to those areas to help reach the water use goals. Variables to consider in setting the water use goals include the estimated volume of water available, recharge, amount of annual water use, estimated life of the aquifer, public input and others to be determined by the Groundwater Management Districts and Division of Water Resources.
3. **Identify aquifer subunit priorities to extend the life of the aquifer and sustain the vitality of western Kansas.** Base priority on rate of decline, the estimated time before an area must transition to less water use due to declines and the potential socio-economic impact of the decline and other factors. High priority aquifer subunits should be candidates for acquiring additional information necessary to implement plans, assistance programs and/or other actions deemed necessary by the Groundwater Management Districts and Division of Water Resources. If incentive and voluntary plans are unsuccessful, then strict administration of existing water law should be applied.

4. **Support and expand programs and activities to extend and conserve the life of the Ogallala aquifer.** Provide a menu of options to extend and conserve the life of the aquifer that are consistent with the prior appropriation doctrine, including the guiding principles that are listed in the full report (see Appendices A and C<sup>(12)</sup>). In subunits where irrigation is no longer economically feasible, Groundwater Management Districts and Division of Water Resources should identify and implement management strategies to sustain the life of the aquifer in that subunit.
5. **Support and expand research and education on the Ogallala to extend and conserve the life of the aquifer.** Enhance understanding of the effectiveness of various options and promote voluntary actions for less water use. Develop tools needed to better manage the Ogallala, especially for areas that must transition to less water use. Identify innovative management strategies to be tested in pilot studies that are consistent with the guiding principles (Section III<sup>(12)</sup>).

### **5) Ground Water Outside of the Ogallala-High Plains Aquifer**

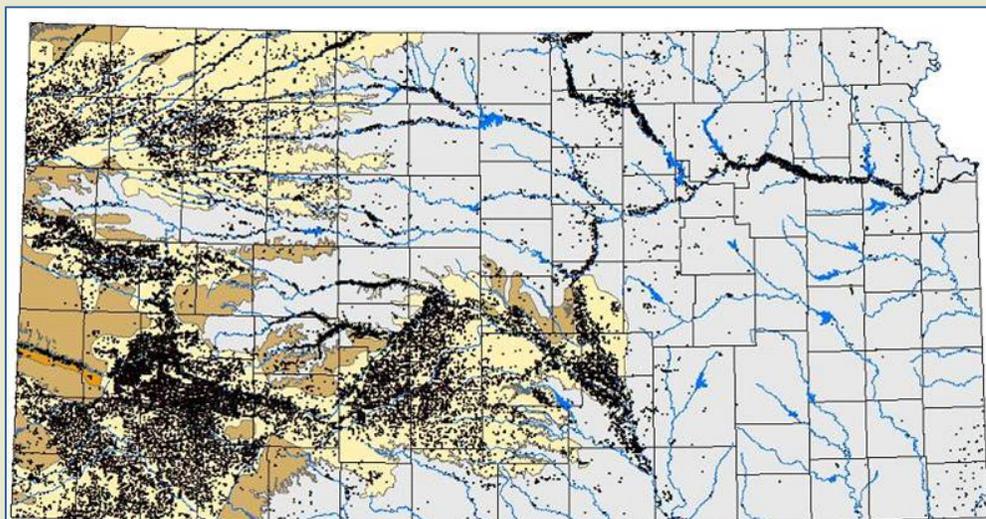
The management focus on ground water outside of the Ogallala-High Plains aquifer is to achieve sustainable yield management by 2015. These aquifers are in geologically younger sediments, and generally are closer to the surface and have higher rates of recharge than the Ogallala. Ground water is extensively developed in the Equus Beds and Great Bend Prairie units of the High Plains aquifer (Figure 4). The alluvial aquifers are a major source of water across Kansas. In addition, the Dakota aquifer is spread across roughly the western half of Kansas, although not all of the Dakota is freshwater. Other, more limited aquifers spread across the state .

Equus Beds GMD2 and the Big Bend GMD5 cover the majority of the High Plains aquifer outside of the Ogallala. GMD5 is closed by regulation<sup>(13)</sup> of the Chief Engineer to new appropriation except for applications for small uses of less than 15 acre feet. GMD2 reviews and makes recommendations on applications for new appropriation based on a safe yield regulation.<sup>(14)</sup> This regulation compares the annual recharge of a local area to the amount of water that has been appropriated.

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The majority of ground water outside of the High Plains aquifer is alluvial ground water. Kansas manages surface and alluvial ground water on a conjunctive use basis. A portion of the natural recharge that reaches the alluvial aquifer contributes to streamflow through baseflow. Some stream baseflow is protected through regulation and a percentage of the recharge is not available for appropriation. There is concern that many surface and alluvial ground water systems have been over appropriated.



**Figure 4. Points of diversion for freshwater wells in Kansas. The High Plains aquifer is highlighted.**

In many areas, sustainable yield management is already attained. When a senior water right is impaired, the owner can ask the Chief Engineer to provide relief by curtailing junior water right withdrawals. Another option to meet water needs is special management plans based on voluntary strategies to reduce water use in a subbasin. The Rattlesnake Creek subbasin is implementing a special management plan. Designation of an Intensive Groundwater Use Control Area (IGUCA)<sup>(4)</sup> is another option that allows for flexible solutions, but when adopted has the force and function of law. An example is the Wet Walnut IGUCA which includes reduced water appropriations by all the water right holders that are junior to the impaired Cheyenne Bottoms water right, where those reductions help relieve the impairment. The solution utilized in the Wet Walnut IGUCA does not cut any water right holder off completely, although the amount of reduction is weighted based on seniority.

The remaining aquifers outside the High Plains are bedrock or deep confined or semi-confined aquifers. The Dakota aquifer is one important resource underlying southwest to north central Kansas. Another aquifer of

note is the Ozark aquifer in southeast Kansas. This aquifer has experienced declines in water level in recent years due to intense development in southwest Missouri. The KWO has begun discussion with neighboring states on this aquifer and will be evaluating management options.

### 6) Interstate Water Management

Interstate water management applies to all surface and ground water that flows across the state border. Water compacts provide a legal arrangement between states to equitably divide and apportion the water supply of a river or river basin. Kansas is a member of the Republican River Compact the Blue River Compact, and two Arkansas River Compacts, one with Colorado and one with Oklahoma (Figure 5). Kansas also is a member of the Missouri River Association of States and Tribes.

Kansas has undertaken litigation in recent years on both the Arkansas River Compact with Colorado and the Republican River Compact with Nebraska. The purpose of these lawsuits was to force adherence to the compact provisions and provide adequate and sustainable water supplies to Kansas. The U.S. Supreme Court ruled in favor of the State of Kansas on the Arkansas River litigation and the Republican River lawsuit was settled out of court. These two actions should ensure that Kansas receives its entitlement under the compacts.

Kansas-Nebraska Big Blue River Compact: The Kansas-Nebraska Big Blue River Compact was ratified in 1971 between Kansas and Nebraska. The compact is to equitably apportion the waters of the Big Blue River basin between the two states, and to encourage an active pollution abatement program in each of the two states. About 75% of the Big Blue River basin is in Nebraska, the rest in Kansas. The Big Blue River is a tributary to the Kansas River. Kansas representatives to the Kansas-Nebraska Big Blue River Compact administration are David Barfield, Chief Engineer, DWR, and Sharon Schwartz, State Representative.<sup>(15)</sup>

Kansas-Colorado Arkansas River Compact: The Kansas-Colorado Arkansas River Compact was negotiated in 1948 between the states of Kansas and Colorado with

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participation by the federal government (Figure 6). Its stated purposes are to settle existing disputes and remove causes of future controversy between the states concerning the waters of the Arkansas River and to equitably divide and apportion between the states of Colorado and Kansas the waters of the Arkansas River as well as the benefits arising from John Martin Reservoir. Chief Engineer David Barfield, DWR serves as one of three Compact Commissioners along with two representatives from western Kansas, David Brenn, GMD1 and Randy Hayzlett, Southside Ditch.

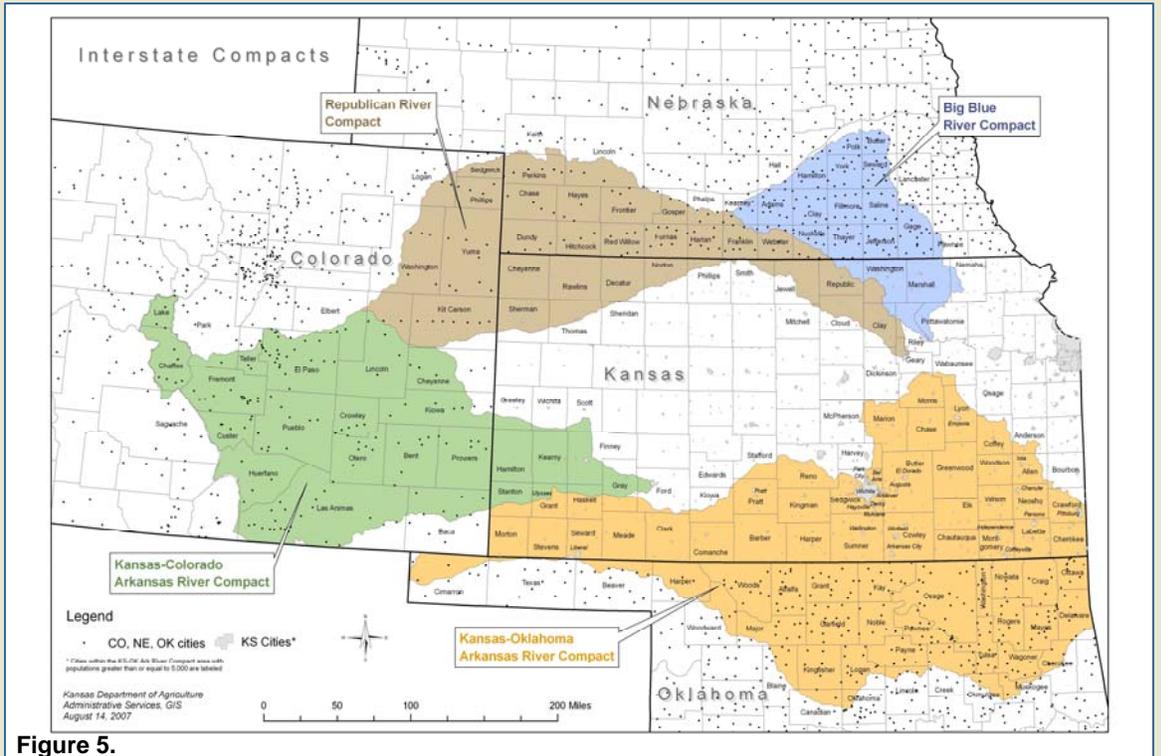


Figure 5.

Kansas filed *Kansas v. Colorado*, No. 105, Original, in 1985 to enforce the terms of the Kansas-Colorado Arkansas River Compact. On May 15, 1995, the United States Supreme Court determined that Colorado had violated the Kansas-Colorado Arkansas River Compact by post-compact well pumping in Colorado. As the result of the damages and remedies phase, Colorado paid Kansas \$34.6 million in damages for Colorado's compact violations during the period 1950 through 1999. In 2006, Colorado paid Kansas an additional \$1.1 million in costs as part of the damages award. This money has been deposited in three funds created by statute.<sup>(16)</sup> that specify how and where the money may be spent.

In 2005, \$9,684,425 was placed in the Water Conservation Projects Fund, one of the three funds into which the damage award was divided. In 2006, an additional \$739,964 was deposited into that fund. The Water Conservation Projects Fund is to be used for efficiency and conservation projects in the area impacted by past compact violations. The fund was administered by the KWO, with the projects approved by the Director, KWO, in consultation with the Chief Engineer, DWR. The Arkansas River Litigation Funds Committee composed of Irrigation Ditch representatives and other stakeholders have provided advice. Feasibility studies have been completed on various projects using the Arkansas River Litigation Funds. In FY2009, the Water Conservation Projects

Fund was transferred to GMD3, and placed into a Western Water Conservation Projects Fund. It is to be administered by the GMD and the Arkansas River Litigation Advisory Committee. The KWO Director still provides approval of projects for the same purposes of improving water use efficiency and conservation.

In January 2008, Special Master Littleworth submitted his Fifth and Final Report to the United States Supreme Court, including the Judgment and Decree. Kansas filed an exception related to limitation on awarding costs imposed by the Special Master. Colorado has filed a response. In 2008, the Special Master's Fifth and Final Report and the Kansas Exception went before the Court.

The Judgment and Decree was jointly developed by Kansas and Colorado based on decisions by the Special Master and the United States Supreme Court. The Hydrologic-Institutional Model and accounting procedures are included which will be used to determine if Colorado is in compliance. Each year, the accounting for the prior 10-year period will be reviewed. The Special Master found that Colorado was in compliance for its first 10-year compliance period (1997-2006). Based on the data available as of May, 2007, it appears that Colorado will be in compliance for the second full 10-year compliance period (1998-2007), although there are differences which will be reviewed by both states to see if agreement can be reached.

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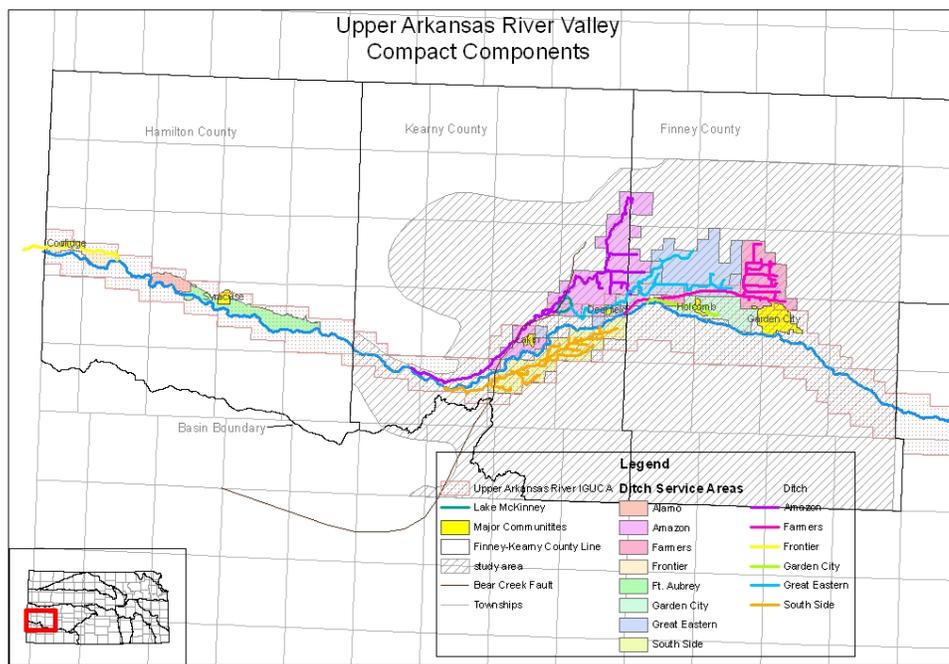


Figure 6.

politan area and other communities of northeast Kansas along the river, including water for cooling at power generation facilities. The reservoir system also provides flood control and navigation benefits to Kansas.

Controversy over the operation of this reservoir system began during the 1980s drought. Upper basin states wanted significantly more drought conservation during such drought periods to reduce reservoir drawdowns and its negative impacts on reservoir recreation. In 1989, after being sued by the upper basin states, the Corps initiated a review of its Master Water Control Manual (Master Manual) governing the operation of these dams. During the course of the Master Manual review, environmental issues, and especially endangered species issues, have become very significant.

**Kansas–Oklahoma Arkansas River Compact** - Kansas and Oklahoma entered into a compact in 1966 to promote interstate comity and divide and apportion equitably the waters of the Arkansas River basin between the states of Kansas and Oklahoma. The compact is also to maintain an active pollution abatement program in each of the two states. The compact details the storage provisions of the Arkansas River water in Kansas and Oklahoma. The Kansas-Oklahoma Arkansas River Compact Commission was created to administrate the terms of the compact.

**Missouri River** - The Corps operates a system of six reservoirs on the Missouri River. The original development plan called for a series of reservoirs to be built in order to lessen the effects of flooding in the lower basin and provide flows for navigation below Sioux City, Iowa. Upper basin benefits included irrigation and power generation. Though irrigation never developed as planned, economically important sport fisheries in the reservoirs and below the dams have developed. The upper three reservoirs, Fort Peck in Montana, Garrison in North Dakota, and Oahe in South Dakota are the Corps' three largest reservoirs, with combined conservation storage more than 50 times that of Tuttle Creek, Milford and Perry lakes. The other dams are Big Bend, Fort Randall, and Gavins Point, all in South Dakota. The Missouri River is a significant source of water supply to the Kansas City metro-

In 2004, the Corps published its Final Environmental Impact Statement (FEIS) on the Missouri River Master Manual Review. The FEIS selected alternative included increased drought conservation to better balance the needs of the upper and lower basin states. The Corps stated that endangered species needs are to be addressed through a process it calls a Missouri River Recovery Implementation Committee (MRRIC) and the use of an adaptive management process.

In 2006, the states replaced the Missouri River Basin Association with the Missouri River Association of States and Tribes (MoRAST).<sup>(17)</sup> MoRAst formed by joint resolution of the Governors of Wyoming, Montana, North Dakota, South Dakota, Nebraska, Iowa and Kansas and the Mni Sose Intertribal Water Rights Coalition. It serves as a forum to foster communication among the member states, tribes and various other governmental units, and to facilitate the management of the natural resources of the Missouri River Basin, including water resources, fish and wildlife while considering the impacts to the economic, historical, cultural and social resources. One of the principle goals of MoRAST is to bring together the representatives of the Governors and to provide for direct participation by the American Indian Tribes in the Missouri River Basin. The Kansas representatives are Mike Hayden, Secretary of Kansas Department of Wildlife and Parks and Tracy Streeter, Director, KWO.



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The Kansas Chief Engineer has called for action by Nebraska to meet its obligations, including immediate well shutdowns within 2.5 miles of the river and its tributaries, and on wells developed after the year 2000.

directed into two funds, one for funds from Nebraska (Republican River Nebraska or RRNE) and one for funds from Colorado (Republican River Colorado or RRCO). These funds will be administered by the KWO Director. A third of each RRNE and RRCO is credited to the *Kansas Water Plan* for water conservation, with conservation projects that enhance the ability of State of Kansas compact compliance as a priority for the RRNE funds. Two-thirds of the RRNE are to be used in the lower Republican counties, and two-thirds of the RRCO are to be used in the upper Republican counties for water conservation, use efficiency, delivery, administrative requirements and similar types of projects.

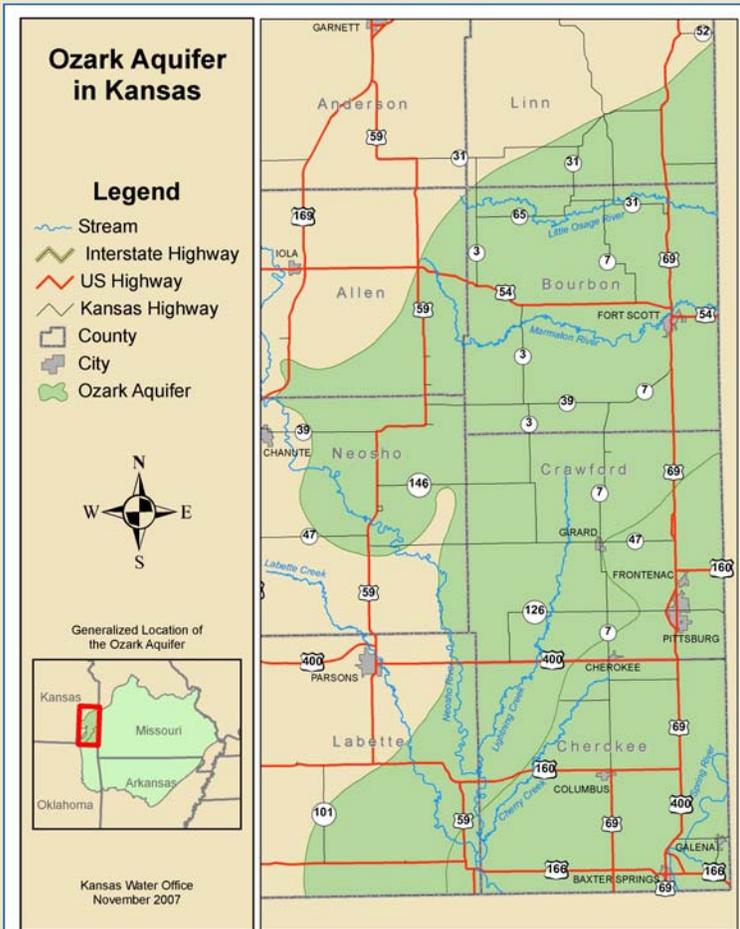


Figure 8.

Colorado's use was also measured to find if it had met its first five year test of normal year compliance ending with 2007. Colorado was also found to have overused and is proposing piping water to the stateline to offset compliance deficits. Where that water would be delivered was under discussion in 2008. Kansas would like to see it delivered to Kansas rather than Nebraska, since Colorado is overusing its South Fork Republican River allocation. Under the settlement terms, all three states must agree to the compliance proposal.

Kansas passed a law in 2008<sup>(18)</sup> to define where damage award funds from the Kansas-Nebraska-Colorado Republican River Compact disputes are to be deposited, and how they may be used. All funds from both Nebraska and Colorado would be deposited into the Interstate Water Litigation Fund<sup>(16)</sup>, until a balance of \$20 million is reached. Once the cap is reached, the funds are

**Ground Water Resources:** Kansas has no interstate compacts on ground water, however, there are two aquifers of significant interstate concern: the High Plains aquifer and the Ozark Plateau aquifer system.

Management of the High Plains aquifer is a multi-state concern along Kansas borders with Colorado and Oklahoma. The High Plains aquifer extends under eight states: South Dakota, Nebraska, Wyoming, Kansas, Colorado, Oklahoma, Texas and New Mexico. Information sharing on the aquifer between states had occurred in the High Plains sub-committee of the Western States Water Council, represented by state water agency personnel. Currently, collaborative interstate research between Kansas State University, Texas A&M University and Texas Tech is under the federally funded Ogallala Aquifer Initiative. This effort involves state water management agencies and key stakeholders.

There are concerns on the declining water levels in the Ozark Plateau aquifer system in southeast Kansas (Figure 8). Ground water in the Ozark Plateau aquifer system originates in Missouri and flows into the southeastern corner of Kansas and into Oklahoma. In 2005, the Tri-State Water Resource Coalition was formed by municipalities and rural water districts representatives to determine the region's water needs, better understand available water resources and provide a long term supply of good quality, affordable water. Tri-State Water Resource Coalition members from Kansas include: Baxter Springs, Cherokee Rural Water District No. 3, the City of Pittsburg, the Kansas Rural Water Association and a DWR employee.

### Water Management Authorities and Programs

#### Kansas Groundwater Management District Act

The Groundwater Management District Act<sup>(19)</sup> establishes the right of local water users to determine their own destiny with respect to the use of ground water, insofar as it does not conflict with the basic laws of the State of Kansas. The GMDs were created, in large part, to address the need to conserve the ground water resources and prevent economic distress.

There are five GMDs (Figure 9): Western Kansas GMD1, Equus Beds GMD2, Southwest Kansas GMD3, Northwest Kansas GMD4 and Big Bend GMD5.<sup>(11)</sup> Each GMD is managed by an elected board of directors. A land owner of at least 40 contiguous acres within a GMD (but not within a municipality) that withdraws or uses one acre foot or more of ground water is an eligible voter. Corporations and individuals that withdraw one acre foot or more ground water within the district are also voting members. All members pay an annual assessment to the GMD based on number of acres owned and water used. The land assessment is 5 cents/acre in each GMD. The water use assessment varies from a low of 10 cents/acre foot in GMD3 to a high of 82 cents/acre foot in GMD2 (as of August, 2008).

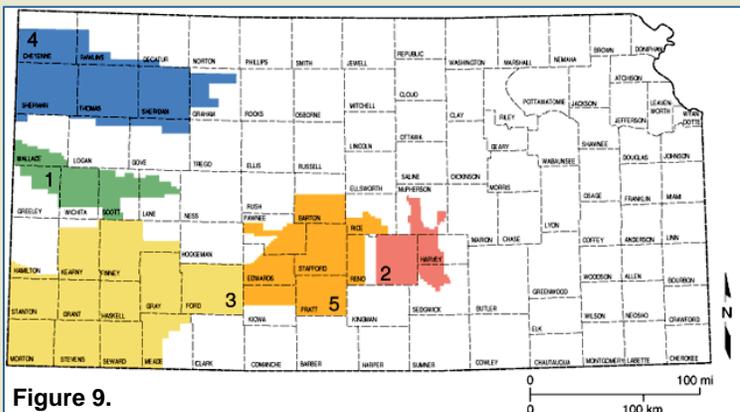


Figure 9.

#### Intensive Groundwater Use Control Areas (IGUCA)

In 1978, the Kansas Legislature authorized provisions for initiation and designation of IGUCAs. The Kansas Groundwater Management District Act<sup>(4, 20, 21)</sup> allows the Chief Engineer to implement additional corrective controls in areas where it is determined, through a public hearing process, that ground water levels are declining excessively, the rate of ground water withdrawal ex-

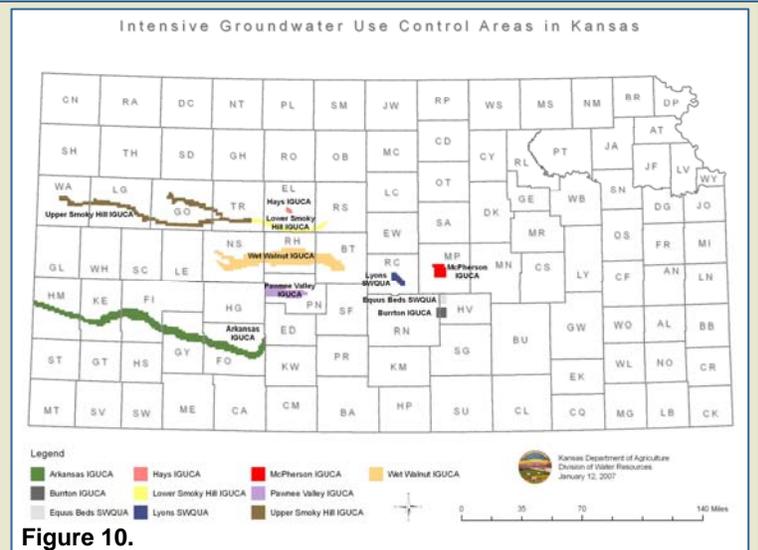


Figure 10.

ceeds the rate of recharge, unreasonable deterioration of ground water quality has occurred or may occur, or other conditions exist warranting additional regulation to protect public interest.

Eight such areas have been designated (Figure 10): McPherson, Pawnee Valley, Burrton, Lower Smoky Hill River, Upper Smoky Hill River, Arkansas River Valley, Hays, and Walnut Creek.

There are ongoing discussions between the Chief Engineer and the GMDs on possible changes to the process of implementation and periodic reviews of IGUCAs.

#### Water Use Reports

Water use in Kansas is regulated by the DWR. Since 1988, the DWR has required an annual water use report from all non-domestic active water right owners, as a condition of the Water Appropriation Act. The agency also requests water use reports from municipal and industrial users purchasing water from state owned storage in federal reservoirs, through the Water Marketing Program and from water suppliers purchasing water wholesale from entities that have water rights or marketing contracts. The water use report is to have complete and accurate information as requested by the Chief Engineer. There are civil penalties for failure to file a water use report or for filing a report with false information.

#### Water Marketing Program

The Water Marketing Program, operated under the State Water Plan Storage Act,<sup>(22)</sup> provides long term contracts (10-40 years) for raw water from state owned storage in

# Kansas Water Plan

## Water Management Policy & Institutional Framework January 2009

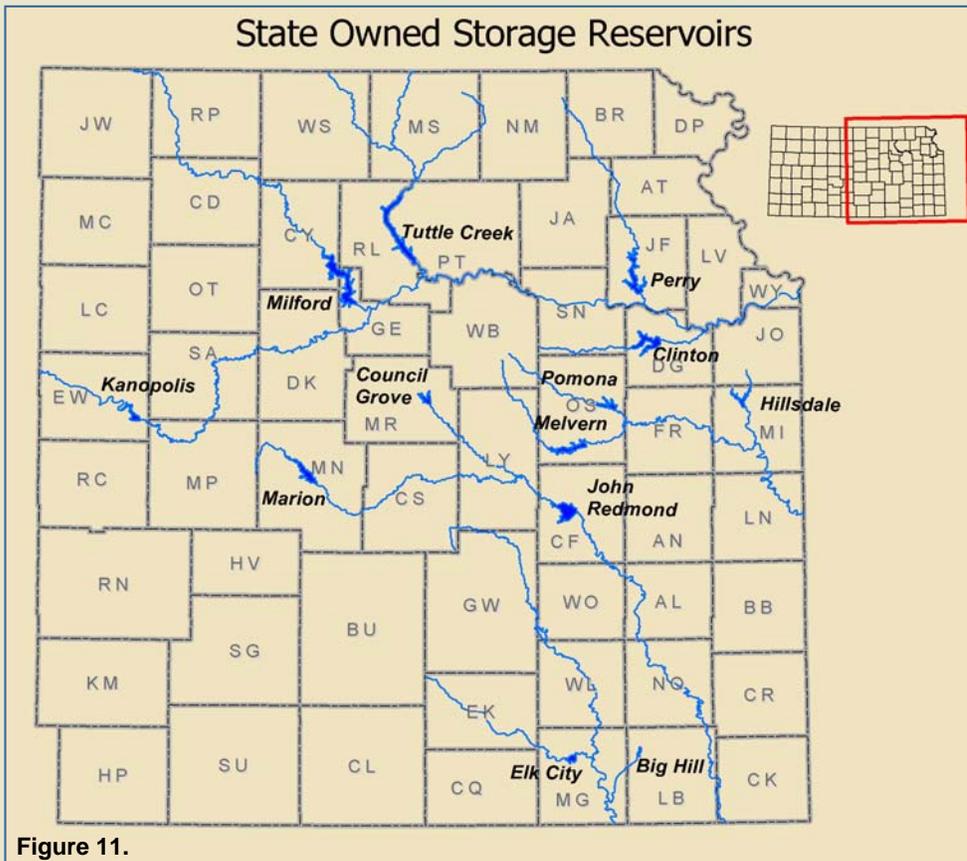
federal reservoirs for municipal or industrial use. The state currently has storage in 10 reservoirs committed to the Water Marketing Program. The Water Marketing Program has a limited, short term option of selling water not under long term contract in one year surplus contracts. Past surplus contracts have been available for irrigation purposes due to special Congressional authorization.

The 1974 Legislature enacted the State Water Plan Storage Act, which authorizes the KWO to contract with water purchasers for sale of water from any reservoir included in the Kansas Water Marketing Program. Water sold from these reservoirs must be used for municipal or industrial purposes.

between the reservoir and point of delivery (customer), continuous monitoring and possible issuance of legal orders by the DWR.

### Water Assurance Districts

Access to water in state owned reservoir storage is also available through the Water Assurance Program (Figure 11). The purpose of the Water Assurance Program is to allow for coordinated operation of state owned or controlled water storage space in federal reservoirs to satisfy downstream municipal and industrial water rights during drought conditions. It is a program to provide enhanced flows from a specific reservoir, which may only be needed during low flow periods.



Through this program, municipal and industrial water right holders in the state's major river basins can purchase storage in Corps reservoirs from the state. Among the powers granted to a water assurance district is authority to levy an annual charge against water assurance district members to cover costs to the state in acquiring, operating and maintaining water supply storage needed to satisfy the water assurance district's needs. A contract, specifying arrangements for payment of these costs to the state, must be negotiated between the KWO and the water assurance district. A key element of the contract and the negotiation process is an operations agreement between the KWO; Chief Engineer, DWR; Corps and the water assurance district which describes the manner in which the reservoirs will be operated to increase their efficiency and enhance the benefits to members of the water assurance district. Eight reservoirs contain storage owned by water assurance districts. All

Much of the water sold from water marketing lakes is directly pumped from the lake and requires minimal operational consideration. Water released for downstream customers requires coordination between the Corps, KWO and the DWR.

usage of water in the water assurance district owned portion of storage is from releases made to meet downstream water assurance district members' needs. The releases are protected against diversion by other users.

The use of a natural water course as a conduit to deliver water to a customer requires estimates of transit loss (evaporation and seepage), determination of natural flow gains, notification of water users (water right holders)

Currently, there are three assurance districts: the Neosho and Cottonwood River Basins Water Assurance District, the Marais des Cygnes River Water Assurance District and the Kansas River Water Assurance District.

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### Irrigation Districts

Irrigation districts are another form of water management in Kansas. Most of the surface water used for irrigation is within irrigation districts. Water right holders can form an irrigation district with a petition of the Board of County Commissioners by three-fourths of the land owners that would constitute the irrigation district.<sup>(23)</sup> They also must petition the Chief Engineer, DWR, for the organization, establishment and authority to incorporate an irrigation district. Irrigation districts can cooperate with the Bureau on construction, maintenance or extension of irrigation works.<sup>(24)</sup>

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# Kansas Water Plan

## Water Conservation Policy and Institutional Framework January 2009

This *Kansas Water Plan* Section describes the current policy and institutional framework through which water conservation is addressed in Kansas and provides an overview of progress towards meeting established goals and objectives.

Basin sections of the *Kansas Water Plan* provide additional detail regarding priority basin issues, including water conservation management and public water supply.

### Overview

Due to past water management and development activities, most Kansas cities, towns, and industries generally enjoy an adequate supply of water. In the future, however, the demands for water imposed by a growing population may exceed presently developed water supplies available for municipal and industrial purposes in some areas. Implementing effective water conservation is a critical component of satisfying future water needs of Kansas. Irrigation is the largest user of water in Kansas, accounting for 79 percent (%) of total use (Figure 1).<sup>(1)</sup> Most of that water is from ground water sources. Ground water supplied 96% of reported water used for irrigation in 2006.

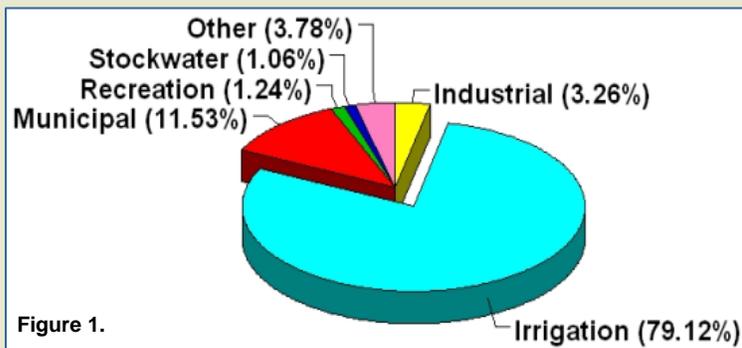


Figure 1.

Water conservation is essential for the effective management of water resources in Kansas to assure that a sufficient, long-term, supply of water is available for the beneficial uses of the people of the state. Water conservation is defined as careful preservation and protection of water, with attention to the planned management and prevention of exploitation. Reduction of water use or water loss is part of water conservation. Kansas water resource development is moving toward more efficient management and conservation to assure adequate water in the future.

The Kansas Water Authority/Kansas Water Office is responsible for water conservation in state water planning. The State Water Resources Planning Act provides for the formulation of the *Kansas Water Plan* and direction

for water conservation for the state as a whole. The Act also provides for the formation of programs and projects in the interest of effective water resource management, conservation and development; conservation storage in reservoir development; and the regulation of streamflow for the purpose of quality control.

Under the Water Appropriation Act water belongs to the people of Kansas. Not wasting water, in other words using water wisely, is part of the agreement to use water under the Water Appropriation Act. Historically, water conservation efforts in Kansas have encouraged water use efficiency.

Studies have shown that efficiency improvements through technology advancements and water scheduling tools for irrigation improve the benefit from water used, but do not necessarily reduce water consumed.

Changes in regional populations, declining aquifers and streamflows, and a greater awareness of environmental water requirements have increased the pressure on Kansas to not only use the water that is available more efficiently, but to actually conserve water.

It is important to recognize that some conservation practices such as converting from flood irrigation systems to sprinklers may change the dynamics of the hydrologic system, including reduction in the amount of ground water recharge. As irrigation scheduling improves crop production efficiency, less water is available for recharge further reducing ground water levels. As municipalities reuse their wastewater, it is not discharged to streams but may instead recharge ground water or recharge a different location.

Water conservation provides one component through which demand management can be accomplished. Water conservation is the most cost-effective and environmentally sound way to reduce our demand for water. This stretches our supplies farther. For example, the entire U.S. uses less water than it did 25 years ago, even though there are more people. Using less water also puts less pressure on our sewage treatment facilities, and uses less energy for water heating. Saving water also saves energy used for pumping and treating water. Electricity production from fossil fuels and nuclear energy is responsible for 39% of all freshwater withdrawals in the nation.

Kansas has approached water conservation through a combination of education, planning, technical assis-

# Kansas Water Plan

## Water Conservation Policy and Institutional Framework January 2009

tance, financial assistance and regulation. The emphasis is on a combination of education and incentive-based programs. Municipalities, rural water districts, and irrigators learn about the cost-savings that can be realized through water conservation and cost-share available to help them adopt water conservation measures. Voluntary incentive programs directed at irrigation include programs that retire water rights, and movement to non irrigated land use. Incentive programs provide cost-share for many practices related to transitioning to dryland and other water conservation activities. Cost-shared practices, such as terraces, keep water on the land effectively retaining soil moisture for crop use. Buffer strips and no or low till farming also contribute to maximizing the retention of precipitation on the land.

can meet new demands less expensively than developing new supplies or infrastructure.

- **Expanding supplies.** If increased demands can be met from existing supplies of water, then the effect is the same as developing new supplies. Increased economic growth and diversity will not be limited if needs can be met with existing supplies used more efficiently.
- **Environmental protection.** Water conservation can help protect natural systems from both the negative effects of over-withdrawals and the disturbances associated with the development of reservoirs, pipelines, and well fields. Conservation can also improve water quality by reducing wastewater discharges and, in the case of irrigation, by reducing the potential for fertilizer and chemical leaching and runoff.
- **Saving Energy.** Although not a direct water related benefit, energy and water are tied. Less water use reduces the energy costs to withdraw water, deliver water and treat water and wastewater.

Since water conservation is a management tool, it is directly related to two other policy sections of the *Kansas Water Plan*, Public Water Supply and Water Management. Basin priority issues also include related sections including long-term supply, subbasin water balance/streamflow, ground water declines and the role of water reuse in conservation.

Aquifer subunits are defined in the Ogallala-High Plains aquifer to address concerns in each groundwater management district in western Kansas as well as in the associated fringe areas of the Ogallala-High Plains aquifer. Figure 2 shows subunits targeted for management and conservation efforts in western Kansas. The targeted areas have changed, and are expected to change as subunit priorities and goals evolve over time.

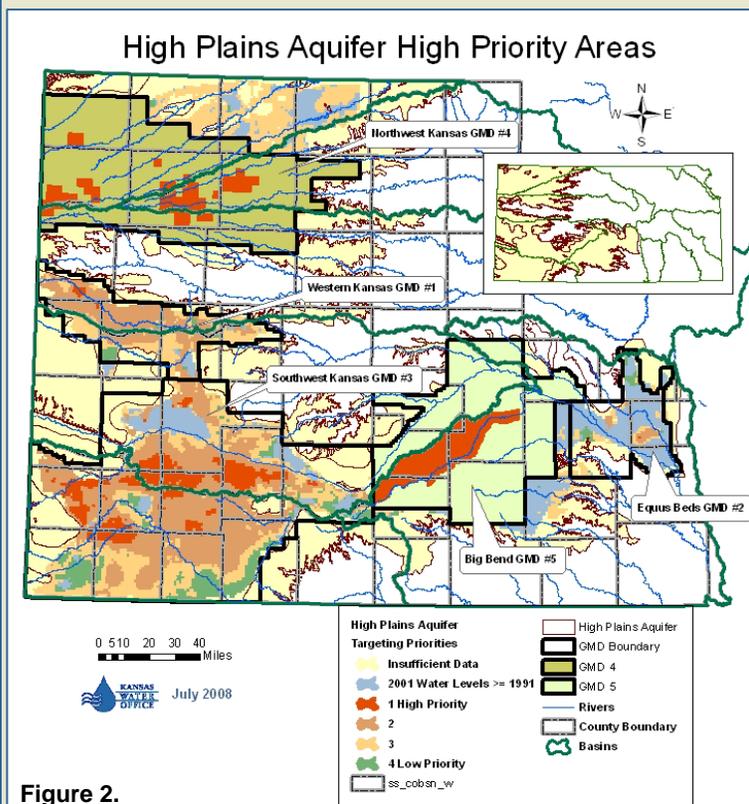


Figure 2.

Conservation efforts work toward a reduction in water use, so efforts are potentially most effective where use is the highest. Critical areas to conserve are where the estimated usable life of the ground water source is short and ground water use is high, or where demand or anticipated demand will exceed the supply.

Put most simply, water conservation is preventing wasteful use of water. Done the right way, water conservation has great potential to deliver multiple benefits:

- **Saving dollars.** Many water conservation measures

### Kansas Water Plan Guidance

The Kansas Water Resources Planning Act provides the statutory authorization for addressing water quantity management in the *Kansas Water Plan*. This Act established long-range goals for the management, conservation and development of the waters of the state, including:

- The prevention of the waste of the water supplies of the state, and
- The protection and conservation of the water resources of the state in a technologically and economically feasible manner.

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## Water Conservation Policy and Institutional Framework January 2009

In October 1998, the Kansas Water Authority (KWA) approved objectives for the year 2010 as part of the *Kansas Water Plan*. Additional objectives for the year 2015 were added to the FY 2004 *Kansas Water Plan Update*. An assessment of current conditions related to each objective provides information for targeting of state program resources to areas of greatest need.

### **Kansas Water Plan 2010 and 2015 Objectives**

- By 2010, reduce the number of public water suppliers with excessive “unaccounted for” water by first targeting those with 30 percent or more “unaccounted for” water.
- By 2010, reduce the number of irrigation points of diversion for which the amount of water applied in acre-feet per acre (AF/A) exceeds an amount considered reasonable for the area.
- By 2015, all non-domestic points of diversion meeting predetermined criteria will be metered, gaged, or otherwise measured.
- By 2015, conservation plans will be required for water rights meeting priority criteria under K.S.A. 82a-733 if it is determined that such a plan would result in significant water management improvement.

### **Tools for Water Conservation**

#### **Irrigation**

Beginning in FY 1994, the Kansas Water Office (KWO) used three approaches to provide irrigators with water conservation education: on-site technical assistance to irrigators who were required to develop water conservation plans; assistance in correcting irrigation water use reports; and education for irrigators on accurate annual water use reporting to the Kansas Department of Agriculture-Division of Water Resources (DWR).

#### **Voluntary Reductions**

Voluntary reduction of water used can occur through crop incentive programs and economic decision making. Federal programs, such as the Environmental Quality Incentives Program (EQIP) Ground and Surface Water Conservation (GSWC) have paid farmers not to produce for a specific number of years. In Kansas, Quick Response Areas (QRAs) are identified by groundwater management districts (GMD) and DWR for areas of the Ogallala-High Plains aquifer as important for reducing consumptive water use (Figure 3). Each QRA is based on various conditions that might include aquifer conditions, with-

drawal patterns, and socio-economic considerations. These areas may change each year. The EQIP-GSWC program then targets these areas. In the period 2002-2005, nearly 18,000 acres had been enrolled.

When acres are enrolled in EQIP or other programs, or an individual simply desires to reduce irrigation, water rights can be entered into the DWR Water Right Conservation Program (WRCP).<sup>(2)</sup> Enrollment protects the water right and irrigation ceases for up to ten years. Economic reasons may also lead a producer to choose not to irrigate or to limit irrigation to lesser quantities.

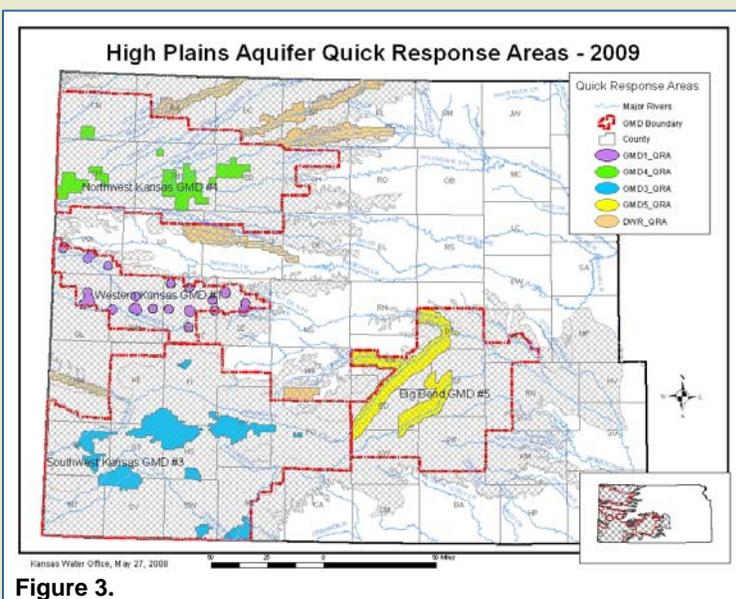


Figure 3.

Incentives to retire a water right can allow water use reduction through retirement of specific water rights. Currently, there is authority for water right buyout under the State Conservation Commission (SCC) Water Transition Assistance Program (WTAP), and using state and federal funds through the Conservation Reserve Enhancement Program (CREP). CREP provides incentives and cost-sharing to participants that enroll their land into eligible conservation practices such as native vegetation establishment or wildlife conservation for a period of 14 to 15 years. The present CREP area lies within 10 counties along the Arkansas River corridor, covering 1,571,440 acres. CREP offers incentives for a producer to sell or retire a water right at a competitive value of the water right. Applications for the enrollment in CREP of nearly 10,000 acres have been received by SCC in less than 2 years (2007-2008).

A voluntary, state incentive-based program to permanently retire water rights, the WTAP<sup>(3)</sup> is designed to restore balance in alluvial aquifers and related stream-

# Kansas Water Plan

## Water Conservation Policy and Institutional Framework January 2009

flows. Passed by the 2006 Kansas Legislature, the WTAP is intended to help stabilize both aquifer resources and landowner income in targeted areas. The program seeks to reduce the overall level of consumptive water use in those aquifers and streams. Prairie Dog Creek and Rattlesnake Creek basins were selected as pilot project areas for 2007 because of their unique water supply issues. Other areas will also be eligible in the future. The pilot project is authorized for 5 years (began July 2, 2007) with an annual budget from federal and state funds not allowed to exceed \$1.5 million. Unexpended fund balances can be carried over to successive fiscal years with the approval of the Legislature. WTAP allows for cooperative cost-sharing from the federal or state government, or private sources, for water right retirement grants. WTAP allows dryland farming after retirement of the water right. As of January 2007, one application was determined eligible and has been approved.

Limited irrigation is another option to help conserve water. The choice of crops and yield goals influence water needs. Choices to reduce irrigation water use include: 1) reducing irrigated acreage; 2) reducing the amount of irrigation water applied to all acres; 3) substituting low-water requirement crops for high-water requirement crops; 4) delaying irrigation until a critical water stage; and 5) managing soil moisture to capture precipitation.<sup>(4)</sup>

Transitioning to dryland agriculture can use the programs and incentives above, and incorporate best management practices (BMPs) to change operations to dryland farming.

Water Banking also has the potential to reduce water use. The Water Bank Act requires consumptive use savings of at least 10% when a water right owner opts to save water for future use. One water bank charter has been approved, for Big Bend Groundwater Management District No. 5.

### ***Irrigation Conservation Plans***

Conservation plans, as currently prepared and implemented, provide a management tool for the individual user that can improve efficiency but may or may not reduce the quantity used. However, most irrigation plans are to keep irrigators within their legal authorized quantities, rather than a conservation goal. It is important to remember that to be most effective the plans must be implemented and maintained.

The Chief Engineer may require water right owners to adopt and implement a water conservation plan. Priority should be given to criteria set out in K.S.A. 82a-733. These are: 1) users that share a common drought vulnerable source; 2) users whose use is significantly higher than their peers, and 3) users who apply for state administered grants, loans or cost-share moneys for water related projects.

All five GMDs have contracted at times with the KWO to provide technical assistance to irrigators, although they did not all choose to contract every year. The GMDs provided assistance in water conservation education, water conservation plan development and water use reporting activities. Annual contracts with the GMDs began in FY 1994 and ended in FY 2002. Most of the GMDs work with the DWR in the development of water conservation plans for irrigators who have been identified for blatant and recurrent over pumping.



As of August 23, 2006, there are 1,430 irrigation water rights in the state with conservation plans. Over 92 percent were required and almost seven percent of these water-right holders submitted plans voluntarily.

Conservation plan activity is centered in western and south central Kansas where irrigation development is more prevalent. The Cimarron and the Upper Arkansas basins had the greatest number of plan requirements and approvals.

The actual effectiveness of irrigation water conservation plans was evaluated by Kansas State University Statistical Laboratory (KSU) based on a comparison of the difference in water use before and after approval of plans

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for each of the five GMDs and for the balance of the state. For plans prepared and approved under both the 1986 and 1993 guidelines, there was a reduction in estimated average water use for water rights located within and outside the boundaries of the GMDs.

Irrigation conservation plan guidelines were revised in 2006 in cooperation with the U.S. Department of Agriculture-Natural Resource Conservation Service (USDA-NRCS) so that state and federal guidelines are consistent.

### Education

Two irrigation water conservation education projects have been funded with *Kansas Water Plan* Funds - the South Central Kansas Irrigation Scheduling and Water Management Project and the Mobile Irrigation Lab (MIL). Both projects were designed to promote the use of irrigation scheduling and water management technology. The south central irrigation project funding ended July 2001. The MIL's purpose is to educate irrigators on management techniques to improve water use efficiency. The MIL provides computer training in irrigation scheduling (KANSCHED) and fuel cost evaluation to county conservationists, crop consultants and irrigators. The Kansas State University (KSU) MIL program provides irrigation seminars, tours and irrigation system analysis. The KANSCHED and Fuel Cost programs are also available online through the MIL website.<sup>(5)</sup>

Educational programs such as the MIL, improve management decisions by providing needed tools and general information to producers. This can result in cropping changes and corresponding water conservation if economically sound for the irrigator. GMDs, KSU Extension, Conservation Districts, Kansas Association for Conservation and Environmental Education and others also provide educational programs or information related to water conservation and water use efficiency.

### Best Management Practices (BMPs)

Also in the Kansas water conservation tool box are agricultural best management practices (BMPs). Through BMP installation, such as terraces, buffer strips and low or no-till practices, irrigators conserve water and reduce costs. BMPs can keep natural precipitation and irrigation water on the land. The state has provided cost-share for BMPs and water application technology as an incentive to adopt water conservation measures.

Tillage methods such as no till, strip till, mulch tillage, and ridge till leave more plant residue on the soil surface year-round. Conservation tillage improves the ability of the soil to hold moisture, reduces the amount of water that runs off the field, and reduces evaporation of water from the soil surface.



K-State Mobil Irrigation Lab

Land surface shaping can contribute to water resource conservation in a number of ways. Contour farming and terracing land help keep water in the fields and reduce ponding on sloped areas by following the contour lines. General grading of agricultural land is used to increase the uniformity with which water is applied to an irrigated field. The leveling work must be designed within the slope limits of the water application method used, provide for removal of excess surface water and control erosion caused by rainfall.

Brush control/management includes the removal, reduction or manipulation of non-herbaceous plants. In Kansas, non-native phreatophytes such as salt cedar utilize a significant quantity of stream and alluvial water. Removal can free up water for other plants and purposes.

### Municipal and Other Public Water Supplies

Municipalities and other public water suppliers can reduce their water needs with an active conservation effort. Household water savings through the installation of low flow plumbing, low water need landscaping and reduction of runoff from watering and car washing should be encouraged. Household water savings can reduce water treatment and sewer costs while allowing growth.

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### **Municipal Conservation Plans**

Conservation plans, as currently prepared and implemented, provide a management tool for the public water supplier that improves efficiency but may or may not reduce the quantity used. To be most effective the plans must be implemented and maintained.

The Kansas Water Office develops and maintains guidelines for water conservation plans and practices.<sup>(6)</sup> In addition to water use conservation plans required by the Chief Engineer, plans are required for anyone: 1) purchasing water from the State Water Marketing Program;<sup>(7)</sup> 2) participating in the Water Assurance District Program;<sup>(8)</sup> 3) sponsoring or purchasing the public water supply portion of a Multipurpose Small Lakes Program project;<sup>(9)</sup> 4) transferring water under the Water Transfers Act;<sup>(10)</sup> or 5) applying for a loan from the State Revolving Fund.<sup>(11)</sup> State agencies that make loans, grants, or cost-share funds available for water related projects may require, prior to approval of funding, the development and approval of a water conservation plan.<sup>(12)</sup>

Technical assistance is provided to municipal water users who are required to adopt and implement conservation plans.

Currently, municipal water conservation goals are based on a system's size and the average water consumption in gallons per capita per day (GPCD) for the region. GPCD calculations do not include municipal water supplied to industries using 1 million gallons per year or more.

The 2007 Municipal Water Conservation Plan Guidelines were developed to assist public water suppliers in preparing a plan. Some public water suppliers are required by Kansas Statute to develop a water conservation plan; however, all public water suppliers, especially those that are drought vulnerable are encouraged to develop and implement a plan as it is a tool for managing both long-term water use efficiency and addressing short-term drought response. Conservation plans assist the public water supplier to focus on long-term water conservation practices, including practices for education; management; and regulation. As part of the water conservation plan, a Water Drought/Emergency Ordinance (for cities) or Resolution (for rural water districts) must also be adopted to allow implementation of the drought response portion of the water conservation plan.

The Chief Engineer may delegate authority to implement and enforce provisions to a municipality that has an ap-

proved conservation plan using the 2007 Guidelines so they can require compliance of private well owners within the city limits. Numerous communities have expressed interest in this concept, as pumping of private wells, when restricted water use is imposed, tends to draw water from the sources of supply that affect the public water supply source. This is in place in at least one community.

### **Technical Assistance**

The Kansas Rural Water Association (KRWA) under contract with the Kansas Water Office provides technical assistance to public water supply operators, managers and local administrators on issues which are critical to public water systems. The program includes on-site technical assistance for rural water districts and municipal water systems. KRWA provides bookkeeping assistance, water rate structuring, water conservation plan development, distribution system and treatment plant reviews/analyses, leak detection, meter testing, well and distribution line cleaning and emergency assistance.

### **Drought Planning**

The Governor has the authority to declare a state of drought when indicators show drought is imminent. When the Governor declares a State of Drought, actions contained within the Drought/Emergency Contingency portions of approved conservation plans at state facilities plans are triggered.<sup>(14)</sup> It is important to recognize the distinction between the county drought stage declarations issued by the Governor and a water system's declaration of a drought stage.

County drought stage declarations provide notice to state and local officials that drought conditions exist and trigger implementation of the Governor's Drought Response Team Operations Plan. This Operations Plan is largely limited to coordination of government actions.

### 2007 Kansas Municipal Water Conservation Plan Guidelines



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County declarations do not trigger implementation of the drought response section of a municipal water conservation plan. However, the county declaration provides a “heads-up” for local water system officials that they should review their system’s drought stage triggers to determine if further action is needed.

Having a state-approved water conservation plan is a public water system’s first line of defense against drought. All public water suppliers are encouraged to develop and implement water conservation plans as a tool for managing for short-term drought response. Public water supply (municipal) conservation plans include phased in, locally determined response to drought triggers. These triggers are developed by and for the local water system. *The 2007 Kansas Municipal Water Conservation Plan Guidelines* provides suggestions for this planning. The Plan Guidelines also include triggers for marketing and water assurance district lakes.

*Emergency Response Planning Guidance for Kansas Public Water Supply Systems*<sup>(15)</sup> from the Kansas Department of Health and Environment also includes planning for drought for public water supplies, as does *Responding to Drought: A Guide for City, County and Water System Officials*<sup>(16)</sup> that was developed by the Governor’s Drought Response Team in 2006.

Municipal Drought Stage Triggers are the signals that water shortage or other conditions indicative of drought have reached certain levels. They act as the signal to begin implementation of the appropriate actions for that stage. A water utility or other municipal water entity should enact the appropriate stage whenever the trigger is reached. Delay in action may lead to a major disruption of the water supply system at a later time.

Every drought response plan is set up in stages, each one more stringent than the one before it. Triggering mechanisms are identified to signal the start of a given stage and specific goals identified as the desired outcome for each stage. Triggers may be capacity, peak demand, or some other utility set condition. Appropriate conservation practices in the areas of education, management and regulation are developed and set under each stage.

Three to four stages are considered appropriate in response to drought to trigger practices or actions. The first three stages; water watch, water warning and water emergency are appropriate for all public water suppliers.

A fourth stage, water rationing is for possible use by public water suppliers in an extreme emergency. Each drought stage has a goal associated with it which describes the desired outcome of the activity under that stage. Goals for a water warning and a water emergency should be quantifiable, specifically describing the water status and targeting water user awareness, reducing overall demand, and reducing peak demand.



Conserving the existing supply through demand reduction is often the most viable action for the public water supplier for drought response. The *Conservation Guidelines* provide options that may be employed by the water utility to reduce demand through education of water customers, management and regulatory actions. Management activities include the utility managing the supply and distribution as effectively as possible (equipment maintenance, pumping schedule, seeking emergency supplies). Regulation puts restrictions on water use. A completed conservation plan allows the utility to take pre-determined actions in a timely manner when a trigger is reached. A city ordinance or a rural water district resolution must be adopted for a conservation plan to be approved by KWO. The ordinance or resolution gives the entity the authority to implement the drought response portion of the water conservation plan.

Drought vulnerable water suppliers are those first impacted by drought due to basic source, distribution system or treatment capacity limitations; or that rely on a single well as a water supply source. Drought planning is most important for these water suppliers. In 2006, 133 of the 800 public water suppliers assessed, or 17% were considered drought vulnerable. A basic source limitation

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was the most common reason for drought vulnerability. The frequency with which each drought limitation category was assigned is summarized in Figure 4. The total exceeds 133 because several public water suppliers had more than one limitation.

The operation of reservoirs and Water Assurance Districts (WADs) generally contain contingencies for drought stages that relate to lake elevations and downstream conditions. A WAD purchases sufficient storage to make assurance water available to support the current needs of all the members of the WAD when natural flows are not available. The KWO coordinates responses to drought for WAD members and Water Marketing customers based on remaining storage in the marketing or assurance district lake(s).

Three water assurance districts are operational: the Kansas River Water Assurance District No. 1, Marais des Cygnes River Water Assurance District No. 2 and Cottonwood/Neosho River Basins Water Assurance District No. 3. The members of a WAD each have a Conservation Plan. The WAD membership includes municipalities, rural water districts and industrial water users.

### Education

Educational programs such as the state supported training for water operators provides tools and general information for those management decisions. GMDs, Extension programs, Conservation Districts, Kansas Association for Conservation and Environmental Education and others also provide educational programs and information related to water conservation and water use efficiency.

Local entities encourage or even require water conservation. Cities and public water suppliers such as WaterOne and the City of Hays are examples of effective water conservation planning. WaterOne, a water purveyor, encourages responsible water use and conservation and has undertaken a number of steps to ensure a dependable water supply for their customers. WaterOne supplies water to more than 375,000 people and has a service area of more than 271 square miles. The primary objectives of WaterOne's conservation plan include the discouragement of wasting water through demand management, analyzing water loss, and customer education on the proper use of the resource.

The City of Hays "Water Allotment and Conservation Ordinance" is a policy to reduce water waste, initiated in the late 1980s. The ordinance includes construction standards and penalizes those wasting water. It has been successful as evidenced by water use figures reported in the annual *Municipal Water Use Report*. From 1987 until 2002, water use, measured in gallons per capita per day (GPCD), was reduced 43%, from 150 GPCD to 95 GPCD.

Between 1987 and 2002 Hays used up to 47% less water than the regional average. The region extends from Phillips County in the north to Comanche County in the south.

The City of Wichita WATER Center offers a hands-on, interactive environmental center dedicated to water education. Basic relationships between the geology and geography of the area, and ground water and surface waters are explored. In addition, water conserving principles of various water-dependent landscapes as well as xeriscapes are demonstrated.

### Reuse

Water reuse is a potentially significant conservation action. Reuse offers an alternate means for managing wastewater that dramatically reduces environmental impacts associated with discharge of wastewater effluent to surface waters. In addition, use of reclaimed water provides an alternative water supply for many activities that do not require potable quality water (such as irrigation, cooling water reuse, and toilet flushing). This conserves available supplies of potable quality water. Some types of reuse offer

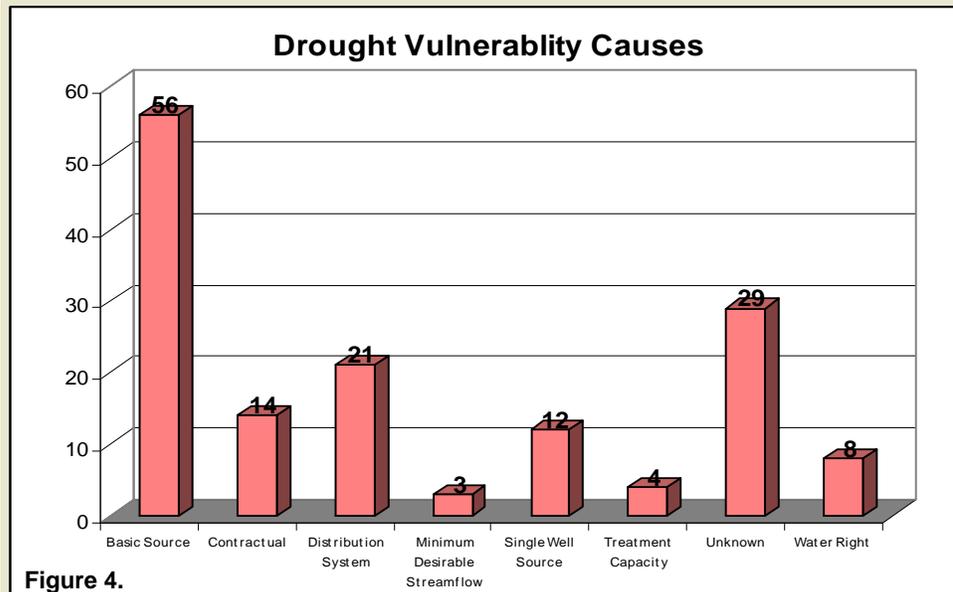


Figure 4.

# Kansas Water Plan

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the ability to recharge and augment available water supplies with high quality reclaimed water.

Currently there are more than 140 communities and facilities that are authorized to reuse treated wastewater. The reuse of wastewater on applications like golf courses and parks allows these communities to keep the potable water for residential use. In some cases the treated water is used for non-human food crop irrigation.

Protection of human health is the primary concern when developing and implementing a reuse program. The Kansas Department of Health and Environment (KDHE) identifies several standard management practices for reuse of treated wastewater for instances when the wastewater will be applied to public areas such as golf courses or parks. Typical protective practices include an increased degree of disinfection, only applying the treated wastewater when public access is restricted and posting signs warning against swimming in or drinking ponded wastewater. Irrigation of crops produced for direct human consumption is not permitted. Monitoring of the treated wastewater is required using US Environmental Protection Agency (EPA) approved methods and KDHE certified laboratories.

Community involvement and public education is an important component in developing large scale water reuse projects.

### Water Conservation and Utility Rate Structures

The cost of water and the design of utility rate structures can influence water use by customers. Opportunities exist in Kansas to strengthen the economic incentive for utility customers to evaluate more carefully their water use habits. As price increases, water demand tends to decrease. There are four basic utility rate structures:



Wichita WATER Center

- *Flat rate*: the consumer's cost of water for a given billing period is fixed regardless of the level of use.
- *Decreasing block*: comprised of a fixed customer charge per month, plus two or more usage blocks, with the price per unit of water consumed decreasing in each subsequent block.
- *Uniform rate*: comprised of a fixed customer charge per month, plus a constant, uniform charge for each unit of water consumed.
- *Increasing block*: comprised of a fixed customer charge per month, plus two or more usage blocks, with the price per unit of water consumed increasing in each subsequent block. (An example: \$1.25 for the first ten thousand gallons, \$1.50 for the second ten thousand gallons, \$2.00 for the third ten thousand gallons, etc.)

Flat rates and decreasing block rates generally do not provide incentives to use water efficiently. A utility with one of these rate structures that changes to a uniform rate or an increasing block rate is moving toward a water-conserving rate structure. Today, uniform rates are regarded as meeting only the minimum standards for such a rate structure and the trend is toward implementing increasing block rate structures to promote water use efficiency.

### Industrial

The 1986 *Kansas Industrial Water Conservation Plan Guidelines* were prepared for use by industrial water users to assist them in developing a water conservation plan. In addition, an excellent resource for management practices for industrial water use efficiency is the "*Handbook of Water Use and Conservation*".<sup>(13)</sup>

### Other Contributing Tools

#### Information and Data

The ability to manage water relies on good information on the resource, water use and related tools. Management is a key component in the efficient use of water as well as in reducing usage. Many activities and measuring equipment provide data needed to make good management decisions. These include acquiring accurate water use and resource information.

All water right holders are required to file an annual water use report with the Kansas Department of Agriculture-Division of Water Resources (DWR).<sup>(17)</sup> Water use reporting provides data on the individual water right with-

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drawals and is valuable in the assessment of regional and hydrologic system conditions. Many public water suppliers obtain water from others that hold the water right, but voluntarily report water use. Water use is also reported by customers in the Water Marketing and Water Assurance District Programs, although that water use is not included in data distributed by the DWR. Water use report information combined with changes in water level and streamflow, precipitation, evaporation and other factors, are used to analyze the stream or aquifer ability to continue to supply water.

Water meters or other measuring devices are water management tools. The operator can obtain information on well performance and water pumped, contributing to the ability to manage a water appropriation. Water meters have been required for most non-domestic water rights in the state. By 2010, all meters will have been installed in remaining areas.

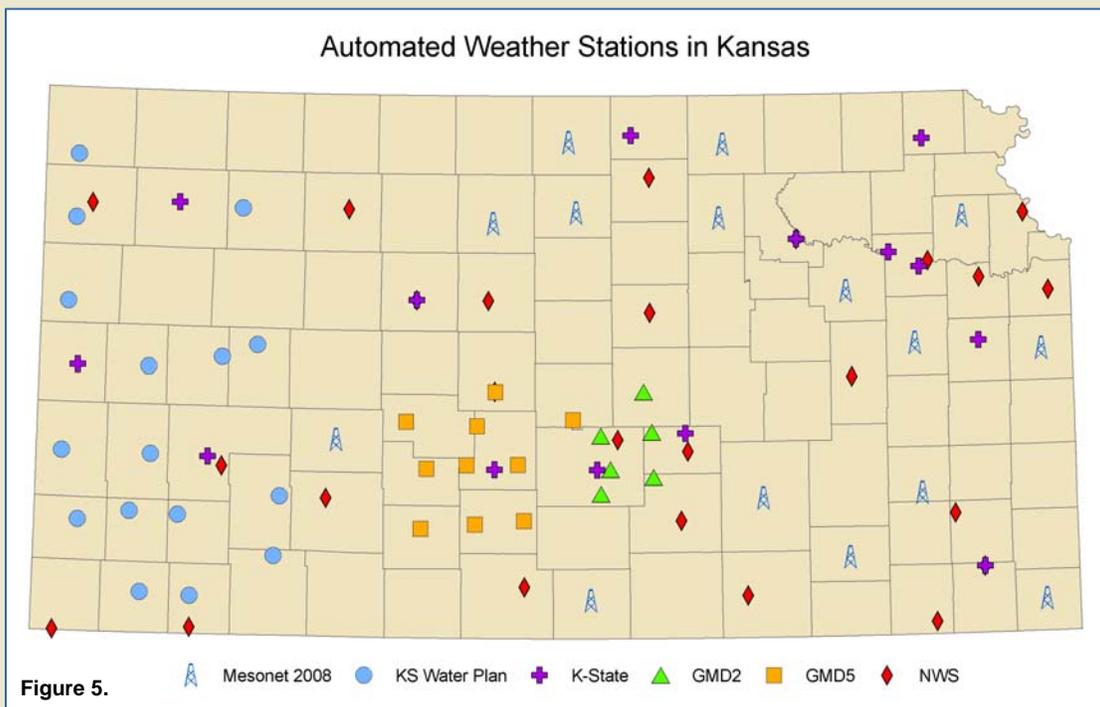
Water level measurements collected by the state are essential for determining the impact of water use on the resource.

Weather Stations are management tools for irrigation that can provide accurate and useful climate and soil condition observations. State Water Plan Funding was allocated in the mid-1990s to assist several GMDs to purchase automated weather stations. Data from these stations are used for making evapotranspiration (ET) calculations valuable to farmers in determining when to irrigate their crops. Such irrigation scheduling contributes to efficiency of irrigation water application and reduction of the amount of water withdrawn.

In 2002, the Kansas Water Office began contracting with Kansas State University to operate and maintain 11 of these ET stations in southwest Kansas. Five additional ET stations were installed in northwest Kansas in 2007. Funding for operation and maintenance of these 16 stations in FY 2008 was provided from the State Water Plan Fund. Figure 5 shows the location of these stations.

Development of the Kansas Mesonet, using State Water Plan and other funding sources began in 2008. Weather stations in this network will support ET calculation and other agricultural purposes, but will also have a broader application due to their location and the sensors deployed. Fifteen priority counties, focusing on underserved areas, were identified for initial Mesonet station installation in 2008. Additional stations will be installed in the future as funding permits.

Other automated weather station networks in Kansas that provide data useful for irrigation water management and other purposes include the 14 stations located at Kansas State University Research and Extension facilities and automated stations operated by the National Weather Service (NWS).



### Weather Modification

The Western Kansas Weather Modification Program, a cloud seeding program, has been in operation since 1975 during the growing seasons. The Program currently includes ten western counties. The Program has been shown to reduce hail damage to crops and property. This reduces the waste of water pumped for crop growth, so contributes to water efficiency. Weather modification activities are permitted and operators licensed by the Director of the Kansas Water Office.

### Special Areas

#### Upper Arkansas River Conservation Reserve Enhancement Program (CREP)

Conservation Reserve Enhancement Program (CREP) is a targeted Conservation Reserve Program (CRP), a federal program administered by the US Department of Agriculture's (USDA) Farm Service Agency (FSA), introduced in the mid-1980s. CRP was designed to prevent soil erosion, but also has provided water quality and wildlife habitat benefits. CREP focuses on a state resource concern; in this case, water conservation.



Figure 6.

The Kansas CREP affords potential benefits for farmers, land and water resources in 10 counties along the upper Arkansas River (Figure 6). Landowners who enroll in CREP receive 14 to 15 years of rental payments, a state sign-up bonus, and state, federal and private cost-share dollars. The water rights associated with the land enrolled will be permanently retired.

The program has multiple water resource benefits, reducing irrigation demands on the stream-aquifer system, reducing the spread of saline river water into the aquifer and helping restore stream and riparian health. Among the approved practices eligible for cost-share money are native grass seeding, wildlife habitat establishment, shallow water area construction, wetland restoration and filter strip and riparian buffer installation.

Approximately 1.19 million acre-feet per year is authorized for irrigation in the upper Arkansas River CREP pro-

ject area from 5,078 wells. In March 2008 the total acreage represented under pending offers was 12,876 acres with an estimated annual water savings of 24,273 acre-feet.

#### Upper Arkansas River-Water Conservation Projects Fund

K.S.A. 82a-1801 provides for the disbursement of funds recovered by the State in the litigation against Colorado to resolve disputes under the Arkansas River Compact. The cost to the Attorney General of conducting the lawsuit was first credited to the Interstate Litigation Fund. Of the amount remaining, two thirds are being used for water conservation, water efficiency and related activities in the area in the Upper Arkansas basin directly impacted by violation of the provisions of the Arkansas River Compact (Figure 7). The remaining one third was credited to the State Water Plan Fund for water conservation projects. In August 2008 the unused portion of funds designated for the Upper Arkansas basin were provided to Southwest Kansas Groundwater Management District No. 3 to be administered according to K.S.A. 82a-1803 and the 2008 Kansas Legislature's Senate Bill 534. Identification of projects and evaluation of their management and conservation effectiveness is underway. Reducing losses and making the most efficient use of all water available is an objective in the use of these moneys. Projects that increase surface storage, increase recharge to the ground water system and improve the ability to meet water right allocations are being considered. More information on the Arkansas River Compact can be found in the Water Management Policy Section.

#### Wichita Aquifer Storage and Recovery (ASR)

One of Wichita's primary sources of supply has been ground water pumped from the city's well field completed in the Equus Beds aquifer. After pumping began in the Wichita well field on September 1, 1940, water levels and storage volumes in the aquifer began declining, and the decline generally has continued over the years. In addition, the water quality of the Equus Beds aquifer is threatened by migration of saline water from natural and anthropogenic sources. Artificially recharging the Equus Beds aquifer is a water reuse alternative being employed to meet future demands for water for Wichita and other users in the area.

In 1995, the Equus Beds Ground Water Recharge Demonstration Project was initiated to evaluate recharge techniques and their impact on the water quality of the

# Kansas Water Plan

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aquifer. The demonstration phase of the project, completed in May 2002, showed the managed diversions of excess Little Arkansas River flows during high flow events could provide benefits to the water resources of the area.

The Equus Beds Aquifer Storage and Recovery (ASR) Project Phase I began in 2006 to inject water into the aquifer for the purposes of storage and later recovery of the water and to form a hydraulic barrier to a brine plume. The project diverted water from the Little Arkansas River through bank storage (diversion) wells, when flow in the river exceeded base flow. The diverted water then was artificially recharged into the Equus Beds aquifer through injection wells and recharge basins. In 2007, over 350 million gallons were recharged into the aquifer through the ASR project.

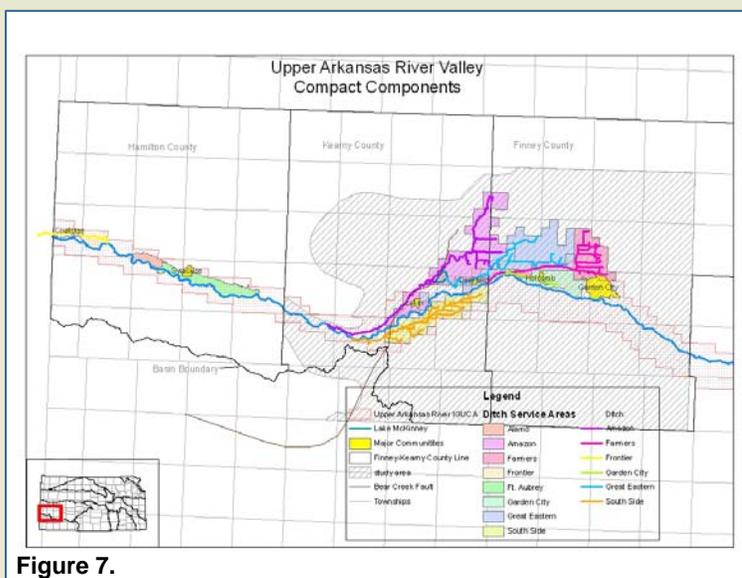


Figure 7.

Phase II of the ASR Project was scheduled to begin design in 2008, with construction initiated in 2009. Phase II design elements will capture and recharge up to 30 million gallons per day (MGD) and will rely on a treatment plant to treat the water before recharging.<sup>(19)</sup>

The ASR Project will store up to 65 billion gallons of water in the dewatered portion of the aquifer and will be a critical component of Wichita's Water Supply Plan. The ASR will restore the water levels of the aquifer to help meet the water supply needs of the City through 2050 as well as help protect the existing water supply from salt-water contamination.

### Rattlesnake Creek Subbasin-Lower Arkansas River Basin

Water banking was proposed as a potential water conservation tool in the Rattlesnake Creek Management Plan. The primary purpose of water banking in the Rattlesnake Creek subbasin is to provide an incentive for water conservation and redistribution of water use within the subbasin. Central Water Bank Charter is the first water banking charter in Kansas. The charter targets the entire Big Bend Groundwater Management District No. 5 area. This water bank charter was approved in 2005. After seven years its operation will be reviewed to determine its effectiveness for water conservation. Leased water must be used in the same basin in which it was deposited.

Water may be deposited in the Central Water Bank on an annual basis for up to five years. Water on deposit may be leased by others or held in safe deposit accounts for use in a subsequent year. A conservation component is calculated to meet the requirement of a minimum of 10% savings in consumptive use. The conservation component for a lease is based on the following hydrologic parameters: 1) decline since predevelopment; 2) total saturated thickness; 3) number of wells within 2-miles of well; and 4) distance from a stream. Both deposits and leases are subject to a conservation component.<sup>(20)</sup>

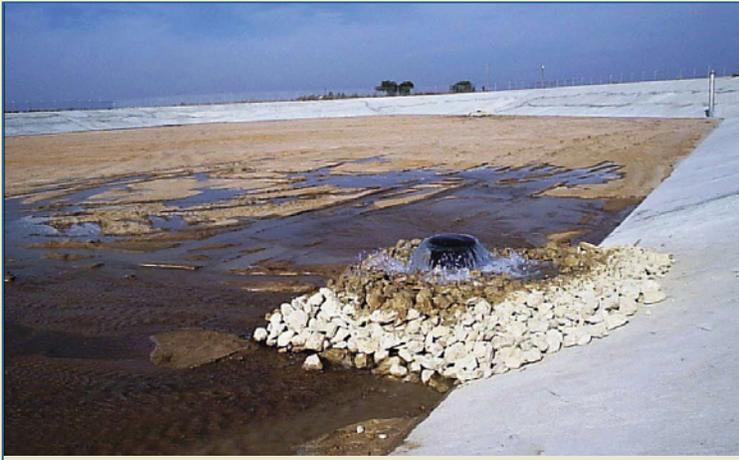
There is legislative authority for two additional water banks to be chartered.

### Upper and Lower Republican Basins

Substitute for Senate Bill No. 89 was signed by the Governor on April 4, 2008 to address the use of damage payments under the Republican River Compact Agreement. This bill stipulates the distribution of cash damage payments from Colorado and Nebraska. The majority of the payments are to be used for water conservation projects in the upper and lower Republican River basins. More information on the Republican River Compact can be found in the [Water Management Policy Section](#).

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Artificial Recharge Basin

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## Public Water Supply Policy & Institutional Framework January 2009

### Overview

Under Kansas law, a public water supply system is defined as a system for the provision to the public of piped water for human consumption, if such system has at least 10 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.<sup>(1,2)</sup> There are two categories of public water supply systems: community and non-community. Community systems serve a year-round population; non-community systems serve a non-residential population such as motels, parks or daycare facilities.

Kansas has about 1,100 public water supply systems, serving approximately 2.6 million Kansas residents. Fifty-nine percent of Kansas public water supply systems serve 500 or fewer people, while only five systems serve over 100,000.<sup>(3)</sup> Public water supply systems are typically managed by a public entity, such as a municipality or a rural water district, but may also be managed privately. The governing bodies of public water supply systems bear primary responsibility for providing an adequate supply of high quality drinking water to the public.

The Kansas Department of Health and Environment (KDHE) has authority under Kansas law<sup>(4)</sup> to regulate public water supply systems through permitting, investigations and regulations. KDHE administers all requirements of the Federal Safe Drinking Water Act and provides some technical and financial assistance. Additional technical and financial assistance is also provided to public water suppliers through a variety of programs administered by other state and federal agencies.

### Federal Safe Drinking Water Act (SDWA)

The SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources. The SDWA does not regulate private wells which serve fewer than 25 individuals.<sup>(5)</sup>

SDWA authorizes the United States Environmental Protection Agency (EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. The EPA, individual states and public water systems then work together to make sure that these standards are met. The KDHE has adopted standards consistent with the SDWA for Kansas public water suppliers.

Originally, SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.



Tri-District Clarifier. Photo courtesy Dennis Schwartz

### Capacity Development Strategy

The SDWA, as amended in 1996, makes capacity development an important strategy in preventing public water supplier problems. This program is located within the KDHE.<sup>(6)</sup> Capacity development involves helping public water suppliers improve their finances, management, infrastructure and operations so they can provide safe drinking water consistently, reliably and cost-effectively. Capacity has three components: technical, financial and managerial, each of which must be adequate for a public water supplier to achieve overall capacity. *Technical capacity* refers to the physical infrastructure of the water system, including source water adequacy, infrastructure adequacy (wells and/or water intakes, treatment, storage and distribution) and the ability of system personnel to implement requisite technical knowledge. *Financial capacity* refers to the financial resources of the water system including revenue sufficiency, credit worthiness and fiscal controls. *Managerial capacity* considers the management structure of the public water supplier, including ownership accountability, staffing and organization and effective internal and external relationships.

# Kansas Water Plan

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### Kansas Water Plan Goals, Policies and Objectives

The Water Resources Planning Act<sup>(7)</sup> provides the statutory authorization for addressing public water supply management in the *Kansas Water Plan*. This Act established long-range goals for the management, conservation and development of the waters of the state, including:

- The development of sufficient supplies to meet anticipated future needs through planning and construction of multipurpose reservoirs and through the acquisition from the federal government of storage in federal reservoirs and by agreements with the federal government regarding the use of storage;
- The efficient, economic distribution of the water supplies of the state;
- The design of municipal water systems to provide an adequate water supply to meet the needs during a drought having a two percent chance of occurrence; and
- The achievement of the primary drinking water standards.

The Kansas Water Authority (KWA) has approved objectives for the years 2010 and 2015 as part of the *Kansas Water Plan*. These objectives provide established targets for quantifying progress in implementing the *Kansas Water Plan*. Three objectives address public water supplies:

- By 2010, ensure that sufficient surface water storage is available to meet projected year 2040 public water supply needs for areas of Kansas with current or potential access to surface water storage;
- By 2010, less than five percent of public water suppliers will be drought vulnerable; and
- By 2010, ensure that all public water suppliers have the technical, financial and managerial capability to meet their needs and to meet SDWA requirements.

In addition, objectives in the [Water Conservation Management Section](#)<sup>(8)</sup> of the *Kansas Water Plan* provide guidance to public water suppliers to use water wisely by targeting excessive unaccounted for water use and the development of water conservation plans. The KWO contracts with Kansas Rural Water Association (KRWA)<sup>(9)</sup> to provide technical assistance to public water suppliers with over 30% unaccounted for water. The KWO also develops guidelines for municipal water conservation plan development to assist in meeting these objectives.<sup>(10)</sup>

### Sources of and Access to Supply

Most Kansas public water suppliers have their own source of raw water. Such sources include wells in alluvial or deeper aquifers, streams and rivers, springs or municipal lakes. Several suppliers use lakes developed through the Kansas Multipurpose Small Lakes Program or obtain water from the Kansas Water Marketing Program. Many public water suppliers also buy finished water at wholesale from another supplier, either as a sole source of supply or to supplement their own source(s).

In eastern Kansas, the primary source of water is surface water: rivers, federal reservoirs, multipurpose small lakes and municipal lakes. In western Kansas, the primary source is ground water drawn from wells that reach into the water bearing aquifers. While 69% of the state's public water systems rely upon ground water sources, these systems serve only 27% of the population (Figure 1).<sup>(3)</sup>

### Kansas Community Water Supply Source Data

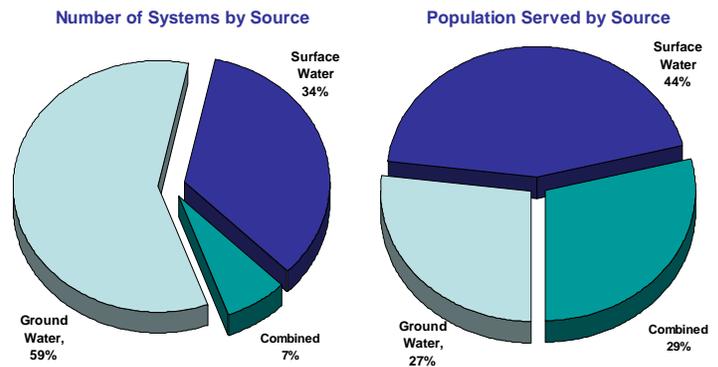


Figure 1.

Graphic courtesy KDHE.

### Kansas Water Appropriation Program

Public water suppliers that have their own source of supply must obtain a water right from the Kansas Department of Agriculture-Division of Water Resources (DWR). The Water Appropriation Program<sup>(11)</sup> provides for the processing, administration and enforcement of water rights. The maximum annual authorized quantity of water that can be diverted is established by the water right. An annual water use report is required to be submitted. Information from those reports is summarized annually.<sup>(12)</sup>

# Kansas Water Plan

## Public Water Supply Policy & Institutional Framework January 2009

### Kansas Water Marketing Program

The State of Kansas has purchased water supply storage in 13 federal reservoirs (Figure 2). Water from this storage space is accessible via contract from the KWO for municipal or industrial use.<sup>(13)</sup>

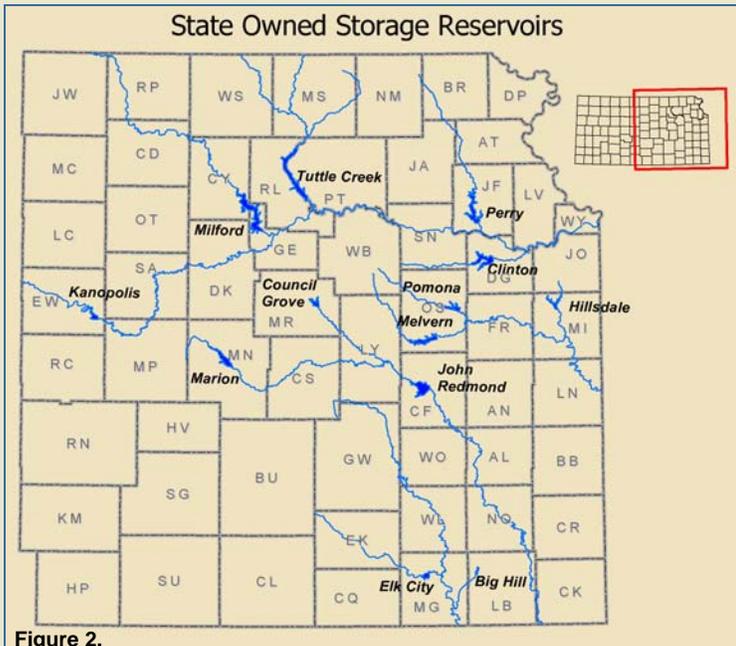


Figure 2.

The State Water Plan Storage Act<sup>(14)</sup> enacted in 1974 and amended since, established the basic framework of the current Water Marketing Program. The basic principles of the program are:

- The entire system of reservoirs is treated as one large reservoir for pricing purposes, so that no particular user or region of the state receives preferential treatment in the pricing of water;
- The state requires payment of water storage costs by the municipal and industrial entities benefiting from that storage;
- The state retains material and fiscal control of the water stored in the reservoirs covered by agreements with the federal government;
- The state only sells raw (untreated) water to users at the reservoir. The state is not responsible for the delivery or treatment of water;
- Contract holders must pay a 50% minimum annual payment, but a purchaser may negotiate a graduated minimum “take or pay” schedule; and
- Purchasers must have a state approved water conservation plan prior to approval of a water purchase contract.

In 2006, the KWO developed the first *Water Marketing Program Capital Development and Storage Maintenance Plan*<sup>(14)</sup> to implement recommendations in the *Kansas Water Plan* approved by the KWA in 2004. This report recommends a timeframe in which to begin paying for storage in two reservoirs (Hillsdale and Clinton) that are not currently called into service. This was implemented in that year as a component of the approach to address *Kansas Water Plan* policy section, *Long-Term Financial Solvency of the Kansas Water Marketing Program*.<sup>(15)</sup>

### Kansas Assurance Program

The Kansas Water Assurance Program<sup>(16)</sup> allows coordinated operation of state owned or controlled water supply storage space in federal reservoirs to satisfy downstream municipal and industrial water rights during drought conditions. Three water assurance districts are operational in the Kansas-Lower Republican, Marais des Cygnes and Neosho River basins.

### Multipurpose Small Lakes Program

The Multipurpose Small Lakes Program<sup>(17)</sup> was authorized by the 1985 Legislature as a result of recommendations in the *Kansas Water Plan*. This program provides financial assistance for flood protection, public water supply storage and water related recreational facilities while requiring a Local Nonpoint Source Pollution Management Plan to be developed for the project area. The program provides assistance for new construction or the renovation of an existing lake. Eligible sponsors as defined in statute include any entity with taxing authority and right of eminent domain. The KWO reviews all projects for future public water supply needs. Eleven multipurpose small lakes that have been constructed through this program include public water supply storage (Figure 3).<sup>(18)</sup>

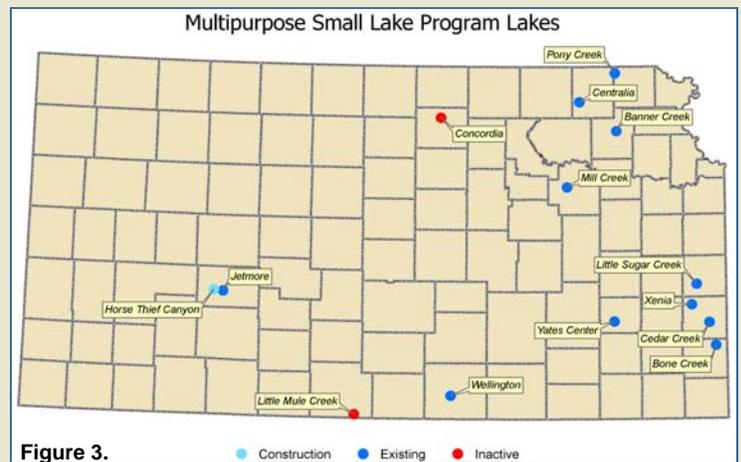


Figure 3.

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### Water Supply Restoration Program

The Water Supply Restoration Program (WSRP) is a voluntary, incentive-based water management program designed to assist eligible sponsors to restore and protect water supply lakes where appropriate watershed restoration and protection are planned or in place. Eligible components for the financial assistance are removal of sediment, rehabilitation of structures, watershed protection and engineering fees.<sup>(19)</sup>



Tri-District. Photo courtesy Dennis Schwartz

### Interlocal Cooperation

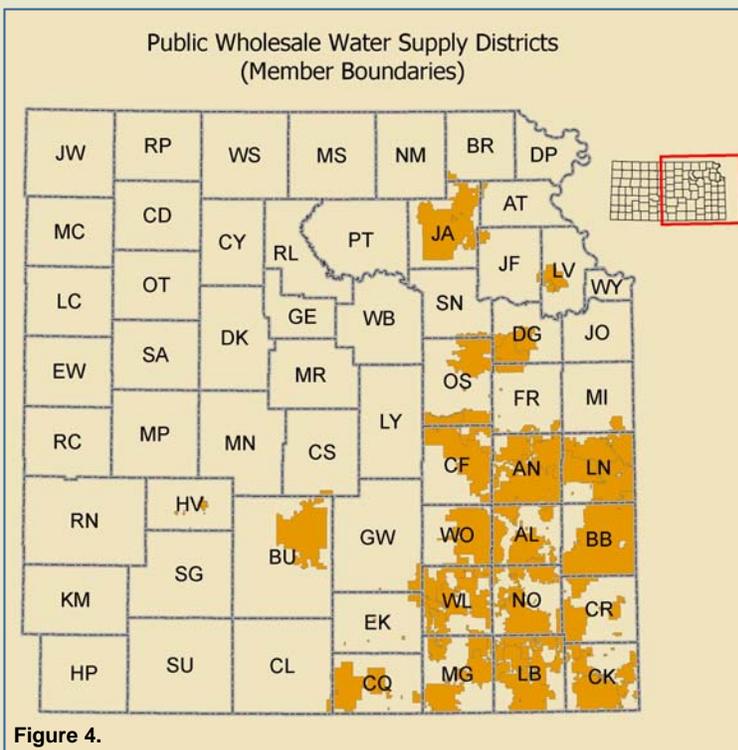
The state encourages the development of regional public water supply systems.<sup>(20)</sup> Regionalization is a key state strategy for ensuring that small systems attain and maintain technical, financial and managerial capacity. Regionalization is further encouraged by Kansas statute.<sup>(21)</sup>

The Secretary of the KDHE shall, “. . . in consultation with the KWO, encourage regional cooperative public water supply projects in accordance with the public water supply regionalization strategy of the *Kansas Water Plan*. . . .” The development of regional systems provides a mechanism for the efficient distribution of raw and finished water supplies for municipal use from existing state owned storage in federal reservoirs, multipurpose small lakes or other supply sources.

Regionalization of public water supply service in Kansas often involves formation of a public wholesale water supply district (PWWS).<sup>(22)</sup> PWWSs are commonly comprised of several municipalities and rural water districts that rely upon the water provided by the PWWS to supplement their own water supply sources or to provide their entire water supply. PWWSs provide the advan-

tages of economies of scale that commonly are not available to their individual members.

Twenty-five PWWSs have been organized in Kansas to date. Not all of these districts are actively delivering water (Figure 4). Several have been organized recently and have not yet had the time to develop the infrastructure to deliver water. Others were formally organized but never became operational.<sup>(23)</sup>



### WATER DEMAND

#### Water Use

Water use is regulated by the DWR. Annual water use reports are submitted by all public water suppliers with water rights.<sup>(24)</sup> The DWR also requests annual water use reports from water suppliers purchasing water from the State Water Marketing Program and from water suppliers purchasing water wholesale from entities that have water rights or marketing contracts. In 2006, 771 public water suppliers filed water use reports. While the range in 2006 was from a high of 886 to a low of 29 gallons per capita day (gpcd), it is more enlightening to compare usage by utilities of the same size and in the same geographic area. The average gpcd usage for public water suppliers in 2006 ranged from a high of 293 in western Kansas to a low of 84 in eastern Kansas.<sup>(12)</sup>

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### Demand Projections

The KWO did a set of demand projections to 2040 for all public water suppliers in 1998. Though this information is still utilized by many entities, it should be used with caution, as it has not been updated since. However, the projections do lend guidance for planning purposes. The projections for population and demand for public water suppliers can be found on the KWO web site.<sup>(25)</sup>

### Supply and Demand Projections

In order to identify future potential surface water supply vulnerabilities in select eastern Kansas basins, the KWO initiated a mainstem river corridor surface water supply and demand projection project.<sup>(26)</sup> Supply and demand projections were estimated under a severe drought scenario. The initial estimates indicated concerns with meeting demands during drought in the Neosho basin within the next decade. For other eastern basins the concerns with meeting demands during drought were within the next several decades; while for still other basins, the next century. Basin priority issues to focus on the concerns are being developed in the basin sections of the Plan. More specific modeling to maximize supply to meet demands is being undertaken. (See [Kansas Water Plan Volume III, Basin Issues](#).)

### Drought

Drought can severely challenge a public water supplier through depletion of the raw water supply and greatly increased customer water demand. Even if the raw water supply remains adequate, problems due to limited treatment capacity or limited distribution system capacity may be encountered.

In 2006, the KDHE assessed the number of drought vulnerable public water supply systems in Kansas based primarily upon 2002 and 2005 Capacity Development Survey information. The definition of drought vulnerability and the drought limitation categories used were similar to those used in a KWO 2001 assessment. Ninety-three systems were assessed to be drought vulnerable in 2005 as compared to 133 drought vulnerable systems identified in the KWO 2001 assessment. Comparisons were also made to earlier assessments dating back to 1979.

The KDHE assessment illustrates the progress that has been made by public water systems in reducing their drought vulnerability. A significant aspect of this pro-

gress has been related to development of PWWSDs that utilize raw water sources that are not drought sensitive.<sup>(27)</sup>

### Demand Management During Drought

The KWO has developed guidelines for development of municipal water conservation plans that contain a drought contingency component.<sup>(10)</sup> Approximately 80 drought vulnerable public water suppliers have state-approved water conservation plans. Water conservation is also an effective mechanism for reducing long-term demand by reducing waste and lowering the amount of water used on a per capita basis.

### Quality of Drinking Water

To help ensure high quality drinking water, several regulatory programs have been developed and implemented by the KDHE. These programs require water quality to be monitored for several constituents, ranging from microbiological organisms to inorganic and organic chemicals and radionuclides. The KDHE Drinking Water Program reports the overall compliance rate for all Kansas public water suppliers for all drinking water regulations during 2006 was 97%.<sup>(3)</sup>

Another provision of the 1996 amendments to the SDWA requires each state to develop a Source Water Assessment Program. A source water assessment for 763 public water supply systems that treat and distribute raw source water was completed by the KDHE. The assessment includes the delineation of the source water assessment area, an inventory of potential contaminant sources, susceptibility analysis and public information. As indicated in the Kansas Source Water Assessment (January 2004), 54% of the 677 systems utilizing a ground water source received a low susceptibility analysis score, 45% were scored moderate and one percent high. Fifty-one percent of surface water systems received low susceptibility scores, with 43% scoring moderate and six percent high. Communities are being encouraged by the KDHE to use these assessments as the foundation for development of a local source water protection plan.<sup>(28)</sup> The [water quality section](#) of the *Kansas Water Plan* also incorporates the source water protection concept.<sup>(29)</sup>

### Source of Assistance for Public Water Suppliers

Although public water suppliers in Kansas have a good track record of compliance, they face many challenges.

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The KDHE has prepared a listing of technical and financial assistance available to public water suppliers. The fact sheet can be found on the KDHE web site.<sup>(30)</sup>

Some highlights are:

The KDHE Public Water Supply Program provides regulatory oversight and technical assistance to public water suppliers to assure safe potable drinking water to Kansas residents. The agency is responsible for implementation of the KDHE Drinking Water State Revolving Loan Fund Program<sup>(31)</sup> which provides low interest loans to public water supply systems for infrastructure projects to help achieve or maintain compliance with SDWA requirements.

The KWO provides or arranges to provide technical assistance to public water suppliers to develop water conservation plans and address high unaccounted for water and other problems.

USDA Rural Development Water Loan and Grant Program provides financial assistance for water and sewer projects in rural areas and towns up to 10,000 people.

The Community Development Block Grant Program administered by the Kansas Department of Commerce (KDOC) provides grants for water and sewer infrastructure projects. Project applicants are required to discuss proposed projects with an interagency committee of funding agencies including the KDOC, KDHE and U.S. Department of Agriculture (USDA) Rural Development. Water project applications are reviewed by the KWO for input prior to selection of projects for funding.

### Recommendations:

For the storage not committed to a user contract and not being paid for, the state should negotiate with the U.S. Army Corps of Engineers for most beneficial investment of state resources by:

- Establishing a joint, interest-bearing escrow account;
- Applying credit against the principal and interest for state investment in reservoir protection and restoration; and
- Requesting reallocation of water supply storage to water quality storage to serve minimum releases and to reduce the total storage quantity payment in Milford and Perry reservoirs.

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# Kansas Water Plan

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This *Kansas Water Plan* Section describes the current policy and institutional framework through which water quality protection and restoration is addressed in Kansas and provides an overview of progress towards meeting established goals and objectives.

Basin sections of the *Kansas Water Plan* provide additional detail regarding basin priority issues, including water quality.

### Overview

Water quality management falls into two general categories: surface water quality and ground water quality. Differing laws and policies govern each category.

The federal *Clean Water Act*<sup>(1)</sup> (CWA) provides the framework for management of water quality in the nation's surface waters. Kansas compliance with CWA provisions has allowed the U.S. Environmental Protection Agency (EPA) to grant "primacy" to Kansas for CWA administration and enforcement in the state.

The Kansas Department of Health and Environment (KDHE) oversees administration of the CWA, although other state agencies play important roles. This compliance includes enactment of state statutes and administrative regulations consistent with federal policy and the various assessment and reporting requirements involved. Kansas has also: 1) established an extensive surface water quality monitoring program; 2) developed numerous Total Maximum Daily Loads (TMDLs) to restore impaired waters; 3) implemented an innovative Watershed Restoration and Protection Strategy (WRAPS); and 4) developed a nutrient reduction plan.

Federal legislation of significance primarily to ground water quality includes the *Resource Conservation and Recovery Act of 1976* (RCRA),<sup>(4)</sup> the associated *Comprehensive Environmental Response, Compensation and Liability Act (Superfund) of 1980* (CERCLA),<sup>(5)</sup> and the *Superfund Amendments and Reauthorization Act of 1986*.<sup>(6)</sup> These Acts address solid and hazardous wastes and storage tanks.

The 1996 amendments to the federal *Safe Drinking Water Act* (SDWA),<sup>(7)</sup> while focused on finished drinking water at the tap, also calls for source water assessments of public water systems treating raw water. Sources of raw water may be either surface water or ground water. These assessments identify potential sources of drinking water contaminants.

The Kansas Corporation Commission (KCC) has authority to regulate and remediate oil and gas exploration and extraction activities that may affect water quality.

### Kansas Water Plan Guidance

The *Kansas Water Resources Planning Act*<sup>(8)</sup> provides the statutory authorization for addressing water quality management in the *Kansas Water Plan*. This Act established long-range goals for the management, conservation and development of the waters of the state, including:

- Protection and the improvement of the quality of the water supplies of the state; and
- Prevention of the pollution of the water supplies of the state.

2010 Objectives - Three 2010 Objectives, added to the *Kansas Water Plan* in 1998, provide targets for quantifying progress in implementing *Kansas Water Plan* water quality protection and restoration policy recommendations. These objectives are as follows:

- By 2010, reduce the average concentration of bacteria, biochemical oxygen demand, dissolved solids, metals, nutrients, pesticides, and sediment that adversely affect the water quality of Kansas lakes and streams.
- By 2010, reduce the average concentration of dissolved solids, metals, nitrates, pesticides, and volatile organic chemicals that adversely affect the quality of Kansas ground water.
- By 2010, ensure that water quality conditions are maintained at a level equal to or better than year 2000 conditions.

While an assessment of each of these objectives was conducted, assessment of water quality monitoring data collected by the KDHE as required by the CWA is now considered to provide a better basis upon which to identify trends and target funding and program assistance to areas of greatest need.

### Watershed Approach

The *Kansas Water Plan* has promoted a voluntary, incentives-based approach to surface water quality management that is focused on individual watersheds.

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**Active Policy Recommendations** – There are no active Water Quality Management policy recommendations. See the [Wetland and Riparian Management Policy and Institutional Framework](#) for recommendations in the *Kansas Water Plan* Policy Section: [Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation](#). This Policy Section, approved by the Kansas Water Authority (KWA) in January 2009, addresses the following four issues:

- Wetland and Forested Riparian Area Protection
- Stream Stabilization Planning and Implementation to Address Sedimentation in Public Water Supply Reservoirs
- Riparian and Wetland Protection
- Stream Stabilization

Contaminant levels in a stream or lake usually represent the combined impact of all upstream inputs. These contaminant inputs originate from either point or nonpoint sources. Point sources are those that can be tied to a specific point of discharge such as a factory, wastewater treatment plant, or a livestock feeding operation. Nonpoint sources generally involve contaminants carried overland in storm runoff from large land areas such as agricultural fields or paved areas.

Wetland and riparian areas are important elements of a properly functioning watershed. Benefits derived from riparian or streamside areas include erosion and sediment control, timber production, wildlife habitat, water quality protection, recreation, and aesthetic values. Wetlands in Kansas provide unique wildlife habitat, floodwater detention, ground water recharge, and water quality benefits.

[Reservoir Sustainability Initiative](#) – The long-term ability of Kansas reservoirs to provide public water supply and other benefits has become a concern. Loss of water supply storage space in reservoirs due to sediment deposition is a primary issue. In November 2007, the KWA adopted a strategic plan for sediment and surface water management policy. Development of policies to provide enhanced stream corridor and wetland management tools are part of this initiative as indicated in the above active policy recommendations summary.

Please see the *Kansas Water Plan* [Wetland and Riparian Management Policy and Institutional Framework Section](#) for a comprehensive description of the policies and institutional framework upon which wetland and ri-

parian area management efforts are undertaken.

### Surface Water Quality: Clean Water Act Compliance

The CWA provides the framework for management of water quality in the nation's surface waters. Initially enacted in 1948 as the *Federal Water Pollution Control Act*, the CWA, as it has come to be known, was significantly expanded and strengthened in 1972, amended in 1977 and reauthorized in 1987. Two fundamental goals of the CWA are to: 1) eliminate the discharge of pollutants into the nation's waters, and 2) achieve water quality standards such that all waters are fishable and swimmable. No such umbrella federal legislation exists for ground water.

At first, the CWA focused on point sources of pollution. The primary management tool was discharge permits issued by the states as part of the National Pollutant Discharge Elimination System (NPDES). Section 319 of the 1987 CWA reauthorization added a focus on nonpoint pollutant sources.

State-established surface water quality standards, approved by the EPA are the keystone of the CWA. States are required to submit an assessment of surface water quality conditions to the EPA every two years. A list of impaired waters not meeting water quality standards must also be submitted every two years for EPA approval. TMDLs must be developed for waters that are chronically impaired.

### Water Quality Standards

Section 303 of the CWA requires the states to set surface water quality standards for waters within their jurisdictions. Water quality standards define uses for water bodies and identify specific water quality criteria to support those uses. These standards also contain antidegradation policies designed to protect improvements in water quality and existing high quality waters.

Once surface water quality standards have been adopted by the states and approved by the EPA, they are used in determining NPDES permit limits, water body impairment status and TMDL endpoints.

Other policies and provisions explaining how the standards are to be implemented etc. may also be part of water quality standards.

[Kansas Surface Water Quality Standards](#) - All Kansas surface waters have been determined to be either classi-

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fied, meaning they are subject to meeting Kansas Surface Water Quality Standards<sup>(9)</sup> or unclassified. The designated uses of classified surface waters are listed in the Kansas Surface Water Register. These designated use categories are:

- Aquatic Life Use (special, expected or restricted);
- Contact Recreational Use (five subcategories);
- Domestic Water Supply Use;
- Food Procurement Use;
- Ground Water Recharge;
- Industrial Water Supply Use;
- Irrigation Use; and
- Livestock Watering Use.

If a designated use for a specific water body is contested, a Use Attainability Analysis may be conducted.

### Water Quality Monitoring and Assessment

The KDHE's Bureau of Environmental Field Services (BEFS) Section monitors water quality conditions in streams and publicly owned lakes and wetlands throughout Kansas. This is accomplished through these long-term monitoring programs: 1) Lake and Wetland, 2) Stream Chemistry, 3) Stream Biology, 4) Stream Probabilistic, and 5) Fish Tissue Contaminant. KDHE also conducts special investigations, often in cooperation with other state or federal agencies.

These monitoring and assessment programs are designed to meet the environmental surveillance and reporting requirements of the CWA and other applicable federal and state laws. Among these requirements are the state's biennial water quality assessment (Section 305(b) Report)<sup>(10)</sup> and the list of water-quality limited surface waters (Section 303(d) List).<sup>(11)</sup> These water quality data are also applied in the formulation of TMDLs for Section 303(d)-listed water bodies.

In addition to these KDHE programs, the Kansas Department of Wildlife and Parks (KDWP) Stream Assessment and Monitoring Program surveys fish and macroinvertebrate populations in streams. These populations may serve as good surrogate indicators of water quality.

2008 Integrated Assessment – The 2008 *Kansas Integrated Water Quality Assessment*<sup>(3)</sup> fulfills water quality reporting requirements contained in sections 303(d), 305 (b) and 314(a) of the federal CWA.



Cheyenne Bottoms. Photo courtesy Dennis Schwartz

Requirements related to Section 305(b) of the CWA were addressed, in part, by using data from the newly implemented Stream Probabilistic Monitoring Program to estimate stream mileage that fails to support those uses (aquatic life support, food procurement and recreation) recognized in Section 101(a) of the CWA. Sampling was targeted to those classified streams that contained water during the summer low-flow periods of 2006 and 2007. Due to severe drought extending into 2006, only 18,679 miles or about 67% of the state's classified stream mileage was sampled.

Results indicated that some 6,903 miles of the total assessed stream mileage supported all three designated uses, while 11,776 miles failed to support one or more designated uses.

Major causes for non-support for streams, in order of prevalence, were nutrient enrichment, natural climatic impacts, sedimentation, elevated *E. coli* concentrations and hydrological modifications. Sources primarily responsible for pollutant loadings and/or use impairments included agriculture (irrigated and non-irrigated crop production, livestock grazing and feeding operations and unrestricted cattle access), natural phenomena such as weather-related impacts and physical habitat degradation.

Of the 190,982 acres assessed in targeted lakes, some 155,340 acres were impaired for one or more designated uses. These lake assessment results were very similar to past assessments. Nutrient and eutrophication-related impacts dominated the list of water quality problems,

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with agriculture, urban runoff, natural sources and non-point source nutrient loads being the most dominant sources.

Water bodies consistently failing to meet water quality standards for their designated use(s) are identified on the Section 303(d) list of water quality limited surface waters. The CWA requires states to identify such waters every two years. The 303(d) list is used to identify those waters targeted for the development of TMDLs. The 2008 Kansas list identified water quality impairments requiring the development of TMDLs.

Other Assessment Information – A *Kansas Unified Watershed Assessment*<sup>(12)</sup> was conducted by KDHE and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) in 1998. Water quality monitoring data and other natural resource condition information were used in the assessment. These Assessments were a key part of the Clean Water Action Plan which also included watershed restoration action strategies. These strategies were a predecessor to the current watershed restoration and protection strategies (WRAPS).

Of 92 HUC-8 level watersheds examined in Kansas, 71 were classified as in need of restoration (Category I). Nine watersheds were classified as needing protection (Category II).

Watershed Condition Reports prepared by KDHE provide additional information with which to assess conditions within a watershed. Also, a joint effort is being made by the NRCS and KDHE to conduct Rapid Watershed Assessments which include estimates of conservation needs within the watershed. Rapid assessments have been completed in 14 HUC-8 level watersheds and are in-progress in an additional 10 HUC-8 level watersheds.

### **National Pollutant Discharge Elimination System**

As authorized by the CWA, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge directly into waters of the United States. Point sources include any discernable, confined and discrete conveyance such as a pipe or ditch. Confined Animal Feeding Operations (CAFOs) are also included.

An NPDES permit is a license for a facility to discharge a specific amount of a pollutant into a waterbody under

certain conditions to protect human health and the integrity of aquatic life. The KDHE is the EPA delegated permitting authority for NPDES permits in Kansas. Permits are issued for a specific period of time not to exceed five years.

Municipal – The Municipal Programs Section of KDHE regulates discharge from municipal waste treatment facilities. Municipal wastewater treatment infrastructure plays an important role in meeting established water quality goals. Replacement and routine maintenance of this infrastructure can present a significant financial challenge for communities. Construction grants were available until the early 1990s under the CWA and were administered by KDHE. The grants provided 50% to 75% of eligible project costs. The CWA amendments of 1987 phased-out the Construction Grants Program and replaced it with a revolving loan program to assist municipalities in the construction of wastewater collection and treatment systems by providing low interest loans. The State Revolving Loan Program is administered by KDHE and has been in-place since the early 1990s.

Industrial - The Industrial Programs Section of KDHE administers regulatory permitting programs for the handling, treatment and disposal of industrial wastewater and the pre-treatment of industrial wastes directed to municipal wastewater collection and treatment systems subject to federal CWA provisions or Kansas surface water quality standards.

Stormwater – The CWA amendments of 1987 required the EPA to adopt regulations to require NPDES permits for stormwater dischargers. The Kansas Municipal Stormwater Program has designated 39 entities within five urbanized areas and 19 municipalities outside of these urbanized areas as regulated municipal separate storm sewer systems requiring individual stormwater NPDES permits. In addition, two general permits have been developed; one for small municipal separate storm sewer systems in urbanized areas and the other for small systems outside urbanized areas. Urbanized areas include Wichita; Topeka; Lawrence, St. Joseph, MO-KS and Kansas City, MO-KS.

The Industrial Programs Section manages permits for stormwater discharges associated with construction and industrial activities.

Confined Animal Feeding Operations - In Kansas, the Livestock Waste Management Section of KDHE's Bureau of Water administers Kansas laws regarding live-

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stock waste. All CAFOs with an animal unit capacity of 300 or more must register with KDHE. Any facility with an animal unit capacity of 1,000 or more must obtain a Livestock Waste Management Permit. Additionally, any facility that represents a significant water pollution potential must register with KDHE.

### **Total Maximum Daily Loads**

The CWA requires states to develop TMDLs for water bodies identified on the state's List of Impaired Waters. <sup>(11)</sup> TMDLs are quantitative plans and strategies for pollutant load reduction needed to achieve the state's surface water quality standards.

In 1995, a complaint was filed against the EPA, compelling enforcement of Section 303(d) of the CWA by establishing TMDLs in Kansas. The State intervened in the litigation and a settlement was reached; the court decree approving the settlement was made on April 13, 1998. The Court Decree included a schedule for TMDLs to be developed and submitted in each of the state's 12 major river basins by 2006.

As of June 30, 2006, Kansas had completed its obligation to develop TMDLs in the 12 river basins of the state. The Court Decree was dismissed on January 22, 2007. The Kansas TMDL Program is now proceeding on a five-year cycle, rotating through each river basin to develop and revise TMDLs for selected impairments identified in the current Section 303(d) List.

The KDHE Watershed Planning Section is responsible for the state's TMDL Program. Selection of impairments to be addressed will be made jointly by KDHE and the basin advisory committees. Implementation of high priority TMDLs is included in each *KWP* basin section as a basin priority issue.

### **Surface Water Quality: Other Plans, Programs and Strategies**

While not necessarily tied directly to compliance with the CWA, the following plans, programs or strategies enhance achievement of its goals. Also, while primarily addressing surface water quality, these efforts may address ground water quality as well.

#### **Surface Water Nutrient Reduction Plan**

Nutrients including phosphorus and nitrogen are one of the greatest impediments to achieving improved quality

of surface waters in Kansas. Additionally, nutrients exported beyond Kansas contribute to water quality problems elsewhere, such as development of a "dead zone" within the Gulf of Mexico where many bottom-dwelling organisms have been killed or forced to move.

The EPA has requested that all states develop plans to establish water quality criteria for nutrients in surface waters. Kansas has focused on nutrient reduction rather than nutrient criteria as proposed in the *Kansas Surface Water Nutrient Reduction Plan*.<sup>(2)</sup> Reduction targets have proven to be effective elsewhere in the United States, notably in Connecticut and North Carolina.

As indicated in the Nutrient Reduction Plan, approximately 51,000 tons of total nitrogen (TN) and 7,700 tons of total phosphorus (TP) are exported from Kansas annually. Point source contributions to this export are 18 % for TN and 25% for TP. While small, these point source contributions are significant. Analysis indicates that discharges from the relatively small number of large wastewater treatment facilities are responsible for the vast majority of the point source contribution.

An overall 30% reduction in the total export of both TP and TN from Kansas is proposed. The 30% overall reduction in TN export is expected to be accomplished by a 55% reduction in contributions from point sources combined with a 24% reduction from nonpoint sources. For the 30% reduction in TP exports, component reductions from point and nonpoint sources are projected to be 55% and 22%, respectively.

Percentage reductions needed to achieve this overall 30% export target will vary by river basin. Figures 1 and 2 show a county-level improvement potential index for TP in surface waters and for TN in surface waters, respectively. This index was devised to screen counties based on the relative potential improvement that could be expected from implementation of nonpoint source best management practices (BMPs). Higher index values indicate a greater potential for improvement.

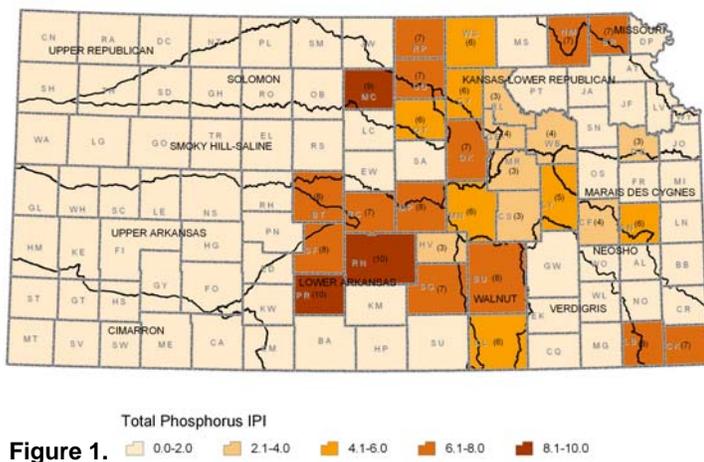
The proposed Kansas approach emphasizes specific controls for large sewage treatment plants along with targeted practices for controlling nonpoint nutrient sources.

Specific actions necessary to meet the 30% reduction target are expected to be developed through WRAPS and establishment of high priority TMDLs. The policy infrastructure for both approaches is in place.

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Improvement Potential Index (IPI) for Total Phosphorus in Surface Waters



framework and guidance for development and implementation of WRAPS in priority watersheds.

A special WRAPS fund has been established through the KDHE with federal funding through the EPA CWA Section 319 Program and state funding through the State Water Plan Fund. Other state and federal programs may be used to support various components of a WRAPS, particularly implementation projects. Local resources may also be used. Four categories of projects are eligible for funding; development, assessment, planning and implementation.

Proposals for WRAPS projects are evaluated based on criteria established by the interagency WRAPS work group. Watersheds above federal reservoirs (Figure 3) that serve public water supply needs have been identified as initial state interest priority areas.

As of March 2008, there were 44 active WRAPS projects located throughout Kansas as shown in Figure 4.

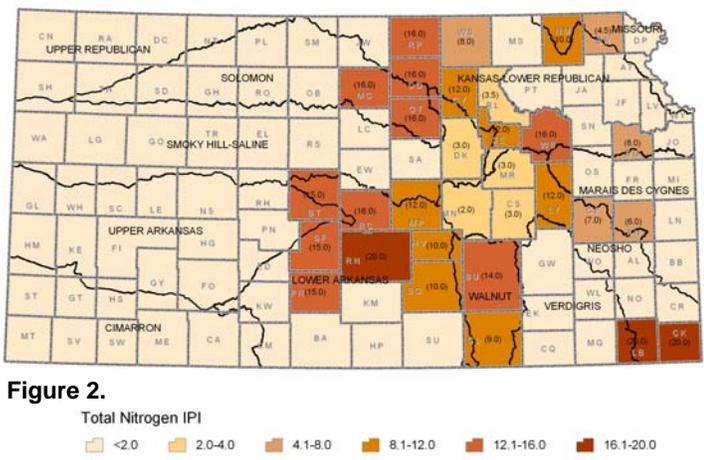
Nonpoint Source Pollution Control Programs – Implementation of WRAPS projects is often accomplished through nonpoint source (NPS) pollution control programs. NPS programs are delivered through coordinated efforts at the federal, state and local levels.

At the federal level, two key programs are delivered by the NRCS. The Conservation Reserve Program (CRP) is a voluntary program that provides annual rental payments to agricultural producers to safeguard environmentally sensitive lands by planting long-term, resource conserving vegetation to control soil erosion, improve water quality and enhance wildlife habitat. Program signups are held periodically. A continuous signup provision of the CRP provides funding for installing vegetative buffers and other practices to protect rivers and streams and other environmentally sensitive areas.

As of July 31, 2008, over 3.1 million acres were enrolled in the CRP in Kansas; approved contracts for all continuous programs, including Conservation Reserve Enhancement Program (CREP), covered nearly 97,000 acres. Additional contracts were pending approval at that time. Contract periods vary from 10-15 years.

The NRCS Environmental Quality Incentive Program (EQIP) provides technical and financial assistance to eligible farmers and ranchers to address soil, water, air and related natural resource concerns on their agricultural land. State water quality priority areas, such as

Improvement Potential Index (IPI) for Total Nitrogen in Surface Waters



### Kansas Watershed Restoration and Protection Strategy (WRAPS)

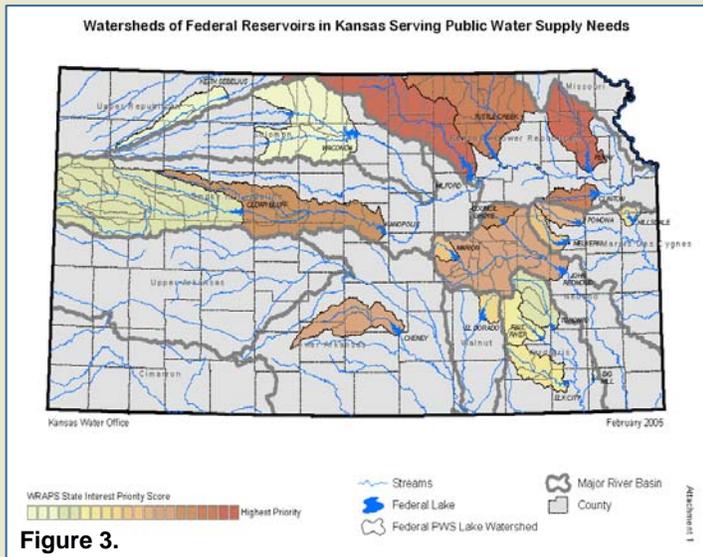
Kansas WRAPS is a planning and management framework that engages stakeholders within a watershed in a process to:

- Identify watershed restoration and protection needs.
- Establish watershed management goals.
- Create a cost-effective action plan to achieve goals.
- Implement the strategic action plan.

The WRAPS<sup>(13)</sup> is the result of a long history of Kansas water resources management programs and activities dating back to the 1950s. WRAPS was adopted in 2004 through a Memorandum of Agreement among member agencies of the Governor's Natural Resources Sub-cabinet. The strategy provides the general program

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high priority TMDL watersheds, source water assessment areas and federal multipurpose reservoirs are considered in the evaluation criteria for ranking and funding EQIP applications.

The U.S. Geological Survey (USGS) is involved with a variety of water quality monitoring and assessment projects that assist cooperators in addressing water quality related issues.

At the state level, the State Conservation Commission (SCC) has several programs that provide cost-share assistance to agricultural producers and other landowners for implementing BMPs that enhance water quality, reduce soil erosion and protect or restore riparian and wetland resources.

Notable among these are the NPS Program and the Kansas Water Quality Buffer Initiative. The NPS Program provides funding for BMPs through county conservation districts that have developed and adopted a Local Nonpoint Source Pollution Management Plan. Currently, 105 counties have adopted plans. The Buffer Initiative provides per acre rental payments supplementing federal rental payments received through the continuous CRP to install vegetative buffers along rivers and streams in priority watersheds to improve water quality.

The KDHE Watershed Management Section administers the EPA Section 319 Grant Program which provides funding for a variety of water quality and watershed related projects. The Local Environmental Protection Program (LEPP) provides funding to local units of government for adoption and implementation of county environmental codes.

University affiliated programs play an important role in water quality restoration and protection. The Kansas State University Research and Extension Program encompasses a variety of water quality related research projects as well as supporting watershed assessment and planning activities through county extension agents and watershed specialists. The Kansas Biological Survey (KBS) and the Kansas Geological Survey (KGS) at the University of Kansas are also engaged in water quality related research and watershed assessment and management projects.

The Kansas Department of Agriculture (KDA) administers programs relating to the use and regulation of pesticides and fertilizers.

Most of the state's water quality programs ultimately involve local entities such as the county conservation districts or watershed districts for implementation of on-the-ground projects.

Please see the [Kansas Water Plan Wetland and Riparian Management Policy and Institutional Framework](#) Section for additional information about NPS programs.

### Source Water Assessment

Enacted in 1972, the federal SDWA originally focused primarily on raw water treatment as the means of providing safe drinking water at the tap. Amendments in 1986 broadened the scope of the SDWA, recognizing the importance of source water protection. As is the case with the CWA, the EPA has designated the KDHE as having primary responsibility for administering and enforcing the SDWA in Kansas.

Each state is required to develop a Source Water Assessment Program (SWAP). Wellhead protection is included. Additionally, states are required to develop a source water assessment for each public water system that treats raw source water.

KDHE has completed source water assessments for all 763 Kansas public water systems required to have them. As indicated in *Kansas Source Water Assessment*,<sup>(16)</sup> 54% of the 677 systems utilizing a ground water source received a low susceptibility analysis score; 45% were scored moderate and one percent high. Fifty-one percent of surface water systems received low susceptibility scores, with 43% scoring moderate and six percent high. Communities are being encouraged by KDHE to use these assessments as the foundation for development of

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a local source water protection plan.

Spillage of solvents, pesticides and other chemicals; illegal dumping of wastes: abandoned industrial facilities and landfills; leaking storage tanks, oil and gas exploration and production; and surface mining are each examples of potential source water contamination sources.

### Other Water Quality Management Tools

Mechanisms existing under state authority to manage pollutant loadings, particularly those of a nonpoint nature are described below.

**Critical Water Quality Management Areas -** KDHE has authority to establish Critical Water Quality Management Areas (CWQMAs) under the authority of K.S.A. 65-171a and 171d, and K.S.A. 65-3301 *et seq.* Watersheds may be designated as a CWQMA because of pollutant sources that may cause damage to resources of the state; public nuisance or health hazards; destruction of fishery habitat; excessive deposition of sediment; additional risk to threatened or endangered species; or violation of water quality standards. Pollutant sources within a CWQMA are evaluated and a management plan is developed.

**Pesticide Management Areas -** The KDA has authority to develop Pesticide Management Areas (PMAs) when notified by the EPA or KDHE that a pesticide poses a serious threat to the public health, safety and welfare or to the natural resources of the state. A technical advisory committee is used in establishing the PMA boundaries and in developing a management plan.

**Sanitation Zones -** K.S.A. 65-187 gives the secretary of health and environment authority to adopt rules and regulations designating and establishing Sanitation Zones to regulate and control development of areas around certain water impoundments to prevent pollution, as-

sure sound and economical development and maintain healthy and sanitary conditions.

**Source Water Protection Planning –** The SDWA requires KDHE to provide assistance and coordinate the completion of public water system source water assessments as described previously. While the SDWA doesn't require source water protection plans to be developed, KDHE encourages public water suppliers and their surrounding communities, on a voluntary basis, to use the source water assessments as the foundation for future protection planning efforts.

### Ground Water Quality: Overview

As indicated previously, no umbrella federal ground water quality legislation comparable to the CWA has been enacted. Emphasis at both the federal and state levels has been on regulation of solid and hazardous waste disposal, storage tanks, and remediation of previously contaminated sites. Much of this emphasis has its roots in concerns about drinking water quality and enhances attainment of federal SDWA goals.

State initiatives related to ground water quality include a Governor's Executive Order covering the Equus Beds aquifer and identification of sensitive areas for wastewa-

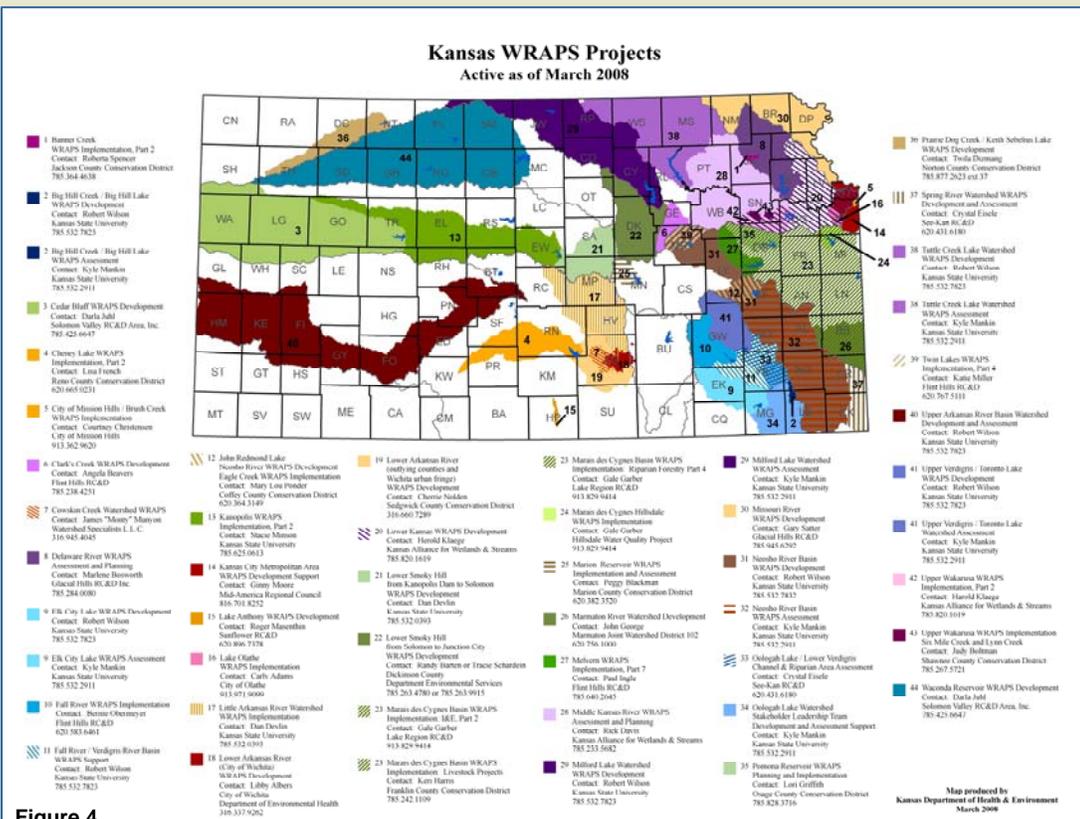


Figure 4.

Map prepared by Kansas Department of Health & Environment March 2008

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ter lagoons. Executive Order 00-04, executed by Governor Graves on March 15, 2000, ordered the Secretary of the KDHE to identify all known sources of existing and potential pollution in the Equus Beds aquifer of south central Kansas.

Regulations adopted by the KDHE in 2004 (K.A.R. 28-16-160 through K.A.R. 28-16-174) cover municipal, commercial and industrial wastewater lagoon requirements. Sensitive groundwater areas have been delineated in regard to implementing these regulations.

While the following certainly may have surface water implications, ground water aspects tend to take precedence in Kansas.

### **Resource Conservation and Recovery Act and Related Federal Statutes**

The federal Resource Conservation and Recovery Act (RCRA) was enacted in 1976 to ensure that the huge volume of municipal and industrial solid wastes generated nationwide were managed properly. Four goals were set by RCRA including protection of human health and the environment from the hazards posed by waste disposal. Three interrelated programs were established to meet these goals:

- Solid Waste Program
- Hazardous Waste Program
- Underground Storage Tank Program

Although RCRA created the framework for proper management of solid waste, it does not address the problems of hazardous waste found at inactive or abandoned sites or those resulting from spills that require emergency response. These problems are addressed by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly called Superfund, which was enacted in 1980. CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) in 1986.

Kansas Compliance and Implementation - As with most federal environmental legislation, RCRA and CERCLA encourage the states to develop their own waste management programs that meet federal standards in lieu of direct implementation of the federal program by the EPA. The Kansas Environmental Response Act<sup>(14)</sup> of 1988 provides authority and guidance for implementation of CERCLA in this state.

Federal and state law requires reporting of accidental spillage of any materials that may pollute water, air or soil. An exception is made for very minor spills and escapes occurring at oil and gas exploration and production sites. Cleanup of these spills is required.

KDHE's Bureau of Environmental Remediation (BER) is charged with responding to environmental emergencies and with managing environmental contamination through pollution source control, containment or remedial action. The BER is responsible for assessment and remediation of contaminated sites, with the exception of those related to oil and gas activities which are the responsibility of the Kansas Corporation Commission.

### **Ground Water Quality Monitoring**

The Kansas Ground Water Monitoring Program was managed and operated by the KDHE from 1990 through 2001. However, the ground water quality network was discontinued in fiscal year 2002 due to budget cuts. The 1990-2001 data includes 1,736 analyses from a maximum of 200 wells used for public water supply, rural/domestic water supply, irrigation, livestock watering, industrial water supply, ground water monitoring, or a combination of these uses that were sampled for inorganic chemistry, pesticides, volatile organic compounds, radionuclide and radon samples.

The primary objective of this monitoring program was to provide reliable information on ground water quality for use in the identification of any temporal and spatial trends in aquifer chemistry. These trends could be associated with alterations in land use patterns, advances in land treatment methods and other resource management practices, changes in ground water availability or withdrawal rates, and regional climatic variations.

Ground water quality is also monitored for specific projects or areas by state and local agencies including the KDHE, KGS; KCC; KDA and the groundwater management districts.

### **Remediation of Contaminated Sites**

State agency responsibility for contaminated site remediation depends upon the source of the contamination. Where contamination is related to oil or gas production at the production site, the KCC is responsible; otherwise, remediation is the responsibility of the KDHE.

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Remediation involves the assessment, investigation, cleanup and monitoring of contaminated sites. Once reported, potentially contaminated sites are inspected to assess the immediate and long-term health and environmental risks. If the site poses an immediate risk, emergency response actions are taken. If the site is determined to pose a threat to human life or the environment, an investigation is conducted to characterize the magnitude and extent of contamination and to evaluate whether remediation may be needed.

Remediation of a site may require removal (excavation of soil, drum removal), on-site clean up, off-site treatment or containment of contaminants. Where human health is threatened, alternate drinking water supplies may be provided.

KDHE encourages those responsible for the contamination to work cooperatively to achieve an appropriate cleanup. However, at so-called orphan sites a responsible party can't be identified, or is unable or unwilling to participate in remedial actions. The State Water Plan Contamination Remediation Program was developed specifically to provide a means of addressing such sites which, for whatever reason, fall outside the scope of other programs. Funding is provided through the SWPF.

State Water Plan Program - Contamination sites in the KDHE State Water Plan Remediation Program are prioritized based upon health risk to identify those sites requiring immediate attention. The majority of sites are being addressed in response to ground water impacts that have affected public and/or private drinking water wells.

During 2007, four sites were added to the program and two sites were removed, resulting in a total of 94 program sites as of December 31, 2007. Of these sites, 37 were in the investigation phase, 36 were being monitored and seven were in active remediation. Site summaries for all sites currently being managed through this program are available. Information regarding all contaminated sites managed by KDHE, regardless of program, is available in the Identified Sites List.

Oil and Gas Related Sites - Abandoned oil and gas wells present a significant public safety and water contamination potential unless properly plugged. The KCC: Abandoned Oil and Gas Well/Site Remediation Program uses monies from the Abandoned Oil and Gas Well/Site Remediation Fund established in 1996 to plug abandoned wells and remediate surface and ground water contamination related to oil and gas activities. An annual

revenue transfer from the SWPF helps provide funding.

### Resources

1. Clean Water Act. <http://www.epa.gov/lawsregs/laws/>
2. Kansas Department of Health and Environment, Bureau of Water. *Surface Water Nutrient Reduction Plan*. December 29, 2004.
3. Kansas Department of Health and Environment. April 1, 2008. *Kansas Integrated Water Quality Assessment*.
4. Resource Conservation Recovery Act of 1976. <http://www.epa.gov/lawsregs/laws/rcra.html>
5. Comprehensive Environmental Response Compensation Liability Act (Superfund) of 1980. <http://www.epa.gov/superfund/policy/cercla.htm>
6. Superfund Amendments Reauthorization Act of 1986. <http://www.epa.gov/superfund/policy/sara.htm>
7. Safe Drinking Water Act. <http://www.epa.gov/OGWDW/sdwa/>
8. Kansas Water Resources Planning Act. K.S.A. 82a-901. <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do>
9. Kansas Surface Water Quality Standards. K.A.R. 28-16-28b
10. Section 305(b) Report. [http://www.kdheks.gov/befs/305b\\_1996/](http://www.kdheks.gov/befs/305b_1996/)
11. Section 303(d). <http://www.kdheks.gov/tmdl/methodology.htm>
12. Kansas Unified Watershed Assessment. <http://www.kdheks.gov/nps/>
13. Kansas WRAPS Work Group. *Kansas Watershed Restoration and Protection Strategy*. Adopted by the Governor's Natural Resources Sub-Cabinet, May 2004 and endorsed by the Kansas Water Authority, June 2004.

# **Kansas Water Plan**

## **Water Quality Policy and Institutional Framework January 2009**

14. Kansas Environmental Response Act K.S.A. 65-3452. <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do>
15. The *Kansas Water Plan* Fiscal Year 2005 Update; Final Draft. *Water Quality Policy Section*. Released by the Kansas Water Authority, July 2003.
16. Kansas Department of Health and Environment. January 2004. *Kansas Source Water Assessment*.

# Kansas Water Plan

## Wetland and Riparian Management Policy and Institutional Framework January 2009

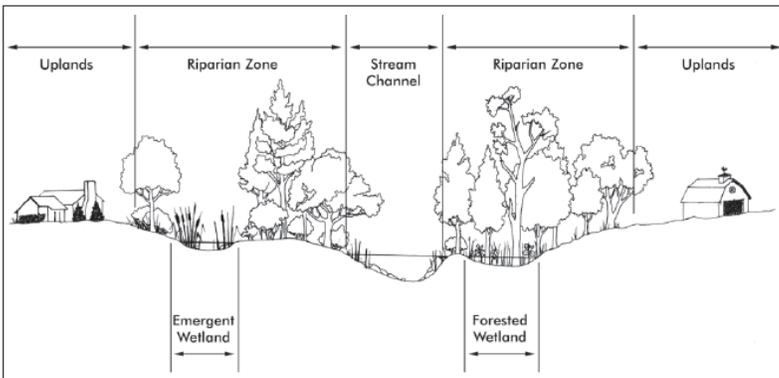
### Introduction

Concerns for the protection, restoration or enhancement of wetland and riparian areas have increased in response to greater public understanding of their ecological and economic value. Wetland and riparian areas are transitional lands between aquatic and upland locations. Wetlands include areas where standing water or wet soil conditions predominate. Riparian areas include stream-side and floodplain areas where the vegetation, soils, or topography are distinguishable from that on adjoining uplands. Figure 1 illustrates the location of riparian areas and wetlands relative to a stream channel.

Benefits derived from riparian areas include erosion and sediment control, timber production, wildlife habitat, water quality protection, recreation, and aesthetic values. Wetlands in Kansas provide unique wildlife habitat,

policy sub-section to the *Kansas Water Plan* in the Fish, Wildlife and Recreation Section titled *Riparian Protection*. The sub-section recommended the following policies:

1. Channel modifications requiring a state permit would include appropriate conditions to maintain riparian vegetation and stabilized banks as designated by the Department of Agriculture-Division of Water Resources.
2. County Conservation Districts would be required to develop county riparian protection programs to assist landowners in managing and maintaining riparian areas.
3. State provision for the use of conservation easements on riparian lands identified as crucial wildlife habitat to encourage protection and proper management.



**Figure 1. Relationship Between Wetlands, Uplands, Riparian Areas And the Stream Channel**

While all of these provisions have been implemented to some extent, riparian losses are still occurring. County riparian protection plans do not contain inventories of existing riparian areas.

In January 2007, the KWA recognized the preservation of public water supply storage capacity in federal reservoirs as a priority issue for further planning. Wetlands and forested riparian areas play vital roles in reducing sedimentation, which aids in preserving reservoir capacity. In all watersheds above these reservoirs, wetland loss is estimated between 50 and 60 percent of their original

floodwater detention, ground water recharge, and water quality benefits.

Estimates by the U.S. Fish and Wildlife Service<sup>(1)</sup> (USFWS) indicate that Kansas has lost more than 400,000 acres or nearly one-half of its wetlands since the 1780s. The vast majority of these were shallow and often ephemeral wetlands drained for agricultural use since 1950.<sup>(2)</sup> Prior to European settlement, Kansas forests were estimated to cover about eight percent of our land area compared to about four percent today. Riparian forests occurred along most of the streams and rivers, especially in the floodplains. Loss of riparian vegetation to channel modifications and streamside clearing has also been extensive in many parts of the state although estimates of these losses are not readily available.<sup>(3)</sup>

In 1986 the Kansas Water Authority (KWA) approved a

**Table 1  
Percent wetland coverage in watersheds above selected Kansas Water Supply Reservoirs.**

Reservoir	% Wetland Coverage
Big Hill	0.2
Clinton	1.2
Council Grove	0.4
Elk City	1.1
Hillsdale	2.3
John Redmond	0.7
Kanopolis	0.2
Marion	0.02
Melvorn	1.2
Milford	0.2
Perry	2.0
Pomona	1.4
Tuttle Creek	0.7

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coverage.<sup>(5)</sup> Table 1 shows estimated current coverage by wetlands within the watersheds of federal reservoirs providing public water supply.

A [Reservoir Sustainability Initiative](#) is being developed by the Kansas Water Office (KWO) to address all aspects of reservoir management. Wetland and forested riparian loss in watersheds above federal reservoirs is a priority concern for riparian forest and wetland protection due to their beneficial impacts on water quality and reduction of sediment transport. A *Kansas Water Plan* Policy Section has been developed that addresses the adequacy of current programs and policies to protect wetlands and riparian areas, and the effectiveness of current targeting of areas for stream restoration programs. Noted in the policy section is that degraded and unstable stream banks are a major source of sediment, especially during high flows.<sup>(6)</sup>



Figure 1. Jamestown State Waterfowl Management Area. Photo courtesy Kansas Geological Survey.

### Management Overview

Conversion of wetland (Figure 1) or riparian areas from their natural state to agricultural or other development uses poses a challenging management problem. Federal regulations, authorized by the Clean Water Act (CWA) Section 404 Program, protect some wetland areas from being filled in, or may require mitigation if filling is unavoidable.

No state regulations exist to protect riparian and wetland areas on private land. The primary policy of the state has been to facilitate the voluntary protection of these areas from conversion or channel modifications, and to stabilize streams which have been adversely affected by channel modification activities. Five guidance documents

were developed and widely distributed in 1993 to assist with this facilitation: 1) *Classification of Wetland and Riparian Areas in Kansas*, 2) *Conservation Goals and Strategies*, 3) *Management Practices for Wetland and Riparian Areas*, 4) *Local Planning Guide for Wetland and Riparian Areas in Kansas*, and 5) *Wetland and Riparian Areas Program Directory Manual*.<sup>(4)</sup> These documents were produced through an Environmental Protection Agency (EPA) grant, coordinated by the KWO, and included input from numerous state and federal resource agencies with expertise in the topic.

The Kansas Alliance for Wetlands and Streams (KAWS), as part of a EPA Wetland Program Development Grant, led an effort to review these guidance documents for updating and incorporation into a *Wetland and Aquatic Resource Protection Plan (WARP)* framework. This effort also involved an interagency group of wetland and riparian professionals. The group has identified the lack of current assessment information as a key impediment to completing a plan. The group also evaluated the need for development of a monitoring strategy to include additional wetlands beyond the publicly owned wetlands currently being monitored. Also evaluated was the need for the development of wetland specific water quality standards. Recommendations from the WARP Team have been discussed with the Governor's Natural Resources sub-cabinet for guidance on implementing the recommendations, and who will be responsible for development of a complete *Kansas Wetland Conservation Plan* for which the WARP provides a framework.

In January 2008, Kansas Stream Mitigation Guidelines were submitted by the Governor's Natural Resources Sub-cabinet to the U.S. Army Corps of Engineers (Corps) for use in designing and implementing mitigation projects when required under the federal CWA Section 404 program. The guidelines were developed by a committee of state resource agencies that are either subject to federal requirements, or have some role in administering the federal regulations. The guidelines are now available for use by entities proposing projects that would require mitigation and are intended to improve the quality of riparian and stream restoration projects.

A *Uniform Conservation Easement Act (UCEA)* in the Kansas statutes allows for state purchase of managed easements from a willing land owner.<sup>(11)</sup> This Act has had limited use. In the past ten years, four Land Trusts have been established in the state: 1) the Kansas Land Trust, 2) the Sunflower Land Trust, 3) the Watershed Institute Land Trust and 4) the Kansas Livestock Asso-

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ciation Ranchland Trust. All of these Land Trusts can permanently protect wetlands and riparian areas, among other valuable resources. Both the Sunflower and the Watershed Institute Land Trusts have established in-lieu fee programs that can be used in conjunction with the CWA Section 404 permitting and mitigation program to establish wetlands to replace those lost to conversion or development. They can also protect riparian areas either on a voluntary basis or in conjunction with mitigation requirements.

The state also promotes the restoration and enhancement of riparian and wetland areas to maintain or maximize the environmental benefits mentioned above. This is a key strategy in addressing the state's water quality restoration needs as part of implementing Total Maximum Daily Loads (TMDL's) in high priority areas (see [Water Quality Policy and Institutional Framework](#) Section), and in addressing identified high priority biological areas. High priority areas were identified and mapped in the *State Wetland and Riparian Implementation Plan*, developed in 2003 by KAWS through an EPA grant. Priority for this map was based on impaired waters and areas with threatened or endangered species and did not consider protection needs. The WARP group is considering updating of this map to include protection needs, updated high priority TMDLs, and a current listing of threatened and endangered species.

In 2004, the Kansas Watershed Restoration and Protection Strategy (WRAPS) was implemented through a Memorandum of Agreement between the state agencies represented on the Governor's Natural Resources Subcabinet to address watershed restoration and protection issues identified in the basin sections of the *Kansas Water Plan*. A major focus of this strategy is to address water quality and sedimentation issues affecting federal reservoirs that provide public water supply benefits. This will be done through the development and implementation of watershed management strategies by local WRAPS groups comprised of watershed stakeholders. These strategies are also expected to enhance the ability to inventory and identify areas in need of protection or restoration to improve water quality in priority areas.

In 2006, the WRAPS Work Group approved the following characteristics for properly functioning wetland and riparian areas to assist local WRAPS groups as they assess watersheds and set goals for implementing Best Management Practices (BMPs).

- Undisturbed hydrologic systems contain transitional

zones between streams and uplands which play important roles in function and maintenance of the systems. These areas should be managed to mimic undisturbed hydrology so that the channels and floodplains continue to sustain flows that are not disruptive to the system.

- Riparian land is covered with permanent vegetation appropriate to the landscape setting.
- Stream channels are connected to their floodplains and functioning appropriately.
- Wetlands are mapped and delineated and their beneficial functions are maintained.

Riparian lands, especially in western Kansas, have also been seriously impacted by the infestation of non-native phreatophytes. Of greatest concern are the effects tamarisk (salt cedar) and Russian olive are having on our native riparian ecosystems. The invasive thickets provide poor habitat for livestock and wildlife; increase fire hazards; decrease water quality, and generally use more water than native vegetation. Infestations in Kansas are roughly estimated to occupy greater than 50,000 acres. Recognizing the need for a long-term coordinated approach in addressing tamarisk and other non-native phreatophyte control, an inter-agency, multi-organizational team was assembled to develop a Strategic Plan. The [10-Year Strategic Plan for the Comprehensive Control of Tamarisk and Other Non-Native Phreatophytes](#) was adopted by the Governor in 2006.



Figure 2. Tamarisk Shrub in Flower.

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### Statutory Framework

Statutory authority for addressing wetland and riparian management issues in the *Kansas Water Plan* is contained in the *State Water Resource Planning Act*.<sup>(7)</sup> This Act establishes as long-range goals: 1) the reduction of damaging floods and the losses resulting from floods, 2) the prevention of the pollution of the water supplies of the state, and 3) the sound coordination of the development of the water resources of the state with the development of the other resources of the state. Statutory policies for achieving these goals can be found in the Resources section at the end of this paper.<sup>(7)</sup>

Statutory guidance is also provided to the Kansas Forest Service, Kansas Department of Health and Environment, Kansas Department of Wildlife Parks and Kansas Department of Agriculture-Division of Water Resources for wetland and riparian issues.

The following guidance is provided statutorily to the KFS:<sup>(10)</sup>

- The KFS is directed to provide an assistance program to forest landowners involved in the practice of forestry, including the growing, harvesting and marketing of forest products and in the management of forests for other multiple benefits such as water quality, streambank stabilization, erosion control, wildlife and recreation.
- The KFS shall cooperate with other agencies and organizations in conducting forestry related programs, including riparian and wetland protection and nonpoint source pollution control.
- The KFS shall cooperate with and assist the cooperative extension and other appropriate agencies in conducting educational programs and demonstrations in forest management, forestation, reforestation and other forestry related programs.
- The KFS shall promote watershed management and urban and community tree planting management and care; and to cooperate with federal and state agencies and such agency's subdivisions for any or all of these purposes.

Statutory guidance is provided to the KDWP to administer a Conservation Easement Program in which landowners can voluntarily enroll eligible high priority wetland and riparian areas or donate easements.<sup>(11)</sup>

The statutory guidance for KDHE involvement in riparian and wetland management related issues is found in the TMDL development and implementation activities<sup>(12)</sup> and in the nonpoint source pollution control measures including grants for development of local protection plans, technical assistance, and demo projects.<sup>(13)</sup>

The *Environmental Coordination Act* which regulates channel change activities is under the statutory authority of the KDA-DWR.<sup>(14)</sup>

### **Kansas Water Plan Objectives and Assessment**

The 2010 Objectives, added to the *Kansas Water Plan* in 1998, provide targets for quantifying progress in implementing *Kansas Water Plan* policy recommendations. The 2010 Objective addressing riparian and wetland management is:

- By 2010, maintain, enhance or restore priority wetlands and riparian areas.

An assessment of this 2010 Objective to determine progress in its achievement has not been conducted due to the lack of current information. An inventory of existing riparian and wetland areas is needed. Currently the best site specific wetland information available is the USFWS *National Wetlands Inventory* (NWI). Only a small part of northeast Kansas has been digitized for this information and the remainder is available only as hard copy.

The Kansas GAP map, developed in 2003 by the Kansas Biological Survey, includes wetland areas but is not at a scale useful for site specific assessment. The goal of the GAP Analysis Program is to identify those species and plant communities that are not adequately represented in existing conservation lands.

An inventory of land use within riparian areas at a 14-digit hydrologic unit code (HUC 14) level has been summarized from the GIS database developed by the Natural Resources Conservation Service (NRCS). However, the database is about 15 years old and more current information is needed. New land use data has been made available that can be used to update this inventory.

In 2008, KWO received a grant from the EPA to develop a more detailed Geographic Information System (GIS) based assessment methodology. The information can be used by local WRAPS groups to develop detailed maps and prioritize areas for protection, enhancement, restoration and creation of wetlands and riparian areas within

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their watersheds. The proposed methodology integrates readily available information to identify and prioritize wetland and riparian areas. The map and GIS database will include information on the location, type, condition and function of wetland and riparian areas.

### Applicable Programs

Several state, local and federal programs are available to carry out the wetland and riparian management effort. Key programs are described below along with a brief synopsis of current implementation activities and FY 2010 objectives where applicable. Additional information is available in the State and Federal Water Programs Manual available at [www.kwo.org](http://www.kwo.org).

Kansas Water Office State Water Planning Program: This program pursues state and federal funding to develop and implement wetland and riparian protection and restoration plans. The KWO Watershed Coordination Unit serves as the lead in coordinating the efforts of the various state water related agencies' riparian and wetland programs, and focusing those efforts on rivers, streams, lakes and wetlands identified in the *Kansas Water Plan* for protection, maintenance and re-establishment.

Kansas Department of Health and Environment (KDHE) Watershed Management Programs: Applicable programs include administration of EPA 319 grant funds by the Watershed Management Program, and development of TMDLs by the Watershed Planning Program. KDHE also administers the CWA 401 certification program.

KFS Forest Stewardship and Conservation Tree Planting Programs: These programs work cooperatively with KDWP, State Conservation Commission (SCC), NRCS, WRAPS groups and Farm Service Agency to implement riparian forestry programs in priority areas. As of 2008, four KFS foresters are service providers to ten WRAPS Groups. In 2007, through WRAPS projects, a total of 728 acres of forestry BMPs were implemented in high priority TMDL areas with estimated load reductions of 1,136 pounds of nitrogen, 797 pounds of phosphorus and 664 tons of sediment.

SCC Riparian and Wetland Protection Program: This voluntary program offers cost-share money via the county conservation districts to implement BMPs to better conserve and manage riparian and wetland areas. Riparian areas, tree plantings, wetland enhancement, streambank stabilization and soil bioengineering prac-

tices are utilized and encouraged where appropriate. Emphasis is placed on targeting projects to high priority TMDL areas and to areas above federal reservoirs. Additional points are given to contiguous projects. State funds are used to match federal funds up to 90% of the project costs to encourage landowner participation.

KDWP Private Lands Program: This program provides technical advice and planning assistance to private landowners interested in improving habitat for wildlife. Funding for the program is obtained from various state and federal sources; thus, the services provided vary depending on requirements stipulated by the fund source. Current programs include the Southeast Kansas Quail Initiative, KDWP Wildlife Habitat Improvement Program, Pheasant Initiative, Upland Gamebird Habitat Improvement Program, Buffer Coordinator Program, Playa Lakes Signup Incentive Program, and Playa Lakes Habitat Improvement Program. Activities supported by these programs include, but are not limited to, cost-share assistance for grass establishment and conversion, hedgerow renovation, shrub planting and food plot establishment. In some cases, KDWP also provides for the use of equipment necessary to accomplish wildlife conservation activities.

### Resources

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2. U.S. Environmental Protection Agency Historic Wetlands Map. 2006. U.S.E.P.A.
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4. Wetland and Riparian Areas Work Group. 1992. Kansas Wetland and riparian Resources: Conservation Goals and Strategies. Kansas Wetland & Riparian Areas Project. Kansas Water Office.
5. Kansas Applied Remote Sensing Program. 2002. Kansas Vegetation Map (GAP)
6. Kyle E. Juracek; Andrew Cl Ziegler. 2007. Estimation of Sediment Sources Using Selected Chemical Tracers in the Perry Land and Lake Wabaunsee Basins, Northeast Kansas. USGS

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7. State Water Resources Planning Act. K.S.A. 82a-901 (a - p) *et seq.* <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do> <http://epa.gov/owow/watershed/wacademy/acad2000/protection/> - Watershed protection site (EPA) includes urban growth planning and riparian and wetland value.
8. Floodplain regulations. K.S.A. 82a-928(a). <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do> <http://www.marc.org/metrotrails.htm> - Metro Greenways - recreation trails in KC Metro – (Mid Am. Reg. Council – MARC) some are riparian (streamside trails).
9. Kansas Watershed Restoration and Protection Program. <http://www.kswraps.org/> <http://www.smartgrowth.org/Default.asp?res=800> – Smart Growth Network – Urban and rural development issues. Incorporation of wetland and riparian areas into development projects.
10. Kansas Forest Service mission and guidance. K.S.A. 76-425. <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do> <http://www.kwo.org> - Kansas Water Office site. Links to many state and federal water related agencies and *Kansas Water Plan*.
11. Uniform Conservation Easement Act. K.S.A. 32-807 and K.S.A. 58-3810. <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do> <http://www.swt.usace.army.mil> – U.S. Army Corps of Engineers, Tulsa District <http://scc.ks.gov> State Conservation Commission website.
12. Riparian and Wetland Management TMDL development and implementation. K.S.A. 65-165 *et seq.* <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do>
13. Nonpoint source pollution control. K.S.A. 75-5657. <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do>
14. Environmental Coordination Act. K.S.A. 82a-325-327. <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do>

## Additional Resources

<http://www.cwp.org> – Information and training on urban stormwater management, urban Best Management Practices (Center for Watershed Protection).

<http://www.kdhe.state.ks.us/tmdl/> - TMDL information (KDHE)

<http://www.kdhe.state.ks.us/water/> - KDHE Bureau of Water (links to state and federal water programs and issues and groundwater management districts).

<http://www.kdwp.state.ks.us> - Water recreation - boating; hunting; fishing; state parks, state parks at federal reservoirs.

<http://www.stormwatercenter.net> – Urban stormwater management site – nonstructural and structural options.

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## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

### Background

Federal reservoirs are an important source of water supply in Kansas, providing water in some manner to roughly two-thirds of the citizens of the state. The State of Kansas owns water supply storage in 14 federal reservoirs operated by the U.S. Army Corps of Engineers (Corps). This storage is being diminished over time due to sediment deposition, reducing the capacity of the reservoir.

The future demand for water supply from federal reservoirs is projected to increase. Increasing demands coupled with decreasing supplies may result in water supply shortages during severe drought conditions. Analysis by the Kansas Water Office (KWO) indicates that this could occur within the next decade in the Neosho River basin. Other basins could face similar situations in the foreseeable future. The KWO has established a [Reservoir Sustainability Initiative](#) that seeks to integrate all aspects of reservoir in-flow, operations and releases into an operational plan for each reservoir to ensure water supply storage availability long into the future. Reduction of sediment transport and deposition is part of this initiative. Wetlands and riparian areas are vital components of proper watershed function that, when wisely managed in context with a watershed system can moderate and reduce reservoir sedimentation.

on reducing the amount of soil erosion coming from the land surface through the implementation of best management practices (BMPs) on crop land, pasture and rangeland, and construction sites. Watershed structures, which can reduce floodplain scour and trap sediment, have also been constructed in many watersheds to address rural flooding concerns.

Naturally occurring wetlands and healthy riparian areas are integral components of managing sediment in a watershed and maintaining stable streams. For over twenty years, state and federal agencies have been working together to promote voluntary participation in government cost share programs that restore, enhance, and create wetlands and riparian vegetative buffers.

Wetlands include areas with hydric soils where standing water or wet soil conditions predominate. Riparian areas include streamside and floodplain areas where the vegetation, soil, or topography are distinguishable from that on adjoining uplands, and also contain wetland resources. Concerns for the protection, restoration and enhancement of wetland and riparian areas have increased in response to greater public understanding of their ecological and economic value. However, losses of both resources continue to occur.

Numerous studies have documented the beneficial role of these resources in moderating runoff, storing excess water and reducing sediment and nutrient input into stream channels.<sup>(1, 4)</sup> Data from the Kansas GAP<sup>(9)</sup> project show the following percentages of wetlands in drainage areas of reservoirs providing public water supply:

Reservoir	Big Hill	Clinton	Council Grove	Elk City	Hillsdale	John Redmond	Kanopolis	Marion	Melvern	Millford	Perry	Pomona	Tuttle
% Wetland Coverage	0.2	1.2	0.4	1.1	2.3	0.7	0.2	0.02	1.2	0.2	2.0	1.4	0.7

While these data likely underestimate wetland occurrence due to limitations of the method used to derive them, the percentages of coverage are low and additional wetland protection and restoration efforts are needed to achieve water quality and sediment management benefits.

Additional research in Kansas documents the effectiveness of forested riparian areas on bank stabilization and sediment trapping.<sup>(3, 5, 6, 7)</sup> Forested riparian areas are superior to grassland in holding banks during high flows,



Reservoir sedimentation is a result of soil erosion from the land surface and from stream channels and banks. In most Kansas watersheds, this natural process has been accelerated due to changes in land cover and the modification of stream channels to accommodate agricultural, urban and other land uses.

Historically, most erosion control programs have focused

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when most sediment is transported.

The primary threats to wetlands and forested riparian areas are agricultural production and suburban/urban development. In Kansas, monitoring the extent of these



losses is difficult and current, updated inventories are needed. Suburban and urban pressures are resulting in increased conversions in the eastern part of the state where most of the population growth is occurring and where reservoirs are most important for drinking water supplies. The growth of the biofuels industry may also result in increased pressure to convert some of these areas for crop production.

There is growing evidence that a significant source of sediment in streams in many areas of the country is generated from stream channels and the edge of field gullies.<sup>(2)</sup> A recent U.S. Geological Survey (USGS) study in the Perry Reservoir watershed showed that stream channels and banks were a significant contributor to reservoir sedimentation in addition to land surface erosion.<sup>(8)</sup> Streambank erosion can also contribute nutrients, such as phosphorus, which can cause water quality impairments.

A naturally stable stream has the ability, over time, to transport the water and sediment of its watershed in such a manner that the stream maintains its dimension, pattern, and profile without either aggrading or degrading.<sup>(15)</sup> Streams that have been significantly impacted by land use changes in their watersheds or by modifications to stream beds and banks go through an evolutionary process in an attempt to regain a more stable condition. This process generally involves a sequence of incision (downcutting), widening and re-stabilizing of the stream. Many streams in Kansas are incised.<sup>(10)</sup>

Streambank erosion is often a symptom of a larger more complex problem requiring solutions that often involve more than just streambank stabilization.<sup>(14)</sup> It is important to analyze watershed conditions and understand the evolutionary tendencies of a stream when considering stream stabilization measures. Efforts to restore and re-stabilize streams should allow the stream to speed up the process of regaining natural stability along the evolu-

tionary sequence. This should involve a watershed-based approach to developing stream stabilization plans.

Stream stabilization projects can be costly compared to more traditional land surface BMPs, involving multiple landowners and a combination of stream stabilization techniques. Most of the stream stabilization work in Kansas has focused on controlling streambank erosion. Streambank stabilization project costs in Kansas have generally ranged from \$15 to over \$50 per linear foot. Costs are highly influenced by how far material must be transported to the site.

While programs do exist for the development, establishment, and management of wetlands and riparian forest, there is currently no state authority in Kansas for their protection and losses continue to occur from agricultural and urban development. Because of the benefits provided by wetlands and riparian forests, their relative scarcity, and the lack of protection authority, there may be a need for additional state efforts to protect them. This may include new and modified programs that overcome barriers to protection and establishment, considering the benefits these resources provide to reduce sedimentation in federal reservoirs. Landowners often comment that while financial assistance is available to establish forested riparian areas, payments are not adequate to compensate for the required long term management of the areas. The availability of annual or extended tax incentives or continued tax incentive payments would help to overcome this objection and make protection of existing high quality wetlands and riparian forests more feasible than removing them for crop production.

Wetlands and forested riparian areas have long been recognized as providing important habitat for a wide variety of wildlife and this has helped in gaining public support for their protection. We now understand and appreciate to a greater extent their value in maintaining healthy watersheds and water quality. Both moderate flows and hydrology which can reduce streambank erosion and reservoir sedimentation. The high cost of dredging federal reservoirs, the research that substantiates the effectiveness of wetland and riparian forests in reducing sediment transport during flood events, the role of riparian trees in streambank stabilization, and the evidence that major sediment deposition in reservoirs occurs during flood events, supports the need for protection and enhancement of wetlands and riparian forests.

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### Regulatory and Voluntary Programs

#### Federal Policies and Programs

The primary federal authority protecting streams and wetlands is the Clean Water Act (CWA) of 1972. Activities that alter wetlands are required to obtain a CWA Section 404 permit from the Corps. Many projects that result in the loss of wetland area, type or function are required to provide mitigation for those losses. However, recent U.S. Supreme Court decisions involving the authority of the Corps to regulate wetlands have limited the scope of the CWA, making headwater streams and isolated wetlands vulnerable to continued loss of acreage and function.

Section 401 of the CWA requires the state to certify that the action will not violate state water quality standards before the Corps can issue a Section 404 permit. Currently this certification only evaluates site specific impacts and does not account for cumulative effects of losses. In Kansas, there is no authority under this program to require mitigation for wetland losses.

The 404 program has a tiered set of project evaluation criteria for wetlands: avoid negative impacts, minimize impacts, and mitigate impacts. While the requirement for the mitigation of wetlands when unavoidable losses occur is a positive aspect of the program, mitigation is not totally effective for the following reasons:

- Smaller and isolated wetlands may not be fully protected under the CWA. It is estimated that between 45% and 83% of remaining wetlands in Kansas may be considered “isolated”, higher than the national average of 20 to 30%.<sup>(4)</sup>
- Mitigation often occurs outside of the watershed in which the loss occurs, reducing the inherent ability of the impacted watershed to self-regulate.
- Mitigation does not always replace the same wetland functional type (e.g., out-of-kind).
- Mitigation is not performed or is unsuccessful.

The Wetlands Reserve Program (WRP), administered by the Natural Resource Conservation Service (NRCS), allows a landowner to provide either a 30 year or perpetual easement to protect and buffer wetlands, and implement a wetland restoration and protection plan. Forested riparian areas are eligible when linked to an eligible wetland. Priority is given to sites that provide permanent protection and enhance habitat for wildlife. Since 1995, a total of 14,129 acres of wetlands in Kansas have been enrolled in this program. NRCS reports that the program

is under-utilized and that available funding goes unspent annually. Despite current and historic efforts to promote wetland conservation, many landowners still do not recognize the presence or value of wetlands on their property, and remain skeptical of wetland programs due to the potential regulatory connection. Additional incentives for landowner participation in the WRP may be needed.



**Cheyenne Bottoms. Photo courtesy Dennis Schwartz.**

Several U. S. Department of Agriculture (USDA) programs offer incentives to Kansas landowners to establish or enhance riparian forest buffers. The most widely used has been the Continuous Conservation Reserve Program (CCRP). Because of barriers to adoption of riparian forests buffers, grass filter strips (CP 21) have been much more popular than riparian forest buffers (CP22) even though research documents that riparian forests are more effective at stabilizing stream banks and causing sediment deposition, especially during flood events.

Barriers to adoption of forested buffers include longer time to establish, preference for grass planting over trees, management needs, and lack of understanding of benefits. In addition, participation in this program is largely dependent on the interest of the local NRCS district conservationist in promoting it. Enhanced marketing and targeting of program availability and resources is needed to better utilize the program. Additional financial incentives may also be helpful.

Another USDA program to address the need for protection and enhancement of riparian forests is the Healthy Forest Reserve Program (HFRP). Created from Title V of the 2003 Healthy Forests Restoration Act the program

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was piloted in Maine, Mississippi and Arkansas in 2006. A HFRP grant was approved in 2008 for a Kansas project in the Delaware River Watershed. With a focus on threatened and endangered species, biodiversity and carbon sequestration, the program offers options of a 30 or 99 year easement, or a 10-year cost-share agreement. Cost-share assistance for forestry practices such as tree planting and timber stand improvement at a 50% rate for the 10-year agreement, 75% for the 30-year easement and 100% for the 99-year easement are provided. Easement payments are based on a fair-market value land appraisal prior to the easement and after the easement is established. The difference in value forms the basis of compensation. Developing a state program that complements HFRP similar to what the Kansas Water Quality Buffer Initiative (WQBI) did with CCRP has the potential to promote protection of riparian forestland.

Swampbuster provisions of the federal Farm Bill disqualify landowners from receiving federal government payment for conservation practices if wetlands on the property are drained or modified. However, this does not apply to landowners not receiving government payments.

Environmental Quality Incentives Program (EQIP) funding for protection of riparian areas is matched by State Conservation Commission (SCC) funds to bring the federal/state share of projects to 90% of total costs. Even with this financial incentive, funds are not fully utilized. Program managers indicate that funding for establishing the protection or enhancement of forested riparian areas is not the main problem in getting program participation. A long term tax incentive program would encourage long term protection of established areas. Allowing selected harvesting of trees in protected riparian forests may encourage long term protection and further incentivize participation.

To date, 30,811 acres of grass filter strips have been established in Kansas through CCRP but only 4,484 acres of riparian forest buffers have been established.

The U.S. Fish and Wildlife Service (USFWS) Partners for Wildlife program also provides funding for restoring wetland or riparian resources.

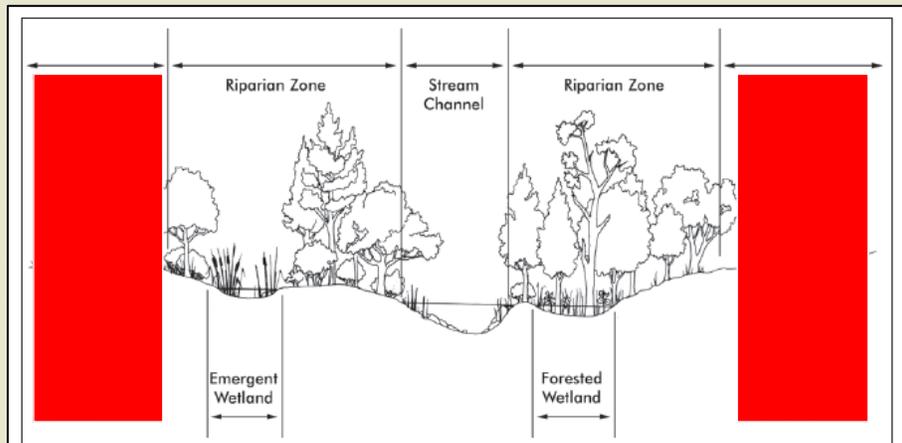
### State Policies and Programs

In 1986 the Kansas Water Authority (KWA) approved a policy sub-section of the *Kansas Water Plan* (KWP) in

the Fish, Wildlife and Recreation Section titled *Riparian Protection*. The sub-section recommended the following policies:

1. Channel modifications requiring a state permit would include appropriate conditions to maintain riparian vegetation and stabilized banks as designated by the Kansas Department of Agriculture-Division of Water Resources (DWR).
2. County Conservation Districts (CD) would be required to develop county riparian protection programs to assist landowners in managing and maintaining riparian areas.
3. State provision for the use of conservation easements on riparian lands identified as crucial wildlife habitat to encourage protection and proper management.

While all of these provisions have been implemented to some extent, riparian losses are still occurring. County riparian protection plans do not contain inventories of existing riparian areas.



**Relationship Between Wetlands, Uplands, Riparian Areas & the Stream Channel**

The Kansas WRAPS Program provides funding to support watershed stakeholder groups to develop and implement watershed restoration and protection strategies. WRAPS projects have been initiated in all but one of the watersheds above federal water supply reservoirs. The WRAPS Work Group has identified the following desired functional conditions for wetland and riparian systems:

- Stream channels are connected to their floodplains;
- Streambank soil loss does not exceed a level commensurate with normal geomorphic processes for the watershed;
- Undisturbed hydrologic systems contain transitional

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zones between streams and uplands which play important roles in function and maintenance of the systems. These areas should be managed to mimic undisturbed hydrology so that the channels and floodplains continue to sustain flows that are not disruptive to the system.

- Riparian land is covered with permanent vegetation appropriate to the landscape setting; and
- Wetlands are mapped and delineated and their beneficial functions are maintained.

Development and implementation of local watershed restoration and protection strategies is expected to enhance more pro-active protection activities. However current state and federal assistance programs focus on restoration of these resources and not on protecting healthy, properly functioning wetland and riparian areas. In the past 10 years, four Land Trusts (Trusts) have been established in the state: The Kansas Land Trust, the Sunflower Land Trust, the Watershed Institute Land Trust and the Kansas Livestock Association Ranchland Trust. All of these Trusts can permanently protect wetlands, among other valuable resources, under the authority of the Uniform Conservation Easement Act.<sup>(16)</sup> Both the Sunflower and Watershed Institute Trusts have also established in-lieu fee programs that can be used in conjunction with the Section 404 permitting and mitigation program to establish wetlands or riparian forests to replace those lost to development. In limited cases, protection of an existing wetland may be eligible for mitigation credits under these programs.

The Kansas Livestock Association has supported the creation of a conservation easement funding source, although the organization does not specifically target conservation easements for wetland protection. Because Trusts usually have specific goals and requirements for what parcels of land are eligible under their programs, small parcels of land containing valuable wetlands may not be eligible for inclusion in these programs.

Stream mitigation guidelines to be used in the Corps Section 404 permitting program are available for use in Kansas. These guidelines can be used to establish mitigation requirements for activities that impact stream channels and riparian areas. Opportunities to establish, enhance, and protect riparian areas are an important aspect of these guidelines. In some cases, permanent protection of existing healthy forested riparian areas may be eligible for mitigation credits. The establishment of a forest riparian registry would assist in matching land owners who would like to permanently protect riparian

forests with entities that are required to comply with mitigation requirements.

Several state agencies administer assistance programs addressing wetland and riparian area management. The SCC administers the Kansas WQBI program, which provides state incentives to complement the federal CCRP Program for establishing riparian forest or grass buffers in high priority watersheds. The Kansas Forest Service (KFS) provides technical assistance for managing and restoring riparian forests through the Forest Stewardship Program and in partnership with the NRCS provides financial incentives through the Environmental Quality Incentives Program for Forestland Health.



Various other conservation organizations, such as the Kansas Alliance for Wetlands and Streams (KAWS), have also implemented many wetland, riparian and streambank stabilization projects throughout the state with funding from multiple sources (e.g. Environment Protection Agency (EPA) Wetland Program Development Grants and CWA Section 319 grants).

There are no state regulations that directly prevent losses of wetland or riparian areas. The state regulatory program is limited to Section 401 Certifications discussed above and does not protect wetlands and riparian areas not subject to federal regulation. In some urban communities, local stream ordinances have been adopted to protect riparian buffer areas. Riparian buffers are the first line of defense in stabilizing streambanks and channels. High quality riparian buffers can mitigate some effects of land use changes in the watershed and allow stream channels to regain equilibrium, perhaps negating the need for extensive restoration over time. Most local ordinances exempt current uses and only require riparian buffer protection in new development or when land changes ownership or use. The Kansas Association of Conservation Districts (KACD) endorsed this model with a Resolution at their 2005 Annual Convention supporting statewide legislation requiring riparian buffers when land changes from agricultural use to a more intensive development use.

In recent years, reservoir sedimentation has become a

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significant focus for targeting state and federal assistance for streambank stabilization projects. Some WRAPS projects above federal reservoirs have recognized streambank erosion as a priority watershed concern and have conducted assessment activities and demonstration projects.

The principal sources of state and federal funding for streambank stabilization projects are currently cost-share programs of the SCC and the NRCS EQIP Program. Most projects are currently implemented on a site by site basis based on applications received from willing landowners. State and federal cost-share rates have generally ranged from 50-90% of the total project costs.

A Stream Rehabilitation Sub-Section of the *Kansas Water Plan* was approved in 1987 to support stream rehabilitation projects for streams affected by past channel modification activities. Projects required a local cost-share sponsor and were restricted to areas where a significant state interest was identified. Plans were required for an entire stream reach to ensure a comprehensive approach and required approval by the Chief Engineer, DWR. The program was administered by the SCC under the authorities of K.S.A. 2-1915 *et seq.* One stream rehabilitation plan was prepared, however no stream rehabilitation projects have been implemented to date under this program. Plan implementation required a local match and due to the relatively high cost of stream rehabilitation, the sponsor chose not to implement the plan.

The DWR administers the Stream Obstruction Act<sup>(17)</sup> which requires prior approval and a permit for projects that modify the course, current or cross section of a river or stream, but specifically exempts from regulation properly placed revetments and jetties installed to protect caving banks. Streambank stabilization projects may require a stream obstruction permit from the DWR and a CWA Section 404 permit from the Corps.



Bendway weirs

K.S.A. 82a-1101 *et seq.* designated the Kansas Water Resources Board (now KWO) with oversight responsibilities for bank stabilization projects involving more than one political subdivision. This statute was enacted in

1969 to address stream bank erosion concerns on several major rivers in Kansas and to secure federal funding and local participation for projects.

### Policy Issues, Options and Recommendations

At issue is how to best manage wetland, riparian, and stream systems to maximize their proper functioning capacity thereby reducing sedimentation in federal drinking water supply reservoirs. Two issues have been identified to better address sediment management within reservoir watersheds. These include:

1. State Wetland and Forested Riparian Area Protection
  - Utilize existing programs.
  - Voluntary easements and incentives.
  - Utilize some regulatory and voluntary elements of both options 1 and 2.
2. Stream Stabilization Planning and Implementation
  - Utilize existing programs.
  - Revitalize the Stream Rehabilitation Program.
  - Redesign the Stream Rehabilitation Program and form a management team.

### Issue #1: State Wetland and Forested Riparian Area Protection

Healthy, properly functioning wetlands and riparian areas are important landscape components in managing sediment and related pollutants within a watershed. About half of the wetlands and forested riparian areas that were present in watersheds in Kansas before European settlement have been lost due to human activities. Loss of these resources contributes to increased landscape and streambank erosion, which contributes to increased reservoir sedimentation and loss of storage capacity.

Programs are available through state and federal agencies to restore or create wetlands and forested riparian areas. However, there are no state programs that are targeted to protect existing high quality, properly functioning wetlands and riparian forest resources. Regulatory authority to protect wetlands is limited to the 401 Certification Program and no additional state oversight has been authorized. Losses of these resources are still occurring in Kansas, although current data are lacking on the extent of these losses. A systematic assessment and evaluation of existing conditions is needed for both resources along with a program to protect high quality

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resources in reservoir watersheds.

### Options to Address Issue #1: State Wetland and Forested Riparian Area Protection

#### *Option #1: Regulatory Oversight*

One option is for the state to use regulatory oversight of wetlands and forested riparian areas. This could include establishing permit requirements to supplement the federal program for wetlands and expanding on local stream ordinances with stream setback requirements by establishing statewide riparian protection legislation. Potential regulatory programs and their use in other states are described below:

- Incorporate Kansas Stream Mitigation Guidelines into 401 Water Quality Certifications. An example is Ohio, which incorporates mitigation standards with credits and debits into the 401 program. Other states, including Colorado, Illinois, and Nebraska also have some ability to require and monitor mitigation through the 401 program.
- Utilize the existing Critical Water Quality Management Areas<sup>(18)</sup> statute and regulations to comprehensively manage wetland and riparian areas, along with other practices, in critical areas (e.g. above federal drinking water supply reservoirs)
- Increase state oversight of the federal Section 404 program to ensure that all wetlands are protected, losses are minimized, and when they occur, that mitigation activities are appropriate at the watershed scale, and they are successful. The state can assume permitting responsibility through State Programmatic General Permits (SPGP). SGPAs are administered by a state agency and designed to eliminate duplication of efforts between Corps districts and states, as well as to make the permitting process more efficient with flexibility as to the geographic region covered. Six states have a SPGP program: Florida, New Hampshire, New York, North Carolina, Pennsylvania, and Wisconsin.
- Special Area Management Plans (SAMPs) can be developed in conjunction with the Corps through a General Permit. There are two main goals of the SAMP process: to establish a watershed-wide aquatic resource identification and reserve program, and to minimize individual and cumulative impacts of future projects in these watersheds. Six states have

instituted SAMPs: Colorado, Florida, Nebraska, Virginia, Washington, and Wisconsin.

- Provide for the permanent protection of wetlands in floodplains through requirements to local governments. For example, Wisconsin's cities and villages are required to zone their flood prone areas. The state sets minimum standards and regulates how development can occur within floodplains.
- Develop a state Isolated Wetlands Permit for wetlands currently or potentially not covered by federal regulation. Six states, Washington, Michigan, Illinois, Ohio Tennessee and North Carolina, have the authority to permit activities in isolated wetlands.
- Consideration of statewide or critical area riparian corridor protection legislation. North Carolina has established the Catawba River Basin Permanent Riparian Buffer Protection Rules that have been in effect since August 2004. Developed with broad representation from the public, the rule requires maintenance and protection of existing 50 foot wide vegetated riparian areas along the river and along mainstem lake shorelines.

See Appendix A for a summary of select states' enhanced program implementation.



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### Option #2: Voluntary, Easements and Incentives

A second option is to better protect riparian and wetland resources through enhanced use of conservation easement programs and tax incentives. Conservation easements have become an increasingly accepted means of protecting valuable natural resources in Kansas. The WRP administered by the NRCS provides for conservation easements to protect and restore wetlands. Forested riparian areas are eligible when linked with an eligible wetland. Available funding for this program has been underutilized and there may be a need to enhance the level of funding to purchase easements to increase program participation. State funds could be made available and leveraged with federal programs when available to protect high quality wetland and riparian forest resources, similar to the approach used for the Kansas WQBI. A state source of funding for conservation easements to protect these areas could be administered by the KFS and the Department of Wildlife and Parks (KDWP) to leverage WRP and other funds when possible. In the past 10 years, four land trusts have been established in the state and present another opportunity to protect wetlands and forested riparian areas through the use of conservation easements. The state could also partner with Trusts when appropriate to enhance funding availability. Following are some incentive programs that could be considered to enhance participation in voluntary protection programs.

- Partner with land trusts to offer additional incentives for protecting wetlands and forested riparian areas. Possible elements to an enhanced program could include:
  - State legislation creating a conservation easement funding source in Kansas. The funding source could be used to both acquire easements and to assist in monitoring and other administrative requirements for easement maintenance. The funds could be used to enhance payments in the WRP to promote participation.

In California, the Riparian Habitat Conservation Program allows the Wildlife Conservation Board to grant funds for acquisition and restoration to non-profits, local governments and state and federal agencies. The Board can also acquire land directly. In Washington, the Riparian Habitat Protection Grant Program, established by state legislation

and paid for through capital bonds, allows the state and local governments to receive grants to acquire and manage high quality riparian areas.

- Develop a Protection of Private Wetland/Riparian Tax Credit Program. In Arkansas, the Creation and Restoration of Private Wetland and Riparian Zones Tax Credit Program allows a credit against the state income tax for any taxpayer engaged in the development or restoration of wetlands and riparian areas. A fee of three percent of the total approved tax credit is paid to the Arkansas Soil and Water Conservation Commission and total tax credits cannot exceed \$50,000/project.

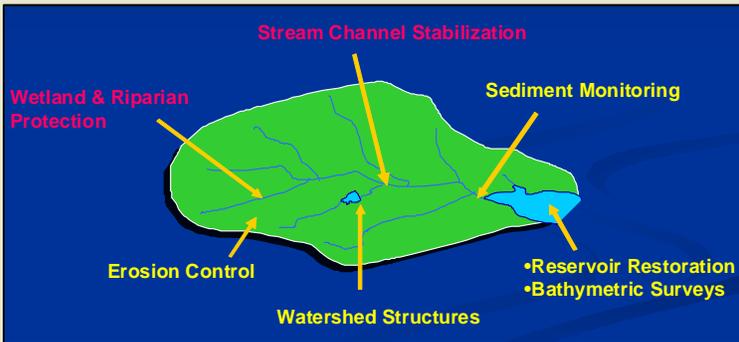
In Virginia, localities can grant tax incentives to encourage landowners to protect wetlands and riparian buffers. Localities can provide real estate tax exemption or reduction by ordinance. A state Water Quality Improvement Fund is used to reimburse local governments for tax credits. The program is administered by the Virginia Department of Conservation and Recreation. The state also administers the Riparian Buffer Tax Credit Program for individuals who own land on which timber is harvested, which abuts a waterway, and who cease timber harvesting on certain portions of the land for 15 consecutive years. The credit is 25% of the value of the timber retained as a buffer up to \$17,500.

- Develop a Property Tax Incentive Program for landowners who permanently protect wetlands and riparian forests on their property. Property taxes would be reduced for these areas.
- Utilize 319 funds and other available funding sources by Trusts to purchase conservation easements for wetlands as an implementation activity in WRAPS projects.

- Several states, including Arkansas, Virginia, California and Oregon, have established tax incentives or credits and property tax relief for wetland and riparian protection. The State of Pennsylvania recently enacted the Resource Enhancement and Protection Program (REAP) which allows farmers and businesses to earn tax credits in exchange for BMPs that

enhance farm production and protect natural resources. Administered by the State Conservation Commission, tax credits by the Pennsylvania Department of Revenue between 25% and 75% of the project costs will be granted as state tax credits for up to \$150,000 of costs. In the first 10 days of the program, over \$10 million in requests were submitted. Combining incentive programs with wetland and riparian assessments accomplished by Watershed Restoration and Protection Strategy (WRAPS) groups could help to target and leverage similar programs in Kansas.

- Allow for exemption from state income tax those monies received from federal government cost share programs to protect wetlands.
- Establish a voluntary wetland and riparian forest registry to enhance effectiveness of the stream mitigation guidelines and mitigation program.



*Option 3. Utilize some regulatory and voluntary elements of both Options 1 and 2.*

A third option is to utilize portions of both Option 1 and Option 2 to develop a comprehensive wetland and riparian area protection program consistent with the goals of the *Reservoir Sustainability Initiative*. Pursuing increased funding and state participation in application of Conservation Easements can be accomplished in a short time frame and would have immediate and cumulative benefits. Further exploration of the most effective use of tax incentives would be done with additional public input to determine the highest probability of success of each proposed program and acceptance by both governmental agencies and private citizens.

A regulatory outreach effort could be initiated to begin public discussion of what level of increased regulation would be acceptable and likely to succeed. This would include discussion of enhanced use of existing regula-

tory authority and discussion about potential additions to existing authority. If the public gains understanding of the intent and benefits of regulatory oversight to the goal of long term water supply availability, it is anticipated that programs could be developed that would benefit both the public and the resource. This approach has not been developed in a targeted manner and to either exclude the potential for increased regulation or to recommend it as the best option at this time is premature.

Option 3 is recommended.

### **Issue #2: State Stream Stabilization Planning and Implementation to Address Sedimentation in Public Water Supply Reservoirs**

Many streams in Kansas watersheds have been impacted from land use changes and modification to stream banks and channels. As a result, many streams are in an unstable condition and are incurring increased channel and bank erosion.

A number of streambank stabilization projects have been implemented in recent years with state and federal assistance to address stream bank and channel erosion concerns. To date, these projects have been implemented primarily on a site by site basis. For maximum effectiveness, multiple projects are often needed within a stream reach to achieve a significant reduction in the sediment load carried by the stream and ultimately deposited in a downstream reservoir. Stream stabilization projects that are implemented to address reservoir sedimentation should employ a holistic, watershed-based approach for assessment, planning, design and implementation to improve the effectiveness of these projects in reducing downstream sedimentation. At issue is how the state can best facilitate this approach in the planning and implementation of stream stabilization projects in reservoir watersheds.

#### Options to Address State Stream Stabilization Planning

##### *Option #1: Utilize Existing Programs*

One option is to promote more comprehensive, watershed-based planning and implementation of stream bank stabilization projects above federal water supply reservoirs through existing state and federal assistance programs. This would primarily involve programs of the SCC and the NRCS. Although this approach should be and has been encouraged to the extent possible, the existing programs are not well-suited to facilitate project

# Kansas Water Plan

## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

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planning and implementation for large scale stream stabilization projects involving multiple landowners and stabilization measures. Funding is also limited for project planning, design and implementation of stream stabilization projects.



*Option #2: Revitalize The Stream Rehabilitation Program*

Another option is to revitalize the SCC Stream Rehabilitation Program discussed previously and target program application to priority watersheds above federal water supply reservoirs. This program employed a comprehensive approach to stabilizing streams, involving development of a rehabilitation plan for a specific stream reach prior to the implementation of stabilization measures. However, this program required local sponsorship and cost-sharing for plan development and project implementation. This can be a significant limiting factor given the potential cost of implementing comprehensive stream stabilization projects and the reliance on voluntary participation in implementing stabilization measures.

*Option #3: Redesign The Stream Rehabilitation Program and Form Management Team*

A third option is to redesign the SCC Stream Rehabilitation Program to provide for enhanced state participation and funding in the planning and implementation of stream stabilization projects. The program would be targeted to problem stream reaches in watersheds above

federal water supply reservoirs that are determined to be a significant contributor of sediment to downstream reservoirs. Reservoirs would be prioritized and comprehensive stream corridor assessments conducted on a priority basis. Potential problem areas would be determined through the assessment process and then prioritized for stream stabilization planning. Funding for the implementation of projects included in an approved plan would be sought through state and federal sources.

Formation of a wetland and stream management team to better coordinate the siting, sizing and functional development of constructed and improved compensatory wetlands and riparian habitat in the state would enhance this systematic approach, provide additional funding sources, and build in house technical capabilities in the KWO. The team would include state, federal, local, and private entities. The KWO would serve as the primary lead in coordinating the partners of the management team as well as a technical service provider in implementing team recommendations. Coordination with WRAPS groups and involvement of local stakeholders would be an integral part of the assessment, planning and implementation process. Such a program would compliment existing programs that are designed to address more site specific streambank erosion problems.

Option three is recommended.

### Plan Implementation

#### Issue: State Riparian and Wetland Protection

##### Legislative Action

A conservation easement initiative fund should be established to provide enhanced funding for the purchase and maintenance of conservation easements for wetland and riparian resources. The fund would provide funding for the KFS and the KDWP to purchase conservation easements in priority areas. It could also provide funding to Land Trusts to enhance their ability to purchase and manage sensitive areas.

Based on recommendations of the KWA legislative action would also be needed to establish tax incentive and credit programs.

##### Administrative Action

Figure 1 outlines the general process to be used in administering the proposed riparian and wetland protection program.

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## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

Comprehensive stream corridor and wetland assessments would need to be conducted in reservoir watersheds to assess the current condition of wetland and riparian resources. Priority areas for wetland and riparian protection and restoration would be identified through this process.

Administrative procedures would be needed for the following:

- Develop a method to identify, assess, and map forested riparian and wetland resources and for identification of priority areas for restoration and protection.
- Develop prioritization criteria for determining easement value and priority for state funding.
- Establish and implement conservation easement agreements with willing landowners including maintenance and monitoring requirements.
- Explore the most effective use of tax incentives with additional public input to determine the highest probability of success of each proposed program and acceptance by both governmental agencies and private citizens.
- Initiate a regulatory outreach effort to begin public discussion of what level of increased regulation would be acceptable and likely to succeed.

### Financial Requirements

Funding will be needed to conduct assessments in priority reservoir watersheds and for the purchase and management of wetland and riparian conservation easements by state agencies.

An estimated \$100,000-\$200,000 will be needed to initiate stream corridor and wetland assessments in a pilot reservoir watershed. Upon completion of the pilot, additional assessment costs would be determined.

\$300,000 should be provided initially for the purchase of conservation easements in priority wetland and riparian areas. Future funding needs would be determined annually based on the level of program participation and the identification of additional priority areas as stream corridor and wetland assessments are completed in reservoir watersheds. Priority would be given to leveraging existing funding sources such as the NRCS WRP or to partner with Trusts when applicable.

Additional agency resources may be needed to administer and monitor conservation easements, depending on the number of easements acquired.

### Information and Education

The KWO, the KFS, the KDWP, and the KDHE would work closely with Basin Advisory Committees (BAC) and WRAPS Stakeholder Leadership Teams to provide information on restoration and protection opportunities to area landowners and other stakeholders in the watershed throughout the assessment and implementation phases of the process.

### Timeline

Plan Implementation Action	Responsible Agency	Schedule
Determine potential tax incentive programs	KWO	2009
Develop administrative procedures for assessments and conservation easements	KWO, KDWP, KFS	2009
Conduct assessments	KWO, KBS, KAWS	2010-2011
Introduce necessary statutory changes for voluntary programs	KWO	2010
Determine local interest in restoration and protection programs and incorporate into WRAPS action plans	WRAPS	2010-2011
Initiate regulatory outreach public scoping meetings	KWO	2010
Introduce statutory changes recommended from public scoping meetings	KWO	2011
Contact landowners in priority areas to generate participation in easement programs. Identify and secure funding for easement projects.	WRAPS, KFS, KDWP, Trusts, KAWS	2011
Implement conservation easements in priority areas with willing landowners	KFS, KDWP, Trusts	2011 forward

### **Issue: Stream Stabilization**

#### Legislative Action

K.S.A. 82a-1102 requires that federal funding be available before the state participates in a streambank stabilization project. This provision should be removed and allowances provided for 100% state funding for project planning and implementation if needed.

#### Administrative Action

Figure 2 outlines the general process proposed for stream stabilization planning and implementation to address reservoir sedimentation.

Administrative procedures need to be developed to address the following:

- Identify priority reservoir watersheds
- Form the Wetland and Stream Management Team

# Kansas Water Plan

## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

- Prioritize areas for stream stabilization planning
- Determine local support for planning and project implementation
- Develop contents of a stream stabilization plan. Preliminary plan components would address:
  - Stream reach to be stabilized and its contributing drainage area
  - Stabilization measures to be utilized
  - Cost-benefit analysis including the sediment reduction to be achieved
  - Proposed Implementation schedule
  - Protection of riparian zones associated with the project
  - Protection of the project from future upstream activities
  - Long-term maintenance and monitoring of the project(Final design and scheduling for implementing stabilization measures would be determined in the implementation phase)
- Determine available state and federal funding
- Seek approval for project funding and inclusion in the *Kansas Water Plan*.

Administrative procedures would be needed for administering project funds to implement approved projects and insuring that appropriate monitoring and maintenance of the project is accomplished.

Existing regulations of the DWR for administration of the Stream Obstruction Act should be reviewed to ensure that stream stabilization projects implemented through this process are not adversely impacted by future stream obstruction projects permitted by the agency. This should also be addressed as part of the Environmental Coordination Act review process for these future projects and through the Wetland and Stream Management Team.

### Financial Requirements

The cost of completing of a stream stabilization plan will vary significantly depending on the size of the area being considered and the specific conditions that exist within the project area. An estimated cost of \$100,000 - \$150,000 per plan is anticipated.

An estimated \$300,000 to \$350,000 would be needed in the first year to initiate the Kansas Wetland and Stream Management Team. After purchase of additional equipment and supplies, somewhat reduced funding would be needed for staff support in subsequent years.

The cost of implementing a stream stabilization plan could vary widely, with projects ranging from \$500,000 to millions of dollars for project design and construction. It is estimated that one or two projects could be considered for implementation annually.

### Information and Education

The KWO, the SCC, BACs and WRAPS Stakeholder Leadership Teams in the project watersheds would help provide information and seek input from area landowners and other stakeholders in the watershed throughout all phases of the process. Local landowner participation will be a primary component in determining whether to proceed with the project planning and implementation.

### Time Line

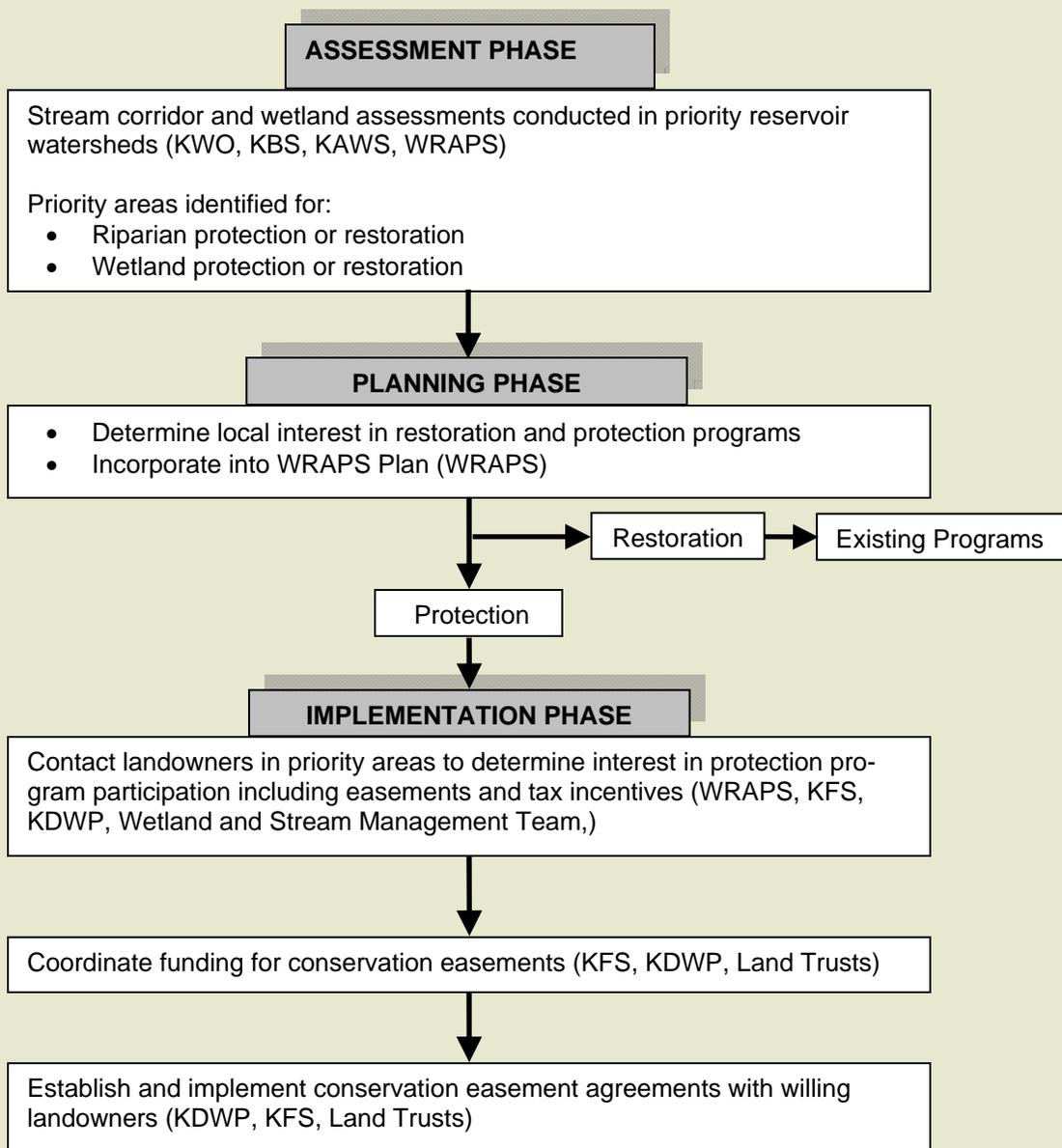
Plan Implementation Action	Responsible Agency	Schedule
Prioritize reservoir watersheds	KWO	2009
Introduce necessary statutory changes	KWO	2009
Develop administrative procedures for stream stabilization assessments and plans	KWO	2009
Develop administrative procedures for implementation of stream stabilization projects	SCC	2009
Review and modify Stream Obstruction Act regulations as needed	DWR	2010
Establish Wetland and Stream Management Team	KWO	2010
Initiate stream corridor assessments	KWO	2010
Begin development of stream stabilization plans	KWO	2010-2011
Begin Implementation of stream stabilization projects	SCC	2011-2012



# Kansas Water Plan

## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

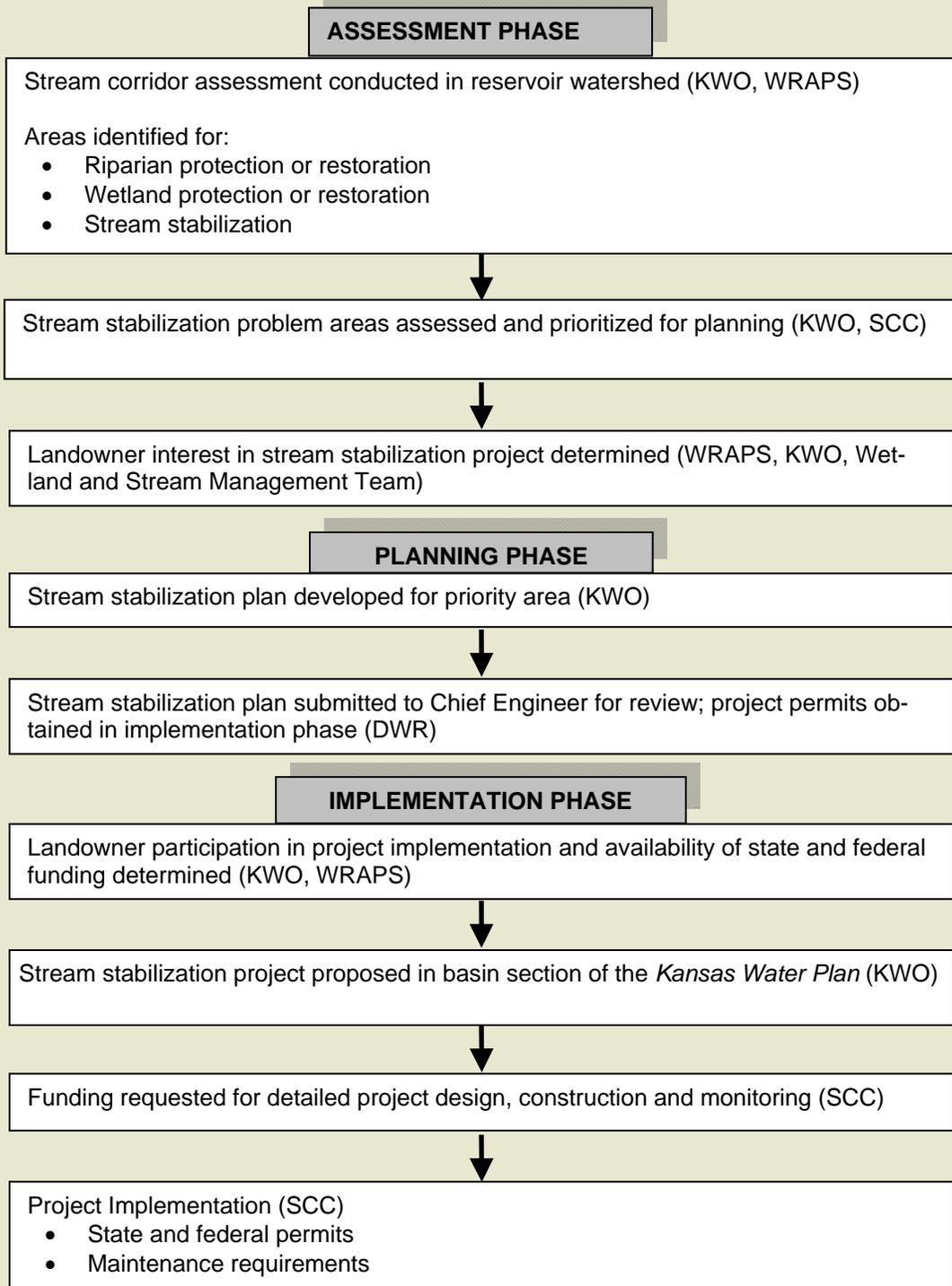
**Figure 1. State Riparian and Wetland Protection**



# Kansas Water Plan

## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

**Figure 2. State Stream Stabilization Program**



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## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

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# Kansas Water Plan

## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

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### Appendix A. Summary of State Enhanced Regulatory Programs.

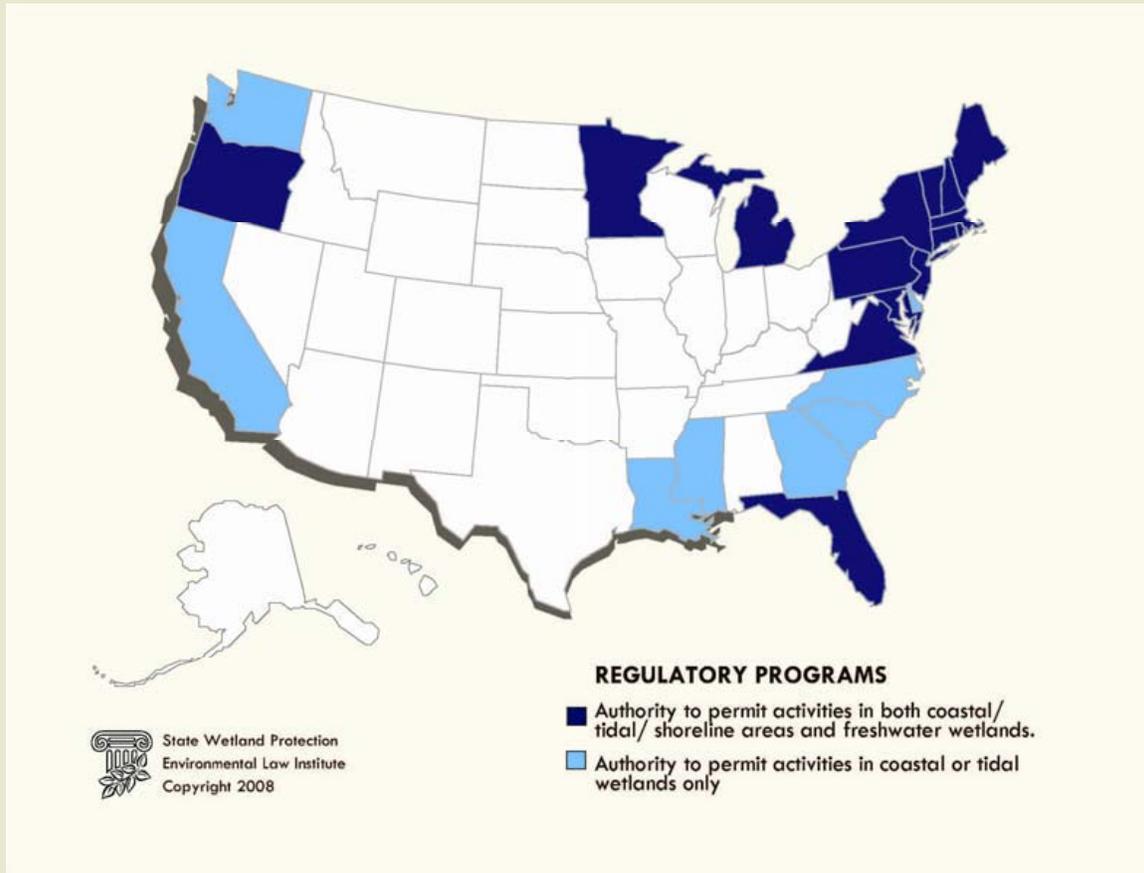
	IWP	SAMP/AIP	SSP	MB/R	CRO	PGP	401M	LUGs	TI	NNLR	404
<b>KANSAS</b>				X							
Arkansas				X					X		
Colorado		X		X			X		X	X	
Iowa				X					X		
Missouri				X							
Nebraska		X		X			X			X	
Oklahoma				X							
Texas				X			X		X	X	
Florida		X	X	X		X				X	
Illinois				X			X				
Indiana	X			X						X	
Kentucky				X							
Louisiana			X	X	X		X			X	
Michigan			X	X						X	X
Minnesota			X	X			X		X	X	
Mississippi				X	X						
New Hampshire			X			X	X				
New York			X	X		X				X	
North Carolina	X		X	X	X	X				X	
North Dakota			X	X							
Ohio	X			X							
Oregon			X	X				X		X	
Pennsylvania			X			X				X	
Tennessee	X		X								
Vermont			X								
Virginia		X	X	X			X			X	
Washington	X	X			X			X	X	X	
Wisconsin	X	X	X	X		X	X	X			
Wyoming				X				X			

Key: IWP = State has an Isolated Wetlands Permit; SAMP/AIP = State has instituted a Special Area Management Plan or Advanced Identification System; SSP = State can issue a separate state permit for wetlands; MB/R = State has a mitigation bank or a registry program; CRO = State has enhanced regulatory authority for coastal wetlands only; PGP = State has a Programmatic General Permit from the Corps; 401M = State has authority within the 401 Certification Program to require mitigation; LUGs = State has special requirements to local units of government for some program; TI = State offers tax incentives for wetland/riparian protection; NNLR = State has regulations for achieving no net loss of wetlands; 404 = State has assumed regulatory authority for the Section 404 Program from the Corps.

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## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

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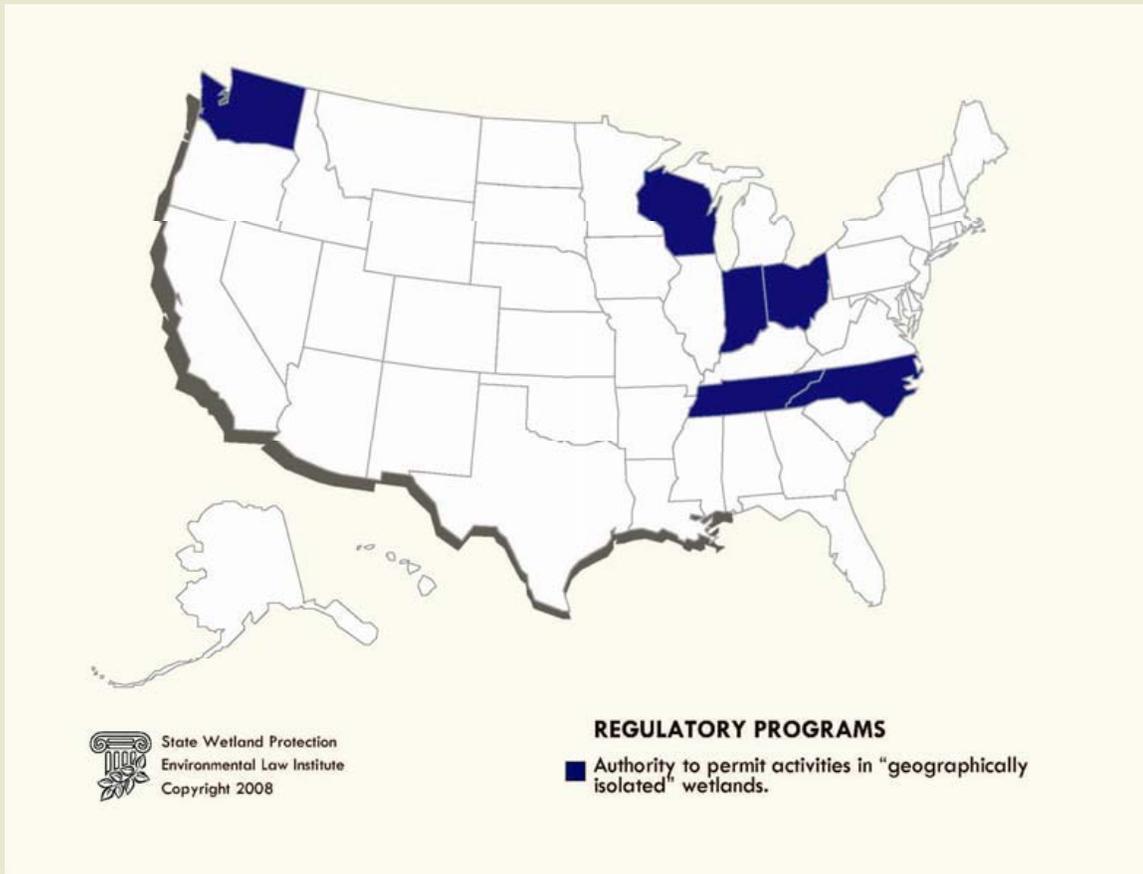
States that have adopted regulatory requirements for wetlands in coastal and/or freshwater wetlands. Twenty-three states have the authority to issue permits for dredge and fill activities in wetlands and other waters. Fifteen states have authority to regulate activities in both coastal/ tidal/shoreline areas and freshwater wetlands. Eight states have authority to regulate activities in coastal or tidal wetlands only.

*Limited Regulatory Reach.* One additional state has a more restricted ability to regulate the discharge of dredge and fill material into waters of the state. Illinois's program only gives the Illinois Department of Natural Resources (IDNR) the ability to regulate state-funded projects and activities that impact wetlands, except for activities on private lands.<sup>8</sup>

# Kansas Water Plan

## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

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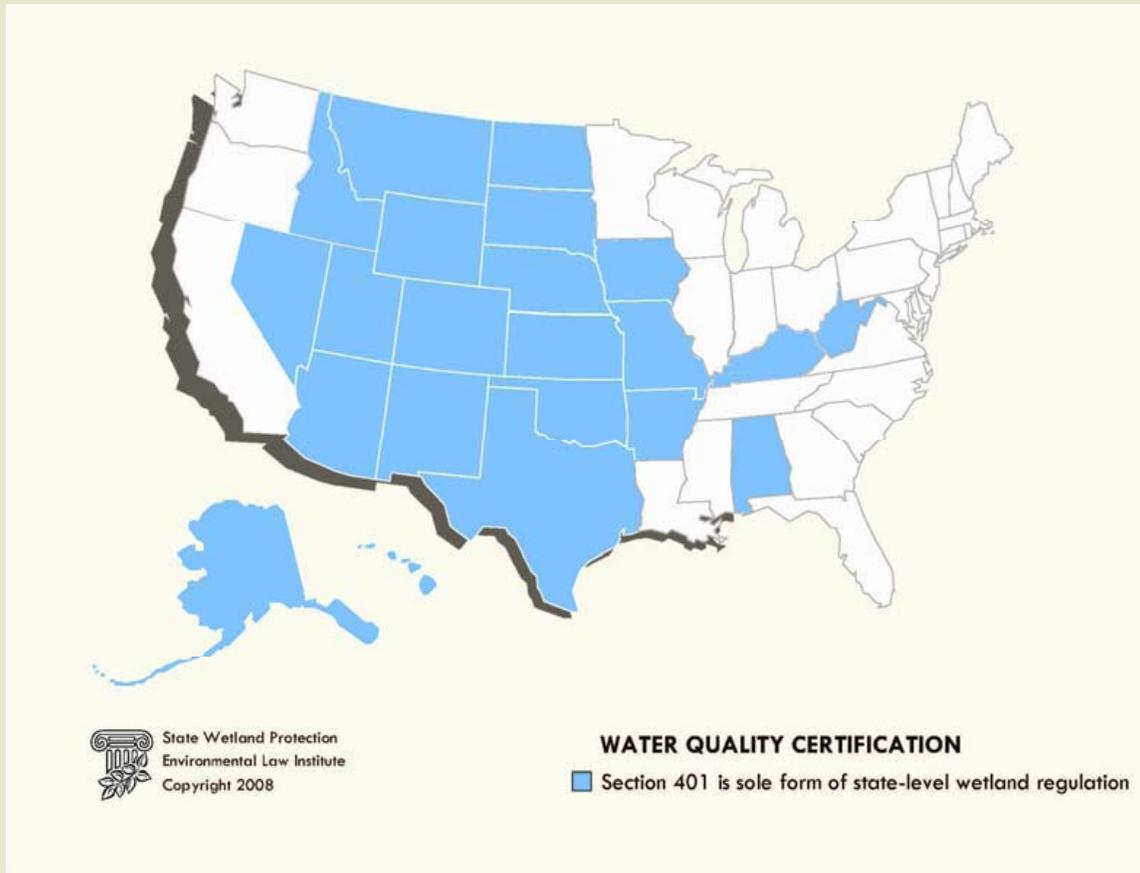


States that regulate activities in "geographically isolated" wetlands. Six states have the authority to permit activities in "geographically isolated" wetlands.

# Kansas Water Plan

## Enhanced Stream Corridor and Wetland Management to Address Reservoir Sedimentation

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States that use §401 certification as the primary or sole form of state-wide wetland regulation. Twenty-two states rely on §401 as the sole form of state-level regulation. An additional 15 states rely on §401 as the primary form of state-level wetland regulation, but have also adopted laws that provide additional protection to coastal wetlands, “isolated wetlands,” or other wetland resource categories.

*Assumption of §404.* Two states, Michigan and New Jersey, have assumed the authority to issue §404 dredge and fill permits. However, in areas where the Corps retains jurisdiction (e.g., interstate waters), §401 certification or a state permit may still be required.

# Kansas Water Plan

This *Kansas Water Plan* Section describes the current policy and institutional framework through which flood damage mitigation and small dam safety are addressed in Kansas.

Basin sections of the *Kansas Water Plan* provide additional basin-specific detail and recommended actions regarding priority basin issues, including flooding.

“Mitigation” refers to sustained actions taken before a flood to reduce or eliminate the long-term risk to people and property. Mitigation differs from emergency response, which is outside the scope of this document.

The 2007 *Kansas Hazard Mitigation Plan*<sup>(1)</sup> (KHMP) also provides important guidance for flood mitigation and small dam safety efforts. In the prioritization of risk included in the KHMP 22 flooding and winter storms ranked second behind tornadoes. Dam and levee failure was ranked sixteenth.

### Overview

Flooding is a natural event associated with streams and rivers. “Floodplains” are those valley lands adjacent to a river that may be inundated during a flood. Flooding can generally be defined as the accumulation of too much water in too little time within too small an area. Floods can also be characterized by type, such as riverine, flash, ice-jam, storm surge and dam or levee failure. Riverine and flash flooding and dam or levee failure are of most concern in Kansas. Flooding can provide benefits under natural conditions, but the encroachment of urban and agricultural development onto floodplains has resulted in the potential for flood damage to development.

Riverine flooding occurs as a result of persistently wet weather conditions. Stream channel capacity is exceeded and water flows over the banks onto the adjacent floodplain. The warning time preceding such flooding often is quite long, allowing for some mitigation measures to take place. Large regional floods, such as occurred in the Kansas River basin and beyond in 1993 are generally riverine in nature.

Some areas of Kansas are particularly prone to flash flooding. Flash floods are a rapid rise in water level, with fast-moving water and flood debris. Hilly terrain subject to intense thunderstorms is particularly vulnerable. Activities associated with urban development such as replacement of natural or agricultural landscapes with impermeable surfaces (roofs, streets and parking lots) and

altering of drainage systems to increase runoff speed may elevate the threat of flash flooding.

Nearly 6,000 small dams have been constructed in Kansas for flood control, water supply, recreation and other purposes. Many were constructed in the mid-20<sup>th</sup> Century and are showing the effects of aging. In some cases, development downstream from the dam has resulted in a higher dam hazard classification requiring upgrades to the dam.

### Kansas Flood History

Perhaps the earliest flood event noted in Kansas was the Kansas River flood of 1844. Available information suggests that this flood exceeded the magnitude of any succeeding floods on the Kansas. Other major 19<sup>th</sup> century floods included those of 1858, 1867 and 1877 on the Kansas at Topeka, Neosho River flooding in 1885 and Arkansas River flooding at Hutchinson and Wichita in 1877. Major flooding occurred at Lindsborg in 1895.

Snowden D. Flora summarizes flood events occurring around the state from 1903 through 1945 in *Climate of Kansas*.<sup>(2)</sup> Information regarding the frequency of river “overflows” as opposed to major flooding is provided for some locations during this 42-year period. Snowden notes that overflows on the Kansas River occurred 29 times at Manhattan and 25 times at Topeka. The Marais des Cygnes River at Ottawa overflowed 27 times. Overflows on the Cottonwood-Neosho River were most frequent, occurring 43 times at Emporia and 88 times at Oswego. Overflows were less frequent on the Arkansas River.



1951 Flood

# Kansas Water Plan

Significant flooding was experienced during the years 1903-1945 along the following streams:

- Kansas River – 1903, 1908 and 1935
- Blue River – 1903 and 1941
- Republican River – 1903, 1915, 1935 and 1941
- Solomon River – 1903, 1908, 1915, 1919, 1935 and 1941
- Smoky Hill River – 1903, 1938 and 1941
- Marais des Cygnes River – 1928, 1944 and 1945
- Cottonwood – Neosho River – 1903, 1904, 1941, 1944 and 1945
- Arkansas River – 1921, 1923 and 1942
- Little Arkansas River – 1944

The most significant flood events during the latter-half of the 20<sup>th</sup> century were the floods in the Kansas River basin in 1951 and 1993, which are described below. Other flood events of note since 1951 occurred on the Arkansas River in 1965, the Solomon River in 1973, the Verdigris River in 1976, in the Great Bend area in 1981, and Fort Scott (Marmaton River and Mill Creek) in 1986. In 1977 and 1998, significant flash-flooding took place in the Kansas City Area.

The 1951 Flood – The 1951 flooding described in *The 1951 Floods in Kansas Revisited*,<sup>(3)</sup> primarily affected the Kansas, Marais des Cygnes, Neosho and Verdigris river basins in eastern Kansas and the Osage (Marais des Cygnes) and Missouri river basins in Missouri. Peak discharges on the Kansas, Marais des Cygnes and Neosho rivers were greater than any previously measured discharges and have remained the highest to date.

According to the American Red Cross, 19 people were killed and about 1,100 injured by the floods in Kansas and Missouri. The most damaging flooding occurred along the Kansas River. Manhattan, Topeka, Lawrence and Kansas City sustained extensive damage.

Total damages from the 1951 flood were unprecedented. Between the headwaters of the Kansas River at Junction City and the mouth of the Missouri at St. Louis, 2 million acres were flooded, 45,000 homes and 17 major bridges were damaged or destroyed. Total damage estimates were as high as \$2.5 billion, (\$17 billion, adjusted to year 2000 dollars). During the height of the flood, on July 13, 1951, nearly 90 percent of the flow in the Missouri River at Kansas City came from the Kansas River, a tributary comprising only 12% of the Missouri's drainage basin.

The 1993 Flood – The historic flood of 1993 affected nine states in the Lower Missouri – Upper Mississippi river basins, including Kansas as described by the U.S. Geological Survey (USGS).<sup>(4)</sup> Flooding occurred from mid-June to early August, resulting in 50 deaths (none in Kansas) and flood damages of nearly \$15 billion.

The magnitude and timing of several rainstorms on top of already saturated soils contributed to moderate to major flooding in much of the Kansas River basin during July 1993. From July 22 to July 24, 2 to 13 inches of rain fell in parts of Kansas and Nebraska, contributing large inflows to already full reservoirs in the Kansas basin. Eighteen of the 163 USGS stream gages in operation in Kansas during 1993 measured record maximum peak daily flows and 69 stations measured the highest mean annual streamflow during their period of record for Water Year 1993.

In the Kansas City metropolitan area, the Missouri and Kansas rivers reached their highest flows almost simultaneously on July 27. The USGS estimates that without the upstream reservoirs, the maximum daily peak flow at Kansas City, Missouri may have reached 713,000 cubic feet per second, a level that would have overtopped the federal levee system.

Major Disaster Declarations – Federal major disaster declarations provide a means of documenting flooding in recent decades. As of April 2008, 26 of 37 declarations involved flooding since 1955. These declarations authorize individual and/or public assistance from the federal government in declared counties.

### **State Planning Authority and Guidance**

#### **Kansas Water Plan**

The *State Water Resources Planning Act*<sup>(5)</sup> provides the statutory authority for addressing flood management in the *Kansas Water Plan*. The *Planning Act* established long-range goals for the management, conservation and development of the waters of the state, including the reduction of damaging floods and of losses resulting from floods.

Policies designed to achieve these *Planning Act* long-range goals include:

- Utilization non-structural methods, including floodplain regulation, and structural measures for the reduction of flood damage.

# Kansas Water Plan

- The design of proposed levees and dikes so as to reduce flood risks in agricultural areas to a chance of occurrence, in any one year, of 10 percent or less.
- Design proposed levees and dikes to reduce flood risks in urban areas to a chance of occurrence, in any one year of 1 percent or less.
- Design proposed storage structures for the protection of agricultural areas to provide sufficient capacity to control the volume of a flood having a chance of occurrence, in any one year, of 25 percent or less.
- The design of proposed storage structures for the protection of urban areas to provide sufficient capacity to control the volume of a flood having a chance of occurrence in any one year of 2 percent or less.

In formulating the *Kansas Water Plan*, the *Planning Act* requires consideration for plans, projects and recommendations of public corporations, the federal government and state agencies prepared pursuant to statutory authority.

2010 Objectives - 2010 Objectives, provide targets for quantifying progress in implementing *Kansas Water Plan*



Flooding in the Walnut Basin, July 2007

policy recommendations. The 2010 Objective addressing flood management is:

- By 2010, reduce the vulnerability to damage from floods within identified priority communities or areas.

Policy and Basin Sections – Since the inception of the current state water planning process, flood management has been addressed in policy and basin plan sections of the *Kansas Water Plan*. In 1985, the Kansas Water Authority (KWA) approved the Rural Flood Management Sub-section<sup>(6)</sup> of the *Kansas Water Plan*. Three basic policy issues were addressed: land treatment funding; watershed dam construction funding; and watershed planning.

Rural flooding was also included as an issue in basin plan sections of the *Kansas Water Plan* approved in 1986. These basin plans contained priority sub-watersheds for rural flood damage reduction that were identified by the former U.S. Department of Agriculture Soil Conservation Service. These sub-watersheds continue to be used for targeting of programs. Flooding was identified as a basin priority issue in several river basins as part of the FY 2005 *Kansas Water Plan* Update conducted in 2003.

The issue of the appropriate level of state involvement in facilitating necessary repairs to dams was addressed in the FY 1999 planning process. This policy subsection did not move past the working draft stage and was not approved by the KWA.

Dam safety was addressed in the *Kansas Water Plan* with the 2005 Small Dam Safety and Rehabilitation Policy Section review by the KWA. The major policy issues addressed were:

1. controlling dam hazard class changes due to development,
2. limiting dam owner liability for damages due to dam failure, and
3. financial assistance for small dam rehabilitation and upgrades.

Twenty-one recommendations are contained in this policy section.

### ***Kansas Hazard Mitigation Plan***

The 2007 update of the *Kansas Hazard Mitigation Plan* (KHMP)<sup>(1)</sup> was developed by the Kansas Hazard Mitiga-

# Kansas Water Plan

tion Team (KHMT) to meet the requirements of the federal *Disaster Relief and Emergency Assistance Act*. The KHMT includes members from various state and local governments and other interested parties. The Kansas Water Office (KWO) is a KHMT member.

The KHMP is an integral part of state programs for management of disasters and their impacts. The KHMP is intended to be consistent with and supportive of the policies, plans and implementation procedures that govern these state programs. In the event of any inconsistency, state agency policies supersede the provisions of the KHMP.

The Federal Emergency Management Agency (FEMA), mitigation is “any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.” The purpose of the KHMP is to guide hazard mitigation to better protect the people and property of the state. KHMP serves as a tool to help decision makers direct mitigation activities and resources. The KHMP is intended to encompass actions by the State of Kansas as well as local governments.

The Adjutant General, who serves as the Director of Emergency Management and Homeland Security, adopted the 2007 update of the KHMP for on November 26, 2007.

As part of the 2007 KHMP update, a risk assessment of 22 hazards was conducted. Flooding was considered to have the second-highest risk (tied with winter storms) following tornadoes. Dam and levee failure was ranked sixteenth.

The Mitigation Strategy within the KHMP includes several actions related to flooding or dam and levee failure. These are summarized in Table 1.

### Flood Damage Mitigation

#### **Available Mitigation Measures**

Attempts to reduce flood losses follow two basic strategies; elimination or reduction of the hazard (flood control), and reduction or prevention of the risk associated with flooding (basically, stay out of the way). Various structural and non-structural mitigation measures may be used with either basic strategy. A brief description of several general categories of mitigation measures provided by the Association of State Floodplain Managers in

*Using Multi-Objective Management to Reduce Flood Losses in Your Watershed.*<sup>(7)</sup>

**Prevention** – Measures are intended to keep a flood problem from occurring or becoming worse. Preventative measures also ensure that future development does not increase the risk for flood damage. Included are: planning and zoning, open space preservation, floodplain development regulations, watershed restoration and protection, wetlands protection, drainage system maintenance, and real estate disclosure laws and policies.

**Property Protection** – These measures reduce susceptibility to flood damage. They are often inexpensive for a community because they are implemented or cost-shared with property owners. These measures include: relocation and acquisition, flood proofing, flood insurance, and community information and assistance programs.

**Structures** – Structural projects seek to control the flow of water and are intended to prevent flood waters from reaching structures or other property at risk of damage. The three general types of structures are: levees and floodwalls, dams and diversions and channel and drainage modifications.

**Emergency Services** – Emergency services protect people during and after a flood. Most counties and many cities have emergency management offices to coordinate disaster warning, response and recovery efforts. Emergency service measures include: flood warning, flood response and post-flood activities.

### **State and Federal Programs and Authorities**

Federal involvement with flood control has a long history. As early as 1850, Congress directed the U.S. Army Corps of Engineers (Corps) to plan flood control for the lower Mississippi River. The modern era of flood control started with the *Flood Control Act of 1936*,<sup>(8)</sup> which declared flood control to be a proper federal activity in the national interest. Major federal interest in watershed development related to flood control came later with enactment of the *Watershed Protection and Flood Prevention Act of 1954*.<sup>(9)</sup>

Initial federal involvement was primarily structural in nature; non-structural approaches have been added in more recent decades. A prime example is the *National Flood Insurance Program*<sup>(10)</sup> authorized under the *National Flood Insurance Act of 1968*.<sup>(11)</sup>

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**Table 1  
Kansas Hazard Mitigation Plan Action Summary**

Mitigation Action	Lead Agency	Support Agencies	Planning Priority
Coordinate GIS capability improvements for emergency management with the Kansas Statewide GIS Strategic Plan	KDEM	KDHE, DWR, rural electric cooperatives, local jurisdictions	High
Provide automatic weather stations	KWO	KSU (state climatologist), NWS, KDOT, USGS	High
Rehabilitate and repair identified deficient dams	KDA	SCC, KDEM, KWO, dam owners	High
Enforce and assist with development of emergency action plans for high and significant hazard dams	KDA	SCC, KDEM, KWO, dam owners	High
Develop inundation maps for high hazard dams	KDA	SCC, KDEM, KWO, dam owners	High
Increase support for and participation in the National Flood Insurance Program (NFIP) and Community Rating System (CRS)	DWR	KWO, KDEM	High
Continue support for floodplain mapping studies	DWR	KWO	High
Mitigate repetitive flood loss and severe repetitive flood loss structures	DWR	KDEM	High
Improve coordination between the Kansas Water Plan and the Kansas Hazard Mitigation Plan	KWO	DWR, KDHE, KSU, SCC, KDEM	High
Identify priority flood issues in river basin sections of the revised Kansas Water Plan	KWO		High
Focus National Flood Insurance Program (NFIP) and Community Rating System (CRS) outreach efforts to priority areas	KDA	KDEM	Medium
Document statewide participation in National Flood Insurance Program and Community Rating System	KDA		Medium
Conduct a flood hazard vulnerability study as a part of the pilot multi-hazard vulnerability assessment to develop an acceptable approach to vulnerability assessments in Kansas	KDA	KWO	Medium
Create a model ordinance for local jurisdictions interested in regulating dam breach inundation areas	KDA		Medium
Compile materials regarding existing, example local codes and ordinances addressing flood hazards and floodplain management	KDA	KWO	Medium
Acquire new statewide elevation data (two-foot contours)	KDA	KDEM	Medium
Enhance the system for tracking buyouts to incorporate mitigation projects for all hazards	KDEM	KITO, KDOA	Medium
Integrate flood mitigation into KDOT construction projects	KDOT	KDA	Medium

Source: Kansas Hazard Mitigation Plan, November 2007

State involvement with flood control also has a long history, going back at least as far as the *Drainage Act of 1905*<sup>(12)</sup> which authorized the organization of drainage districts. State involvement also focused on structural measures. State and local partnerships have been particularly vital to the development of watershed projects as described below. Nonstructural approaches to flood control have been explored in recent years. The riparian and wetland protection and restoration efforts conducted through state-local partnerships are one example. These efforts are described in the [Wetland and Riparian Management Policy Section](#) of the *Kansas Water Plan*.

**Major Federal Reservoirs** - The *Flood Control Act of 1944*,<sup>(13)</sup> which included the *Pick-Sloan Missouri Basin Plan*, significantly expanded the Corps' involvement in large multi-purpose projects. It authorized massive flood control and irrigation development within the Missouri River basin, including portions within Kansas. Other federal legislation authorized construction of reservoirs within the Arkansas and Missouri river basins. Eighteen Kansas reservoirs were built between 1944 and late 1960.

By the late 1960s, construction of major water projects had declined. Changing national priorities, increasing

# Kansas Water Plan

construction costs and completed projects at most prime locations were contributing factors. Between 1970 and 1985, no major water projects were authorized. Congress reduced several projects that had been previously authorized. In Kansas, a total of 55 major federal reservoirs were authorized, but only 24 were built as illustrated by Figure 1.

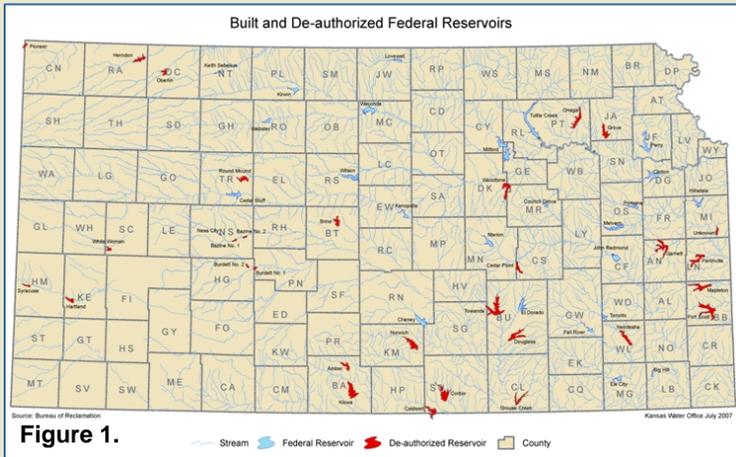
The peak of the reservoir construction period was in the 1960s 13 reservoirs were constructed. The 24 federal reservoirs in Kansas have a combined contributing drainage area of over 40,000 square miles and a flood

constructed in 1965 alone. In recent years fewer than 10 dams have been constructed annually. Figure 3 shows this trend in the number of dams constructed.

As of 2006, 778 dams had been completed in Kansas, five were under construction and 190 remained to be built. The unfunded federal commitment resulting from this backlog in PL 83-566 construction in Kansas was \$68.4 million.

More than 1,500 small dams in Kansas have been constructed by watershed districts for flood control purposes. Financial and technical assistance was provided for some dams by the USDA NRCS as authorized by the *Watershed Protection and Flood Prevention Act of 1954* (9) and other authorizations. Since 1977, state cost-share assistance for watershed dam construction has also been available from the State Conservation Commission (SCC).

The *Watershed Protection and Flood Prevention Act* authorized a permanent, nationwide program to provide technical and financial assistance to local watershed groups willing to assume responsibility for initiating, carrying-out and sharing in costs of upstream watershed conservation and flood control.



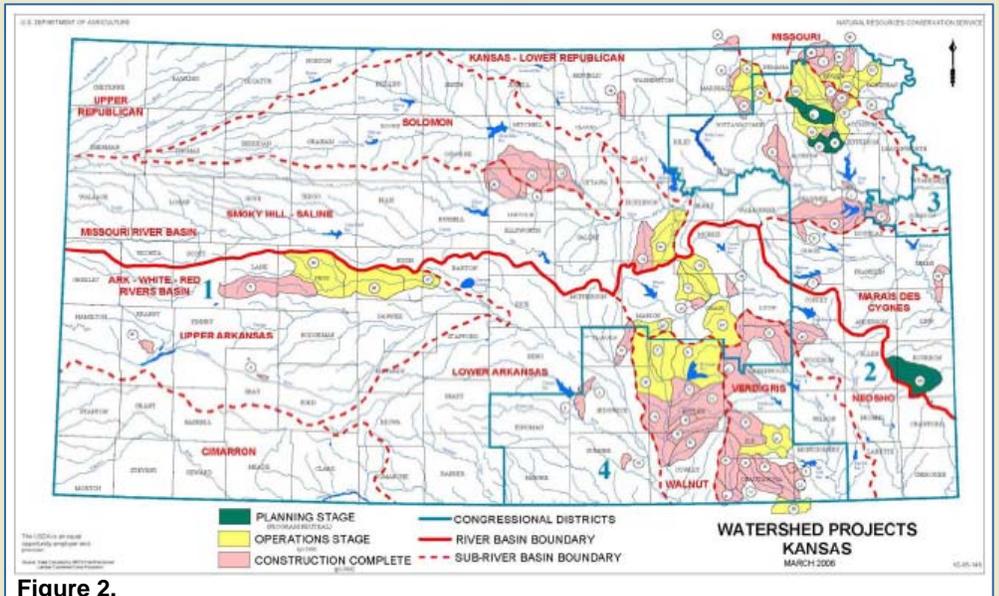
control storage capacity of nearly 10 million acre feet. Table 2 provides summary information about these reservoirs.

Corps' water project planning and funding was fundamentally changed by the *Water Resource Development Act (WRDA) of 1986*.<sup>(14)</sup> WRDA established new cost-share formulas, resulting in financial and decision-making roles for non-federal project sponsors. WRDA provided the Corps with authority to determine if changes can be made in existing structures or operations to improve environmental quality.

**Watershed Projects** - Kansas ranks third among the states with 63 active PL 83-566 projects. Only Texas and Oklahoma have more. Figure 2 shows the location of these projects and their status as of March 2006.

The 1960s and 1970s were the heyday for watershed dam construction in Kansas. More than 70 dams were

A Pilot Watershed Program within the former USDA Soil



Conservation Service was funded in the *Agricultural Appropriations Act of 1953*. Fifty-four pilot watershed projects were authorize, of which 5 were in Kansas under this program.

# Kansas Water Plan

The 2000 amendments authorized the NRCS to work with local communities and watershed project sponsors to address concerns related to aging dams.

The NRCS implements the provisions of PL 83-566 through three programs:

- Watershed Surveys and Planning
- Watershed Protection and Flood Prevention Opera-

tions

- Watershed Rehabilitation

State Role - The *Kansas Watershed District Act*<sup>(15)</sup> was enacted in 1953 to provide a subdivision of state government with adequate powers to sponsor watershed projects developed with federal assistance under PL 83-566. Watershed districts have authority to levy taxes and special assessments, issue bonds and to acquire land

**Table 2  
Major Federal Reservoirs in Kansas**

	Operating Agency <sup>1</sup>	Year Storage Began	Drainage Area (sq. miles) <sup>2</sup>	Storage Capacity (acre-feet) <sup>3</sup>	
				Conservation / Multi-purpose	Exclusive Flood Control
Big Hill	Corps	1981	37	26,650	12,571
Clinton	Corps	1977	367	120,643	394,000
Council Grove	Corps	1964	246	43,176	64,217
El Dorado	Corps	1981	234	157,973	79,259
Elk City	Corps	1966	634	38,385	248,667
Fall River	Corps	1949	585	19,433	232,249
Hillsdale	Corps	1981	144	71,950	160,000
John Redmond	Corps	1964	3,015	44,385	524,417
Kanopolis	Corps	1948	2,327	43,121	419,000
Marion	Corps	1968	200	75,133	61,213
Melvern	Corps	1970	349	147,973	360,000
Milford	Corps	1964	3,796	351,577	1,146,000
Perry	Corps	1966	1,117	199,824	723,000
Pomona	Corps	1962	322	59,642	240,000
Toronto	Corps	1960	730	15,734	179,808
Tuttle Creek	Corps	1963	9,628	253,265	2,151,000
Wilson	Corps	1965	1,917	243,000	773,000
Cedar Bluff	Bureau	1950	5,530	170,658	364,000
Cheney	Bureau	1964	933	143,427	80,857
Kirwin	Bureau	1955	1,373	99,435	313,000
Lovewell	Bureau	1957	364	41,690	86,000
Keith Sebelius	Bureau	1964	712	34,330	134,000
Waconda	Bureau	1967	5,076	217,426	942,000
Webster	Bureau	1956	1,125	77,370	260,000
Total			40,761	2,696,200	9,948,258

Corps – U.S. Army Corps of Engineers; Bureau – U.S. Bureau of Reclamation

Contributing drainage area

Conservation / Multi-purpose pool 2004 estimate by Kansas Water Office; Exclusive flood control from BOR or COE

### Kansas Watersheds Dams Constructed by Year

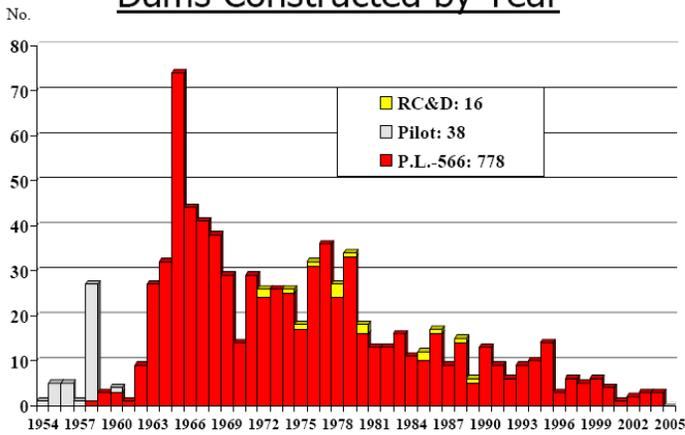


Figure 3.

and interests in land by gift, purchase, exchange or eminent domain.

The *Watershed District Act* requires that a general plan identifying planned works of improvement such as dams and their associated costs and benefits be prepared. The general plan is reviewed and approved by the Chief Engineer, DWR.

There are presently 86 organized [watershed districts](#) in Kansas that cover about 22% of the state's area. Approximately 60 districts have active general plans.

Improvements may be financed by general tax levy or special assessment against the area benefited. Bonds may be issued by the district following a vote. A majority of affected landowners must approve special assessments. General tax levy's may be used to finance operating costs and works of improvement without a special election. Most districts have found it necessary to finance their projects within their taxing authority with only a few utilizing the special assessment option.

Watershed district general plans usually include works of improvement beyond those eligible for federal financial assistance. The most common funding source other than federal PL 83-566 assistance has been the *Watershed Planning Assistance Program* managed by the SCC.

The *Watershed Planning Assistance Program* provides state financial assistance to organized watershed, drainage or other special purpose districts to implement flood control structural and non-structural practices. These

practices provide protection for agricultural lands, urban areas, roads, bridges and utilities. In addition, structures may provide water for livestock and in some instances for rural fire departments. The structures also benefit wildlife habitat and serve to trap sediment and pollutants. Construction and rehabilitation of flood control and/or grade stabilization dams are the main practices and components of the program.

FEMA - National Flood Insurance Program - The *National Flood Insurance Program* (NFIP) is a federal program enabling property owners in participating communities to purchase insurance protection against losses from flooding. This program is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. This detailed program description is available from the FEMA; *National Flood Insurance Program: Program Description*.<sup>(10)</sup>

Participation in the NFIP is based on an agreement between local communities and the federal government providing that if a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in Special Flood Hazard Area (SFHA) the federal government will make flood insurance available within the community as a financial protection against flood losses. A SFHA is a high-risk area defined as any land that would be inundated by a flood having a 1 percent chance of occurrence in any given year. This so-called "100-year flood" is also referred to as the base flood.

The Kansas Department of Agriculture-Division of Water Resources (DWR) works with both FEMA and local communities in coordinating NFIP activities in Kansas and providing technical assistance.

In support of the NFIP, FEMA identifies flood hazard areas throughout the nation by producing Flood Hazard Boundary Maps, Flood Insurance Rate Maps, and Flood Boundary and Floodway maps. Several areas of varying flood hazards are usually identified on these maps. One is the SFHA.

Development may take place within the SFHA so long as it complies with local floodplain management ordinances, which must meet minimum federal requirements. While purchase of flood insurance is usually voluntary, the *Flood Disaster Protection Act of 1973* and the *Flood Insurance Reform Act of 1994* mandate the purchase of flood insurance for insurable structures within

# Kansas Water Plan

the SFHA to protect federal financial investments and assistance used for acquisition and/or construction purposes.

Community Participation Categories – NFIP defines a community as a political subdivision that has the authority to adopt and enforce floodplain management ordinances for the area under its jurisdiction. In most cases a community is an incorporated city or the unincorporated area within a county.

Community participation in the NFIP is voluntary, but non-participating communities are subject to certain restrictions on available federal assistance should a major disaster resulting from flooding be declared for the community by the President. Flood insurance under the NFIP is not available in non-participating communities.

The Emergency Program is the initial phase of a community's participation in the NFIP. A limited amount of insurance at less than actuarial rates is provided. A community participating in the Emergency Program either does not have an identified and mapped flood hazard area or has been provided with a Flood Hazard Boundary Map (FHBM) and the community is required to adopt limited floodplain management standards to control future use of its floodplains.

Communities participating in the Regular Program of the NFIP usually are provided with a Flood Insurance Rate Map (FIRM) and a detailed engineering study termed a Flood Insurance Study. Under the Regular Program additional comprehensive floodplain management requirements are imposed on the community in exchange for higher amounts of flood insurance coverage.

Participating communities are required to adopt and enforce a floodplain management ordinance that meets minimum NFIP requirements. Communities that do not enforce these ordinances can be placed on probation or suspended from the NFIP. Probation involves a formal notification to a community by FEMA that its floodplain management program does not meet NFIP criteria. Suspension of a participating community occurs when a community fails to solve its compliance problems or fails to adopt an adequate ordinance. If suspended, the community becomes non-participating and flood insurance policies can't be written or renewed. Policies in force at the time of suspension continue in force for the remainder of the policy term.

Community Rating System – The Community Rating System (CRS), implemented in 1990, provides discounts

on flood insurance premiums in those communities that establish floodplain management programs that exceed minimum NFIP standards. Under the CRS, communities receive credit for more restrictive regulations, flood-prone structure acquisition or relocation, structural flood proofing, open space preservation and other measures that reduce flood losses or protect the natural functions of floodplains.

Participation in the CRS is voluntary. Any community in compliance with NFIP rules and regulations may apply. The CRS recognizes 18 creditable activities organized under four categories: Public Information, Mapping and Regulations, Flood Damage Reduction and Flood Preparedness. Communities are assigned to one of 10 CRS classes depending upon their number of credit points. Class 1 requires the most credit points and gives the largest premium reduction. CRS flood insurance premium discounts range from five percent for Class 9 communities up to 45% for Class 1 communities. Class 10 communities receive no premium reduction.

Flood Hazard Assessment and Mapping – Flood hazard areas are determined using statistical analyses of precipitation and streamflow records, floodplain topographic surveys and hydrologic and hydraulic analyses. A FHBM is based on approximate data and identifies, in general, the SFHA within a community. It is used in the NFIP Emergency Program for floodplain management and insurance purposes. A FIRM usually is issued following a flood risk assessment conducted in connection with the community's conversion to the NFIP's Regular Program.

Several areas of flood hazard are commonly identified on the FIRM. One of these is the SFHA which is defined as the area that will be inundated by a flood event having a one percent chance of being equaled or exceeded in any given year. The one percent annual chance or "100-year flood" is also referred to as the "base flood." If a detailed assessment called a Flood Insurance Study (FIS) has been performed, the FIRM will show Base Flood Elevations (BFE's) and insurance risk zones in addition to floodplain boundaries. The FIRM may also delineate the regulatory floodway.

The regulatory floodway adopted into the community's floodplain management ordinance, is the stream channel plus that portion of the 100-year floodplain that must be kept free from encroachment in order to discharge the one percent annual chance flood without increasing flood levels by more than one foot. The community is responsible for prohibiting encroachments, including fill,

new construction and substantial improvements within the floodway unless it has been demonstrated that the proposed encroachment will not increase flood levels within the community.

In those areas that fall within the 100-year floodplain, but are outside the floodway (termed the “floodway fringe”), development will, by definition, cause no more than a 1.0 foot increase in the 1 percent annual chance flood water surface elevation. Figure 4 illustrates the concept of the floodway and the floodway fringe within a river’s 100-year floodplain.

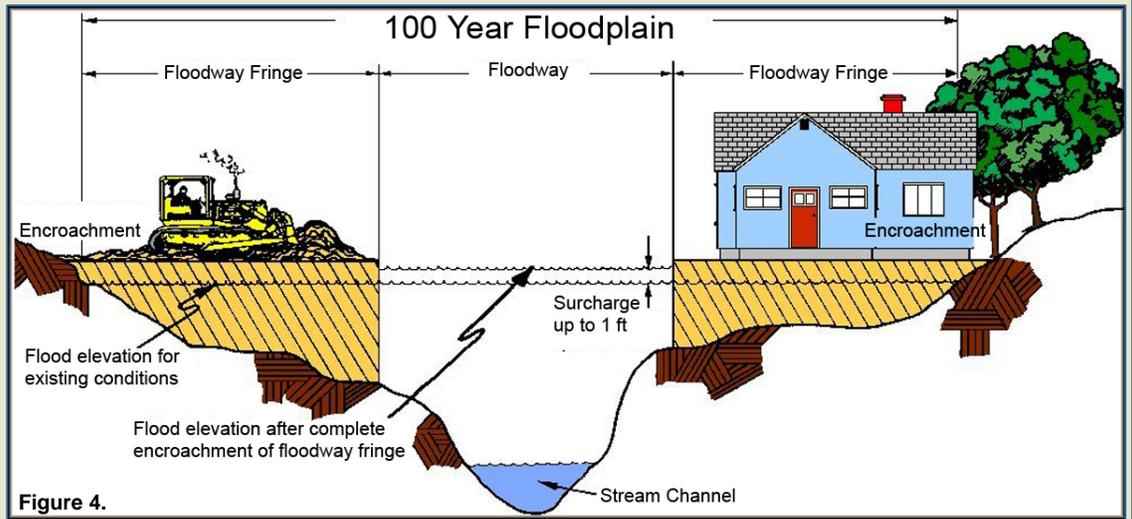


Figure 4.

**Map Modernization** – Most FEMA flood maps were produced using manual cartographic techniques. Many maps are old and do not include recent development. As

Allen	Franklin	Osage
Barton	Harvey	Ottawa
Bourbon	Jackson	Pottawatomie
Butler	Jefferson	Reno
Cherokee	Johnson	Republic
Cowley	Labette	Riley
Crawford	Leavenworth	Saline
Doniphan	Linn	Sedgwick
Douglas	Lyon	Seward
Edwards	Marion	Shawnee
Ellsworth	McPherson	Sumner
Finney	Miami	Wabaunsee
Ford	Neosho	Wyandotte

a result, DWR launched the Kansas Flood Mapping Initiative in 1993. By 2010, 39 counties will have modernized maps produced with a mix of state and federal funding. These counties are:

Digital Flood Insurance Rate Maps (DFIRMs) may be used for NFIP regulatory purposes once they become effective. A community is sent a Letter of Final Determination by the DWR where the effective date is stated: communities then have six months to adopt the appropriate ordinance for their community. Counties with DFIRM effective dates in 2007 or 2008 include Edwards, Linn, Lyon, Miami, Sedgwick and Wabaunsee.

**Repetitive Loss Properties Strategy** – The primary objective of the Repetitive Loss Properties Strategy is to eliminate or reduce losses and disruption of life caused by repeated flooding of the same properties. A special target group of repetitive loss properties is identified and serviced separately from other NFIP policies by a Special Direct Facility (SDF). This target group includes every NFIP-insured property that, since 1978 and regardless of any change in ownership during this period, has experienced:

- Four or more paid flood losses of more than \$1,000 each, or
- Two paid flood losses within a 10-year period that, in the aggregate, equal or exceed the current value of the insured property, or
- Three or more paid flood losses that, in the aggregate, equal or exceed the current value of the insured property.

At least 90 days before the policy renewal date, affected property owners and their flood insurance agents are notified that the policy is ineligible for renewal through the NFIP Write Your Own Program. Renewal is offered through the SDF.

Information about repetitive loss properties is provided to the appropriate FEMA Regional Office and state and local floodplain management officials. States or communities may sponsor projects to mitigate flood losses to these properties. Project grants are made through the *Flood Mitigation Assistance Program* authorized by the *National Flood Insurance Reform Act of 1994*. Planning and technical assistance grants are also available through this program.

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The *Flood Insurance Reform Act of 2004* established two additional programs for addressing repetitive loss properties. Under the *Repetitive Flood Claims Program*, up to \$10 million is available annually for FEMA to provide funds to assist states and communities in reducing flood damages to insured properties that have had one or more NFIP claims. Eligible mitigation activities include acquisition of properties, and either demolition or relocation of flood-prone structures, where the property is limited in perpetuity to open space uses. Other eligible activities are elevation of structures, dry floodproofing of non-residential structures and minor localized flood control projects.

The *Severe Repetitive Loss Program* provides grants to reduce or eliminate the long-term risk of flood damage to severe repetitive loss properties insured under the NFIP. A severe repetitive loss property is defined as a residential property covered under an NFIP flood insurance policy and:

- That has at least four NFIP claim payments (including building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or
- For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

Eligible *Severe Repetitive Loss Program* mitigation activities include acquisition and relocation of flood-prone structures and conversion of the property to open space, elevation of existing structures to at least the base flood elevation, minor physical localized flood control projects, and dry floodproofing of historic properties only.

Kansas NFIP Claims Analysis - In updating the *Kansas Hazard Mitigation Plan* in 2007, the Kansas Division of Emergency Management analyzed NFIP flood loss data to determine areas in Kansas with the greatest flood risk. As of August 2007, 340 Kansas communities were participating in the NFIP, including 61 that do not have a delineated SFHA and 85 that are only minimally flood-prone. Ninety-eight Kansas communities that have mapped flood hazard areas are not NFIP participants.

Flood loss information was obtained from FEMA records documenting losses in participating NFIP communities from 1978 through May 31, 2007. The greatest losses have occurred in Wyandotte, Johnson, Butler and Sedgwick counties as indicated in Table 3. The level of pay-

ments in Bourbon County is also noteworthy given the relatively few current policies and flood claims there.

Repetitive and Severe Repetitive Losses – As indicated in the *Kansas Hazard Mitigation Plan*, there were 368 identified repetitive loss properties in Kansas in 2007; such properties were found in 32 counties. Johnson County had the most repetitive loss properties with 94, followed by Wyandotte (45), Sedgwick (36), and Butler counties (34). As of July 31, 2007, there were six validated severe repetitive loss properties in Kansas. An

**Table 3**  
**Top Ten Counties for Flood Insurance Payments**  
**(1978-2007)**

County	Dollars Paid (historical)	Number of		Coverage (\$)
		Flood Claims	Current Policies	
Wyandotte	9,319,262	388	300	71,282,000
Johnson	7,795,772	926	762	162,721,000
Butler	7,788,315	384	389	53,657,000
Sedgwick	6,736,441	647	1,914	264,100,000
Harvey	2,791,818	352	463	42,533,000
Barton	2,351,467	517	213	17,378,000
Bourbon	2,335,901	57	36	4,755,000
Leavenworth	2,163,416	193	165	27,991,000
Shawnee	1,914,209	241	576	74,407,000
Pottawatomie	1,532,460	236	215	42,907,000

Source: FEMA: "Policy and Loss Data by Community with County and State Data," June 29, 2007

additional four properties were pending validation. Validated properties were located in Cherokee, Montgomery, Leavenworth, Johnson, Wyandotte and Saline counties.

FEMA - Hazard Mitigation Grant Program - The Hazard Mitigation Grant Program (HMGP) is a state administered federal program authorized under Section 404 of the *Disaster Relief and Emergency Assistance Act of 1988* (PL 100-707). The Adjutant General's Department, Division of Emergency Management administers the program in Kansas.

The HMGP is intended to help state and local governments carry out long-range mitigation projects following a major disaster declaration by the President. The amount of funding available is determined by calculating 15% of FEMA's costs for the other disaster assistance programs implemented as a result of the disaster. FEMA can contribute up to 75% of the individual project's cost. The remaining 25% must come from non-federal sources.

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Either public or private property may be protected with the HMGP. Project examples include acquisition and re-location of structures from hazard-prone areas, construction of tornado shelters in public facilities or schools and flood protection of critical community facilities.

Although priority is generally given to project applications from the area affected by the disaster, eligible applicants from other communities may also apply. Projects must be consistent with the mitigation priorities established in the KHMP and meet additional eligibility criteria as well.

### Small Dam Safety

Dam failure occurs infrequently, but the consequences can be catastrophic, depending upon the degree of development downstream from the dam. The area that would be flooded should a dam fail is referred to as the "breach inundation zone". This zone may extend as much as 10 to 15 miles below a small dam depending upon such factors as the water storage capacity of the reservoir and local topography.

As is the case with other physical infrastructure, dams need regular maintenance and upkeep. Many dams were constructed in the 1950s and 1960s and are now showing the effects of aging. These effects include physical deterioration of structural components, sediment deposition in reservoirs and increased runoff due to upstream development.

Demographic and land use changes have greatly altered the physical setting of some projects. Dam construction standards have been revised since many dams were built. The hazard class of some dams has been increased due to breach zone development. Dams elevated to a higher hazard class may need to be upgraded to meet the design standards for that class regardless of their current condition. Dam owners may be challenged by the costs of routine maintenance and upkeep.

The *Kansas Stream Obstructions Act*<sup>(16)</sup> gives the Chief Engineer, the exclusive authority to regulate the construction, operation and maintenance of dams in Kansas. As of 2005, nearly 6,000 small dams falling under this authority had been constructed in Kansas, as summarized in Table 4. These dams provide flood control, public water supply, recreation and other benefits. Many dams were built by local watershed districts using federal or state cost-share assistance. Others have been constructed by municipalities and by the state.

### State and Federal Programs and Authorities

FEMA: National Dam Safety Program - The *Dam Safety and Security Program*, addresses safety and security for dams through the coordination of federal programs by the FEMA and the transfer of federal best practices in dam security to the states. The Act includes resources for the development and maintenance of a national dam safety information network and the development by the National Dam Safety Review Board of a strategic plan that established goals, priorities and target dates to improve the safety and security of dams in the United States.

**Table 4**  
**Kansas Dam Summary**

Item	Number of Dams
Total number of regulated <sup>1</sup> dams	5,951
Number of high hazard dams	180
Number of significant hazard dams	247
Number of low hazard dams	5,524
Average age in years (based on 4,000 dams)	37.1
Number of permits for dams held by watershed districts	1,513
Number of federally owned dams in 2002	38

<sup>1</sup>Dams regulated by the Kansas Dept. of Ag, DWR.  
Source: KDA, DWR as of July 15, 2005

The 2002 Act continues programs established by *Water Resources and Development Act*, including grants to the state dam safety programs, training for state dam safety staff and inspectors, and development of devices for the continued monitoring of dam safety. The Corps is charged under PL 107-310 with conducting a national dam inspection program. All dams in the nation are to be inspected except as excluded by this Act. Among these exclusions are dams determined not to pose any threat to human life and property. The state dam safety agency may request to participate in these inspections.

A *National Dam Safety Program* is to be established and maintained by the FEMA. One feature of this program is financial assistance for state dam safety programs. In order to qualify for assistance, a state program must be authorized by state legislation to include:

1. The authority to review and approve plans and specifications to construct, enlarge, modify, remove and abandon dams.

# Kansas Water Plan

2. The authority to perform periodic inspections to ensure compliance with approved plans and specifications.
3. A requirement that, on completion of the dam, state approval must be given prior to the operation of the dam.
4. The authority to require or perform the inspection, at least once every five years, of all dams and reservoirs that would pose a significant threat to human life and property in case of failure.
5. A requirement that all inspections be made under the supervision of a state-registered professional engineer with related experience in dam design and construction.
6. The authority to issue notices, when appropriate, to require owners of dams to perform necessary maintenance or remedial work, improve security, revise operating procedures, or take other actions, including breaching dams when necessary.
7. Regulations for carrying out the legislation of the state.
8. Provisions for necessary funds to ensure timely repairs to or removal of a dam in order to protect human life and property, and, if the owner of the dam does not take action, to take appropriate action as expeditiously as practicable.
9. A system of emergency procedures to be used if a dam fails or if the failure of a dam is imminent.
10. Identification of each dam, the failure of which: a.) could be reasonably expected to endanger human life; b.) the maximum area that could be flooded if the dam failed; and c.) necessary public facilities that would be affected by the flooding.

NRCS Watershed Rehabilitation Program - There is growing national concern that many small flood control dams that were built by local watershed districts with United States Department of Agriculture (USDA) technical and financial assistance are at or near the end of their 50-year planned design life. Watershed rehabilitation amendments to the *Watershed Protection and Flood Prevention Act of 1954*<sup>(9)</sup> (PL 83-566) were enacted in 2000, establishing the *Watershed Rehabilitation Program*. These amendments authorize the USDA NRCS, to work with local communities and watershed project sponsors to address the public health and safety concerns and potential adverse environmental impacts of aging dams.

Only dams that were constructed through USDA assisted water resource programs or authorizations qualify for rehabilitation assistance. Rehabilitation projects must

be cost-shared between the federal government and local project sponsors. The NRCS may provide up to 65% of the total cost of the rehabilitation project.

There are 829 watershed dams in Kansas that qualify for this rehabilitation assistance. Most of these dams have a 50-year design life. Their average age is 33 years. Thirty-four of these dams have exceeded their design life; an additional 462 dams will do so by 2018. Also, 126 dams have had a hazard class change due to development below the dam or because of a change in definitions, methods, criteria, and/or policy. Fifty-seven other dams have had a hazard class change due to removal of potential hazards.

Between 1958 and 1979, 105 dams were built with corrugated metal pipe as the principal spillway. A study of one of the first watershed projects showed that 40% of such spillway pipes needed replacement which would also include upgrading the dam to today's design standards.

Presently, the NRCS has completed assessment of 47 dams in Kansas. Of these, structural deficiencies were discovered in 5 dams and 18 dams have had a hazard class increase since construction.

To date, the NRCS has received four applications for rehabilitation planning in Kansas from the following sponsors:

- Rock Creek in Butler County
- Sand Creek in Harvey County
- Switzler Creek in Osage County
- Spring Creek in Sedgwick County.

NRCS Rehabilitation Needs and Costs in Kansas - In a 1999 report, the NRCS estimated that it would cost approximately \$20 million to repair or upgrade 97 PL 83-566 watershed dams in Kansas needing rehabilitation. An inspection of dams in the Little Delaware-Mission Watershed in northeast Kansas identified 11 grade stabilization structures in need of major rehabilitation. The cost of rehabilitating one of these dams, constructed in 1958, to current dam safety standards, was estimated to be \$155,000.

Another cost example is provided by a Pilot Rehabilitation Project conducted by the NRCS in the Sergeant Major Creek Watershed in Oklahoma. Two dams in this watershed were determined to be unsafe. They both had deteriorated metal and concrete components in the prin-

# Kansas Water Plan

cipal spillways. Also, both structures had collected a considerable amount of sediment, resulting in lost flood storage. Rehabilitation work included:

- The old principal spillway pipes were plugged for abandonment and new pipes and concrete towers were installed.
- Foundation drains were installed in the back of the dams to stabilize the embankment.
- The earthen spillways were enlarged.
- The height of Dam No.2 was increased to provide additional downstream protection and to protect a state highway.
- Rehabilitation extended the life expectancy of the dams for another 100 years.

Rehabilitation costs were \$325,998 for Dam No. 1 and \$431,822 for Dam No. 2, giving an average cost per dam of \$378,910. If this project had been completed under the dam rehabilitation provisions of the 2000 amendments to PL 83-566, the local sponsor would have been responsible for 35% of the total cost or \$265,237 (\$132,619 per dam).

KDA - DWR: Dam Safety Program - This program is part of the *Stream Obstructions Program* within the Water Structures Program of the DWR.

The *Kansas Stream Obstructions Act*<sup>(16)</sup> gives the DWR Chief Engineer the exclusive authority to regulate the construction, operation and maintenance of dams in Kansas. Written consent or a permit from the Chief Engineer is required to construct a dam or make changes in any dam as required by the Act.

The Chief Engineer has the power and duty to inspect any dam and may issue orders requiring correction of deficiencies or removal of the dam if deemed necessary. An annual inspection of all dams found to be unsafe is required until the deficiency is corrected or the dam is removed.

Following amendments to the *Stream Obstruction Act* in 2002, a structure requires a permit as a dam if it meets either of the following two criteria:

1. It is an artificial barrier which can impound water or other liquids that has a height of 25 feet or more measured from the lowest point on the downstream toe to the top of the barrier; or
2. It is an artificial barrier which can impound water or

other liquids that has a height of six feet or more, measured as in (1), and is capable of impounding 50 acre-feet or more.

Between 1978 and 2002, the statute exempted from the permitting requirement all dams which impounded 30 acre-feet of water or less.

The Chief Engineer has the power and duty to inspect any dam and to issue orders requiring correction of deficiencies or removal of the dam. Where a dam's condition is so dangerous as to pose an immediate safety threat, the Chief Engineer shall immediately employ any remedial means considered necessary. The Chief Engineer continues in control of any such dam until it is considered safe or the emergency prompting the remedial action has ceased.

The *Stream Obstructions Act* requires that the Chief Engineer adopt rules and regulations to establish standards for the administration and enforcement of the Act. Three dam hazard classifications have been established as described in K.A.R. 5-40-9. These classes are:

1. Class A (low hazard) – dams located in rural or agricultural areas where failure may damage farm buildings, limited agricultural land, or county, township and private roads.
2. Class B (significant hazard) – dams located in predominately rural or agricultural areas where failure may endanger few lives, damage isolated homes, secondary highways or minor railroads or cause interruption of use or service of relatively important public utilities.
3. Class C (high hazard) – dams located in areas where failure may cause extensive loss of life, serious damage to homes, industrial and commercial facilities, important public utilities, main highways or railroads.
- 4.

K.A.R. 5-40-73 requires the owner of each significant hazard dam to create an emergency action. Plans Owners of high hazard dams are required to create and maintain an emergency action plan that meets FEMA guidelines presented in Handbook 64 – Federal Guidelines for Dam Safety. Plans are submitted to the Chief Engineer.

The DWR has received federal financial assistance for enhancement of the *Dam Safety Program*. Current Congressional authorization for these current grants runs

# Kansas Water Plan

through September 30, 2011. Grants are renewed each year.

State Conservation Commission: Watershed Planning Assistance Program - Since 1977, the Kansas Legislature has annually appropriated funds for cost-share assistance for the construction of flood control detention and grade stabilization dams. The *Kansas Watershed District Act* and the *Watershed Planning Assistance Program* rules and regulations provide guidance for the administration of the assistance.

In 2006, the *Watershed Planning Assistance Program* was revised to provide for state cost-share financial assistance for dam rehabilitation and for breach inundation zone mapping. Any organized watershed district, drainage district, other special purpose district, or other dam owner authorized by the Legislature may apply. These revisions are summarized as follows.

Watershed Dam Rehabilitation – Rehabilitation means any work, except that is required due to inadequate dam operation and maintenance, needed to extend the service life of a dam or to meet applicable safety and performance standards. The state may provide up to 70% cost-share and an additional 10% for engineering fees for dam rehabilitation. Eligible activities may include sediment removal, structure upgrade and replacement of deteriorated components.

Inundation Zone Mapping – The State Conservation Commission provides cost-share assistance for dam breach inundation zone mapping at a rate of 70%. Maps produced are approved by the Chief Engineer, DWR. Preparation of breach inundation zone maps is necessary to evaluate the need for development controls downstream from a dam. Mapping also assists in the preparation of emergency action plans to be implemented should a breach occur.

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20. Kansas Water Office, July 2003. *Kansas Water Plan: Fiscal Year 2005 Update: Flood Management Policy Section*. Final Draft.
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# Kansas Water Plan

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## Water Based Recreation Policy and Institutional Framework January 2009

### Introduction

Increasing recreational opportunities at the lakes, rivers and streams of Kansas is an objective of the [Kansas Water Plan \(KWP\)](#).

The 2003 *KWP* contained a brief management section on water-based recreation emphasizing increased access. A policy section of the *KWP* on *Economic Development Opportunities at Federal Reservoirs in Kansas*<sup>(1)</sup> was approved in 2006 along with background support papers. This 2009 management section updates these documents and adds descriptive information. It does not include additional objectives, recommendations or implementation strategies.

### Overview

The State of Kansas lacks significant natural lakes and contains only three legally navigable rivers. Consequently, water-related outdoor recreation in Kansas is centered on and around the 24 federal reservoirs, 48 state fishing lakes, 198 city and county lakes and hundreds of smaller private impoundments, wetlands and stream reaches.

Permanent standing and flowing waters in Kansas cover about 356,000 acres. This acreage is comprised of the normal conservation pool level of 24 federal and three utility company reservoirs covering 166,000 acres; 9,806 miles of streams amounting to 65,000 acres; over 80,000 private impoundments contributing an estimated 100,000 acres; and more than 300 lakes covering 25,000 acres owned and operated by either the Kansas Department of Wildlife and Parks (KDWP), or counties and cities.<sup>(2)</sup> Public reservoirs and lakes are typically adjacent to parks and wildlife management areas which support bank fishing, waterfowl hunting, wildlife observation and other water-related recreational activities.

Development of the Kansas state park system largely followed the construction of federal reservoirs. Of 25 Kansas state parks, 22 are water-based with 19 located adjacent to federal reservoirs and three at smaller state-owned lakes. At the five federal reservoirs lacking state parks, recreational access and facilities have been developed by the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, or both.

A key policy issue identified in surveys conducted by the Kansas Water Office (KWO) and KDWP is that demand for water-based recreation exceeds present availability.

Visitation at state parks in 1990 was estimated at 4.1 million visitors. By 2001, visitation had increased to 7.52 million. With 30 percent of state park users driving more than 50 miles for access to existing public lands and waters, fuel prices may play a larger role in recreational use than in the past.<sup>(2)</sup>



Pottawatomie State Lake No. 1. Photo courtesy KWO.

While generally smaller in size, state-owned fishing lakes, along with city and county-operated lakes, offer varied and widely distributed water recreation opportunities. Ranging from small fishing ponds to impoundments like the 1,250-acre Winfield City Lake, these waters offer recreational opportunities close to the majority of Kansas residents.

Kansas contains three publicly navigable rivers available for recreational use: the Kansas, Arkansas and Missouri. Although considered public, the Arkansas River from just west of Garden City to near Larned is often dry. The number of access points on these public rivers has increased in recent years through initiatives by KDWP, local governments and interest groups. A proposal from KDWP in cooperation with the City of Wichita calls for an access point every five miles on the Arkansas River beginning in Rice County and ending near the Oklahoma border. No action has been taken on this proposal as of 2008.

### Economic Impacts

The Interdisciplinary Communication Research Institute at Wichita State University conducted a survey of water-based recreational participation and desire for increased

# Kansas Water Plan

## Water Based Recreation Policy and Institutional Framework January 2009

opportunities in October 2001.<sup>(3)</sup> Their results are summarized below in Table 1.

Activity	Percent Reported	
	Current Participation	Increased Participation Desired
Swimming	83.8	7.1
Fishing	79.7	25.2
Picnicking	75.2	3.9
Camping	61.9	18.3
Motor Boating	48.7	14.1
Water Skiing	30.3	6.4
Jet Skiing	19.1	5.9
Canoeing	15.6	3.2
Waterfowl Hunting	15.6	1.8
Sailing	3.4	2.1
Windsurfing	1.1	3
Other	7.6	1.2

A 2005 study by the KWO collected and analyzed physical and natural resource data on all 24 federal reservoirs in Kansas to determine which reservoirs had attributes for different kinds of economic development.<sup>(4)</sup> After data were collected on each of the reservoirs, a statistical tool was used to group reservoirs with similar attributes for three development categories: residential, resort and recreational.

Table 2 shows the results generated by the KWO study. The intent of this analysis was to evaluate only the physical and natural resource characteristics of the federal reservoirs in Kansas. It does not cover all attributes that could make successful development possible or desirable.

Development Category	Top Tier Group	2 <sup>nd</sup> Tier Group	3 <sup>rd</sup> Tier Group
<b>Residential</b>	Clinton Hillsdale El Dorado	Milford Perry Pomona	NA
<b>Outdoor Recreation</b>	Big Hill	Kirwin K. Sebelius Webster Cedar Bluff	Milford Perry Waconda
<b>Resort</b>	Clinton Hillsdale Perry	Big Hill Wilson Milford	N/A

### Boating

There were 103,170 registered boats in Kansas as of December 31, 2000, contributing an estimated \$388,870,600 to the Kansas economy with \$105,343 of this coming from personal watercraft owners.<sup>(2)</sup> Recreational boating accounted for 3,627,524 user days of activity in 2000. Kansans spent \$43,864,000 on boat purchases, \$13,906,000 on outboard motors, \$1,318,000 on boat trailers and \$11,114,000 on boating related accessories in 1999. By 2002, boating registrations generated a total of \$823,250 in KDWP revenue.<sup>(5)</sup> Some trends in boating use are evident. While personal watercraft (jet skis) use has become increasingly popular, small craft sailing has decreased. Kayaking is one of the fastest growing sports nationally with participation increasing by more than 182 percent from 1995 to 2000.<sup>(6)</sup> Vessels propelled by hand are not required to be registered in Kansas, so tracking participation for this recreational segment is not possible.



Wilson Lake Marina. Photo courtesy KWO.

Facilities to support recreational boating have been impacted by sedimentation as reservoirs age. Entire recreation areas in the upper reaches of Perry and Tuttle Creek reservoirs have been converted to wildlife areas as the shoreline silted in and boat ramps became unusable. Ramps at the upper end of John Redmond and Melvern reservoirs no longer allow access to the main water body due to log jams. Marina development at federal lakes has been stable with commercial facilities located on most federal reservoirs.

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## Water Based Recreation Policy and Institutional Framework January 2009

### Fishing

According to KDWP, about 404,000 anglers 16 years of age or older fished in Kansas during 2005.<sup>(2)</sup> Of those, 88% were residents; up from 75% in 2001. A national survey in 1985 determined that anglers in Kansas average about 20 fishing trips annually.<sup>(7)</sup> Results of a Kansas Licensed Angler Survey conducted in 1995 showed that lifetime license holders averaged 24 one-day fishing trips and four overnight trips; residents made 22 one-day trips and four overnight trips; and non-residents made 16 one-day trips and four overnight trips.<sup>(8)</sup> Kansas supported an estimated 7.8 million fishing trips by adult anglers in 1989 (including unlicensed residents). The 2001 *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* estimated that fishermen participated in 5,662,000 days of activity in Kansas.<sup>(7)</sup>

In a 1987 KDWP survey of resident licensed anglers, lakes supported 31% of the total fishing pressure; private impoundments, 26%; reservoirs, 23%; and streams, 20%.<sup>(2)</sup> By 1995, preference had changed to federal reservoirs, with private lakes and ponds second and state fishing lakes third.<sup>(8)</sup>

In 2002, the KDWP was reimbursed \$4,837,091 from a federal excise tax on the sale of fishing equipment and motor boat fuels. Income to the Department also came from the sale of 252,000 resident fishing licenses in 2004.<sup>(2)</sup>

### Hunting

Hunting is not as obviously tied to water resources as boating and fishing, but significant activity occurs on public wildlife areas associated with reservoirs, public and private wetland areas and adjacent to private streams and ponds. Federal funds collected as excise taxes on the sale of hunting and recreational shooting equipment and ammunition are proportionately distributed back to the states. The KDWP reimbursement for federal projects is about \$3 million per year.<sup>(2)</sup> Hunting expenditures bring millions of dollars to Kansas economy. According to the 2001 *National Survey of Fishing, Hunting and Wildlife Associated Recreation*, total expenditures in Kansas were \$236 million for hunting.<sup>(7)</sup>

### Wildlife Watching and Other Activities

Similar to hunting, areas associated with water bodies in Kansas support bird watching and other activities such as bicycling, hiking, triathlons and outdoor education.

Shorebird watching is a major tourist attraction in central Kansas at Cheyenne Bottoms Wildlife Area and the nearby Quivira National Wildlife Refuge. A new visitor center and education building has been constructed at Meade State Park in southwestern Kansas and a visitor center is under development at Cheyenne Bottoms.



Cheyenne Bottoms. Photo courtesy Dennis Schwartz.

### Kansas Water Plan Objective

- By 2010, increase public recreational opportunities at Kansas lakes and streams.

### Statutory Framework

Since 1955, the state has developed extensive statutory authority to protect, provide and improve outdoor recreation and the natural resources of the state. These key mandatory water-based recreation considerations are found at K.S.A. 82a- 907(a)(b)(d)(i)(m)(n).

- It shall be the policy of the State of Kansas to protect, provide and improve outdoor recreation and natural resources in this state and to plan and provide for the wise management and use of the state's natural resources, thus contributing to and benefiting the public's health and its cultural, recreational and economic life (K.S.A. 32-702).
- Outdoor water-based recreation has long been an important consideration in the management of Kansas water resources as recognized in the State Water Resource Planning Act (K.S.A. 82a-901 *et seq*). This Act provides guidance in formulating the *Kansas*

# Kansas Water Plan

## Water Based Recreation Policy and Institutional Framework January 2009

*Water Plan* and sets out a number of water-based recreation related issues that the KWO must consider.

- Day use, camping, boating, fishing and other recreational opportunities are developed by KDWP along with federal and local government. Facilities are in place and managed at small fishing lakes, and major irrigation, flood control and water supply reservoirs by KDWP (K.S.A. 32-807; K.S.A. 32-837).
- Assistance is provided to communities to enhance fisheries and associated recreational opportunities by KDWP through the Community Fisheries Assistance Program (K.S.A. 32-807, K.S.A. 32-829).
- Recreation is an authorized purpose under the multi-purpose small lakes program administered by the State Conservation Commission (K.S.A. 82a-1602; K.S.A. 82a-1603(l)).

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Sailboat at Lake Wilson. Photo courtesy KWO.

# Kansas Water Plan

## Data and Research Policy and Institutional Framework January 2009

### Overview

Accurate and timely data is crucial to both planning and management of water resources in Kansas. Basic analysis and research is coordinated through the water planning process and the Kansas Water Authority. All state agencies with water resource responsibilities target data collection and analysis on high priority water resource issues and in support of the 2010 objectives.

Geospatial data, as available from each water resource related agency, is shared through the Geographic Information Systems (GIS) Policy Board and the Data Access and Support Center (DASC). The GIS Policy Board was initiated in 1989. Administrative support for the GIS Policy Board is contained within the Department of Administration. The DASC<sup>(1)</sup> is located at and partially supported by the Kansas Geological Survey (KGS).

Research is primarily carried out at the Kansas Board of Regents' universities and by federal agencies. Statutory guidance indicates that it is the responsibility of the KWO to coordinate and guide data collection and research toward issues of importance within the *Kansas Water Plan*.

The state develops and supports research, through the Kansas Water Resources Institute (KWRI)<sup>(2)</sup>, on high priority water resource issues and objectives of the state, as identified through the state water planning process. The KWRI fosters the dissemination and application of research results, and facilitates effective communication among water resource professionals in Kansas.

Programs are designed to a level of completeness and accuracy to support planning and management of the state's water resources.

### Kansas Water Plan Guidance

- It is a policy of the state that all state agencies with responsibilities affecting water resources of the State shall carry on basic data collection, research and analyses concerning matters relating to the water resources of the state.<sup>(3)</sup>
- It is a policy of the state that the KWO review and coordinate financial assistance for research that may be provided by federal or state agencies to public corporations concerned with management, conservation and development of water resources to prevent duplication of effort.<sup>(3)</sup>
- The KWO has a mandate to collect and compile information pertaining to a wide range of water issues

and, in so doing, collect and compile information obtainable from other agencies, instrumentalities and political subdivisions of the state and the federal government.<sup>(4)</sup>

### Objectives

- By 2010, target data collection, research projects, and data sharing activities to address specific water resource issues as identified in the Kansas water planning process and to support and guide state water resource program operations.

### WATER MANAGEMENT AUTHORITIES AND PROGRAMS

#### Data Collection

##### Streams

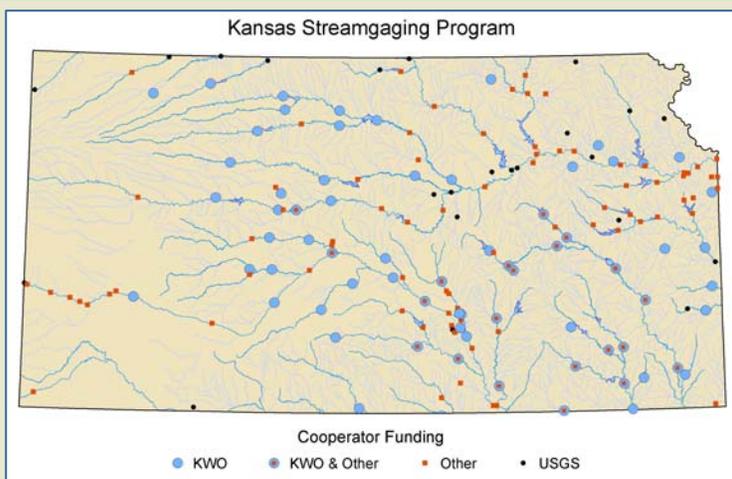
Flow and stream surface elevation is automatically collected at 170 locations by gages maintained and operated by the U.S. Geological Survey (USGS). A number of these gages (147) are operated in conjunction with state and local cooperators. This information is supplied in near real time to the Internet through satellite uplink. Stream gage data are used for flood forecasting, reservoir operations, water right administration, water quality monitoring and interstate compact compliance as well as a host of other uses. Long-term stream gages provide the ability to complete analyses of changes in the hydrologic system in response to management or watershed changes.

Water quality in flowing streams is measured primarily by the Kansas Department of Health and Environment (KDHE). KDHE collects grab samples at established sites on a rotational basis to determine water quality conditions and any changes that may be happening over time. The USGS also has established a few continuous real time water quality monitoring stations in Kansas. This information is used to establish total maximum daily loading (TMDL) values as well as measure impact of management practices.

Aquatic species monitoring is used to determine the relative water quality and changes that may be happening to the overall biological stream community. Monitoring is conducted by the Kansas Department of Wildlife and Parks (KDWP), KDHE and university researchers at Kansas State University (KSU), Kansas University's Kansas Biological Survey (KBS) and other regents' institutions.

# Kansas Water Plan

## Data and Research Policy and Institutional Framework January 2009



### Reservoirs

The U.S. Army Corps of Engineers (Corps) and U.S. Bureau of Reclamation (Bureau) operate 24 federal reservoirs within the State of Kansas. For each of these reservoirs the respective federal agency collects daily information regarding lake surface elevation, water in storage, releases, evaporation and inflow. This information is used by state and federal agencies for reservoir operations as well as analysis of flood risk and reservoir yield.

In 2006, the KBS started a Bathymetric Survey Program. This Program is conducted in cooperation with the KWO and other local and state agencies. The survey program measures reservoir storage and sediment accumulation. Data from this program is used to estimate the sediment rate in Kansas reservoirs and the chemical composition of the sediment that has been deposited.

Information on the quality of water in reservoirs is collected by the KDHE. This information is used in conjunction with stream information to determine reservoir loading and contaminant source.

### Ground Water

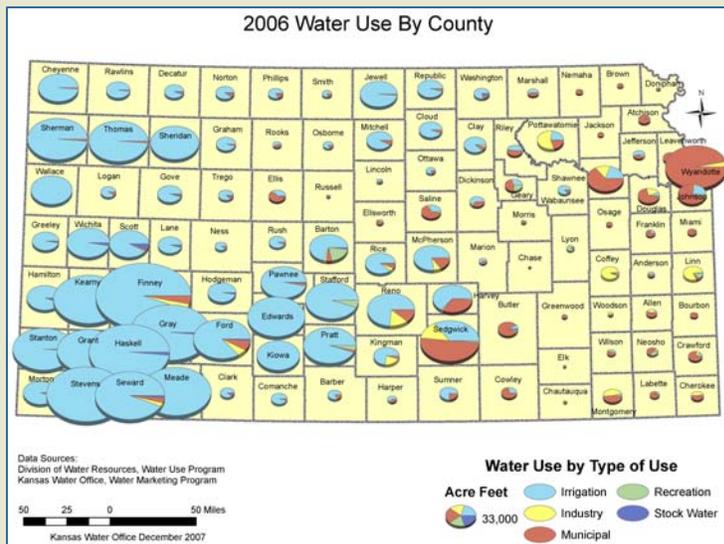
Ground water levels are measured throughout the high plains aquifer system by a cooperative program of the KGS<sup>(5)</sup>, the Kansas Department of Agriculture – Division of Water Resources<sup>(6)</sup> (DWR) and the local groundwater management districts. These measurements show the depth to water and change from the previous year. When combined with bedrock elevations from drilling logs, the measurements show the saturated thickness remaining in the aquifer.

Limited ground water quality data are collected by local public water suppliers in cooperation with the KDHE. This information is used primarily to determine whether safe drinking water laws and rules are being met. Additionally, ground water quality data are measured at contamination remediation sites as well as around certain solid waste land fills.

### Water Use

The DWR collects information each year about water use in Kansas. Information for the previous calendar year is self-reported by each water right holder in Kansas by March 1. This information is used for water right compliance. When combined with water level measurements, these data can be used for multiple analyses related to Kansas' aquifers and ground water movement.

The KWO collects a limited amount of water use information for holders of Water Marketing Program contracts. This information shows the amount of water directly withdrawn from reservoirs each year. This information is used for contract compliance as well as passed along to the Corps to be combined with other reservoir information.



### Climate

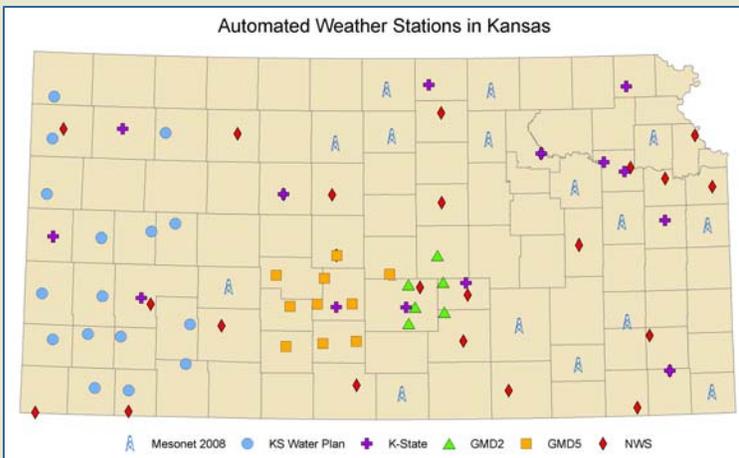
Information about [precipitation](#), wind speed, temperature, and other atmospheric conditions is measured at numerous weather stations throughout the state. These stations are operated by several government agencies for a variety of purposes. Agencies involved in this effort include the National Weather Service (NWS), the USDA

# Kansas Water Plan

## Data and Research Policy and Institutional Framework January 2009

Natural Resources Conservation Service, KSU, the Kansas Department of Transportation, and local groundwater management districts.

In addition to automated airport stations, the NWS maintains a volunteer Cooperative Observer Program. Some of these stations, most of which are not automated, have been in operation for over 100 years. KSU operates a network of 14 automated weather stations located at KSU agricultural experiment stations. KSU also provides operation and maintenance for 16 additional automated stations that provide data primarily for irrigation scheduling.



Development of a multi-purpose Kansas mesonet of automated stations was initiated in 2008. Mesonet stations eventually will be deployed in all Kansas counties. KSU will operate and maintain this network.

### Data Storage

Data are stored and organized in a number of different manners within Kansas to serve various purposes.

#### Data Access and Support Center - Geographic Information Systems

GIS data are developed by a number of agencies and research organizations in Kansas. Basic GIS data are stored at the DASC at the KGS. This Center and the basic data development are overseen by the Kansas GIS Policy Board established by executive order.

#### Weather Data Library

KSU maintains a Weather Data Library<sup>(7)</sup> within its Department of Agronomy. The library serves as a repository

for the weather data observed within the state. It is affiliated with the High Plains Climate Center and the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center. Information available from the Weather Data Library comes from a number of sources and is delivered to a wide variety of clients through either the internet or customer response. The State Climatologist oversees the library.

### National Water Information System

The USGS collects and maintains a national database of water information.<sup>(8)</sup> This information ranges from streamflow measurement, to lake levels to ground water levels in certain cases. This information is readily accessible on the Internet.

### Ground Water Levels

The KGS maintains the WIZARD database, a repository of information for freshwater wells drilled into Kansas aquifers. Data are available through the KGS website.

### Research

#### Kansas Water Resources Institute

The KWRI<sup>(2)</sup> was established in 1965 as part of the Water Resources Research Act. It is a component of a national network of water resources institutes in every state and trust territory of the United States.

KWRI works to develop and support research on the high priority water resource issues and objectives of the state. KWRI also helps foster the dissemination and application of research results, as well as facilitates effective communication among water resource professionals in Kansas. The Institute supports research through a competitive grant program. KWRI distributes and applies research results through conferences, briefings, white papers, and newsletters. The Institute also helps sponsor the annual Water and the Future of Kansas conference.

### State Agencies

Each of the Governor's Natural Resources Subcabinet agencies conduct water resources research to support the agencies' missions. In addition, the KGS and KBS serve as research resources to the state. Both agencies are non-regulatory and non-degree granting research and service units of the University of Kansas.

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The mission of the KGS is to conduct geological studies and research and to collect, correlate, preserve, and disseminate information leading to a better understanding of the geology of Kansas, with special emphasis on water quality and quantity.

In 2006, the Applied Science and Technology Reservoir Assessment (ASTRA) Initiative<sup>(9)</sup> was created at the KBS in response to the need for information regarding the status and conditions of Kansas reservoirs.

### Federal Agencies

Several federal agencies contribute water resources research to the state of Kansas including the USGS. Through the Kansas Water Science Center<sup>(10)</sup>, the USGS conducts research and produces publications about water resources.

### Universities

Kansas' six state universities, 19 community colleges, and a municipal university conduct research that directly supports the goals and objectives of the water resource agencies in the state.

### Resources

1. Kansas Data Access and Support Center. <http://www.kansasgis.org/>
2. Kansas Water Resources Institute (KWRI). <http://www.k-state.edu/media/webzine/institute/KSwater.html>
3. K.S.A. 82a-901 *et seq.* - State Water Planning Act. <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do>
4. K.S.A. 74-2608 *et seq.* <http://www.kslegislature.org/legsrv-statutes/getStatuteInfo.do>
5. Kansas Geological Survey. <http://www.kgs.ku.edu>
6. Kansas Department of Agriculture-Division of Water Resources. <http://www.ksda.gov/cid/2>
7. Kansas State University, Weather Data Library. <http://www.oznet.ksu.edu/wdl/>
8. U.S. Geological Survey, National Water Information System. <http://waterdata.usgs.gov/nwis>

9. Kansas Biological Survey, Applied Science and Technology for Reservoir Assessment. <http://www.kars.ku.edu/astra>
10. U.S. Geological Survey, Kansas Water Science Center. <http://ks.water.usgs.gov/>

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### Background

Kansans historically have enjoyed a plentiful supply of safe drinking water. Delivered reliably to homes and industries across the state for less per gallon than the cost of a 12-ounce can of soda, water generally is taken for granted. Only during times of drought, flood or ice storms does water earn a headline in the newspaper or a spot on the evening news.

Telling the behind-the-scenes-story of the pipes and policies and offering educational resources directly or through contract is the objective of the Public Information and Education Program.

Two objectives are described in the *Kansas Water Plan* related to this program:

- By 2010, Kansas Water Office (KWO) public information activities should be directed at ensuring the public is aware of the *Kansas Water Plan* and knows where and how to obtain current and reliable information on the status of water resources in Kansas.
- By 2010, provide educational activities to ensure that Kansans increase their knowledge and understanding of the state's water resources to enable them to make better personal and public decisions on water conservation, development and management.

Information and education are keys to all *Kansas Water Plan* policies. To make considered water resource decisions, the state's decision makers and all Kansans need to have an awareness, understanding and appreciation for water resource fundamentals. Knowledge and critical thinking skills developed and enhanced through various facets of the on-going information and education programs funded through the *Kansas Water Plan* help fulfill those needs.

Public information and education, while related, have different objectives. Public information provides timely and topical facts about specific issues or problems by means of news releases, feature articles, informational brochures, journals, bulletins, videos and the KWO web page [www.kwo.org](http://www.kwo.org). Providing targeted exhibits on topical issues at governmental and professional trade shows serves as yet another way to deliver information.

Public education is process oriented with the goal of enhancing critical thinking, problem solving and decision making skills.

### Kansas Water Office Information Outreach

The KWO works through the state's 12 [Basin Advisory Committees](#) (BACs) to deliver information to the public on local and state water resource issues. The BAC meetings are organized and facilitated by KWO staff members who serve as basin planners. They arrange for guest speakers or present policy proposals for comment by the committee members and local citizens. In turn, the meetings provide a forum for previously unidentified issues to be brought forward. The BACs serve in an advisory capacity to the KWO and the Kansas Water Authority (KWA).

Since 2007, one of the four quarterly meetings (usually in early December) is expanded into a regional conference on a current water resource topic. In 2007, the topic was "Bioenergy and Water;" in 2008, "Water and Energy."

The KWO works in concert with the state's other water resource agencies to propose consistent, coordinated proposals intended to conserve and protect water and related resources. Presentations are made to the Kansas Legislature and the Governor to advance these proposals.

The KWO web site, [www.kwo.org](http://www.kwo.org) provides a resource for current water issues, status of pending legislation, results of BAC and KWA meetings and a month-by-month accounting of the state's federal reservoirs. Electronic links to the other state agencies and relevant sites also are provided.

The "State and Federal Water Programs" directory provides a listing and description of state and federal water resource agencies and the services they offer. Printed copies historically have had a red cover, giving the directory the name "Red Book." The [Red Book](#) is complemented by a statewide electronic services directory available online through the home pages of many of the state's agencies, including the KWO.

Each month, the KWO publishes the electronic "[HydroGram](#)," a collection of articles on current water topics from across the state. A "[Climate Summary and Drought Report](#)," published monthly updates readers on overall climatic conditions during the past month and current drought status, if any.

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### Kansas Water Resource Education Initiatives

Kansas' water resource education work is designed to create an environmentally literate citizenry. Water resource education initiatives funded by the *Kansas Water Plan* Fund are Project WET (Water Education for Teachers) and the Kansas Environmental Leadership Program (KELP).

In 2005, the State of Kansas added Alternative Dispute Resolution for natural resources to its educational arsenal. The program strives to create a mutual understanding of the facts by parties who hold different views on natural resource issues.

### Project WET

Project WET trains classroom teachers and lay educators (i.e. Conservation District personnel and youth group leaders), who, in turn, use the nationally developed curriculum correlated to the State of Kansas' standards for pre-Kindergarten through 12th grade. The program is administered by the Kansas Association of Conservation and Environmental Education (KACEE)<sup>(1)</sup>. A suite of related programs, including WET in the City, Project Wild, Project Wild Aquatic, Project Learning Tree, Investigating Your Environment, and Leopold Education Project complement Project WET and are taught by KACEE staff. The activities of these programs are used to reinforce water resource points at Water Celebrations held across the state.

Under KACEE's leadership, environmental education interests in the state came together and developed an Environmental Education Plan for Kansas. Seed money

for the project came from a grant to KACEE from the Region VII Environmental Protection Agency (EPA).

### Kansas Environmental Leadership Program

The Kansas Environmental Leadership Program (KELP) provides environmental and leadership training to adults.<sup>(2)</sup> Each year, up to 25 natural resource professionals are selected to enhance their leadership skills and broaden their understanding of water resource issues. They participate in a five-session (3-days per session) program conducted over the course of a year. Meeting around the state, they receive an in-depth look at region-specific water resource issues. The leadership training enables KELP participants to recognize and enhance the skills they have to engage and motivate others to become involved in environmental issues.



**Kansas Environmental Leadership Program's (KELP) Applied Leadership Project located at the University of St. Mary, Leavenworth. Photo courtesy of KELP**

Since its inception in 1999, KELP students have included Kansas legislators, environmental scientists, engineers, journalists, conservationists, farmers, and environmental advocates. The class diversity has added to the educational benefits.

For five years, members of the state's BACs, were provided partial scholarships. Their participation may have helped convince their fellow KELP class members to apply and subsequently serve on the BAC in their area.

Class members also must initiate and complete an applied leadership project. Working in teams of three or four, they generate an idea, establish a budget and recruit outside resources, both money and knowledge, to



**Project Wet training and water celebrations**

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complete their project. Projects have included field days demonstrating best management practices to installation of a hard rock crossing to prevent cattle from eroding a stream bank. Videos, booklets, and interpretive signs have been created on a variety of topics. Plans are to improve the KELP program to meet current needs.

### Alternative Dispute Resolution

As water issues become more contentious, it's critical to resolve them in the most civil and cost effective manner possible. Alternative dispute resolution techniques can help.

In 2004, the KWA endorsed a three-year pilot project to coordinate the use of dispute resolution techniques. The pilot project was funded by the Kansas Legislature in 2005. Services offered include mediation, facilitation and arbitration.

While the specifics of alternative dispute resolution cases are always held confidential, examples of mediation topics have included allocation of water supply and lake level management to control invasive aquatic species. Facilitation services have enhanced the working relationships of many groups.



Alternative Dispute Resolution training in Newton, KS hosted by the Kansas Institute for Peace and Conflict Resolution at Bethel College.<sup>(3)</sup>

writing the agreements reached and each party's responsibilities. Agreements reached through these services are binding between the parties, but self enforcing. In the event one party feels the other has not followed through on its commitments, however, then all the normal administrative, judicial and legislative options are still on the table.

In some instances, the involved parties prefer to have a determination of a dispute made by an impartial referee who has the approval of both parties. They also decide whether the decision made by the third party is to be the final say (binding vs. non-binding) on the issue.

The Alternative Dispute Resolution services are sponsored by the Governor's Natural Resources Subcabinet and are coordinated by the KWO. The KWO recommends a trained individual. Neutrality of this individual is key to successful alternative dispute resolution.

Any natural resource dispute at the local, county or state level is eligible for these services as long as there is a state interest in resolving the dispute. Examples include multi-party, multi-county, or multi-agency disputes. Disputes which are likely to go to the Kansas Legislature, State of Kansas agencies' administrative review or the Kansas court system also are high priorities.

Participation in facilitated services is voluntary and is provided free or at a nominal cost.

### Resources:

1. Kansas Association of Conservation and Environmental Education. 2008. [www.kacee.org](http://www.kacee.org)
2. Kansas Environmental Leadership Program. 2008. [www.oznet.ksu.edu/kelp/](http://www.oznet.ksu.edu/kelp/)
3. Kansas Institute for Peace and Conflict Resolution. [www.bethelks.edu/kipcor](http://www.bethelks.edu/kipcor)

Research indicates that compliance in mediation and facilitation is higher when parties have been fully involved in coming to an agreement. Once an agreement is reached, it is common practice for parties to put in