

Kansas Water Plan

Water Resource Objectives

January 2009

The Kansas Water Authority approved the following water resource 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. ***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.

Walnut Basin: Demand in the upper end of the Walnut Basin is projected to increase due to population growth.



Clinton Dam. Photo courtesy Kansas Geological Survey.

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. ***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 Arkansas, Upper Arkansas, Cimarron, Smoky Hill-Saline and Solomon). Substantial declines were noted in the Kan-

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sas-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 water resource objective has not been achieved on a statewide basis.

3. 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.

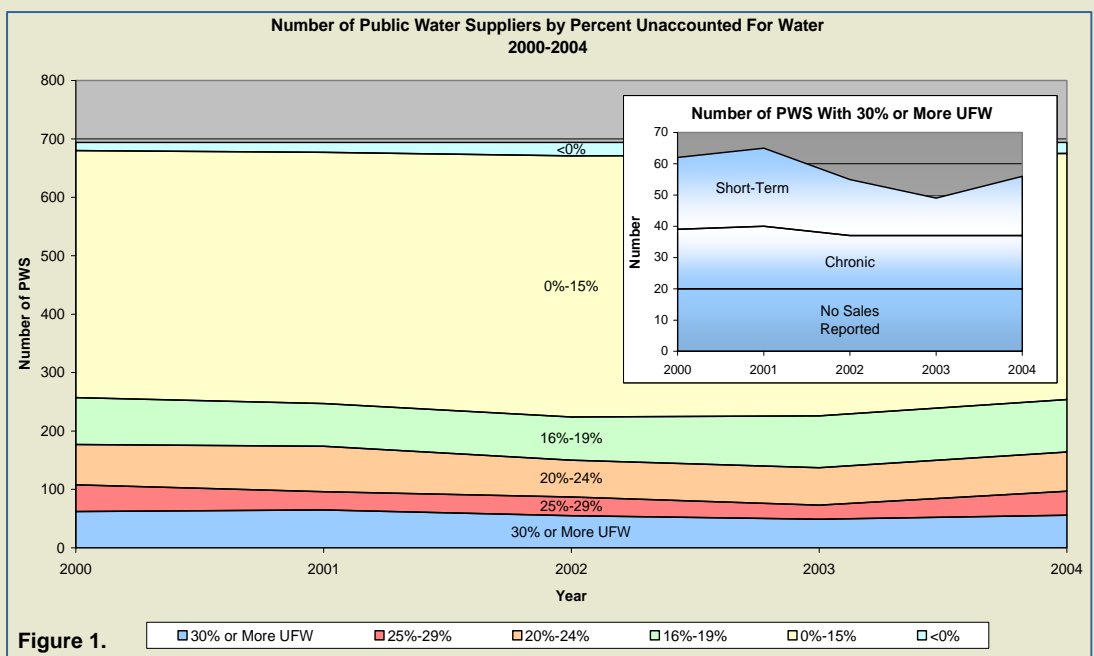
Comparison of average and extreme scores shows little difference in community water system capacity between 2002 and 2005. The number of high priority systems decreased four percent between 2002 and 2005,

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. 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 repairs for recognized problems. The remaining systems



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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. 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. 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 plan could not be established from the DWR conservation database.

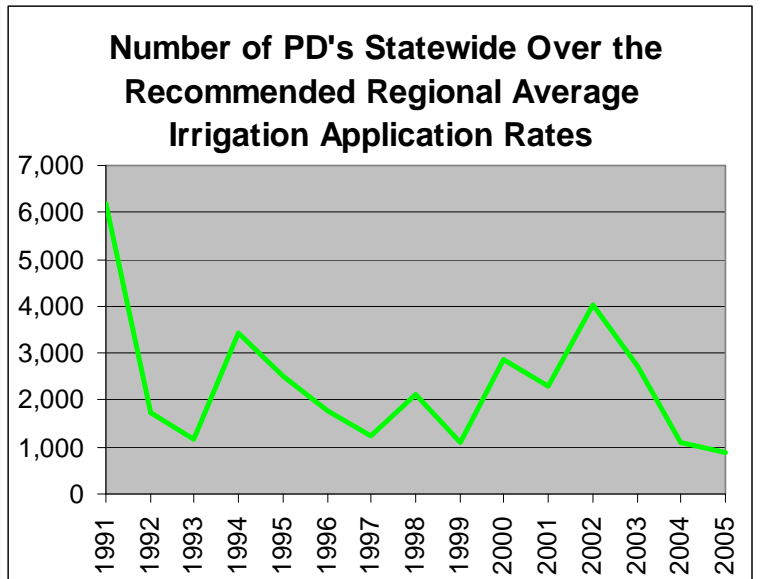


Figure 2.

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. 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%
Total	27,006	21,489	79.57%

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. 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. 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.

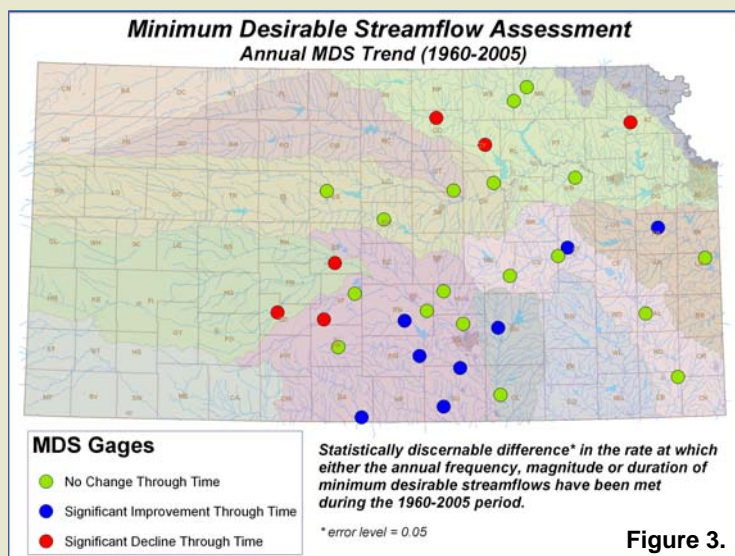
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10. Meet Minimum Desirable Streamflow (MDS) at a frequency no less than the historical achievement for the individual sites at the time of enactment.

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. 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. 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. 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.

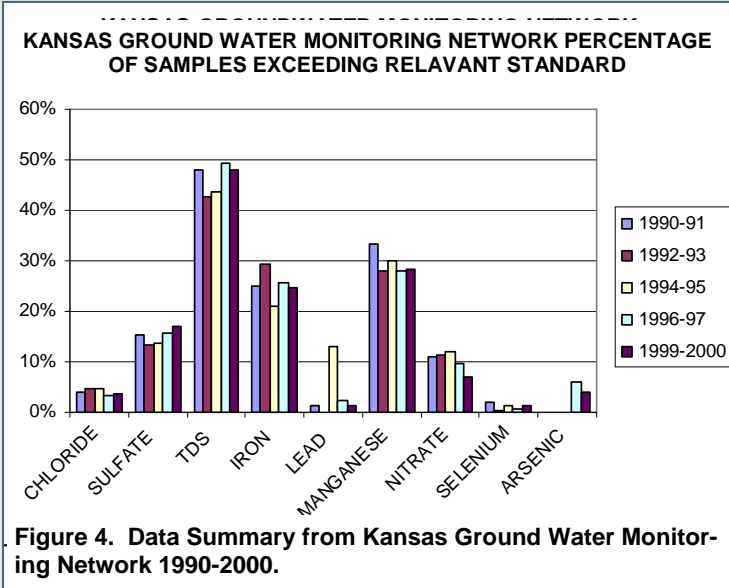
Water quality analysis of treated water for public water supplies using ground water is the only source of statewide ground water data. For the period of 1990-2000 the state public water supply systems network analyses indicated that the Safe Drinking Water Act Standards, as indicated by the maximum 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. Reduce the vulnerability to damage from floods within identified priority communities and areas.

2006 Assessment - This water resource 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. 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. 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)

**Table 2
Fish Impoundment and Fish Habitat Summary
(2001-2005)**

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

**Table 3
River Access on Navigable Streams (2001 and 2005)**

River	2001	2005
Kansas	7	12
Missouri	3	6
Arkansas	8	10
Total	18	28

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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
Total	7,524,820	7,938,105	7,274,430	6,802,461	6,386,772

17. 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. 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. 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.