

Surface Water Supply

Surface water supply includes all water stored and flowing above the surface of the ground, including rivers, streams, reservoirs, lakes, wetlands and ponds. The distribution of surface waters in Kansas is approximately 28,000 miles of rivers and streams and nearly 120,000 impoundments, although most (>80%) are farm ponds smaller than one acre. Eighty-four reservoirs are used as a source of public water supply. There are 24 federal reservoirs in Kansas, 21 of which can be used for public water supply. Seventeen of the federal reservoirs are routinely used for public water supply. The state owns water supply storage in 13 of the 24 federal reservoirs in Kansas. Figure WS-02 shows the public water supply reservoirs in Kansas.

Reservoir Yield Analysis

The KWO has estimated water supply yields under a severe drought scenario for the federal reservoirs that contain water supply storage. The objective of a reservoir water supply yield analysis is to maximize the quantity of water continuously available through a drought scenario. Kansas statute defines this scenario as a two percent drought and regulations establish that the yield analysis includes all available climatic and hydrologic information for the period of record. If the climatic and hydrologic information does not include the drought period of 1952 through 1957, estimation of the climatic and hydrologic information for those years shall be required. The reservoir is artificially aged through time by estimating reductions

to area-capacity tables from projections of sedimentation rates. Figure WS-03 shows the total estimated reservoir water supply yield for the 17 Kansas federal reservoirs that are regularly used for water supply and also shows the total estimated conservation pool storage capacity and water supply storage capacity for those reservoirs.

Reservoir Capacity and Sedimentation

The loss of reservoir storage capacity over time is due to the accumulation of sediment in the reservoirs. Figure WS-03 shows the estimated loss of conservation pool storage capacity in all 24 Kansas federal

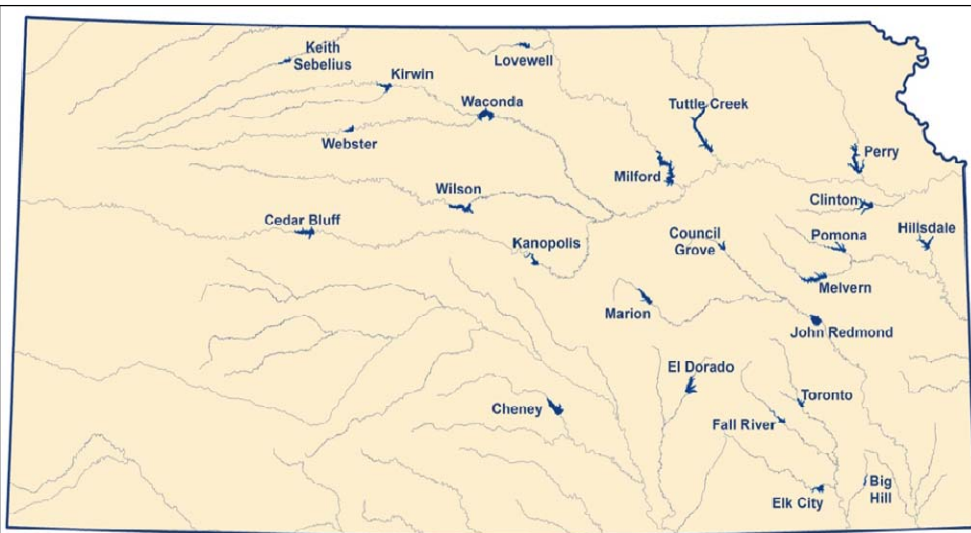


Figure WS-02. Public Water Supply Reservoirs

Reservoirs

Reservoirs are an important component of surface water resources. Reservoirs are used, in part, to provide dependable water supplies in streams with highly variable flow. Most of the reservoirs are located in the eastern half of Kansas in areas where higher precipitation, increased runoff and lower evaporation rates make the reservoirs more sustainable. The reservoirs were built to serve multiple purposes, including flood control, irrigation, fish and wildlife benefits, recreation, water supply, navigation and water quality. The state and municipal owned storage in the reservoirs provides public water supply for more than two-thirds of the state's population. Population growth projections indicate Kansas will be increasingly reliant on the reservoirs.

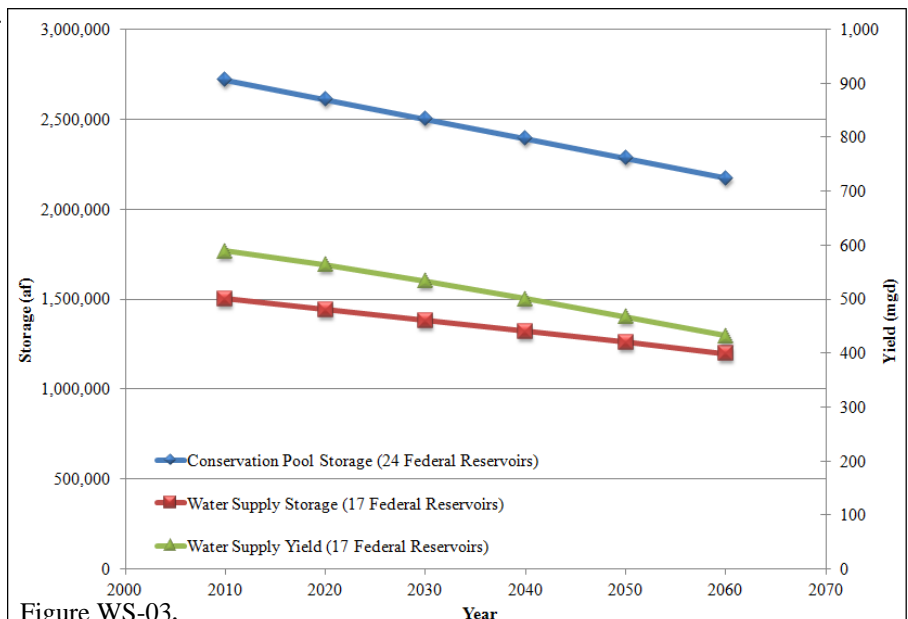


Figure WS-03.

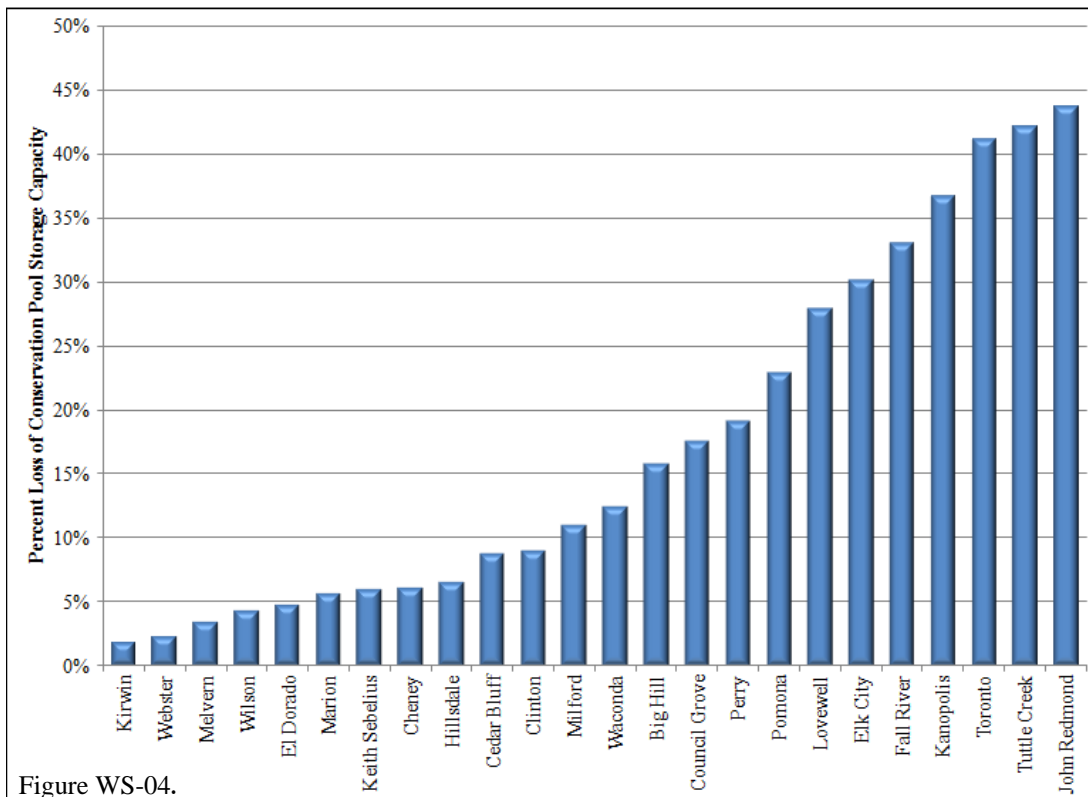


Figure WS-04.

reservoirs. As illustrated in Figure WS-04, yield is directly proportional to storage capacity.

Reservoir Management

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 models have been developed for several river-reservoir systems: Neosho, Marais des Cygnes, Verdigris, Walnut, Smoky Hill and Kansas rivers. These models incorporate the rules that govern operations of the systems, including lake regulation manuals, lake level management plans, assurance district operations agreements and other agreements between federal, state and local entities.

Challenges to managing reservoir supplies include protecting the reservoir storage by decreasing sedimentation, restoring storage lost to sedimentation at key reservoirs, working with the Corps to minimize the impact of navigation releases from Kansas River reservoirs and identifying a method to pay for unfunded storage and operation and maintenance costs.

Non-Federal Public Water Supply Reservoirs

In addition to the 21 federal reservoirs that can be used for public water supply, there are 61 smaller state or locally-

owned reservoirs used for public water supply. While the information for these reservoirs is not as extensive as the federal reservoirs, the total capacity of all the state- or locally owned reservoirs is estimated to be approximately 100,000 acre feet.

Rivers

The primary law for non-impounded water is the Kansas Water Appropriation Act. The majority of streams in the state are fully appropriated, at least during the irrigation season from July 1 to September 30. Only the Kansas, Missouri, Little Blue and Spring rivers are open to

new appropriations for those months. Over time there has also been a trend of lower streamflow in basins during drier conditions, possibly related to changes in land use that enhance soil moisture management and/or a loss of baseflow from further groundwater declines.

While the Missouri River is currently a source of surface water supply for a limited number of municipalities and industries, the possibility of expanding its use throughout the state has been studied for many years. The average monthly flow of the Missouri River at St. Joseph, Missouri since 1928 is over 28,000 million gallons per day (mgd). The minimum monthly flow of the Missouri River since construction of most of the Missouri River dams during the 1950's is over 6,000 mgd. By comparison, for the 17 federal reservoirs in Kansas that are used for water supply, the total water supply yield is approximately 600 mgd.