

Walnut Basin High Priority Issue

Water Supply Management and Conservation

January 2009

Issue

The western part of the Walnut and the eastern part of the Lower Arkansas basins have experienced [population](#) growth at an increasingly high rate over the last few years, resulting in increasing demands placed on existing water supplies. While [surface water](#) and ground water supplies are available to meet current and future (2050) demands in the area and are generally of good quality, supplies are not necessarily located in the immediate area of demand. A complete understanding of the capability of meeting future demand is needed.

For water supply issues, it is necessary to evaluate the above concerns on a regional rather than a basin scale. For this issue, the region is defined as the five-county area that includes Butler, Cowley, Harvey, Sedgwick and Sumner counties. In order to improve sustainability and address the availability of adequate public water supply to meet long-term needs, evaluation of surface and ground water management and conservation, including supply and demand analysis and [aquifer](#) characterization are needed.

Description

Communities in this region have long been aware of potential water shortages in the future and have taken proactive steps to secure supplies for current and future uses. The City of El Dorado manages the public water supply storage capacity in [El Dorado Reservoir](#) and is a regional supplier of raw and potable water. The City of Winfield owns a water supply reservoir, Winfield City Lake, which will be adequate to provide water to the city and surrounding area for many years. Augusta City Lake can serve as a short-term back up supply for the city. Additional small community lakes serve localized areas. The City of Wichita is a major regional water supplier and has adopted a plan of action to ensure adequate supplies to the year 2050. This plan utilizes both surface and ground water sources and includes the innovative aquifer storage and recharge project. See the [Lower Arkansas Basin Section](#) for more description of this project.

Water Supply

Understanding of water supply and demand in the Walnut basin has improved over the last ten years. A study completed by the Kansas Water Office (KWO) in November of 1998⁽¹⁰⁾ found that in the five county region, because of existing water supply in El Dorado Reservoir and Winfield City Lake, the development of additional

water supply storage was not warranted. The study recommended that the focus for water supply planning be the development and improvement of the infrastructure of the public water utilities in the region in order to provide adequate service to their customers.

A January 2000 report, *Butler County Public Wholesale Water Supply District Feasibility Study*,⁽⁹⁾ evaluated the potential for El Dorado Reservoir to serve as a regional supply for the area and concluded that regionalization is both possible and recommended, with modifications to existing delivery infrastructure.



El Dorado Reservoir

In 2004, a proposal was made by a group of private developers to construct a new 7,000 surface-acre reservoir at the confluence of Grouse and Silver Creeks in southern Cowley County. The KWO updated the [population](#) and demand projections and current water supply storage available in that portion of the Walnut basin to determine if a state interest in participating in the proposed project existed. This study found that adequate supplies were available and that the infrastructure to deliver the water where it was needed was the main impediment to providing water supply most efficiently.⁽¹⁾

In 1997, the Regional Economic Area Partnership (REAP)⁽¹¹⁾ was formed that includes nine counties in the region. In addition to the five counties listed above, McPherson, Reno, Harper, and Kingman counties are included in REAP. The South Central Water Coalition was formed in 2003 through an inter-local agreement, to collaboratively engage in regional water studies and planning. This area takes in nearly all the Walnut River basin and generally the east half of the Lower Arkansas

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basin. The area also includes the Equus Beds [aquifer](#) and all of the Wichita Metropolitan Area. This is a geographically and economically integrated area. The Coalition has now been merged into the REAP organization, to be carried on by a special Water Resources Committee of REAP. Through this merger, a paid staff member has been added to assist in the initiatives and work previously undertaken by the Coalition. To address the issue of water supply management and conservation, it is important that public works and planning staffs in the five county area described above, which contains parts of both the Walnut and Lower Arkansas basins, participate in REAP planning efforts. The Water Resources committee of REAP is well positioned to provide leadership in developing a long-term regional water management plan.

In 2005, the U.S. Department of Interior, Bureau of Reclamation (Bureau), through a Planning Assistance to States grant, began a process of gathering, interpreting and consolidating water supply and demand information throughout the nine county region covered by REAP. In March 2008, the Bureau released a draft report of the study titled *“Walnut and Lower Arkansas River Basins Water Supply Special Study – Kansas”*.⁽⁸⁾ The purpose of the study was to provide information for the formulation of strategies for supply sources and associated water treatment and distribution alternatives to meet the future municipal and industrial demands and usage within the study area. The draft report recommended that local water users explore inter-local efforts to meet future water demands in the most cost effective manner.

The following strategies were evaluated in the report: enhanced water conservation, existing surface water supplies, use of river water while in flood stage, water reuse, desalination of brackish water, development of existing ground water supply sources, and cost sharing opportunities. The report is still draft and is undergoing external review by participating partners; it is expected to be released in the near future.

In 2007, KWO initiated an analysis of water supply and demand in five Kansas river basins. The analysis utilized historic climate and streamflow, along with current census information to predict the total water supply and demand in the basin over time. The preliminary finding in the Walnut basin was that in Butler County, which is primarily served by El Dorado Reservoir, demand could exceed supply during a 2 percent probability drought by the year 2025 (Figure 1). If other sources of water in the basin are included, the projection for shortages in Butler County is in the year 2052. This evaluation did not in-

clude ground water availability from the Wellington formation, or sources from outside of the basin that are or could be used to supply water in the Walnut basin.

The 2007 KWO analysis did not account for water that is used in the Walnut basin that originates in the Lower Arkansas basin and is distributed across basin boundaries by the City of Wichita and rural water districts (RWDs). Because the northern part of the Walnut basin is strongly influenced by regional growth patterns to the west, long-term water supply issues will be best addressed by planning with the cities and RWDs in the eastern part of the Lower Arkansas basin. The groundwork exists to build on the information in these studies to develop long-term water supply plans for the region.

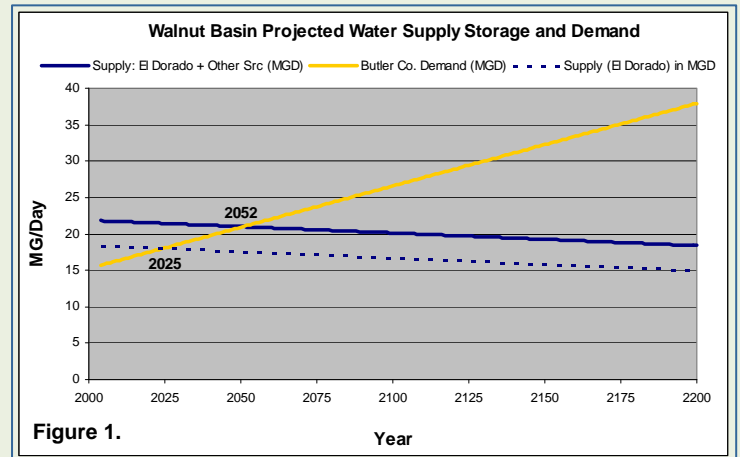


Figure 1.

The major sources of surface water storage in the Walnut basin are El Dorado Reservoir, Winfield City Lake, and Augusta City Lake. Cities in the southern part of the basin get their water from the Walnut River and alluvial wells. Numerous watershed dams have been built in the basin for rural flood control and these have not been considered as either back up or primary sources for water supply and no infrastructure is currently in place to distribute water stored in these structures. Another potential source is ground water from the Wellington formation. Preliminary evaluation of this aquifer indicates that it may be suitable for a short-term supply but long-term needs in this area of the basin cannot be met due to limited storage in the aquifer.

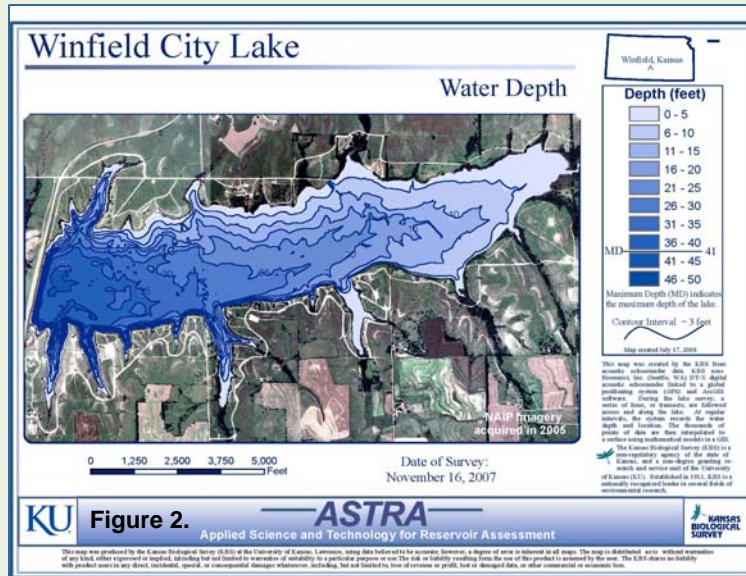
According to the 1981 bathymetric survey⁽⁹⁾ of El Dorado Reservoir, the water supply storage pool had lost about 4 percent of its original storage capacity due to sedimentation. A more recent survey was conducted by the Corps in 2004. Due to changes in technology, it was not possible to compare the two surveys to derive a current sedimentation rate that could be used to project storage

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capacity loss to sedimentation in the future. However, the 2004 survey does provide current baseline information for future evaluations. See the [El Dorado Reservoir Fact Sheet](#) for additional storage information.



A bathymetric survey (Figure 2) was completed for Winfield City Lake in 2007. According to this survey, the lake has lost only approximately 4 percent of its original storage capacity and is projected to be able to continue to supply water to the Winfield area for many years. The city has taken steps to reduce sedimentation and maintain water quality in the lake by providing cost-share funds to land owners in the watershed to install best management practices (BMPs) to reduce nutrients and sediment carried in runoff.

The current status of contracts of water suppliers who sell water to other cities and/or RWDs is summarized in the Bureau feasibility study report cited above.⁽⁸⁾

Water Demand

Understanding of water demand in this basin has grown in the past ten years. The most comprehensive information is available in the Bureau report cited above. Fundamental to the recommendations included in the report is the need to manage demand for water. Managing or reducing demand effectively creates additional supply available for essential uses and extends the life of the supply. Actions taken by individuals can have a positive cumulative effect in reduction of water demand. These include low flush toilets, low flow water faucets, hot water on demand water heaters and other water efficient

appliances, and xeriscaping. City utilities can implement rate structures that encourage water conservation and demand management.

Municipal and Industrial Demand

In the 2007 KWO supply and demand analysis, all population projections were developed from the county level, so entire counties were assigned to the basin based upon predominance of area *and* existence of larger incorporated areas. The Walnut River corridor in the analysis included Butler and Cowley counties. This demand analysis does not include the larger region recommended for water supply planning purposes.

Water demand associated with the population projections is based on municipal [water use](#) as gallons per capita per day (gpcpd) usage reported to the Kansas Department of Agriculture-Division of Water Resources (DWR) for 2000 through 2004 by suppliers in the basin.⁽²⁾ The quantity of water that municipalities sold for non-domestic use is not included in gpcpd calculations and was added to the total. To develop the total projected water use from industry, commerce, agriculture and recreation, all non-municipal surface water points of diversion within five miles of the main stem of each basin were selected.

The projected [surface water](#) demand increase on the Walnut River corridor and El Dorado Reservoir is primarily associated with the anticipated demand increase of Butler County. As discussed above, further evaluation of future water supply and demand should be done in a regional context rather than a basin context.

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Recommended Actions

1. Continue to support collaborative efforts of the REAP to provide leadership in regional planning for water including urban growth issues (see [Regional Planning for Urbanization Basin Priority Issue](#)).
2. Develop inter-basin hydrologic models with location specific supply and demand information.
3. Identify options for supply and demand management including: interconnections between public water suppliers, better use of existing supplies, dredging, development of new supplies, modification of reservoir operations, conservation measures, and individual responsible use of water through residential activities. Refine plans to reflect outcomes of identified options. Implement the most beneficial and cost-effective options.
4. Begin incorporating demand management into utility operations. Demand management should also include education of and interaction with the development community and include existing local authorities.

7. Kansas Department of Agriculture, Division of Water Resources. 2006. *Public Water Suppliers, Sources and Purchasers*.
8. Bureau of Reclamation. 2008. "Walnut and Lower Arkansas River Basins Water Supply Special Study – Kansas".
9. Professional Engineering Consultants, P.A. January 2000. *Butler County Public Wholesale Water Supply District Feasibility Study*.
10. Kansas Water Office. November 1998. *Walnut Basin Area Regional Water Supply Strategic Analysis*.
11. Regional Economic Area Partnership. <http://www.reap-ks.org>

Resources

1. Kansas Water Office. 2007. *Surface Water Supply and Demand Projections for Selected Basins in Eastern Kansas*.
2. Kansas Water Office. 2006. *Kansas Municipal Water Use*.
3. Kansas Water Office. 2007. *Kansas Municipal Water Conservation Plan Guidelines*.
4. Kansas Water Office. 2002. *Status Report State of Kansas Water Marketing and Assurance Programs, Multipurpose Small Lakes Program*.
5. Kansas Department of Health and Environment. 2006. *Public Water System Capacity Development Assessment*.
6. Kansas Department of Health and Environment. 2006. *Public Water Supplies Drought Vulnerability Assessment*.