

Solomon River Basin Management Categories

WATER MANAGEMENT CATEGORIES

The following categories include issues identified in the Solomon basin plan as items that require attention in addition to the basin priority issues. These issues are addressed within the following management categories:

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

These categories also correspond to the statewide management categories and policies of the *Kansas Water Plan* found in [Volume II](#). These documents contain new policy issues and the existing policy and statutory framework that relate to the management categories.

ISSUE: WATER MANAGEMENT

Management of Kansas' ground and [surface water](#) fits into six statewide categories, with five of these applicable in the Solomon basin. These are:

- 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; and
- 5) Ground water outside of the Ogallala-High Plains aquifer.

Ground water is the primary water supply in the basin. The Ogallala-High Plains [aquifer](#) is a major source in the western portion of the basin where it interconnects with alluvial ground water and may have an affect on streamflow. Ground water recharge rates are generally low throughout the basin. A majority of the basin is restricted or closed for new water appropriations. The Ogallala-High Plains aquifer area of the basin is managed with the local leadership by Northwest Kansas Groundwater Management District No. 4 (GMD4). GMD4 has identified six high priority aquifer subunits. Goals and management for each are under development. Portions of two subunits are in the basin. In 2008, a computer model developed for the six priority subunits was completed through cooperation of Kansas Water Office

(KWO), GMD4 and the U.S. Bureau of Reclamation (Bureau). The model will aid in development and analysis of the management strategies.

In 2006, the KWO calculated the median annual water level changes in wells from 1981 to 2005. In the north-west Ogallala aquifer area, as of 2005, there has been no statistically significant change (at a +or- 5% error level) in the rate of water level decline.⁽¹⁾ Reducing the decline rate of the Ogallala-High Plains aquifer is a basin priority issue. Additional information on this issue may be found in the [Solomon Basin Ogallala](#) decline priority issue section.

Reduced streamflow and runoff into streams has been reflected in lower water levels in Webster Reservoir, Kirwin Reservoir and Waconda Lake. These conditions and reduced availability of irrigation water stored in the reservoirs have suggested a need to take a fresh look at reservoir management. Maintaining a minimum water level in Webster Reservoir is a basin priority issue. Additional information on this issue may be found in the [Solomon Basin](#) priority issue section.



Kirwin Reservoir on Solomon River and Bow Creek
Photo courtesy Kansas Geological Survey

There is one minimum desirable streamflow (MDS) location in the basin, located on the Solomon River near Niles. Statistically this gage had no change in the frequency that MDS was met from 1984 to 2004 and the historical frequency (1960 to 1983).

Subbasin water budgets are under development by the Kansas Department of Agriculture-Division of Water Resources. Analysis of water resources and their use by subbasin has been completed for the upper North and South Forks Solomon River. Analyses are planned for

Solomon River Basin Management Categories

January 2009

the other subbasins to better understand and manage the resources.

Applicable *Kansas Water Plan Objectives*

- Reduce water level decline rates within the Ogallala-High Plain aquifer and implement enhanced water management in targeted areas.
- 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 streamflows.
- Meet minimum desirable streamflow at a frequency no less than the historical achievement for the individual sites at time of enactment.

Applicable Programs

The following programs help to meet the objectives in the Water Management (quantity) category. For more information on the programs and associated policies, see the [Programs Manual](#).

- Kansas Department of Agriculture-Division of Water Resources: Water Appropriation Program
- Kansas Geological Survey and Kansas Department of Agriculture-Division of Water Resources: Water Well Measurement
- State Conservation Commission: Water Right Transition Assistance Program
- USDA-Natural Resources Conservation Service: Environmental Quality Incentive Program (EQIP)
- USDA-Farm Services Agency: Conservation Reserve Enhancement Program
- Kansas Geological Survey: High Plains Aquifer Technical Assistance Program
- Kansas Water Office: State Water Planning Program

ISSUE: WATER CONSERVATION

Water conservation is essential for the effective management of water resources in the basin to assure that a sufficient, long-term supply of water is available for the beneficial uses of the people of the state. Conservation is defined as a careful preservation and protection of something, especially the planned management of a natural resource to prevent exploitation or destruction.

Water conservation activities apply to all uses; irrigation, municipal, industrial, and others, and from all sources. In 2006, irrigation accounted for nearly 95% of all reported water pumped or diverted in the basin. Municipal use accounted for four percent of water used in the basin, with stock water at one percent and industry, recreation, domestic and other uses at less than one percent each.

Of the 616 [public water suppliers](#) that have an approved conservation plan in place as of December 31, 2008, 38 plans have been approved in the Solomon basin. As of August 2006, 139 conservation plans had been approved for irrigation water rights in the basin. The number of diversion points in Kansas that reported irrigation application rates over the regional average fluctuated from about 3,700 to less than 500 from 1991 to 2005. Of the total number of individual points of diversions that



Irrigation. Photo courtesy Kansas Geological Survey

reported diversion of a measurable quantity of water in Kansas in 2006, more than 45% reported a metered quantity at least once during that year in the Solomon basin. (Source: DWR-Water Right Info. System).

Applicable *Kansas Water Plan Objectives*

- Reduce the number of public water suppliers with excessive unaccounted for water by first targeting those with 30% or more unaccounted for water.
- 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.
- All non-domestic points of diversion meeting predetermined criteria will be metered, gaged, or otherwise measured.
- Conservation plans will be required for water rights

Solomon River Basin Management Categories

January 2009

meeting priority criteria under K.S.A. 82a-733 if it is determined that such a plan would result in significant water management improvement.

Applicable Programs

The following programs help to meet the objectives in the Water Conservation category. For more information on the programs and associated policies, see the [Programs Manual](#).

- Kansas Department of Agriculture-Division of Water Resources: Water Appropriation Program
- Kansas State University Research and Extension: Water Conservation and Management Program
- State Conservation Commission: Water Resources Cost-Share Program
- State Conservation Commission: Water Right Transition Assistance Program
- Kansas Water Office: Water Conservation Program
- USDA-Natural Resources Conservation Service: Environmental Quality Incentive Program (EQIP)
- USDA-Farm Services Agency: Conservation Reserve Program

ISSUE: PUBLIC WATER SUPPLY

The primary approach to addressing public water supply issues in the basin focuses on ensuring that there are adequate supplies of surface and ground water within the basin to meet future water demands, reducing the number of public water supply systems that are vulnerable to drought, and ensuring that systems have the technical, financial and managerial capacity to meet future needs for water quality and quantity.

In 2006, there were 49 [public water supplies](#) in the Solomon basin. Ground water is the primary source for most public water supplies, accounting for over 95% of the



Waconda Lake. Photo by Kansas Water Office.

total supply, principally from the Ogallala-High Plains and Dakota aquifers and alluvial deposits along major streams. The City of Beloit obtains their water from surface flow in the Solomon River below Waconda Lake.

Among the state's major river basins, the percentage of drought vulnerable public water suppliers in 2006 ranged from three percent (Neosho Basin) to 42% (Solomon basin). Comparison of the KWO 2000 and 2006 lists show a significant increase in the number of drought vulnerable public water suppliers in most western river basins including the Solomon. There were 20 public suppliers considered drought vulnerable in the Solomon basin in 2006.

Applicable Kansas Water Plan Objectives

- 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.
- Less than five percent of public water suppliers will be drought vulnerable.
- Ensure that all public water suppliers have the technical, financial and managerial capability to meet their needs and to meet Safe Drinking Water Act requirements.

Applicable Programs

The following programs help to meet the objectives in the Public Water Supply category. For more information on the programs and associated policies, see the [Programs Manual](#).

- Kansas Department of Agriculture-Division of Water Resources: Water Appropriation Program
- Kansas Department of Health and Environment: Public Water Supply Program
- Kansas Department of Health and Environment: Kansas Public Water Supply Loan Fund
- Kansas Water Office: State Water Planning Program
- Kansas Water Office: Water Conservation Program

ISSUE: WATER QUALITY

Water quality and related water resource issues are addressed through a combination of watershed restoration and protection efforts utilizing voluntary, incentive-based approaches, as well as regulatory programs.

All the counties within the basin have a sanitarian funded by the Local Environmental Protection Program (LEPP).

Solomon River Basin Management Categories

January 2009

All conservation districts in the basin have adopted non-point source pollution management plans. Buffer coordinators have also been employed in three counties in the basin to facilitate enrollment of stream buffers in the continuous Conservation Reserve Program (CRP) and State Water Quality Buffer Initiative.

The federal Clean Water Act requires states to conduct Total Maximum Daily Load (TMDL) studies and develop TMDLs for water bodies identified on the state's List of Impaired Waters (Section 303(d) List). TMDLs are quantitative objectives and strategies needed to achieve the state's surface water quality standards. There are 21 approved TMDLs within the Solomon Basin. Dissolved oxygen on Limestone Creek is a high priority for implementation. There are three lakes in the basin listed as water quality impaired. Streams are sampled at 15 locations within the basin with dissolved oxygen, total suspended solids (TSS), and total phosphorous (TP) identified as the cause of the greatest number of impairments. Other pollutants limiting use of Solomon basin streams include arsenic, biological stressors, copper, E. coli bacteria and sulfate. TMDL development for bacteria total suspended solids and total phosphorous are anticipated in 2009.

Kansas Watershed Restoration and Protection Strategy (WRAPS) is a planning and management framework that engages stakeholders within a watershed in a process to:

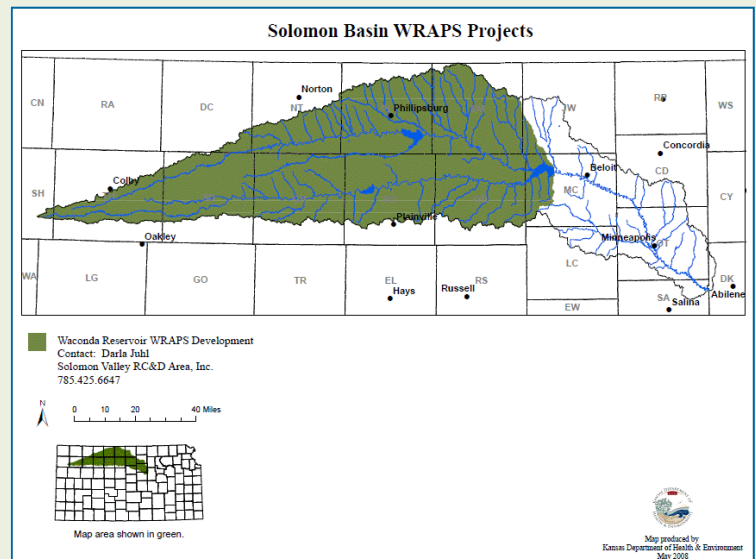
- Identify watershed restoration and protection needs.
- Establish watershed management goals.
- Create a cost-effective action plan to achieve goals.
- Implement the action plan.

As of March 2008, there were 44 active WRAPS projects located throughout Kansas. One project is in the Solomon basin and includes the watersheds above Glen Elder Dam/Waconda Lake.

Applicable *Kansas Water Plan Objectives*

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

- Maintain, enhance, or restore priority wetlands and riparian areas.
- Nutrient reduction goals will be included in all WRAPS projects within the basin.
- All public water suppliers will complete and implement a source water protection plan.



Applicable Programs

The following programs help to meet the objectives in the Water Quality category. For more information on the programs and associated policies, see the [Programs Manual](#).

- Kansas Department of Health and Environment: State Water Plan Program (Contamination Remediation)
- Kansas Corporation Commission: Conservation Division Programs
- Kansas Department of Health and Environment: Local Environmental Protection Program
- Kansas Department of Health and Environment: Watershed Management Program/WRAPS
- Kansas Department of Health and Environment: Watershed Planning Section/TMDL Program
- State Conservation Commission: Nonpoint Source Pollution Control Program
- State Conservation Commission: Water Resources Cost-Share Program

ISSUE: WETLAND & RIPARIAN MANAGEMENT

The primary approach to wetland and riparian management in the basin focuses on providing technical and financial assistance to landowners to protect and restore

Solomon River Basin Management Categories

January 2009

these resources in priority watersheds through the implementation of best management practices.

Riparian lands in the Solomon basin have been impacted by infestation of non-native phreatophytes, although not to the degree as in other western basins. Of greatest concern are the effects tamarisk (salt cedar) and Russian olive on native riparian ecosystems. A biological control project releasing leaf eating beetles occurred in the basin in 2005 and 2006. It was determined that the timing of the release limited success.

Applicable *Kansas Water Plan Objectives*

- Maintain, enhance or restore priority wetlands and riparian areas.

Applicable Programs

The following programs help to meet the objectives in the Wetland and Riparian Management category. For more information on the programs and associated policies, see the [Programs Manual](#).

- Kansas Forest Service: Forest Stewardship Program and Conservation Tree Planting Program
- State Conservation Commission: Riparian and Wetland Protection Program
- Kansas Water Office: State Water Planning Program
- Kansas Department of Wildlife and Parks: State Parks and Wildlife Areas Planning and Development Program
- Kansas Department of Wildlife and Parks: Wildlife Habitat Improvement Program

ISSUE: FLOOD MANAGEMENT

Flooding is a natural, recurring event associated with streams and rivers that has resulted in the formation of natural floodplains over time. While this inundation provided benefits under natural conditions, encroachment of urban and agricultural development onto floodplains has resulted in the potential for flood damage. In addition, the Solomon basin is prone to flash flooding which is characterized by a rapid rise in water level, fast-moving water and much flood debris.

Kansas Water Plan flood management guidance has targeted watershed dam construction assistance to priority watersheds, encouraged National Flood insurance participation and updating floodplain maps for priority communities.

Significant flooding was experienced during 1903, 1908, 1915, 1919, 1935, 1941 and 1973 on the Solomon River. Three federal projects; Kirwin, Glen Elder and Webster dams contribute to flood control in the basin. There is one organized [watershed district](#) in the basin. Two watershed dam projects are complete in the basin.



Kirwin Reservoir. Photo courtesy Kansas Geological Survey.

Financial assistance from the State Water Plan Fund has been provided for flood mapping as part of the 1993 Kansas Department of Agriculture-Division of Water Resources, Kansas Flood Mapping Initiative in Ottawa County in the basin.

Applicable *Kansas Water Plan Objectives*

- Reduce the vulnerability to damage from floods within identified priority communities or areas.

Applicable Programs

The following programs help to meet the objectives in the Flood Management category. For more information on the programs and associated policies, see the [Programs Manual](#).

- Kansas Department of Agriculture-Division of Water Resources: Water Structures Program/Floodplain Management
- Kansas Department of Agriculture-Division of Water Resources: Water Structures Program/Dam Safety
- Kansas Division of Emergency Management: Hazard Mitigation Grants Program
- State Conservation Commission: Watershed Dam Construction Program
- State Conservation Commission: Watershed Plan-

Solomon River Basin Management Categories

January 2009

ning Assistance Program

- FEMA: National Flood Insurance Program

ISSUE: WATER-BASED RECREATION

The Solomon basin has a wide variety of public water recreation sites on state and federal land. There is a demand for more consistent water levels to provide access to water-based recreation facilities for area residents and recreational income by attracting sportsmen and women to the area.

The federal dam projects include Kirwin Reservoir, Wacanda Lake and Webster Reservoir and associated recreation and wildlife areas that draw hunters, fishermen and boaters to the area. Public hunting areas include Kirwin National Wildlife Refuge, Webster Wildlife Area and Glen Elder Wildlife Area. The state also offers fishing at Jewell, Ottawa, Rooks, and Sheridan state fishing lakes. In addition, Antelope Lake-Graham County and Logan City Lake are community lakes supported by Kansas Department of Wildlife and Parks Community Lakes Assistance Program.

Maintaining a minimum water level in Webster Reservoir is a basin priority issue. Additional information on this issue may be found in the [Solomon Basin Webster Water Level](#) priority issue section.

Applicable *Kansas Water Plan* Objectives

- Increase public recreational opportunities at Kansas lakes and streams.

Applicable Programs

The following programs help to meet the objectives in the Water-Based Recreation category. For more information on the programs and associated policies, see the [Programs Manual](#).

- Kansas Department of Wildlife and Parks: Rivers and Stream Access
- Kansas Department of Wildlife and Parks: State Parks

ISSUES FOR FUTURE ACTION

Irrigation Districts needs if any.