

LOWER ARKANSAS RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: Silver Creek Water Quality Impairment: Dissolved Oxygen

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Kaw Lake

County: Cowley

HUC 8: 11060001

HUC 11 (HUC 14s): 010 (010 and 020)

Drainage Area: 87.2 square miles

Main Stem Segment: 17; starting at the confluence with Grouse Creek and traveling upstream to Burden.

Tributary Segment: Snake Creek (25)
Pebble Creek (26)
Plum Creek (33)

Designated Uses: Expected Aquatic Life Support on all segments
Food Procurement on Silver and Plum Creek

1998 303(d) Listing: Table 1 - Predominant Non-point Source and Point Source Impacts

Impaired Use: Expected Aquatic Life Support

Water Quality Standard: Dissolved Oxygen: 5 mg/L (KAR 28-16-28e(c)(2)(A))

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 1998 303(d): Partially Supporting Expected Aquatic Life

Monitoring Sites: Station 706 near Silverdale

Period of Record Used: 1996 and 1999 (Kansas Biological Survey samples in 1999)

Flow Record: USGS Station 07148110; calculated flow based on measurements at 07148110 and data from Station 07151500 (Chikaskia R. nr Corbin)

Long Term Flow Conditions: 10% Flow Exceedence = 65 cfs, 7Q10 = 1 cfs

Current Conditions: Excursion from Dissolved Oxygen (DO) Water Quality Standard was seen in July 1996.

Date	1/9/96	3/12/96	5/7/96	7/9/96	9/3/96	11/5/96	7/9/99	8/28/99	11/13/99
DO (mg/L)	15	11.8	5.6	3.9	6.3	9.7	7.7	7.9	8.3

Biochemical Oxygen Demand (BOD) was lower than all other samples for the July 1996 sample and the July 1996 ammonia was near the average for all samples. This indicates that there was no point source influence on BOD during the instance of DO excursion. Based on this information and the fact that the DO excursion appears to coincide with the lowest flow condition of all samples and one of the warmest water temperatures, flow and temperature are seen as the primary components to low DO levels in the watershed.

Desired Endpoints of Water Quality at Site 706 over 2005 - 2009

The ultimate endpoint for this TMDL will be to achieve the Kansas Water Quality Standard of 5 mg/l to fully support Aquatic Life.

Seasonal variation is accounted for by this TMDL, since the TMDL endpoint is sensitive to the low flow and higher temperature conditions, generally occurring in the summer months.

This endpoint will be reached as a result of expected, though unspecified, reductions in loading from the various sources in the watershed resulting from implementation of corrective actions and Best Management Practices, as directed by this TMDL. Achievement of this endpoint will provide full support of the aquatic life function of the creek and attain the dissolved oxygen water quality standard.

3. SOURCE INVENTORY AND ASSESSMENT

NPDES: There is one NPDES permitted municipal wastewater discharger within the watershed.

MUNICIPALITY	STREAM REACH	SEGMENT	DESIGN FLOW
Burden	Silver Cr	17	0.0612 mgd

Population projections for Burden to the year 2020 indicate substantial growth for this smaller town (80% increase from 1990 to a total population of 931). Projections of future water use and resulting wastewater appear to exceed design flows for the current system’s treatment capacity. Examination of effluent monitoring indicates very low levels of BOD leaving the treatment plant and entering the stream system.

Livestock Waste Management Systems: Four operations are registered, certified or permitted within the watershed. These operations are either swine or beef production. Potential animal units for the watershed are 3,150. The actual number of animal units on site is variable, but typically less than permitted numbers.

Land Use: Most of the watershed is mixed between grassland (68%), cropland (27%) and woodland (4%). Most of the cropland within the watershed is located either near the mainstem or toward the watershed's boundary. Grazing density of livestock for both off-season and the growing season is high for the watershed.

Contributing Runoff: The watershed's average soil permeability is 0.5 inches/hour according to NRCS STATSGO data base. About 99.9% of the watershed produces runoff even under relative low (1.5"/hr) potential runoff conditions. Even under very low (<1"/hr) potential conditions, this potential contributing area is maintained (99.9%). Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. As the watersheds' soil profiles become saturated, excess overland flow is produced. Generally, storms producing less than 0.5"/hr of rain will generate runoff from 21.7% of this watershed, chiefly along the stream channels.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

Point Sources: Because of the indications that low flow and temperature are causes of the excursion from the water quality standard rather than BOD, the point source is not seen as a significant source of DO excursions. Streeter-Phelps analysis indicates the BOD WLA of 15.3 pounds per day for the City of Burden is assumed to correspond to maintaining an average of BOD of less 2.8 mg/L at the sampling site.

Non-Point Sources: Based on the assessment of sources and the relationship of the excursion to runoff conditions and season, non-point sources are seen as the primary cause of the water quality violation. The previous assessment suggests that lack of flow in the stream and high water temperatures are the primary components in the occasional dissolved oxygen excursion. Since the flow component is natural in its source (particularly at low flow), stream temperature during summer and fall will be the emphasis of this TMDL. Riparian vegetation restoration should occur adjacent to the main stem of Silver Creek to provide shade and generally reduce surface water temperatures during the season of concern.

Defined Margin of Safety: The Margin of Safety will be implied based on conservative assumptions used in the permitting of the point source discharges including coincidence of low flow with maximum discharge from the treatment plant, associated CBOD content and temperature of the effluent, and the better than permitted performance of the treatment plant in producing effluent with BOD well below permit limits under critical summer conditions.

State Water Plan Implementation Priority: Because this watershed has indicated some problem with dissolved oxygen which has short term and immediate consequences for aquatic life, this TMDL will be a High Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Kaw Lake Subbasin (HUC 8: 11060001) with a Category II designation (Watershed meeting goals, including those needing action to sustain water quality).

Priority HUC 11s and Stream Segments: Because of the intermittent nature of its tributaries, priority should be directed toward baseflow generating and conducting stream segments; the main stem of Silver Creek, Segment 17, beginning with greatest emphasis at its confluence with Grouse Creek and extending with diminishing priority upstream to its confluence with Plum Creek (Segment 33).

5. IMPLEMENTATION

Desired Implementation Activities

1. Where needed, restore riparian vegetation along main stem.

Implementation Programs Guidance

Riparian Protection Program - SCC

- a. Develop riparian restoration projects along main stem especially those areas with baseflow.

Timeframe for Implementation: Riparian restoration should be installed within the priority stream segment (17) over the years 2000-2005.

Targeted Participants: Primary participants for implementation will be landowners immediately adjacent to the creek. Implemented activities should be targeted to those stream segments with greatest potential contribution to baseflow. Nominally, this would be most likely be :

1. Areas of denuded riparian vegetation along the main stem.

Some inventory of local needs should be conducted in 2001 to identify such areas. Such an inventory would be done by local program managers with appropriate assistance by commodity representatives and state program staff in order to direct state assistance programs to the principal activities influencing the quality of the streams in the watershed during the implementation period of this TMDL.

Milestone for 2005: The year 2005 marks the mid-point of the ten year implementation window for the watershed. At that point in time, milestones should be reached which will have at least two-thirds of the landowners responsible for riparian restoration, cited in the local assessment, participating in the implementation programs provided by the state. Additionally, sampled data from Station 706 should indicate evidence of low dissolved oxygen problems

Delivery Agents: The primary delivery agents for program participation will be the conservation districts for programs of the State Conservation Commission and the Natural Resources Conservation Service. Producer outreach and awareness will be delivered by Kansas State County staff managing.

Reasonable Assurances

Authorities: The following authorities may be used to direct activities in the watershed to reduce pollution.

1. K.S.A. 65-164 and 165 empowers the Secretary of KDHE to regulate the discharge of sewage into the waters of the state.
2. K.S.A. 65-171d empowers the Secretary of KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through required treatment of sewage and established water quality standards and to require permits by persons having a potential to discharge pollutants into the waters of the state.
3. K.A.R. 28-16-69 to -71 implements water quality protection by KDHE through the establishment and administration of critical water quality management areas on a watershed basis.
4. K.S.A. 2-1915 empowers the State Conservation Commission to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.
5. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control non-point source pollution.
6. K.S.A. 82a-901, et seq. empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.
7. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*.
8. The *Kansas Water Plan* and the Lower Arkansas Basin Plan provide the guidance to state agencies to coordinate programs intent on protecting water quality and to target those programs to geographic areas of the state for high priority in implementation.

Funding: The State Water Plan Fund, annually generates \$16-18 million and is the primary funding mechanism for implementing water quality protection and pollution reduction activities in the state through the *Kansas Water Plan*. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watersheds and water

resources of highest priority. Typically, the state allocates at least 50% of the fund to programs supporting water quality protection. This watershed and its TMDL is a High Priority consideration.

Effectiveness: Riparian restoration projects are being touted as a significant means for water temperature buffers of streams.

6. MONITORING

KDHE should collect bimonthly samples at Station 706 in 2000, 2004 and 2008 in order to assess progress and success in implementing this TMDL in reaching its endpoint.

Local program management needs to identify its targeted participants of state assistance programs for implementing this TMDL. This information should be collected in 2001 in order to support appropriate implementation projects.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the Lower Arkansas Basin were held March 9, 2000 and April 26-27, 2000 in Wichita, Hutchinson, Arkansas City and Medicine Lodge. An active Internet Web site was established at <http://www.kdhe.state.ks.us/tmdl/> to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Lower Arkansas Basin.

Public Hearing: A Public Hearing on the TMDLs of the Lower Arkansas Basin was held in Wichita on June 1, 2000.

Basin Advisory Committee: The Lower Arkansas Basin Advisory Committee met to discuss the TMDLs in the basin on September 27, November 8, 1999; January 13, 2000; March 9, 2000 and June 1, 2000

Discussion with Interest Groups: Meetings to discuss TMDLs with interest groups include:

Agriculture: January 12, February 2 and 29, 2000

Environmental: March 9, 2000

Conservation Districts: November 22, 1999

Industry: December 15, 1999, January 13, February 9 and 22, 2000

Local Environmental Protection Groups: September 30, November 2, December 16, 1999

Milestone Evaluation: In 2005, evaluation will be made as to the degree of implementation which has occurred within the watershed and current condition of Silver Creek. Subsequent decisions will be made regarding the implementation approach and follow up of additional implementation in the watershed.

Consideration for 303(d) Delisting: The river will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2005-2009. Therefore, the decision for delisting will come about in the preparation of the 2010 303(d) list. Should modifications be made to the applicable water quality criteria during the ten year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

Incorporation into Continuing Planning Process, Water Quality Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2002 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process for Fiscal Years 2001-2005.

Approved September 11, 2000.