KANSAS-LOWER REPUBLICAN BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: **Baker Wetlands**
Water Quality Impairment: Dissolved Oxygen

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Lower Kansas River **County**: Douglas

HUC 8: 10270104 **HUC 11**: 020 (Lower Wakarusa River Watershed)

Drainage Area: Approximately 4.2 square miles.

Pool Volume: 19.7 acre-feet

Designated Uses: Secondary Contact Recreation; Expected Aquatic Life Support, Food Procurement

1998 303d Listing: Table 4 - Water Quality Limited Lakes

Impaired Use: Expected Aquatic Life Support

Water Quality Standard: Dissolved Oxygen: 5 mg/L

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 303d: Not Supporting

Monitoring Sites: Station 014401 in Baker Wetlands.

Period of Record Used: 1997 & 1998

Lake Record:

Lake Station	Date	Chlorophyll a (ug/L)	DO (mg/L)	pH
014401	27-Aug-97	3.90	**3.8**	6.61
014401	27-Aug-97	2.90		6.76
014401	04-Aug-98	10.70	**0.7**	6.4
014401	04-Aug-98	9.60		6.5

Current Condition: Wetlands have reduced dissolved oxygen concentrations (mean <2.5 mg/L at surface) during summer months. Low dissolved oxygen may result from high plant material decomposition and local groundwater interaction. It is unlikely that this can be "fixed" in this portion of the wetland, and may be a normal feature of the marsh areas in Baker Wetlands.

Turbidity is low, but the water is humic stained. Chlorophyll to phosphorus yield is low and nutrient ratios of N:P are 1.4, indicating nitrogen limitation.

Desired Endpoints of Water Quality at Baker Wetlands over 2004 - 2008:

1. No oxygen demanding substances entering wetland from external sources causing additional declines in summer dissolved oxygen beyond levels typically associated with a dystrophic system, averaging 2.2 mg/l

3. SOURCE ASSESSMENT

Fifty seven percent of watershed is urban, 22% woodland and 21% cropland. Based on the 20 acres of natural marsh chosen to represent the original wetlands, the ratio of drainage area to waterbody is 135:1 with a maximum depth of water of 0.3 meters in the central area.

Greatest impact on marshland would be residential, commercial or transportation development in proximity to wetland. No external factors for low dissolved oxygen levels is apparent. Low levels may be a feature of wetland.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

No apparent external sources can be attributed as the cause of low dissolved oxygen conditions. Additional monitoring over time will be needed to ascertain the dissolved oxygen characteristics of the wetland and ascertain any level of impairment.

Point Sources: Since this impairment is not associated with point source pollution, there will be no Wasteload Allocation assigned to point sources under this TMDL.

Non-Point Sources: Dissolved oxygen declines appear to be a natural feature of the wetland, Nontheless, no external sources or loads should discharge into the wetland, thereby aggravating the declines in oxygen. Therefore, the Load Allocation of Biochemical Oxygen Demanding substances will be set at zero for external sources around the wetland. Background levels within the wetland remain to be determined.

Defined Margin of Safety: The margin of safety provides some hedge against the uncertainty of loading and the dissolved oxygen endpoint. Therefore, the margin of safety will be expected levels of dissolved oxygen over 3 mg/l to ensure meeting the endpoint.

State Water Plan Implementation Priority: As a wetland in an urban area, this TMDL will be a **High Priority** for implementation. However, implementation will be done through wetland protection and restoration activities rather than pollution reduction efforts.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Lower Kansas Subbasin (HUC 8: 10270104) with a **priority ranking of 1 (Highest Priority for restoration work).**

Priority HUC 11s and Stream Segments: Because of the localized extent of the wetland, the focus of implementation priority should be the wetland itself and immediate vicinity rather than the subwatershed.

5. IMPLEMENTATION

Desired Implementation Activities

1. Provide wetland protection and restoration features in vicinity of wetlands.

Implementation Programs Guidance

Wetland Protection Program - SCC

a. Develop wetland protection and restoration projects

Timeframe for Implementation: Wetland protection practices should be installed within the vicinity of the wetlands over the years 2000-2004.

Targeted Participants: Primary participants for implementation will be city and county officials responsible for managing the wetlands.

Milestone for 2004: The year 2004 marks the mid-point of the ten year implementation window for the wetland. At that point in time, milestones should be reached which will have all protection activities planned or implemented in the vicinity of the wetlands. Additionally, sampled data from the wetland should indicate evidence of stable oxygen levels in the marshy relative to the conditions seen over 1997-1998.

Delivery Agents: The primary delivery agents for program participation will be the conservation district and the city and county officials responsible for the wetland.

Reasonable Assurances:

Authorities: The following authorities may be used to direct activities in the wetland to provide protection.

1. 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 wetland areas.

2. 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.

3. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*.

4. The *Kansas Water Plan* and the Kansas-Lower Republican 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 1% of the fund to programs supporting wetland protection. This wetland and its TMDL is a **High Priority** consideration.

In State Fiscal Year 1999, the state provided to Douglas County $10,000 for wetland protection activities associated with Baker Wetlands. The Commission will decide State Fiscal Year 2000 allocations in May 1999.

Effectiveness: Wetland protection, notably buffer areas, are effective in limiting external factors influencing the water quality of established wetlands. Furthermore, water quality standards developed by the state prohibit discharges into classified palustrine wetlands.

6. MONITORING

More sampling is required at water sampling station and at other sites within the wetlands. The original sampling site was selected in the marshy area of the wetlands as representative of pre-settlement for the wetlands as a whole. There are "ponds" left over from agriculture that took place in other areas of the wetland complex. These other sites will be examined for water quality during the 1999 survey, in order to compare with the representative site.

Additional evaluation of the dissolved oxygen conditions will be made over 2000-2004 in order to evaluate continued listing on the 2004 Section 303d list of impaired waters.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the KLR Basin were held March 10, 1999 in Topeka, April 27 in Lawrence and April 29 in Manhattan. 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 Kansas-Lower Republican Basin.

Public Hearing: A Public Hearing on the TMDLs of the Kansas-Lower Republican Basin was held in Topeka on June 3, 1999.

Basin Advisory Committee: The Kansas-Lower Republican Basin Advisory Committee met to discuss the TMDLs in the basin on December 3, 1998; January 14, 1999; February 18, 1999; March 10, 1999; May 20, 1999 and June 3, 1999.

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

Agriculture: November 10, 1998; December 18, 1998; February 10, 1999; April 10, 1999, May 4, 1999, June 8, 1999 and June 18, 1999.

Municipal: November 12, 1998, January 25, 1999; March 1, 1999; May 10, 1999 and June 16, 1999.

Environmental: November 3, 1998; December 16, 1998; February 13, 1999; March 15, 1999, April 7, 1999 and May 3, 1999.

Conservation Districts: March 16-18, 24-25, 1999

Milestone Evaluation: In 2004, evaluation will be made as to the degree of implementation which has occurred within and along the wetland. Subsequent decisions will be made regarding additional measures, upon evaluation of the need for continued listing under Section 303d.

Consideration for 303d Delisting: The streams in this watershed will be evaluated for delisting under Section 303d, based on the monitoring data over the period 2004-2008. Therefore, the decision for delisting will come about in the preparation of the 2008 303d 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 2000-2004.

Approved January 26, 2000.