

LOWER ARKANSAS RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Water Body: Barber County State Fishing Lake
Water Quality Impairment: Dissolved Oxygen

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Medicine Lodge

County: Barber

HUC 8: 11060003

HUC 11 (HUC 14): 040 (040)

Drainage Area: Approximately 3.7 square miles.

Conservation Pool: Area 42 acres, Maximum Depth = 9 meters

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

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

Impaired Use: 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

Monitoring Sites: Station 013101 in Barber County State Fishing Lake.

Period of Record Used: Four surveys during 1980-1996.

Barber Co SFL TMDL Reference Map

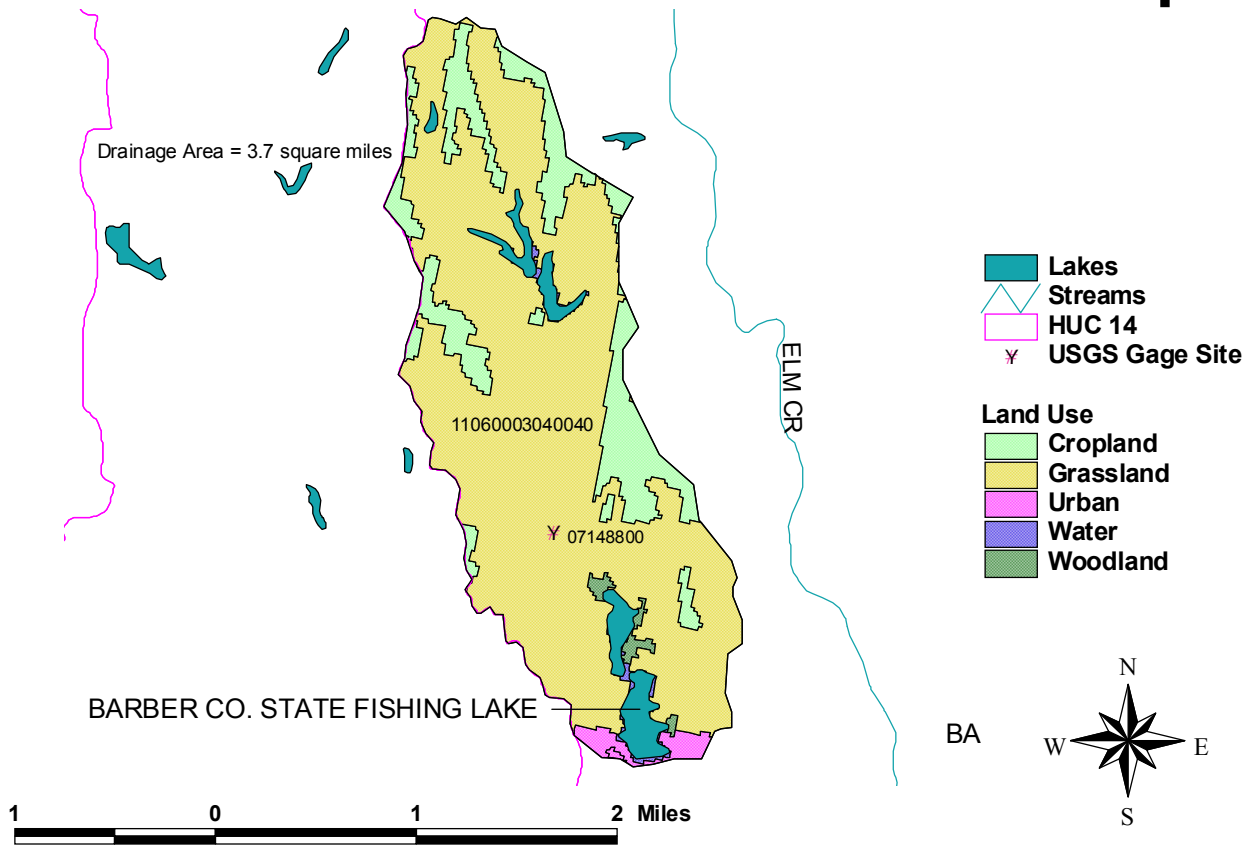


Figure 1

Current Condition: The dissolved oxygen concentrations decreased with increased depth. (See below table). At the surface, the average concentration was 8.8 mg/L, a sufficient amount of dissolved oxygen for aquatic life support. However, near the bottom of the lake, the concentration approaches zero mg/L.

Barber Co SFL/WA	Date	Depth (ft)	Dissolved Oxygen (mg/L)
013101	28-Aug-80	0	7.000
013101	28-Aug-80	3	6.900
013101	28-Aug-80	6	6.900
013101	28-Aug-80	9	6.800
013101	28-Aug-80	11	6.600
013101	28-Aug-80	13	4.500
013101	28-Aug-80	14	3.600
013101	28-Aug-80	16	0.400
013101	28-Aug-80	19	0.200
013101	27-Jul-87	0	7.800
013101	27-Jul-87	1.64	7.800
013101	27-Jul-87	3.28	7.800
013101	27-Jul-87	6.56	7.100
013101	27-Jul-87	9.84	6.100
013101	27-Jul-87	13.12	5.100
013101	27-Jul-87	16.4	2.600
013101	27-Jul-87	19.68	1.000
013101	27-Jul-87	22.96	0.800
013101	17-Jun-91	0	9.400
013101	17-Jun-91	1.64	9.400
013101	17-Jun-91	3.28	9.400
013101	17-Jun-91	6.56	9.000
013101	17-Jun-91	9.84	8.600
013101	17-Jun-91	13.12	5.600
013101	17-Jun-91	14.76	4.400
013101	17-Jun-96	0	11.000
013101	17-Jun-96	1.64	11.000
013101	17-Jun-96	3.28	11.400
013101	17-Jun-96	6.56	10.500
013101	17-Jun-96	9.84	2.200
013101	17-Jun-96	13.12	0.300

It is doubtful that the low dissolved oxygen observed within the top 3.0 meters of Barber Co. SFL is due to either organic or nutrient loads and subsequent eutrophication. The average total phosphorus concentration is 22 ppb; the average chlorophyll a concentration is 8.1 ppb. The phosphorus to chlorophyll a yield is high. Phosphorus appears to be the primary limiting factor in the water column. Light is not a limiting factor despite some inorganic turbidity.

The dissolved oxygen impairment (within the top three meters) appears to be the result of lower water levels during 1996 combined with the degree of thermal stratification during 1996. This impairment of numeric criteria can be attributed to natural processes. Unless lower water levels were repeated, during future surveys, it is doubtful such conditions would be recorded.

Interim Endpoints of Water Quality (Implied Load Capacity) at Barber County State Fishing Lake over 2005 - 2009:

The desired endpoint will be summer dissolved oxygen concentrations at or above 5.0 mg/l. Refined endpoints will be developed in 2005 to reflect additional sampling and artificial source assessment and confirmation of impaired status of lake.

3. SOURCE INVENTORY AND ASSESSMENT

The watershed has a low potential for nonpoint source pollutants. An annual phosphorus load of 33.1 pounds per year is necessary to correspond to the concentrations seen in the lake.

Sixteen percent of watershed is cropland, 77% grassland, and 1% woodland. The greatest impact on lake would be agricultural production and animal grazing in the watershed. (The summer and winter grazing densities are high).

4. ALLOCATION OF POLLUTANT REDUCTION RESPONSIBILITY

Additional monitoring over time will be needed to ascertain the dissolved oxygen characteristics of the lake and ascertain any level of impairment.

Point Sources: A current Wasteload Allocation of zero is established by this TMDL because of the lack of point sources in the watershed. Should future point sources be proposed in the watershed and discharge into the impaired segments, the current wasteload allocation will be revised by adjusting current load allocations to account for the presence and impact of these new point source dischargers.

Non-Point Sources: Dissolved oxygen declines appear to be due to the low lake level in 1996. With normal water levels, the nutrient load from animal waste is not sufficient to cause a water quality impairment. The general Load Allocation is 29.8 pounds of phosphorus per year. No reduction in available phosphorus is necessary to reach the endpoint.

Defined Margin of Safety: The margin of safety provides some hedge against the uncertainty of variable annual phosphorus loads. Therefore, the margin of safety will be 3.3 pounds per year of phosphorus taken from the load capacity.

State Water Plan Implementation Priority: Because Barber County State Fishing Lake needs a more detailed assessment of the dissolved oxygen impairment, this TMDL will be a Low Priority for implementation

Unified Watershed Assessment Priority Ranking: This watershed lies within the Medicine Lodge Subbasin (HUC 8: 11060003) with a priority ranking of 49 (Low Priority for restoration work).

Priority HUC 11s: The entire watershed is within HUC 11 (040).

5. IMPLEMENTATION

Desired Implementation Activities

Minimize anthropogenic oriented contributions of loading of Biochemical Oxygen Demanding substances to the lake.

Implementation Programs Guidance

Until the 2005 assessment of the continuation of monitoring is made, no direction can be made to those implementation programs.

Time Frame for Implementation: Continued monitoring over the years from 2001 to 2005.

Targeted Participants: No targets until 2005 assessment.

Milestone for 2005: The year 2005 marks the midpoint of the ten-year implementation window for the watershed. At that point in time, sampled data from the lake will be reexamined to confirm the impaired status of the lake. Should the case of impairment remain, source assessment, allocation, and implementation activities will ensue.

Delivery Agents: Depending upon confirmation of impairment and assessment of probable sources, 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 Extension.

Reasonable Assurances:

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

1. 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.
2. 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.
3. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control nonpoint source pollution.

4. 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.

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

6. 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 pollutant 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 are a Low Priority consideration and should not receive funding until after 2005.

Effectiveness: Minimal control can be exerted on natural contributions to loading.

6. MONITORING

KDHE will collect dissolved oxygen samples from Barber County State Fishing Lake in 2000. Further sampling and evaluation should occur once before 2006.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the Lower Arkansas Basin were held March 9 in Wichita, April 26 in Wichita and Hutchinson, and April 27 in 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.

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 impairment which has occurred within the drainage and current condition of Barber County State Fishing Lake. Subsequent decisions will be made regarding implementation approach and follow up of additional implementation.

Consideration for 303d Delisting: Barber County State Fishing Lake will be evaluated for delisting under Section 303d, based on the monitoring data over the period 2005-2009. Therefore, the decision for delisting will come about in the preparation of the 2010 303d list. Should modifications be made to the applicable nutrient criterion 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 after Fiscal Year 2004.

Approved November 13, 2000.