

LOWER ARKANSAS RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Water Body: Dillon Lakes Water Quality Impairment: Eutrophication Bundled with pH

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Cow

County: Reno

HUC 8: 11030012

HUC 11 (HUC 14): 030 (050)

Drainage Area: Approximately 29.5 acres. (Figure 1)

Conservation Pool: Area = 3 acres, Maximum Depth = 2 meters

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

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

Impaired Use: All uses are impaired to a degree by eutrophication

Water Quality Standard: Nutrients - Narrative: The introduction of plant nutrients into streams, lakes, or wetlands from artificial sources shall be controlled to prevent the accelerated succession or replacement of aquatic biota or the production of undesirable quantities or kinds of aquatic life. (KAR 28-16-28e(c)(2)(B)).

The introduction of plant nutrients into surface waters designated for primary or secondary contact recreational use shall be controlled to prevent the development of objectionable concentrations of algae or algal by-products or nuisance growths of submersed, floating, or emergent aquatic vegetation. (KAR 28-16-28e(c)(7)(A)).

pH less than 6.5 and greater than 8.5 (KAR 28-16-28e(c)(2)(C))

Dillion Lakes Watershed

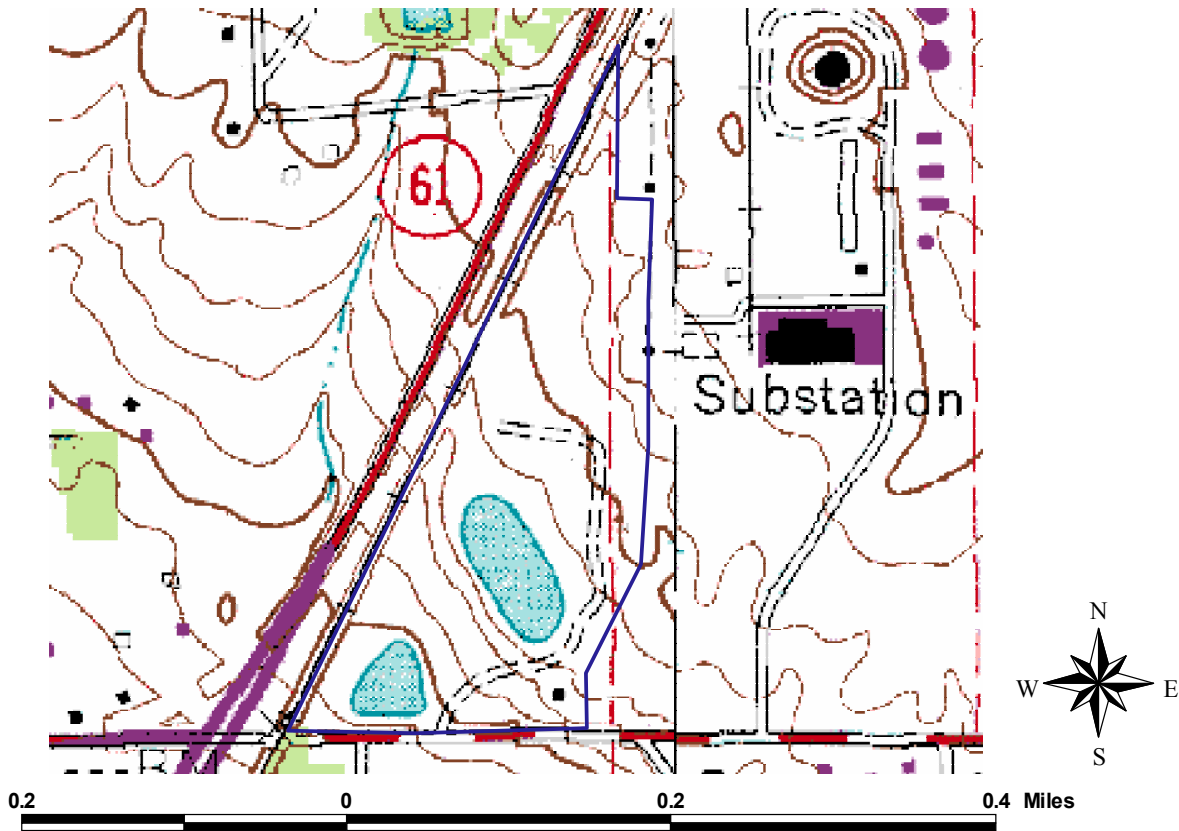


Figure 1

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Eutrophication: Hypereutrophic, Trophic State Index = 69.13

Monitoring Sites: Station 063101 in Dillion Lakes.

Period of Record Used: One survey during 1994, with subsequent visual observations.

Current Condition: Dillion Lakes have elevated chlorophyll a concentrations. The average concentration is 50.95 ppb and ranges from 48.80 to 53.10 ppb . The average relates to a Trophic State Index of 69.13, indicating hypereutrophic conditions.

The Trophic State Index is derived from the chlorophyll a concentration. Trophic state assessments of potential algal productivity were made based on chlorophyll a concentrations, nutrient levels and values of the Carlson Trophic State Index (TSI). Generally, some degree of eutrophic conditions is seen with chlorophyll a concentrations over 12 ug/l and hypereutrophy occurs at levels over 30 ug/l. The Carlson TSI, derives from the chlorophyll concentrations and scales the trophic state as follows:

- | | |
|-----------------------|-----------------|
| 1. Oligotrophic | TSI < 40 |
| 2. Mesotrophic | TSI: 40 - 49.99 |
| 3. Slightly Eutrophic | TSI: 50 - 54.99 |
| 4. Fully Eutrophic | TSI: 55 - 59.99 |
| 5. Very Eutrophic | TSI: 60 - 63.99 |
| 6. Hypereutrophic | TSI: ≥ 64 |

In 1994, the average pH was 9.28 ranging from 8.57 to 9.98. Total phosphorus concentrations average 70 ppb. The chlorophyll a to total phosphorus yield is very high. Phosphorus appears to be the primary limiting factor. Light is not a limiting factor.

Interim Endpoints of Water Quality (Implied Load Capacity) at Dillion Park Lakes over 2005 - 2010:

In order to improve the trophic condition of the lakes from their current hypereutrophic status, the desired endpoint will be summer chlorophyll a concentrations at or below 20 ug/l, corresponding to a trophic state of fully eutrophic conditions by 2009. Achievement of this endpoint should also result in pH values between 6.5 and 8.5. Refined endpoints will be developed in 2005 to reflect additional sampling and artificial source assessment and confirmation of impaired status of lakes.

3. SOURCE INVENTORY AND ASSESSMENT

Land Use: The watershed has a moderate potential for nonpoint source pollution. An annual phosphorus load of 8.2 pounds per year is necessary to correspond to the concentrations seen in the lakes.

Fertilizer applications to lawns and flower beds within the Dillion Nature Center are probable loading sources. Thirty-two percent of the nature center is grassland. Numerous planting beds surround the lakes.

Contributing Runoff: The watershed has an average soil permeability of 1.8 inches/hour according to NRCS STATSGO data base. Runoff would be produced from storms one to two hours in duration, having a recurrence interval up to twenty five years and storms of three hours in duration, having a recurrence interval of twenty-five years. Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. Generally, 15 percent of the watershed would generate runoff under dryer conditions or smaller storms. Moderate or wet conditions or larger storms would see runoff contributed from most of the watershed.

Background Levels: Twenty-six percent of the Dillon Nature Center is woodland; leaf litter may be contributing to the nutrient load. Wildlife waste increases the levels of phosphorus in the lakes. Groundwater is the source of the water in the lakes. Trace amounts of phosphorus (approximately 0.1 mg/L) are present in the groundwater and may contribute to the phosphorus load.

4. ALLOCATION OF POLLUTANT REDUCTION RESPONSIBILITY

More detailed assessment of sources and confirmation of the trophic state of the lakes must be completed before detailed allocations can be made. The general inventory of sources within the drainage does provide some guidance as to areas of load reduction.

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.

Nonpoint Sources: Water quality violations are predominantly due to nonpoint source pollutants. Background levels may be attributed to wildlife waste and leaf litter. The assessment suggests that fertilizer applications within the Nature Center contribute to the hypereutrophic state of the lakes. Generally a Load Allocation of 1.8 pounds per year, leading to a 75% reduction in 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 and the chlorophyll a endpoint. Therefore, the margin of safety will be 0.2 pounds per year of phosphorus taken from the load capacity to ensure that adequate load reduction occurs to meet the endpoint.

State Water Plan Implementation Priority: Because a more detailed source assessment and additional in-lake monitoring of nutrient and algal content are needed, this TMDL will be a Medium Priority for implementation

Unified Watershed Assessment Priority Ranking: This watershed lies within the Cow subbasin (HUC 8: 11030012) with a priority ranking of 27 (Medium Priority for restoration).

Priority HUC 11s: The lakes are within HUC 11 (030).

5. IMPLEMENTATION

Desired Implementation Activities

The potential exists for meeting full use support in Dillon Lakes. The small size of the watershed may limit the amount and type of best management practices that can be utilized. Given the low total loads very little absolute reduction in nutrients should provide good benefits. Some of the recommended practices are as follows:

1. Implement soil sampling to recommend appropriate fertilizer applications to lawns and planting beds.
2. Some in-lake management might be able to reduce nutrient cycling within the lake.

Implementation Programs Guidance

Nonpoint Source Pollution Technical Assistance - KDHE

- a.. Provide technical assistance on nutrient management in vicinity of the lakes.

Extension Outreach and Technical Assistance - Kansas State University

- a. Encourage annual soil testing to determine capacity of soil to hold phosphorus.

Time Frame for Implementation: Pollution reduction practices should be installed within the lake drainage after the year 2005. Evaluation of nutrient sources to lake and identification of potential management techniques should occur prior to 2005.

Targeted Participants: Primary participants for implementation will be the City of Hutchinson. Source assessment would occur over 2000-2005.

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 Dillon Lakes should indicate probable sources of nutrients and plans in place to initiate implementation.

Delivery Agents: The primary delivery agents for program participation will be the City of Hutchinson. 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 Medium Priority consideration.

Effectiveness: The key to success will be utilization of nutrient management within the watersheds cited in this TMDL.

6. MONITORING

Additional data, to establish nutrient ratios, source loading and further determine mean summer lakes trophic condition, would be of value prior to 2005. Further sampling and evaluation should occur twice before 2005 and once between 2005 and 2010.

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 will be 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 implementation which has occurred within the watershed and current condition of the Dillon Lakes. Subsequent decisions will be made regarding the implementation approach and follow up of additional implementation in the watershed.

Consideration for 303d Delisting: The river 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 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 after Fiscal Year 2005.

Approved November 13, 2000.