

Current Condition: The lake has an elevated chlorophyll a concentration (19.4 ppb), indicative of slightly eutrophic conditions. Total phosphorus concentration (61 ppb) is moderate. Phosphorus is the most likely limiting factor (Total N/Total P = 20.3, >12 indicates phosphorus of more importance). Chlorophyll-to-phosphorus yield is relatively high. There is moderate inorganic turbidity, but light availability remains high in the water column.

The Trophic State Index of 55 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 are seen with chlorophyll a concentrations over 12 ug/l and hypereutrophy occurs at levels over 20 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 |

Lakeview Estates Lake has a large population of coontail.

Interim Endpoints of Water Quality (Implied Load Capacity) at Lakeview Estates Lake over 2004 - 2008:

In order to improve the trophic condition of the lake from its current slightly eutrophic status, the desired endpoint will be summer chlorophyll a concentrations at or below 12 ug/l by 2008. Achievement of this endpoint should also result in a manageable coverage of macrophytes. Refined endpoints will be developed in 2004 to reflect additional sampling and artificial source assessment and confirmation of impaired status of lake.

3. SOURCE INVENTORY AND ASSESSMENT

Septic systems: Septic system load calculated as 26 capita-years (26 capita-years = 7% of current total load).

NPDES: Two point sources exist in the drainage--the USD 437 high school and elementary school.

Land Use: A main source of phosphorus is from urban fertilizer applications. Land use coverage analysis indicates that 74% of the watershed is urban. Most of the homes near the lake have substantial lot sizes compared to impervious surface, and numerous fertilizer applications per year are probably made to these estates. An annual phosphorus load of 344 pounds per year is necessary to correspond to the concentrations seen in the lake.

Phosphorus from animal waste is a third contributing factor. Twenty-five percent of land around the lake is grassland.

A non-point source of phosphorus within Lakeview Estates Lake is probably runoff from agricultural lands where phosphorus has been applied. Land use coverage analysis indicates 1% of the watershed is cropland.

Background Levels: Nutrient recycling from the sediments in the lake is likely contributing available phosphorus to the lake for algal uptake. Some organic pollution may be contributed by wildlife and pets near the lake. Geological formations contain small amounts of phosphorus (up to 0.5% of total weight), and may contribute to phosphorus loads.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

More detailed assessment of sources and confirmation of the trophic state of the lake 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: Since this impairment is associated with USD 437, some of the load will be allocated to point sources. A Wasteload Allocation of 80 pounds of available phosphorus within a wasteload allocation of total phosphorus of 210 pounds is necessary to achieve the endpoint.

Non-Point Sources: Some of the phosphorus loading is due to non-point source pollution. Background levels may be attributed to geological sources and animal waste. The assessment suggests that cropland, urban areas, and livestock waste contribute to the slightly eutrophic state of the lake. Given the runoff characteristics of the watershed, overland runoff can easily carry phosphorus into the streams. Generally a Load Allocation of 25 pounds per year, leading to a 24% 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 total phosphorus loads and the chlorophyll a endpoint. Therefore, the margin of safety will be 26 pounds per year of total phosphorus taken from the load capacity to ensure that adequate load reduction occurs to meet the endpoint.

State Water Plan Implementation Priority: Because Lakeview Estates Lake is a small lake under local jurisdiction and a more detailed source assessments and additional in-lake monitoring of nutrient and algal content is needed, this TMDL will be a Low Priority for implementation

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: The entire watershed is with HUC 11 (010).

5. IMPLEMENTATION

Desired Implementation Activities

Point source controls and improvements would appear necessary to allow Lakeview Lake to achieve full support of its uses. Non-point controls alone would not be likely to produce the desired results. While septic systems do exist, and do contribute a significant portion of the total annual P-load, their removal would not, in isolation, achieve full support. Full support is projected to be equally achieved by either 1) elimination of point source discharge and minimal NPS BMPs, or 2) Point source treatment to 1mgP/L with reasonable NPS reductions.

Dredging, to improve water depth, is projected to have some water quality benefit, but not in isolation. This too requires a reduction in the pollutant load from point and non-point sources.

Implementation Programs Guidance

Until additional assessment of probable non-point sources is made, no direction can be made to those implementation programs.

Timeframe for Implementation: Additional point and non-point source pollution reduction practices should be installed within the lake after the year 2004 re-evaluation.

Targeted Participants: Primary participants for implementation will be the school district and landowners around the lake.

Milestone for 2004: The year 2004 marks the mid-point of the ten year implementation window for the watershed. At that point in time, additional monitoring data from Station 075301 will be re-examined 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 local officials.

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.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.
4. 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.
5. 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.
6. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*.
7. 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 50% of the fund to programs supporting water quality protection. This watershed and its TMDL is a Low Priority consideration and should not receive funding until after 2004.

Effectiveness: Effectiveness of corrective actions will depend upon the sources which contribute to the impairment at the lake.

6. MONITORING

KDHE will collect nutrient and chlorophyll a samples from Lakeview Estates Lake in 2001 and 2003. Additional data, to establish nutrient ratios, source loading and further determine mean summer lake trophic condition, would be of value prior to 2004. If lake impairment is confirmed in 2004, further sampling and evaluation should occur in 2005 and 2007.

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

Consideration for 303d Delisting: The lake will be evaluated for delisting under Section 303d, based on the monitoring data over the period 1999-2003. Therefore, the decision for delisting will come about in the preparation of the 2004 303d list. Should the lake continue to be listed as impaired in 2004, the next evaluation for delisting will occur with the preparation of the 2008 Section 303d list. Should modifications be made to the applicable water quality criteria during the ten year implementation period, consideration for delisting, development of desired endpoints of this TMDL and implementation activities will 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 January 26, 2000.