



EPA Region 7 TMDL Review

TMDL ID 189 **Water Body ID** LP2-L0090
Water Body Name Yankee Hill Lake
Pollutant Nutrients
Tributary Cardwell Branch
State NE **HUC** 10200203
Basin Missouri/Lower Platte
Submittal Date 06/21/2002
Approved yes

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/ water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

Letter and package received 8/21/02.

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

Nebraska's Aesthetics beneficial use is identified as not attained due to excessive nutrients causing a hypereutrophic condition in the lake. Nebraska does not have numeric criteria for nutrients, however, apply the Carlson's trophic state index (TSI) as an assessment tool for determining beneficial use attainment in lakes. Beneficial uses are considered to be in attainment when 2 of 3 TSI parameters (secchi depth, phosphorus and chlorophyll-a (chl-a)) are less than 60 with an overall mean not to exceed 60. The targeted in-lake water quality conditions resulting from the identified allocations will result in the lake fully supporting the aesthetic beneficial use.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

All beneficial uses are described as well as the applicable narrative criteria. The TMDL is based on narrative criteria for aesthetics which is translated to a numeric chl-a water quality target through the use of targeted TSI scores and modeling. The lake's current phosphorus load and loading capacity was determined through the use of the EUTROMOD watershed and lake modeling spreadsheet. Phosphorus was selected as the nutrient/parameter of concern because past monitoring has indicated eastern Nebraska lakes to be phosphorus limited and as well as TSI scores also giving that indication.

Link Between Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

In-lake conditions indicate accelerated eutrophication/algal growth caused by excessive nutrient loading; this linkage has between accelerated eutrophication and water quality impairments has been repeatedly documented. The EUTROMOD model was used to estimate annual phosphorus loads from the watershed and in-lake monitoring data was used to calibrate the EUTROMOD model, define the loading capacity, current load and the in-lake response predictions. The loading capacity is identified as 997.2 pounds/year phosphorus; a 90% reduction in the current load (9,972 pounds/year) is necessary to meet the load capacity and ultimately achieve water quality standards attainment.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

There are no point sources of phosphorus in the watershed. Phosphorus loads for the ten land use classes identified in the watershed were estimated using the EUTROMOD model and field surveys were conducted. Row crops (milo and soybeans) were identified as the largest contributor, accounting for 81% of the phosphorus load.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

WLA Comment

The WLA is zero.

LA Comment

The LA is identified as 997.2 pounds/year.

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

The MOS is implicit based on the assumption that all phosphorus delivered is maintained in the lake and available for algae production rather than any losses occurring through the outlet of the lake.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

The Universal Soil Loss Equation used in the modeling efforts applied average "spring season" (critical conditions) values for soil and climatic conditions. An annual loading period was used in modeling the lake assimilative capacity and for estimating the loading reduction necessary to meet in-lake water quality targets.

Public Participation

Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

The draft TMDL was announced through a public notice in the Lincoln Journal Star Newspaper with just over a 30-day comment period provided. The TMDL was also made available on the NDEQ website and announcement letters were mailed to identified stakeholders.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

The USACE has agreed to conduct monthly monitoring throughout the growing season and forward the results to NDEQ for assessment. The USACE will also conduct periodic bathymetric surveys. NDEQ will periodically conduct monitoring to evaluate the effectiveness of BMPs.

Reasonable assurance

Reasonable assurance only applies when reduction in nonpoint source loading is required to meet the prescribed waste load allocations.

Although reasonable assurances are not required for this TMDL, the Nebraska Game and Parks Commission has deemed the lake a high priority for renovation based on public input and has started an aquatic habitat project on the lake which includes sediment retention structures, reparation of shoreline erosion, increase of water depth in the upper arms, improving water clarity and an increase in the amount of aquatic vegetation. Yankee Hill Lake was placed on the list of waters needing rehabilitation following the establishment of the \$5 Aquatic Habitat Stamp required by licensed anglers over 18 years of age. The appendix also provides a list those entities that may be included in the implementation process.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

All beneficial uses are described as well as the applicable narrative criteria. The TMDL is based on narrative criteria translated to a numeric water quality target. Annual volume loss targets in comparison with current sediment load estimates allowed for the determination of the desired endpoint and the associated degree of sediment load reduction needed to attain beneficial uses. The lake's current sediment load and loading capacity was determined through the use of bathymetric survey data and the EUTROMOD watershed and lake modeling software (Reckhow 1990) respectively.

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The lake was identified on the 303(d) list as impaired because of the severity of the sedimentation rate occurring in the lake's multi-purpose pool. Therefore, the targeted endpoint is translated as the amount of sediment the lake can receive on an annual basis and still meet an average annual multi-purpose pool loading rate of <0.5%. In order to reach the goal of less than 0.5% volume loss/year, 650 tons/year of sediment needs to be reduced. Existing information (storage capacity) and monitoring data were used as a verification for the modeled sediment load predictions.

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There are no point sources of sediment in the watershed. Sediment loads for the ten land use classes identified in the watershed were estimated using the EUTROMOD model. Row crops (milo and soybeans) were identified as the largest contributor, accounting for 83% of the sediment load.

Allocation

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WLA Comment

The WLA is zero.

LA Comment

The LA is identified as 13,350 tons/year of sediment.

Margin of Safety

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The MOS is implicit based on conservative assumptions (worst case scenarios) used in the modeling of sediment loads, and the assumption that all sediment delivered is deposited in the multi-purpose pool rather than any losses occurring through the outlet of the lake.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

The Universal Soil Loss Equation used in the modeling efforts applied average "spring season" (critical conditions) values for soil and climatic conditions. However, there are no specific critical conditions associated with this TMDL because once sediment settles in the lake, it is assumed to have an infinite residence time and is present on a year round basis.

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