EPA Region 7 TMDL Review

TMDL ID:	IA 06-LSR-02450-L	**Waterbody ID:**	IA 06-LSR-02450-L
Waterbody Name:	TRUMBULL LAKE		
Tributary:	Two Unnamed tributaries		
Pollutant:	Algae and Turbidity		
State:	IA	**HUC:**	1023000307
BASIN:	East Fork Des Moines River Basin		
Submittal Date:	6/22/2006		
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.

The TMDL for Trumbull Lake was formally submitted by the Iowa Department of Natural Resources (IDNR) in a letter received by EPA on June 22, 2006.

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.

The loading capacity is set through the use of a lake response model to target the annual amount of total phosphorus (TP) that Trumbull Lake can receive to meet its designated uses. To address the identified pollutants (algae and turbidity) a Trophic State Index (TSI) value of 70 for TP has been targeted to limit the growth of algae and improve the effects on water transparency. This TMDL will result in a 64% reduction in TP loading and should result in attainment of applicable water quality standards.

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.

Designated uses of Trumbull Lake are primary contact recreational use (Class A1) and aquatic life (Class B(LW)). In 1998, Trumbull Lake was included on the impaired waters list due to low dissolved oxygen. In 2002, this impairment was changed to algae and turbidity, which are more descriptive of the problems identified at Trumbull Lake. Assessments in 2002 and 2004 revealed that the Class A1 designated use was assessed as "not supporting" and the Class B designated use was assessed as "partially supporting" due to the excessive water column nutrient loading, resuspension of sediment, and nuisance algal species (e.g., bluegreen algae) which contribute to a violation of the narrative criteria of aesthetically objectionable conditions.

For algae and turbidity the impairment is based on narrative standards which state that Trumbull Lake should be "free from materials attributable to wastewater discharges or agricultural practices producing objectionable color, odor, or other aesthetically objectionable conditions." The presence of objectionable algal blooms, limited clarity, and the presence of nuisance algal species are linked to TP loading through the use of Carlson's Trophic State Index (TSI). The TSI uses a relationship between Secchi transparency (SD), algal biomass as chlorophyll a (CHLA), and TP derived from a set of reference temperate lakes. The target is a TSI(TP)<70, which should result in TSI(SD) and TSI(CHLA)<65.

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.

Carlson's Trophic State Index (TSI) was used in the TMDL to relate algae, as measured by chlorophyll a; transparency, as measured by Secchi depth; and total phosphorus to one another to set water quality improvement targets. A Mean TSI Multivariate Comparison Plot was used to find a linkage between TP, chlorophyll, and water transparency. If the TSI values for the three variables are the same then the relationship between TP and algae and transparency are strong. If the TP TSI values are higher than the chlorophyll values this means there are other limitations to algal growth besides phosphorus. Comparison of the TSI values for chlorophyll, Secchi depth, and TP for Trumbull Lake 2000 to 2005 in-lake sampling indicate some limitation of algal growth attributable to light attenuation by elevated suspended solids (i.e., non-algae turbidity). The comparison also indicates that there is surplus phosphorus, (i.e., not all available TP is expressed as algae). In addition, based on mean values from sampling during 2000 to 2005, the ratio of total nitrogen to total phosphorus for this lake is 16.7. This ratio indicates that nitrogen is not the limiting nutrient in Trumbull Lake. Reductions in total phosphorus are expected to result in similar reductions in suspended solids and chlorophyll. The load allocations and margin of safety do not exceed the load capacity.

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.

Sources for total phosphorus are influence by both point and non-point sources. The point source contribution comes from the City of Terrill (NPDES IA0036609) wastewater treatment lagoon. Potential non-point sources include agricultural activities, inadequate on-site septic tank treatment systems, wildlife, run-off from built-up areas, atmospheric deposition, and internal recycling loads. One confined animal feeding operation and one open feeding lot have been identified within the watershed. Two natural background conditions, atmospheric deposition directly to the lake and groundwater have also been considered as possible candidates for phosphorus loading. Potential phosphorus contributions from groundwater influx were not separated from the total non-point source load. The largest estimated non-point source comes from phosphorus load from the watershed areas that drain directly into the lake and the phosphorus recycled from the lake sediments. It appears all sources of total phosphorus have been considered.

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.

The load allocation for this TMDL consists of two parts, the external load that includes watershed non-point sources and atmospheric deposition, and internal recycling load. 6410 lbs/year, 350 lbs/year, and 4270 lbs/year, have been allocated to the Trumbull Lake watershed, atmospheric deposition, and internal recycling of phosphorus, respectively.

WLA Comment

A WLA has been set at 250 pounds per year for the point source identified in the watershed (Waste Water Treatment Plant for the City of Terrill).

LA Comment

The load allocation for total phosphorus is determined by splitting it between the watershed and recycled loads. Targets for external loads contributed by non-point sources within the watershed were separated from the internal recycling loads and estimated by using the Nurnberg model. The load allocation for external sources is 6,760 lbs/year and for recycled internal load 4,270 lbs/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 for total phosphorus is explicit. It consists of 10% of the external non-point target load and 10% of the recycle load (1,230 lbs/year).

Seasonal Variation and Critical Conditions

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

The TMDL for algae and turbidity was set for an annual loading of phosphorus that will result in meeting growing season targets (May through September).

Public Participation

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

A meeting was held at the regular monthly meeting of the Clay County Soil and Water Conservation Board on April 20, 2005. A second public meeting was held on April 20, 2006 at the Oneota Lodge in the City of Spencer, Iowa. The draft TMDL was available on the Iowa DNR's web site on April 3, 2006 to commence a30 day public comment period and ended on May 5, 2006. Comments received were incorporated where appropriate.

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).

Monitoring for parameters associated with the algal and turbidity impairments will, at a minimum, meet the requirements established by 305(b) guidelines for water body assessment. This will consist of three lake samples per year for three years or five samples a year for two years. The data will be collected by 2010.

Reasonable assurance

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

Reasonable assurances are not required. The WLA assigned to the sole point source in the watershed makes up only 2% of the load capacity to the lake. Further required reductions in the point source loading is not likely to have any measurable effect on the TMDL targets.