EPA Region 7 TMDL Review

TMDL ID: IA 06-LSR-02390-L_0 **State:** IA
Document Name: LOST ISLAND LAKE

Basin(s): MISSOURI-LITTLE SIOUX
HUC(s): 10230003
Water body(ies): LOST ISLAND LAKE
Tributary(ies): BLUE WING MARSH
Pollutant(s): PHOSPHORUS, SUSPENDED SOLIDS, TURBIDITY

Submittal Date: 10/24/2008 **Approved:** Yes

Submittal Letter

State submittal letter indicates final Total Maximum Daily Load(s) (TMDL) 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 [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by EPA, date of receipt of any revisions, and the date of original approval if submittal is a phase II TMDL.

The TMDL for Lost Island Lake was formally submitted by the Iowa Department of Natural Resources (IDNR) with a cover letter sent October 22, 2008, and received by U.S. Environmental Protection Agency (EPA), Region 7, on October 24, 2008.

Water Quality Standards Attainment

The water body's loading capacity (LC) 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 (WQS) [40 CFR § 130.7(c)(1)]. A statement that WQS will be attained is made.

Iowa does not have numeric water quality criteria for algae or turbidity. The cause of Lost Island Lake algae and turbidity impairments are algal blooms resulting from excessive phosphorus input to the lake and inorganic suspended solids from resuspension of the lake sediment and watershed runoff.

The criteria for assessing the Lost Island Lake algae and turbidity impairment are based on Carlson Trophic State Index (TSI) scores for chlorophyll and Secchi Depth (SD). The impairment threshold for nuisance conditions are TSI values of 65 for both chlorophyll and SD, giving a target chlorophyll concentration of 33 micrograms per liter (ug/l) and a target SD of 1.0 meter.

The average annual Total Phosphorus (TP) concentration target for this goal has been estimated using the BATHTUB model and is 42 ug/l. The average annual chlorophyll concentration target for a 1.0 meter SD has been estimated using the BATHTUB model and is 24 ug/l. The average annual allowable TP LC is 1,532 lbs/year or 151 lbs/day.

EPA agrees that meeting the TP LC target will results in the attainment of WQS in Lost Island Lake.

Numeric Target(s)

Submittal describes applicable WQS, 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.

The Iowa WQS (IAC 567-61) list the designated uses for Lost Island Lake as primary contact recreational use (Class A1), aquatic life (Class B(LW)) and Human Health (HH). The use that is impaired is Class A1. More recent assessments in 2006 revealed that the Class A1 designated use was assessed (monitored) as "partially supporting" due to very poor water transparency resulting primarily from high levels of non-algal turbidity and the Class B use was assessed (evaluated) as "fully supporting." The Lost Island Lake primary contact recreational use has been assessed using narrative criteria for aesthetically objectionable conditions as not supporting the Class A1 use. The recreational season is defined in the Iowa WQS as the period from March 15 through November 15.

Iowa does not have numeric water quality criteria for algae or turbidity. The algae and turbidity impairment is based on narrative standards which state that Lost Island Lake should be "free from materials attributable to wastewater discharges or agricultural practices producing objectionable color, odor, or other aesthetically objectionable conditions." The criteria for assessing lake algae and turbidity impairment are based on TSI scores for chlorophyll and SD. A numeric translator TSI was used to address the narrative standard. The phosphorus target was determined using the BATHTUB lake nutrient model.

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 (MOS) that do not exceed the LC. If submittal is a phase II TMDL there are refined relationships linking the load to WQS attainment. If there is an increase in the TMDL there is a refined relationship specified to validate the increase in TMDL (either load allocation (LA) or waste load allocation (WLA)). This section will compare and validate the change in targeted load between the versions.

Carlson's TSI scores were used to define and establish the linkage between TP concentrations and the reduction of algae and turbidity. The TSI is used to relate algae (measured by chlorophyll), transparency, and TP, as seen in a group of reference lakes. The watershed, atmospheric deposition, and resuspended TP loads are linked to the water quality impairment with the Loading Function Model that estimates annual average phosphorus delivery. The internal resuspension and atmospheric deposition loads have been linked to the impairment through BATHTUB lake nutrient modeling.

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, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered. If this is a phase II TMDL any new sources or removed sources will be specified and explained.

Only nonpoint sources influence the TP and sediment loading. There are no permitted point sources in the Lost Island Lake watershed. A significant source of phosphorus loading is external watershed loads (septic tanks and geese).

There are three nonpoint phosphorus sources for Lost Island Lake: 1) Phosphorus from the watershed areas draining into the lake, 2) phosphorus resuspended from lake sediments, and 3) atmospheric deposition. The Loading Function Model calculates estimates of watershed phosphorus loads. The BATHTUB model estimates internal resuspended and atmospheric deposition phosphorus loads. All known significant sources have been identified.

Allocation - Loading Capacity

Submittal identifies appropriate WLA for point, and load allocations for nonpoint sources. If no point sources are present the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2 (i)]. If this is a phase II TMDL the change in LC will be documented in this section.

The target for this TMDL is a SD transparency of 1.0 meter. As modeled, the TP and chlorophyll targets that achieve 1.0 meter transparency are less than 42 ug/l and less than 24 ug/l respectively. The LC is the annual average TP load Lost Island Lake can receive and still meet the chlorophyll and SD targets. The annual average

TP LC is 1,532 lbs/year.

WLA Comment

Submittal lists individual WLAs for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to WQS excursions, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLAs. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a phase II TMDL any differences in phase I and phase II WLAs will be documented in this section.

There are no point sources in Lost Island Lake watershed; therefore, the sum of the WLA is zero.

LA Comment

Includes all nonpoint sources loads, natural background, and potential for future growth. If no nonpoint sources are identified the LA must be given as zero [40 CFR § 130.2(g)]. If this is a phase II TMDL any differences in phase I and phase II LAs will be documented in this section.

The TP LA for Lost Island Lake is the sum of the external watershed nonpoint sources, turbulent internal resuspension of phosphorus, and loads from atmospheric deposition. The external loads from the watershed were estimated using the Loading Function Model as described in Appendix D in the TMDL. The internal and atmospheric loads were estimated using BATHTUB Lake Nutrient Modeling. The LA for this TMDL is allowable TP load less 10% for the MOS.

Based on the BATHTUB Lake Nutrient Modeling, the internal LA is 297 lbs/year or 0.93 lbs/day, and the atmospheric direct load of 277 lbs/year (a constant 277 lbs/365 day = 0.76 lbs/day). Based on the Loading Function Model, the external watershed nonpoint sources LA is 804 lbs/year or 134 lbs/day. The LC for TP is 1,532 lbs/year or 151 lbs/day and the LA is 1,378 lbs/year or 135.7 lbs/day.

EPA agrees this is an appropriate LA.

Margin of Safety

Submittal describes explicit and/or implicit MOS for each pollutant [40 CFR § 130.7(c)(1)]. 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. If this is a phase II TMDL any differences in MOS will be documented in this section.

The procedures used to provide the MOS for the maximum annual average load and maximum daily load are the same, an explicit 10% decrease in the targeted TP loads. The MOS for the maximum annual average target load is 153 lbs/year or 15.2 lbs/day. Table 6 in the TMDL shows the MOS for each TP load category.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of WQS. If this is a phase II TMDL any differences in conditions will be documented in this section.

The critical condition the TMDL TSI targets are applied to is the growing season (April through September), when nuisance algal blooms in the lake are prevalent. The existing and targeted TP concentrations for the Lost Island Lake is expressed as annual averages. The TP load estimates are calculated from the existing and maximum allowable loads.

Public Participation

Submittal describes required public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].

The draft TMDL was posted on the IDNR website on May 22, 2008, and comments were accepted from

May 22 to June 23, 2008. On June 4, 2008, a public meeting was held at the Palo Alto County Conservation Board and Lost Island Prairie Wetland Nature Center to obtain comments and input. Written comments and the response to these comments by IDNR staff can be found in Appendix G of the TMDL.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies a 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) [40 CFR § 130.7].

Monitoring similar to that done for the Iowa State University (ISU) Lake Study sampling will continue at Lost Island Lake. This monitoring, consisting of three to six samples taken in the growing season, provides enough information for 305(b) assessment purposes.

Reasonable Assurance

Reasonable assurance only applies when less stringent WLAs are assigned based on the assumption of nonpoint source reductions in the LA will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads.

There are no point sources in the watershed and reasonable assurances are therefore not required.