



## EPA Region 7 TMDL Review

**TMDL ID:** NE-BB1-L0030  
**Document Name:** BIG INDIAN LAKE

**State:** NE

**Basin(s):** BIG BLUE  
**HUC(s):** 10270202  
**Water body(ies):** BIG INDIAN LAKE  
**Tributary(ies):** OTOE CREEK  
**Pollutant(s):** SEDIMENT, TOTAL PHOSPHORUS

**Submittal Date:** 7/16/2009

**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.*

This TMDL was officially submitted for U.S. Environmental Protection Agency (EPA) approval with a cover letter received by EPA Region 7 on July 16, 2009.

### 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.*

The LC for total phosphorus (TP) was determined by using the aggregate ecoregion reference value (25th percentile) of 0.033 milligrams per liter (mg/L) as phosphorus. This will require a decrease of 87.5% from the present loading estimate of 4,423 pounds/year.

The LC for sediment was set at an annual sedimentation rate of <0.75% of the reservoir volume. This will require a decrease of >32.6% in sediment load to the reservoir. The present loading rate is estimated at 8,050 tons/year and the target at <5,429 tons/year.

When the TMDL targets are met WQS should be attained.

### 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.*

Big Indian Lake's assigned beneficial uses are; primary contact recreation, aquatic life warmwater class A, agricultural water supply class A, and aesthetics. The aquatic life warmwater class A and aesthetics uses are impaired because of excessive TP and sediment.

Nebraska does not have numeric criteria for TP or sediment for the impaired uses. Big Indian Lake is impaired under the narrative standard: *"To be aesthetically acceptable, waters shall be free from human induced pollution which causes floating, suspended, colloidal or settleable materials that produce objectionable films, colors, turbidity or deposits."* The narrative aesthetics standard is translated to a TP numeric target of 0.033 mg/L as phosphorus based on EPA's recommended ecoregion target for lakes in Nutrient Ecoregion V, in which Big Indian Lake is located. This TP target is expressed as annual and daily maximum loads. The narrative standard is also translated to a sediment target as total suspended solid (TSS) concentrations, which lead to a sedimentation rate of <0.75% of lake volume on an annual basis, and is additionally expressed as a maximum daily load.

### **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.*

The sediment impairment is used to address the loss of lake volume which violates the narrative standard. Phosphorus is also targeted to ensure that the lake does not experience increased algal growth as a result of the clearing of the lake water. The submittal explains how the present algal levels in the lake are mediated by light limitation because of the suspended sediment loads in the lake. As the sediment TMDL is implemented the resulting clearing will result in an increase in the levels of algal biomass. To keep that from happening a TP TMDL is also being submitted to reduce the concentration of phosphorus in the lake which will result in algal concentrations that will meet WQS as the lake clears.

### **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.*

There are no known permitted point sources which discharge into the watershed. In the absence of an NPDES permit, the discharges associated with sources were applied to the LA, as opposed to the WLA for purposes of this TMDL. The decision to allocate these sources to the LA does not reflect any determination by EPA as to whether these discharges are, in fact, unpermitted point source discharges within this watershed. In addition, by approving these TMDLs with some sources treated as LAs, EPA is not determining that these discharges are exempt from NPDES permitting requirements. If sources of the allocated pollutants in this TMDL are found to be, or become, NPDES-regulated discharges, their loads must be considered as part of the calculated WLA in this TMDL.

The sources of sediment and phosphorus to Big Indian lake seem nonpoint in nature. The land cover breakdown in the watershed is 40% pasture, 35% cropland, 20% in conservation reserve, and the remaining cover in homesteads and the surface area of the lake (72 acres). The CNET Reservoir Eutrophication Modeling Worksheet model was used to estimate phosphorus load based on tributary inflow and TP concentrations in that inflow. This resulted in an underestimation of the load needed by the model to account for in-lake TP concentrations. As a result the remaining load is attributed to resuspension and internal loading from the lake sediments. The amount of internal load is consistent with quantities seen in other midwestern lakes.

The sediment loading to the lake was estimated on an annual basis through the use of bathymetric evaluations which were completed in 1995 and 2003. The loss of lake volume was averaged over the period of time between the surveys.

Nonpoint and background sources were not separated in the source analysis.

It seems all known sources have been considered.

### **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 LCs for TP and sediment are the LAs as there are no point sources and the MOS are implicit. For TP, the LC is 573 pounds/year (maximum 3.75 pounds/day) and for sediment 5,426 tons/year (maximum 55.8 tons/day).

### **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.*

As there are no permitted point sources discharging to the lake, the WLA is 0 (zero) for both TP and sediment.

### **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 LA for TP is 573 pounds/year (551 from nonpoint load and 22 from atmospheric deposition). Using the Technical Support Document for Water Quality-Based Toxics Control (TSD) method, the annual load is equivalent to a maximum daily LA of 3.75 pounds/day.

The LA for sediment is 5,426 tons/year. Using the TSD method, the annual load is equivalent to a maximum daily LA of 55.8 tons/day.

## **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 MOS in this TMDL are implicit for both pollutants. The LCs assume that all pollutants delivered to the lake are available and remain within the lake. Some of the pollutants are exported from the system through the dam. From the lake model, outflow from the lake consists of 18% of the annual water budget. The pollutants contained in this outflow are assumed to remain within the lake for reduction purposes.

This is found to be an acceptable implicit MOS.

## **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 water quality of the lake is evaluated on a seasonal approach. The loading of both pollutants occurs over the entire year. The CNET model used to estimate phosphorus load and evaluate algal growth is valid for growing seasons. As such, the expression of loads on an annual basis is more appropriate for this TMDL.

## **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 TMDL was made available for public review on the Nebraska Department of Environmental Quality internet site from May 19, 2009 through June 30, 2009. Announcements were also published in the Beatrice Daily Sun and the Wymore Arbor State. No comments were received from the public.

## **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].*

Samples will be collected during the growing season (May - September) to evaluate the lake's water quality. A formal monitoring plan will be prepared as part of a watershed management plan.

## **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.*

Reasonable assurances apply in cases where less stringent WLAs are allocated and greater LA reductions are required. As there are no permitted point sources of pollutants to the lake and the WLAs for both pollutants are zero, reasonable assurances do not apply.