TMDL Decision Document
Wisconsin Mead Lake TMDL

Total Maximum Daily Load (TMDL) Decision Document

TMDL: Total Maximum Daily Load for Mead Lake, Clark County, Wisconsin
Status: Final
Date of U.S. EPA Decision: October 2, 2008

Water Body Addressed by TMDL as identified on Wisconsin's 2006 303(d) list and draft 2008 category 5 of the Integrated Report (IR):

- Mead Lake
- Wisconsin Waterbody Identification Code (WBIC): 2143900
- Location: Hydrologic Unit Code (HUC) 07050006
- Designated Use: warm water sport fishery
- Priority: high

Impairment/Pollutant: Two TMDLs have been established, one for phosphorus and one for sediment, which will address three impairments in Mead Lake: degraded habitat, excess algal growth, and pH exceedances.

Summary: Mead Lake was placed on Wisconsin's 1998 list of impaired waters due to impairments caused by excessive sediment and phosphorus. The approved 2006 list includes Mead Lake with phosphorus and sediment as pollutants contributing to eutrophication, pH criteria exceedances, and sediment impairments. The draft 2008 list also includes Mead Lake with phosphorus and sediment as pollutants contributing to the degraded habitat, excess algal blooms and pH criteria exceedances. The TMDL report states that the 2008 list has been updated to reflect the State's current understanding of the impairments in Mead Lake. Mead Lake is a shallow lake with phosphorus-laden sediments and excessive phosphorus levels in the water column which cause the lake to experience severe algal blooms during the growing season, May through September, often accompanied by elevated pH levels. The goal of the TMDL is to reduce sediment and phosphorus loadings to Mead Lake. Such reductions will cause a decrease in chlorophyll levels leading to a reduction in algal blooms during the growing season which will cause reductions in pH levels, thereby improving the degraded habitat.

Conclusion: After a full and complete review of the TMDL report and supporting documents received by U.S. EPA on August 19, 2008, and a revised TMDL report received by U.S. EPA on September 25, 2008, U.S. EPA finds that pursuant to Section 303(d) of the Clean Water Act, 33 U.S.C. Section 1313(D), and U.S. EPA's implementing regulations at 40 CFR Part 130, the TMDLs for Mead Lake satisfy the elements of approvable TMDLs. This decision approves one phosphorus and one sediment TMDL, both of which will address the impairments of degraded habitat, excess algal blooms, and pH criteria exceedances as identified on Wisconsin's 303(d) list. Seasonal and annual daily capacities were established for both sediment and phosphorus. The approved loading capacities and allocations are included in Table 1 of this decision document.

U.S. EPA's approval of this TMDL extends to Mead Lake as identified in this decision document, with the exception of any portions of Mead Lake that is within Indian Country, as defined in 18 U.S.C. Section 1151. At this time, U.S. EPA is taking no action to approve or disapprove this TMDL with

respect to those portions of Mead Lake within Indian Country. U.S. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under Section 303(d) for these water bodies or portions of these water bodies within Indian Country.

U.S. EPA REVIEW OF THE ELEMENTS OF MEAD LAKE TMDL

Section 303(d) of the Clean Water Act (CWA) and U.S. EPA's implementing regulations at 40 CFR Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for U.S. EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) of the CWA and U.S. EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for U.S. EPA to determine if a submitted TMDL is approvable.

1. Identification of Water body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the water body as it appears on the State's/Tribe's 303(d) list, the pollutant for which the TMDL is being established, and the priority ranking of the water body. The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the National Pollutant Discharge Elimination System (NPDES) permits within the water body. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for U.S. EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use (e.g., urban, forested, agriculture); (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and (4) an explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments; chlorophyl a and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comments and Assessment:

Identification of Water Body: Mead Lake is a shallow, eutrophic impoundment of the South Fork Eau Claire River. The South Fork Eau Claire River is the primary source of surface water inflow to Mead Lake. The Mead Lake watershed is located in the upper half of the South Fork Eau Claire River watershed of the Lower Chippewa basin, in Clark County. The watershed drains 248 km^2 of the west

central portion of the state. Approximately 99% of the watershed is in Clark County with the remaining portion in Taylor County. Mead Lake has a surface area of 1.3 km^2, a volume of 1.9 hm^3, a mean depth of 1.5 m and a maximum depth of 5 m.

Wisconsin's 2006 303(d) list identifies Mead Lake as follows:

MEAD LAKE, Clark County
WBIC 2143900, Unique ID 277
Pollutants: phosphorus and sediment
Impairments: eutrophication, pH, and sediment
Current/Designated Use: warm water sport fishery/warm water sport fishery
Nonpoint source dominated

Table 1 in the TMDL report includes water body information from Wisconsin's draft 2008 303(d) list. In development of the 2008 list, Wisconsin Department of Natural Resources (WDNR) updated the impairments for Mead Lake. The change between the information in Table 1 in the TMDL report and the 2006 303(d) list is eutrophication and sediment were removed as impairments and replaced with degraded habitat and excess algal blooms. These changes are consistent with the prior impairments identified in 2006 therefore, U.S. EPA considered the most current impairments as identified in Table 1 of the TMDL report as being addressed by these approved TMDLs.

Pollutant of Concern: Both Wisconsin's 2006 and 2008 303(d) list identify phosphorus and sediment as pollutants of concern. Sediment and phosphorus enter Mead Lake via the South Fork Eau Claire River. Phosphorus binds to sediment entering the lake from the river system then, once in the lake system, the phosphorus has the capacity to transfer to the lake bottom. A two-year study in 2002 and 2003 conducted by the U.S. Army Corps of Engineers (USACE) showed that total phosphorus concentrations in the South Fork Eau Claire River accounted for 54% of the total phosphorus load to Mead Lake. Laboratory derived internal phosphorus loading rates from sediments were very high under anoxic conditions and suggest that there is a potential for substantial phosphorus flux from bottom sediments in the lake. This study also showed that 83% of the phosphorus load to Mead Lake originated from direct drainage and tributaries. The Wisconsin Trophic State Index (TSI)[1] was estimated over the period of May through September of both years of the study. Mean summer TSI values were found to be greater than 60 for both years.

Sources of Pollutant Loads: There are no point sources in the Mead Lake watershed. Nonpoint sources have been identified as the primary source. Table 2 in the TMDL report identifies cropped farmland as the largest land use in the watershed. As previously mentioned, the USACE study showed that 83% of the phosphorus load to Mead Lake originates from direct drainage and tributaries. Since

[1] The concept of trophic status is based on the fact that changes in nutrient levels (measured by total phosphorus) causes changes in algal biomass (measured by chlorophyll *a*) which in turn causes changes in lake clarity (measured by Secchi disk transparency). A trophic state index (TSI) is a convenient way to quantify this relationship. The TSI is a continuum scale of 0 to 100, where TSI values range from low (<30), representing very clear, nutrient-poor lakes, to high (>50) for extremely productive, nutrient-rich lakes.

there are no point sources in the watershed, the phosphorus load to the lake has been determined to be from nonpoint sources.

Land Use, Population Characteristics, and other Relevant Information: The land that drains to Mead Lake encompasses 103 square miles and includes a mosaic of agricultural row crops, forest, grassland and wetland. Less than 5% of the watershed is urban or impervious land cover. Agriculture is the most prevalent land use in the northern portion of the watershed while forested land is most prevalent in the southern portion. Table 2 in the TMDL report provides a summary of land cover in the Mead Lake watershed. The State selected the Soil Water Assessment Tool (SWAT) to estimate phosphorus loadings from various agricultural scenarios. SWAT is a modeling mechanism specifically developed for agricultural lands. The model simulates both hydrology and water quality while predicting effects of various land management practices. The land use provided by the State in the TMDL report supports the State's selection of SWAT.

Priority Ranking: According to Wisconsin's 2006 303(d) list and the draft 2008 303(d) list, Mead Lake has a high priority ranking. A ranking of high indicates likely completion of a TMDL within a two-year time period.

U.S. finds that the Mead Lake TMDLs submitted by the State of Wisconsin adequately identify the water body, pollutants of concern, pollutant sources, priority ranking, and important assumptions made in developing the TMDLs.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the water body, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 CFR §130.7(c)(1)).
U.S. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Comments and Assessment:
Use Designation and Applicable Water Quality Standard: The goals of the Mead Lake TMDLs are to reduce phosphorus and sediment loading to the lake to address pH criteria exceedances, decrease algal blooms during the growing season, and address degraded habitat to a level sufficient to meet applicable water quality standards (WQS) and the lake's designated use. Wisconsin does not have numeric WQSs for phosphorus or sediment. Nor does the State has numeric WQS specific to algal blooms and degraded habitat. The State does have a numeric pH criteria. The first five sections of the TMDL report provide information linking the pollutants of concern and the impairments.

The designated use applicable to Mead Lake as set forth at Chapter NR 102.04(3) intro., and (b) of the Wisconsin Administrative Code (WAC) is warm water sport fish communities. To meet this designated use, Wisconsin Department of Natural Resources (WDNR) has identified the narrative standard set forth at Chapter NR 102.04(1) of the WAC as the applicable standard for sediment and phosphorus. The standard states in part, "Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state." WDNR considers sediment to be an objectionable deposit.

Phosphorus is bound to the sediment particles entering Mead Lake via the South Fork Eau Claire River. Once in the lake system, sediment has the capacity to transfer phosphorus to the lake bottom. The shallow depth of Mead Lake along with the phosphorus-laden sediments and excessive water column phosphorus levels cause the lake to experience excessive algal blooms during the growing season, i.e., May through September. Algal blooms in the lake are often accompanied by exceedances of the Wisconsin water quality criteria for pH. The elevated lake pH levels are due to removal of carbon dioxide from water during photosynthesis. The reduction in carbon dioxide levels during daylight causes an increase in pH. Reduction in sediment loadings will reduce phosphorus levels and the corresponding reduction in phosphorus levels will cause a reduction in maximum pH levels, all of which will restore the degraded habitat in Mead Lake.

The numeric WQS for pH is set forth in Chapter NR 102.04(4) intro, and (c) of WAC. In accordance with these WQS, the pH of Mead Lake shall be within the range of 6.0 to 9.0. WDNR has documented exceedances of this WQS. The State considers these exceedances due to algal productivity. The State has chosen to reduce the phosphorus loads to Mead Lake as the mechanism of reducing the frequency and extent of algal blooms which in return will reduce pH exceedances in the lake.

TMDL target: WDNR has established 93 ppb phosphorus as the numeric target for this TMDL. This target was based on the State's establishment of a baseline phosphorus load using data from the USACE two-year study previously discussed in this decision, estimated long term phosphorus loadings, and a stakeholder established reduction goal of 30% for the growing season. The 93 ppb phosphorus target represents an approximate 24% decrease in the mean growing season phosphorus load. The State used the BATHTUB model to demonstrate that a 30% reduction in external phosphorus loading from nonpoint sources during the growing season will achieve the 93 ppb numeric TMDL target. Refer to Appendices 1-3 to the TMDL report for more details on how the model was run and outputs from the model.

U.S. EPA finds that the State of Wisconsin adequately described the applicable WQS, including the designated use of the Mead Lake, and adequately demonstrated the appropriateness of the numeric TMDL target of 93 ppb phosphorus loading into Mead Lake.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a water body for the applicable pollutant. U.S. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 CFR §130.2(f)). The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model. The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. U.S. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account critical conditions for steam flow, loading, and water quality parameters as part of the analysis of loading capacity. (40 CFR §130.7(c)(1)). TMDLs should define applicable critical conditions and describe their approach to estimating both point and nonpoint source loadings under such critical conditions. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comments and Assessment:
As previously discussed in this decision document and as discussed on pages 1-8 of the TMDL report, the State has established that phosphorus and sediment entering Mead Lake are the primary causes of the degraded habitat, excess algal blooms, and pH criteria exceedances, all of which have been identified as impairments on Wisconsin's 303(d) list. The State has also demonstrated that phosphorus binds to sediment entering the lake system then is transferred to the lake bottom. A combination of the shallow lake depth, the phosphorus-laden sediment and water column phosphorus levels cause excessive algal blooms in the growing season. These algal blooms have been accompanied by exceedances of the State's pH WQS. The State has adequately presented its position that achieving the numeric TMDL target of 93 ppb phosphorus through a reduction in external sediment load to Mead Lake will reduce phosphorus levels in the lake[2] and these reductions in phosphorus levels will result in a decrease in algal blooms.[3] Reduction of algal blooms in the lake will decrease the pH exceedances

[2] Model simulations demonstrated the numeric TMDL target represents approximately a 24% decrease in the mean growing season phosphorus load. See Appendices 1-3 to the TMDL report and Water Quality Goals and Background sections of the TMDL report.
[3] Model simulations demonstrated a 29% reduction in the amount of time Mead Lake will experience nuisance summer algal bloom conditions. See Appendices 1-3 to the TMDL report and Water Quality Goals and Background sections of the TMDL report.

thereby improving the degraded habitat in Mead Lake. Considering the linkage provided by the State between the pollutants, impairments, applicable water quality standards and the numeric target for these TMDLs, U.S. EPA finds that the State of Wisconsin adequately identified phosphorus and sediment as pollutants needing loading capacities to address the impairments in Mead Lake.

The State established loading capacities for phosphorus and sediment using SWAT and BATHTUB. SWAT is a watershed model used to assess nonpoint source loadings from watersheds and subwatersheds. SWAT was specifically developed for agriculture areas. It simulates hydrology and related processes to predict the effect of land management practices on water, sediment, nutrient and pesticide export. Specifically for these TMDLs, SWAT was used to determine current loadings in the watershed through identification and quantification of current sources and to assess the effectiveness of reducing phosphorus and sediment loads to Mead Lake for three crop rotation scenarios. The SWAT model was calibrated to simulate runoff and sediment and phosphorus loadings in the watershed using land management information developed from the Clark County Land Conservation Department, a 2002 farm survey, a 1999 land use transect survey, and sediment loads and flows from 2002 and 2003.

BATHTUB is an USACE mass-balancing model which applies a simple approach to link nutrient loads and water quality parameters such as nitrate and phosphorus. BATHTUB applies steady-state water and nutrient balance calculations in a spatially segmented hydraulic network. Eutrophication related water quality conditions such as total phosphorus, chlorophyll-a, and transparency are predicted from the lake data. Specifically for these TMDLs, BATHTUB was used to predict a change in total phosphorus, chlorophyll, and Secchi transparency in Mead Lake under various phosphorus loading scenarios. The model was calibrated using data collected during the summer of 2002, and used to predict lake responses to measured phosphorus loadings and in-lake water quality for 2003. All the model runs were based on the growing season due to the relatively short hydraulic residence time of Mead Lake.

General agreement was demonstrated between measured and simulated responses for both models.[4]

The approved loading capacities are found in Table 1 of this decision document. Using the information from SWAT and BATHTUB the State determined that a 30% reduction in the external mean summer phosphorus load to Mead Lake from nonpoint sources during the growing season was needed to achieve the 93 ppb TMDL target for phosphorus. Additionally, the State determined that an approximate 24% decrease in the external mean growing season phosphorus load is also needed.

A baseline growing season phosphorus load and a baseline annual phosphorus load to Mead Lake were established. The State used data from the USACE 2002-2003 study and flow data from 1974 to 2005 from a nearby USGS gage to derive these baseline loads. The State established 5,500 pounds as the baseline phosphorus load during the growing season. The land management scenarios considered in SWAT resulted in likely phosphorus load reductions between 5% and 27%. The State applied a 26% reduction to the baseline for the growing season to establish a daily growing season loading capacity of **26.5** pounds per day (lb/day). The State's selection of a 26% reduction is reasonable because it falls

[4] See Appendices 1, 2, and 3 to the TMDL report for more details on the models, including calibrations.

within the likely reductions demonstrated by SWAT and it is slightly more conservative than the 24% decrease needed in the external mean growing season phosphorus load demonstrated through SWAT and BATHTUB.

The State established the annual baseline phosphorus load at 13,230 pounds. The State applied a 35% reduction to the annual phosphorus load to establish a daily overall loading capacity of **24** lb/day. The SWAT scenarios predict that many agricultural best management practices will achieve a higher percent reduction of phosphorus in the annual load as compared to the growing season load. Therefore, the State applied a higher reduction, i.e., 35% instead of 26%, to the annual phosphorus baseline.

Appendix 3 to the TMDL report provides the explanation of how the annual and growing season baseline sediment loads were established. As with phosphorus, SWAT was calibrated using the data available from the USACE 2002-2003 study. Long term simulations were then developed for 1999-2004. Table 1 and Figure 3 of Appendix 3 present the SWAT output resulting in annual and growing season baseline sediment loads of 1,180 tons and 333 tons, respectively. As previously discussed in this decision document, the State has demonstrated a linkage between phosphorus and sediment with regard to the impairments identified in Mead Lake, therefore, the State chose a 30% reduction[5] for sediment load annually and during the growing season.

U.S. EPA finds that the State of Wisconsin adequately established loading capacities for phosphorus and sediment to attain the TMDL target and in turn attain the applicable water quality standards for Mead Lake. U.S. EPA's approval applies to the loading capacities included in Table 1 of this decision document.

4. Wasteload Allocations (WLAs)

U.S. EPA regulations require that a TMDL include wasteload allocations, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 CFR §130.2(h), 40 CFR §130.2(i)). In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated wasteload allocation can be assigned to the group of dischargers.

Comments and Assessment:
There are no point sources in the Mead Lake watershed; therefore, a zero wasteload allocation is appropriate.

U.S. EPA finds that the State of Wisconsin satisfied all requirements for establishing a wasteload

[5] Thirty percent is the phosphorus load reduction needed from nonpoint sources during the growing season to attain the TMDL target of 93 ppb.

allocation for Mead Lake.

5. Load Allocations (LAs)

U.S. EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 CFR §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

Comments and Assessment:
The annual and growing season load allocations for phosphorus were established by subtracting a 5% margin of safety from the loading capacities, the difference being the load allocation. SWAT scenarios showed that an approximate 30% reduction in phosphorus loading from nonpoint sources would attain the TMDL numeric target. The growing season daily load allocation for phosphorus is 30% of the baseline phosphorus load. The annual daily load allocation is an approximate 38% reduction from the baseline annual phosphorus load. As discussed in the loading capacity section of this decision document, the State found through the SWAT scenarios that many agricultural best management practices will achieve a higher percent reduction of phosphorus in the annual load as compared to the growing season load; therefore, a higher percent reduction for the annual load allocation is reasonable. The load allocations approved by U.S. EPA can be found in Table 1 of this decision document.

The State did not provide specific nonpoint source category load allocations; rather the State established a gross load allocation applicable to all nonpoint sources in the watershed. U.S. EPA's implementing regulations found at 40 CFR 130.2(g) allow for gross load allocations.

Since the margin of safety for the sediment loading capacity is implicit there was no explicit margin of safety to subtract from the sediment loading capacities. The annual and growing season daily load allocations for sediment are the same as the loading capacities. This is reasonable since there are no point sources in the watershed.

U.S. EPA finds that the State of Wisconsin satisfied all requirements for establishing load allocations for Mead Lake.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 CFR §130.7(c)(1)). U.S. EPA's 1991 TMDL Guidance explains that the margin of safety may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the margin of safety.

If the margin of safety is implicit, the conservative assumptions in the analysis that account for the margin of safety must be described. If the margin of safety is explicit, the loading set aside for the margin of safety must be identified.

Comments and Assessment:
The State established an approximate 5% explicit margin of safety for the phosphorus loading capacities and also applied some conservative assumptions in its use of the models, which will minimize the uncertainty associated with the loading capacities and the relationship between the load allocations and the WQS. There is uncertainty associated with the annual phosphorus loads more so than the growing season loads because, in general, the State did not have actual data from the months February through April, therefore, scenarios simulated for those months did not have the benefit of field data for calibration. Lack of actual data increases the uncertainties associated with calibrating a model. This uncertainty is addressed by the higher percent reduction used to establish the annual loading capacities and by the explicit 5% margin of safety. Since phosphorus loading is dependant upon flow conditions, the State's use of estimated long-term flow data in addition to the USACE two-year study helps to minimize uncertainties associated with phosphorus loads due to flow. Since phosphorus loads are dependant upon flow conditions, consideration of more flow data over time helps to minimize uncertainty associated with achievable reductions presented by the models and used to demonstrate that the loading capacities will attain the WQS. Another conservative approach used in the modeling scenarios was that not all control programs and best management practices likely to be implemented in the basin were included. For example, implementation of best management practices pursuant to voluntary participation in Conservative Reserve Program (CRP) were not incorporated into the model scenarios however, participation in CRP is one of the options provided by the State in the reasonable assurance section of the TMDL report. It is likely that when implemented, best management practices pursuant to participation in CRP will result in load reductions not considered in the model scenarios. Therefore, not including all potential reduction scenarios presents a conservative approach to the modeling scenarios thus providing margin of safety.

The margin of safety for the sediment loads is implicit. In order to achieve the in-lake phosphorus goals, the State used SWAT to determine the mean sediment loads and these SWAT derived sediment loads were used to establish the sediment loading capacities. Since the State modeled the sediment loading capacities based on the amount of sediment reduction needed to achieve the necessary phosphorus goals, an implicit margin of safety exists.

U.S. EPA finds that the State of Wisconsin adequately included an explicit and an implicit margin of safety into the phosphorus and sediment TMDLs approved by this decision.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 CFR §130.7(c)(1)).

Comments and Assessment:
Phosphorus contributions during early spring, fall and winter contribute differently to the degraded habitat and algal blooms. Early spring has short residence times, cold temperatures, and high runoff flows that cause much of the phosphorus laden water to flush through the lake. Fall and winter runoff can contribute phosphorus laden sediments that can release phosphorus to the water column during summer anoxic conditions. Late spring and summer warm temperatures, increased residence times and anoxic conditions increases internal cycling of phosphorus that contributes to algal blooms. For these reasons daily and annual loads were established by WDNR on an annual and seasonal basis.[6] The State's use of annual and seasonal loads accounts for flow variations which will impact the phosphorus loading to the lake. Total phosphorus loading is dependent on flow conditions, therefore, the spectrum of flow conditions expected during a year were used in the modeling efforts used to establish the TMDLs. The State also considered estimated long term phosphorus loading by comparing flow data from a nearby United States Geological Survey (USGS) gage from 1974 to 2005 to the data available from the USACE two-year study on Mead Lake. Consideration of long term flow data allows for consideration of seasonal flow variations over time.

U.S. EPA finds that the State of Wisconsin adequately considered seasonal variation in the establishment of the daily, seasonal and annual loading capacities and allocations for Mead Lake.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a NPDES permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 CFR §122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the wasteload allocation is based on an assumption that nonpoint source load reductions will occur, U.S. EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for U.S. EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

U.S. EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, U.S. EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

[6] U.S. EPA's approval is for the annual and seasonal daily loads however, U.S. EPA recognizes that annual loads established in the TMDL report can help direct implementation efforts.

Comments and Assessment:
U.S. EPA finds that the Mead Lake TMDL submitted by the State of Wisconsin provides reasonable assurances that the load allocations will be implemented in a manner to achieve WQS. The State has identified various funding mechanisms that can support implementation of best management practices in the watershed. The State will include the TMDL report and implementation plan, upon its completion, as an amendment to the area wide water quality management plan so reduction efforts taking place pursuant to this plan can incorporate reductions established in the Mead Lake TMDLs.

Some of the potential funding sources to support implementation include the following.

- The WDNR and Clark County Land Conservation Department will implement agricultural and non-agricultural performance standards to address sediment and nutrient loadings in the Mead Lake watershed. Many landowners voluntarily implement best management practices and cost-sharing provides an incentive for landowners to implement these practices. If cost-sharing is offered at least 70%, landowners in violation of the performance standards are obligated to comply.
- The county can apply for Targeted Runoff Management (TRM) grants. These grants are a competitive financial award that supports small-scale and short-term projects completed locally to reduce runoff pollution. Agricultural projects are eligible for funding.
- Lake Protection grants are available to assist lake users, lake communities and local governments undertake projects that protect and restore lakes and their ecosystems. Projects eligible for these grants can include watershed management projects, lake restoration, and shoreline and wetland restoration.
- Conservation Reserve Program is a voluntary program available to agricultural producers to help them safeguard environmentally sensitive land. Producers enrolled in this program plant long-term, resource conserving covers to improve the quality of water, control soil erosion, and enhance habitats. In return for these actions funding is provided in the form of rental payments and cost share assistance.

9. Monitoring Plan to Track TMDL Effectiveness

U.S. EPA's 1991 document, Guidance for Water Quality-Based Decisions: The TMDL Process (U.S. EPA 440/4-91-001) recommends a monitoring plan to track the effectiveness of a TMDL.

Comments and Assessment: The TMDL report states that water quality monitoring will be conducted by WDNR on Mead Lake and in the watershed beginning five years after the initiation of the TMDL implementation plan. The TMDL report states that monitoring will replicate the 2002-2003 USACE study discussed earlier in this decision document. For two years, pollutant loads entering Mead Lake via South Fork Eau Claire River will be monitored, stream flow measurements will be taken continuously, and water chemistry data collected bi-weekly. Water quality in Mead Lake will be measured at three sites. Land use data will be updated. Updated land use data and monitoring data will be used to update the watershed SWAT loading model in order to evaluate attainment of the

TMDL goals and targets.

U.S. EPA finds the TMDL report submitted by the State adequately describes future monitoring efforts designed to track the effectiveness of the TMDL, although U.S. EPA is not approving any recommendations for monitoring contained in this TMDL report or any other aspect of Wisconsin's monitoring program through this decision.

10. Implementation

U.S. EPA policy[7] encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d) listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, U.S. EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. U.S. EPA is not required to and does not approve TMDL implementation plans.

Comments and Assessment:
U.S. EPA is taking no action on the implementation discussions within the TMDL Report but notes that the State appears to have good understanding of measures needed to achieve the allocations in these TMDLs. The State did not provide a formal implementation plan with the TMDL report. The State did recognize the need to develop an implementation plan upon approval of the TMDL and outlined necessary steps to move toward development of a plan.

11. Public Participation

U.S. EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 CFR §130.7(c)(1)(ii)). In guidance, U.S. EPA has explained that final TMDLs submitted to U.S. EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments.

Provision of inadequate public participation may be a basis for disapproving a TMDL. If U.S. EPA determines that a State/Tribe has not provided adequate public participation, U.S. EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by U.S. EPA.

Comment and Assessment:

[7] Perciasepe, B., U.S. EPA, Office of Water, *New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)*, August 8, 1997.

Mead Lake TMDL was developed with input from a local advisory group which was formed in September 2007. The advisory group consisted of WDNR staff, Clark County Land Conservation Department staff, town officials, farmers, lake district members and other private individuals. On May 15, 2008, a news release announcing the availability of the draft TMDL for review and comment was sent to local newspapers, television stations, radio stations and other interested parties. The news release, public notice announcement and draft TMDL were available on WDNR's website. The draft TMDL for Mead Lake was available for public review and comment from May 22 through June 30, 2008. Two public informational meetings were held on May 24, 2008 and June 14, 2008 to discuss the draft TMDL. Three comment letters supporting the TMDL were received by WDNR during the public review and comment period. These three comment letters did not raise any technical issues with the TMDL rather, they encouraged allocation of state and federal funds to implement the TMDL. Copies of the three comment letters were submitted to U.S. EPA with the TMDL report via the August 13, 2008 correspondence.

U.S. EPA finds that the State adequately provided the public the opportunity to participate in the development and review of these TMDLs.

12. Submittal Letter

A submittal letter should be included with the TMDL, and should specify whether the TMDL is being submitted for a technical review or final review and approval. Each final TMDL submitted to U.S. EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for U.S. EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and U.S. EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the water body, and the pollutant(s) of concern.

Comment and Assessment: WDNR's August 13, 2007 correspondence signed by Russ Rasmussen, Director, Bureau of Watershed Management, addressed to Kevin Pierard, Branch Chief, Watersheds & Wetlands Branch, U.S. EPA, Region 5, was received by U.S. EPA on August 19, 2008. The August 13 correspondence states that the final TMDL for Mead Lake and supporting documentation and information are submitted under Section 303(d) of the Clean Water Act for U.S. EPA final review and approval. On September 25, 2008, Nicole Richmond, TMDL Coordinator, Water Evaluation Section, WDNR submitted a revised final Mead Lake TMDL via electronic mail. The electronic mail message and attached revised TMDL report sent by Ms. Richmond was received by Julianne Socha, U.S. EPA, Watersheds & Wetlands Branch, on September 25, 2008. The revised TMDL report corrected some numeric errors contained in the original final TMDL report. Information contained in the August 13 and September 25 submittals provided the necessary information to complete U.S. EPA's review and approval of one TMDL for phosphorus and one TMDL for sediment for Mead Lake in Clark County, Wisconsin.