APPENDIX L. RESPONSE TO PRELIMINARY COMMENTS

This appendix provides a summary of the comments received during the July 11 through August 5, 2018 comment period. The actual comments are followed by a response and have been grouped by category. The commenter is identified in parentheses.

Lake Winnebago Comments: **Macrophyte Restoration, Zebra Mussels, Nitrogen, Models, Chlorophyll**

1) We appreciate the Wisconsin Department of Natural Resources' (WDNR's) attempt to find a more balanced approach to this TMDL by including reductions in Lake Winnebago internal loading prior to making allocations. One of the proposed approaches assumes macrophyte restoration to reduce wind-driven sediment suspension. We understand that future TMDL report revisions will include additional information on this concept. We suggest the TMDL report include a discussion of potential associated water quality trades available to point sources. Will stringent credit thresholds and trade ratios apply to in-lake macrophyte restoration practices? It would be helpful to the macrophyte restoration effort if the WDNR would detail a streamlined approach to water quality trading (WQT) in the TMDL Report because the current Wisconsin guidelines make WQT onerous in many cases. *(Strand Associates on behalf of the Cities of Fond du Lac and City of Oshkosh)*

   Response: Thank you for your comment regarding our efforts to include aquatic plant restoration activities into the TMDL. The draft TMDL report has included additional information on the proposed restoration of aquatic vegetation within the Winnebago Pool system including Lake Winnebago. However, DNR feels that including details regarding water quality trading within the TMDL report is not appropriate. Water quality trading shall be conducted consistent with the WI Statutes and WDNR Guidance. Please note, at this time, the Department of Natural Resources has approved nineteen water quality trades, has several additional draft trades pending, and continues to receive inquiries about water quality trading from interested point source dischargers. For additional information and/or specific questions regarding water quality trading should be directed to the WDNR regional or statewide water quality trading coordinators.

2) Page 1- Section 1.2 "Problem Statement"- 1st paragraph- Please address the role of zebra mussels in Lake Winnebago in terms of filtering lake water and removing green algae scum. *(Nahn & Associates)*

   Response: Zebra mussels have been observed in Lake Winnebago since 2009. The impact of zebra mussels on Lake Winnebago water quality is a complex topic that is currently being studied and is outside the scope of the introduction to the TMDL report. In general, zebra mussels have the potential to reduce algal biomass and increase water clarity by filter feeding algae and other solid particles out of the water column. Zebra mussels can alter the phosphorus cycle within a lake due to intake of suspended organic and particle-bound phosphorus and excretion of phosphorus to deeper water in forms that are more readily available for uptake by benthic organisms. Increased macrophyte growth can also occur with zebra mussel establishment. At shallow depths, greater water clarity encourages growth of macrophyte species that feed from the water column. In deeper waters, mussel feces provide phosphorus for macrophytes that feed from sediment in root zones. A negative effect may be that zebra mussels attach to macrophytes, thus impairing their growth potential. Changes in macrophyte diversity can also occur. Lake ecology can change with the introduction of the zebra mussels as well, as the removal of phytoplankton through filter feeding can change the lake to a plant-dominated habitat. The role of zebra mussels in Lake

Winnebago is partially documented in reports by Kessenich (2012)[1] and Higgins et al. (2011)[2]. Sample data suggest that chlorophyll-a levels in Lake Winnebago have decreased following invasion of zebra mussels, particularly during mid- to late-summer months (July and August). The decrease in chlorophyll is consistent with increased water clarity. Water column total phosphorus concentrations in Lake Winnebago have increased following zebra mussel invasion, though other factors could have contributed to a phosphorus increase.

3) Page 1- Section 1.2 "Problem Statement"- 3rd paragraph- Please address if cyanobacteria blooms are limited by phosphorus loading and not nitrogen. *(Nahn & Associates*)

Response: The limiting nutrient for cyanobacteria blooms in Lake Winnebago has not been thoroughly studied. In freshwater lakes, phosphorus is often the limiting nutrient for the growth of cyanobacteria, however, nitrogen and phosphorus co-limitation can develop in eutrophic systems (Paerl et al., 2011)[3].

In Lake Winnebago, phosphorus concentrations are low relative to nitrogen during the spring and early summer and primary production in the system is likely limited by phosphorus during these periods. As phosphorus increases relative to nitrogen later in the summer, co-limitation by both nitrogen and phosphorus may occur. Nitrogen limitation can favor certain species of cyanobacteria that fix their own nitrogen and therefore can use atmospheric nitrogen. However, the effect of nitrate concentrations on cyanobacteria densities in Lake Winnebago is unknown. Ultimately, phosphorus must be reduced in Lake Winnebago to mitigate the impacts of eutrophication (Schindler, 2012)[4]. Nitrogen reduction strategies may be considered as phosphorus concentrations decrease and additional research on cyanobacteria is completed.

4) Page 17- Section 2.4.2 "Lake Phosphorus Model" 2nd sentence- "As part of the USGS study, summer mean TP concentrations were modeled under a phosphorus loading scenario with tributary TP concentrations set to 20 µg/L and anthropogenic TP sources (point source and nearshore septic system discharges) set to zero." This modeling scenario assume that all TP point sources (including POTW and CAFO) are set to zero which cannot be achieved. In addition,

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[1] Kessenich, M. (2012). Macrophyte Communities of Lake Winnebago: Baseline Study of Species Composition with Abundances and Water Quality Conditions. Lawrence University Honors Projects.

[2] Higgins, S. N., Vander Zanden, M. J., Joppa, L. N., & Vadeboncoeur, Y. (2011). The effect of dreissenid invasions on chlorophyll and the chlorophyll: total phosphorus ratio in north-temperate lakes. Canadian Journal of Fisheries and Aquatic Sciences, 68(2), 319-329.

[3] Paerl, H. W., Hall, N. S., & Calandrino, E. S. (2011). Controlling harmful cyanobacterial blooms in a world experiencing anthropogenic and climatic-induced change. Science of the Total Environment, 409(10), 1739-1745.

[4] Schindler, D. W. (2012). The dilemma of controlling cultural eutrophication of lakes. Proc. R. Soc. B, rspb20121032.

assuming all tributary sources are set to 20 µg/L is unrealistic given the size and number of upstream tributary sources. *(Nahn & Associates)*

Response: Not all the phosphorus loading scenarios simulated with the lake models were designed to be future alternatives for implementation. The loading scenario mentioned in this comment (tributary TP concentrations set to 20 µg/L and anthropogenic TP sources set to zero) was designed to estimate what the Pool Lakes conditions would have been prior to anthropogenic loading to the lakes, in other words, reference conditions. It is important to understand what reference conditions are for any system. Reference conditions shown to be statistically higher than the current criteria can be used to support evaluation of a site-specific water quality criteria.

5) Page 18- Section 2.4.3 "Total Phosphorus-Chlorophyll Relationship" 5th paragraph 1st sentence "The constrained regression curves for Lake Winnebago indicate that the lake should meet its CHL target with water column TP concentrations of 47, 41, and 35 µg/L at the south, middle, and north stations, respectively." Please note two of the three concentrations exceed the 40 µg/L standard. (*Nahn & Associates*)

   Response: The estimates of historic TP concentrations in Lake Winnebago and estimates of TP concentrations corresponding to attainment of chlorophyll-a targets each have an inherent level of uncertainty. Section 2.4 of the TMDL report has been updated with confidence intervals for each estimate to quantify that uncertainty. Confidence intervals for the paleoecological study results show that historic Lake Winnebago TP concentrations may have been below 40 µg/L at both sampling points (confidence intervals are 32-50 µg/L for the north site and 37-59 µg/L for the south site). Confidence intervals for the TP-chlorophyll a analysis indicate that Lake Winnebago TP concentrations of 40 µg/L or less may be needed to attain the chlorophyll-a target at all three sampling sites (confidence intervals are 31-45 µg/L for the north site; 36-47 µg/L for the middle site; and 39-59 for the south site). In addition, lake modeling with loads set to pre-anthropogenic rates show that Lake Winnebago would have had an equilibrium concentration of 32 µg/L.

6) The paleoecological study results suggest that the total phosphorus (TP) concentration in Lake Winnebago was at or above the water quality criterion of 40 micrograms per liter (ug/L) prior to anthropogenic development in the area (1310 to 1725). Based on this data, we do not believe that the 40 ug/L criterion is appropriate or attainable, considering that this would require all phosphorus sources to be lower than the naturally occurring "background" sources from the 1300s. It would be impossible to completely reverse anthropogenic impacts, considering the extensive development and construction of dams that occurred since 1725.

   In Section 2.4.2 of the draft TMDL Report, it states that the lake phosphorus model was used with tributary concentrations set to 20 ug/L TP to simulate conditions prior to extensive anthropogenic development in the watershed. This was then used in the pool lake modeling to suggest that the historic Lake Winnebago TP concentration could have been below 40 ug/L. Please provide additional information to support the tributary TP concentrations used in this analysis. The diatom analysis indicates that the Lake Winnebago TP concentration was higher than the lake model predicted under these conditions, suggesting that the tributary concentrations were greater than

20 ug/L prior to extensive settlement, or that another parameter in the model needs to be adjusted to accurately predict Lake Winnebago TP concentrations.

Section 2.4.3 of the draft TMDL Report presents a regression analysis indicating water column TP concentrations of 35 to 47 ug/L should result in meeting the recreational use target of 20 ug/L chlorophyll (CHL) 70 percent of the summer days in Lake Winnebago. We have questions about the way the analysis was done and would appreciate additional explanation in the TMDL Report. However, our biggest question relates to the 20 ug/L CHL target. We understand this target is not codified and is based on surveys of user perceptions in Minnesota. Lake Winnebago is unique, and its users likely have different perceptions than a typical Minnesota lake user. The TP concentrations that were determined from this analysis coincide fairly closely with the pre-development sediment core results; does this mean the lake was at 20 ug/L CHL 70 percent of summer days back in 1310-1725? Again, we do not believe these historical TP concentrations are attainable considering anthropogenic development. *(Strand Associates on behalf of the Cities of Fond du Lac and City of Oshkosh)*

Response: Please see response to comments 4 and 5. The tributary concentration of 20 µg/L used in the pre-settlement lake modeling scenario is based on reference stream and river TP concentrations reported in Robertson et al. (2006). The lake modeling estimated a pre-settlement Lake Winnebago TP concentration of 32 µg/L. This result falls within the prediction interval for pre-settlement Lake Winnebago TP concentrations derived from diatom analysis (32 to 59 µg/L). Allocations to meet the 40 µg/L in Lake Winnebago do not require tributary phosphorus loads to be less than the natural background loads which, as mentioned above, is estimated at 20 µg/L total phosphorus.

The model does accurately predict TP concentrations for Lake Winnebago. The historic scenario simply involves replacing the incoming loads in the calibrated and validated existing conditions lake model with pre-settlement loading rates and allows the model to run until a new equilibrium is reached.

The 20 µg/L Chlorophyll a numeric target is contained in the Wisconsin Consolidated Assessment and Listing Methodology (WisCALM, Section 4.5, http://dnr.wi.gov/water/wsSWIMSDocument.ashx?documentSeqNo=144407523).

The chlorophyll-a target of 20 µg/L was originally obtained from Minnesota studies; however, subsequent analysis using Wisconsin lake user perception data also support the use of a 20 µg/L for Wisconsin lakes. In particular, users of shallow drainage lakes in Wisconsin such as Lake Winnebago perceive recreational use impairments at similar chlorophyll-a levels as users of other lake types in other regions of Wisconsin, including the northern forested region. In addition, Lake Winnebago is a drinking water source and the chlorophyll-a numeric target of 20 µg/L significantly reduces the probability of harmful algal blooms and thus supports the public health and welfare designated use of this lake in addition to the recreational use.

Anthropogenic development is not a factor in the development of water quality criteria and standards.

Using the current total phosphorus and chlorophyll relationship for Lake Winnebago, a historic total phosphorus concentration of 30 to 40 µg/L would have resulted in a chlorophyll-a concentration at or below 20 µg/L greater than 70% of the time. Meeting the allocations in the TMDL will allow attainment of the water quality criteria of 40 µg/L TP.

7) The paleoecological study results suggest that the TP concentration in Lake Winnebago was at or above the water quality criterion of 40 ug/L prior to development in the area (1310 to 1725). Based on this data, we do not believe that the 40 ug/L criterion is appropriate or attainable, considering that this would require all phosphorus sources to be lower than the naturally occurring "background" sources from the 1300s. The Lower Fox River TMDL report noted that 40 ug/L is not likely attainable in Lake Winnebago. The agencies should use an attainable target for the phosphorus TMDL. *(Strand Associates on behalf of Green Lake)*

Response: Please also see responses to comments 4, 5, and 6. The TMDL for Lake Winnebago is set to meet the water quality criteria of 40 µg/L for total phosphorus. The modeling conducted in support of the TMDL development process does not support your belief that allocations require phosphorus sources to be lower than naturally occurring sources from the 1300s.

The development and modeling process for the Lower Fox TMDL pre-dated the adoption of phosphorus criteria for Lake Winnebago and as such required the establishment of a boundary condition for the Lower Fox TMDL to account for loads from Lake Winnebago entering the Lower Fox River. This is addressed on page 37 and page 126 of the Lower Fox TMDL report and is restated in comment 14 in Appendix H of the Lower Fox TMDL report and likely encompasses the reference to "the note" in the comment. Text from page 37:

> "As previously discussed, phosphorus loads from Lake Winnebago (and the Upper Fox and Wolf Basins) must also be reduced if the goals established by this TMDL are to be met. As discussed in Appendix C, a 40% reduction goal (286,782 lbs./yr.) has been established for phosphorus loads entering the basin at the outlet of Lake Winnebago. This reduction goal for loads entering the LFR Basin from the outlet of Lake Winnebago represents reasonable expectations for load reductions that may be achievable in the Upper Fox and Wolf Basins given that Lake Winnebago is a eutrophic/hypereutrophic lake. Reducing the amount of phosphorus released from the lake by greater than 40% may not be feasible given that part of the phosphorus input to Lake Winnebago may come from internal sources (D. Robertson, personal communication, June 2010). Further studies by USGS and WDNR are being conducted to determine what measures would be needed to reduce phosphorus loading from Lake Winnebago by 40%. The reduction goal for Lake Winnebago may need to be adjusted following the TMDL analysis for the Upper Fox and Wolf Basins."

And page 126:

> "A 40% reduction goal has been established for phosphorus loads originating from Lake Winnebago. This reduction goal for loads entering the LFR Basin from the outlet of Lake Winnebago represents reasonable expectations for load reductions that may be achievable in the Upper Fox

and Wolf Basins. This reduction goal may need to be adjusted if the TMDL analysis for the Upper Fox and Wolf Basins reveals that it is not feasible."

The Lower Fox TMDL assumed a conservative boundary condition of a 40% reduction in total phosphorus to satisfy the U.S. EPA reasonable assurance requirements of the Lower Fox TMDL. In this case, conservative means a lower percent reduction to ensure that water quality criteria are attained in the Lower Fox River. As noted on both pages 37 and 126, the reduction goal may need to be adjusted following TMDL analysis for the Upper Fox Wolf Basins. Preliminary analysis provided by Dale Robertson of the USGS was utilized to establish the boundary condition for the Lower Fox TMDL; Dale Robertson also conducted the lake modeling for the Upper Fox Wolf Basin. Without having conducted detailed modeling yet, Dale Robertson assumed that greater than a 40% reduction in the total phosphorus concentration of Lake Winnebago may not be feasible due to phosphorus loads from internal loading. Internal loading involves the recycling of previously deposited phosphorus through various processes making it available for algal growth. Subsequent detailed lake modeling of Lake Winnebago, performed as part of the Upper Fox-Wolf TMDL, confirmed that internal loading does play a significant role with 56% of the total phosphorus load during the growing season coming from internal loading. However, this detailed modeling also showed that internal loading will decrease in proportion to external loading, and additional internal load reductions could be achieved through the re-establishment of rooted aquatic plants. Therefore, contrary to the assumption made in the Lower Fox TMDL, this analysis shows that the water quality criterion of 40 µg/L total phosphorus is attainable and requires a 67% reduction in external loads.

8) The paleoecological study results suggest that the TP concentration in Lake Winnebago was at or above the water quality criterion of 40 ug/L prior to anthropogenic development in the area (1310-1725). The dams at the outlet to Lake Winnebago were constructed after that time, resulting in a raising of the water level. This caused increased shoreline erosion and lake area and likely reductions in groundwater inputs to the lake. Further, additional agricultural, urban, and other development occurred after that time and prior to the enactment of the Clean Water Act. There is significant in-lake recycling and internal loading of TP occurring now, and modeling indicates it will take the better part of a century to reduce the internal loading to an acceptable level after external loadings are reduced. All of these factors suggest that the 40 uglL criterion is not attainable. It is unacceptable to require point sources to comply with the proposed stringent TP wasteload allocations now or in the future when the criterion is unattainable. *(Stafford Rosenbaum on behalf of Municipal Environmental Group – Wastewater Division (MEG))*

Response: The allocations in the TMDL are set to meet 40 µg/L total phosphorus. The allocations account for in-lake recycling and internal loading. In addition, allocations have been adjusted to account for re-establishment of macrophytes such that point sources and nonpoint sources are not saddled with additional reductions to account for the in-lake recycling and internal loading. The Jensen model indicates that Lake Winnebago will take about 75 years to reach 40 µg/L of total phosphorus and that the Upper Pool Lakes will take about 40 years. Higher percent reductions (lower allocations) would accelerate the response time. The presence of anthropogenic factors indicate that attaining the criteria will take time and effort, not that it is unattainable.

9) Page 17- Section 2.4.1 “Paleoecological Study” - - a. 1st paragraph, 2nd sentence – The results are based on two sediment cores for the entire Lake Winnebago lake bottom? What about other lake bottoms and additional cores to base the assumption on?? b. 2nd paragraph 3rd sentence- “In the bottom core layers, the diatom community corresponded to estimated summer TP concentrations of 40 µg/L in north basin and 47 µg/L in the south basin.” Please note the summer TP concentrations in the south basin exceed the 40 µg/L standard. Pre-settlement, pre-dam construction TP levels exceed the TP Lake column level for this TMDL. (see Comment #3) c. 2nd paragraph, 4th sentence- “Dating procedures showed that bottom layer sediment was deposited at least 150 years ago and possibly as early as the 1300’s.” A dam was installed in 1850 and 1930 which significantly increased the trapped sediment in the Lake. If sediment dates back to the 1300’s, this sediment is not indicative of the present dam-trapped sediment. *(Nahn & Associates)*

   Response. The purpose of analyzing sediment from the bottom of the core was not to evaluate present-day sediment but rather to analyze sediment deposited during a pre-settlement era. The dating analysis verified that the bottom section of the sediment core was representative of pre-settlement conditions. The use of two cores for the analysis is consistent with other paleoecological lake studies in Wisconsin and the observed similarity between the two cores indicates that conditions were relatively uniform across the Lake Winnebago bottom when the sediment was deposited.

Site Specific Criteria

10) MEG recommends that the DNR reconsider appropriate and attainable site-specific criteria (SSC) for the pool lakes, including Lake Winnebago. The sediment core results, TP criteria from Minnesota (on which the Wisconsin lake and reservoir criteria were based), and this TMDL effort all suggest that a higher TP criterion could be justified. In addition, MEG questions the validity of applying a chlorophyll-a threshold from Minnesota, which was developed based on public perception of water quality in lakes, to water quality in Lake Winnebago. A phased TMDL as discussed above could be implemented initially to allow time for SSC development that would implement more appropriate phosphorus criteria. *(Stafford Rosenbaum on behalf of MEG)*

    Response: The lake modeling conducted as part of the TMDL development process indicates that 40 µg/L is the proper total phosphorus concentration associated with addressing nuisance algae blooms and meeting water quality standards and designated uses, specifically the recreational and public health designated uses. Site-specific criteria are appropriate when analysis indicates that an alternative total phosphorus concentration is adequately protective of water quality standards and designated uses. The driver for developing site-specific criteria is not whether the statewide criterion can be met but rather if an alternative criterion is equally protective. A variance is utilized if criterion cannot me met.

    Please see the response to comment 6 which addresses chlorophyll-a relationship. See the response to comment 20 which addresses phased TMDLs.

11) Page 16- Table 3- “Wisconsin Numeric Total Phosphorus Criteria” - Lake Winnebago and Lake Butte des Morts have a Numeric Total Phosphorus Criteria of 40 µg/L for Non-Stratified Lakes. These lakes are extremely shallow impoundments similar to enlarged rivers and should have a TP criterion of 75 µg/L for “Other Rivers and Streams” or a separate criterion for the unique Winnebago Pool of Lakes (Poygan, Winneconne, Butte des Morts and Winnebago). Please note that Lake Winnebago has always been a fertile, green shallow lake subject to fish kills even before urbanization. (“In 1634, the French discovered the Winnebago tribe on the shores of Green Bay, inhabiting the area stretching to Lake Winnebago. Although "Ho-Chunk" is the people's own name for themselves, their Algonquian neighbors called them "Winnebago", which means "people of the filthy water". This term was used by the Algonquians because Lake Winnebago had a strong fish odor in the summer.5 “according to Wikipedia). To use a state-wide standard including many other deeper, pristine, more traditional lakes is misleading. *(Nahn & Associates)*

Response: The WDNR feels that the 40 µg/p criteria for lake Winnebago is appropriate for several reasons, including the collection and analysis of sediment cores from lake Winnebago which indicate that the lake did historically meet the 40 µg/L criteria.

Regarding your reference to Winnebago meaning “people of the filthy water” please note that creditable sources also referenced the term Winnebago to mean a derogatory term for other tribes; people of the salt water; or that the water smelled of salt as a way of locating alternative route to far east. In addition, please note that Wikipedia is a web-based resource in which requirements to post information to the page may be more consensus than factual.

Some popular histories of Northeast Wisconsin assume that southern Green Bay has always been notorious for its summer green algae bloom and bad smell and conclude that these conditions must have been the inspiration for its name, but such interpretations are not supported by historical accounts, many of which referred to the bay as a clear and fresh body of water.
3. P.V. Lawson, "The Winnebago Tribe," Wisconsin Archeologist (July 1907), p. 85.

12) Page 17- “Evaluation of Potential Site-Specific Criteria” section, 1st paragraph, 2nd sentence- “In the process of developing this TMDL, three sources were consulted to determine whether a site-specific TP criterion was appropriate for Lake Winnebago”. These three sources attempt to reduce TP levels to pre-settlement, pre-dam construction conditions on Lake Winnebago when the entire upstream watershed was either forested or prairie with no human disruption. This reduction exceeds the maximum extent practicable (MEP) given the dramatic changes in the land use that have occurred since that time and results in unachievable allocation loads. A more realistic level would be to use the 75 µg/L criteria. *(Nahn & Associates)*

Response: A criteria of 75 µg/L would not support the recreational designated use. MEP is not a term or expression allowed in TMDLs as TMDLs are required to meet water quality criteria. Modeling of historic conditions as well as results from the paleoecological study support that Lake Winnebago historically met the current water quality criteria. Modeling of relationships between phosphorus and algae in Lake Winnebago supports that current criteria is needed to meet the recreational designated use. Also, please see response to comment 9 and 10.

Land Use

13) Page 23- Figure 4 "Summary of Land Use" – Please note that the Urban MS4 regulated area is very small (1%) compared to the total land use. In addition, the majority of the Urban MS4 regulated area is concentrated in the two large cities (Fond-du-Lac and Oshkosh) within the Winnebago watershed. *(Nahn & Associates)*

Response: The TMDL report already notes that the urban MS4 regulated area is 1% of total basin area in Table 4 and Figure 4. Regulated MS4 areas for individual municipalities are presented in Table 10.

14) Why was the 2006 NLCD used over the 2011 NLCD that is available? The urban land use is likely being underestimated in some areas by using the 2006 NLCD. Was there additional editing done to update the 2006 NLCD? *(Outagamie County Land Conservation Department)*

Response: The 2006 NLCD was the most current version of the NLCD land cover dataset available when SWAT watershed modeling was initiated. The 2011 NLCD was evaluated following its release and was found to show a minimal increase in developed land cover (approximately 6-7 square miles or 0.1% of the total basin area). Because of the small difference, the 2006 NLCD was retained for watershed modeling.

Development of Allocations

15) MEG requests that DNR consider alternative allocation scenarios. For example, DNR should run scenarios to determine whether different allocation methods could be more cost-effective than the proportional approach used in other Wisconsin TMDLs. For this TMDL, where only a small percentage of loadings are from WWTPs and MS4s, DNR should run a scenario where all WWTPs are set at a less restrictive TP limit, such as 0.5 mg/l, at design average flow and all MS4s to the TP-equivalent of a 40 % TSS reduction to determine whether this methodology would change the required nonpoint source load allocations significantly. *(Stafford Rosenbaum on behalf of MEG)*

Response: The allocation scenario must meet water quality standards. The premise of this comment places phosphorus sources into categories comparing the aggregate load allocation (LA) to individual waste load allocations (WLA) allocations. However, the reality is that each discharger, whether it be an agricultural producer or point source, has distinct reductions under this TMDL. Unlike typical TMDLs in which only point sources have specific allocations identified, this TMDL provides the equivalent of individual load allocations for agricultural producers through the edge of field targets contained in Appendix J. From an economic standpoint, when the aggregate allocations are broken down to their disparate sources, an increase in the allocation and any associated cost savings for one source (Source A) results in a lower allocation and increased costs for another source (Source B). Under this scenario, Source A may argue that this is the most cost-effective approach, but Source B will likely not concur with such an assessment. The

proportional allocation method provides equal treatment for sources with alternative compliance options providing cost-effective options.

In addition, the assigning of higher point source allocations and thus shifting more reductions to nonpoint sources is contrary to comment 25 which implies that nonpoint source reductions have been ineffective to date and are unlikely to be achieved. Shifting additional reductions to nonpoint sources weakens the reasonable assurance section of the TMDL. Without the reasonable assurance section, required reductions move back to the more stringent s. NR 217.13 limits for most facilities.

16) In the report it states that the model was run on 281 subwatersheds that were then aggregated to 89 subbasins which the baseline loadings and allocations seemed to be based on. Some of these are rather large subbasins, is it reasonable to assume average even distribution of TP/TSS loading /acre for each land use for every subwatershed that makes up a "subbasin"? And same percent reduction required for all subwatersheds aggregated to a "subbasin"? *(Outagamie County Land Conservation Department)*

Response: The TMDL study uses 89 subbasins to develop allocations to allow greater flexibility for point source implementation strategies; however, more detailed information on smaller watershed units can be incorporated into implementation plans to help target nonpoint reductions. In recognition of the need for more detailed nonpoint targeting, Appendix J was developed and presents baseline and target pollutant yields for TSS and total phosphorus, expressed in edge of field targets consistent with SnapPlus, for model subwatersheds and HUC12 subwatersheds in addition to the TMDL subbasins. Such information is provided to guide implementation planning efforts in smaller-scale watersheds.

Uncontrollable Sources of Phosphorus

17) We have previously submitted comments stating that we believe TP loadings from forest and wetland (defined as "uncontrollable" sources in the TMDL Report) can be reduced through implementation of best management practices (BMPs). Regardless of what Dane County is doing in streams, sediments can be dredged from wetlands, wetland plants can be harvested, gully erosion in forested areas can be corrected, and so on. Background load reductions are inherent in the TMDL's suggestion that Lake Winnebago TP concentration can be reduced to a value lower than the pre-anthropogenic development concentration identified in the paleoecological study. We request that the agencies add language to the TMDL Report stating that background sources were considered uncontrollable for purposes of setting load and wasteload allocations, but that this definition is not intended to prohibit trading with these sources. *(Strand Associates on behalf of the Cities of Fond du Lac and City of Oshkosh)*

Response: The water quality trading guidance dated August 2013 (https://dnr.wi.gov/topic/surfacewater/documents/WQT_guidance_Aug_21_2013signed.pdf) outlines options for wetland restoration and stabilization of gullies. Methods exist for the calculation of credits from such practices. Dredging of wetlands and harvesting of wetland

vegetations is more complicated from both a credit calculation perspective and an implementation perspective. Methods to calculate credits have not been formalized and implementation can be limited once issues pertaining to waterfowl migration and breeding, fish spawning, and other wildlife and habitat issues are considered. In addition, the research has been inconsistent on the benefits of such dredging given the costs associated, dredging back to parent material, and re-establishment of native plant species. The statement "Background load reductions are inherent in the TMDL's suggestion that Lake Winnebago TP concentration can be reduced to a value lower than the pre-anthropogenic development concentration identified in the paleoecological study" is inaccurate and not supported by the TMDL modeling and analysis; allocations and the criteria for Lake Winnebago are not set such that they are lower than pre-anthropogenic levels.

The TMDL did not apply reductions to background sources; however, water quality trading can occur with these sources. Existing practices in the water quality trading guidance that could be applied to background sources include streambank stabilization and gully stabilization.

18) Nonpoint sources will not be required to reduce TP loadings as a result of this TMDL. Nonpoint sources will, however, need to reduce loadings significantly for the TP criterion in Lake Winnebago to be met. We believe it is unlikely that nonpoint sources will make meaningful reductions that will lead to improvements in water quality, especially near term, and especially without a significant increase in cost-sharing funding. Wisconsin Admin Code § NR 217.16 allows TMDL-based limits to be used in Wisconsin Pollutant Discharge Elimination System (WPDES) permits for two or possibly three permit terms if nonpoint source loads have been substantially reduced. NR 212.76, on the other hand, simply says TMDL-based water quality based effluent limits (WQBELs) can be included in permits in lieu of or in addition to other WQBELs. The WDNR should provide assurances that further reduction will not be demanded of point sources if the nonpoint source reductions are not met within the next 20 years.

    NR 217 indicates that TMDL-based limits can be used in WPDES permits for two or three permit terms if nonpoint source loads have been substantially reduced. How does the Wisconsin Department of Natural Resources (WDNR) anticipate that the high nonpoint source reductions identified are realized? Can the WDNR provide assurances to point sources that further reduction will not be demanded of point sources if the nonpoint source reduction is not met in the 20-year planning period used by most publicly owned treatment works (POTWs)? Please provide language in the TMDL or in a revision to NR 217, and in subsequent WPDES permits, clarifying that the TMDL-based limits will not decrease in the future, for at least 20 years. *(Strand Associates on behalf of Green Lake)*

    Response: DNR agrees that nonpoint reductions will be necessary to meet water quality goals. Nonpoint source programs, requirements, and activities including past Wisconsin priority watersheds and current farmer led-groups have been shown to reduce nonpoint loads. Please refer to the implementation section the of draft TMDL report

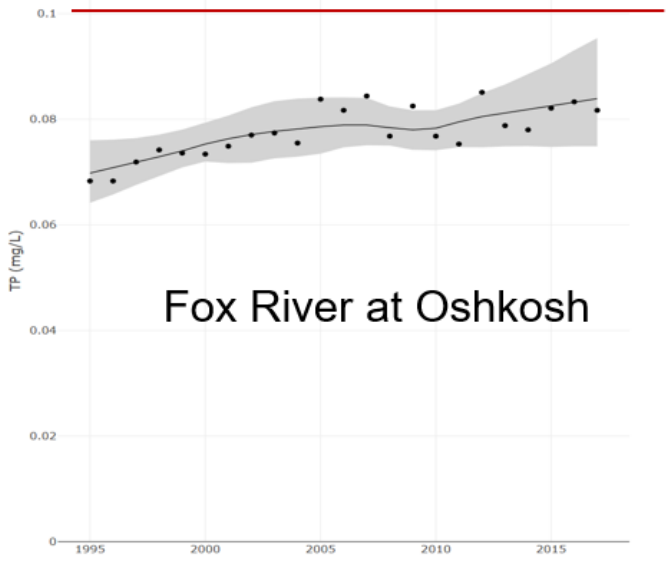
    The TMDL cannot supersede administrative code, in this case s. NR 217, Wis. Admin. Code, either through mandating new requirements or eliminating existing code requirements. The language in NR 217.16 was required by US EPA and reflects their interpretation of a "phased TMDL". NR

217.16(2) does offer the DNR some flexibility; DNR must first make a determination and then the DNR "may impose" (instead of explicit language requiring) the imposition of more stringent effluent limits.

19) The United States Geological Survey (USGS) pool lake modeling included several scenarios that are not mentioned in the TMDL report. We recall from the October 2016 meeting with United States Environmental Protection Agency (USEPA), WDNR, and USGS that the pool lake modeling showed if the Oshkosh and Fond du Lac treatment plant loads were set to zero, it would only reduce the Lake Winnebago TP concentration by 2 ug/L, from 90 ug/L to 88 ug/L. This change is so small that it is not reliably measurable. The TMDL report indicates that the municipal separate storm sewer systems (MS4s) have an even smaller impact. With this in mind, it is unreasonable to expect point sources to expend millions of dollars to make further load reductions until significant strides are made with nonpoint load reductions. *(Strand Associates on behalf of the Cities of Fond du Lac and City of Oshkosh)*

Response: Not all the phosphorus loading scenarios simulated with the lake models were designed to be future alternatives for implementation or to identify allocations to meet water quality standards. Any individual phosphorus source, whether it be a point source or an agricultural operation, can claim to only be a small part of the overall phosphorus load and thus individually play an insignificant role; however, it is the cumulative effect of each source that negatively impacts water quality necessitating reductions from all sources. Please see response to comment 15 regarding the contribution percentage of different sources and associated costs.

The monitoring station (Station 713056) on the Upper Fox River at Oshkosh, located downstream of the Oshkosh WWTF, has shown increasing phosphorus concentrations since monitoring was initiated in 1995. A summary plot for the station is shown below:



Contrary to the modeling referenced in the comment, these increasing concentrations reflect broadly the impact of upstream sources and locally the impact of the MS4 and WWTF. By

contrast, since 2005 the monitoring site for the Upper Fox River at Berlin has shown downward trends in phosphorus concentration as has the monitoring site for the Wolf River at New London.

Please also see comment 20 regarding phasing of TMDLs and TMDL waste load allocations.

Phased TMDL Comments

20) Finally, we would like to clarify one of our previous comments and apologize for the confusion. In the WDNR's May 15, 2018 response to the City's November 17, 2017 comments, the WDNR responded to our suggestion for a phased or staged TMDL by noting that the DuPage River and Salt Creek TMDLs were for chlorides and total dissolved solids (TDS). However, we were referring to the 2004 Salt Creek and East Branch DuPage River TMDLs for dissolved oxygen. Illinois does have numeric water quality standards for dissolved oxygen. For these TMDLs, USEPA approved a phased, holistic approach with adaptive implementation, in lieu of placing more stringent ammonia and biochemical oxygen demand effluent limits in wastewater treatment facility permits. Additional information is available at the DuPage River Salt Creek Workgroup Web site (http://drscw.org/wp/) and on the Illinois Environmental Protection Agency (IEPA) TMDL report status page. Note that USEPA staff also stated in the October 2016 meeting that a phased or staged approach would be approvable for the Upper Fox Wolf TMDL as long as the TMDL included a roadmap for eventually meeting water quality criteria. We suggest that it would be possible to include both interim and final wasteload allocations in the TMDL report, along with the schedule and conditions under which the final wasteload allocations would go into effect, so that NR 217.13 limits do not go into effect in the meantime. We believe this would be an appropriate approach for many reasons, including the following: significant phosphorus load reductions have already been made by point source dischargers and making additional load reductions will come at a premium cost; point sources represent a small percentage of the total loading; there are many uncertainties related to the pool lake phosphorus criterion value and attainability; there is little assurance that nonpoint sources will reduce their loadings in a timely manner; and the internal lake TP loading is very high and will take decades to reduce. *(Strand Associates on behalf of the Cities of Fond du Lac and City of Oshkosh)*

Response: Phased or staged TMDL wasteload allocations (WLAs), as described in the comment, are not supported by the memo referenced (Memorandum: Clarification Regarding "Phased" Total Maximum Daily Loads, U.S. EPA 2006) in that WLAs are unable to be phased in the way envisioned in the comment as outlined below. However, implementation of wasteload load allocations and other water quality based effluent limits can be "phased" through use of adaptive management or the multi-discharge variance (MDV).

U.S. EPA's memo also clearly states that all TMDL WLAs must be set to meet water quality standards:

"Under the phased approach the TMDL has LAs (load allocations) and WLAs (wasteload allocations) calculated with margins of safety ***to meet water quality standards****" (emphasis added by U.S. EPA*).

TMDLs do not create new regulatory requirements but rather are implemented through existing regulations. For Wisconsin, ch. NR 217, Wis. Adm. Code sets out the requirements for implementation of the wasteload allocation from a TMDL. Specifically, s. NR 217.16(2):

> *If the phosphorus limitation based on an approved TMDL is less stringent than the water quality based effluent limitation calculated in s. NR 217.13, the department may include the TMDL based limit in lieu of the limit calculated in s. NR 217.13 if the limit calculated under s. NR 217.13 has not yet taken effect. If the department includes the TMDL based limitation for phosphorus in the WPDES permit in lieu of the limit calculated in s. NR 217.13, the TMDL based limit may remain in the permit for up to two permit terms to allow time for implementation of the TMDL, or the implementation period specified in the TMDL, whichever is less. The department may include a schedule of compliance to achieve a TMDL based limit if the department determines a schedule of compliance is necessary.*

Please note that NR 217.16(2) is consistent with a phased TMDL approach as laid out in U.S. EPA's memo from 2006:

> *In such cases, the Guidance recommends that some additional provision in the TMDL, such as a schedule and description of the implementation mechanisms for nonpoint source control measures, be included to provide reasonable assurance that the nonpoint source measures will achieve the expected load reductions. Such additional provisions also assure compliance with federal regulations 40 CFR 130.2(i), which provide that in order for the wasteload allocations to be made less stringent, more stringent load allocations must be "practicable".*

To bolster the reasonable assurance section of the TMDL, the department is utilizing new modeling capabilities to express the load allocation as an edge of field yield consistent with output from SnapPlus and has conducted analysis to show that the load allocations in the TMDL, which give point sources relief from NR 217.13 limits, are achievable with reasonable implementation of agricultural management practices.

The East Branch and Salt Creek TMDLs are being taken out of context in their relevance to the Upper Fox and Wolf Basin TMDL. The TMDLs for the DuPage River and Salt Creek in Illinois were for chlorides and total dissolved solids (TDS), and the "phased implementation" was related to NPDES permit requirements to reduce phosphorus, for which Illinois has not adopted numeric criteria. However, it can be used as a hypothetical for comparison. If a state does not have numeric promulgated water quality standards for the pollutants in question, then water quality targets can be used in setting allocations. The lack of numeric water quality standards allows more flexibility for so called phased or adaptive approaches such that targets are set in the TMDL and once reached compared to water quality monitoring and then targets can be adjusted as needed. Wisconsin has promulgated numeric phosphorus criteria which prevents this approach for phosphorus TMDLs in Wisconsin; however, through negotiations with U.S. EPA the department was successful in gaining elements of a phased or adaptive approach for point sources through NR 217.18, the watershed adaptive management option.

When questioned about the TMDLs, U.S. EPA noted that while the East Branch and Salt Creek TMDLs contain phased implementation for BOD and dissolved oxygen, this was due to a unique circumstance involving the removal of a dam. Subsequent TMDL approvals (for example, the Ottawa River, Ohio, TMDL Decision Document) explicitly state that timelines and milestones included in the TMDL regarding the implementation of WLAs permits are not part of the EPA decision document. EPA approval is for the allocations; permit conditions and compliance schedules are laid out in administrative code and set during the permitting process.

21) MEG requests that DNR strongly consider and provide additional information on a phased TMDL implementation. This is particularly necessary for this TMDL area, where there is such significant uncertainty that the water quality criterion is appropriate and attainable. A phased TMDL would provide additional time to study and revise the criteria if appropriate, without locking permittees into stringent wasteload allocations that could be subject to antibacksliding restrictions.

    A phased TMDL would also allow for achievement of interim milestones and waste load allocations while allowing time for achieving important nonpoint source reductions. A phased implementation process could include initial load reductions followed by monitoring and modeling and resulting modifications to the TMDL allocations. Without a phased approach, point sources will be forced to meet final allocations over a short timeframe as compared to nonpoint sources. And, as discussed above, reductions from such allocations will not result meaningful water quality improvements.

    The authority to implement a phased TMDL approach exists under the Clean Water Act. The U.S. EPA has issued several guidance documents that discuss the permissible use of phased or staged TMDLs. See Guidance for Water Quality-Based Decisions: The TMDL Process, Environmental Protection Agency (1994); Memorandum: Clarification Regarding "Phased" Total Maximum Daily Loads, Environmental Protection Agency (2006). MEG requests that DNR provide further evaluation of a phased approach to the Upper Fox and Wolf River TMDL. *(Stafford Rosenbaum on behalf of MEG)*

    Response: See response to comment 20.

NPS Implementation and PS Implementation: - Alternative Compliance Options

22) Using adaptive management as a compliance alternative requires the receiving stream to be above its water quality criterion. This will not be the case for the Puchyan River. The TMDL results in stringent phosphorus limits for the Green Lake WWTF, and adaptive management may provide cost relief and environmental benefit. We request that adaptive management is made available as a compliance option for all WWTF dischargers that are requiring reductions based on downstream water quality. Please add appropriate language to the TMDL Report and subsequent Wisconsin Pollutant Discharge Elimination System (WPDES) permits to allow this. *(Strand Associates on behalf of Green Lake)*

Response: Adaptive management was envisioned to occur with facilities needing to make reductions to meet water quality criteria and not necessarily meet downstream waterbodies. See Appendix K of the TMDL report which provides adaptive management targets for local subbasins based on a facilities requirement to meet downstream requirements, in most cases Lake Winnebago. More details can be found in Appendix K. Lake Winnebago meets adaptive management requirements and is listed on the impaired waters list for phosphorus. The adaptive management targets listed in Appendix K are all lower than the local stream criteria of 75 µg/L.

23) Water quality trading with nonpoint sources as a long-term compliance option is onerous under current rules and guidelines, requiring credit thresholds, trade ratios, nutrient management plans for all land owned by the farmer regardless of location, and more, to provide multiple safety factors. This draft TMDL Report already incorporates implicit margins of safety. Therefore, could the agencies consider language in the TMDL Report that will provide some streamlining and relief from current Wisconsin water quality trading guidance? One example could be to not require a credit threshold for the macrophyte restoration, and to allow the credit in the trade ratio for this management practice, as would normally be allowed for an aquatic habitat improvement action. *(Strand Associates on behalf of Green Lake)*

Response: Portions of water quality trading and watershed adaptive management are either codified or in guidance. The portions in guidance have balanced flexibility against meeting the codified requirements including the Clean Water Act. Per Federal requirements, credits need to be below the credit threshold to be permanent. The concept of interim credits was negotiated with US EPA. Prior to DNR's negotiations, the only credits allowed were those below the credit threshold.

The MOS and trade ratios are for separate processes. MOS is for the TMDL and covers the calculation of allocations. The trade ratios cover uncertainty related to implementation and performance of management practices implemented through water quality trading. The trade ratio is comprised of several factors of which the delivery factor is one of the factors. In a TMDL, the delivery factor is based on the modeling methodologies used in the TMDL. Trading between point sources has a minimum trade ratio of 1.1:1 and several nonpoint practices can result in a trade ratio of 1.2:1; both ratios are the minimum allowed.

TMDLs do not create new regulations or policies but rather rely on existing rules and policies for implementation.

24) Comment 24 (Policy). With municipal dischargers potentially facing extremely stringent TMDL based limits, the limited availability of practical compliance options becomes even more challenging. DNR should reevaluate restrictions on trading and adaptive management in order to provide more flexible compliance options for point sources. Without such flexibility, municipal dischargers are likely to face substantial costs for facility upgrades well into the future that will not result in meaningful water quality improvement.

DNR should also make it clear in the TMDL report that WWTPs (and any MS4s that partner with a WWTP) will be eligible for the adaptive management option if their wasteload allocation is stringent, even if their local receiving stream meets its water quality criterion. The DNR should

work cooperatively with adopters of adaptive management to set reasonable, site specific local water quality targets for such facilities. *(Stafford Rosenbaum on behalf of MEG)*

Response: Response: See Appendix K and responses to comments 22 and 23. This comment will be forwarded to the wastewater program, which establishes the requirements for phosphorus compliance options. Please note that in many cases, the TMDL based limit is less restrictive than the NR217.13 limit which would otherwise be implemented in the permit. Per administrative code, adaptive management is set to meet water quality standards.

Nonpoint source implementation

25) Wisconsin was a leader in establishing technology-based effluent limits on phosphorus back in 1992 at 1.0 mg/L. As a result, Wisconsin municipal treatment plants have already removed approximately 90% of the phosphorus in their discharges. It is thus not surprising that most of the phosphorus impairments in Wisconsin's waters do not come from municipal treatment plants, but from nonpoint sources.

    The TMDL seeks to impose extremely restrictive limits on point source dischargers, despite the fact that baseline phosphorus loadings in the Upper Fox and Wolf River TMDL area are dominated by nonpoint sources. Because point sources have already removed a substantial amount of phosphorus from their discharges, reducing phosphorus discharges from point sources to the level proposed in the TMDL will not result in meaningful water quality improvement. Scenarios modeled by USGS in 2016 showed only a 2% reduction in Lake Winnebago total phosphorus (TP) concentrations even if WWTP loadings were set to zero. This reduction may not even be measurable.

    The Draft TMDL Report discusses reasonable assurances for reduction of phosphorus from nonpoint sources. Such efforts have, however, been historically ineffective. MEG requests that DNR provide further explanation as to how TMDL implementation will achieve the proposed reductions in nonpoint source phosphorus pollution. *(Stafford Rosenbaum on behalf of MEG)*

    Response: TMDL modeling identifies the contribution of point and nonpoint sources to current conditions and estimates the proportioned reductions needed to meet water quality standards. Modeling indicates that the proportion of phosphorus loads between point and nonpoint sources can vary significantly from year to year and within individual subbasins, so to ensure attainment of water quality standards point sources reductions are needed.

    It is true that many wastewater discharges have been subject to technology-based limits (TBELs) of 1.0 mg/l (or alternate TBELs > 1.0) since the initial promulgation of ch. NR 217, Wis. Adm. Code, in 1992. Those discharging less than 60 pounds per month (industry) or less than 150 pounds per month (municipal) were not subject to TBEL requirements and many are still discharging well above the 1.0 mg/l level. Wastewater treatment facilities are still a source of phosphorus with the exact percent varying based on rainfall and the time of the year.

    Please see responses to comments 15 and 19

TMDLs do not create new regulatory requirements but rather rely on existing rules for implementation. Section NR 151.005, Wis. Adm. Code, does allow for the adoption of more stringent performance standards, if necessary to meet a load allocation in a US EPA approved TMDL. As part of the analysis for this TMDL, the DNR has expressed the load allocation for agricultural areas in a pound per acre format to better integrate with existing performance standards, such as s. NR 151.04 and modeling tools such as SnapPlus, to facilitate implementation of nonpoint reductions.

Existing nonpoint programs will continue to be implemented partnering with land conservation practitioners including county land and water conservation departments, NRCS, DATCP, and agricultural producers to develop an implementation plan to address nonpoint sources. Farmer led organizations have already been initiated within the Upper Fox and Wolf Basins and have proven to be effective and cost effective in promoting the adoption of management practices.

MS4 Implementation

26) Page 43 – "Regulated Stormwater" section- 1st paragraph- Stormwater is described in this section as "runoff that is generated from surfaces that have been affected by human development (e.g., parking lots, roads, lawns, exposed soils). These surfaces typically accumulate solid particles (dust, small rocks, plant matter, etc.) that are carried into waterbodies with stormwater. Some of these solid particles, such as soil or plant matter, also contain phosphorus. Other sources of elevated phosphorus in stormwater can include lawn fertilizers and pet waste." Stormwater is comprised of soil particles from regulated urban sources according to the section. *(Nahn & Associates)*

Response: The text in question describes stormwater in general terms as runoff from developed lands that can contain elevated levels of sediment and phosphorus. The subsequent paragraph further defines "regulated" stormwater as stormwater discharge to surface waters that is regulated under the WPDES program.

27) Page 53- Section 4.2.2 "Regulated Municipal Separate Storm Sewer Systems (MS4s)" 2nd paragraph - "The UFWB SWAT model was used to calculate phosphorus and sediment loading from urban sources regulated by a WPDES MS4 permit". SWAT is an agricultural runoff model. WinSLAMM should be used for urban MS4 areas matching the modeling for the municipal stormwater permitting requirements. *(Nahn & Associates)*

Response: Section 4.2.2 of the TMDL report has been updated with additional text describing the use of SWAT for modeling regulated MS4 urban areas. SWAT is a watershed model that simulates the export of water and pollutants from all land cover types in a watershed. Within SWAT, urban lands are simulated using unique sets of parameter values for various urban land use categories (e.g., high-, medium-, or low-density urban). The parameters reflect characteristics such as total impervious area and the directly connected impervious area within each urban category to estimate runoff and pollutant loading. Conceptually, SWAT is similar to other models such as WINSLAMM in its approach to simulating urban runoff and pollutant loading.

The major difference between SWAT and urban water quality models is that SWAT also simulates the routing of runoff and pollutant loads that are generated from urban areas across the landscape and through the channel network to the outlet of each model subwatershed. The urban pollutant loads estimated from SWAT are lower in magnitude than loads estimated from alternative urban water quality models that do not simulate the same degree of routing. The use of SWAT TP and TSS loading estimates for regulated MS4 urban sources in the TMDL analysis provides a measure of consistency in the methods used for each major source category (i.e., background, agriculture, non-regulated urban, and regulated MS4 urban).

28) Page 53- Section 4.2.2 "Regulated Municipal Separate Storm Sewer Systems (MS4s)" 5th paragraph- "SWAT results provided values of TP and sediment loads from regulated MS4 urban sources in each model subwatershed, however, results did not differentiate between loads generated from individual municipalities. An area-weighting approach was therefore used to estimate phosphorus and sediment loading for individual MS4 permittees by proportionally dividing total regulated MS4 loads per model subwatershed among the MS4 permitted municipalities located in each subwatershed according to the area of the municipality's regulated MS4 urban land cover in the subwatershed." The TP and Sediment loads should not be pro-rated by areas of the municipalities MS4 urban land cover. The Town urbanized area is much different that the cities and village urbanized area including mostly residential land-use, very low-density lot size (1/2-acre minimum lot size) and unconnected grassed swale discharge. Due to these differences, the loading from the Town areas will be much less that the cities and villages per acre of urban land use. *(Nahn & Associates)*

Response: The method used to estimate baseline loads for each MS4 permittee applied separate area-based weights to distribute loads for four different urban land use types: open space, low density, medium density, and high density. The method therefore did consider differences in urban cover types among municipalities. The TMDL report has been updated to describe these details.

29) I read over the relevant sections of the Draft TMDL report with special attention to defining "baseline" for the MS4s. Either I missed it, or the report does not provide a specific definition of what is meant by "Baseline". Section 4.2.2 describes the MS4 modeling approach but never actually says that baseline means that the MS4's have achieved a 20% TSS load reduction compared to a 'no controls' condition. The section states that the SWAT model was run for the period of 2009 – 2013, which might be interpreted to mean that the MS4s were supposed to be meting NR 151 requirements, but I think that's a vague connection to make. Baseline should be explained more explicitly to the readers. This is pretty important to the MS4s to understand the WLAs. *(Brown and Caldwell)*

Response: Section 4.2.2 and Section 6.4.3 of the TMDL report have been updated to clarify the definition of baseline MS4 loadings. To calculate baseline MS4 loads, SWAT model estimates of 2009 through 2013 MS4 loads were adjusted to reflect a 20% TSS reduction and corresponding 15% reduction in TP to be consistent with performance standards for existing development defined

in WPDES MS4 permits and required under chapters NR 216 and NR 151 of Wisconsin Administrative Code.

30) In an earlier email I mentioned that the MS4 loadings reported on Table 10 and in Appendix G generally show annual TSS loads < 10 lbs./acre. WinSLAMM results generally shows annual urban loads in the hundreds of lbs./ac./yr. I can understand small differences (~ 25% or so). However, the draft states on page 53 that "SWAT loads were compared to WINSLAMM results for the municipalities and found to have baseline loads within 10% of one another." This is a big difference from what we are modeling for the urban areas. Something doesn't seem right either with the units, a conversion factor, or something else. This issue is also pretty important for the MS4s to have confidence in the TMDL recommendations. *(Brown and Caldwell)*

Response: The TMDL report has been revised with updated text discussing the similarity of SWAT and WinSLAMM loading estimates to address inaccuracies in that section of the draft TMDL report. The TMDL report now notes that the MS4 baseline loads derived from the UFWB SWAT model are lower in magnitude than loads that could be estimated from alternative urban water quality models like WinSLAMM. The values from the UFWB SWAT model represent loads from regulated MS4s that are delivered to a TMDL subbasin outlet after being routed across the landscape and through stream channels. These values are not directly comparable to urban water quality models that simulate direct export of pollutants from urban lands without routing through the watershed.

31) Page 53- Section 4.2.2 "Regulated Municipal Separate Storm Sewer Systems (MS4s)"4th paragraph- "SWAT loads were compared to WINSLAMM (http://www.winslamm.com/) results for the municipalities and found to have baseline loads within 10% of one another." The WinSLAMM comparison for the Town of Oshkosh shows the WinSLAMM baseline loads in the stormwater permitting modeling to vary significantly (well over 75%) compared to the TMDL baseline loads. The areas in the Town of Oshkosh stormwater permitting modeling also varies over 50% from the areas listed in the TMDL. *(Nahn & Associates)*

Response: The TMDL report has been revised with updated text discussing the similarity of SWAT and WinSLAMM loading estimates to address inaccuracies in that section of the draft TMDL report. The TMDL report now notes that the MS4 baseline loads derived from the UFWB SWAT model are lower in magnitude than loads that could be estimated from alternative urban water quality models like WinSLAMM. The values from the UFWB SWAT model represent loads from regulated MS4s that are delivered to a TMDL subbasin outlet after being routed across the landscape and through stream channels. These values are not directly comparable to urban water quality models that simulate direct export of pollutants from urban lands without routing through the watershed.

32) Page 63- Table 12 & 13 "Summary of baseline total phosphorus and sediment loads" – Note less than 1% or less of phosphorus and sediment load into Lake Winnebago or the upstream lakes is

coming from Regulated MS4 urban as compared to 32% from Agricultural and 63% from individual permits. *(Nahn & Associates)*

Response: The TMDL report already notes the percent contributions of regulated MS4s to total loads in Table 12 and Table 13.

33) (Technical and Policy). Page 73- Section 6.4.1- "Wasteload Allocations- Permitted Municipal and Industrial Wastewater Discharges", 1st paragraph, 2nd sentence- "Wasteload allocations for municipal and industrial wastewater discharges covered by an individual WPDES permit are listed in Appendix F for total phosphorus and in Appendix G for sediment"- Comparing the baseline loads in "Appendix E" to load allocations in "Appendix F" and "Appendix G", the Town of Oshkosh must achieve an 83% reduction in TP for sub watersheds #73 and #75 (17.2 lbs./ yr. to 2.9 lbs./year for #73 and 21.6 lbs./yr. to 3.7 lbs./yr. for #75) with no reduction in TSS (998 lbs./yr. to 998 lbs./yr. for #73 and 744 lbs./yr. to 744 lbs./yr. for #75). Since total suspended solid particles have attached particulate phosphorus (see comment #9 above), the suspended solids would need to be reduced to meet the phosphorus allocations. How can the TMDL report specify a large reduction in TP with no reduction in TSS? Please explain this contradiction in the TMDL report. The contribution of the Town loads is so small compared to the Agricultural and Individual Permit loads (see comments 8 and 13 above), the required TP reduction from the Town of Oshkosh will not significantly affect Lake Winnebago or Lake Butte des Morts. (equivalent to requiring reducing 80% of the size of a single grain of sand in a large sandbox of sand particles) The companion USGS report "Water-Quality Response to Changes in Phosphorus Loading of the Winnebago Pool Lakes, Wisconsin, with Special Emphasis on the Effects of Internal Loading in a Chain of Shallow Lakes" states the following "phosphorus inputs need to be reduced by about 60 percent to the Upper Pool Lakes and 69–73 percent to Lake Winnebago to reduce their mean summer total phosphorus concentrations to 0.040 mg/L; (page 2)" and this is for major loading sources (such as Agricultural and Individual permits) which is less than the 83% TP required reduction in the TMDL for the Town of Oshkosh. The USGS report also states "The effects of any reduction in phosphorus loading will take many years (50 to more than 75 years) to be fully realized in lake water quality because of phosphorus release from the lake sediments. (page 2)" which should be stated in the TMDL report. Please note one of the methods in reducing phosphorus loading is to increase the frequency of leaf pickup during the fall months. The Town does not offer leaf pickup to its residents instead asking them to compost the leaves either on-site or at a designated off-site area, so this alternative would not be available for the Town to consider. (Nahn & Associates)

Response: The TMDL allocations for TSS are calculated independently from TP allocations. Each set of allocations reflect loading magnitudes needed to achieve separate numeric water quality targets for each pollutant. The main reason for large differences between the TP and TSS percent reductions is that TP reductions are set to achieve TP targets for both streams/rivers and lakes/reservoirs while TSS reductions are set to achieve TSS targets in stream/river segments only. For example, many subbasins require large reductions to achieve the Lake Winnebago TP water quality target (40 µg/L) but smaller reductions are needed in these subbasins to achieve the stream/river TSS target (12 mg/L).

The TMDL report and the companion USGS report present different percent reductions for Lake Winnebago TP loading because each study uses: (a) different initial loading magnitudes (as noted Sections 4.2 and 5.1.2 of the TMDL report); and (b) different approaches for source reductions. The TMDL study defines a "baseline" load as the initial loading magnitude for calculating percent reductions while the USGS study used estimates of "existing conditions". The "baseline" load is higher than the "existing conditions" load because of assumptions applied to point source facility discharges (the baseline assumes point sources are discharging at their design flow and maximum permitted TP concentrations, for example). Further, the USGS study applies a uniform reduction to all incoming tributary loads without separating loads from non-controllable background sources (forests and wetlands). The USGS study also does not include a set-aside for Reserve Capacity.

Section 5.1.2 of the TMDL report notes the timing of the lake response estimated from the Jensen model, "The Jensen model showed that a 75% reduction from the initial (existing conditions) external phosphorus load to the Winnebago Pool system during the growing season was needed to achieve the 40 µg/L TP target in Lake Winnebago within 65 to 70 years, while a 69% reduction was needed to achieve the 40 µg/L TP target in Lake Winnebago within 100 to 105 years."

Facility Specific Comments

34) The Draft TMDL Subbasin Map depicts a subdivision of subbasin 25 between South Lawson Drive and the dam at North Lawson Drive that includes areas that drain to Green Lake directly or through the City's storm sewer system. We request that the subdivision of subbasin 25 between South Lawson Drive and the dam at North Lawson Drive be combined with subbasin 20 based on natural drainage area, hydrologic regimes, and land use patterns. The land use upstream of the dam at North Lawson Bridge is similar to that in subbasin 20, while the land use downstream of North Lawson Drive is almost completely agriculture, forest, or wetlands. Including the entire drainage area for Green Lake in subbasin 20 is consistent with the subbasin delineations for the rest of the TMDL. *(Strand Associates on behalf of Green Lake)*

Response: Subbasin 20 is intended to delineate the area draining to the Green Lake main pool only (the lake area located south of South Lawson Drive). Drainage analysis completed for subbasin delineation shows that the land area north of South Lawson Drive (within Subbasin 25) does not drain to the Green Lake main pool but instead drains to the Green Lake Millpond and the Puchyan River. Subbasin 25 therefore cannot be grouped with Subbasin 20 for TMDL development.

35) Appendix D of the draft TMDL report indicates that Green Lake has a loading capacity of 9,319 pounds of total phosphorus per year (lbs TP/yr) to achieve its total phosphorus (TP) criterion of 15 micrograms per liter (ug/L). The sum of the total loads from subbasins that are tributary to Green Lake (20, 17, 18 , 19, 79, 83, and 87) is 6,618 lbs TP/yr. This suggests that Green Lake has excess loading capacity based on the upstream load reductions necessary for local water quality in the respective subbasins. Given the excess loading capacity available in Green Lake, please confirm that the lake outlet TP concentration used in the TMDL modeling is less than 15 ug/L when determining necessary downstream reductions, making this excess loading capacity available to downstream subbasins. *(Strand Associates on behalf of Green Lake)*

Response: The TMDL analysis uses the allocated load for Green Lake and its tributary subbasins (not the Green Lake loading capacity) when calculating allocations for downstream subbasins. Note however that the concentration of TP in Green Lake is not considered in the allocation analysis. The analysis assumes that the entire TP load entering Green Lake (from Subbasins 17-20, 79, 83, and 87) is exported to Subbasin 25 (Puchyan River) immediately downstream of Green Lake. Although retention of TP in Green Lake may occur, the assumption of full export represents an additional margin of safety for downstream reaches. Further, the UFWB SWAT model was calibrated to TP and TSS data from monitoring stations located downstream of lakes and reservoirs. Nonpoint source loading estimates from the UFWB SWAT model therefore implicitly account for lake or reservoir retention.

36) The draft TMDL Report indicates that the Green Lake WWTF requires a reduction in effluent TP partially based on local water quality. The TP concentration data presented in Table 6 of the draft TMDL Report indicates that the Puchyan River upstream of the dam at North Lawson Drive meets the water quality criterion. It appears that the current WWTF discharge is protective of the water quality in the river and no reduction based on local water quality should be required. *(Strand Associates on behalf of Green Lake)*

Response: The tables and maps displaying sampled TP and TSS data in Section 3.4 of the TMDL report are intended to present a summary of current water quality conditions in the UFWB. These data were not used for TMDL analysis. The allocations and reductions are derived from baseline loading magnitudes, which differ from existing condition's loadings (see Section 4.2 of the TMDL report), and consider a reserve capacity. Also, as noted in Response 35, the TMDL analysis assumes that the entire TP load entering Green Lake (from Subbasins 17-20, 79, 83, and 87) is exported to Subbasin 25 (Puchyan River) immediately downstream of Green Lake. Although retention of TP in Green Lake may occur, the assumption of full export represents an additional margin of safety for downstream reaches. Further, the UFWB SWAT model was calibrated to TP and TSS data from monitoring stations located downstream of lakes and reservoirs. Nonpoint source loading estimates from the UFWB SWAT model therefore implicitly account for lake or reservoir retention.

Agricultural Implementation

37) I ran some numbers on average TP loading and allocations per acre for agriculture and compared them to the Lower Fox TMDL numbers. The average Baseline TP for agriculture in LF is 1.23 lbs/acre/yr and the average allocated TP for agriculture in LF is 0.34 lbs/acre/yr. The average Baseline TP for agriculture in UF/Wolf is 0.35 lbs/acre/yr and the average allocated TP for agriculture in UF/Wolf is 0.09 lbs/acre/yr. By these calculations it looks like agriculture is required to reduce its baseline load (which is near equivalent to agriculture's allocated load in the LF) to a significantly lower amount than what's allowed per acre in the LF Basin. Reaching an average TP load of 0.09 lbs P/acre/yr for agriculture doesn't seem like a realistic goal. *(Outagamie County Land Conservation Department)*

Response: Load allocations for nonpoint agricultural source sources reflect TP and TSS loads that have been routed across the landscape and through the channel network to each subbasin outlet. The allocations are not comparable to estimates of "edge-of-field" pollutant loads. In order to facilitate agricultural management planning, load allocations have been translated to equivalent "edge-of-field" values in Appendix J of the TMDL report.