

## Wisconsin Department of Natural Resources (DNR) Responses to Comments on 2016 Draft WisCALM

Responses to US EPA Region 5 Comments (see Attachment A for submitted comments)

- I. General Comments
  1. DNR thanks EPA for their comments on the draft 2016 WisCALM and understands that EPA may review the final 2016 WisCALM as part of their review of the 2016 draft impaired waters list.
- II. Assessment Unit Delineation and Grouping Section 2.6
  1. Future redesigns of the WATERS database will be tailored to conform to the redesigned ATTAINS v.1.1 database schema, and DNR will retire any assessment unit identification numbers for any revised assessment units.
- III. Lake Impairment Assessment Section 4
  1. Available lake data within the most current 5-year period is used for lake assessments; otherwise, data from the most recent 10-year period may be used. Generally, data collected more than 10-years ago are not considered representative of current conditions and are not use in assessments. The reference to a specific year range on page 18 was removed.
  2. No changes were made during the 2016 WisCALM updates regarding the calculation of the grand mean and related statistics for the lake fish and aquatic life use assessment methods described in section 4.4. The footer on page 27 describing these changes was removed, as it describes a change from our 2012 version of WisCALM.
  3. Only one year of data is required to determine nonattainment of the TP criteria when that dataset indicates an ‘overwhelming exceedance.’ However, when multiple years of data are available, all qualifying monthly means are included in the calculation of the statistic (90% confidence interval) that is compared against the applicable criterion.
  4. Wisconsin bases its General Condition Assessment for lakes on the Carlson Trophic State Index (TSI). The TSI is the most commonly used index of lake productivity, and WisCALM includes TSI thresholds to place a lake into one of four general condition categories of excellent, good, fair, and poor. These thresholds are not codified as water quality standards and are not used for impairment assessments (i.e. to determine a use is not supported). However, TSI data may be used to determine that the fish and aquatic life use is supported and the lake may be assigned to integrated reporting Category 2 when the lakes general condition falls in a condition category of “fair” or better and no other information is available to assess. This explanation was added to section 4.2 Lake General Condition Assessment on page 19.
  5. DNR will evaluate the TSI thresholds for consistency with the endpoints described in the “Wisconsin Phosphorus Water Quality Standards Criteria: Technical Support Document” in a future update to WisCALM.
  6. The following defines the use of the assessment categories that describe attainment status of the total phosphorus criteria:

- If Lower 90% CI > criteria, the lake “Clearly Exceeds” the criteria and is impaired.
- If Upper 90% CI > criteria, the lake “Clearly Meets” the criteria and the lake may be removed from the impaired waters list.
- If Grand Mean > criteria, AND lower CI < criteria, AND Upper CI > criteria, the lake “May Exceed” the criteria and is placed in Reporting Category 3 (i.e., insufficient data to assess) and targeted for follow-up monitoring.
- If Grand Mean < criteria, AND lower CI < criteria, AND Upper CI > criteria, the lake “May Meet” the criteria and is placed in Reporting Category 3 (i.e., insufficient data to assess) and targeted for follow-up monitoring.

This language was added to section 4.4 on page 28 of the final 2016 WisCALM.

7. EPA’s suggested edit was incorporated on page 29 to clarify the following sentence: “If a lake’s lower 90% confidence interval TP exceeds the criteria but not by more than 1.5 times, biological confirmation will be used to determine which category 5 listing is appropriate.” [underlined words were inserted for clarification].
8. EPA’s suggested edit was incorporated on page 31 to clarify the following sentence: “If 10% or more of all DO values are below the applicable thresholds, the lake is not meeting criteria.” [underlined words were inserted or replaced existing text for clarification].
9. EPA’s comment states the fish and aquatic life (FAL) use thresholds for chlorophyll and phosphorus are not consistent with the “Wisconsin Phosphorus Water Quality Standards Criteria: Technical Support Document.” DNR has intentionally set FAL use assessment thresholds for these parameters that are less stringent than those used to assess the recreation use. The thresholds for these parameters for assessing the recreation use are consistent with the “Wisconsin Phosphorus Water Quality Standards Criteria: Technical Support Document.” DNR is currently reevaluating the FAL use thresholds and will provide more information in a future update to WisCALM when the evaluation has been completed.
10. A definition of the acronym LCL was added on page 29. LCL means “lower confidence limit.”
11. DNR is open to discussing with EPA how the use of confidence intervals for assessment of lake TP and chlorophyll data may be affected by seasonal variability and lake type and will discuss this with EPA in the context of the proposed updates to the state’s water quality criteria related to assessment of TP and chlorophyll data.

#### IV. Public Water Supply Designated Use Section 6.3

##### A. General Comments

1. DNR will consider adding additional specificity regarding the extent of the waters assessed for the public water supply use in a future update to WisCALM. With the exception of the Great Lakes, DNR

plans to assess whether the public water supply use is supported for the entire waterbody, rather than a portion thereof, when this use is assessed. However, Green Bay will be assessed separately from Lake Michigan, as it is already assigned its own assessment unit and is listed separately in the state's water quality standards as being assigned this use.

2. DNR will consider all readily available information when assessing the public water supply use, which may include but is not limited to data collected from the source water or treated water from the public water supply.

B. Cyanobacteria Toxins

1. Text on page 54 describing the assessment of algal toxin (microcystin-LR) data against the provisional World Health Organization threshold of 1 ug/L as an acute threshold not to be exceeded was removed. The toxin data collected from a site within a 30-day period will be averaged and waters with 30-day average values that exceed the threshold more than once in a 3-year period will be deemed as not supporting the public water supply use. Best professional judgment will be used to determine whether the datasets are representative of the waterbody as a whole.
2. DNR will review any future EPA-developed drinking water health advisory thresholds for microcystin-LR and cylindrospermopsin, which are expected to be available in 2015, and may use them in future assessment methods updates.

C. Nitrate

1. Quality assured sample data from ambient (raw) water or PWS finished water will be evaluated from the most recent 10 year period of record; two or more discrete values within a consecutive 3-year period are required to assess against nitrate standard.

D. Cryptosporidium

1. Cryptosporidium sample concentration data is used to place the public water system in SDWA Bin classifications of 1 through 4, following the procedures in s. NR 810.34, Wis. Adm. Code. Per EPA's request, a reference to a description of the bin classification system (s. NR 810.34, Wis. Adm. Code) was inserted in the final 2016 WisCALM guidance on page 54.

E. Pollutants with Human Health-based Water Quality Criteria

1. A clarification was added to the final WisCALM based on EPA's comment to explain that the consecutive 3-year periods are rolling periods and thus able to capture all excursions that would occur within 3 years of each other.

F. Taste and Odor-producing Substances

1. The final 2016 WisCALM references criteria for substances which impart tastes and odors to waters. The taste and odor criteria are equal to that threshold concentration below which objectionable tastes or odors to human consumers do not occur. Threshold concentrations for

substances imparting tastes and odors to water are listed in Table 1 of [s. NR102.14\(2\)\(a\), Wis. Adm. Code](#). In addition, where additional treatment by the public water supply is needed specifically to prevent taste and odor problems, the water may be deemed not supporting the public water supply use.

- V. Threatened Waters Section 7.3
  - 1. DNR may assess monitoring stations with sufficient data to detect a statistically significant long-term trend, if those data are readily available and as staff resources allow. Section 7.3 was updated to reflect this guidance. DNR will discuss with EPA recommended options for assessing a statistically significant declining water quality trend for specific parameters of concern and may develop more detailed guidance in a future update to WisCALM regarding the determination of threatened waters.
- VI. Issues raised in past comments on WisCALM documents still needing resolution
  - 1. DNR will continue to work with EPA to address their concerns regarding the ability of the state's monitoring program to collect sufficient data to meet the state's assessment requirements and the biological thresholds that are used in the current WisCALM.
- VII. Temperature issues
  - 1. The draft 2016 WisCALM included an allowable exceedance frequency of 10% of the acute temperature criteria. EPA's comments stated that this guidance is inconsistent with the state's water quality standards for water temperature. In related comments on the 2014 version of WisCALM, EPA stated that they are "reevaluating its guidance on the use of a 10% exceedance rate, and plans to explain it further in guidance for the 2016 listing cycle and beyond." As this guidance is not yet available, DNR is retaining our existing temperature assessment methods in the 2016 WisCALM.
- VIII. Chronic criterion question from the state
  - 1. DNR will implement the state's chronic water quality criteria for the protection of fish and aquatic life as advised by EPA in their response to DNR's inquiry. As recommended by EPA, readily available data will be assessed for an interval that falls within a four day time period. If more than one sample is available for a given 4-day period, they are averaged to compare against the applicable chronic criteria. When only one sample is available to assess in a four day period, that sample may be used to represent the 4-day averaging period. DNR will look at all exceedance over a 3-year time frame to make the listing determination. Two exceedances over the three years would be the basis on which to find that the waterbody is impaired.

## **Response to Comments from Frank Pratt, Fisheries Consultant**

### Response to comment letter #1 (Attachment B)

Mr. Pratt states that using a lower confidence limit (LCL), such as the 90% LCL, approach in our TP assessment methods may result in DNR not listing some waterbodies that fail to meet water quality standards. While this could occur in a few cases, the most likely outcome is that waters with limited datasets would be targeted for additional monitoring and some would be eventually listed as impaired as more data tighten the confidence intervals. On the other hand, using a sample mean or median with no measure of confidence would result in higher numbers of incorrect listing decisions. Therefore, in order to yield the highest number of correct assessment decisions with the least amount of sampling effort, DNR has adopted the confidence interval approach for assessing waters against the applicable statewide total phosphorus criteria.

### Response to comment letter #2 (Attachment C)

Mr. Pratt provides an example of a waterbody, Whitefish Lake, with a multiple years of monitoring data that may not be sufficient to assess against our phosphorus criteria according to the current WisCALM, as the variability of the measured sample phosphorus concentrations and nearness of the concentrations to the applicable criterion preclude a definitive assessment decision. He argues that the burden of proof and level of risk in the assessment of these water quality data are not commensurate with that of the Safe Harvest fishery regulations. DNR may use the mean total phosphorus sample concentration to assess criteria attainment on a case-by-case basis for multi-year (e.g., three or more years) total phosphorus datasets for which the calculated 90% confidence interval of the sample concentrations overlaps the applicable criterion.

### Response to comment letter #3 (Attachment D)

Mr. Pratt recommends considering a less stigmatic term for “impaired waters” and suggests using the term “protection priority water.” DNR will consider this suggestion in ongoing efforts related to future program branding, education and outreach.

Mr. Pratt also offers recommendations regarding updates to waterbody classification systems and associated water quality criteria. First, he suggests reclassifying all headwater lakes as “seepage” or creating a separate subcategory of “headwater-drainage” for lakes that lie at the headwaters of a drainage system, as these types of lakes behave functionally more like seepage lakes since most of their inputs (water and pollutants) originates from direct drainage, rather than upstream watershed areas. Therefore, Mr. Pratt argues that such headwater drainage lakes should be treated like seepage lakes in regard to water quality protections. DNR’s current lake classification system includes a “headwater drainage lake” class defined as a lake with a surface water inflow/outflow from a river or stream and a contributing watershed draining to the lake of an area less than 4 square miles. A drainage lake with contributing watershed area greater than 4 square miles is classified as a “lowland drainage lake.” However, applicable water

quality standards are currently the same for both headwater and lowland drainage lake classes. DNR recognizes the relative water quality of headwater lakes may be higher, generally, in relation to lowland drainage lakes due to their smaller contributing drainage areas and, thus, a lesser extent of potential anthropogenic sources of pollutants. However, the applicable statewide water quality criteria are the same for these two waterbody types, as their potential to support their assigned designated uses in the absence of human-caused pollution was determined to be equivalent.

Secondly, Mr. Pratt suggests developing sub-classifications for the current “two-story fishery” lake class and remarks that a single total phosphorus water quality criterion provides inadequate protection to this class of lakes. DNR acknowledges that certain circumstances may warrant the development of water quality criteria for specific waterbodies or groups of waterbodies that are different from the established criteria applicable statewide. Section [NR102.06\(7\)](#), Wis. Adm. Code, NR 102.06(7) provides the authority for the department to modify the total phosphorus criteria by rule for a specific surface water segment or waterbody where site-specific data and analysis using scientifically defensible methods and sound scientific rationale demonstrate a different criterion is protective of the designated use of the waterbody. This section of code includes the following note: “Reservoirs, *two-story fishery lakes* and water bodies with high natural background phosphorus concentrations are the most appropriate water bodies for site-specific criteria [emphasis added].”

Finally, Mr. Pratt requests clarification or more broad utilization of protections afforded to waterbodies assigned the “Outstanding Resource Water” (ORW) designation in Wisconsin’s surface water quality standards to some high-quality waterbodies. [NR 102.11\(2\)](#) provides that the waters identified as ORW may not be lowered in quality except as provided in ch. [NR 207](#) (implementation procedures for the antidegradation policy in s. [NR 102.05 \(1\) \(a\)](#)). DNR may identify any waterbody, or portion thereof, as “threatened” when it currently attains water quality standards, but for which existing and readily available data and information on adverse declining trends indicate that water quality standards will likely be exceeded by the time the next list of impaired waters is required to be submitted to EPA.

Attachment A

EPA Comments dated February 17, 2015

I. General Comments

1. EPA Region 5 appreciates the opportunity to review and comment on Wisconsin's Draft 2016 WisCALM. The Region may review subsequent versions of the 2016 WisCALM methodology in conjunction with its review of the draft and final 2016 303(d) lists.

II. Assessment Unit Delineation and Grouping Section 2.6

1. When changing an assessment unit (either combining multiple units or splitting a unit) the old assessment unit or segment number should be retired and a new number given to the new unit(s).

III. Lake Impairment Assessment Section 4

1. Page 18 identifies the year range to be used for data requirements for lake data. The Document should clarify whether this range will stated is correct (2008-2012) or if the range for the 2016 cycle should be from rom 2010-2014 for the 2016 cycle.
2. It appears that changes were made concerning the calculation of the grand mean and related statistics for section 4.4 *Lake Impairment Assessment: Fish & Aquatic Life (FAL) Uses* on page 27. This should also be identified in the proposed program guidance updates attached in the beginning of the document.
3. Page 29 identifies the process of *determination of listing categories: Hierarchy of Indicators*. The first bullet point states "If a lake's lower 90% confidence interval exceeds its phosphorus criterion by 1.5 times, it is considered to have an 'overwhelming exceedance' of the phosphorus criteria, and the lake can be listed as impaired based on phosphorus alone, in Category 5A. In this case, only one year of overwhelming exceedance is required if that year is not an extreme weather year (see 2016 WisCALM p.8 on Data Requirements for a definition of extreme weather year), and biological confirmation is not required (though can be included if available)." Please confirm that the waterbody be listed if there were two years of data and one year meets the "overwhelming exceedance" and the other year does not.
4. The final WisCalm should clarify the function of the Lake General Condition Assessment, in particular how the Lake General Condition Assessment works in conjunction with the Aquatic Life Assessment.
5. The Lake General Condition Assessment (measured as TSI) thresholds are based on endpoints similar to those in the "Wisconsin Phosphorus Water Quality Standards Criteria: Technical Support Document" for deriving the TP criteria, however the thresholds are much higher in the Lake General Condition Assessment than levels identified as signaling impairment in the Technical Support Document. See below for the details of these discrepancies, which we recommend be resolved in the final listing methodology (**Bold** portions are the endpoints, and the *italic and underlined* are the thresholds portions).

a. *Shallow lakes: (pg. 20)*

The draft WisCALM provides: "The transition between a fair and poor condition for shallow lakes was set at a TSI of 71 (corresponding to TP concentration of 100 µg/L)



because this approximates TP concentrations that lead to a **switch from aquatic plant dominated to algal dominated ecosystems in shallow lakes** (Jeppesen et al. 1990).” We are concerned that using this TSI as the assessment threshold is not protective enough because a TSI of 71 represents a major ecosystem change and once it occurs, it is very difficult to restore the waterbody to the aquatic plant dominated state.

As WDNR notes in its Technical Support Document, however: “Similar to the deeper lakes, the Department looked at the frequency of nuisance algal blooms and protecting the fishery. In addition, the Department looked at preventing a **shift in the shallow lakes from macrophyte domination to algae domination** during the summer. Recent studies in Minnesota have shown that shallow lakes can shift from macrophyte dominated to algal dominated during the summer if there are high concentrations of phosphorus in the lake. Figure 5 shows that the start of this shift is apparent at about 40 ug/l total phosphorus.”

b. *Deep Lakes: (pg. 20)*

The WisCALM provides: “The fair to poor transition threshold for deep lakes was set using a TSI value known to **cause increased frequency of algal blooms**, high amounts of blue-green algae and/or hypolimnetic oxygen depletion. A TSI of 63 (corresponding to TP of 60 ug/L) was chosen because it represents the threshold between eutrophic and hyper-eutrophic lakes (Carlson 1977).”

As WDNR notes in its Technical Support Document, however: “A primary piece of information used to determine phosphorus concentrations for deeper lakes was **the frequency of algal blooms** based on in-lake phosphorus concentrations (see Figure 1). A chlorophyll a value of 20 ug/l is commonly used to represent a nuisance algal bloom. A frequency of 5 percent, about 6 days out of the “summer” was used as a goal. The curve corresponding to 20 ug/l is highlighted and arrows show the 5 percent frequency and the corresponding phosphorus value of 27 to 28 ug/l. That value, when rounded to the nearest 5 or 0 results in a value of 30 ug/l. . . .”

c. *Two-Story Lakes: (pgs. 20-21)*

The WisCALM provides: “Two-Story Lakes: TSI values that cause **significant hypolimnetic oxygen depletion** should be used as the threshold for two-story lakes since this habitat component is critical for maintaining coldwater fisheries. This value will be highly dependent upon the lake's morphometry. Hypolimnetic oxygen demand is largely from the sediment; therefore, the greater the ratio of sediment area to hypolimnetic water volume the higher the hypolimnetic oxygen demand. That makes setting this threshold very difficult. A conservative TSI value of 53 (corresponding to a TP of 30 ug/L) is recommended. Further research on these relationships is needed to derive accurate values for two-story lakes.” We note that the guidance does not say how 30 ug/L TP is associated with the TP threshold at which significant hypolimnetic oxygen depletion occurs.

As WDNR notes in its Technical Support Document, however: "In Wisconsin, 2-story lakes represent a relatively small percent of the inland lakes. A key goal for these lakes is to attain and maintain a minimum of 6 mg/l of **dissolved oxygen in the hypolimnion**, the lowest layer in these stratified lakes. The total phosphorus concentration needed to maintain 6 mg/l of dissolved oxygen varies with the volume of the hypolimnion. That is, lakes with a large volume of water in the hypolimnion could have a higher total phosphorus concentration than those lakes with a small volume of water in the hypolimnion."

"The proposed criterion of 15 ug/l is based on the mean concentration of reference lakes plus one standard deviation. Reference lakes were selected based on a minimum of human impact, and the phosphorus concentrations were derived through interpretation of sediment cores. In all cases, the bottom of the core was used to present pre-settlement conditions. The Department recognizes that the concentration of 15 ug/l is higher than the 10 ug/l associated with classic oligotrophic lakes and the 12 ug/l promulgated by the Minnesota Pollution Control Agency. Also, the concentration would seem to result in a concentration too high to support a lake trout fishery as depicted on Figure 3 below."

6. Page 28. The graphic identifies "*May exceed*" and "*May meet*," but the implications of these categories are not clear and should be explained.
7. Page 29. The WisCALM states: "If a lake's lower 90% confidence interval TP exceeds the criteria but not by 1.5 times, biological confirmation will be used to determine what listing category is appropriate." Should this read instead: "If a lake's lower 90% confidence interval TP exceeds the criteria but not by **more than** 1.5 times, biological confirmation will be used to determine which category 5 listing is appropriate."
8. Page 31. The WisCALM states at p. 33, Table 5: "a) Calculations. Data from the most recent 5-year period may be lumped together for this calculation (however, the data should all be from a single station). If 10% of values exceed DO criteria, the lake is not meeting criteria. Because low DO most commonly occurs in shallower portions of a lake, individual station data should be assessed separately to determine whether DO problems exist." Should this read instead: "a) Calculations. Data from the most recent 5-year period may be lumped together for this calculation (however, the data should all be from a single station). If 10% **or more of all DO values exceed DO criteria are below the applicable thresholds**, the lake is not meeting criteria."
9. The WisCALM should provide the scientific basis for the Fish & Aquatic Life (FAL) Use Assessment impairment thresholds as identified in table 5, pg. 33. Specifically the discussion should include the use of Chlorophyll a, and TP values and how these values were determined. The values in the table do not appear to be consistent with Technical Support Document as discussed in question 5 above in this section of our comments.
10. Page 48. The acronym LCL should be defined.
11. Page 27 describes the use of confidence intervals for assessment of TP and chlorophyll in lakes. EPA would like to discuss with WDNR the extent to which seasonal variability, influences the width of the confidence intervals, and whether certain types of lakes tend to exhibit greater seasonal variability.

#### IV. Public Water Supply Designated Use Section 6.3

##### A. General comments

1. In general, the WDNR should consider clarifying the source, type and applicable location for the data needed for the various assessments. In particular, the area being assessed, especially if different from established Assessment Unit IDs, should be specified. This applies to all of the indicator pollutants discussed below. Also since Lake Winnebago is the only inland surface water source for public water supply, WDNR should explain whether Lake Winnebago would be assessed as a single assessment unit and listed as such, or whether a segmentation scheme will be developed later.
2. The WisCALM should explain that the state's monitoring strategy will be modified to provide the new monitoring data that will be needed to support some of the indicator pollutants discussed below. In addition, WDNR should explain where additional sources of monitoring data would be appropriate, for example, data collected by public water systems.

##### B. Cyanobacteria (Blue-green Algae) Toxins

1. The WisCALM appears to rely on the World Health Organization (WHO)'s 1.0 ug/L guideline for microcystin as an acute exposure number, which it is not. WHO's "Toxic Cyanobacteria in Water: A guide to their public health consequences, monitoring and management" indicates that this guideline is not an acute guideline if the exposure is limited: "Exceeding the provisional guideline value of 1 µg/L for microcystin-LR can be tolerated . . . . This may occur if, for example, discontinuation of exposure is expected in the near future due to implementation of measures to eliminate cyanotoxins from drinking water or cyanobacteria from the water resource. In such instances of guideline exceedances, it may be appropriate that information is communicated to the public, and especially to particularly susceptible sub-populations (such as patients with liver disease, parents of infants, dialysis centers or dialysis patients)." (p. 163.) We recommend that the WisCALM include additional discussion of how WDNR will use the guideline in conjunction with best professional judgment to create a methodology for assessing impairment.
2. EPA is in the process of developing drinking water health advisories for microcystin-LR and cylindrospermopsin, which are expected to be available in 2015. These health advisories, once available, should also be used for assessing and making impairment decisions.

##### C. Nitrate

1. The WisCALM should explain whether SDWA compliance data (i.e., MCL violations) will be used, or whether monitoring data would be obtained from the water systems and used to determine if the assessment thresholds are exceeded. WDNR should also consider specifying how WDNR plans to transition into making these assessments for FY 2016.

- D. Cryptosporidium
1. It would be helpful to include brief definitions for each bin referenced on page 54, or alternatively a reference to the source material where the definitions can be found.
- E. Pollutants with Human Health-based Water Quality Criteria
1. WisCALM, p. 55, 2d paragraph: The WisCALM should explain whether the consecutive 3-year periods are rolling periods and thus able to capture all excursions that would occur within 3 years of each other.
- F. Taste and Odor-producing Substances
1. The WisCALM should explain more clearly the type of data that would be used for these determinations.
- V. Threatened Waters Section 7.3
1. The WisCALM states that there currently is no available guidance on how to formally list threatened waters as impaired. EPA's 2006 Integrated Report guidance states "EPA recommends that states consider as threatened those segments that are currently attaining WQS, but are projected as the result of applying a valid statistical methodology to exceed WQS by the next listing cycle (every two years)." (2006 IR Guidance, p. 59). We encourage WDNR to further develop its methodology to address assessment and listing of threatened waters. For example, WDNR could develop a statistical methodology to identify a declining trend that could be used to determine whether the waterbody will meet standards in the next listing cycle. We look forward to discussing this issue further with WDNR.
- VI. Issues raised in past comments on WisCALM documents still needing resolution
1. Region 5 will continue to work with WDNR to address the issues raised in past comments on the listing methodology regarding the ability of the State's monitoring program to provide the data needed to make assessments against the state's water quality standards, and regarding biological thresholds that are used in the assessment process.
- VII. Temperature issues
- EPA recommends revising the language in Tables 5 and 14 pertaining to the temperature data requirements. NR 102.25(e) states that "*Final acute and sub-lethal water quality criteria for temperature specified in or developed pursuant to §§ NR 102.24-26 shall not be exceeded at any point outside the mixing zone.*" As written, this means that if monitoring data show even one exceedance (measured as the daily maximum for acute, and maximum weekly average temperatures for sub-lethal, i.e. the arithmetic mean of all daily maximum temperatures during a calendar week), this would constitute an exceedance of the standard and should be considered a possible impairment for that waterbody. Therefore, Region 5 remains concerned that any requirement to collect 10 or more days' worth of data for rivers and streams, or 20 days' worth of data for lakes, is inconsistent with the standard as written and may significantly reduce the likelihood that impairments with the temperature standard will be detected. EPA would recommend removing the number of discrete values needed and based the listing determination on the samples collected. EPA proposes the following edits to the language in the tables as outlined below:

Table 5 Fish & Aquatic Life Use impairment thresholds for lake natural communities

Temperature	<p>20 discrete [Foot note omitted] values collected within a given calendar month[.]</p> <p>Suggested Language:</p> <p><b>A discrete <del>20 discrete values</del> daily value collected, or any one week of continuous temperature values in a given calendar month week, to assess against acute and sub-lethal criteria, respectively will be considered.</b></p>
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Table 14. Fish and aquatic life use impairment thresholds for rivers/streams.

Temperature	<p>10 discrete daily values [Foot note omitted] or of continuous temperature data [Foot note omitted] collected within a given calendar month to assess against acute and sub-lethal criteria, respectively.</p> <p>Suggested Language:</p> <p><b><del>10 discrete</del> A discrete daily values value, or any one week of continuous temperature data collected within a given calendar month week, to assess against acute and sub-lethal criteria, respectively will be considered.</b></p>
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VIII. Chronic criterion question from the state

1. WDNR asked EPA to clarify its interpretation of the chronic aquatic life criteria as set out in EPA's *Technical Support Document for Water Quality-Based Toxic Control* which states "... the 4-day averaging period is based on the shortest duration in which chronic effects are sometimes observed for certain species and toxicants, and thus should be fully protective even for the fastest-acting toxicants." (<http://www.epa.gov/npdes/pubs/owm0264.pdf>, at p. 35) WDNR interpreted this provision in their assessment guidance to require a 4-day averaging period with samples collected from four separate, but consecutive calendar days. EPA interprets this provision to mean that to evaluate attainment of the chronic criterion for the FAL Use, at least two 4-day averages within a 3-year period are required.

The state also asked whether it is appropriate to calculate rolling 4-day averages for the chronic criterion and then compare each rolling average value against the chronic criterion, or whether each of the 4-day average values have to be calculated from unique days.<sup>1</sup>

EPA does not require that there be 4 consecutive days of sampling. EPA's guidance states that available data should be assessed for an interval that falls within a four day

<sup>1</sup> See email from Aaron Larson, WDNR to Donna Keclik, EPA November 25, 2014

time frame. This would be the data that is averaged to make a determination if the chronic criteria is being met. For example if data exists for day 1 and day 4, these data would be averaged to make a determination. If data exists for day 1 and day 10, these data would comprise two data sets, with each sample being in a separate data set used to compare to the criterion.

For the listing methodology we recommend that WDNR look at all exceedance over a 3 year time frame to make the listing determination. Two exceedances over the three years would be the basis on which to find that the waterbody is impaired.

The state should be using the rolling averages to make determinations. For example, if the state has 5 consecutive days of data, the first average would be derived using days 1-4. If the resulting average exceeds the criterion, this would constitute one violation. The second average would be derived from data taken from days 2-5. If the second average exceeded the criterion, that would be considered a second violation. Two such violations within a 1 year period would place the waterbody into the impaired category (2 violations in a three year period) and therefore, we would expect WDNR to list the waterbody.

## Attachment B

Dec. 26, 2014

To: Wisconsin DNR- Aaron Larson, Bureau Water Quality  
From: Frank Pratt (Retired WDNR Fisheries/Fisheries Consultant)  
Subject: Comments, 2016 WisCALM

Aaron:

Significant improvements have been made in WisCALM. However, as proposed, it is still fatally flawed because of an unjustified dichotomy in listing/de-listing criteria. In section 7.6, the lower 90% confidence interval (CI) is the bench-mark for listing, but the upper CI is used for de-listing. Yet, a very weak argument is advanced to justify the difference. In effect, it is now be hard to get a water listed, as well as hard to get it off the list, later. So, the latest proposal is only, half way there: Environmental protection is best served if it is relatively EASY to list. Otherwise, you end up with Musky Bay type situations- where the obvious takes 7 years to implement.

My quarrel is the first part, the listing criteria. Why should it be so hard to get a water listed? Just because a few "hovering" waters, might be misdiagnosed as impaired? A very tepid defense- one that "hovers" around absurdity. Especially, when so many other at-risk waters could go undetected. How many waters are there out there at might test false-positive for TP? Show me the data showing that false-positive is even a significant problem. (Assuming that the standard used is even the correct one for the lake which imparts even more, un-accounted for risk ). There can't possibly be enough "natural exceptions" to justify allowing nearly all of the truly impaired waters to go undetected? If one out of a hundred waters (very liberal estimate) could test false-positive- does that justify giving 95 out of 100 truly- impaired waters a clean bill of health? Not according to the WDNR's legacy of environmental protection. Not according to the world's best forecasters. Don't throw the signal out because of fear of the noise.

For TP, WisCALM already dictates sampling five years in a row, three samples per summer. A very rigorous experimental design. For what? To detect problems in only one lake in every 20 lakes which actually have real problems? Why bother? I am sure that the objective is NOT to waste lots of money on ambivalence. Not in an Agency which has lead the world in environmental protection. One with enough global vision and responsibility to be a prime mover in the huge project to reduce TP run-off into the Mississippi River and the Gulf of Mexico. Wisconsin has a long history and legacy of doing environmental protection the right way- risk adverse, pro-active.

The listing part of WisCALM proposal abandons that legacy: It is NOT in concert with established environmental protection practice and resource law in Wisconsin. I specifically cite Treaty Safe Harvest in the Ceded Territory. Safe Harvest is court-mandated and approved. Furthermore, it has been researched and found to be effective for almost thirty years, at the desired level ( 1 in 40) of over-harvest risk. The 9<sup>th</sup> Circuit Court, WDNR Fisheries, and GLIFWC have it right: Protect the resource, by avoiding high risk, and the consequences of high risk. A philosophy borne out by statistics in many fields, not just environmental protection and fisheries . Uncertainty justifies assuming worst case, not the opposite.



Dec. 26, 2014

To: Wisconsin DNR- Aaron Larson, Bureau Water Quality  
From: Frank Pratt (Retired WDNR Fisheries/Fisheries Consultant)  
Subject: Comments, 2016 WisCALM

Nate Silver's book "Detecting the Signal from The Noise" is full of spectacular failures based on unjustified, best case type assumptions. To quote Silver: " If the predictive model isn't risk adverse, it is ultimately doomed to catastrophe." The WisCALM model is not sufficiently risk-adverse. In my 38 year career with WDNR, the resource first principle has always been the foundation of good environmental protection. I was taught and practiced that the burden of proof goes on the polluter/user/harvester- not the resource. So, why is Water Quality deviating from that course? Even when, the excellent introductory section of WisCALM, itself, preaches proactivity. It warns that belated action is ultra-expensive , and often irreversible.

In rare situations where the water in question might be naturally fertile, but "hovering", then the LACK of other Biological Impairment should be used to justify an exemption . Or, also , if core samples show that nutrient levels have always been high, pre-European settlement. Currently, if CI overlaps the standard, additional Biological Impairment "may justify listing." Turn that one around and we have addressed the false-positive phobia. That paradigm shift amounts to replacing "may" with "highly likely". IF CI overlaps the standard, the water is impaired- **unless proven otherwise by the LACK of Biological Impairment or core samples proving historical water quality stability.** That way, if a water is "hovering" around an action-level standard, we won't have to wait around until blue green algae explodes to make the impairment call. Maybe, take action before dogs start dying. Again, put the onus back on the polluter and get it off the resource- On both sides of the listing/delisting equation.

Change WisCALM section 7.6 so that the lower confidence interval drives both listing and delisting decisions. Otherwise, the entire document is near-worthless. That would be a real a shame, because a lot of good people, worked a long time , trying to make WisCALM a useful document. It can't be useful until the resource is, finally, given the benefit of the doubt. -FBP 12/24/14

# Attachment C

January 12, 2014

From: Frank Pratt

To: Aaron Larson

Subject: Continued comment on WisCALM citing specific data from Whitefish Lake, Sawyer County, and with special consideration to Treaty Safe Harvest.

I commented previously (12/24/14) on the problem with using a less rigorous analyses for TP listing, as opposed to delisting. In summary: The current proposal as set forth in WisCALM 7.6 is to require the entire 90% confidence interval to exceed the standard for listing. That is not proactive environmental protection, since the burden of proof is on the resource -and not the polluter. The policy is at odds with other Wisconsin law and it's resource protection mission legacy. It is especially at odds with the way Safe Harvest in fisheries is handled. My comments, here, use specific water quality and fishery data from Whitefish Lake, Sawyer County to frame these issues.

Whitefish Lake is a 786 acre, 106 ft. deep, mesotrophic lake in Sawyer County in the upper Couderay watershed. It is a drainage lake which receives water from upstream Sand Lake, and in turn is tributary to Lac Courte Oreilles (LCO). It is a listed ORW Lake\* and is also classed as "Two-Story"\* since it supports a cold-water fishery of cisco and whitefish. Whitefish Lake is in the Ceded Territory, Subject to the Treaties of 1837-53. The mixed sport and Tribal fishery is subject to Safe Harvest (SH) under WDNR and GLIFWC promulgated Rules, as mandated by the Federal Court of Appeals. Being immediately adjacent to the LCO Reservation it is a popular venue for Tribal spearers targeting both walleye and muskellunge. Because the cold-water forage base, the lake grows trophy size fish much in demand by sports anglers. The currently listed, quantitative, benchmark standard for this type lake is 15 ppb, TP.

The following table summarizes summer, surface, TP, over the deep hole, in Whitefish Lake, for the last five years, from the WDNR, SWIMS data-base. (Additional LCO Conservation Department data is available on the Federal Storet system.)

Table 1: Summary- Whitefish Lake total phosphorus (TP), 2010-2014

Category	Value
Years	2010-2014 (n=15)
Lake Class	ORW/ Two-Story
TP Standard	15 ppb
Lake Mean	15.2 ppb
90% CI	+/- 4.2 ppb (11.0-19.4 ppb)
Impaired? (under current WisCALM)	May be
-Additional documentation required (Under current WisCALM)	Yes- additional proof of "Biological Impairment"

Under WisCALM, Whitefish Lake does not qualify as impaired relative to the Two-Story lake class standard of 15 ppb. Seven (47%) of the 15 field values exceed 15 and the mean TP calculates at 15.2, 2% higher than the standard. But- in essence the real standard for TP impairment is the UCL of 19.4

ppb. Whitefish Lake will have to eutrophy on the order of 30% more nutrients to be detectable under WisCALM. This entails unacceptable risk to water quality and fish community structure.

Currently, the Whitefish confidence interval overlaps the standard. Therefore, under WisCALM the lake “may” qualify as impaired- provided additional biological impairments can be documented. That subject will be open for future comment.

The mixed (tribal and recreational) fishery in Ceded Territory lakes is currently regulated by a complex system commonly known as “Safe Harvest” (SH). During Treaty litigation, SH was modeled and successfully proposed to the Courts by Mike Hansen and Michael Staggs, from WDNR Fisheries. SH has the force of Federal Law, as prescribed by Judge Barbara Crabb, Western District Federal Court of Appeals (1989-91), and under-pinned by the Treaties. Tribal harvest is regulated with a strict quota, daily/individual permits, and a 100% registration of Off-Reservation take. Recreational anglers are regulated via a sliding bag. Over the years, Whitefish Lake has been subject to either a two or three walleye bag limit. Tribal quotas and harvest falls in the 50-150 range, and have always been achieved. By all accounts, and thanks to SH, the walleye population has not been endangered by overharvest from spear-fisher-men and recreational anglers. Since 1991, the WDNR has expended about \$600,000 a year on Treaty Management. GLIFWC and the Tribe expend a near equal amount of Federal dollars. About 180 lakes, including Whitefish, are SH- regulated. The typical expenditure on a lake like Whitefish has been about \$167,000, overall, or about \$7000 per year (closer to \$10,000 when fish stocking is added) The operation of SH has been rigorously tested, and found to deliver, as originally modeled. SH is vastly different from WisCALM, especially in the assumption and acceptance of risk to the resource. The table below compares and contrasts the statistics and assumptions of WisCALM and Safe Harvest.

Parameter	Justification	Methodology	Objective	Years	Mean	Lower CL	Upper CL	Risk (in 40)
TP	Clean Water Act	WisCALM	WQ Protection	2010-2014	15.4	11.0	19.4*	38
Walleye PE	Treaty Law	Mark-Recapture	Safe Harvest	1994-5 2003-4	1613 1244	938** 933	2288 1555	1
		Regression Model		1991-2013	1054	267	1941	1

Table 2: Comparison of WisCALM and fishery approaches to water quality impairment and safe harvest, as indexed by actual TP and walleye population (PE) data from Whitefish Lake, Sawyer County, 1991-2014. (\*Level of significance for WisCALM is defined as 90%, and 95% for Safe Harvest. Under current WisCALM for impairment listing, lower CL must exceed standard for lake class. So, In other words, the upper CL is interpreted as the standard. \*\*Under current Safe Harvest the lower CL is used to calculate the standard.)

Safe Harvest is risk adverse, and puts the burden of proof on the harvester- to protect the resource. It assumes a 1 in 40 risk that a lake will be overharvested in any one year. WisCALM is risky, and puts the burden of proof on the resource, rather than the polluter. It assumes a 38 in 40 risk that even the prescribed 5 years of TP data, will fail to detect a real impairment. So, WisCALM falls way short of pro-

active resource protection and is not consistent is with the way the Department is court-mandated to do SH.

The consequences of being too lax with water quality are dire and strongly linked to the fishery. If the whitefish and or the cisco populations were to go extinct due to declining water quality that would constitute the ultimate breach of SH . No different than taking every single fish from the population with angling, nets, or spears- the net result being zero left. Only worse, because now the habitat is gone. That would prevent successful reintroduction, even if native genotype could be cultured or reconstructed. Additionally, the impact of such a massive bio-energetic collapse, from losing the key forage base (as well as increased macrophytes) , would be catastrophic to the fish community. Those effects would likely be smaller and slower growing predators, and an accelerated shift from walleye to largemouth bass. Not to mention the tax and property value loss due to decreased water clarity.

As Mike Hansen testified during the Treaty litigation –“Fish first and the rest shall follow.” Judge Crabb listened, the Tribe listened, most of WDNR, especially Fisheries, listened. Almost 25 years of Safe Harvest proves the hypothesis. Water Quality should get on the same page. Stop requiring virtually all the water quality data to exceed the standard, and set standards which truly protect the resource. Get the burden of proof off the resource to protect it . Don't continue to subject it to needless risk. Make listing easy, not hard.

Thank you for allowing me the opportunity to comment. I may have a few additional comments prior to Jan. 15. If so, they will be relative to lake class usage and terminology. There is a problem with classification of headwater drainage lakes, the way ORW is (mis)-treated in WisCALM, and there may be a need for a more user-friendly term than the I-word, “Impaired”. Note also, that I interpret the Jan. 15 deadline as for WisCALM comments, and new data ( which I interpret that to be numeric data only, and not qualitative, and certainly not the defense of nomination ). Various parties, including myself will probably be nominating Whitefish Lake and all or parts of main-lake, LCO, later on this year. Be forewarned that documentation for biological impairment might include AIS, Climate Change, anoxia, fish-kills, The 7 Point Plan, the Public Trust Doctrine, fish community changes due to extinction and inter-guild predation, the economics of water quality and the recreational fishery, and the incompatibility of WisCALM with other Department resource protection and the Treaty Fishery. (Some of these things are partially covered, already, in this memo.) None of us would have to fight so hard to present additional documentation if your phosphorus standards and statistical methodology were more reasonable.



Attachment D

Jan 12(b), 2015

To: Aaron Larson

From : Frank Pratt

**Subject: Part 3- Some Additional Ideas on How to Improve WisCALM**

### **1. Terminology/Acronyms: The “I” word**

The term “Impaired” has negative connotations with the public. It is hard to enlist support from individuals and lake groups to list their lake. (At least not until it is so grossly polluted that everyone agrees that remedial action is needed, a very reactionary system. And as WisCALM already concedes, an expensive and often “too late” and futile exercise.) Why not “Make a threat an opportunity”?

I suggest replacing the I-word , “Impaired” with “Protection Priority Water”. I realize that “Impaired” is so deeply embedded in law that it would take all sorts of legislative action, on multiple levels to change the legalese (Nor do I think that we would want to change it at that level since it clearly emphasizes the threat aspect. It IS serious business.) So as the base term, in law, impaired would still be the base term.

However, a change in terminology could be done in guidelines, and in normal everyday use when communicating with the public. Especially for the incipient impaired categories which imply watch-list, endangered, or threatened. How about this: In WisCALM , replace the “May be Impaired” sub-category engendered by a water quality parameter confidence interval overlapping the standard, with: “Protection Priority Water” ( = PPW). PPW designation would impart institutional will for priority funding to support proactive management and research. Under this system lakes like Whitefish, Lac Courte Oreilles, Grindstone etc. would earn the priority they deserve for pro-active management, without backlash from the public due to the negative connotations of “I” word. It sure beats waiting around until our kid’s dogs start dying from the noxious blue-green algae. “Oops, Houston, we did have a problem!”

### **2. Lakes Classification**

**Head-water lakes:** Technically a lake which lies at the headwaters of a drainage system, like Sissabagama in the Upper Couderay drainage could be classed as “drainage”. It does have an outlet in Sissabagama Creek which feeds into Sand, Whitefish, LCO etc..., downstream. BUT functionally is behaves more like a seepage lake since most of its water and nutrient budget comes from direct drainage, off it’s own watershed. Therefore such headwater drainage lakes should be treated like seepage lakes relative to water quality. For example the TP standard for Sissabagama should be 20 ppb (deep-seepage) and not 30 ppb (deep-drainage). The same situation exist for Round Lake, which was originally several unconnected seepage lakes but is now a drainage lake because of increased ground-water infiltration from elevation increases in the Tiger Cat Chain. I suggest redefining headwater lakes as “seepage” or creating a special subcategory terminology of “headwater-drainage” which would be



assigned the same water quality standards of a “seepage” lake. Function should trump form, especially in WisCALM.

**Two-Story:** Everyone knows that the current catch-all category with a TP standard of 15 ppb is inadequate. Especially if the upper 90% confidence limit is used as the standard, which puts the real number closer to 20 ppb. Aside from the confidence interval debate, there is a problem with the “lump-all” approach to fish community structure. Whitefish and lake trout are much more thermally sensitive cold-water species than cisco, which are in turn more sensitive than rainbow smelt or stocked rainbow trout. In the current system any lake thought capable of supporting any of these cold-water species is classed as “Two-Story”. This puts the more sensitive cold-water species at risk because the TP, and thermal oxygen requirements are not restrictive enough. I propose a three-tier, “guild”, sub-category system as follows:

Table 3: Pratt proposal for three sub-categories of “two-story” lakes based on fish communities as thermal guilds.

Sub-Category (Guild)	Cold-water Species	TP 90%CI	TDO3 Degrees C	Examples
Lake Trout	Lake trout, lake whitefish	6-10	14	Trout Lake, Black Oak Lake, Geneva, Whitefish (Sawyer County), LCO
Cisco	Cisco	8-12	17	Grindstone, Diamond, Round, U. Eau Claire, Bardon
Stocked Trout*	Rainbow, brown trout, smelt	10-15	20	Silver, Stone*, Beaver Dam

\*Some lakes like Stone Lake in Washburn County do not contain cold-water species but would be capable of doing so, if they were stocked (trout) or introduced (cisco, smelt). TDO3 is defined as the temperature at depth where dissolved oxygen equals or exceeds 3 ppm. Minimum dissolved oxygen for Wisconsin trout streams is 6.0 ppm. Field evidence from Whitefish Lake, and the Wisconsin and Minnesota Climate Change studies suggest that cold-water species in lakes are more tolerant of low oxygen, down to about 3 ppm. Rainbow smelt are at least as tolerant of warm-water as stocked stream-species trout, possibly more so. That AIS threat is at play in some of these waters (Diamond, Beaver Dam) and all are threatened. One could argue that ALL two-story lakes are biologically impaired because of the threat of rainbow smelt and the threat of Climate Change.

There are over 200 “Two-Story” waters in Wisconsin. I am shocked to find that less than 5% of these even have WisCALM protocol, TP data in SWIMS. One way to deny a problem is to NOT get the data. To the Department’s credit it has finally embarked on cold-water fisheries research in lakes. However, the methodology being used (vertical gill netting) is hardly state-of-the-art (bio-acoustics). The latter technology has been out there since the early 1980s, when I recommended it for Whitefish Lake. I still recommend it: for Whitefish, LCO, Grindstone, Round, Asheton, Slim, Bardon, Diamond, etc... At least

20 lakes, with all 200+ gill-netted, as well. It goes without saying TP, temperature and dissolved oxygen profiles, are highest priority needs, too.

**ORW:** Please do something to quantify this. Right now it is a useless category because it is only “qualitative” as defined by “non-degradation”. I am all for a protocol which is lake specific, based on core samples to determine pre-European conditions, as has been proposed by WDNR. Put it in writing and promulgate rules if you need to. Please, no more: “ It is not wastewater so ORW doesn’t apply” or “WDNR does not use ORW for anything except point-source water quality decisions”. I worked 38 years in the Department and was responsible for getting many waters listed ORW, based mainly on their fisheries. I have used and have seen ORW used repeatedly and extensively for funding, program priority, and environmental protection decisions.

Talk to the WDNR Fisheries or the Water Management Sections. A good place to start would be the newest Chapter 30 permitting system mandated by the “Jobs Creation” Act. ORW waters are singled out for special, much more restrictive, and much more expensive treatment. That’s the way it should be done.

So- Get ORW fixed. Put some numbers on it. Use it in a broader sense than point-source. LCO, Grindstone, Whitefish, Round, even Sand Lake- all ORW waters. Their fate awaits the out-come.

That’s it for now. I now, have three separate comment documents in for the January 15 deadline. I think they are full of good recommendations. To summarize: make listing easier and more compatible with Department resource protection. - If the confidence interval overlaps the standard then there is enough chance of exceedance to justify listing. Chances are that Whitefish Lake and probably many other two-story lakes are phosphorus-impaired, and we sure don’t want to suffer the massive consequences of not being pro-active. The TP standard of 15 ppb for two-story lakes is too high and needs fixing. ORW is toothless in WisCALM and that needs fixing, too. More research is needed on two-story limnology and fish community. Headwater lakes are functionally seepage lakes. The term “impaired” is not user-friendly and should be replaced by something more proactive and less threatening to the public.

Thank you for the opportunity to comment. You will most definitely be hearing from me when it becomes time to nominate new I-word waters. Keep up the good fight for water quality. The lovers of the resource do appreciate your efforts.