



February 26, 2018

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U.S. Environmental Protection Agency

EPA Docket Center

Washington, DC 20004

Re: Comments on proposed rule "*Water Quality Standards for the State of Missouri's Lakes and Reservoirs*"; EPA Docket ID No. EPA-HQ-OW-2017-0010

Dear Sir or Madam,

The Missouri Corn Growers Association (MCGA) and the Missouri Soybean Association (MSA) submits the following joint comments on the proposed rule titled *Water Quality Standards for the State of Missouri's Lakes and Reservoirs*, as published in the Federal Register Volume 82 page 61,213 dated December 27, 2017. In addition to the comments below, we also submit the attached technical comments prepared by Brown and Caldwell (Attachment 1).

Missouri corn and soybean farmers support efforts that protect water quality. No one will argue with the fact that water is one of our most valuable resources. It's the lifeblood of agriculture. Water grows and transports our crops which grows and sustains our communities and our cities. It provides power to run our homes and businesses; sustains our forests, our wildlife and provides us recreation. It is a powerful yet fragile natural resource. We all desire clean water and for corn and soybean growers, practicing good land stewardship is a personal duty and responsibility. Farmers are voluntarily investing time, energy and their own dollars to reduce nutrient runoff, improve the soil and preserve natural resources. To date, Missouri farmers have already preserved an estimated 182 million tons of soil, and their conservation practices have impacted over 5 million acres of Missouri farmland. Missouri is home to one of the most successful state soil and water conservation programs in the nation, the Missouri Soil and Water Conservation Program. This program is dedicated to further educating and encouraging soil and water conservation improvements.

However, an unnecessarily costly and poorly conceived, developed and executed nutrient criteria regulation stands to make the job of focusing state cost-share dollars as well as voluntary conservation potentially more challenging and difficult. Simply put, getting this rule right will help ensure that farmers good works will be carried on into the future.

That being said, it cannot be overstated that numeric nutrient based water quality regulations are inherently difficult to develop, as well as complex and costly for the public and private sectors to implement. Such regulations can also add substantial workload and costs to state water quality agency operations. The protection and benefit this regulation provides, will unavoidably come with certain tradeoffs that must be carefully weighed and considered. In particular, numeric nutrient criteria can and will place new and sometimes substantial burdens and costs on both the point source and non-point source community. Therefore, both state

and federal government's should appropriately and proportionally balance environmental protection with the varying interests of stakeholders. The rule should seek to accomplish its goal efficiently as well as cost-effectively, and should seek to minimize unintended impacts and interfere as little as possible with private business and commerce as well as the everyday rights of landowners and people.

Given this, we feel strongly that that EPA need only approve a nutrient criteria regulation that is focused and narrowed on the immediate task at hand; the task of adequately resolving the consent decree. In our view of this Proposed Rule, neither Alternative 1 nor Alternative 2 is the right choice for the state of Missouri. Instead, we strongly encourage EPA to focus its efforts on reviewing and approving the state's nutrient criteria rule as approved by the Missouri Clean Water Commission on January 4, 2018. By approving the state rule and withdrawing the EPA proposed rule, EPA would both satisfy the Agency's obligation under the consent decree and keep the state in the Clean Water Act (CWA's) preferred lead over its state water quality standards.

Since the publishing of the EPA proposed rule, the Missouri Department of Natural Resources (DNR) has finalized scientifically sound criteria. We recommend EPA approve DNR's rule and withdraw the federal proposed rule. The consent decree in the Missouri Coalition for the Environment litigation established certain deadlines for EPA to propose and finalize a federal water quality criteria for Missouri's lakes, unless the State promulgates its own rulemaking that is acceptable to EPA. On December 27, 2017 in line with the consent decree, EPA published in the federal register a proposed federal nutrient rule for Missouri. The federal rulemaking contains two alternative approaches, with EPA purporting that Alternative 2 is similar to DNR's state rulemaking. Even though the proposed rule claims it has "mirrored" DNR's nutrient criteria, this claim of similarity between Alternative 2 and DNR's rulemaking is virtually impossible to verify as EPA did not actually include the state's nutrient criteria rule language in the federal proposed rule. Furthermore, EPA states in its proposed rule that it would likely have to make changes to the state nutrient criteria rule text so as to conform to federal rulemaking requirements. It's unclear what type of changes this might include and what effect these changes would have on implementation and the regulated community. In any case, we disagree with the assertion that the EPA proposed rule Alternative 2 is similar or otherwise equal to DNR's nutrient criteria rule.

On January 4, 2018 the Missouri Clean Water Commission approved a state developed nutrient criteria rule; a rule DNR found to be protective of water quality and appropriate for Missouri lakes. DNR's rule was the product of several years of DNR technical workgroup meetings and consultation with in-state water quality experts, interested stakeholders and the regulated community. With input from stakeholders, DNR developed the state numeric nutrient criteria taking in to account the firsthand knowledge and expertise they and others have on Missouri's unique man-made lakes as well as other state specific considerations.

Conversely, the federally proposed numeric nutrient criteria rule was developed solely by EPA staff, behind closed doors with no involvement or input from in-state experts or the regulated community. Prior to this proposed rule's public notice, EPA provided no opportunity for Missouri stakeholder involvement or interaction into its development.

In the federal proposed rule, EPA states that it will not proceed with final rulemaking (or will withdraw its final rule, if applicable) if Missouri adopts and submits criteria to address EPA's 2011 disapproval and EPA approves them as meeting CWA requirements prior to the December 15, 2018 consent decree deadline. This state level task is largely completed, and a final state nutrient criteria rule is expected to be submitted for review to EPA in the coming months.

Within the Clean Water Act's federalism approach, Congress emphasized and gave states primary responsibility for developing and adopting water quality standards for their state waters. Given that state agencies are also primarily responsible for implementing such standards, it is self-evident that states should also be given broad discretion and decision-making when developing these standards. States have the firsthand knowledge of how to get such a complex rulemaking implemented and on the ground successfully; they know how to reduce unnecessary costs and regulatory impacts, and how best to work with stakeholders, the regulated community and the public.

In view of the Clean Water Act's federalism goals and EPA's own recognition of the importance of state-led solutions to nutrient pollution, we strongly encourage and strongly recommend that EPA focus its efforts on reviewing and approving the state's nutrient rulemaking as approved on January 4, 2018. By approving the state rulemaking and withdrawing EPA's proposed rule, EPA would both satisfy the Agency's obligation under the consent decree and keep the state in the CWA's preferred lead over its state water quality standards.

EPA's Alternative 1 represents overly protective criteria that will needlessly cost Missourians millions, if not billions, of added regulatory costs that can be avoided by approving DNR's state rulemaking. States have a finite amount of resources to implement, identify and address impairments, therefore the criteria approved for Missouri must accomplish its goal efficiently as well as cost-effectively, and it must seek to minimize unintended impacts. In other words, it must reliably and accurately identify only the lakes that are truly not meeting designated uses. Criteria that creates false positives would consume State and permittee resources unnecessarily.

In our review, we have found EPA's Alternative 1 to rely on both overly conservative methods and arbitrary decisions. This includes the use of the 75th percentile approach and EPA's use of a three-year rolling average of the lake seasonal geometric mean. Both will create false positives--falsely identifying healthy lakes as nutrient-impaired. See attached technical comments for more details.

We also do not agree that waterbodies should be listed as impaired in situations where protection values are exceeded but the waterbody lacks data concerning a given response variable. EPA's Alternative 1 states that if a protection value is exceeded and data are unavailable for any applicable response variable, the waterbody would be deemed impaired until such time that data collected indicates no response variable is exceeded. We strongly disagree with this approach; in no way is the lack of data for a given response variable (eutrophication factor) equivalent to non-attainment of designated uses. In other words, protection values or screening levels are not sufficient alone to determine impairment.

Overall, EPA's Alternative 1 represents overly protective criteria that will unnecessarily designate Missouri lakes as being impaired when in fact they are meeting their designated use. These "false positives" will create unnecessary collateral damage, expense, regulatory uncertainty and confusion without actually improving water quality. We find this approach and outcome unacceptable.

Missouri DNR's rule more appropriately links criteria, screening levels and eutrophication factors to actual attainment of designated uses. DNR's rule more appropriately applies nutrient water quality criteria to Missouri lakes and reservoirs by using a biological validation approach. In addition, the proposed chlorophyll-a criteria in DNR's rule were supported by additional evidence that link the criteria to designated uses. The chlorophyll-a criteria were based on a review of the literature and discussions with Missouri reservoir and fishery management professionals; staff from the Missouri Department of Conservation and University of Missouri made

recommendations for chlorophyll concentrations that would support aquatic life uses in reservoirs. The proposed chlorophyll-a criteria were set to the low end of the range of literature values related to nutrient versus fish community productivity, and are within the range of chlorophyll-a values set for other states. Further, by linking the chlorophyll-a (as well as nitrogen and phosphorus) screening levels to the eutrophication factors, DNR's rule is based on sound scientific rationale that more accurately identifies impairment when screening levels and eutrophication factor(s) are exceeded. This will prevent false positives, an outcome we believe EPA's Alternative 1 approach is certain to create.

Overall, we believe DNR's nutrient criteria rule approach is more robust and scientifically defensible. In the end, this approach will allow for a higher level of confidence that exceedance of the proposed criteria is linked to unhealthy or undesirable conditions that cause non-attainment of designated uses.

Conclusion

Keeping Missouri in the lead role in developing and administering its water quality standards program best serves the CWA's federalism policy. We strongly encourage EPA to focus its efforts on reviewing and approving the state's nutrient rulemaking as approved by the Missouri Clean Water Commission on January 4, 2018. By approving the state rulemaking and withdrawing this proposed rule, EPA will satisfy the Agency's obligation under the consent decree and keep the state in the CWA's preferred lead over its state water quality standards.

Again, thank you for the opportunity to provide comments.

Regards,



Kyle Kirby, President

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Attachment 1 (Brown and Caldwell Comment Letter)



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Technical Memorandum

Prepared for: Agricultural Nutrient Policy Council; The Fertilizer Institute

Project Title: EPA Proposed Numeric Nutrient Criteria for Missouri Lakes and Reservoirs

Technical Memorandum [No. 1]

Subject: Comments Regarding EPA Proposed Numeric Nutrient Criteria for the State of Missouri

Date: February 26, 2018

Section 1: Introduction

On December 27, 2017, the United States Environmental Protection Agency (EPA) proposed two alternatives for development of numeric nutrient criteria (NNC) for Missouri lakes and reservoirs. The proposed rule is the latest action in a long-standing issue over MO lakes NNC that dates back to 2011 when EPA disapproved most of the nutrient criteria Missouri had proposed in 2009. On February 26, 2016, the Missouri Coalition for the Environment (MCE) filed a lawsuit alleging the EPA did not fulfill its statutory obligation to act “promptly” and set water quality criteria if the state did not adopt criteria addressing EPA’s disapproval (Fed Reg Vol. 82, No. 247 at 61213). The consent decree that followed committed EPA to propose rulemaking if the State did not submit and EPA approve criteria that address the disapproval on or before December 15, 2017. The December 27, 2017 notice of proposed rulemaking and proposed water quality standards fulfill the requirements of the consent decree.

EPA proposed two Alternatives: 1) EPA proposed its own nutrient protection values and eutrophication impact factors in a combined criterion approach, and 2) EPA proposed a combined criterion approach that is characterized as nearly identical to the State’s proposed criteria from October 2017. In January 2018, the Missouri Department of Natural Resources (DNR) adopted revised NNC for lakes. If Missouri’s NNC are approved by EPA, the proposed rule gives EPA the ability to withdraw rulemaking for either Alternative 1 or 2.

This document presents technical comments regarding the two alternatives proposed by EPA in the December 27, 2017, notice of proposed rulemaking. As a threshold comment, we appreciate the substantial effort undertaken by the EPA to develop the criteria proposed in Alternatives 1 and 2. Our comments are specific to the technical aspects of the criteria development processes and future implementation of the criteria, if adopted as proposed. These comments focus on specific areas in the Notice of Proposed Rulemaking where EPA asked for comment on the various aspects of the Alternative 1 and 2 approaches to criteria development. A summary of the comments is provided below.

- *Alternative 2 provides more flexibility for implementation to Missouri DNR and the regulated community and more appropriately links the proposed criteria to attainment of designated uses.*
- *EPA’s use of the 75th percentile of least disturbed lakes in Alternative 1 is not justified for Missouri lakes and reservoirs*
- *Alternative 2 more appropriately links criteria, screening levels, and eutrophication impacts to attainment of designated uses.*
- *Alternative 1 lacks a relationship between causal and response variables.*
- *The implementation of the Alternative 1 criteria is not consistent with their derivation.*
- *Further clarification of specific thresholds for eutrophication factors is necessary to reduce uncertainty.*
- *Proposed criteria (Alternative 1 and 2) should not be applied to Tributary Arms*

Section 2: Technical Comments

1. Alternative 2 provides more flexibility for implementation to Missouri DNR and the regulated community and more appropriately links the proposed criteria to attainment of designated uses.

Following review of both Alternatives presented by EPA, we can make an initial general conclusion regarding the applicability of the proposed criteria and their ability to determine attainment of designated uses of Missouri lakes and reservoirs. EPA's Alternative 1 derived nutrient protection values (criteria) and eutrophication impacts (response variables, a form of biological validation) to determine attainment of the criteria and, therefore, designated uses. This is similar to Alternative 2 in that both use criteria in conjunction with eutrophication factors to validate an impairment has occurred if criteria are exceeded. A major difference between the Alternatives that affects the applicability of the criteria is observed in how the eutrophication factors are incorporated into the overall criteria.

EPA's Alternative 1 states that if a protection value is exceeded and data are unavailable for any applicable response variable, the waterbody would be deemed impaired until such time that data collected indicates no response variable is exceeded (Fed. Reg. Vol. 82, No. 247 at 61219). This approach is overly restrictive for several reasons. First, given the reference approach used to derive the protection values (see comments in the following section), exceedance of a protection value alone is not sufficient to determine impairment. Second, lack of data for a given response variable (eutrophication factor) is not equivalent to non-attainment of designated uses. Third, when data concerning eutrophication factors do not already exist, it would be impossible to show that no response variable was exceeded during the same time period of data that indicated a protection value was exceeded. Therefore, it is not possible to determine if the exceedance of the protection value resulted in an actual impairment. This would make delisting a waterbody that exceeded a protection value very difficult after the fact. Fourth, this approach creates uncertainty for the regulated community and Missouri DNR during permit negotiations and issuance. Data collection for some of the eutrophication factors may take years to complete (e.g. observed shifts in aquatic diversity), compile, and interpret, leaving waterbodies that exceed protection values as impaired while this process goes on. In the meantime, Missouri DNR and the regulated community would need to make permitting and operational decisions based on incomplete and perhaps inaccurate data that may need to be reversed in the future. This not only creates confusion, but could consume State and permittee resources unnecessarily. Finally, EPA's Alternative 1 approach does not apply the eutrophication factors in their intended manner. Evaluation of response variables is intended to determine if an impairment has occurred in a given waterbody as a result of the observed nutrient concentrations or loads, thus allowing for determination of water quality criteria compliance. However, by listing waterbodies that exceed protection values alone as impaired, without compatible data concerning the attainment of response variables, the eutrophication factors become irrelevant in determining attainment of water quality criteria. Their only value is in disproving an impairment has occurred after the waterbody has already been listed impaired. Conversely, if a waterbody achieves the protection values, the waterbody is deemed in compliance with water quality standards without the use of eutrophication factors. For these reasons, we do not recommend that waterbodies be listed as impaired when protection values are exceeded, and a waterbody lacks data concerning a given response variable.

The Alternative 2 approach provides more flexibility and recognizes the importance and value of response variables in nutrient water quality standards. Under Alternative 2, when a screening value is exceeded, data and information concerning the response variables are used to make impairment determinations. Waterbodies that lack data for a given response variable are not deemed impaired,



but listed as “undetermined” until response variable data can verify if an impairment has occurred. While we recognize this approach can have shortcomings, the ability to verify a water quality standard has been exceeded prior to listing it as impaired is key to determining if designated uses are met. This approach allows for more certainty to stakeholders and permittees, incorporates response variables in their intended manner, and provides flexibility for Missouri DNR in criteria implementation.

Overall, Alternative 2 more appropriately applies nutrient water quality criteria to Missouri lake and reservoirs by using a biological validation approach. The incorporation of eutrophication factors into nutrient water quality criteria in this manner has been approved by EPA in the past (e.g., Florida) and allows for determination of attainment of designated uses consistent with the Clean Water Act (CWA). While we agree with the overall structure of the Alternative 2 criteria over Alternative 1, the following sections present specific comments concerning the derivation of each Alternative, that would improve the criteria development and implementation processes.

2. EPA’s use of the 75th percentile of least disturbed lakes in Alternative 1 is not justified for Missouri lakes and reservoirs.

The dataset for EPA’s Alternative 1 criteria was derived from the 75th percentile of the lake-specific medians of all seasonal geometric mean nutrient and chlorophyll-a concentrations. The list of screening criteria used to develop the least disturbed population of lakes was extensive, including an evaluation of native versus developed land cover, presence of point sources and Confined Animal Feeding Operations (CAFO) in the watershed, extent of shoreline residential land use, information regarding historical or recent manure applications, deliberate fertilization efforts, areas with formerly cultivated fields, and a case-by-case elimination of outlier lakes with higher nutrient values that passed the other screening tests. This process resulted in a heavily screened dataset that EPA states represents the least disturbed condition and best remaining condition in Missouri (Fed. Reg. Vol. 82, No. 247 at 61222). Given that this condition represents the best remaining condition in the State, it is not appropriate to select a percentile of this dataset that could result in up to 25 percent of Missouri’s best lakes listed as impaired. If this dataset is designed to represent the desired condition for all Missouri lakes, a higher percentile is justified that would better represent the entirety of that best remaining condition.

The numbers that EPA generated using the 75th percentile of least disturbed lakes are lower than the Missouri DNR screening chlorophyll-a values (in Alternative 2) that were generated using the 50th percentile of all lakes¹. This means that under EPA’s Alternative 1 approach, using the 75th percentile would result in more than half of all Missouri lakes and reservoirs being listed as impaired, including lakes considered least disturbed by EPA’s own reference lake selection criteria. EPA has not provided any justification why the 75th percentile of the least disturbed lake population is necessary to attain designated uses, versus another percentile measurement. Nor has EPA demonstrated how exceedance of the 75th percentile indicates impairment has occurred.

Other comments in this document regarding the overall applicability and appropriateness of EPA’s Alternative 1 approach notwithstanding, if an approach like Alternative 1 were to be adopted, the use of a higher percentile of the least disturbed lakes distribution is warranted and scientifically defensible. The 95th percentile of the EPA Alternative 1 dataset is consistent with the chlorophyll-a criterion proposed by Missouri DNR (and EPA’s Alternative 2), that were based on a review of the

¹ The EPA and Missouri DNR methods of averaging and determining percentiles are not identical; EPA uses a distribution of lake-specific long-term medians of seasonal geometric means, and Missouri DNR does not.

literature, discussions with Missouri reservoir and fishery management professionals and Missouri Department of Conservation (MDC) and University of Missouri (MU) staff recommendations for chlorophyll concentrations that would support aquatic life uses in reservoirs (Table 1). This provides reasonable and scientifically defensible evidence that the 95th percentile represents a biological healthy and desirable condition in Missouri lakes and reservoirs.

Table 1. Comparison of Chlorophyll-a Proposed Criteria from Alternative 2, Alternative 1, and Other Scenarios based on Higher Percentiles Than Alternative 1.

| Region | Missouri DNR and EPA Alternative 2 | EPA (Alternative 1, 75th percentile) | EPA (Alternative 1, 90th Percentile) | EPA (Alternative 1, 95th Percentile) |
|----------------|------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| | Chlorophyll-a criterion | Chlorophyll-a Screening Value | Chlorophyll-a criterion | Chlorophyll-a criterion |
| Plains | 30 | 14 | 24 | 32 |
| Ozark Border | 22 | 7.1 | 13 | 20 |
| Ozark Highland | 15 | | | |

Although EPA guidance on setting NNC suggests use of the 25th percentile of all lakes or the 75th percentile of “healthy” lakes (EPA 2000), these are not the only approaches and the use of higher percentiles to represent healthy environmental conditions and thresholds is well documented in the scientific literature. It is reasonable to assume that, in a sample of lakes specifically screened and selected to represent a particular condition, there might still be a small number that do not meet that condition. In general statistical practice, the accepted convention for setting upper confidence limits or thresholds is to use a percentile in the range of 90 to 99 percent (Quinn and Keough 2002, Reimann et al. 2005, Miesch 1981). The 95th percentile is the one of the most commonly chosen thresholds in both normal and lognormal distributions, and many statistical papers have been devoted to determining how to best estimate the 95 percent confidence interval of lognormal distributions specifically (Zou et al. 2009, Zhou and Gao 1997, Olsson 2005, Cimermanova 2007, Singh et al. 1997). Many examples of the use of 95th percentiles for determining water, soil, or air quality thresholds exist in the environmental science literature; several examples are given here for illustrative purposes.

Bhaumik and Gibbons (2004) state that environmental compliance is often determined by comparing the mean of samples in an impacted area to the upper bound of background (or unimpacted) samples; they used an upper bound of 95 percent of background samples to determine compliance of mean soil lead concentrations at an impacted former plating waste disposal area. Marr and Canale (1988) used 95th and 99th percentiles to propose effluent limits for ammonia and chromium discharge in Grand Rapids, Michigan, based on a Monte Carlo model of discharge effects on the receiving river. In the United Kingdom, the National Water Council (Crabtree et al. 1987) defined both river water quality reference-based criteria and sewage treatment discharge effluent limits using 95th percentile limits.

Reimann and others (2005) evaluated several methods of estimating background soil quality thresholds, and all methods used on lognormal data produced a threshold value greater than the 75th percentile. Reimann et al. 2005 and Sanei et al. 2007 both recommend using the upper whisker of boxplots, which is the 75th percentile + 1.5(75th -25th percentile). European scientists (Hinsby et al. 2008) suggest using the 90th or 97.7th percentiles to establish natural background



threshold values for groundwater. The authors recommend using the 90th percentile, not the 75th, for small datasets or for data where there may be some anthropogenic impact, which is consistent with the best remaining condition population of Missouri lakes.

In addition, several guidance documents previously published by EPA have recommended the 90th, 95th, or 99th percentiles for use in soil or water quality threshold determinations. In a guidance document on interpretation of environmental contaminant data published by EPA (Singh et al. 1997), several methods of calculating upper confidence limits of lognormally distributed environmental data were evaluated. For each method and example, the 95th percentile was always used as an example of an upper confidence limit. EPA's guidance document on acceptable statistical methods for determining Resource Conservation and Recovery Act (RCRA) facility compliance states that the 95th percentile of background (reference) data is recommended to establish an upper tolerance limit that is not to be exceeded in groundwater (USEPA 2009). When contamination thresholds rather than background conditions are being evaluated, EPA also has recommended the use of percentiles between 90 and 99 to make decisions about human health risk (USEPA 2002, USEPA 2006).

Even in studies that utilize the EPA recommended 75th percentile of reference sites or the 25th percentile of all sites approaches (often funded by the EPA), other methods are also recommended to be used in conjunction with or in lieu of the 75th percentile approach. Wang and colleagues (2007) used several methods to estimate potential reference thresholds for nutrients in wadable streams, including a regression modeling approach (intercept of nutrient concentrations and anthropogenic impact), regression tree analysis of biological responses, and the EPA 25th percentile approach for all sites. Notably, they did not recommend the use of the percentile approach without corroborating biological response data. Herlihy and Sifneos (2008) found that when they compared the EPA 25th percentile all streams approach, the 75th percentile reference stream approach, and a regression model of nutrients and human disturbance, there were problems with the application of both EPA approaches to setting nutrient criteria. The 25th percentiles of all streams were significantly lower than the 75th percentile of reference streams, calling into question the validity of the EPA guidance. In addition, the choice of screening methods for reference sites made a significant impact on the value of the 75th percentile. Stevenson and others (2008) only recommended a stream nutrient criterion based on the 75th percentile of reference streams after it was confirmed by multiple dose-response change-point analyses of biological variables. They recommend the use of multiple approaches for setting criteria and the use of experiments to confirm causal relationships, neither of which have been performed by EPA in the process of proposing Missouri NNC for lake and reservoirs.

The weight of the above evidence points to EPA's use of the 75th percentile of the best remaining condition in Missouri lakes as arbitrary, and use of that percentile would falsely identify healthy lakes as nutrient-impaired. This produces the exact situation EPA was attempting to avoid by not picking a measure of central tendency (EPA 2000). If the EPA Alternative 1 approach were used to develop NNC for Missouri lakes and reservoirs, the 95th percentile of the least disturbed lakes would be a more representative and defensible condition (than the 75th percentile). The 95th percentile is a very common threshold used in statistics for a wide range of tests, distributions, and hypotheses, including statistics using the lognormal distribution.

3. Alternative 2 more appropriately links criteria, screening levels, and eutrophication impacts to attainment of designated uses.

EPA specifically requests comment regarding each Alternative's ability to be protective of designated uses (Fed. Reg. Vol. 82 No. 247 at 61220). EPA's Alternative 1 protection values were derived based on the 75th percentile of a least disturbed lakes population (see Comment 2), but lacks the necessary, specific relationship to attainment of designated uses as required by 40 CFR part 131.11. A percentile distribution of a reference set of lakes can be used to derive criteria, but only when the selected percentile and criteria used to develop the reference population show a scientifically sound relationship to designated uses. EPA's selection criteria for least disturbed lakes define lakes with "minimal" human impact, but do not necessarily identify lakes that attain designated uses. An example is EPA's decision to eliminate lakes that met all screening criteria, but had higher nutrient and/or chlorophyll-a levels that were deemed outliers. There was no determination that these lakes exhibited unhealthy or undesirable conditions, nor any data to support that designated uses were not met in these particular lakes. EPA's Alternative 1 approach was also not supported by any Missouri specific studies that would demonstrate appropriate chlorophyll-a and/or nutrient levels for maintenance of aquatic life (or human health) uses. The assumption that a percentile distribution of a reference population is by itself, without supporting evidence of designated use attainment, is flawed. Ultimately, the flaws inherent in this approach are what led EPA Region 4 to withdraw NNC for Florida in favor of the State's approach. These flaws are exacerbated by the fact that the Alternative 1 proposed criteria are treated as standalone and sufficient to determine impairment in the absence of the eutrophication impacts that would be identified if non-attainment of designated uses has occurred.

Missouri's proposed screening values as represented by Alternative 2 were also set based on a percentile distribution of a population of lakes, but the chlorophyll-a criteria were supported by additional evidence that link the criteria to designated uses. The chlorophyll-a criteria were based on a review of the literature and discussions with Missouri reservoir and fishery management professionals; staff from the Missouri Department of Conservation (MDC) and University of Missouri (MU) made recommendations for chlorophyll concentrations that would support aquatic life uses in reservoirs. The proposed chlorophyll-a criteria were set to the low end of the range of literature values related to nutrient versus fish community productivity (MDNR 2017, p.21-25), and are within the range of chlorophyll-a values set for other states (MDNR 2017, p.8-10). Further, by linking the proposed screening levels to the eutrophication factors, Missouri DNR's proposal is based on sound scientific rationale that identifies impairment when screening levels and eutrophication factor(s) are exceeded.

Like Missouri DNR's proposal, the Alternative 2 approach to linking criteria to attainment of designated uses is more robust and scientifically defensible. This approach allows for a level of confidence that exceedance of the proposed criteria is linked to unhealthy or undesirable conditions that cause non-attainment of designated uses.

4. Alternative 1 lacks a relationship between causal and response variables.

EPA's Alternative 1 identified chlorophyll-a, TN, and TP criteria independent of each other based on the 75th percentile distribution of least disturbed lakes. No attempt was made to determine the nutrient levels that may (or may not) correspond to the 75th percentile chlorophyll-a concentrations. Chlorophyll-a is a nutrient response variable and while it is reasonable to set criteria for response variables, thresholds identifying impairment need to be linked to their causal variables (TN and TP) (EPA 2000). Lack of an identifiable link between the causal and response variables prevents the ability to consider the uncertainty that is inherent in the nutrient/chlorophyll-a relationship, further



undermining the ability of the proposed criteria to effectively serve as water quality criteria and demonstrate attainment of designated uses.

In contrast, the Missouri and Alternative 2 approaches similarly derive nutrient screening values based on the relationship with the chlorophyll-a screening value, which directly ties them to a biological response. Although the relationship does have some uncertainty that is not directly addressed in the proposed TN and TP screening values, this approach is preferred, is consistent with EPA guidance (EPA 2000), and is more appropriate for determining attainment of designated uses.

5. The Implementation of the Alternative 1 criteria is not consistent with their derivation.

For each lake selected to be part of the Alternative 1 least disturbed population, seasonal geometric mean concentrations were derived for chlorophyll-a, TN, and TP. The median of these seasonal geometric mean concentrations was selected to represent that lake in the population. Then, the 75th percentile of that distribution across all selected lakes was used to derive the criteria. EPA is proposing the implementation of the criteria using a three-year rolling average of the lake seasonal geometric means. There are multiple flaws in this approach that render the criteria overprotective and inconsistent. EPA's selection of the median concentration of seasonal geometric means for each lake is unnecessary and overprotective. Following the selection criteria used to identify least disturbed lakes, the entire dataset for each lake represents that least disturbed condition. By selecting the median value (a measure of central tendency), EPA is adding an overly conservative measure that effectively identifies half of the dataset (the years with higher values) for each lake as unrepresentative of the nutrient and chlorophyll-a condition of the lake. This is inappropriate given that the lake (and all of the data associated with that lake) are representative of the least disturbed condition. All of the seasonal geometric means for each lake represent this "desired" condition, including its inherent variability, and should not be reduced to a single measure of central tendency of the dataset.

The derivation of the criteria includes spatial variability (by including multiple lakes in varying locations), but not temporal variability, as it includes one long-term median per lake. EPA is proposing the criteria to be implemented as a three-year rolling average of seasonal geometric mean concentrations. A single long-term median has less variability than three year rolling averages. A three-year rolling average of seasonal geometric means is not consistent with the long-term median of seasonal geometric means and leads to an implementation strategy that can result in falsely identifying lakes as impaired. Given that the median value is the central tendency for data over a long period of time and the seasonal geometric means will vary each year (and over three-year rolling averages), it is not appropriate to implement a strategy that does not account for the temporal variability of chlorophyll-a or nutrient concentrations. For example, several of the lakes used in the Alternative 1 dataset have a median below the 75th percentile of the medians dataset, but if the proposed chlorophyll-a criteria were implemented on three-year rolling averages, then those lakes would be considered impaired (Breckenridge Lake, Deer Ridge Lake, Hazel Creek Lake, Lake Paho, Lake Thunderhead, Milan Lake, etc.)

In contrast, the Missouri DNR and Alternative 2 proposed screening values are derived from seasonal geometric means and applied as such. The chlorophyll-a criteria are implemented on a not-to-exceed more than once in a three-year period, which is consistent with how other states have applied NNC (e.g. Florida). This approach accounts for the spatial and temporal variability inherent in nutrient and chlorophyll-a data and is consistent with the derivation.



6. Further clarification of specific thresholds for eutrophication factors is necessary to reduce uncertainty.

Both Alternatives in the EPA Notice of Proposed Rulemaking incorporate eutrophication factors as forms of biological validation of attainment or impairment. EPA decided to include the same eutrophication factors in Alternative 1 as those proposed by Missouri DNR and incorporated into Alternative 2 (Fed. Reg. Vol 82 No. 247 at 61225). While Comment 1 above addresses the structure of incorporating these eutrophication factors into the criteria, here we discuss the factors themselves and how each is used to determine impairment. The most recent Missouri DNR Technical Support Document (TSD) for lake nutrient criteria development (MDNR 2017) improves on earlier versions by including more specific factors and thresholds that would be used to identify impairment. However, additional clarification is needed to ensure consistency, applicability, and provide Missouri DNR and the regulated community with certainty of the criteria implementation. Specifically, two of the eutrophication impact factors warrant discussion: epilimnetic excursions from dissolved oxygen (DO) or pH criteria, and observed shifts in aquatic diversity attributed to eutrophication. In both cases, more information is necessary to determine what would constitute impairment.

Missouri DNR discusses the magnitude of DO and pH excursion that would trigger impairment, but does not discuss frequency and/or duration of exceedance (MDNR 2017). In the current form, the Missouri TSD could be interpreted to indicate that a single DO or pH measurement outside the applicable range would be deemed an impairment and, therefore, the eutrophication factor would be exceeded. Given the diel and seasonal variability in these constituents and the fact that a short-term excursion is not indicative of aquatic life use impacts, we recommend further clarification on how DO and pH measurements would be interpreted.

Similarly, the Missouri DNR TSD (MDNR 2017) does not discuss what constitutes a shift in aquatic diversity or how any shift could be directly linked to eutrophication. While we agree generally that this eutrophication factor can be used to determine if an impairment may exist as a result of nutrients, more information is needed to understand how this particular factor would be implemented. Information regarding what specific aquatic communities would be investigated, how a shift would be identified and calculated, the time-period of investigation, and how a link to eutrophication would be established are necessary. This particular eutrophication factor may require significant data collection over an extended period of time, and is subject to multiple potential influencing factors and varying interpretation. Until such time that specific thresholds identifying shifts in aquatic diversity and links to eutrophication can be established, we recommend this impact factor be removed from the proposed list, while relying on the remaining factors to determine impairment.

In general, we agree with the inclusion of eutrophication factors in conjunction with screening values in a combined criterion approach to deriving scientifically defensible NNC. These factors should be considered carefully, and include specific thresholds that allow for clear and consistent implementation. This would ensure clarity and certainty for Missouri DNR who implement the criteria as well as stakeholders tasked with compliance.

7. Proposed criteria (Alternative 1 and 2) should not be applied to Tributary Arms

EPA requested comment on the potential application of either proposed lake criteria to so-called “tributary arms”, which it defines as “a substantial segment of a Class L2 lake that is primarily recharged by a source or sources other than the main channel of the lake.” We believe that the datasets used to derive the Alternative 1 criteria and Alternative 2 screening values are not representative of tributary arms, and thus the proposed alternatives are not appropriate. EPA states that “only data from the main body of these lakes/reservoirs (i.e., from deeper, open water locations)



were used in the reference condition analysis” for Alternative 1 (Fed. Reg. Vol. 82 No. 247 at 61220). Similarly, the dataset for the Missouri DNR (MDNR 2017) screening values was “limited to sample sites located near the reservoir dam and excluded sites located in reservoir arms” and the rule states that “all samples must be collected from the reservoir surface, near the outflow end of the reservoir, and during the growing season of May through September. Criteria may be assigned at a later date to tributary arms of large reservoirs to provide additional protection.” The specific locations used in derivation of the Alternative 1 and 2 criteria are specific to the lakes, and cannot be expected to result in criteria that would reflect conditions in the tributary arms. The resulting criteria may be over or under protective. Criteria applicable to the tributary arms should be derived with consideration of the specific nutrient and biological conditions of these systems. Derivation of criteria for the tributary arms would need to consider downstream waters impact, but ascribing the lake criteria to the tributary arms would not account for the inherent mixing and assimilative capacity of these systems.

We appreciate the opportunity to provide comments on this proposed regulatory action. We support the use of the combined criteria approach for NNC development, including nutrient thresholds and biological verification (eutrophication factors) to determine attainment of designated uses. We also support the use of site-specific data and sound scientific rationale during the criteria derivation process.

We acknowledge and appreciate the extensive effort Missouri DNR and EPA have undertaken thus far, and welcome the opportunity remain engaged in this important issue.



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