

State of Minnesota  
Minnesota Pollution Control Agency (MPCA)  
**Attachment 1** to MPCA Post-Hearing Response to Public Comments  
MPCA Detailed Responses to Public Comments  
November 22, 2017

This document supplements information in the Statement of Need and Reasonableness (SONAR) in the matter of the proposed amendment to Minnesota Rules Chapter 7050, relating to the revision of the sulfate standard to protect wild rice and identification of wild rice waters, Minn. R. pts 7050.0130, 7050.0220, 7050.0224, 7050.0470, 7050.0471, 7053.0135, 7053.0205, and 7053.0406.

This document is **Attachment 1** to the Cover Memorandum and other attachments that comprise the Minnesota Pollution Control Agency (MPCA or Agency) Post-Hearing Response to Public Comments. This Attachment 1 provides the MPCA's detailed response to comments about specific concerns or addressing technical details not addressed in the Cover Memorandum. The comments addressed were submitted during the pre-hearing comment period; during the public hearings held on October 23, 24, 25 and 30, 2017 and November 2, 2017; and the post-hearing period through November 17, 2017. The Agency thoroughly reviewed public comments, participated in the hearing, and reviewed the transcripts of the hearing. Where the MPCA's review determined that a comment, or multiple comments on a similar topic, required a detailed response that response is provided in this document.

To facilitate the review of comments and organize the response, the MPCA anticipated a number of topic areas and in some cases subtopics within topic areas. Those topics and subtopics are identified by number in the list below and **Attachment 3** to the MPCA Post-Hearing Response to Public Comments, and correspond to the topic number for each comment in the **Attachment 2** spreadsheet. At the time of this Response, comments have not been received for some of the identified topic areas and therefore no response is provided. However, because the MPCA expects to receive comments in those areas, the topics and numbers are reserved for future responses.

**Topic Area 1 – Comments about the beneficial use.**

Responses to general concerns about the beneficial use are provided in Attachment 2.

Topic Area 1.1 - The beneficial use should be expanded

Responses to this topic area are provided in Attachment 2.

Topic Area 1.2 - Wild rice should be a Class 2 beneficial use

Responses to this topic area are provided in Attachment 2.

Topic Area 1.3 – The beneficial use should not be limited to use of the grain by humans and wildlife

No comments were classified under this topic area.

Topic Area 1.4 - The use as a food for wildlife is undefined

No comments were classified under this topic area.

Topic Area 1.5 - Issues with 11/28/75 as the existing use

No comments were classified under this topic area.

Topic Area 1.6 - Issues regarding the need for a use attainability analysis (UAA), and Topic Area 1.7 - Issues regarding a Use and Value Demonstration

Some commenters referenced a concept called “use attainability analysis” in the context of MPCA’s identification of the Class 4D wild rice waters to which the standard applies. A use attainability analysis (UAA) is primarily used to show that a waterbody cannot meet the critical Clean Water Act (CWA) goals of supporting aquatic life and recreation. A UAA “is a structured scientific assessment of the factors affecting the attainment of uses specified in Section 101(a)(2) of the Clean Water Act (the so-called “fishable/swimmable” uses). The factors to be considered in such an analysis include the physical, chemical, biological, and economic use removal criteria described in EPA’s water quality standards regulation (40 CFR 131.10(g)(1)-(6)).”<sup>1</sup>

Some commenters stated that a UAA is required to complete this rulemaking because the MPCA is establishing a new wild rice beneficial use. Other commenters stated that a UAA is required to complete this rulemaking because the MPCA’s list of wild rice waters removes the wild rice beneficial use from waters where that use exists.

Some background is needed to fully respond to these comments. A critical goal of the CWA is to ensure that all waters are fishable and swimmable. These are known as the 101(a)(2) goals. “The national goal in CWA section 101(a)(2) is water quality that provides for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water where attainable” (80 Fed. Reg. 51024, Aug.21, 2015). States must protect the 101(a)(2) uses in all waters, unless those uses are shown to be unattainable via a UAA.

States must consider other uses and values of water beyond the 101(a)(2) goals and may designate other uses (beyond 101(a)(2) uses, which in MPCA’s water quality rules are identified as Class 2 uses) such as drinking water, industrial use, agriculture, etc. The wild rice beneficial use is one of these other uses. It is a Class 4 use, related to agriculture and wildlife uses; it is not a Class 2 use. The MPCA established this beneficial use through rulemaking in 1973 and rule amendments in 1997. As noted on pp. 33-35 of the SONAR, in this rulemaking the MPCA is clarifying the existing Class 4 beneficial use; the MPCA is not removing the existing Class 4 beneficial use, nor designating a new wild rice beneficial use. This rulemaking provides a specific list of waters that demonstrate the wild rice beneficial use.

Even if the MPCA were proposing a new beneficial use, the use being proposed (wild rice) is not a 101(a)(2) use. Therefore, changes to the use do not require a use attainability analysis. See 40 C.F.R. § 131.10(k); 78 Fed. Reg. 51024 (Aug. 21, 2015) “For non-101(a)(2) uses, this rule provides that a UAA is not required when a state or authorized tribe removes or revises a non-101(a)(2) use...”). See background and additional explanation in the following paragraphs.

Federal regulations set forth a different requirement – known as a Use and Value Determination when a state or authorized tribe removes or revises a non-101(a)(2) use. Under the Clean Water Act, states must classify their waters taking into consideration the “use and value of water” for various purposes. when a state is “adopting new or revised designated uses other than the uses specified in section 101(a)(2) of the Clean Water Act, States must submit documentation justifying how their consideration of the use and value of water for those uses...appropriately supports the State’s action.” (40 CFR 131.10(a)). This Use and Value Determination is the appropriate analysis for revising the application of the wild rice beneficial use to specific waters.

This rulemaking does for the first time provide a specific list of those waters that demonstrate the wild rice beneficial use. For that reason, The MPCA provided in the SONAR information about each source used to

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<sup>1</sup> <https://www.epa.gov/wqs-tech/use-attainability-analysis-uaa>

develop the list of wild rice waters. This information constitutes the necessary “consideration of the use and value of water” required under 40 CFR 131.10(k)(3). All waters in the source lists were considered; where the MPCA has not proposed waters from the sources as wild rice waters, the MPCA has concluded that sufficient information does not exist at this time to demonstrate that the use of the wild rice grain as a food source for humans and wildlife is an existing use or value for that water.

The MPCA provides its justification of how it has considered the use and value of the waters in its review of the sources used to develop the 4D list of wild rice waters in the SONAR. (See SONAR pp. 41-58 for a detailed discussion of the sources and how they were used to develop the 4D list of wild rice waters.)

### **Topic Area 2 – Comments relating to sulfate and porewater sulfide**

Comments in this topic area are addressed specifically in Attachment 2 and more generally in the Cover Memorandum to this response. Subtopic areas referenced in Attachment 2 are identified in Attachment 3.

### **Topic Area 3 – Comments about the equation**

#### *Topic Area 3.1 – Support for the existing 10 mg/L standard, and Topic Area 3.2 – Support for a single (fixed) standard instead of an equation*

Many commenters asserted that the MPCA should keep the existing 10 mg/L wild rice sulfate standard and enforce that level year-round. Some commenters stated that the existing standard is “well-supported by multiple lines of evidence” (Hearing Exhibit 1020, comment C).

In the SONAR and TSD, the MPCA has provided evidence that an equation-based approach that tailors the sulfate standard to the naturally variable environmental conditions that determine how efficiently sulfate is converted to porewater sulfide provides more precise protection of the wild rice beneficial use than the current standard. This does not mean that the current standard is “wrong,” but rather that it is imprecise. The MPCA’s analysis found that the current 10 mg/L standard has the lowest total of false positive and false negative rates of any fixed standard (32%, TSD p. 48). A fixed sulfate standard of 10 mg/L would also be the most balanced between false positives and false negatives, since at 10 mg/L the proportions of the two types of error are equal, at 16%, summing to a total of 32% (TSD, page 48). However, this misclassification rate is nearly double that of the proposed equation-based approach (16%-19% depending on the data set, TSD pp. 48-49). In other words, the proposed standard has significant advantages over even the best fixed standard since it is more likely to be correct for more cases.

Those in favor of keeping the 10 mg/L standard have not spoken to the fact that we know that there are waterbodies where sulfate is more efficiently converted to sulfide in the porewater, and a 10 mg/L sulfate standard would not protect wild rice. Table 1-12 of the TSD provides examples of these waterbodies from the field survey data set. We do not know at this point how many of the proposed wild rice waters need a sulfate level less than 10 mg/L to protect wild rice, but we do know that there will be some based on the evidence from the field survey.

Some commenters suggested that a fixed standard is preferable to the proposed equation-based approach irrespective of the “level” of the fixed standard. Commenters asserted that the equation-based approach was too complicated to understand and implement. Pages 73-75 of the SONAR and 48-62 of the TSD specifically address the benefits of the equation-based approach over any fixed standard. As noted in Part D of the Cover Memorandum, maintaining the 10 mg/L standard, or any fixed standard, would also lead to additional costs to the MPCA and dischargers, in the form of increased TMDL or site-specific standard requests, without improving the overall protection of wild rice from impacts due to elevated sulfate.

Lastly, we agree (and have proposed) that the standard should be enforced year-round, since sulfate in the ambient water contributes to the formation of sulfide in the porewater year-round.

Topic Area 3.3 – Issues regarding an aspect of the proposed equation

The comments are responded to in Attachment 2.

Topic Area 3.4 – Comments that use of an equation is unproven/inconvenient/unreliable

No comments were received in this topic area.

Topic Area 3.5 – Use of  $EC_{10}$

The comments are responded to in Attachment 2.

Topic Area 3.6 – Comments about steady-state assumption in developing the equation

Comments in this subtopic area are addressed in topic area 4.

Topic Area 3.7 – Groundwater concerns

Multiple commenters suggested that sulfate in surface water may not be controlling sulfate availability to the bacteria in the sediment that convert sulfate to sulfide. In particular, it was suggested that sulfide in sediment where wild rice grows may be controlled by the sulfate content of upwelling groundwater rather than the sulfate content of the surface water. Several commenters asserted that that it has not been demonstrated that discharged sulfate could adversely affect wild rice, perhaps because of upwelling groundwater.

Pollman et al. 2017 (Response Exhibit N.4) showed that there is a significant and quantifiable impact of sulfate in surface water on porewater sulfide in Minnesota waterbodies. Since discharged sulfate would increase sulfate concentrations in surface water, it is therefore reasonable to conclude that discharged sulfate has the potential to affect wild rice.

The TSD considered the potential effects of upwelling groundwater in some detail. It is noted that waterbodies with upwelling groundwater could be favorable sites for wild rice growth, and that such sites would not conform to the conceptual model underlying the proposed equation (TSD, pp. 23-24). Groundwater upwelling is discussed in the TSD as a likely reason for some of the observed false positives in the MPCA data set (waterbodies for which the equation predicts that sulfide should exceed 120 micrograms per liter, but the sulfide is less than 120).

Commenters expressed concern that permittees might be required to control sulfate in a discharge when such control is not necessary due to upwelling groundwater where the wild rice is growing (a false positive waterbody). The overall error rate of the proposed equation (16-19% depending on data set) is the sum of false positives and false negatives. False positives are indicative of situations where dischargers might erroneously be required to control sulfate; the false positive rate of the proposed equation is 9 to 11%. That rate would be significantly decreased by the implementation of the alternate standard included in the proposed rule, which would address situations where the porewater sulfide is below 120 micrograms per liter when average sulfate concentrations are higher than the standard that would be calculated based on the equation.

The TSD identified four wild rice waters in the field data set where the likely explanation for the observed false positive was upwelling groundwater (TSD, page 67). Therefore, the MPCA not only considered the possibility of upwelling groundwater affecting the sensitivity of a wild rice water to elevated surface water sulfate (and therefore sulfate discharge), but is proposing an alternate standard as part of this rulemaking that would address that concern. This topic is further addressed in pp. 67-71 of the TSD.

### Topic Area 3.8 – Long-term effectiveness of the calculated sulfide levels

No comments were received in this topic area.

### Topic Area 3.9 – Error Rate

Numerous comments were received suggesting that the error rate of the proposed equation is too high. Multiple people suggested that the error rate of almost 20% could be reduced by adopting the suggestions made by Ramboll/Environ in May 2017, which would reduce the error rate to just 4%. The error rate comments are addressed generally in the Cover Memorandum and more specifically here and in Attachment 2.

There were numerous misunderstandings as to just what the error rate of almost 20% means. Some commenters assumed it means an error rate of plus or minus 20% (e.g., Bemidji Comment 2A), which is not the case. Rather, the error rate is the sum of false positives and false negatives, which sum to 16% or 19% depending on the dataset being evaluated (TSD, Chapter 1F, pages 48-52). About half of the errors are false positives, and half false negatives.

It is important to understand that the error rate concerns only the accuracy of the equation in predicting the sulfide concentration from the sulfate, iron and carbon concentrations — it has nothing to do with whether the approach is protective of wild rice. The Ramboll/Environ error rate of 4% is achieved by changing the proposed protective sulfide concentration from 120 micrograms per liter in the porewater to 300 micrograms per liter — a concentration that is not protective, because wild rice density is significantly lower above 120 micrograms per liter (see TSD pages 63-66). That section of the TSD concludes, "...is important to remember that while it is desirable to minimize error rates as much as possible, doing so is a secondary consideration. The primary goal and requirement of the standard is to protect the wild rice beneficial use from the impacts of elevated sulfide. The MPCA's review of the proposal shows that the changes would result in a standard that is not sufficiently protective" (TSD, page 66).

The false positive rate of 9-11% would be significantly decreased by the implementation of the alternate standard included in the proposed rule revisions. The alternate standard (TSD, Chapter 2, pages 67-75) would address sulfate standards for false positive sites where the porewater sulfide is below 120 micrograms per liter when the average sulfate concentrations exceed the equation-calculated standard. Such cases are thought to be a result of upwelling groundwater low in sulfate. When groundwater moves upward through wild rice habitat, sediment sulfide is not a function of surface water sulfate, which cannot move downward into the sediment because of the upward groundwater movement. The TSD identifies four wild rice waters (out of 108 studied sites) where the likely explanation for the observed false positive was upwelling groundwater (TSD, page 67).

### Topic Area 3.9 – Effect of sulfate on different parts of the wild rice plant

See below in topic area 4.2.

## **Topic Area 4 – Comments about the MPCA's research and data analysis**

While MPCA designated discrete subtopic areas within this general topic, many comments overlap multiple subtopic areas. To some extent, therefore, the responses cannot be placed precisely into specific subtopic areas. Many are also generally addressed in the Cover Memorandum to the Response.

### Topic Area 4.1 – Issues with the research basis for the standard, and Topic Area 4.2 – Issues with peer review

A number of comments expressed concern that the laboratory hydroponic experiments did not fully replicate natural conditions and noted that the external peer review conducted by MPCA in summer 2014 identified deficiencies in the laboratory experiments sponsored by MPCA. Commenters suggested that since the MPCA did

not have the funding to repeat the experiments with adjustments to address peer review comments, the MPCA's proposed revisions to the sulfate standard are not scientifically supported.

First, it is important to emphasize that the MPCA fully recognizes the limitations of any one line of scientific investigation (laboratory studies, outdoor containers (mesocosms), field surveys, or sediment incubation experiments). Those limitations are acknowledged in Table 1-1 of the TSD. This limitation of any one line of investigation is why the MPCA has relied on a "multiple lines of evidence" approach to evaluate further the effects of sulfate on wild rice (see p. 4 of the TSD and the research protocol finalized on November 8, 2011, referenced in the TSD).

In particular, the laboratory experiments sponsored by the MPCA and by others (Fort et. al, 2017) both only evaluated the effect of sulfide on seed germination and early growth stages of wild rice. Given that wild rice is an annual plant that relies on re-seeding to sustain growth over successive years, it is critical to consider other biological endpoints such as number and weight of seeds produced. It is also important to investigate presence/absence and density of wild rice found in the natural environment at varying concentrations of sulfide. The need to evaluate the effects of wild rice over the full life cycle of the plant, relying on more than the limited-duration laboratory hydroponic experiments, is fully acknowledged in the research protocol and is reflected in the multiple lines of evidence approach undertaken by the MPCA in the study and data analysis that led to this rulemaking proposal.

Several commenters expressed the specific concern that the hydroponic experiments conducted as part of the MPCA-sponsored research exposed the entire wild rice seedling (root and stems) to sulfide, which in the commenters' assertion is a situation that does not exist in nature. Based on this some commenters have suggested the proposed protective sulfide value of 120 ppb is flawed. The MPCA noted on page 38 of the TSD that there is uncertainty in any protective sulfide concentration derived from the MPCA-sponsored hydroponic experiments due in part to the exposure of the whole seedling to sulfide, "which may not occur in nature except when the plant is germinating from a seed buried several inches in the anoxic sediment." In other words, while we do not agree that the hydroponic experiments represent a condition *never* encountered in nature, we do acknowledge the uncertainty. That is a main reason why the protective sulfide concentration was developed from the *field survey* data, not the hydroponics results. The hydroponics results help to identify a range of potential protective sulfide concentrations and also serve as a second line of evidence to support the proposed protective level, but they are not the data set from which the proposed 120 ppb protective concentration was developed.

Regarding the peer review panel comments on the MPCA-sponsored laboratory hydroponic experiments, in their September 2014 report the peer reviewers identified on pp. 4-5 improvements that could be made to those experiments *if* the experiments could be repeated. In addition to acknowledging limitations in the laboratory study and recommending potential improvements, the peer reviewers also noted on p. 4 that:

"The laboratory study on seeds and seedlings made an important contribution by demonstrating that sulfide (not sulfate) is the chemical form that drives observed toxicity in wild rice and is detrimental to wild rice growth. This study also provided information on the concentrations of sulfide where toxicity to wild rice could be expected..."

Simply focusing on the peer review conclusions and recommendations regarding the hydroponic experiments provides an incomplete picture of the results of the peer review. This is particularly important given that the MPCA relied more heavily on the field survey data set in determining the protective level of sulfide upon which

to base the proposed sulfate standard revisions. In fact, on page 6 of their report the peer reviewers specifically recommended that the MPCA make further use of the field data set in just this way:

“The field survey study was comprehensive and provides a rich data set that can be used to address the question of how, and at what level, sulfate, via sulfide, affects wild rice. The field survey encompassed a wide range of sites that varied in their concentrations of sediment water and porewater sulfate, sulfide, and iron. The panel agrees that the field survey provides some of the best data that the MPCA has available to investigate the relationship between wild rice and surface water sulfate levels. **These data also offer a means of determining sulfide levels that are protective of wild rice.** Much more analysis should be done on this data set. ...” [emphasis added]

The MPCA did not have the resources to repeat the hydroponic laboratory experiments with the refinements suggested by the peer review panel. Furthermore, the MPCA recognized that the hydroponic experiments, no matter how well designed, provided only part of the picture regarding the potential impacts of sulfate and sulfide on wild rice given their limited duration. Therefore, MPCA followed the conclusions and recommendations of the peer review panel to further explore the field data set to identify a protective sulfide level, and relied on the laboratory studies as corroborating information that demonstrated sulfide as the driver of toxicity and provided a range of concentrations where toxicity to wild rice could be expected. And while others did conduct additional laboratory hydroponic experiments using refined methods that addressed some of the peer review recommendations (Fort et al., 2014), that experimental design also had limitations (discussed on pp. 13-15 and 37-38 of the TSD).

#### Topic Area 4.3 – Issues with the MPCA's data analysis/statistical procedures

Multiple commenters asserted that the MPCA incorrectly analyzed the data that the MPCA used to support the choice of the protective concentration of sulfide. Many of the comments were vague or general, but Dr. Hawkins made specific comments at the Brainerd Hearing, in both oral and written comments. The specificity of his comments required the development of more complete responses than would fit into the spreadsheet format of Attachment 2. Therefore, his specific comments and responses are below:

**Brainerd Hearing Comment 4A:** My first key point is the proposed sulfate standard ... does not differentiate between water bodies that do and do not contain wild rice.... Now it's not because the MPCA did a bad job with their modeling. The fact of the matter is that there is no relationship between sulfate, TOC and iron and the presence or absence of wild rice. (77, line 18)

**Response:** See detailed response below to Hearing Exhibit 1026 Sub-comment A.

**Brainerd Hearing Comment 4B:** If we turn to sulfide, sulfide is somewhat predictive of the presence or absence of wild rice. Statistically significant, not really strong. It explains ten percent of the variability in the presence or absence of wild rice. Now, it may be the most powerful of the three factors looked at by MPCA, but it is still a small player. Ninety percent of the variability is still there. Now, the MPCA assessment found quite (inaudible) behavior for the sulfate standard. But the reason for that is that they're not predicting wild rice. They're predicting sulfide. We're not here to look after sulfide. We are here to look after wild rice. When you take the sulfide, the monkey in the middle, out of the picture, the association just goes away. (78, line 21)

**Response:** See detailed response below to Hearing Exhibit 1026 Sub-comment C.

**Brainerd Hearing Comment 4C:** All of these analyzed items, the sulfides, sulfate, sulfide, the TOC and the iron vary substantially from time to time within a water body. The variability within a water body is

comparable to that between water bodies. So, these chemistries are rapidly moving forward. Sulfate, TOC and iron are statistically significant predictors of sulfide, but they're not very accurate. Most of the variability in sulfide is still there even after you do the prediction. So, I think these are fundamental difficulties with the analyses that are being carried out, with the conclusions. (79, line 8)

**Response:** See detailed response below to Hearing Exhibit 1026 Sub-comment E.

**Brainerd Hearing Comment 4D:** The proposed standard of 120 is not well supported by the data. There is a wide range of cutoffs on sulfide, which will just trade off with specificity, more or less on a one-for-one basis. So, this number is no line in the sand. I am concerned that the sulfate standard is going to lead to a lot of time spent on wild goose chases, looking for problems where there aren't any and ignoring problems where there are. The effort spent on enforcing the standard might better be spent on looking into the more fundamental issues of why wild rice is or is not there. Not on a water-body-by-water-body basis. (80, line 14)

**Response:** See detailed response below to Hearing Exhibit 1026 Sub-comment G.

**Hearing Exhibit 1026 Comment A (Hawkins p. 2):** The waterbody-specific sulfate standard proposed by MPCA does not differentiate waterbodies hosting wild rice from water bodies that do not. This refers to Chapter 1 E, Development of an equation to calculate a numeric sulfate standard for each wild rice water. Both P values far from statistical significance. In other words, the predicted protective sulfate thresholds do not associate with the presence or absence of wild rice.

**Response:** Here Dr. Hawkins criticizes a straw man that was not presented by the MPCA in support for the proposed equation-based sulfate standard. The commenter misleadingly implies that the calculated sulfate standards should act as a bright line, below which wild rice should be significantly present more often than above the calculated standards. The MPCA reasoned in the TSD that an appropriate water quality standard is not a bright line (TSD, p. 77), but rather a protective concentration of a pollutant below which wild rice can thrive, and above which conditions are progressively less favorable. Because of the progressively less favorable conditions, statistical tests of differences above and below a protective standard, such as performed by Dr. Hawkins, may not detect a significant difference in presence/absence. In addition, in identifying 120 µg/L as a protective sulfide concentration the MPCA considered wild rice density in addition to the presence and absence of wild rice. Although wild rice presence rate is not significantly different for data points compared between those grouped below 120 µg/L and from 120 to 300 µg/L, the density of wild rice is significantly lower when porewater sulfide concentrations are above 120 µg/L. Therefore, for the purposes of the proposed standard this indicates that sulfide levels above 120 are not as protective, even if wild rice is present (TSD, pages 65-66).

**Hearing Exhibit 1026 Comment B (Hawkins p. 3):** I have been unable to find any function of surface water sulfate, porewater iron and porewater total organic carbon that differentiates water bodies hosting wild rice from water bodies that do not. This refers to Chapter 1 E Development of an equation to calculate a numeric sulfate standard for each wild rice water. This also finds no evidence of any difference in surface water sulfate, porewater TOC or porewater iron between bodies with and without wild rice. In other words, the core components of the proposed equation do not associate with wild rice presence or absence.

**Response:** Dr. Hawkins implies that the lack of relationship between the presence of wild rice and each of the three variables that control porewater sulfide (surface water sulfate, sediment total extractable iron, and sediment total organic carbon) is a weakness in the proposed equation. However, his analysis simply reiterates the analysis presented in the TSD (p. 23): "Interestingly, sulfate, TOC, and TEF<sub>e</sub> do not have any statistically significant effect on wild rice occurrence when considered individually (p= 0.15, 0.79, and 0.48, respectively; Table 1-3; Myrbo et al., in press-1). These three environmental variables only have a

relationship to the occurrence of wild rice when they are considered simultaneously, given that particular combinations of the three can produce excessive concentrations of porewater sulfide (Part E of this Chapter)." The lack of statistically significant individual relationships does not negate the statistically significant relationship found by the simultaneous consideration of the three variables in combination, and it is this combination that is the basis for the proposed equation. Note that Dr. Hawkins mistakenly identified the iron and carbon variables as in porewater but presents statistical output that corresponds to the correct variables (i.e. iron and carbon in sediment).

**Hearing Exhibit 1026 Comment C (Hawkins p. 4):** Porewater sulfide is a weak predictor of wild rice presence. Although statistically significant, it is not much better than blind guessing. This refers to Chapter 1C. Identification of 120 µg/L as the protective sulfide concentration. Receiver operating characteristic is a standard tool for assessing a diagnostic. The ROC of a good diagnostic initially rises sharply then flattens. Random guessing gives a straight line from bottom left to top right corner of graph. Area under the curve (AUC) measures quality of diagnostic: 1 for a perfect predictor, 0.5 for random guessing. There is a formal test of whether AUC is better than 0.5. AUC of 0.653 shows that porewater sulfide is statistically significantly better than random guessing (AUC=0.5), but not by much. Quantifying another way, sulfide is highly significant in logistic regression for wild rice presence (P=0.0031). But it explains less than 10% of the variability, leaving better than 90% due to other causes.

**Response:** The text of this criticism is very similar to Dr. Hawkins's first comment (comment A, page 2), although it is not clear what data he analyzed (see below). In his comment, Dr. Hawkins implies that the protective concentration of sulfide should be a bright line, below which wild rice is generally present, and above which wild rice is generally absent. In his oral comments, Dr. Hawkins stated that the proposed 120 µg/L protective sulfide level is not the bright line that he erroneously seeks ("So, this number [120] is no line in the sand." Brainerd Hearing Transcript, Page 80, line 7).

A "line in the sand" concentration might be an appropriate way to identify a target concentration of an herbicide to kill most of the weeds in a field. But the MPCA mandate is to identify a *protective* concentration, which is necessarily a significantly lower concentration than the level above which the wild rice beneficial use is completely absent, which seems to be the concentration sought by Dr. Hawkins. The protective concentration of sulfide will necessarily be a "weak predictor of wild rice presence," because wild rice will be present above that concentration, albeit at progressively lower probabilities of occurrence and density. The MPCA never intended the protective sulfide concentration to approximate an absolute dividing line between wild rice presence and wild rice absence – the "line in the sand" sought by Dr. Hawkins – but rather a threshold above which the wild rice beneficial use is not sufficiently protected. This renders non-significant the simplistic statistical analysis used by Dr. Hawkins. Dr. Hawkins's final point is that sulfide is highly significant in determining wild rice presence but explains a small portion of the variability. This is true and thoroughly acknowledged in the TSD. The TSD repeatedly affirms that sulfide is just one of several factors that impact the viability of wild rice, but the fact that there are other factors besides sulfide that impact wild rice (the TSD describes several of these factors; TSD Chapter 1B, p. 23) is not a reason to abandon a sulfate standard (since sulfate leads to sulfide formation). The fact that sulfide is a statistically significant predictor of wild rice presence is exactly why a sulfate standard is needed to protect wild rice from the impacts of elevated sulfate.

The graphic and statistical analysis presented by Dr. Hawkins are also ambiguous. In particular:

- Dr. Hawkins claims to respond to TSD Chapter 1C, which explains MPCA's justification for the choice of 120 µg/L as the protective sulfide concentration based on multiple lines of inquiry and analysis. However, the comment refers to diagnostic tools (false positives and false negatives) that assess the

accuracy of a binary predictive model (i.e., predicting presence or absence or predicting whether a threshold is exceeded or not).

- It is not clear if Dr. Hawkins is talking about the model to predict if sulfide concentration in a waterbody will have a greater than 0.5 probability of exceeding 120 µg/L (which is addressed in the TSD in Chapter 1F) or the model to predict whether there is a greater than 0.5 probability of wild rice presence. There is no such predictive model discussed in Chapter 1C. Thus, it is not clear what Dr. Hawkins is graphing.
- The false positive rate, measured on the x-axis (the axis is mislabeled "False positives" when it should be "False positive rate"), is depicting the false positives of what? The comment is not clear.
- Similarly, the sensitivity measured on the y-axis (which is, by definition, the true positive rate) depicts the true positives of what?
- Also, in a receiver operating characteristic (ROC) curve, the false positive rate and the true positive rate (or sensitivity) are both presented as functions of some parameter such as the threshold chosen in the model (e.g., the protective sulfide concentration or the probability of wild rice presence used in the logistic model). But, Dr. Hawkins does not say what this parameter is in the graph he presents.

It is difficult to interpret and to respond to this statistical analysis without further explanation of what the commenter is trying to show in the ROC curve. Also, it is customary in an ROC curve to include a diagonal ( $x=y$ ) line spanning from the point (0,0) to (1,1) to represent the expected curve resulting from random guessing. Dr. Hawkins does include a line, but it is shifted upward and to the left and therefore potentially misleading. The standard  $x=y$  line would be entirely below the line of the predictive model, showing that the model does better than random guessing. With the shifted line, one might get the distorted impression that the model does not do better than random guessing, which is not true, as demonstrated by Dr. Hawkins in his ROC analysis.

**Hearing Exhibit 1026 Comment D (Hawkins p. 5):** The MPCA assessment of performance is questionable. This refers to Chapter 1 F Comparison of an equation-based standard to fixed standards: Error rates and concerns. MPCA document claims that proposed sulfate standard does fairly well in predicting porewater sulfide. Porewater sulfide is a surrogate endpoint for rice presence/absence. Our real concern is predicting wild rice, not porewater sulfide. Surrogate endpoints are valuable in some circumstances: when they are easier to get than the real endpoint, and when they are strongly associated with the real endpoint. Neither of these conditions holds here. A visual assessment of the wild rice is surely easier, cheaper and quicker than sampling and assaying to determine water chemistry; and porewater sulfide is not strongly associated with wild rice presence or absence. The more appropriate question is whether the proposed sulfate standard can predict presence or absence of wild rice, the answer to which appears to be "No."

**Response:** Here Dr. Hawkins criticizes a straw man that MPCA never presented as support for the proposed equation-based sulfate standard. Dr. Hawkins states that the equation should predict the presence and absence of wild rice, whereas the point of the equation is to calculate the concentration of sulfate that maintains the sulfide concentration below the protective value of 120 µg/L (TSD Chapter 1E, pp. 45-47). Dr. Hawkins is essentially suggesting that low sulfide should cause wild rice to appear in a waterbody; but low sulfide does not cause wild rice. Rather, low sulfide allows wild rice to grow if other conditions are also favorable. Wild rice may not be present in a waterbody for multiple reasons that are not fully understood (e.g., inappropriate hydrology, inappropriate bottom substrate, or competition by perennial plants such as lilies or cattail), and were not the goal of the research sponsored by the MPCA. The goal of the proposed equation is to calculate a sulfate standard that protects wild rice from impacts of elevated sulfate (which

occurs due to conversion of sulfate to porewater sulfide as explained in the TSD and elsewhere in this Response).

**Hearing Exhibit 1026 Comment E (Hawkins p. 6):** All four analytes vary substantially from time to time within the same water body. This relates to Chapter 1D Assumption that sulfate, TOC, iron and sulfide are in a steady state at field sites. Data sets include 53 water bodies sampled on two or more occasions. The variation in sulfide level from time to time within the same water body, shown in this logarithmic-scale box and whisker plot, is large – it is comparable to that from one water body to another. Sulfate, iron and TOC show similar large variations within a water body from one time to another. Water body chemistry is a moving target. This may help explain its low association with wild rice.

**Response:** Dr. Hawkins apparently misunderstands what is meant regarding steady state as presented in Chapter 1D of the TSD. Dr. Hawkins presents a chart of variation in sulfide levels within 53 water bodies that were sampled on two or more occasions during the MPCA-sponsored field survey. (The MPCA database includes 64 such waterbodies; it is unknown why Dr. Hawkins did not graph all the waterbodies. It is also unknown what the numbers on the x axis of his chart refer to.) Dr. Hawkins seems to assume that repeated samples represent variation over time (e.g., “time to time”). However, 17 different waterbodies were sampled multiple places on a given day, the analysis of which demonstrated that the variation is more place-based than time-based. Myrbo et al. (Response Exhibit N.2) showed that in the waterbodies sampled monthly there was no seasonal trend in sulfide, iron, or TOC. Dr. Hawkins implies that because sulfide concentrations vary within water bodies, the variation must be evidence of non-steady state. “Steady state” does not mean that a waterbody has the same concentrations of measured variables at all sediment sampling sites within a waterbody, but rather that at a given site within a wild rice water there will be no significant change in sediment concentrations of TOC, iron, or sulfide over seasons or years (TSD, p. 43). Pollman et al. (Response exhibit N.4) demonstrated that sulfide concentrations in Minnesota lakes and streams are in steady state with the sulfate, iron, and TOC concentrations. Dr. Hawkins simply reinforces the conclusion that sulfide should respond to different sediment conditions when he notes that sulfide, TOC, and iron vary within water bodies. It is because of this natural environmental variation in TOC and iron that the proposed rule mandates the sampling of sediment in five transects across each wild rice water, and the analysis of TOC and iron. The protection of the wild rice beneficial use in that water body is achieved by implementing the lowest calculated sulfate concentration as the numeric sulfate standard for that wild rice water.

**Hearing Exhibit 1026 Comment F (Hawkins p. 7):** SO<sub>4</sub>, TOC and Fe are imprecise predictors of sulfide, albeit statistically significant. This refers to Chapter 1 C. Relationship between surface water sulfate and porewater sulfide. Regression of porewater sulfide on surface water sulfate, porewater TOC and porewater iron gives High statistical significance, but explains only 49% of sulfide variability. Graph of actual vs predicted sulfide. Dotted lines are where prediction is off by a factor of 2. Many predictions are this bad or worse.

**Response:** Dr. Hawkins performed multiple linear regression (MLR) on the MPCA field data and implies that sulfide prediction values are not satisfactory. The MPCA did compare MLR to the model that was used to create the proposed equation (which was not created with MLR, but rather with multiple binary logistic regression, MBLR), and concluded that it is more accurate to use MBLR. The MLR model developed by the MPCA had a misclassification rate of 23%, compared to 16% for MBLR (SONAR, p. 76).

**Hearing Exhibit 1026 Comment G (Hawkins p. 8):** A toxic sulfide threshold of 120 µg/L is unreasonable and would lead to many false alarms. Since sulfate seems ineffective in predicting presence/absence, could sulfide be used? ROC curve indicates possibility. A wide range of cutoffs - from 100 µg/L to 300 µg/L gives similar overall performance. PPV is proportion of bodies above cutoff that do not have wild rice. This is

below 50%; most of the effort in following up alarms is wasted. NPV is proportion of bodies below cutoff that have wild rice. Higher cutoffs give better PPV and worse NPV. For example 274 µg/L gives fewer, and better-focused alarms. PPV goes from 46% to 57% with modest drop in NPV from 76% to 73%. This tighter focus on where trouble is more likely may represent more effective use of resources.

**Response:** This comment is confusing. By referring to “false alarms,” Dr. Hawkins seems to be assuming that first a sulfide concentration would be obtained from a wild rice waterbody, and then compared to the presence or absence of wild rice. He implies that if wild rice is present above the protective sulfide concentration of 120 µg/L, a “false alarm” will have occurred. In this analysis Dr. Hawkins suggests that a more defensible protective sulfide concentration would be 274 µg/L. That suggestion is similar to the Ramboll Environ suggestion of 300 µg/L, which is addressed in the TSD (pp. 63-66). Both Dr. Hawkins and Ramboll Environ only evaluate the wild rice presence vs. absence, whereas the TSD points out that the density of wild rice declines significantly above 120 µg/L. The TSD concludes that declining densities above 120 µg/L indicate that sulfide concentrations above 120 µg/L would not be sufficiently protective of wild rice populations (TSD, p. 66). In addition, note that Dr. Hawkins expresses confusion about the nature of the proposed sulfide concentration of 120 µg/L by identifying it as “A toxic sulfide threshold of 120 µg/L...” The TSD and SONAR clearly describe 120 µg/L as a *protective* concentration, which must be a lower concentration than any threshold of demonstrable toxicity.

#### **Topic Area 5 – Comments stating that the proposed standard is not protective of wild rice**

Many comments stated their belief that the proposed revision to the sulfate standard will not be protective of wild rice. The MPCA has provided a response to these comments the Cover Memorandum to this Response. In addition, this topic is extensively covered in Chapter 1 of the Technical Support Document (TSD) and pp. 65-79 of the SONAR.

#### **Topic Area 6 – Comments about the Alternate Standard**

The comments received have been addressed in Attachment 2.

#### **Topic Area 7 - Comments about the Site-Specific Standard**

No comments received as of the time of this Response.

#### **Topic Area 8 - Comments about the narrative sulfate standard**

The comments received have been addressed in Attachment 2.

#### **Topic Area 9 - Comments about the use of a Water Identification (WID) number**

No comments received as of the time of this Response.

#### **Topic Area 10 – Comments about the identification of wild rice waters**

Many comments were received relating to the MPCA's identification of Class 4D wild rice waters; some of these comments were general while some were more specific. Very specific comments are addressed in Attachment 2.

##### *Topic Area 10.1 – Issues with the source materials – MPCA did not identify a sufficient number of waters as wild rice waters*

Several commenters generally requested that the MPCA include more waters as Class 4D wild rice waters, indicating that the list of Class 4D waters misses some important waters that should be included in the rule as wild rice waters. Some commenters stated that the MPCA did not fully use all the sources of information about wild rice waters that were available, particularly the MDNR 2008 list. Others (such as Recurring Comment G)

simply requested that the MPCA list additional lakes, streams, creeks, rivers and wetlands on which natural wild rice grows and has grown.

The MPCA acknowledges that it is likely that not all wild rice waters have been identified and is proposing a specific process for future identification of wild rice waters (proposed 7050.0471, subp. 2) A discussion of the proposed process is in SONAR pp. 58-64.

One source of particular concern was the 2008 Minnesota Department of Natural Resources (MDNR) Report *Natural Wild Rice in Minnesota—A Wild Rice Study Report to the Legislature* (MDNR 2008 report, SONAR Exhibit 21). Some commenters asserted that the identification of waters in the MDNR 2008 established the wild rice beneficial use as an existing use in those waters, and therefore any waters identified in the MDNR 2008 that are not included in the proposed rule as Class 4D wild rice waters will require a UAA because the MPCA is removing an existing use. The legal reasons why a UAA is not needed is addressed in the response to topic area 1.6. This section covers more specifics about why not all waters from the MDNR 2008 report were proposed as wild rice waters.

The MPCA does not agree that the list of waters in the MDNR 2008 report was developed for the purpose of regulation in general, and establishing the wild rice beneficial use as an existing use and therefore applicability of the wild rice sulfate standard in particular. The MDNR 2008 report includes the most comprehensive statewide inventory of wild rice available to date, but it has some limitations with respect to the MPCA's need to identify Class 4D wild rice waters subject to the wild rice sulfate standard. These limitations are specified on pp. 43-45 of the SONAR along with the MPCA's affirmative presentation on the reasonableness of how it used the information from the MDNR 2008 report when identifying proposed Class 4D wild rice waters.

Another source of particular concern was a recent list of waters provided by the 1854 Treaty Authority. The MPCA has collected and reviewed information from a variety of sources since 2012 to determine which waters to propose as wild rice waters, including information from the 1854 Treaty Authority (see detailed discussion in SONAR pages 38-51.) As MPCA staff was preparing the final list of proposed Class 4D wild rice waters in 2017, they were working with the most recently available information from the 1854 Treaty Authority (available on the Authority's web site and dated 3/24/2016.) On February 21, 2017, MPCA staff person Gerald Blaha received an e-mail from Darren Vogt (Environmental Director with the 1854 Treaty Authority) indicating that the Authority would likely be adding three additional lakes to their information (a list of 1854 Treaty Authority wild rice waters) when it was updated for 2017 (Response Exhibit N.20).

MPCA reviewed the additional information provided by the Authority in February 2017 and subsequently added the three waters as proposed wild rice waters. At that time MPCA staff were working with an internal deadline to finalize the proposed list of wild rice waters by March 21, 2017 for submittal to the Revisor of Statutes as a rule proposal in a new part 7050.0471 - Class 4D Surface Waters in Major Drainage Basins.

In the process of finalizing the SONAR for the wild rice rulemaking, MPCA staff person Patricia Engelking sent a few paragraphs from the SONAR describing the 1854 Treaty Authority information to Darren Vogt for review. This e-mail referenced the list the Authority had on its web site at the time dated 3/24/2016 (SONAR Exhibit 24) and the three additional waters MPCA was including as proposed wild rice waters.

MPCA received an e-mail on April 14, 2017 from Darren Vogt with review comments on the SONAR paragraphs and an updated list of 1854 Treaty Authority wild rice waters. The new list was dated March 29, 2017, and included 507 waters (Response Exhibit N.21). Since MPCA had already substantially completed the MPCA list of proposed waters wild rice waters, MPCA staff informed the 1854 Treaty Authority that this latest updated list

came in too late to be included in the list of waters submitted to the Revisor’s Office for the proposed rule part 7050.0471.

In October 2017, MPCA compared the March 29, 2017 list from the 1854 Treaty Authority with the March 24, 2016 version of the list that MPCA used in developing the MPCA wild rice waters proposal. There are 115 “new” waterbody entries that added to March 2017 version of the Authority’s wild rice list. Ninety-eight of the 115 water entries were also received from MDNR in April 2013 in response to the MPCA Call for Data. MPCA had previously reviewed these waters, found that there was not sufficient information to conclude at this time that the Class 4D wild rice beneficial use is an existing use for most of these waters, and identified them as insufficient information waters in the MPCA wild rice database. (See SONAR discussion on page 49 and SONAR exhibit 29.)

Of the remaining 17 “new” waters on the March 2017 version of 1854’s list:

- Four of those waters are proposed Class 4D wild rice waters:

Eagle Lake	69-0238-00
North Wigwam Lake	16-0804-00
Pelican River	09030002-530
Pigeon River	09030002-530

- Four of those waters are identified as insufficient information waters in the MPCA wild rice database:

Good Lake	38-0726-00
Loon Lake	16-0448-00
Rush Lake	58-0078-00
Unnamed (HWY 53)	69-0640-00

- The remaining nine waters, which are located in Cook County, appear to be wholly within the Grand Portage Indian Reservation based on the township and range location identifiers:

Center Lake	no lake ID noted
Chevan’s Lake	no lake ID noted
Dutchman Lake	16-0002-00
Eagle Marsh Lake	no lake ID noted
Helmer Nelson Lake	no lake ID noted
Little Lake	no lake ID noted
Loon Lake	no lake ID noted
North Lake	no lake ID noted
Taylor Lake	no lake ID noted

MPCA is not planning to include these nine waters as proposed Class 4D wild rice waters since the Grand Portage Band has requested that we not include waters wholly within their reservation in the proposed rule.

The MPCA also reviewed a number of other current and historical sources to look for evidence demonstrating the beneficial use is an existing use (on or after November 28, 1975) in specific water bodies. The MPCA has identified approximately 1300 waters that meet the beneficial use of use of the grain of wild rice as a food source for wildlife. See SONAR pp. 41-58 for details on the how the MPCA has reasonably considered a variety

of information sources to identify these waters. Waters were not proposed as wild rice waters absent evidence that demonstrated the beneficial use, but information about the waters was retained in an “insufficient information” list in case additional information demonstrating the beneficial use becomes available in the future.

A number of commenters (Recurring comment G) requested that the MPCA protect waters where wild rice has grown since the November 28, 1975 CWA “existing use” date and protect waters where wild rice was harvested by tribes. The MPCA agrees that it is important to propose wild rice waters where wild rice has been harvested by tribes (and others) since the existing use date. The MPCA has proposed all waters it is aware of that have been harvested by tribes (the exceptions being where tribes have specifically asked MPCA to not identify as Class 4D wild rice waters wholly within their reservation boundaries).

Topic Area 10.2 – Issues about consistency of identifying wild rice waters

No specific comments were received in this topic area.

Topic Area 10.3 – Issues about using two acres as a listing factor

No specific comments were received in this topic area.

Topic Area 10.4 – Requests to eliminate listing criteria (e.g. single stem constitutes wild rice water)

Comments on this topic area are addressed in Attachment 2.

**Topic Area 11 – Comments about specific waters that are/are not proposed as Class 4D wild rice waters**

The MPCA received a number of comments about specific waters and whether or not they were proposed in the rule as Class 4D wild rice waters. Those specific comments that could not be succinctly addressed in Attachment 2 are addressed below, with headings based on the waters that are the subject of the comment(s).

Dark Lake and Dark River

The MPCA received a comment from Dennis Good during the October 30, 2017 public hearing in Brainerd, Minnesota about whether Dark Lake (69-0790-00) and Dark River were proposed as wild rice waters.

**Dark Lake** was one of the MPCA Wild Rice Study Field Survey Sites (SONAR Exhibit 27). It is currently an insufficient information water because it had very few stems of wild rice when field crews surveyed the lake in 2013; see the photos and notes taken at the site during the field survey (Response Exhibit N.22). Information from a 2013 permittee report also indicated very few stems of rice over the 3.7 miles paddled on the lake (2013 *Wild Rice and Water Quality Sampling Report: Dark River and Dark Lake*, August 2013 report by Barr Engineering for the United State Steel Corporation, Minnesota Ore Operations – Minntac; see permittee reports in SONAR Exhibit 30). In addition, the MPCA has concluded from information received from the 1854 Treaty Authority that the wild rice observed in 2016 was very sparse (see photos in Response Exhibit N.29).

The **Dark River** was directly surveyed by kayak as part of the Barr Engineering 2013 permittee report cited above. No occurrences of wild rice were seen in the Dark River when it was surveyed from approximately one-quarter mile east of Timber Creek to Dark Lake. The total paddled survey length was 7 miles. For more details about the Barr Engineering survey of Dark lake and Dark River, see sections 2.2.1 and 2.2.2 in the *Wild Rice and Water Quality Sampling Report: Dark River and Dark Lake* (part of SONAR Exhibit 30).

MPCA staff also reviewed the MDNR Dark River fisheries survey file and found no record of wild rice at the river survey sites sampled by the MDNR in August, September, and November 1983. MPCA found no other information about the Dark River in other sources it used to evaluate wild rice waters. Therefore, Dark River is

neither proposed as a Class 2D wild rice water or identified as an insufficient information water in the MPCA wild rice database.

*Sandy and Little Sandy Lakes (also referred to as Twin lakes)*

At the October 24 public hearing in Virginia, Minnesota, Chrissy Bartovich (Environmental Director, United States Steel – Minnesota Ore Operations) commented that based on the November 28, 1975 CWA existing use date there is no evidence to demonstrate that the Class 4D wild rice beneficial use is an existing use in Sandy and Little Sandy Lakes. These waters, sometimes referred to as Twin Lakes, are currently proposed to be included as Class 4D wild rice waters in Minnesota Rules 7050.0471.

Ms. Bartovich correctly noted that the MPCA relied on a series of reports and lists of wild rice waters to support its list of Class 4D waters where the proposed sulfate standard would apply. However, the agency does not agree with her assertion that the information is vague and that “there is no evidence to prove the water bodies actually meet the criteria for designation.” (10/24/2017 transcript at page 81). The following discussion briefly outlines the evidence that MPCA relied on in determining that it is reasonable to include Sandy and Little Sandy lakes as Class 4D wild rice waters in the proposed rule.

- Waters identified in Appendix B of the MDNR 2008 Report with wild rice acreage estimates greater than two acres were proposed as wild rice waters (see SONAR p. 42 and SONAR Exhibit 21). In the case of Little Sandy Lake and Sandy Lake, Appendix B of the MDNR 2008 report at pages 80 and 81 has estimated wild rice coverage for Little Sandy Lake and Sandy Lake of 89 and 121 acres, respectively.
- SONAR Exhibit 23 is a list of 350 important wild rice waters in Minnesota. Response Exhibit N. 36 is the uncropped version of this spreadsheet that contains a comments column regarding the listed waters. (See also Response Exhibit N.28 for background information on how this list was developed.) The comments column for the Sandy Lake (69-0730-00) entry, which has a wild rice acreage estimate of 121 acres, indicates it is based on 1982 data and implies that it was no longer being managed for wild rice in 1992. The comments entry for Little Sandy Lake (69-0729-00), which has a wild rice acre estimate of 89 acres, has a similar statement but does not give a specific date when it was no longer being managed for wild rice.
- Sandy Lake has a long history of wild rice harvest and management. Response Exhibit N. 35 is a 1942 Fisheries Research Investigation Report No. 40 titled *The 1941 Minnesota Wild Rice Crop*. Little Sandy and Sandy Lake (formerly assigned a single lake identification number 16-249) are noted on page 8 under section 3 which discusses wild rice ripening dates and harvesting periods. Page 49 of the report identifies a 1941 wild rice acreage estimate of 50 acres and notes that the lake was being managed for wild rice. Lastly, page 58 of this report shows that the lake was open for wild rice harvesting in 1941. While this information pre-dates the existing use date in the CWA, it is useful corroborating evidence to support the information provided in the 2008 MDNR report and SONAR Exhibit 23.
- A September 3, 1966 MDNR Fisheries Lake Survey of Little Sandy Lake indicates the lake had wild rice stands of moderate density over the entire lake with the heaviest stand in the northeast part of the lake. A MDNR Fisheries Lake Survey of Sandy Lake on the same date described wild rice covering the entire lake – “wild rice stand in excellent condition over entire lake”. Again, while this information pre-dates the existing use date in the CWA, it is useful corroborating evidence to support the information provided in the 2008 MDNR report and SONAR Exhibit 23.

Wild rice on these two lakes is currently extremely limited in comparison with what it once was. The 1854 Treaty Authority has been involved in monitoring Little Sandy and Sandy Lakes since 2010 and an excerpt from the its December 2016 report titled *Sandy Lake and Little Sandy Lake Monitoring (2010-2016) Technical Report 16-06* follows and can also be found in Response Exhibit N. 37:

*Sandy Lake and Little Sandy Lake, also known locally as the Twin Lakes, historically have produced good stands of wild rice. Wild rice harvesters utilized the lakes when suitable crops were present. A lake survey in 1966 indicated moderately dense to dense stands covering both lakes. Rice production generally declined through the 1970s and 1980s, with little or no rice found in the lakes during a 1987 survey. Rice production has since remained poor. The lakes are located downstream of the tailings basin at the U.S. Steel Minntac iron ore operation.*

In summary, available evidence supports a determination that the Class 4D rice beneficial use existed in Little Sandy Lake (69-00729-00) and Sandy Lake (69-0730-00) after November 28, 1975, though in recent years the wild rice populations within Little Sandy and Sandy Lakes have largely been extirpated. The bases for this conclusion can be found in the comments and wild rice acreage estimates noted in Response Exhibit N. 36, the Vegetation Surveys discussion in Response Exhibit N. 37 at page 16, and the two 1987 MDNR memoranda regarding wild rice on Sandy and Little Sandy Lakes (Response Exhibit N. 39). The MPCA maintains that it is reasonable to include these two lakes as Class 4D wild rice waters during this rulemaking.

#### Day Brook

At the October 23, 2017 public hearing in St. Paul, Minnesota, Rob Beranek suggested that Day Brook (WID # 07010103-542) should not be included in the rule as a Class 4D wild rice water and instead should be identified as an insufficient information water.

Day Brook was proposed as wild rice water based on information in a permittee report listed in SONAR Exhibit 30, Permittee Monitoring Reports. Results from the Day Brook field survey are documented in a technical memorandum to Hibbing Taconite Company from Barr Engineering, subject heading *2011 Wild Rice Survey for Hibbing Taconite Company* dated 12/22/2011. During the field survey crews found a stand of wild rice in Day Brook of approximately 0.1 acres with between 50 and 75% wild rice coverage. The survey report notes that additional standards of wild rice were found immediately downstream of the above-referenced stand and “continued for several hundred yards” with wild rice coverage ranging from less than 10% to more than 75%. Based on this information MPCA concluded that it was reasonable to determine that sufficient wild rice was found in Day Brook during this survey to demonstrate the existence of the Class 4D beneficial use.

#### Topic Area 11.1 – Comments about identifying waters within tribal boundaries

As described in the section of the SONAR entitled “Note on Waters Within Indian Reservations” (pp 52 – 58), the MPCA has authority to identify and list wild rice waters for all waters of the state. Waters of the state in Minnesota is a broad designation, and results in overlapping or shared jurisdiction on some waters.

The Grand Portage Band (Hearing Exhibit 1020) objects to the MPCA’s decision to list wild rice waters in rule unless a tribe “opts-out”, stating that this “offends the Band’s inherent civil regulatory jurisdiction over our waters”. The Band also notes their opposition to the MPCA’s proposed standard and their intent to enforce their federally-approved standard on waters wholly within the Grand Portage reservation. They express their wish not to have any wild rice waters wholly within the reservation to be included in the MPCA’s list of Class 4D wild rice waters.

The MPCA apologizes that we misunderstood the Band's position on this issue offered during consultation. It was clear to MPCA that Grand Portage would be continuing to enforce their existing wild rice water quality standard within their reservation boundaries. We will remove the Grand Portage reservation waters (Cuffs Lakes, Mount Maud wetland, Teal Lake, and unnamed (Grand Portage) stream" from the identification of Class 4D wild rice waters.

The Fond du Lac band in oral testimony also objected to the MPCA's decision to identify waters wholly within the boundaries of the Fond du Lac Reservation as Class 4D wild rice waters. It has been clear to the MPCA that the Fond du Lac band would be continuing to enforce their existing wild rice water quality standard within their reservation boundaries. The MPCA will remove the Fond du Lac reservation waters from the identification of Class 4D wild rice waters. The waters being removed from the list of proposed wild rice waters are identified in Part IV of the MPCA's Response Cover Memorandum.

**Topic Area 12 - Comments regarding cultivated wild rice**

The comments received have been addressed where they are identified in Attachment 2.

**Topic Area 13 - Comments about the requirements for the future listing of wild rice waters**

The comments received have been addressed where they are identified in Attachment 2.

**Topic Area 14 – Comments about the enforcement of the standard**

The comments received have been addressed where they are identified in Attachment 2.

**Topic Area 15 – Comments about implementation of the standard**

The comments received have been addressed where they are identified in Attachment 2.

**Topic Area 16 – Comments about the Sampling Procedures and Analytical Methods**

The comments received have been addressed where they are identified in Attachment 2.

**Topic Area 17 – Comments about “no effluent limit required” in 7053.0406**

One commenter objected to this provision, and the U.S. EPA has notified the MPCA that it will be suggesting the removal of this provision. In Part IV of the Cover Memorandum to this Response, MPCA is proposing to remove this proposed provision from part 7053.0406, subpart 1. If there are situations where rice is not and cannot grow within part of a WID, the MPCA will split the WID and conduct a use and value determination (see response to topic area 1.6) to remove the wild rice beneficial use from the WID that does not support the beneficial use.

**Topic Area 18 – Comments about variances**

Responses to comments on variances are provided in Attachment 2.

**Topic Area 19 – Comments about costs**

Comments about costs, and particularly about the assertion that the MPCA failed to consider costs or needs to wait for the completion of the LCCMR study, are addressed in the Cover Memorandum to this Response. Responses related to specific details in comments are provided in Attachment 2.

**Topic Area 20 – Comments about political influences in the rule development process**

Some commenters raised concerns that the rule revisions are being made because of political interests or political pressure from certain interests. Many of these concerns are addressed in Attachment 2.

Topic Area 20.1 - Concerns about influences on the future listing of wild rice waters/sulfate standard levels/effluent limits and variances

Commenters stated their concerns that certain future activities of the MPCA will be subject to political influence. Comments have indicated concerns about: 1) the stability of MPCA funding that may delay the implementation of the standard; 2) whether the MPCA will actually conduct rulemaking to list additional wild rice waters; and 3) the ability of the MPCA to enforce the standard in light of the considerable costs involved with sulfate treatment.

Commenters are correct that there is no assurance that future funding levels, legislative actions, or state and federal environmental priorities will remain the same as at this time. However, the potential for changes in the future does not affect the reasonableness of the rule proposal or present an obstacle to its adoption.

Decisions regarding variances, effluent limits (which are part of a permit), site-specific standards, and the future identification of wild rice waters must all be made through a public process that includes public notice and the opportunity to comment. The MPCA's administrative processes for providing public involvement in these decisions (e.g. granting of variances, permit issuance, and rulemaking) have been in place for many years and are fair and reasonable mechanisms to implement decisions regarding complex regulations.

The MPCA has provided a specific discussion of each part of the proposed rules that addresses the process for future decision-making:

- Part 6 I. of the SONAR (pg. 106) provides a specific discussion of the reasonableness of the variance requirements specific to wild rice.
- Part 6. E.10 of the SONAR (pg. 89) provides a discussion of the reasonableness of the process for establishing alternate and site-specific standards. Note also that the proposed process for determining an alternative standard is based on the direct analysis of the sediment sulfide and not on considerations or issues that would be subject to political influences, such as economic impact or sociological factors.
- Part 6. D.4 of the SONAR (pg. 58) provides a discussion of the process for considering future identification of wild rice waters.

Topic Area 20.2 – Political basis for the rulemaking/revision of the existing standard

Commenters have stated concerns that political influences, both in support of mining interests and in opposition to mining interests, directed the MPCA's proposed revision of the existing 10 mg/L sulfate standard. The MPCA denies any intent for proposing the revisions to the sulfate standard other than the effective implementation of a water quality standard for the protection of the wild rice beneficial use. The MPCA does not dispute that when it adopted the existing standard in 1973, it provided needed and reasonable protection of the wild rice beneficial use. However, since that time, the scientific understanding of sulfate's effects on wild rice has improved and specific issues with the existing standard support the revision of that standard. The MPCA has discussed the need to revise the existing standard in the discussion of Need (SONAR pg.19) and in the discussion of the consequences of not adopting the proposed revisions in part 10.E. (pg. 189).

Some commenters have asserted that MPCA had decided to maintain the existing 10 mg/L sulfate standard in spring 2014, but changed that conclusion in the face of political pressure. This is not the case, and is a misunderstanding or misrepresentation of the actual events. In early March 2014 MPCA was preparing to issue a preliminary analysis of the results of the wild rice sulfate study. While the draft report was undergoing internal review and editing, MPCA recognized that the summary of the preliminary analysis was written in such a way that interested parties could interpret it to mean that the MPCA had concluded its work on the data analysis and evaluation of the existing standard. This was not the case; for example, the analysis had not yet had any form of independent peer review. To clarify this point the release of the report was delayed to allow time to revise the

summary section to avoid suggesting that a decision had been made when in fact it had not. The preliminary analysis report (SONAR Exhibit 5) was released in March 2014. Through a Data Practices Act request an interested party obtained a copy of an earlier draft of the preliminary analysis, and some commenters have drawn erroneous conclusions about the MPCA's intent based on that earlier draft.

**Topic Area 21 – Comments relating to the cultural aspects of wild rice**

The MPCA has heard much from the Tribes about the cultural importance of wild rice and included this information in the SONAR. It is also discussed in the response to Topic Area 23.

**Topic Area 22 - Comments about the historic range of wild rice.**

No comments received as of the time of this Response.

**Topic Area 23 – Comments about Native American issues and Treaty rights**

A number of comments asserted that the tribes have important treaty rights that give them a legal interest in protecting natural resources, including wild rice. They also assert (e.g., Hearing Exhibit 1020) that state agencies have a legal responsibility to maintain those treaty resources. In speaking about these treaty resources, tribes also mentioned that there has been damage to wild rice since the treaties.

A decline in wild rice amounts or quality since the treaties is a major concern to tribes, and they note that they disproportionately bear the impacts of any decline in wild rice, since rice is so important to their culture. Many spoke to the fact that the existence of wild rice is required for the survival of the Anishinaabe people, and that failing to protect wild rice will destroy their culture. Some commenters noted that preserving manoomin (and opposing the MPCA's rules) is an important part of preserving their cultural identity.

Disproportionate impacts are an issue of environmental justice or environmental racism. Commenters spoke about past injustices against native peoples, including the general discounting of indigenous views and knowledge. Some commenters feel that the proposed rule revisions, by not protecting wild rice, perpetuate a long history of oppression of the right of native peoples. Tribal commenters note that wild rice is food, medicine, and a relative. Comments raised concerns that the proposed revisions did not adequately recognize those Native American rights, or respect the concerns of the Native American community.

The MPCA recognizes the importance of wild rice to Native American culture. The SONAR discusses this importance, including in the section on environmental justice (page 133) and in the regulatory analysis. The MPCA views the proposed rule revisions to protect wild rice from the impacts of sulfate as an important component of maintaining the health of wild rice so that the tribes can exercise the harvest rights that may be established in treaty.

We agree with the Tribes that it is extremely important that wild rice be protected. The MPCA in no way intends to harm the Tribes, their rights, or their culture and cultural identity, through this rulemaking or any other action.

Some commenters spoke about the special knowledge that Tribes have about wild rice, because of their long association with rice. This kind of traditional ecological knowledge is important. So is the view of the Tribes that wild rice is a relative. However, the MPCA is constrained to operate within the Clean Water Act and state laws and regulations. The Clean Water Act is based on "beneficial uses" and how water can be used by people. The Clean Water Act and traditional knowledge are based on different conceptions of natural resources and epistemologies. The MPCA has tried, in this rulemaking, to balance those different worldviews.

#### **Topic Area 24 – Comments about mining, including Polymet**

A number of comments were received identifying concerns with the process of mining in general and specifically new kinds of non-ferrous mining including the Polymet mining proposal. The MPCA acknowledges these comments and the concerns that prompted them. However, because these comments relate to issues beyond the scope of this rulemaking, the MPCA is not providing a discussion of them in this Response.

#### **Topic Area 25 – Comments about the application of “sound science”**

The MPCA discusses comments about the application of “sound science”, including peer review in the Cover Memorandum to this Response. Furthermore, the SONAR and TSD, along with the responses to Topic areas 3 and 4, demonstrate that the proposed rule is based on sound science.

#### **Topic Area 26 - Comments relating to antidegradation**

No comments received as of the time of this Response.

#### **Topic Area 27 – Comments about iron plaque formation**

The comments received have been addressed where they are identified in Attachment 2.

#### **Topic Area 28 - Comments about mercury and the relationship of mercury and sulfate (mercury methylation)**

Multiple comments were received that stated or implied that a sulfate standard to protect wild rice should also consider the effect of increased sulfate concentrations on the methylation of mercury. The MPCA acknowledges that increased concentrations of sulfate have been shown to increase the methylation of mercury in aquatic systems where organic carbon is available and especially where background sulfate concentrations are low. Only methylmercury accumulates in fish, so enhanced production of methylmercury is a significant concern.

However, the proposed rule is about protecting wild rice from the impacts of sulfate; in a formal sense the effects of sulfate on the methylation of mercury are out of scope for this rulemaking. Nonetheless, the MPCA is very concerned about actions that might increase the mercury content of fish, and the MPCA is conducting a significant separate study concerning the factors that control mercury in fish. The MPCA has reviewed what is known about the effect of elevated sulfate on mercury methylation, and finds that the relationship between sulfate and mercury methylation is significantly more complicated than the relationship between sulfate and sulfide on which the proposed wild rice rule is based. Therefore, it would be even more challenging to develop a proposed sulfate standard that addresses the role of sulfate in the potential for production of methylmercury. The MPCA will not make any decisions as how to proceed on the question of enhanced mercury methylation until the results of the ongoing major study are available.

#### **Topic Area 29 – Comments about the relationship of nutrient pollution to sulfate**

Comments in this topic area are addressed in Attachment 2.

#### **Topic Area 30 – Comments about the genetic diversity of wild rice**

Several commenters identified concerns about protecting the genetic diversity of wild rice. The MPCA acknowledges these comments and the concerns that prompted them. However, because these comments relate to issues beyond the scope of this rulemaking, the MPCA is not providing a discussion of them in this Response.

#### **Topic Area 31 – Comments about procedural issues**

At the October 30 hearing at Brainerd, Minnesota, Peder Larson commented that the MPCA had failed to meet specific requirements of the Administrative Procedures Act, specifically the requirement of Minn. Stat. §14.131 regarding the description of the classes of people affected by the proposed rules. (10/30/17 Brainerd transcript,

beginning on page 102, line 1) " *The MPCA does not describe how the regulation of discharges will affect the benefit of enjoying the resource being protected... Only the wild rice below a discharge is affected...how many acres will be better protected if they adopt the standard? I suggest the benefits described will be enjoyed regardless of the rule.*" An additional comment (line 24, Holmes, 10/24 hearing comments) states "a cost benefit analysis will be required at the end of the day" implying the same deficiency in the MPCA's SONAR.

The Administrative Procedures Act requires the MPCA to provide a description of the classes of people the rule will probably affect.

*Minn. Stat. § 14.131-By the date of the section 14.14, subdivision 1a notice, the agency must prepare, review, and make available for public review a statement of the need for and reasonableness of the rule. The statement of need and reasonableness must be prepared under rules adopted by the chief administrative law judge and must include the following to the extent the agency, through reasonable effort, can ascertain this information:*

*(1) a description of the classes of persons who probably will be affected by the proposed rule, including classes that will bear the costs of the proposed rule and classes that will benefit from the proposed rule;....*

The statute requires a description of the classes, and further limits the requirement "to the extent the agency, through reasonable effort can ascertain this information." In Part 10. A (pg. 145) of the SONAR, the MPCA has provided the required discussion of the classes of people who will bear the cost and the classes of people who will benefit.

MPCA interprets Mr. Larson's comment as a request to MPCA to quantify the amount (e.g. acres) of wild rice that will be protected through the adoption of the proposed sulfate water quality standard. The comment implies that by not identifying the number of wild rice acres that are either at risk of damage or that will be protected by the standard, the MPCA has not adequately addressed how the regulation of sulfate discharges will affect the enjoyment of the beneficial use. Requiring identification of the amount of acres affected in order to determine the value of the benefit implies that the MPCA must conduct a cost/benefit analysis. The intent of the proposed standard is to protect the beneficial use of wild rice in Minnesota's surface waters – lakes, streams, rivers, reservoirs, and wetlands. The standard protects the water where wild rice grows and is not limited to protecting only those stems of wild rice present at this time or the use as it is enjoyed at this time. In addition, the extent and yield of wild rice in an identified wild rice water will naturally vary from year to year. The intent of the proposed standard is to protect existing and future wild rice. The Administrative Procedures Act does not require the MPCA to justify whether the benefit (in terms of the number of acres of wild rice affected, or the number of people who will derive some benefit from the protection of those acres) is greater than the cost of protecting those acres.

#### Topic Area 31.1 – Issues with inadequate notice

Some comments identified issues relating to the rulemaking process, alleging deficiencies in the notice provided, conflicts with other hearings being conducted about environmental topics, or concerns about the time available to review the extensive material provided in the rulemaking proposal.

The MPCA recognized the proposed revisions would be controversial and that many people would want to provide comments and present testimony regarding the proposed revisions. In response, the MPCA provided an expanded pre-public hearing notice period (from August 21, 2017 to the start of the hearings on October 23, 2017) well beyond the minimum 30-day notice required by the Administrative Procedures Act. The MPCA also provided hearings far in excess of the number and total time usually provided for rulemaking hearings. The MPCA scheduled hearing opportunities at a wide range of locations and times and provided extensive advance

notice. Six hearings were held and access was provided at eleven different locations for a total of 25 hours. No one was deprived of the opportunity to comment on the proposed rules.

The MPCA scheduled the hearings with the goal of providing the maximum accessibility to different groups within the constraints of budget and the availability of MPCA staff and the Administrative Law Judge. Only one of the six hearings was scheduled during business hours; the remaining five hearings were scheduled with the goal of making them accessible outside of typical business hours. For several years the MPCA has used videoconferencing for rulemaking hearings to increase access to persons in outstate locations. For this rulemaking, videoconferencing the November 2 hearing provided the opportunity for people in different parts of the state to attend the hearing. The MPCA also held one hearing at a tribal community college, specifically to provide convenient access to the Native American community in that area.

Topic Area 31.2 through 31.4

No comments were received in these subtopic areas.

Topic Area 31.5 – Issues with statutory requirements for cost analysis

Comments relating to this topic area are addressed in Attachment 2.

Topic Area 31.6 – Issues with Tribal Consultation

The MPCA takes the requirement to consult with tribal entities very seriously. Executive Order 13-10 requires state agencies to “recognize the unique legal relationship between the State of Minnesota and the Minnesota Tribal Nations, respect the fundamental principles that establish and maintain this relationship, and accord Tribal Governments the same respect accorded to other governments” and requires agencies to have a tribal consultation policy.

The MPCA recognizes the importance of wild rice to the Dakota and Anishinaabe peoples. The MPCA reached out to Native American communities during the process of developing the proposed revisions and when the rules were published for comment. The MPCA invited tribal participation on the Wild Rice Advisory Committee, held formal government-to-government consultations with tribes and provided additional notice to tribal contacts and persons who had registered their interest in Environmental Justice issues. At the request of the Fond du Lac Band, the MPCA also held a rulemaking hearing at the tribal community college in Cloquet, to provide a space where any native person would feel comfortable expressing his/her views on the rule. In these ways, and as further discussed in SONAR Part 9.C (pgs. 136-138) and SONAR Part 8.A (pgs. 123-124), the MPCA made significant efforts to provide information and the opportunity for meaningful participation to Native American communities in order to hear their concerns and to encourage their participation in the rulemaking process.

Some commenters viewed the MPCA’s decisions about the rule language regarding the wild rice beneficial use and which waterbodies to identify as Class 4D waters as evidence that the MPCA’s consultation was inadequate and not meaningful. The MPCA disagrees. The MPCA heard a lot of very valuable information about wild rice from the tribes and strove to take this into account (see Response Exhibit N.26). A key part of meaningful involvement is that people feel that their concerns have been heard and that their comments have the ability to make a difference. The tribal comments did make a difference in the rule.

In addition to its efforts to provide opportunities for meaningful involvement, the MPCA has adjusted the list of wild rice waters in response requests from tribes. The MPCA has indicated in the SONAR discussion that it will remove additional wild rice waters from the list in Minn. R. 7050.0471 during this rulemaking at the request of tribal governments. The MPCA agreed to remove more than 100 wild rice waters from the proposed rules at the

request of the Leech Lake Band, the Grand Portage Band, and the Fond du Lac band. These band requested – either during consultation or during the public comment period – that the MPCA not apply the revised standard to any waters wholly within the reservation boundaries or identify them on the proposed list of wild rice waters. The MPCA has removed those waters from consideration and in Part 6.D of the SONAR (pgs 52-58) and in the response to comments on topic 11.1, provides discussion of this decision.

#### **Topic Area 32 – Comments about the legislative requirements specific to wild rice**

The one comment received on this topic area is addressed in Attachment 2.

#### **Topic Area 33 – Comments supporting the proposed rules**

Some comments expressed general support for protecting wild rice or for the proposed rules. The goals of this rulemaking were to update the existing sulfate standard to reflect current scientific understanding and to clarify the application of the sulfate standard to wild rice waters. The MPCA appreciates the comments that support reasonableness of the MPCA's proposal to address these goals.

##### *Topic Area 33.1 – The 10 mg/L standard is not valid and should be repealed*

Many commenters expressed support for the parts of MPCA's rule proposal that relate to removing the existing 10 mg/L standard. However, most commenters did not further support the adoption of the proposed equation in lieu of the 10 mg/L standard. The MPCA notes that the decision to move away from the 10 mg/L standard is not separate from moving forward with the proposed equation. This is further discussed in the Cover Memorandum to this Response. Attachment 2 also provides some references to response exhibit N.30, which discusses the requirements under the Clean Water Act for revising an existing standard.

#### **Topic Area 34 – Comments suggesting alternatives/rules changes**

Although a large number of commenters made suggestions for changes that would significantly alter the MPCA's proposed rule (e.g. eliminate the sulfate standard entirely), only a limited number made suggestions that still allowed the adoption of the rule meeting the MPCA's stated goals.

The MPCA is proposing several changes to the rules as proposed and is providing a discussion of the need and reasonableness of those changes in the Cover Memorandum to this Response.

#### **Topic Area 35 – Comments that are out of scope**

The MPCA received a number of comments that, although they identified valid concerns regarding wild rice or the environment in general, were not within the MPCA's ability to address in this rulemaking. Commenters identified concerns with climate change, radioactive waste, threats to the genetic diversity of natural wild rice, and the construction of oil pipelines. The MPCA acknowledges these comments and the concerns that prompted them. However, because these comments relate to issues beyond the scope of this rulemaking, the MPCA is not providing a discussion of them in this Response.

#### **Topic Area 36 - Comments about reverse osmosis/sulfate treatment**

Many comments identified concerns with the use of reverse osmosis to remove sulfate from wastewater. A discussion of reverse osmosis and the problems associated with its use is provided in the Cover Memorandum to this Response in III.C.

#### **Topic Area 37 - Comments stating that the proposed rules will not improve wild rice growth**

Many commenters stated that the MPCA could not even say with certainty whether or not the proposed standard will protect or benefit wild rice. A number of commenters also questioned how many acres of wild rice

will be protected or restored by the proposed rule revisions, either implying or expressly stating that the benefit of the existing or proposed sulfate standard is minimal.

The goal of the standard is to protect wild rice from adverse impacts from sulfide in the porewater, which develops from sulfate in the surface water. All of the MPCA's research shows that sulfide impacts wild rice. See the responses to comments in Topic area 2.

It is MPCA's intent that the standard be protective of *all* the wild rice waters in Minnesota where the beneficial use is an existing use. The intent of the standard is not necessarily to restore the beneficial use, but to establish what level of sulfate is protective of the beneficial use in each identified Class 4D wild rice water.

The comments seem to request a definitive, quantitative statement about what will happen to the acreage of wild rice in Minnesota if the proposed standard is implemented: the response to that is very difficult for multiple reasons.

First, the MPCA does not have a reliable estimate of the total acres of wild rice that exist or could potentially exist in the listed 1300 waters. As noted throughout the supporting documents for this rulemaking, wild rice stands can vary from year to year – both in acreage and density. Wild rice is an annual crop that perpetuates through re-seeding; seeds can also lie dormant in the sediment for several years before germinating and growing. Also, the MPCA does not have sufficient information at this time to evaluate every single water in Minnesota for the existence (now or since 1975) of the Class 4D wild rice beneficial use.

Second, being able to predict how much wild rice would be benefited by the imposition of any sulfate standard (whether the existing 10 mg/L standard or the proposed new standard) requires knowing where the wild rice has declined because of the impact of sulfide. Of the waters being listed as wild rice waters in the proposed rule, only about 250 to 350 are expected to be impacted by permitted dischargers. At this time the MPCA does not know how many of these dischargers might actually be impacting the wild rice water based on the levels of sulfate in their effluent or their distance to the wild rice water. However, if the sulfide levels in these waters needs to be reduced to allow wild rice to thrive, then the proposed rule will set the level of sulfate that can allow that to happen. Whether rice returns or becomes more robust in those waters will depend on other factors.

Finally, it is also important to note that for wild rice waters that are not currently impacted by a discharger, establishing the standard will protect those wild rice waters from being adversely impacted by sulfate/sulfide in the future. New facilities may be designed to discharge to non-wild rice waters or designed from the beginning to ensure that the level of sulfate in their discharge will not cause or contribute to an exceedance of the sulfate standard.

Meeting the sulfate standard in a wild rice water means that sulfide in the sediment porewater will not be a factor inhibiting the growth of wild rice in that wild rice water.

#### **Topic Area 38 - Comments stating that wild rice is/is not in decline**

Many comments stated their concern that wild rice is not declining and is in fact thriving and other comments stated concerns that wild rice is seriously diminished throughout the state. The MPCA has addressed these concerns in the Cover Memorandum to this Response, in Section III.B.

#### **Topic Area 39 - Comments about the restoration of wild rice**

This topic is addressed in the Cover Memorandum to this Response, in Section III.E.