

# Summary

Draft Technical Support Document

## Refinements to Minnesota's Sulfate Standard to Protect Wild Rice



Water quality standards are set to protect specific “beneficial uses” of state waters, such as swimming, fishing, drinking, and supporting wildlife. In 1973, Minnesota established a new beneficial use: “water used for production of wild rice.”

The observation that wild rice grew in waters with lower sulfate levels — and didn’t in waters with elevated sulfate — led to the adoption of the wild rice sulfate standard in 1973. As part of the process to revise the standard, the agency released its initial Draft Proposal for Protecting Wild Rice from Excess Sulfate in March 2015, and formally requested comments on the proposal in October 2015. The Technical Support Document reflects new analyses of the study data. The MPCA has revised its initial proposal in several ways.

### Document highlights **Beneficial use and wild rice waters**

MPCA proposes to replace the existing language “water used for production of wild rice” with the simpler phrase “wild rice waters.”

In 2011, the Minnesota Legislature directed the MPCA to identify waters where the wild rice sulfate standard would apply, and develop criteria for designating wild rice waters. The agency will identify wild rice waters based on current and historical information, such as previous field surveys, harvest records, or documented oral accounts. MPCA has a draft list of approximately 1,300 waters that are proposed for identification as wild rice waters. For about 940 additional waters, the agency has some wild-rice information, but not enough to include the waters on the proposed wild rice water list.

The definition of a “wild rice water” has been revised from the initial proposal. A lake, stream, or wetland must have a documented history since November 28, 1975 of wild rice harvest or a natural bed of wild rice of at least:

- 0.25 acres, with a stem density of at least 8 stems per square meter

*OR*

- 0.5 acres, with a stem density of at least 4 stems per square meter

### **Determining the sulfate standard**

MPCA determined that a sulfate standard is needed to protect wild rice from the potential repercussions of excess sulfate in surface water. Sulfate in lake or stream water can diffuse into the sediment where wild rice grows and turn into sulfide, which can be toxic to wild rice at high concentrations. The agency needed to identify a tolerable sulfide concentration to be able to develop a sulfate standard. MPCA evaluated the effect of sulfide on wild rice, analyzed the data, and found a concentration of sulfide in the sediment that wild rice can tolerate, detailed in the MPCA draft technical support document.

Certain factors change how efficiently sulfate in the water is converted to sulfide

in the sediment. Most significantly, higher levels of iron can lead to less sulfide, and higher levels of organic carbon can lead to more sulfide. To take these variables into account, the MPCA developed an equation that can determine a sulfate level that would keep sulfide at or below a safe sulfide concentration. The agency proposes collecting sediment samples in wild rice stands, measuring the iron and organic carbon concentrations in the sediment, and then plugging the data into the equation to calculate a sulfate standard for that particular wild rice water:

$$\text{Sulfate standard (mg/L)} = 0.0000121 \times \text{Organic Carbon}^{-1.197} \times \text{Iron}^{1.923}$$

The equation-based sulfate standard would protect wild rice better than the current fixed standard of 10 mg/L because the equation takes into account environmental variables affecting the conversion of sulfate in the water to sulfide in the sediment.

### **Implementing the wild rice sulfate standard**

When a new or modified water permit is needed for a discharge that may affect a wild rice water, sediment will be collected — five composite samples collected at five different sites in wild rice beds (25 individual samples). The MPCA will analyze the samples for organic carbon and iron to calculate the sulfate standard for that body of water. Locations of the five sampling sites should represent areas where wild rice is currently growing or where growth has previously been documented.

For every wild rice water, MPCA is proposing to use data from the wild rice beds and the equation to calculate five sulfate values that are each protective of wild rice. To protect the whole wild rice water, the MPCA would use the lowest of these values as the numeric sulfate standard for the water body, applied as an annual average through the year.



---

## **Full document**

To view the full technical support document, visit: <https://www.pca.state.mn.us/water/protecting-wild-rice-waters>

---

## **Contact**

wildriceTSD.pca@state.mn.us

