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Minnesota Pollution Control Agency
520 Lafayette Road North
Saint Paul, MN 55155-4194

**Re: MPCA's Draft 2024 Impaired Waters List and Proposed Revisions to Assessment Manual Guidance**

Dear Sir or Madam,

Thank you for the opportunity to provide comments on Minnesota Pollution Control Agency's (MPCA) Draft 2024 Impaired Waters List (List) and the proposed revisions to the Assessment Manual Guidance for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report & 303(d) Impaired Waters List (Manual). Cleveland-Cliffs wholly owns and operates three taconite mines and processing facilities in Minnesota: United Taconite, Minorca, and Northshore Mining. Cleveland-Cliffs is also the majority owner and operator of a fourth taconite mine and processing facility, Hibbing Taconite. Water which is discharged from Cleveland-Cliffs' Minnesota operations flows into or through numerous listed water bodies or streams. Accordingly, Cleveland-Cliffs would be directly affected by MPCA's Proposed Framework and respectfully submits the following comments for your consideration.

Due to the large volume of datasets used to assess the waters included in the draft impaired waters list, a 30-day extension is requested for comments to be provided to MPCA. This will allow time for a fulsome analysis of these data. In the event that MPCA declines to grant an extension, please consider the following comments when finalizing the 2024 Impaired Water List and Manual.

**2024 Draft Impaired Waters List – Class 4: Waters used for the production of wild rice**

Researchers agree that aqueous sulfate has little-to-no direct impact on wild rice. Instead, conversion of sulfate in overlying water to sulfide is more likely an adverse influence on wild rice health. The numeric 10 mg/L surface water standard is based on limited scientific review. MPCA should re-evaluate the basis for this standard and define a more scientific-based numeric sulfate concentration or a narrative standard. The current 10 mg/L sulfate standard does not include any consideration for observed / measured wild rice health in waterbodies. Another attempt at rulemaking that addresses the Administrative Law Judge's concerns raised during the failed 2017 rulemaking attempt, and reconsiders the scientific basis for the 10 mg/L standard, should be pursued by MPCA.

Ultimately, when considering influences on wild rice growth, development, and productivity, MPCA must consider wild rice health itself to be an indicator (seed density, seed size, stalk density, stalk health, root health, etc.). Multiple water resources proposed for sulfate-impairment listing support yearly harvestable densities of wild rice; specifically, Birch Lake, receiving system for unnamed Creek (Bob Bay) and Dunka River (Dunka Bay). In general, Birch Lake supports significant, yearly harvestable densities of wild rice in several locations of appropriate water depth, sediment, and competing aquatic vegetation characteristics. Yet, MPCA lists it as a sulfate impaired water.  Additional field-scale study data, both temporal and spatial, are required to defensibly conclude a water resource impaired for wild rice production; in particular, a water resource proposed for impairment listing currently supporting yearly harvestable densities of wild rice in multiple areas.

Additionally, MPCA may consider the possibility to develop a "wild rice conservation bank" similar in function to Board of Water and Soil Resources (BWSR) wetland mitigation banking as an alternative to a facility upgrade, compliance schedule, variance, or site-specific standard to meet sulfate effluent limits.

**2024 Revisions to the Assessment Manual Guidance for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report & 303(d) Impaired Waters List**

Results of a preliminary review of the data raises many questions and concerns. Although data obtained from samples is valuable (i.e., sulfate measurements obtained from a properly certified laboratory), MPCA must publically share a number of other key sample characteristic in order for fulsome public review:

- Where in the lake or stream were water samples obtained?
- Seasonal frequency?
- Collected within wild rice areas?
- Could these water samples have been influenced by other sources of anthropogenic contaminants such as roadway runoff (ex., salts, sedimentation, tire contaminants)?

Additionally, although some measured sulfate concentrations are higher than the current 10 mg/L water quality standard (WQS), aqueous sulfate concentrations in water samples from Birch Lake, Dunka River, and Embarrass River are not significantly higher than the sulfate standard, which again is based on limited data and does not account for the primary wild rice stressor, sulfide. Tedrow and Lee (2022, paper attached) grew wild rice in two paddy-scale bioassays for two consecutive growing seasons (Paddy C) and three consecutive growing seasons (Paddy A) with varying sulfate concentrations and observed no adverse influences in either case. Additionally, typical plant cell growth medium used for plant micropropagation purposes contains many times higher sulfate than this WQS. Although this is not an 'apples to apples' comparison, a point is made to the need for sulfur as sulfate, a required plant macro-nutrient.

The Manual (pgs. 63-64) states, "For measurements taken at multiple sites on the same day within a water body, the maximum value is used," and the "Period of Record: Most recent 10 years, April – September." Using the maximum may give a high bias. Conversion of aqueous sulfate to sediment sulfide may be important throughout the year, not just when wild rice is actively growing. The sulfate assessment criteria should be revised to use an average when measurements are taken at multiple sites on the same day and include data collected year-round.

**Appendix A of 2024 Assessment Manual Guidance for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report & 303(d) Impaired Waters List**

Appendix A of the Manual includes nearly 2,400 waters identified as waters used for the production of wild rice. The Manual states that the comprehensive list of waters used for the production of wild rice was developed from 1,300 wild rice waters proposed in 2017 plus 1,100 waters that had "insufficient information" at that time. Waters having "insufficient information" should not be identified as waters used for the production of wild rice. It appears multiple influences on wild rice growth and productivity were not considered when this list of water resources was developed. Specifically, those that would result in determination of whether a water resource, or area within a water resource, were appropriate or conducive to wild rice growth and productivity: water depth and water depth fluctuations, sediment characteristics, available nutrients and competing vegetation. Additionally, characteristics of data used to identify these waters need to be considered; specifically, when samples were obtained, where samples were obtained, and frequency of sampling which can be critical with respect to seasonality of water depth and flow (if applicable) conditions.

- Water depth and water depth fluctuations: Wild rice is an annual aquatic grain, and as such must re-grow from viable seed each year. During early germination and seedling development, appropriately shallow water depth is critical to wild rice survival – light availability is more often the primary limiting factor for seedling development. Although influences on wild rice from water depth coincide with influences from other vegetation, suspended materials, and water coloration, overall water depth during seedling development in wild rice areas is of critical importance. Despite seedlings being more sensitive to overall water depth, observations and data indicate that the floating leaf stage of the seasonal wild rice growth cycle is more sensitive to water depth increases (Thomas and Stewart 1969; Stevenson and Lee 1987; Tucker et al. 2011; Tedrow 2020). This is due to physical root characteristics not being as thoroughly developed as in aerial phenology, and floating leaves themselves acting as 'sails' in water turbulence. Furthermore, following solar exposure a cuticle forms on the leaf's surface immediately following floating leaf development. Re-submersion of leaves with a formed cuticle can result in wild rice mortality due to gas exchange limitations (from cuticle development). Additionally, if the sampled water resource is more susceptible to increasingly intense precipitation events (i.e., creeks; rivers) wild rice habitats may be non-predictably adversely influenced via larger-scale weather pattern changes. Regardless of chemical water characteristics, if water sample locations, or water resources in general, are not conducive to wild rice growth and development due to water depth influences, identifying these as waters as "used for the production of wild rice" is not warranted.

- Sediment characteristics: Sediment in which wild rice tends to thrive is generally organic 'muck,' but of sufficient bulk density and integrity to allow rooted stability. This ties into water depth fluctuations – absent sufficient rooting stability due to loosely aggregated sediment, chemical water characteristics are a moot point. Wild rice can more easily uproot or become nutrient limited if sediment is too loosely aggregated (flocculent). Plant nutrient-element levels in sediment is also critical; in particular, ammonium nitrogen. Multiple studies have highlighted the importance of bioavailable ammonium nitrogen for wild rice growth and productivity; and how nitrogen sequestration in wild rice plant litter can result in a lack of bioavailable nitrogen (Archibold 1990; Walker et al. 2006, 2010; Sims et al. 2012a,b; Hildebrandt et al. 2012; Tedrow 2020; Tedrow and Lee 2021, 2022). Nutrient characteristics of sediment at water sample locations, or sampled water resources in general, also appear to be more critical than aqueous sulfate, or sediment sulfide, at much higher concentrations than measured in select waters proposed for sulfate-impairment listing (Tedrow 2020; Tedrow and Lee 2021, 2022). Regardless of chemical water characteristics, absent adequate, or more so, bioavailable sediment nutrient elements, and sufficiently dense aggregation of sediment materials, wild rice will not thrive in any water resources. Identifying waters with, based on existing data, sediment nutrient and / or bulk density limitations as "used for the production of wild rice" is not prudent.

- Competing vegetation: As an aquatic annual, wild rice must re-grow each year from viable seeds. In general, wild rice does not compete well with aquatic perennial plants, be they planktonic or emergent. Some aquatic plants have adapted a defense mechanism known as allelopathy. Basically, some aquatic plants produce compounds which are known to impair wild rice growth characteristics (Quayyum et al. 1999). Although not evaluated by Quayyum et al (1999), field observations suggest cattails (*Typha* spp.) may impede wild rice growth (Dysievick 2019). Multiple areas of cattail dominance (over 20 years in some areas), in previous wild rice harvest areas, were selected for a mechanical cattail removal project in Ontario. Following one mechanical removal event (Aug 2014), wild rice grew and thrived the following growing season (2015) in all areas where cattails had been removed. Following cattail removal, wild rice dominated each area the following growing season, and continues to dominate each area. However, despite such rapid and dense wild rice re-growth, virtually no wild rice was (or is) growing in cattail dominated areas. This suggests, at the very least, idiopathic yet thorough adverse influences from cattails on wild rice. Regardless of chemical water characteristics, presence or development, of competing aquatic vegetation with either known or potential allelopathic effect on wild rice, can preclude any water resource from wild rice growth, development, and production.

In summary, MPCA should not list waters as "used for the production of wild rice" unless appropriate physical, biological, and chemical characteristics of the water resource have been assessed and determined to be appropriate for wild rice growth. Moreover, all data used for determining that a water is "used for the production of wild rice" must be made publically available for proper review and comment. Specific criteria should be used for assessment of wild rice, including using existing data to assess wild rice area density (to better determine temporal harvestability), water depth / fluctuation characteristics (to help determine suitability for wild rice production), sediment characteristics (to determine nutrient-element bioavailability), and competing vegetation (to help determine suitability of the resource for, and potential sustainability of, wild rice populations). All waters proposed to be included in Appendix A of the Manual (i.e., waters used for the production of wild rice) should be re-assessed using these criteria. Additionally, waters should not be listed as impaired unless it can be demonstrated that wild rice growth itself is impaired and specifically describe what factor(s) are more likely causing that impairment.

The original intent of the 10 mg/L WQS for sulfate was to protect wild rice. We now know that sulfate as it converts to sulfide in sediment pore water is not the only factor impacting wild rice growth. MPCA needs to acknowledge that other factors exist, which adversely influence wild rice growth, development, and productivity, and properly consider these factors when rulemaking.

Sincerely,

Jason Aagenes

Director – Environmental Compliance, Mining & Pelletizing

## References

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