Maureen Johnson

Comments
Maureen Johnson
mjsciled@earthlink.net

Framework for developing and evaluating site-specific sulfate standards for the protection of wild rice

Comment

p. 8. Allowing a higher standard of sulfate for wild rice stand in a certain location should also require study downstream to assure that standard will not affect other downstream populations. It should not be assumed that all populations downstream have the same concentration of sulfate as upstream of the site in question. There may be inflow of cleaner water prior to another wild rice population downstream and the higher standard may affect it.
Or if in a lake, in all locations of that lake since wind will redistribute concentrations.
Or there may be other factors that the higher sulfate level supports that cause problems.

Comment

Each SS Standard change and the reasonings and scientific documentation should be public noticed for comment, so that all perspectives have opportunity to contribute to the positives and negatives of the proposal.

Comment

Allowing a higher SSS also may affect other wildlife such as invertebrates due to an increase in specific conductance, especially in a headwaters area where the natural specific conductance is below 100 or especially below 70 µS/cm. is that excess level of sulfate maintaining a level of specific conductance that does not support populations of invertebrates that otherwise would be present? What do we know about how sulfate affects other parameters in the water? Especially mercury and methyl mercury formation – is the amount of sulfate that exceeds the 10 standard actually supporting mercury methylation that would not be occurring otherwise? Amy Myrbo indicates that low levels of sulfate will result in more methylation. Does the sulfate interfere with nutrients or species survival that are normally available to invertebrates or other wildlife in their survival?

The principle of DO NO HARM should be considered here.

A higher SSS should not be allowed in a water body with mercury levels that require a TMDL, until the TMDL is determined, and the allowed TMDL is allocated to not only permittees but also a reserve for the natural setting and a reserve for future permittees.

Comment re non-point sources

Framework, p. 15 "This allows for an estimation of the levels of sulfate in a watershed without any point source loading. This is not a rigorous natural background calculation but rather a way to understand point versus non-point sulfate contributions on a regional basis." But non-point sources are very important, and are not equal to background. Farms are not permitted but they use sulfate fertilizers.

https://www.mda.state.mn.us/sites/default/files/docs/2022-12/2020fertsalesreport.pdf
2020 Crop Year Fertilizer Sales Report
MINNESOTA DEPARTMENT OF AGRICULTURE
11/4/2022
p. 2 "Dealers reported products containing sulfur have increased in sales. Ammonium sulfate sales have more than doubled since 2010 and continue to increase in sales."

Figure 6. Major fertilizers containing sulfur expressed as total tons of product by year from 2010 – 2020.
This figure shows a total of 334,000 tons of sulfur-containing fertilizer sold in 2020.
Some of this will show up in runoff to water bodies, and will not be reflected in the "non-point" estimate.

Comment

The draft Framework proposes use of MPCA's 2017 proposed equation that "established a statistical relationship between sediment iron, organic carbon, and surface water sulfate of wild rice waterbodies"(p. 5)

However, the following 2022 article does not appear to support the equation's use.

Sulfur Geochemistry Destabilizes Population Oscillations of Wild Rice (Zizania palustris)
Sophia LaFond-Hudson, Nathan W. Johnson, John Pastor, Brad Dewey
First published: 18 July 2022
https://doi.org/10.1029/2022JG006809

Result from Abstract:
"Populations exposed to 300 mg L^{-1} sulfate concentrations produced fewer and smaller seeds and declined to extinction in 6 years or less. We did not find a strong effect of iron loading or litter removal on wild rice biomass or seed production. Our observations show the potential of elevated surface water sulfate to rapidly destabilize wild rice populations under varying iron and organic carbon concentrations."

This 2022 study's results appear to provide evidence that the 2017 formula that incorporates iron and carbon has an unstable basis.

MPCA oversimplifies the known facts about wild rice. MPCA should also acknowledge the unknowns that may or may not affect the SSS decisions.

The 2017 "statistical" proposed equation is oversimplified. If it is to be used, the user and/or MPCA

must refute all the weaknesses of the equation and its potential consequences that were provided in comments on the rulemaking, and address its use in the context of scientific knowledge gained since, and review its viability as new knowledge becomes available.

One of the referenced articles stated there are "complex and as yet poorly understood couplings among biomass and litter cycles, nitrogen availability, sulfide inhibition of seed production, control of sulfide concentrations in sediments by iron and litter, and precipitation of iron sulfide on roots during seed production."