MINNESOTA POLLUTION CONTROL AGENCY

Wild Rice and Sulfate/Sulfide

Catherine Neuschler
Manager, EAO, Water Assessment Section

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CLEAN WATER LAND & LEGACY AMENDMENT

Outline

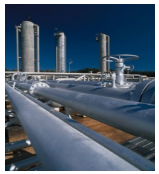
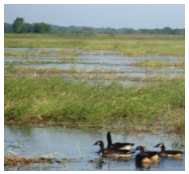
- Brief overview of water quality standards
- History of wild rice WQS
- Development of MPCA's rule proposal
  - Scientific investigation
  - Process

What are water quality standards?

- CWA goal is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters”
- WQS are Clean Water Act tool that addresses:
  1. What and who are we protecting?
  2. What conditions are protective?
  3. How do we maintain high water quality?
- CWA requires
  - States to adopt water quality standards (WQS)
  - EPA to review and approve state WQS

What are water quality standards?: Beneficial Uses



- Beneficial use defines what we are protecting the water for
- In Minnesota:
  - Drinking water
  - Aquatic life and recreation
  - Industrial use and cooling
  - Agricultural and wildlife use
  - Aesthetics and navigation
  - Other uses
  - Limited resource value

What are water quality standards?: Standards/Criteria

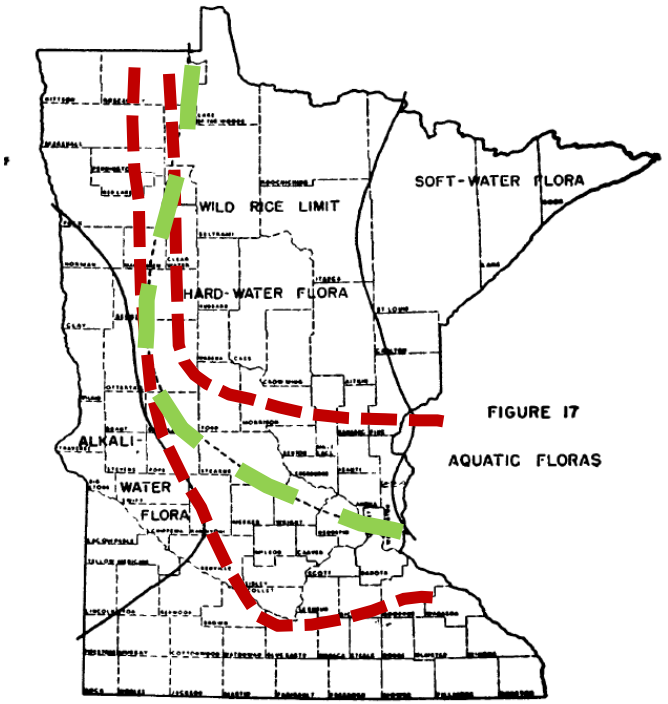
- Standards (criteria) identify conditions needed to protect the beneficial use
- Generally statewide or region-specific
- Descriptive (narrative) or numeric
  - Typically start with narrative standard, then adopt a number when science is better understood
- Standard applies in the waterbody

Existing Wild Rice Sulfate Standard

- States get primacy in determining what uses they want to protect in their water
  - In 1973, Minnesota decided that it was important to protect water for wild rice
  - We are one of the few places with remaining natural wild rice
- Wild rice is important ecologically, economically and spiritually
  - Adopted as the state grain in 1977
- Wild rice is incredibly important to the Ojibwe and Dakota people
  - It is part of the Ojibwe creation story
  - Many view rice as a relative
  - The tribes have an intrinsic value for wild rice

Existing Wild Rice Sulfate Standard

- Data from MN lakes showed relationship between lower sulfate levels and wild rice
- Standard adopted in 1973:
  - "10 mg/L, applicable to water used for production of wild rice during periods when the rice may be susceptible to damage by high sulfate levels"



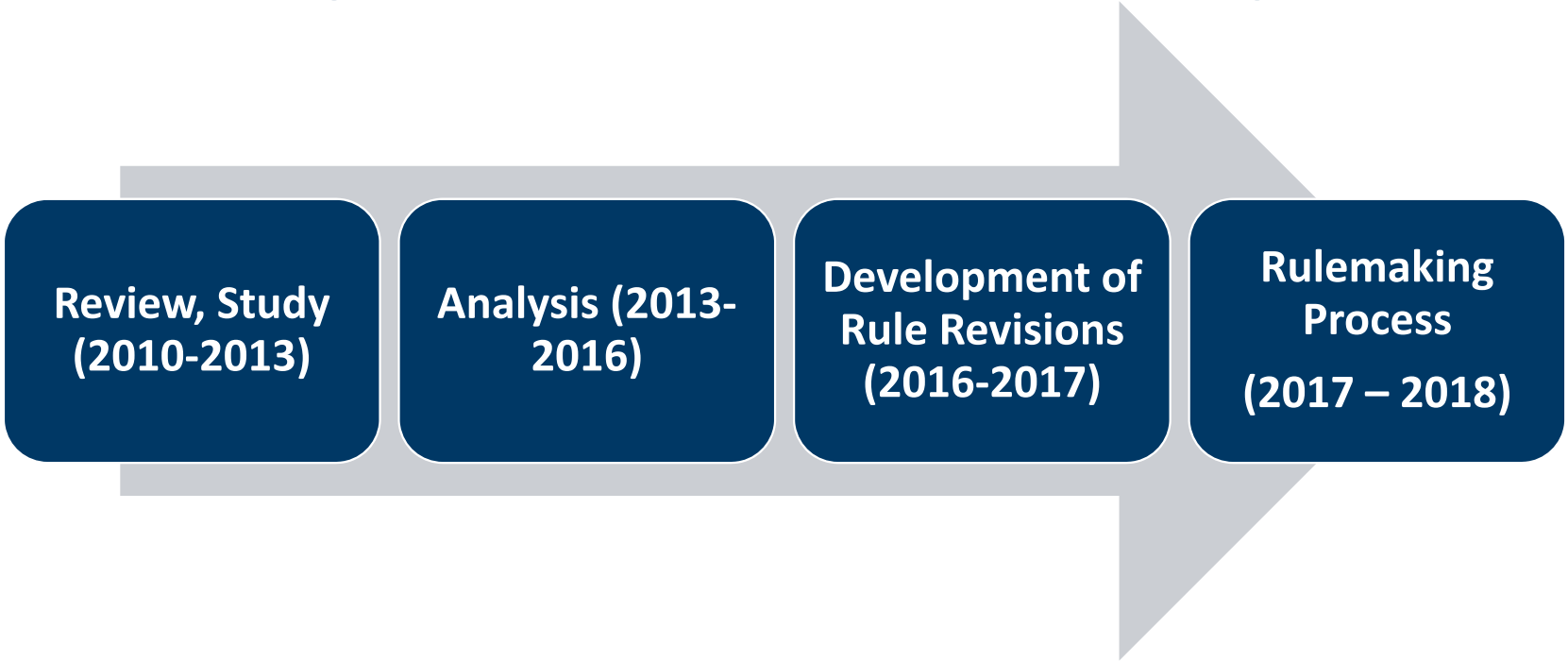
Moyle (1956) J Wildlife Management

Existing Wild Rice Standard

- Part of the agriculture and wildlife use class
  - Beneficial use: “harvest and use of grains from this plant serve as a food source for wildlife and humans” (added 1998)
  - Sulfate standard applies to the “water used for production of wild rice” waters
  - Narrative standard:
    - Applies to selected wild rice waters [WR]
    - “The quality of these waters and the aquatic habitat necessary to support the propagation and maintenance of wild rice plant species must not be materially impaired or degraded”

Why did MPCA Propose WQS Revisions?

- Questions about application led to uncertainty and litigation
- MPCA began to review and consider changes



Why did MPCA Propose WQS Revisions?

- In 2010 MPCA embarked on an effort to:
  - Clarify how and when sulfate causes a problem
  - Clarify where and how the current standard applies
- Goals:
  - Protect wild rice production
  - Incorporate new scientific findings
  - Reduce uncertainty, add clarity
  - Avoid unnecessary regulatory impacts

Wild Rice Sulfate Standard Review and Study

- 2011: Wild rice research and rulemaking legislation
  - $1.5 million for wild rice standards study from the Clean Water, Land and Legacy Amendment
  - Advisory committee to provide input on study protocol, review research results, and advise on rulemaking
  - MPCA to initiate rulemaking upon completing the study

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Advisory Committee

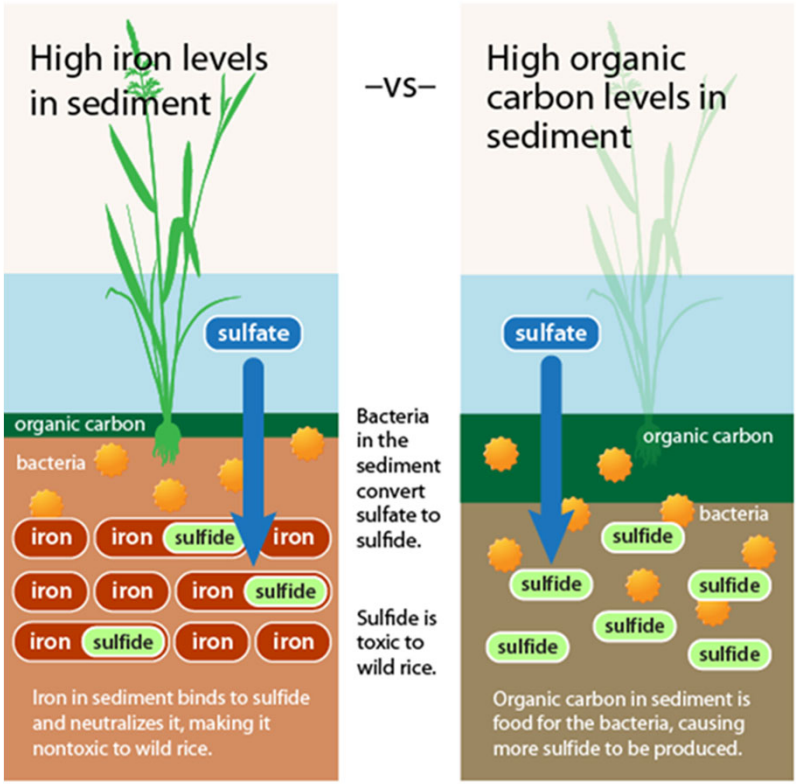
- MPCA invited expression of interest, 25 members selected
  - Representatives of tribal governments, municipal wastewater treatment facilities, industrial dischargers, wild rice harvesters, wild rice research experts, and citizen organizations.
- Met from October 2011 – July 2017
- Principles and Goals
  - Input from varied interests and expertise
  - Transparency and inclusive approach
  - Common understanding of the study purpose and progress
- No expectation of consensus

Wild Rice Study and Analysis

- Goal: Enhance understanding of the effects of sulfate on wild rice; inform standard evaluation
- Advisory Committee discussion/input
- Key avenues of investigation:
  - Hydroponic experiments
  - Mesocosm experiments
  - Field survey
  - Sediment experiments
- Independent scientific peer review, further analysis, journal articles

Study and Analysis Findings

- **Sulfide** in sediment porewater is toxic to wild rice
  - Sulfide levels equally controlled by:
    - **Sulfate** in the ambient water
    - Sediment total organic **carbon**
    - Sediment total extractable **iron**
- Need to keep sulfide below below 120 µg/L
  - Through controlling sulfate



Overview of Rule Revision Proposal

- Proposed an equation that sets a sulfate level that ensures sulfide stays below 120
- Identified about 1300 lakes, rivers and streams as wild rice waters
- Specified implementation details

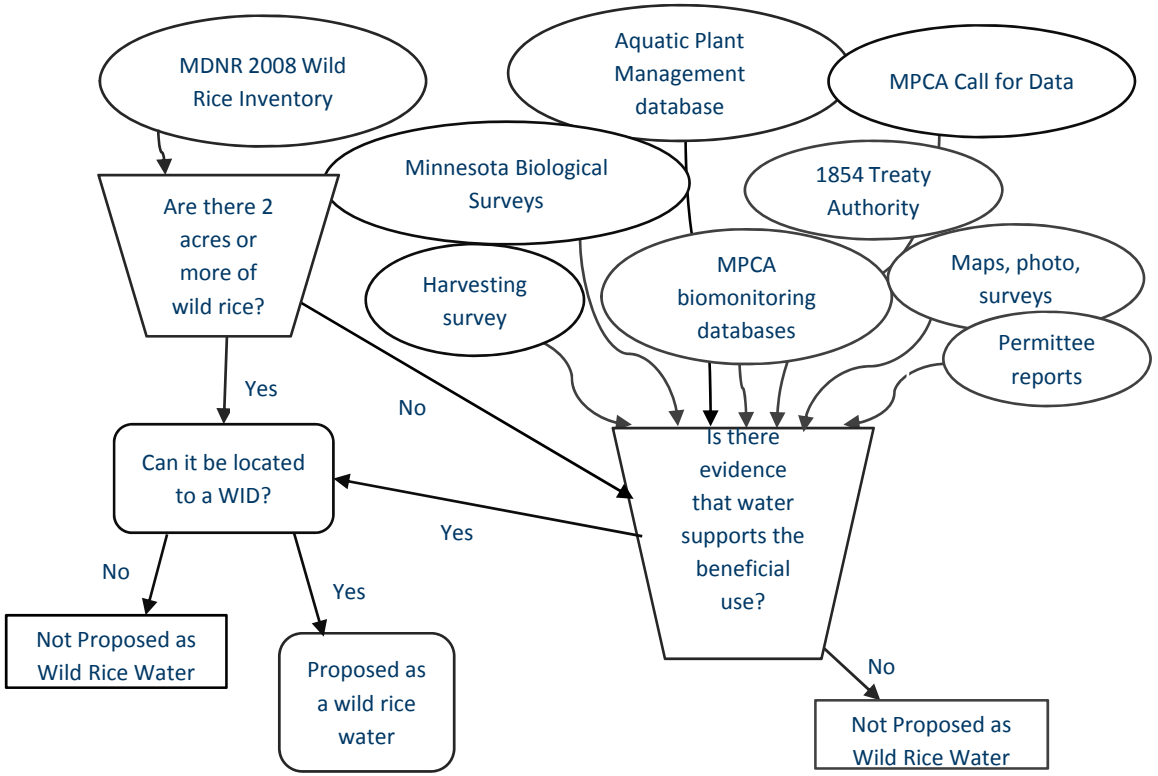
Sulfate Equation

- $Sulfate = 0.0000854 \times \frac{iron^{1.637}}{organic\ carbon^{1.041}}$

  - Resulting sulfate cannot be < 0.5 mg/L or > 335 mg/ L
  - Must be met as an annual average
  - Cannot be exceeded more than one in ten years
  - Rule included procedures to collect and analyze sediment for iron and carbon content

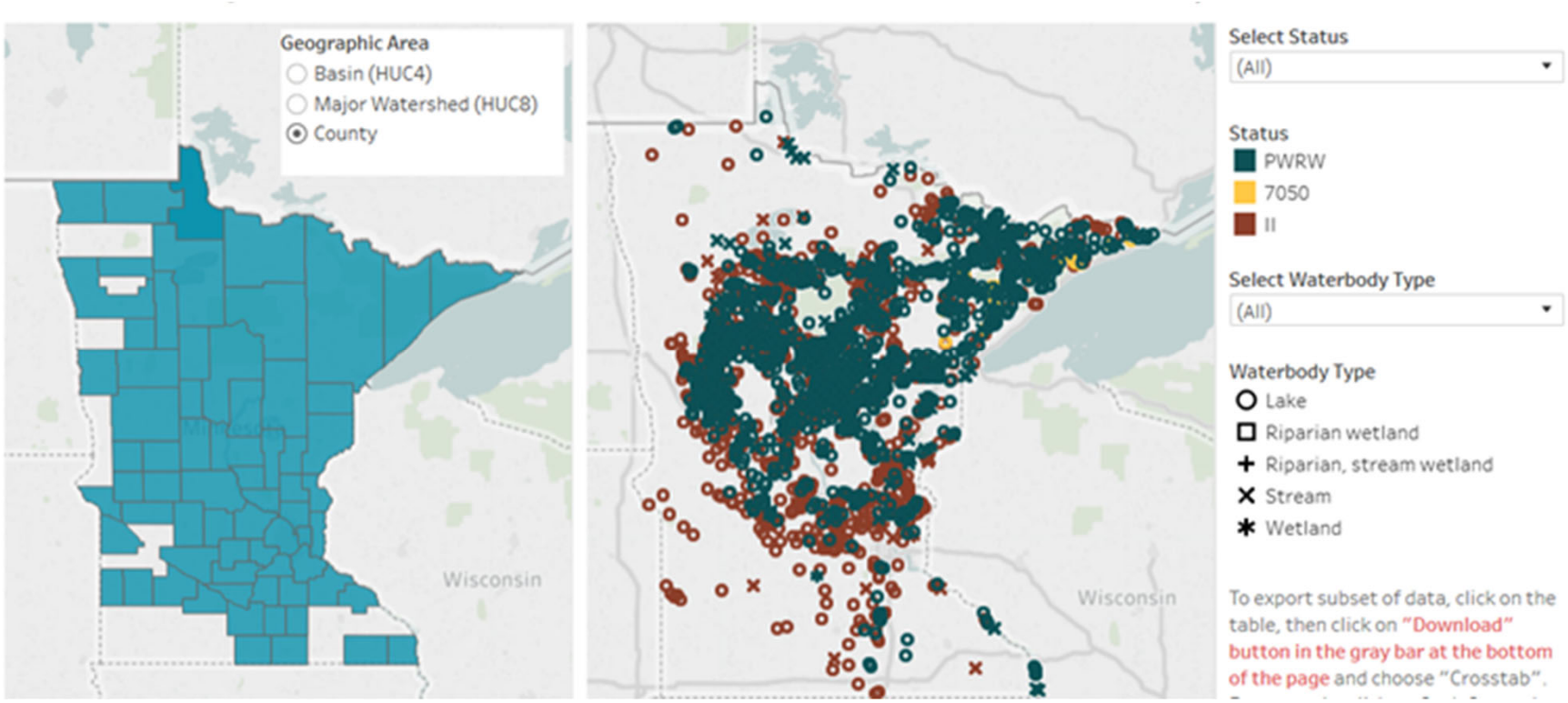
Wild Rice Waters

- Proposed to specifically identify waters where the sulfate standard would apply (Class 4D “wild rice waters”)
- Sorted through information to find waters that demonstrated the beneficial use since November 28, 1975



Wild Rice Waters

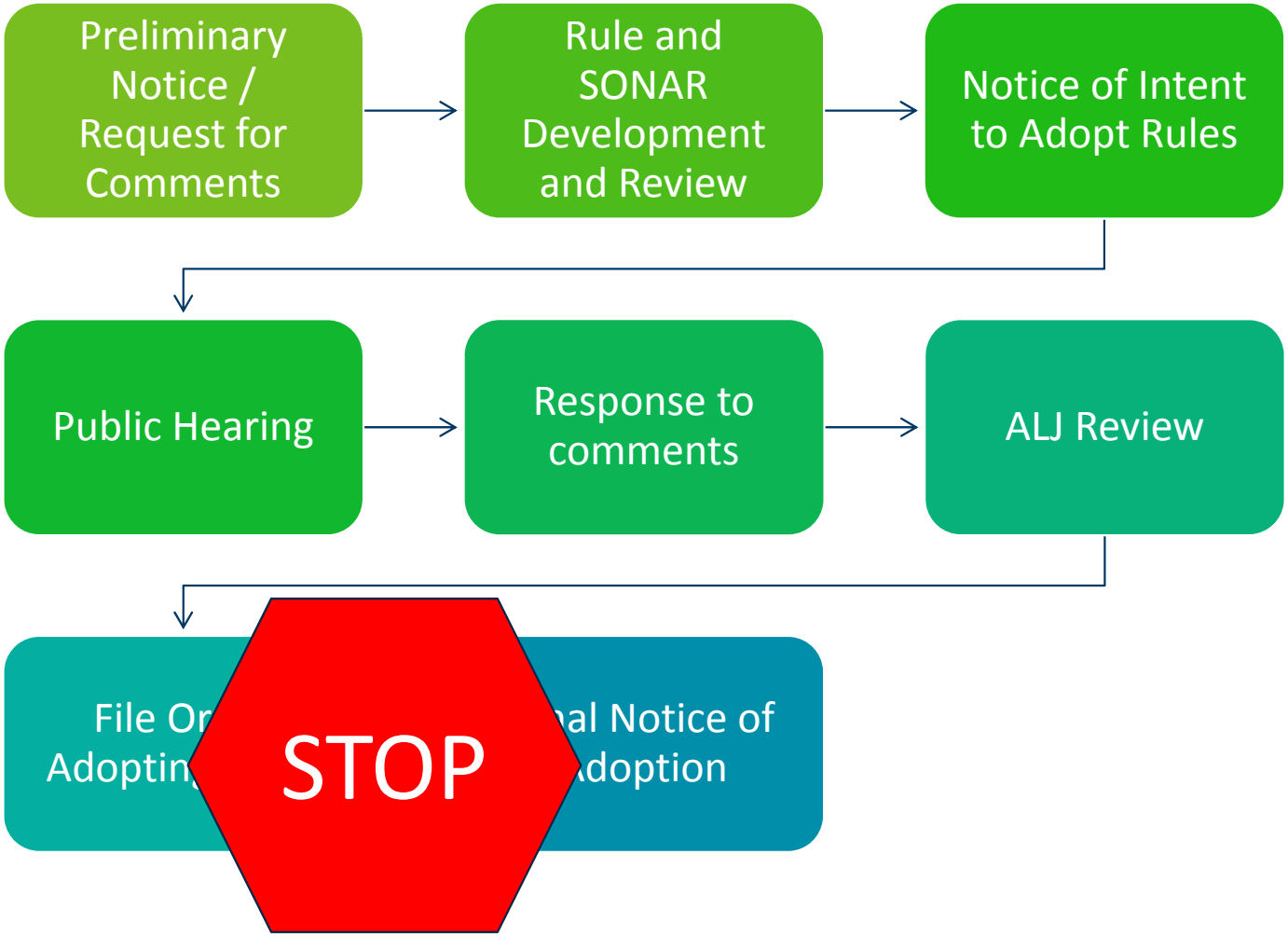
- MPCA proposed ~1300 waters as wild rice waters
- Waters could be added in future through rulemaking



Effluent Limits and Implementation

- Effluent limits are placed on facilities to ensure that the facility discharge does not cause/contribute to a violation of the standard
  - Limit developed with “translation” based on specific factors
  - Level of standard ≠ effluent limit
- Data needed included sediment information and sulfate levels
- MPCA proposed to develop timelines and approaches for gathering data based on using resources to get higher priorities done first
  - Once relevant data is collected, review need for limits
- Rule included information on variances
  - Tool when an effluent limit cannot be met

Rule Process Overview



Thank you!

- Much more information on the MPCA's rulemaking is available at:

  https://www.pca.state.mn.us/water/protecting-wild-rice-waters

  https://minnesotaoah.granicusideas.com/discussions/minnesota-pollution-control-agency-environmental-assessment-and-outcomes-division

- And on the initial study and advisory committee:

  https://www.pca.state.mn.us/water/wild-rice-sulfate-standard-study

  https://www.pca.state.mn.us/water/protecting-wild-rice-waters#advisory-committee-075198ac

Catherine Neuschler

Manager, Water Assessment Section

catherine.Neuschler@state.mn.us

651-757-2607