Agenda and Presentation Outline

• Overview of Adaptive Management in Wisconsin
  • Background of Phosphorus Regulations
  • Motivations for Alternative Compliance Options
  • Program History / Development of Rule Language

• “Nuts and Bolts” of Adaptive Management
  • Eligibility Conditions
  • Adaptive Management Plan Content
  • DNR/Public Review Process
  • Permitting

• Examples of Adaptive Management Projects
  • Success Stories
  • Water Quality Data

• Lessons Learned
Who is DNR?

DNR is the delegated Clean Water Act authority for the State of Wisconsin.

NPDES program oversees roughly 750 surface water discharges and 150 groundwater discharges (individual permits).

Roughly 550 municipal surface water discharges.

Several large urban areas (Milwaukee is largest, ~100 MGD) and MANY small village wastewater facilities.

Many industries including dairy, food/meat processing, and paper.

Roughly 70 staff comprise the Wastewater Program.

Interface closely with other DNR programs (Water Eval, Monitoring, etc.)
Who are the Three Amigos?
(Three Statewide Adaptive Management and Water Quality Trading Coordinators)

Andrew Craig
(Nonpoint Program)

Matt Claucherty
(Wastewater Program)

Kevin Kirsch
(TMDL/Standards Program)
Overview and Background of Phosphorus Regulation in Wisconsin

Criteria, WQBELs
Sources of Phosphorus
Economic issues
Alternative compliance options and variances
2010 Phosphorus Rule: Numeric Criteria

- **Rivers**: 100 µg/L
- **Streams**: 75 µg/L
- **Reservoirs**:  
  - Not Stratified = 40 µg/L  
  - Stratified = 30 µg/L
- **Inland Lakes**:  
  - Ranges from 15-30 µg/L
- **Great Lakes**:  
  - Lake Michigan = 7 µg/L  
  - Lake Superior = 5 µg/L
Adaptive Management (AM) Timeline

2010: Phosphorus water quality criteria and ch. NR 217, Wis. Adm. Code adopted which lays out implementation requirements for point sources.

2013: AM guidance issued by DNR.

2015 & 2016: First AM projects approved.

2020: AM guidance updated by DNR.
Nonpoint Phosphorus in WI

- Phosphorus loads from agricultural areas vary significantly based on the types of crops grown, soil, slope, tillage practices, and nutrient application rates.

- Manure applications have historically been based on nitrogen needs of the crop typically resulting in a build-up of phosphorus in soils.


**NR 151.02** Sheet, rill and wind erosion performance standard.
**NR 151.03** Tillage setback performance standard.
**NR 151.04** Phosphorus index performance standard.
**NR 151.07** Nutrient management.
**NR 151.08** Manure management prohibitions.
Economics of Phosphorus

- 60% of all surface water dischargers initially received a WQBEL equal to the criterion
- Tertiary filtration is typically required to achieve these low-level phosphorus limits
- Filtration is expensive: $4,000,000 median cost to meet a low-level phosphorus limit
- Nonpoint source offsets offer a lower-cost solution
- Wisconsin has worked to develop alternative compliance and variance options that rely on nonpoint source offsets
- These include Water Quality Trading, Adaptive Management, and a Multi-discharger Variance for phosphorus
Statewide Distribution of Limits

- No Limit Applicable
- Blue Markers
- Limit > 0.3 mg/L
- Green Markers
- Low-level phosphorus limit
- Orange Markers
Alternative Compliance Options and Variances

- Water Quality Trading (50 facilities)
  - Direct offset of pollutant discharged

- Adaptive Management (20 facilities)
  - Long-term effort to restore water quality

- Multi-discharger Variance (130 facilities)
  - Statewide variance that uses “county payment” system at $50/lb

- Individual Phosphorus Variance (30 facilities)
  - Facility-specific pollutant minimization plans for the smallest/poorest communities
Adaptive Management (AM) Basics

Definition
Conception and Motivations
Rule Language
Eligibility Considerations
PRESTO
Compliance Schedule and CWA Requirements
Adaptive Management Basics – NR 217.18

Definition: The adaptive management option is a strategy to achieve the phosphorus water quality criteria in s. NR 102.06 in the most economically efficient manner, and as soon as possible, taking into consideration the contributions of phosphorus from point and nonpoint sources in a watershed.

This is not an off-set like in water quality trading, but rather an attainment of water quality criteria in the receiving water at the point of standards application.
(2) Application

a) Exceedance of water quality criteria caused by point and nonpoint sources.

b) At least 50% of the phosphorus load is from nonpoint sources including permitted and unpermitted MS4s.

c) Documentation that the permittee will require filtration or equivalent treatment technology to achieve compliance.

d) The permittee submits an adaptive management plan
Adaptive Management Basics – NR 217.18

(3) Permit Terms and Conditions

   a) Monitoring of the receiving water
   b) Design and implement actions identified in approved AM plan
   c) Optimize treatment system to control phosphorus
   d) Reporting requirements
   e) Progression of interim effluent limits – 0.6 mg/L, 0.5 mg/L and calculation of final limit.

Note: Statutory provisions made by the legislature during the budget process expanded adaptive management to include TSS and expanded it to a third permit term allowing for a total compliance period of 20-years. NR 217 has not been updated yet to reflect those changes.
Key Considerations for Dischargers

• Is the facility prepared to meet the required interim limits of 0.6 and 0.5 mg/L for total phosphorus?
• Can in-stream monitoring be performed regularly?
• Is the facility prepared to coordinate with partners?
• What are the estimated costs?
• Consider the long-term commitment (10 – 20 years)

Eligibility Requirements

1. Receiving water exceeding the WQC
2. NPS contribute >50% of P load or NPS must be controlled
3. Filtration or equivalent technology required to meet site-specific limits
Pollutant Load Ratio Estimation Tool (PRESTO)

Modeling tool developed to support AM, PRESTO provides a summary of point and nonpoint phosphorus loads, landcover, modeled stream flow, natural community type, and delineates watershed.

Note: Nonpoint phosphorus loads are calculated using Wisconsin-specific regression export coefficients and multiple regression analysis. Point sources load derived from measured data.

Figure 2: Comparison of facilities to Adaptive Management Eligibility Threshold
Compliance with the Clean Water Act

• DNR and EPA Region 5 staff worked together closely on the adaptive management option

• MOA between EPA and DNR clarify some key points regarding adaptive management implementation in permits:
  • Adaptive Management is a compliance schedule
    • Annual timestep for AM reporting
    • Compliance must be achieved “as soon as possible”
  • The WQBEL must remain on the table
    • The permit must contain the final WQBEL and define under what conditions it becomes effective
    • Minimum offset must be specified

Addendum to the National Pollutant Discharge Elimination System Memorandum of Agreement between the U.S. Environmental Protection Agency, Region 5 and the Wisconsin Department of Natural Resources

The U.S. Environmental Protection Agency (EPA), Region 5, and the Wisconsin Department of Natural Resources (WDNR) enter into this Addendum to their National Pollutant Discharge Elimination System (NPDES) Memorandum of Agreement to ensure that Wisconsin permits which implement ss. NR 217.14(2) and 217.18 Wisconsin Administrative Code (Wis. Adm. Code), and the fact sheets that accompany such permits, are prepared in conformance with all NPDES requirements including 40 C.F.R. §§ 122.44(d), 122.45(d), 122.47, 124.8, and 124.56. EPA retains its authority to review and object to specific proposed and draft permits in accordance with Section 402(d)(2) of the Clean Water Act, 33 U.S.C. § 1342(d)(2), for any of the grounds set forth in 40 C.F.R. § 123.44(c).
Adaptive Management “Nuts and Bolt”

Adaptive Management Plans
Source Identification and Attainment of WQS
Review of Plans and Permit Conditions
MMSD – an Example Plan
Required Under NR 217.18: Adaptive Management Plans
Adaptive Management Plan Development & Review

- Plan development starts with a municipality and (typically) a consulting firm
- DNR regional coordinators help steer the process
  - Verify eligibility
  - Agree to adaptive management action area
  - Review “Adaptive Management Request Form”
  - Answer questions, convey expectations
  - Conduct final review, provide a conditional approval letter
- Other DNR staff may become involved: NPS Staff, Biologists, etc.
- Statewide coordinators: complex projects and EPA interface
- EPA reviews adaptive management plans & permits
Adaptive Management Plan – Key Components

1. Identify Partners
2. Describe the watershed and set load reduction goals
3. Conduct a Watershed Inventory
4. Identify where reductions will occur
5. Describe management measures
6. Estimate load reductions expected by permit term
7. Monitoring Plan
8. Financial Security
9. Implementation Schedule with Milestones
1. Identify Partners

- **NR 217.18(2)(d)3. AM Plans Must Include:** “Identification of any anticipated partners... including the partner's level of support for the plan.”
- Partners are often essential for adaptive management plans
- Facilities may leverage the resources of other organizations
- Ability to partner vary depending on hydrology, location, interest, etc.
- Letters of support are required for core AM partnerships
- “Adaptive Management Actions” are limited to the permittee and partners identified in the AM plan
Source Area Identification and Attainment of Water Quality Criteria

• Similar to a total maximum daily load, AM address pollution from many different sources with the goal of attaining water quality criteria.

• DNR approved AM plans have been submitted to EPA and approved by EPA as “alternative restoration plans” to address impaired waters.
Waterbody: Stream  
Pollutant: phosphorus  
Water Quality Criteria: 75 μg/L

1) Describe watershed and identify sources  
Uses watershed surveys, models, TMDL results, watershed assessments, and monitoring data.

- Urban runoff
- Wastewater
- Agricultural runoff
- Naturally occurring

Phosphorus = 150 μg/L  
Status = Impaired  
Estimate 10,000 lb. of TP per year enters the stream.
Waterbody: Stream
Pollutant: phosphorus
Criteria: 75 μg/L

1) Describe watershed and identify sources
2) Set load reduction goals
3) Identify and implement management measures during each permit term

Baseline load = 10,000 lb of P per year
Loading capacity = 3,000 lb per year

Overall, 70% reduction is estimated to be needed to meet water quality criteria

3,000 lb of P per year

Urban runoff
Wastewater
Agricultural runoff
Naturally occurring

Reductions occur through adoption of interim limits plus additional reductions if implemented by the permittee

Attainment of water quality criteria verified through monitoring.
5. Describe Management Measures

• Specific types of practices must be identified
• Must address phosphorus/TSS sources identified in watershed inventory
• Must demonstrate that practices will be adequate to achieve goals

NR 217.18(2)(d):
The permittee has submitted an adaptive management plan that identifies specific actions to be implemented that will achieve compliance with the applicable phosphorus criterion in s. NR 102.06 through verifiable reductions of phosphorus from point and nonpoint sources in the watershed.
<table>
<thead>
<tr>
<th>BMP Type</th>
<th>Calculated Average Phosphorus Reduction (lbs per BMP acre per year)</th>
<th>Term 1 - 25%</th>
<th>Term 2 - 70%</th>
<th>Term 3 - 95%</th>
<th>Term 4 - 100%</th>
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<td>BMP Acres</td>
<td>Phosphorus Reduction, lbs/yr</td>
<td>Cumulative BMP Acres</td>
<td>Phosphorus Reduction, lbs/yr</td>
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<td>637</td>
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<td><strong>TOTAL</strong></td>
<td><strong>4,907</strong></td>
<td><strong>13,741</strong></td>
<td><strong>18,648</strong></td>
<td><strong>19,630</strong></td>
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**Table 3-7. Example Implementation Scenario to Achieve Phosphorus Reduction Goals by Permit Term**
6. Estimate load reduction expected by permit term

Table 3-6. Phosphorus and TSS Reduction Goals by Permit Term

<table>
<thead>
<tr>
<th>Permit Term</th>
<th>Phosphorus (lbs/year)</th>
<th>TSS (lbs/year)</th>
<th>% of Total Action Area TMDL Reduction</th>
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<td>1</td>
<td>4,727</td>
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<td>2</td>
<td>13,238</td>
<td>2,760,618</td>
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<td>3</td>
<td>17,965</td>
<td>3,746,553</td>
<td>95%</td>
</tr>
<tr>
<td>4</td>
<td>18,911</td>
<td>3,943,740</td>
<td>100%</td>
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</tbody>
</table>
7. Monitoring Plan

• At a minimum, monitoring in the receiving water must track progress towards meeting the criterion.

• Monitoring efforts must be consentient with Wisconsin’s assessment and listing methodology to demonstrate the criterion has been obtained.

https://dnr.wisconsin.gov/topic/SurfaceWater/WisCALM.html
8. Financial Security

• AM plans are required to address funding and financial feasibility

NR 217.18(2)(d)(4):

A demonstration that the permittee has the ability to fund and implement the plan either individually, or in conjunction with other permittees and nonpoint sources, or other partners, including municipal and county governments, in the watershed.
9. Implementation Schedule with Milestones

- Different types of milestones may exist
- Examples: landowner contacts, acres in perennial cover, WQ response parameters
- All AM plans must include pollution load reductions as milestones
Yahara WINS AM Plan Development

• Large in scale with many partners.

• Plan was completed in January of 2017.

• Required extensive DNR review, drafting of an MOU, and lots of negotiation. DNR point source staff, nonpoint staff, TMDL staff, and attorneys were involved.

• Reminder that this is simply not a pollutant load reduction exercise but rather attainment of water quality criteria.
What is Included in an AM Permit?

• Interim limits
• Compliance schedules for interim limits/final limit
• Actions proposed in AM plan
  • Incorporated by reference
• Monitoring Requirements
  • In-stream & effluent
• Annual reporting
  • Identify which BMPs have been installed
  • Monitoring results
  • Management updates
  • Modifications to the plan

| Permit term 1 | 0.6 mg/L |
| Permit term 2 | 0.5 mg/L |
| Permit term 3 | 0.5 mg/L |
| Permit term 4 | Revised site-specific limit |
Adaptive Management Success Story
• 20 facilities are engaged in adaptive management.

• 16 adaptive management plans.

• If all AM plans are fully successful:
  • ~250,000 lbs./yr. phosphorus load reduction
Yahara Pride Farms offers new ag programs

Thanks to the support of Yahara WINS, Dane County and other partners, Yahara Pride Farms is offering farmers in the watershed two new programs designed to minimize the risk of trying new management tools and develop practical, data-driven best management practices for long-term adoption.

The programs include low disturbance manure injection applicator rental and a composting partnership. Details follow:
TP data from lower end of the Yahara River, 2014 – 2020
Criterion (0.1 mg/L TP) shown in red line.

Long-term trend data for TP.
The Rock River near border with Illinois.
Lessons Learned

AM and Permit Compliance Schedules
Workload
Multiple Compliance and Variance Options
Geographic Issues
Downstream Waters
Response Time
One huge benefit for point sources is the extended compliance schedule. Each permit term has interim limits and phosphorus loads need to be addressed; however, final compliance does not have to occur in the typical 5-year time frame.

Some facilities use adaptive management as a bridge into water quality trading which again provides additional flexibility.

The challenge has been with some facilities that have no intention of attaining water quality criteria and are only using AM to delay final compliance or switch to water quality trading. Some of these facilities have proposed less than stellar plans and have required a significant amount of DNR’s time and energy. Plans must meet the requirements for DNR and EPA approval.
Consequences of Complexity

• Facilities with limited in-house expertise must rely on expensive consulting firms
• Creates a barrier to entry, even for facilities who can pay
• Can be difficult to sell an adaptive management strategy to municipal leadership or rate payers
• Element of uncertainty can make AM less attractive when compared with WQT
Workload Can be Significant for both Regulators and the Regulated Community

• AM plans address the whole watershed making them much more complicated than traditional facility upgrades or optimizations.

• Wastewater staff often need assistance from nonpoint agricultural staff, modeling staff, urban stormwater staff, and biologists.

• Plans often require several iterations, require review of annual reports, verification of implementation, and other tasks beyond what normally occur if a facility chooses to upgrade or optimize to meet their final limit.
Geographic Issues

• Pursuant to NR 217.18(3)(e)(4), the receiving water must meet the applicable criterion for success.

• Depending on the location of the discharger, the receiving water may not be the best place for watershed work.

• Typically, HUC 12 or TMDL subbasin scale is appropriate.

• HUC 12 mainstem dischargers are best suited for AM.
Downstream Waters and AM Targets

TMDLs are now being developed or retro-actively having added to them information related to water quality trading and AM.

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Permit Number</th>
<th>Outfall Number</th>
<th>TMDL Subbasin</th>
<th>TP Wasteload Allocation (lbs./year)</th>
<th>Local Wasteload Allocation (lbs./year)</th>
<th>Max Downstream Credits (lbs./year)</th>
<th>Downstream Waterbody</th>
<th>Adaptive Management Target (μg/L)</th>
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<tr>
<td>KINGSTON WASTEWATER TREATMENT FACILITY</td>
<td>36421</td>
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<td>LARSEN WINCHESTER SD WWTF</td>
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<td>LEACH FARMS - AURORAVILLE</td>
<td>52809</td>
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<td>LITTLE RAPIDS CORP SHAWANO SPECIALTY PAPERS</td>
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<td>5,054</td>
<td>Lake Winnebago</td>
<td>27</td>
</tr>
</tbody>
</table>

Note: Stream and river criteria are expressed as a median of monthly samples collected between May and October. For reservoirs and lakes, the criteria are expressed as a mean of monthly samples collected between June and September.
Response Time (Modeled vs. Monitored)

• The premise of AM is that pollutant reductions will result in improvements in water quality; however, those reductions often must reach a certain threshold to even be picked-up by water quality monitoring and some waterbodies may have a delay in response due to legacy phosphorus in the sediments and internal loadings.

• This is very much waterbody specific and varies based on annual rainfall and runoff.

• For AM plans, modeling can be used to show progress; however, final compliance still requires monitoring.
## Key Differences: Montana vs Wisconsin

<table>
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<tr>
<th>Program Piece</th>
<th>Wisconsin</th>
<th>Montana</th>
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<tr>
<td>Regulatory controls over nonpoint sources</td>
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<tr>
<td>Permitting variance option</td>
<td>✔</td>
<td>Limited*</td>
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<td>Numeric phosphorus criteria</td>
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<tr>
<td>Interpreting narrative standards by measuring response variables</td>
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<td>Interpreting numeric standard by measuring instream nutrient concentrations</td>
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* Variances per Circular DEQ-12B were eliminated in 2021 by SB358; however, individual water quality variances are still available under 75-5-320, MCA
ANY QUESTIONS?
https://dnr.wisconsin.gov/topic/Wastewater/AdaptiveManagement.html