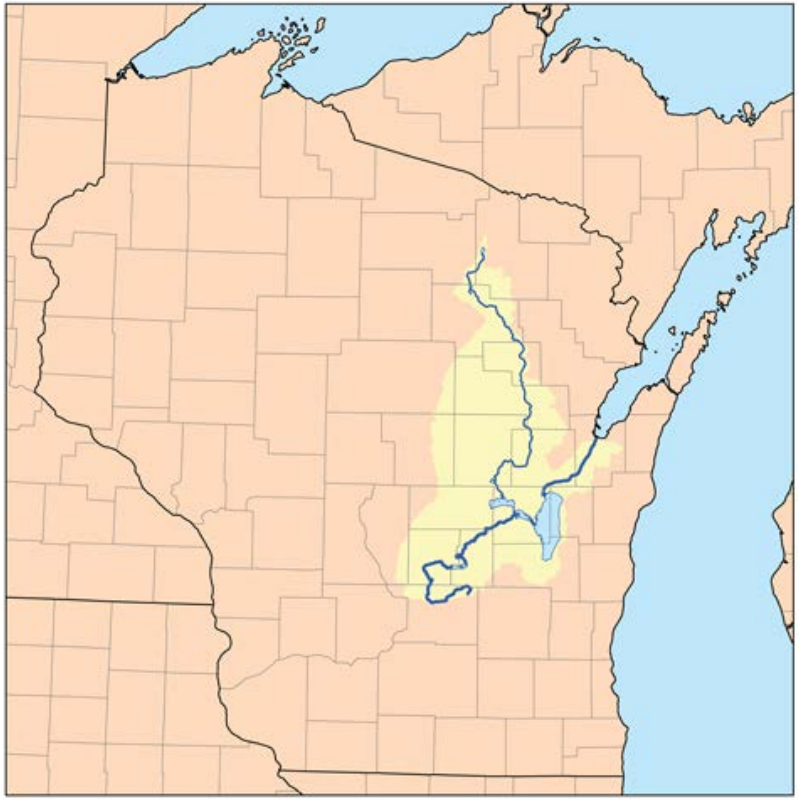
Overview of Total Maximum Daily Load Development

Kevin Kirsch, P.E.
Department of Natural Resources

Overview

- Overview of Impaired Waters and TMDL Process
- Project Background of Upper Fox – Wolf TMDL



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What is an Impaired Water?

Waters that do not meet designated uses or do not meet water quality criteria.

Lake Winnebago
photo taken 6/27/2014

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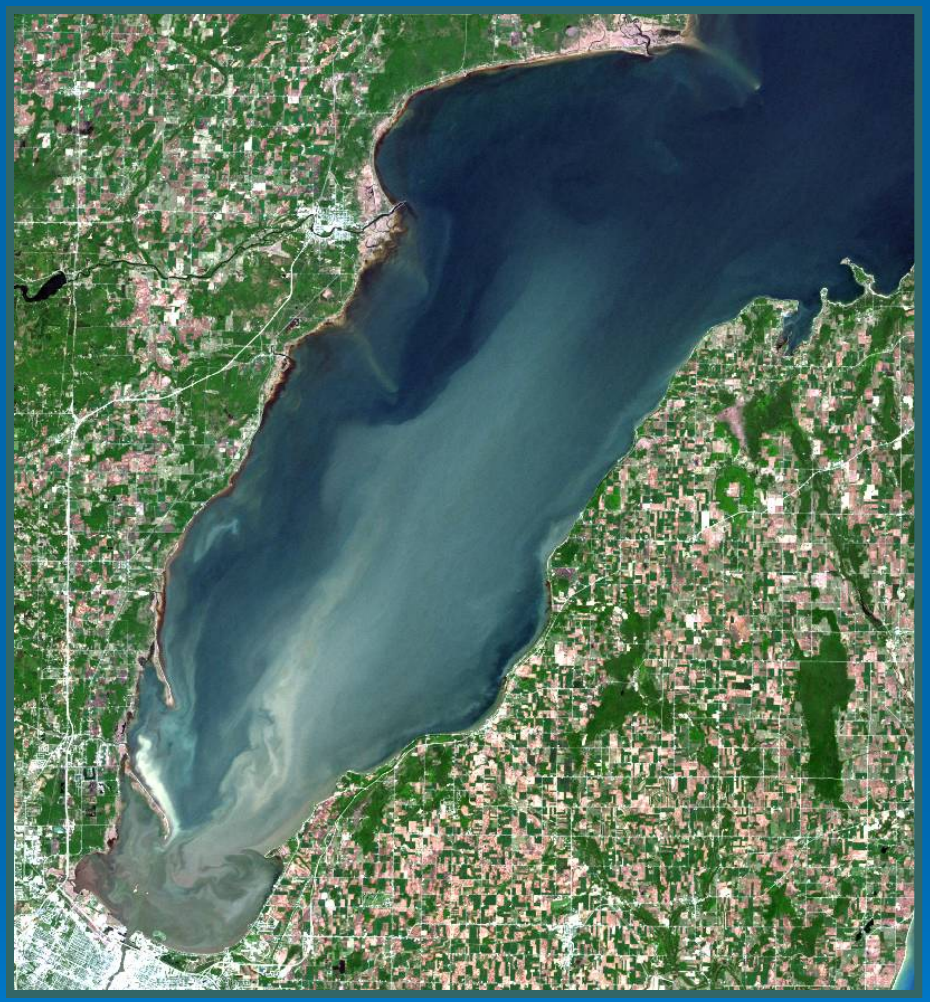

University of Wisconsin ERSC Satellite, May 2000

Lake Winnebago
photo taken 6/24/2014

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Water Quality Standards

Designated Uses:

- Fish & Aquatic Life
- Public Health
- Recreation

Water Quality Criteria:

- Numeric: dissolved oxygen, pH, bacteria, toxic substances, phosphorus, etc.
- Narrative: “no objectionable deposits,” “substances in concentrations or combinations shall not be harmful to humans, fish, plants, or other aquatic life.”

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Phosphorus Criteria NR 102.06

- Rivers $_{\text{NR 102.06(3)(a)}}$ = 100 µg/L
- Streams = 75 µg/L
  - All unidirectional flowing waters not in NR 102.06(3)(a)
- Reservoirs
  - Stratified = 30 µg/L
  - Not Stratified = 40 µg/L
- Lakes range from 15-30 µg/L
- Lake Michigan =7 µg/L
- Lake Superior = 5 µg/L
- Exclusions
  - Ephemeral Streams
  - Wetlands
  - Lakes <5 ac

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TMDL TSS Targets

- Wisconsin has numeric criteria for phosphorus and narrative standards for sediment or total suspended solids (TSS).

- Narrative standards translated into numeric a target for TMDL based on multiple lines of evidence relating biotic impacts to TSS concentrations using correlations between casual and response parameters.

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TSS TMDL Targets

- U.S. Geological Survey Professional Paper 1754, Nutrient Concentrations and Their Relations to the Biotic Integrity of Nonwadeable Rivers in Wisconsin, by Dale M. Robertson, Brian M. Weigel, and David J. Graczyk, provides data and statistical results that allow identification of TSS targets, as supplemented by unpublished analysis by Dale Robertson.

- Subsequent breakpoint analysis shows a range between 10 mg/L to 15 mg/L with an average of 12 mg/L.

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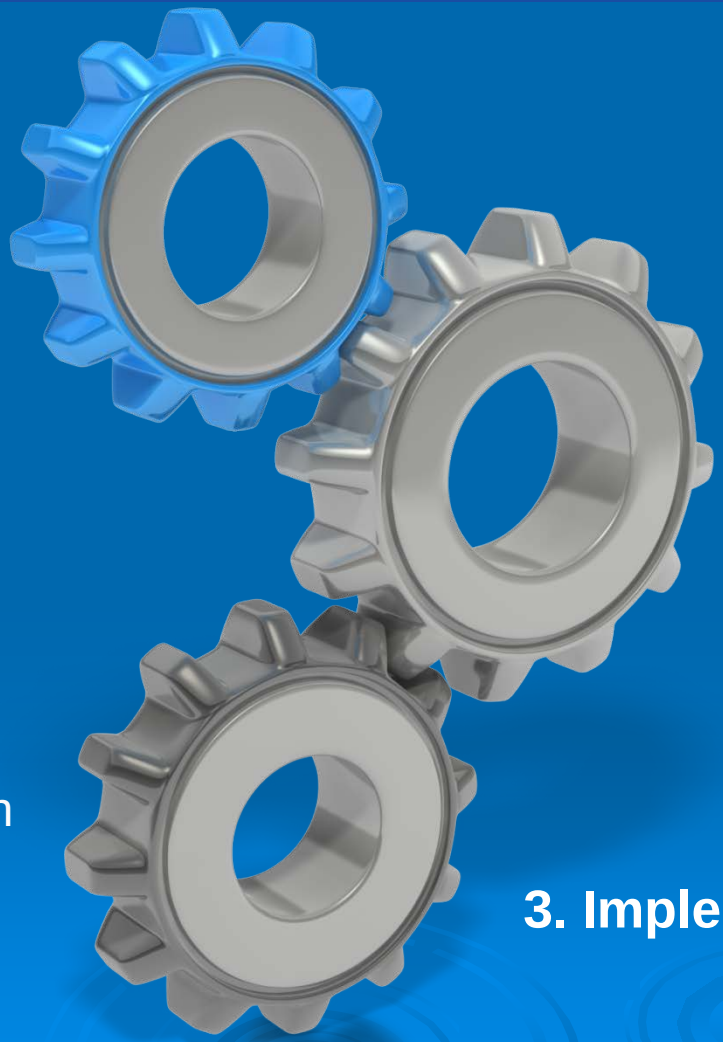
Process Overview

1. **Evaluate Waterbodies**



2. **Establish Maximum Allowable Pollutant Load (TMDL)**

3. **Implementation**

★ Public input at each stage of process

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Evaluation for Rivers and Streams

- Minimum data requirements for listing:
  - Phosphorus:
    - 1 year, 6 samples May – October
      - 1 sample per month, preferably mid-month
      - 95% confidence interval, median values
  - Biological data:
    - Macroinvertebrate surveys
    - Fish surveys
      - 1 “poor” condition score; IBI in recent 10-year period

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Listing Impaired Waters

- Impaired Waters List updated every 2 years
- Public comment period for List
- WDNR submits list to U.S. EPA for approval
- More information available on WDNR Website:

http://dnr.wi.gov/org/water/wm/wqs/303d/303d.html

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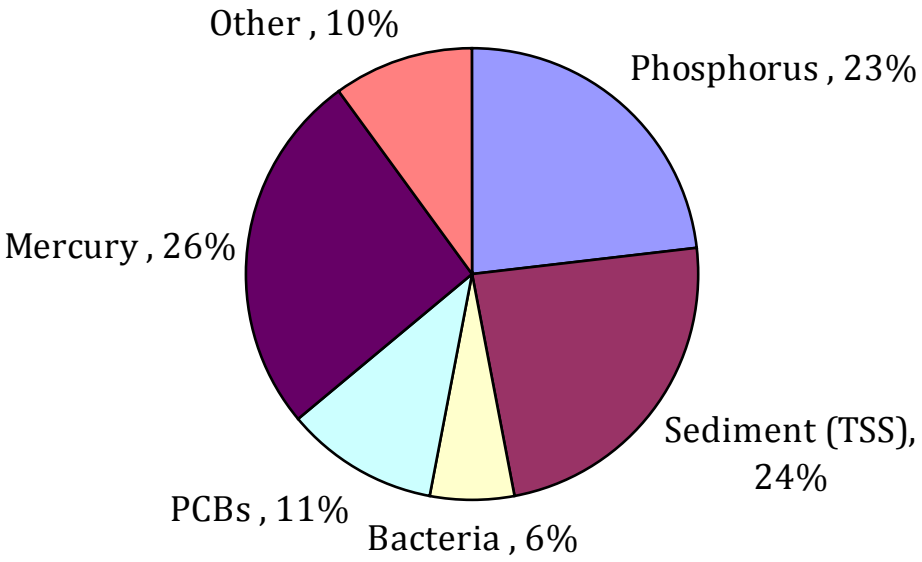
Summary of Proposed 2012 List



~ 40 proposed waters being listed for phosphorus in 2012

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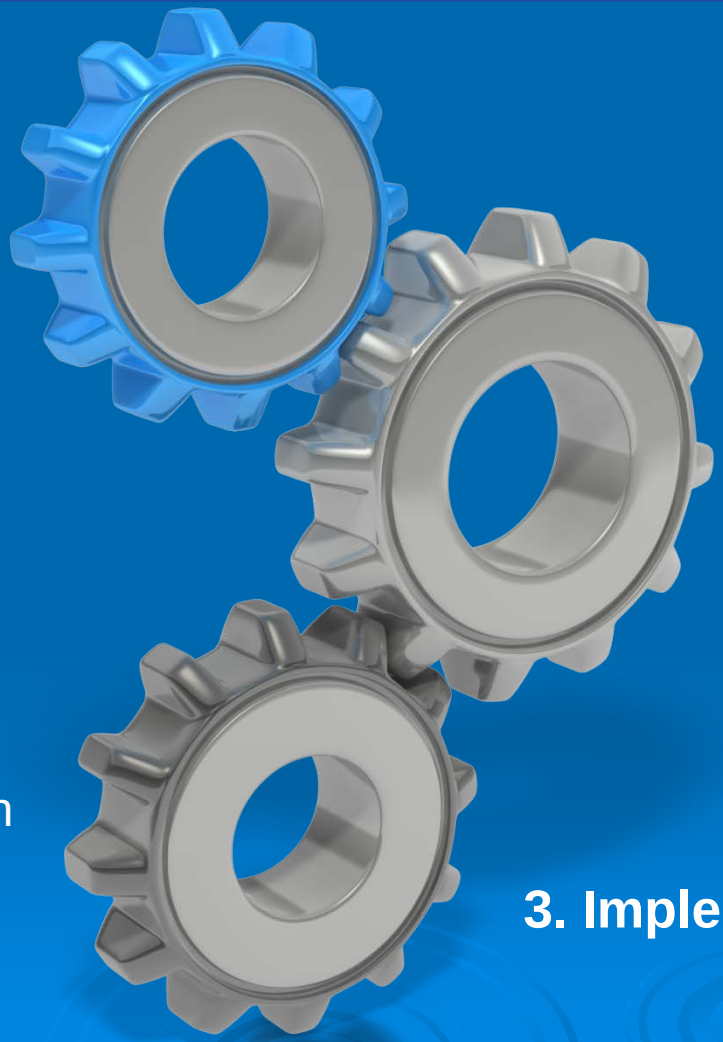

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★ Public input at each stage of process

3. **Implementation**

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What are TMDLs?

The amount of a pollutant a waterbody can receive and still meet water quality standards

Total **M**aximum **D**aily **L**oad =

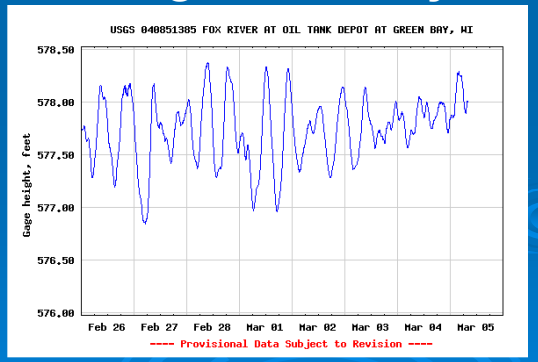
Load Allocation

+

Waste Load Allocation

+

Margin of Safety



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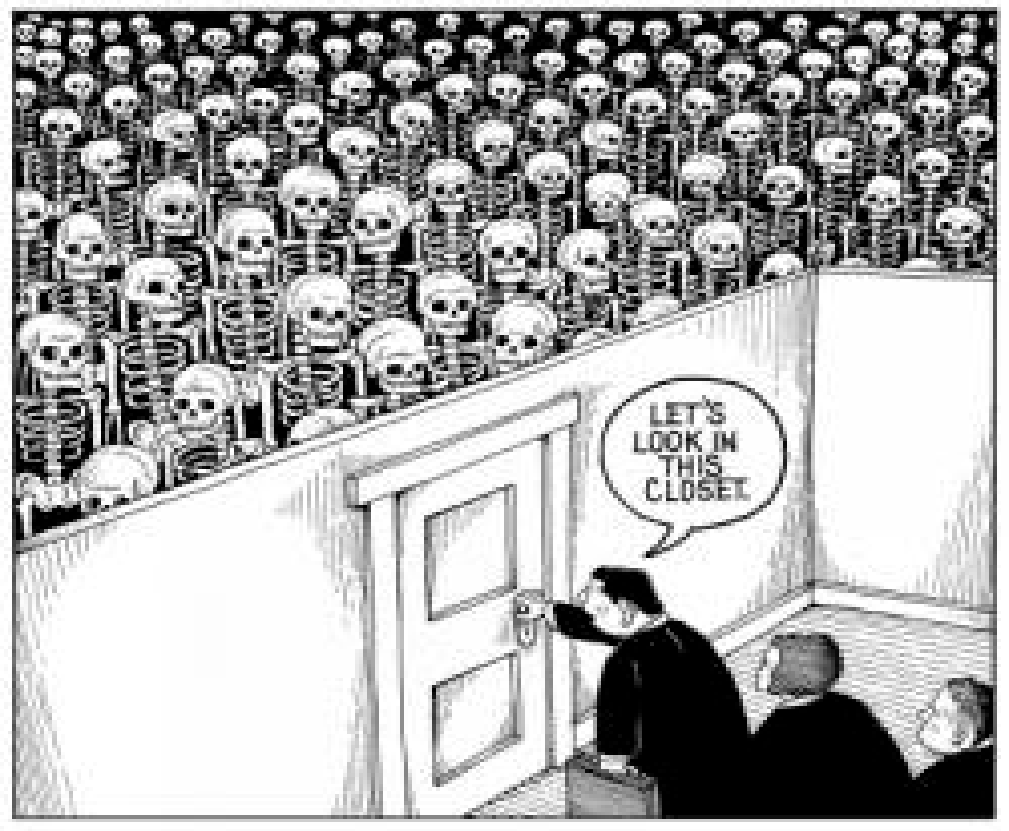
What are TMDLs?



"A TMDL reveals the skeleton in the closet"

Dean Maraldo, EPA

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How did we get to TMDLs?

- Clean Water Act of 1972
  - Amended in 1977
  - Established 303(d) and TMDL in law
- Reliance on NPDES process with little early use of TMDL process
- Legal challenges in 80s - 90s because of the non-use of TMDLs
- EPA ramps up 303(d) + TMDL processes in 2000

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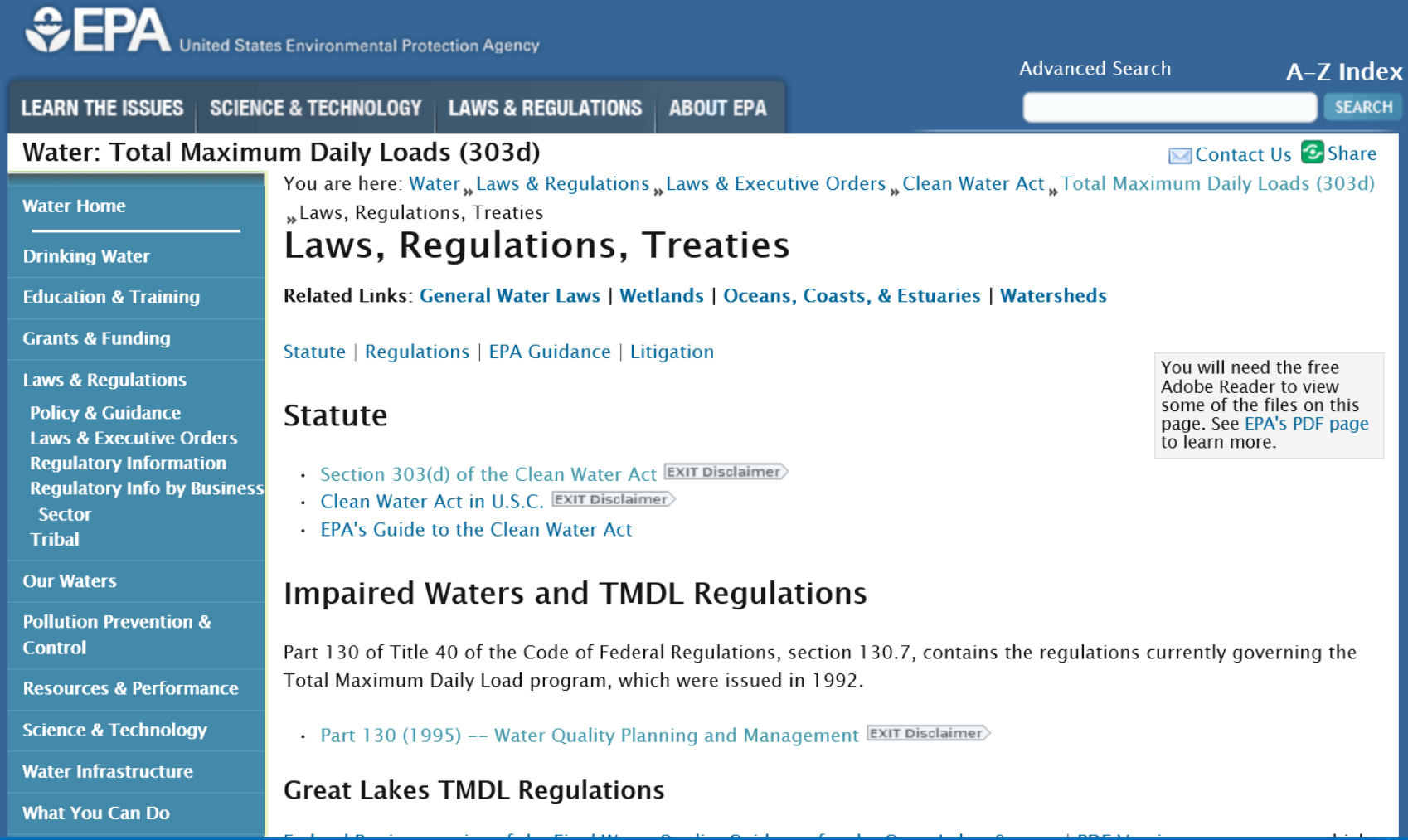

http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/

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TMDL Allocations

Waste Load Allocation

- WWTPs / POTWs
- Industries
- MS4s
- Non-Metallic Mines
- Construction Sites
- CAFOs

Load Allocation

- Agricultural
- Non-permitted Urban
- Background

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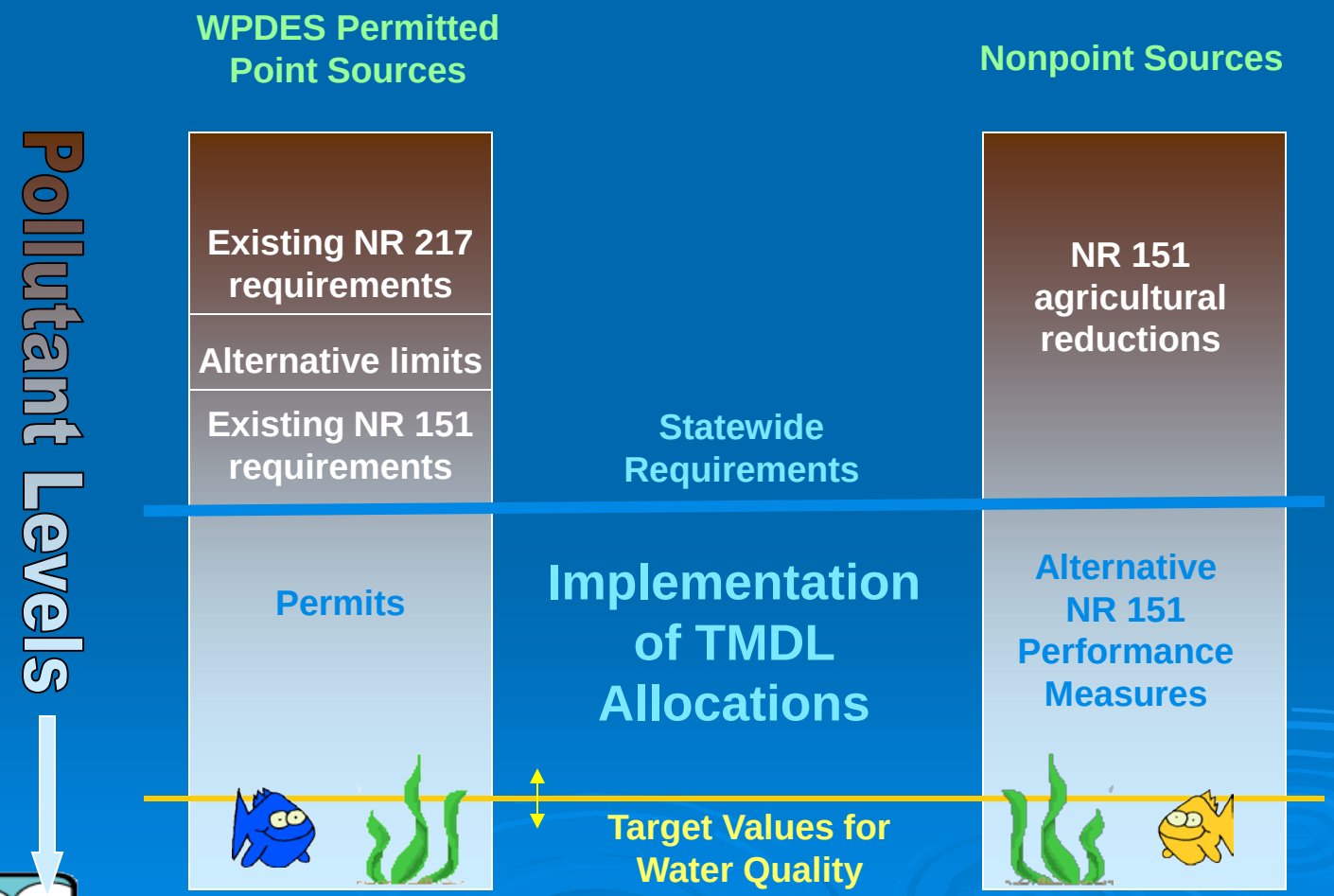
Load Allocation Approach



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Expression of Allocations

- TMDL must expression allocations by mass and on a daily basis (lbs./day).
- The TMDL can be implemented on different time steps such as monthly, seasonal, or annual.

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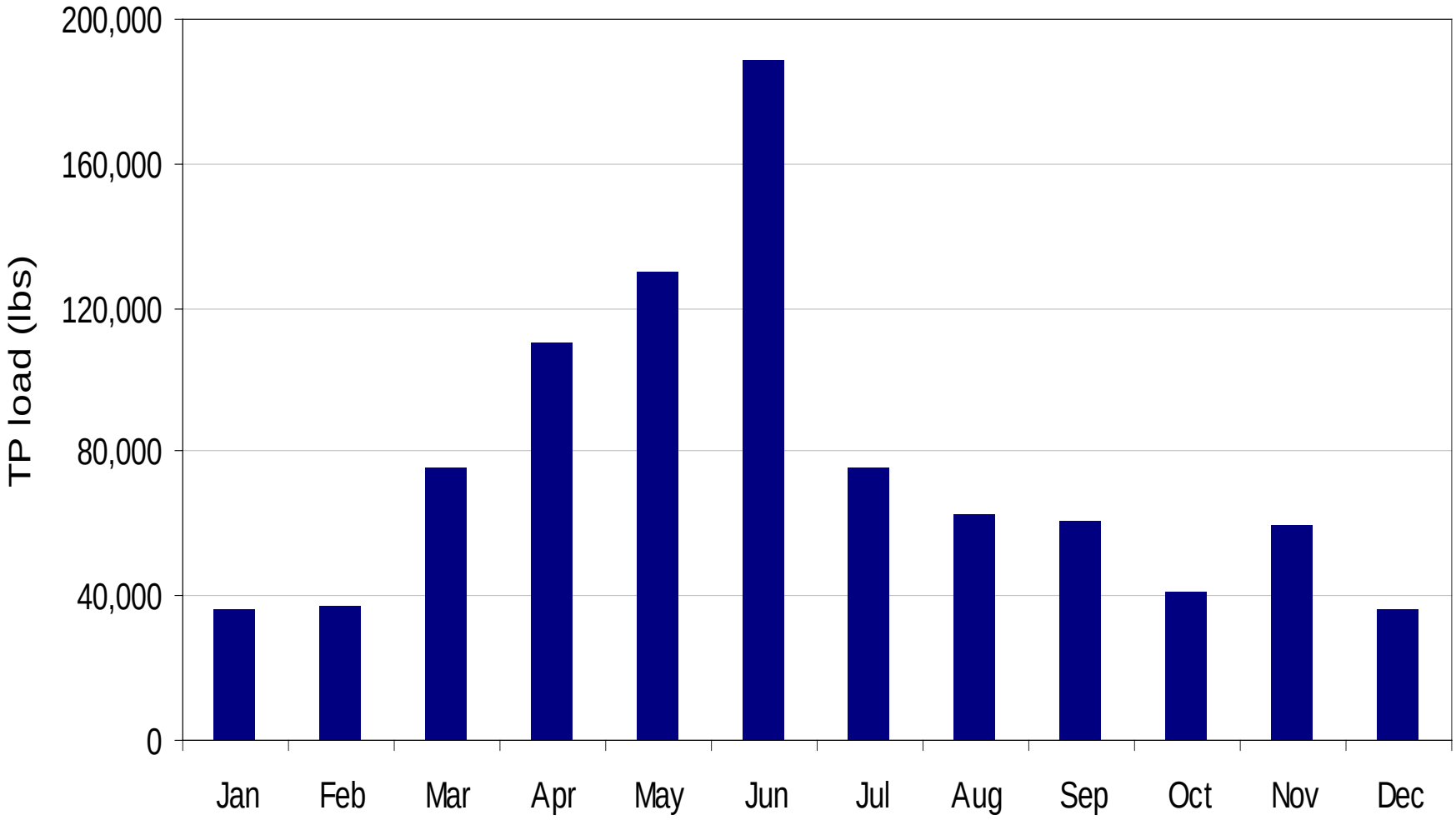
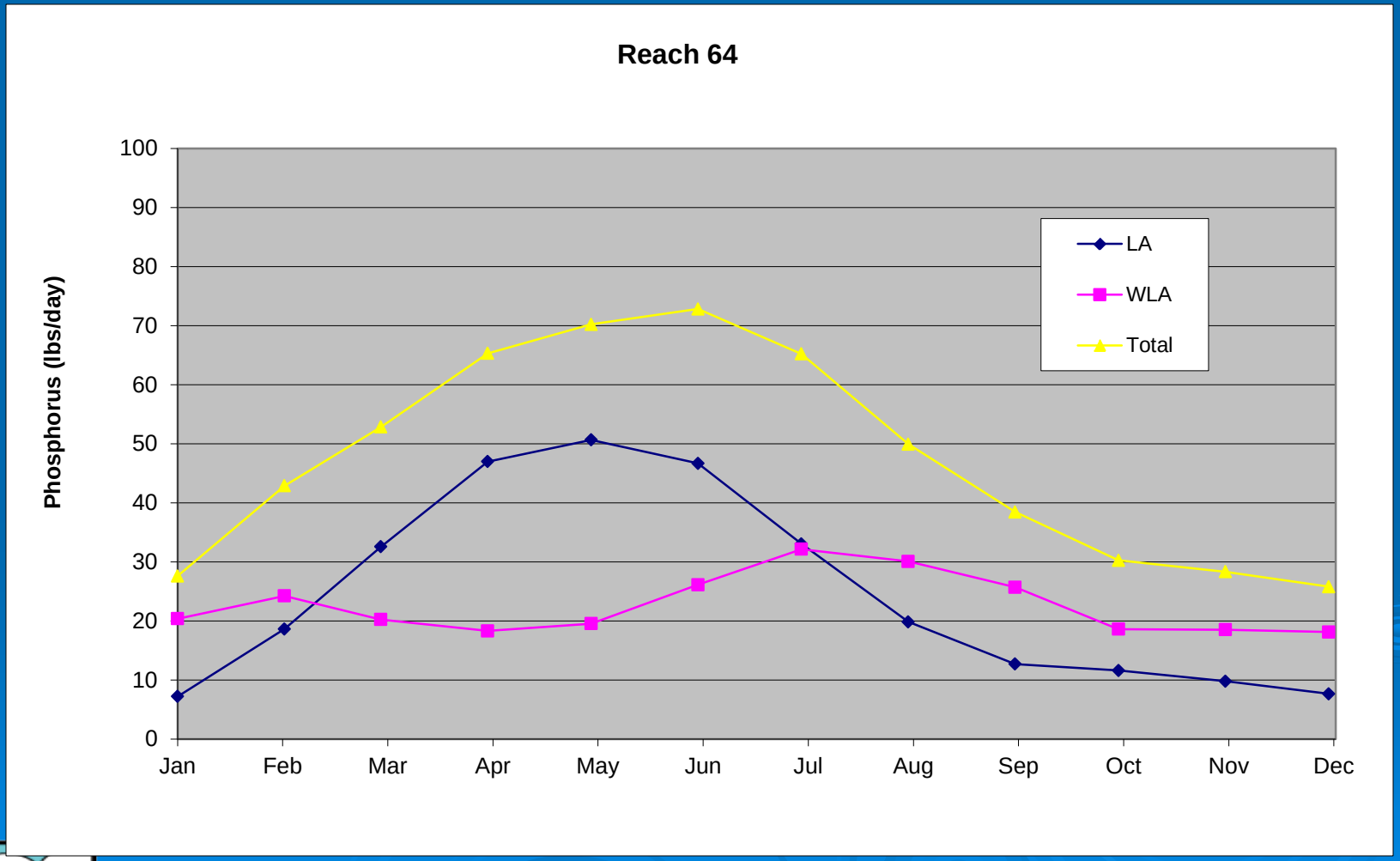
Seasonal Variation in Loadings



Timing of Allocations



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TMDL Development Steps

- Calculate loading capacity and allocations
- Draft TMDL & implementation plan
- Public comment period conducted by DNR
- Submit TMDL to EPA for approval
- Implementation

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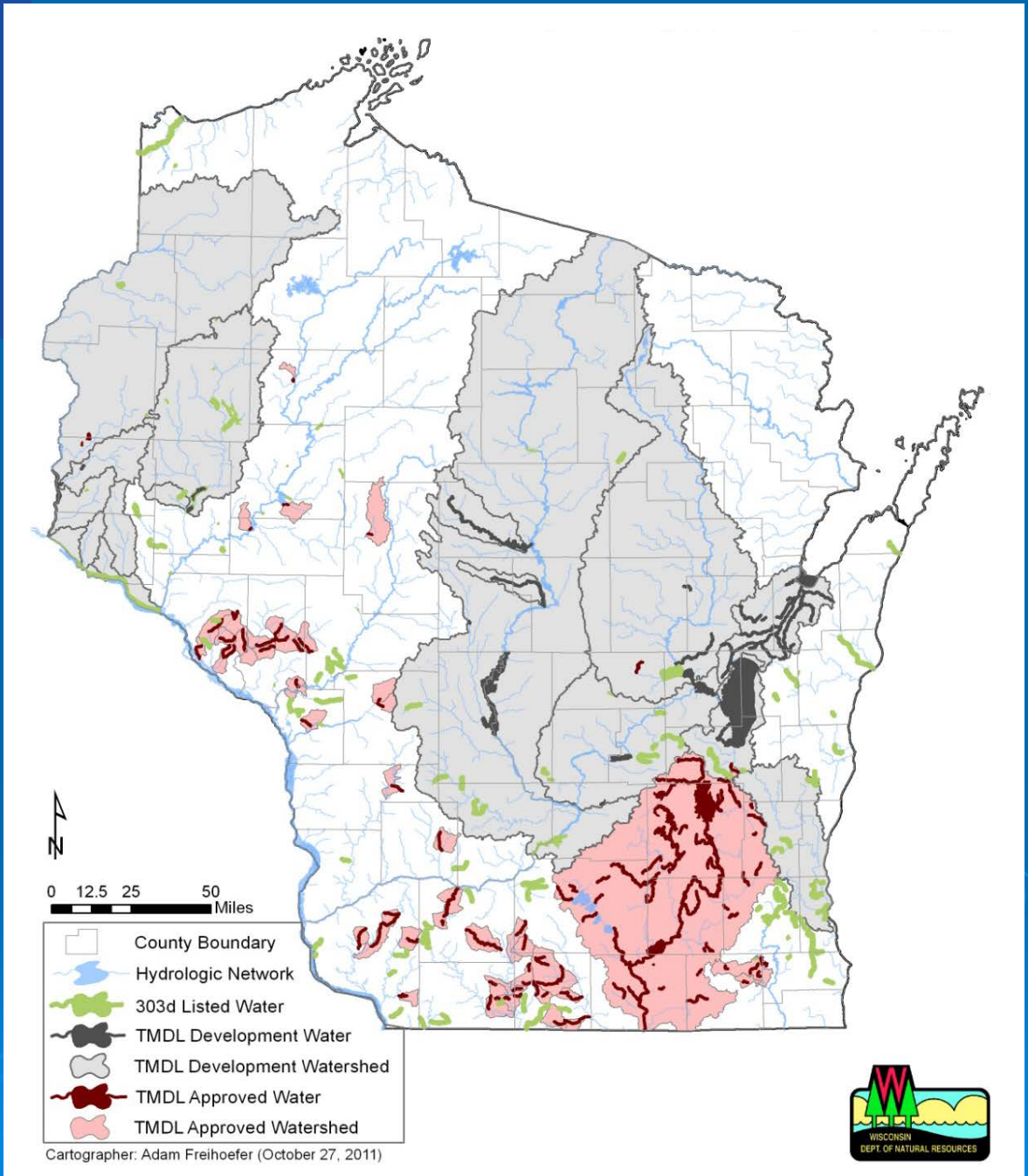
Wisconsin Phosphorus TMDLs



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Rock River Basin TMDL

- 101 TMDLs for TSS and TP;
  - *Approved* by US EPA on September 28, 2011
  - Point Source Permits WLAs: 76
  - MS4 (stormwater) WLAs: 48
- Implementation "Sector Teams" formed
  - Addressing MS4s, Point Sources, Agricultural, Monitoring, and Education & Outreach.

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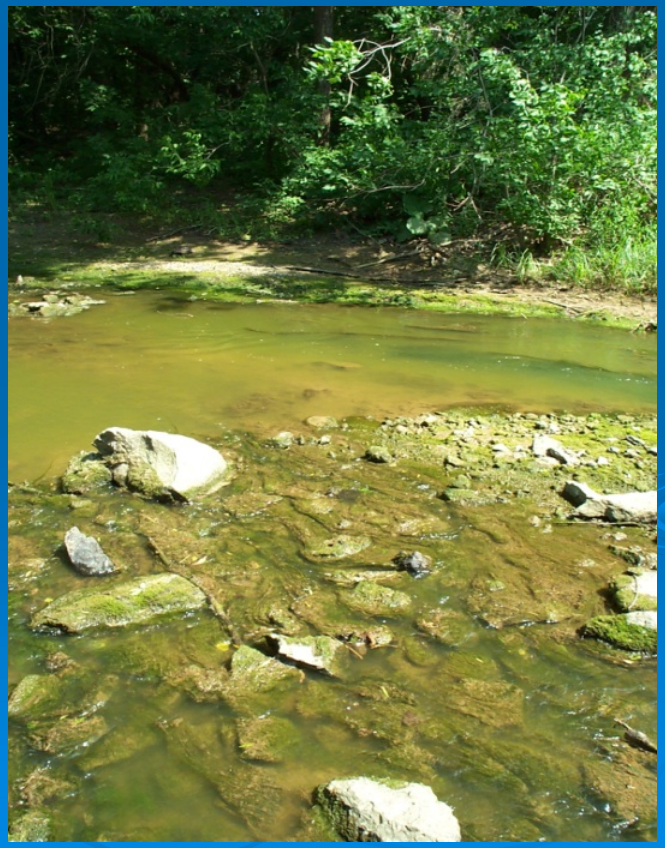
Lower Fox River Basin TMDL

- TMDL addressing TSS and TP
- EPA approved 5/18/2012
- Lake Winnebago served as a boundary condition with estimated reductions prior to detailed lake modeling.



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Phosphorus TMDLs in Development

- The Wisconsin River TMDL
  - External stakeholders encouraged state to fund project . Additional funding from EPA.

- Milwaukee River TMDL
  - 3rd Party TMDL, led by MMSD

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Process Overview

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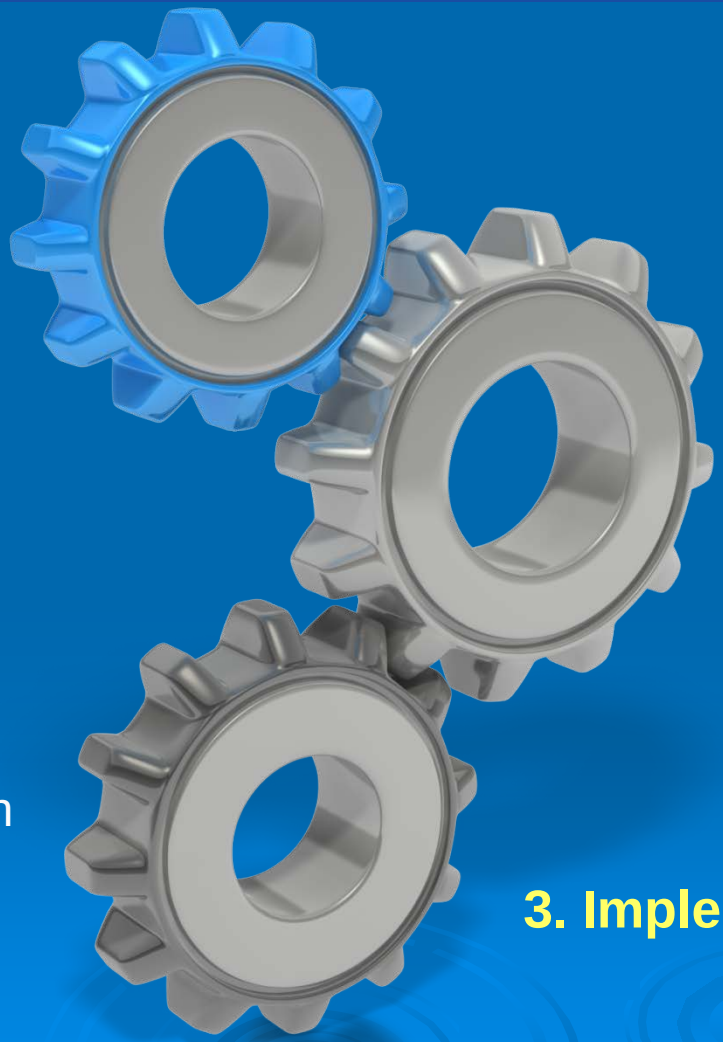

2. **Establish Maximum Allowable Pollutant Load (TMDL)**

★ Public input at each stage of process

3. **Implementation**

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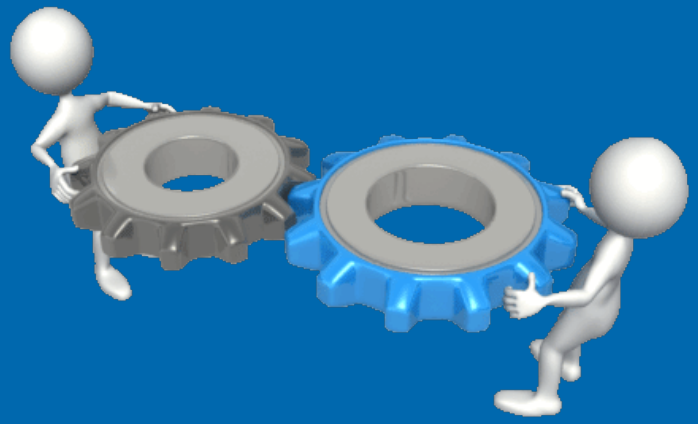
Implementation of TMDLs

1. **Evaluate Waterbodies**



2. **Establish Maximum Allowable Pollutant Load (TMDL)**

- Implementation planning delegated to state level; however, some federal funding tied to TMDL implementation.
- TMDLs rely on existing rules for implementation.
- Federal law requires permits to reflect allocations.

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Implementation Mechanisms

- **Point sources:** Wisconsin Pollutant Discharge Elimination System (WPDES) permits
- **Nonpoint sources:** NR 151 Agricultural & Non-Agricultural Performance Standards
- **Others:** Local construction site erosion control ordinances, manure storage ordinances, shoreland zoning, etc.



TMDLs and MS4s

- Federal law requires allocations be reflected in permits. Permits must be consistent with the TMDL.
- Build on NR 151 percent reduction and modeling framework.
- Extended compliance schedules in lieu of MEP.

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Example MS4 Allocations

- Rock River TMDL
  - Baseline condition (assumed to be 40% TSS reduction).
  - 0% to 70% TSS reduction from baseline.
  - 0% to 81% TP reduction from baseline.
  - Allocations by watershed (segementshed).

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Treatment Plants and Industrial Discharges

- A WLA is assigned to each individual facility or outfall with individual permits.
- The WLA expressed daily but placed in permit as monthly or annual.
- NR 217 for implementation

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Treatment Plants and Industrial Discharges

- TMDL based limits can be used in addition to or in lieu of WQBELs calculated under NR 217.13.
- The TMDL based limit may remain in permit for two permit terms to allow for implementation of the TMDL.
- If after two permit terms there has not been progress toward meeting the TMDL allocations, the NR 217.13 WQBELS can be placed in the next permit.

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Compliance Schedules

- Compliance schedules based on level of treatment technology required by the facility to meet limits.
- Compliance periods of 5, 7, or 9 years.
- Measured from the date a permit first modified or reissued to include WQBELs under NR 217.13.

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NPS - Load Allocation

- Break-out by watershed or sub-watershed

- Break-out by land use
  - Agricultural fields and pastures
  - Non-permitted urban areas
  - Woodland, natural areas, and background

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Post-Implementation Monitoring

- Repeat Step 1: Evaluate Waterbodies
- **Verify** the "condition" of the waterbody through water quality monitoring
- **Compare** results to "condition" thresholds:
  - If meeting standards, initiate de-listing efforts.
  - If not meeting standards, either:
    - Evaluate alternative implementation strategies,
    - Revise TMDL if appropriate, or
    - Potential for UAA or variance to standard.

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Upper Fox – Wolf TMDL

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Upper Fox – Wolf Basin TMDL

- The TMDL will cover both basins with special focus on the Winnebago pool lakes.
- This is an EPA funded project. EPA issued an RFP in the winter of 2012 and awarded a contract to Cadmus in early 2013. The Cadmus team includes USGS.
- Spring of 2013 was spent refining the scope and developing an approach.

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USGS science for a changing world

Upper Fox – Wolf Basin TMDL

- Developed a QAPP for the project.
- Inventoried and identified impaired waters.
- Developed TSS targets for impaired rivers and streams.
- Delineated watersheds based on drainage network, water quality targets, location of pollutant sources, and location of impaired waters. Geo-located permitted dischargers.

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Upper Fox – Wolf Basin TMDL

- Fall of 2013 met with tribes to explain TMDL process, outline preliminary approach, and gather relevant data for portions of the basin on tribal land.
- During 2014 modeling data has been collected including point source data, agricultural land use and practices through survey of county conservationists, and MS4 mapping data. This data will be made available for review.
- Preliminary model set-up initiated so models can be ready to accept final input data.

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Next Steps

- Modeling of loadings using SWAT
- Lake modeling
- Allocations to meet water quality standards

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DNR TMDL Website:

http://dnr.wi.gov/topic/tmdls/

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