

# Total Maximum Daily Load Development in Wisconsin and MS4 Permits

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# Wisconsin's Waters

- 44,000 miles of streams
- 15,000 lakes
- 100 warm water fish species
- 59 cold water fish species
- 5 million wetland acres
- 1.2 quadrillion gallons of ground water





University of Wisconsin ERSC Satellite, May 2000



Lower Fox River at Kimberly on June 2007, Photo: B. Cleland





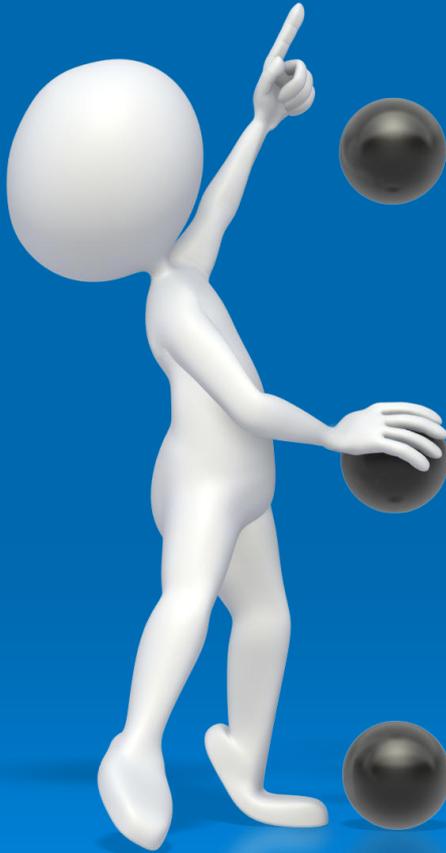
- Overview of TMDL Program
- Status and Background of TMDL Projects In WI
- Examination of Allocation Process
- Implementation of TMDLs and MS4 Permits

# ● Overview of TMDL Program

● Status and Background of TMDL Projects In WI

● Examination of Allocation Process

● Implementation of TMDLs and MS4 Permits



# What is an Impaired Water?

- Waters that do not meet designated uses
- Waters that do not meet water quality criteria



# 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.”



# Phosphorus Criteria NR 102.06

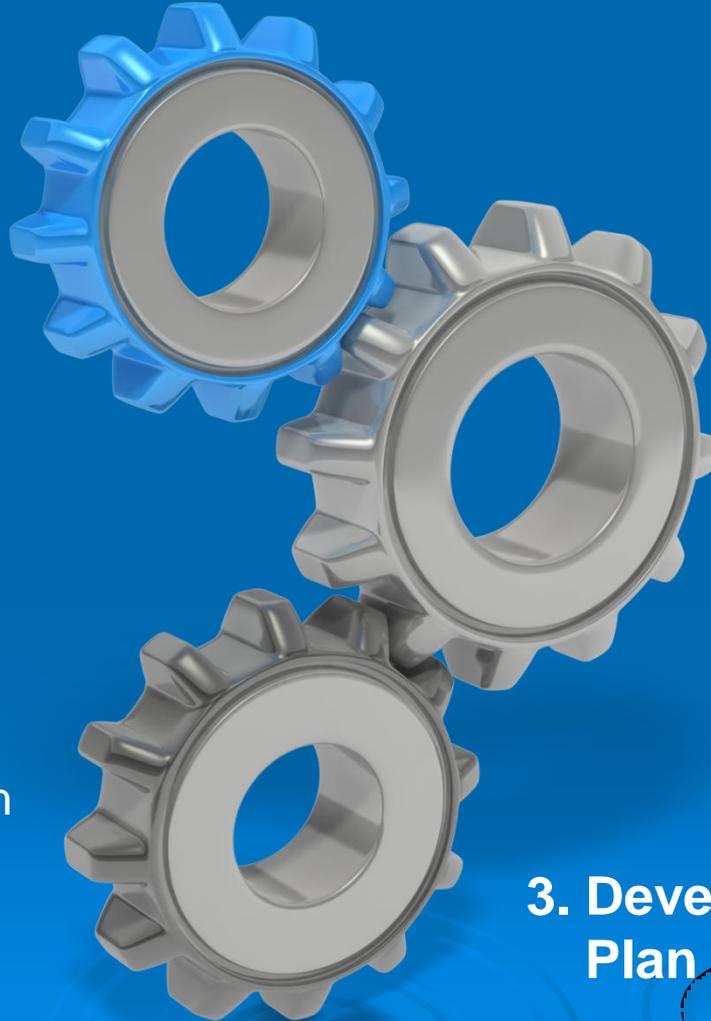
- Rivers  $_{NR\ 102.06(3)(a)} = 100\ \mu\text{g/L}$
- Streams =  $75\ \mu\text{g/L}$ 
  - All unidirectional flowing waters not in NR 102.06(3)(a)
- Reservoirs
  - Stratified =  $30\ \mu\text{g/L}$
  - Not Stratified =  $40\ \mu\text{g/L}$
- Lakes range from  $15\text{-}30\ \mu\text{g/L}$
- Lake Michigan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



# Process Overview

**1. Evaluate  
Waterbodies**

★ Public input at each  
stage of process



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

**3. Develop & Implement  
Plan**



# 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



# Evaluation for Lakes

## ➤ Minimum data requirements for listing:

- Phosphorus:

- 2 years, 3 values/yr; Jun. 1 – Sept. 15
  - Minimum 3 values, separated by 15 days
  - Surface samples, from top 2m, deep hole
  - Station or whole lake average used

- Chlorophyll a:

- 6 sample min - 2 years, 3 values/yr; Jul. 15 – Sept. 15
  - Chlorophyll a threshold dependent on lake type
  - 2 years of exceedances needed to list lake



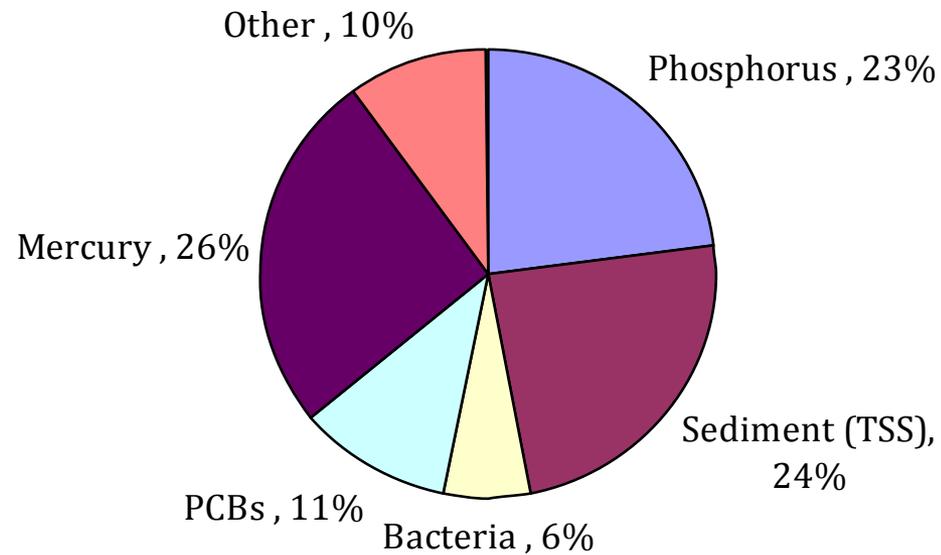
# Listing Impaired Waters

- 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>



# Summary of Proposed 2012 List



~ 40 proposed waters being listed for phosphorus in 2012



# What are TMDLs?

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

Total Maximum Daily Load =

Load Allocation



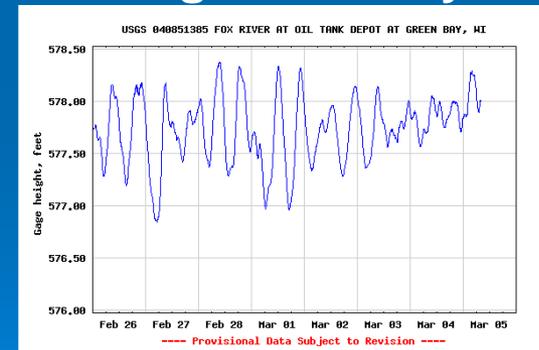
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Waste Load Allocation

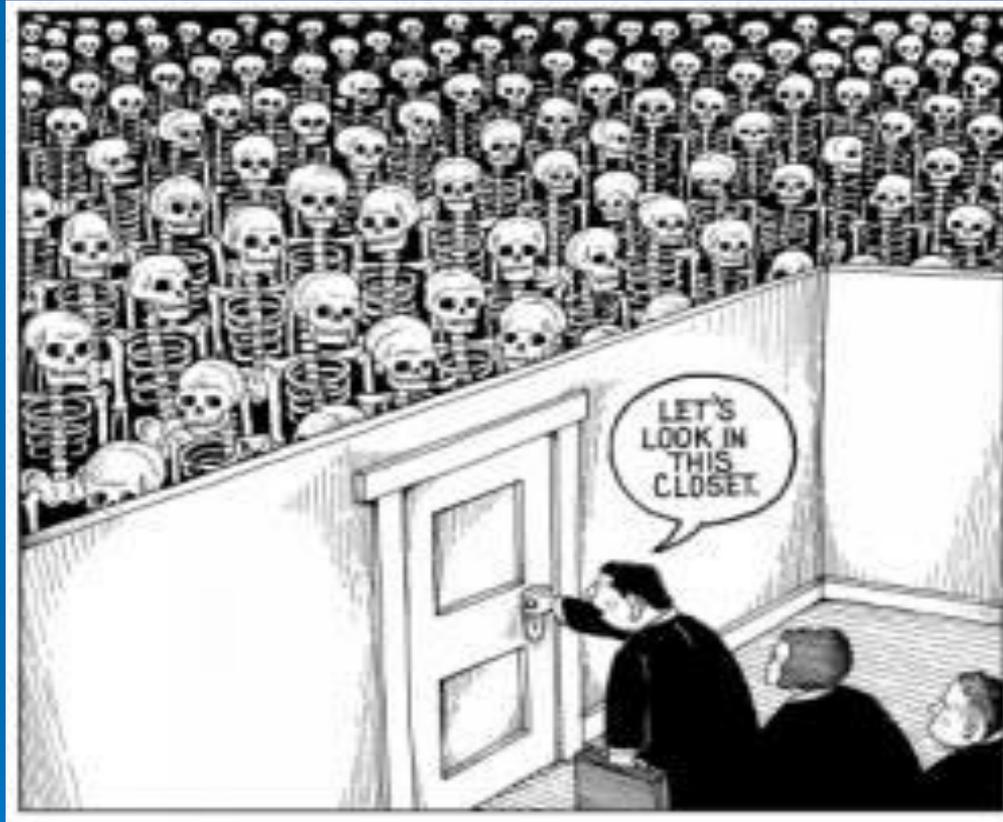


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Margin of Safety



# What are TMDLs?



“A TMDL reveals the skeleton in the closet”

Dean Maraldo, EPA



# TMDL Allocations

## Waste Load Allocation

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

## Load Allocation

- Agricultural
- Non-permitted Urban
- Background



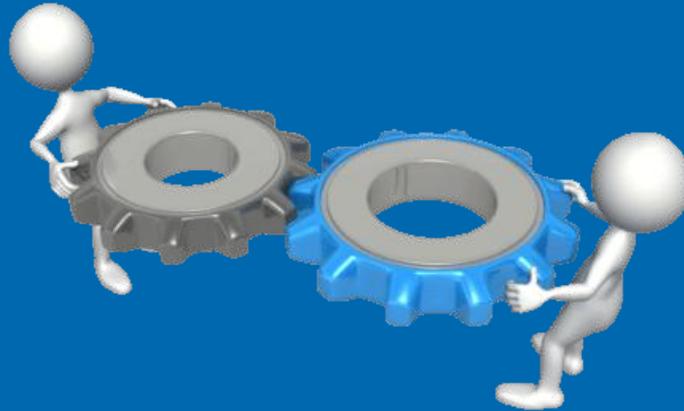
# TMDL Development Steps

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



# Implementation of TMDLs

## 1. Evaluate Waterbodies



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

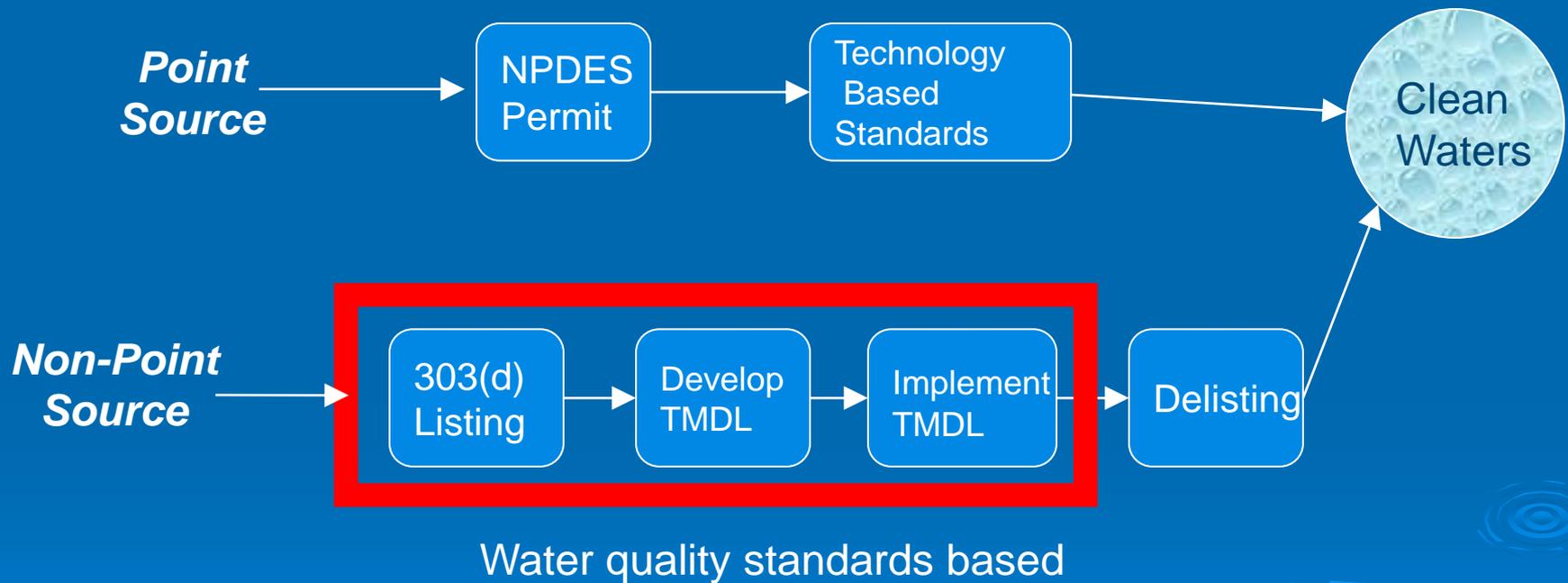
- Implementation planning delegated to state level.
- TMDLs do not create rules but rather rely on existing rules for implementation.
- Federal law requires permits to reflect allocations.

# 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



# Clean Water Act Process



## Water: Total Maximum Daily Loads (303d)

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# Laws, Regulations, Treaties

Related Links: [General Water Laws](#) | [Wetlands](#) | [Oceans, Coasts, & Estuaries](#) | [Watersheds](#)

[Statute](#) | [Regulations](#) | [EPA Guidance](#) | [Litigation](#)

## Statute

- [Section 303\(d\) of the Clean Water Act](#) [EXIT Disclaimer](#)
- [Clean Water Act in U.S.C.](#) [EXIT Disclaimer](#)
- [EPA's Guide to the Clean Water Act](#)

## Impaired Waters and TMDL Regulations

Part 130 of Title 40 of the Code of Federal Regulations, section 130.7, contains the regulations currently governing the Total Maximum Daily Load program, which were issued in 1992.

- [Part 130 \(1995\) -- Water Quality Planning and Management](#) [EXIT Disclaimer](#)

## Great Lakes TMDL Regulations

- Water Home
- Drinking Water
- Education & Training
- Grants & Funding
- Laws & Regulations
- Policy & Guidance
- Laws & Executive Orders
- Regulatory Information
- Regulatory Info by Business Sector
- Tribal
- Our Waters
- Pollution Prevention & Control
- Resources & Performance
- Science & Technology
- Water Infrastructure
- What You Can Do

You will need the free Adobe Reader to view some of the files on this page. See [EPA's PDF page](#) to learn more.

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





- Overview of TMDL Program

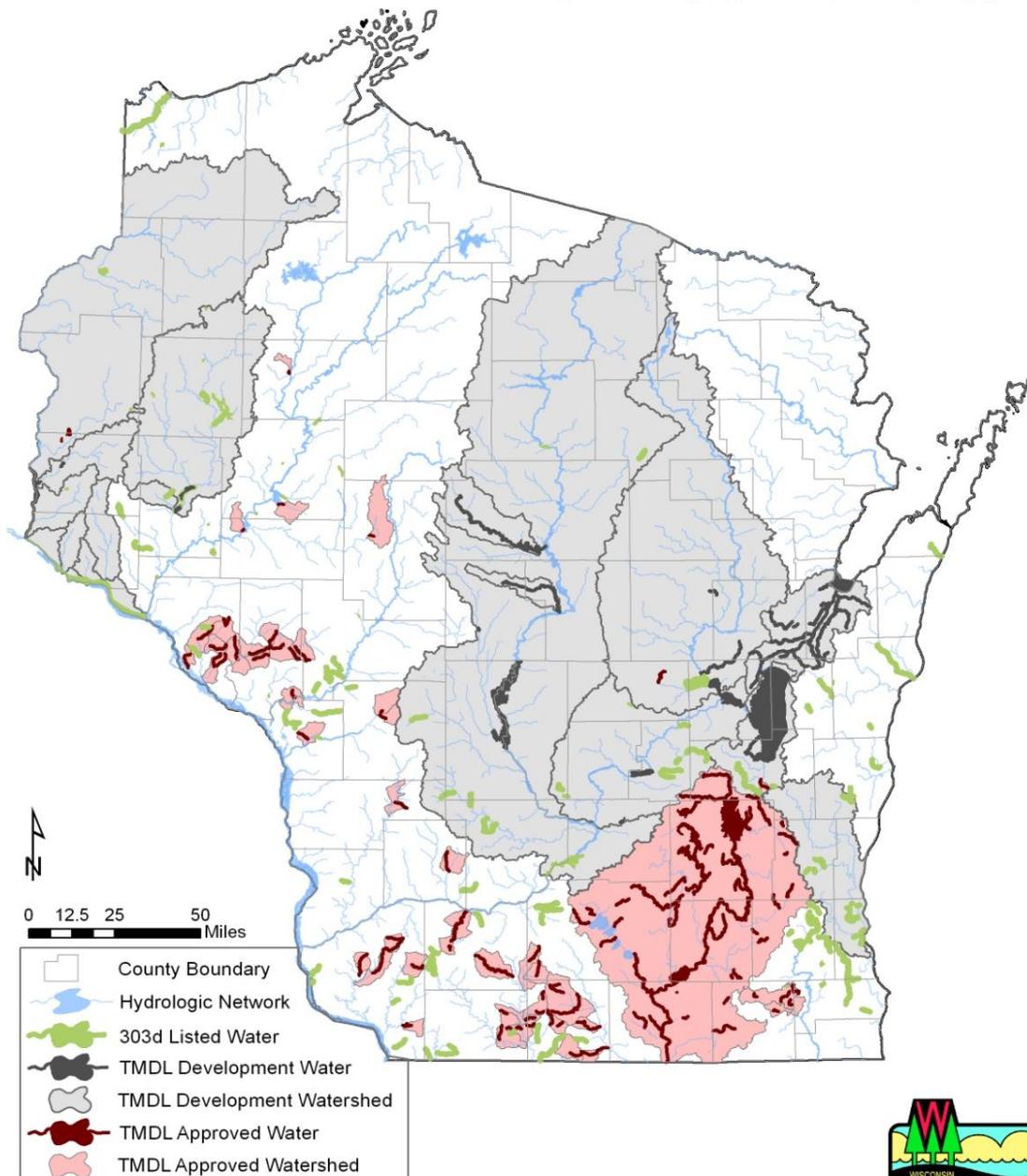
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# Wisconsin Phosphorus TMDLs



Cartographer: Adam Freihoefer (October 27, 2011)



# Phosphorus TMDLs in Development

## ➤ The Wisconsin River TMDL

- External stakeholders encouraged state to fund project



## ➤ Milwaukee River TMDL

- 3rd Party TMDL, led by MMSD

## ➤ Upper Fox/Wolf TMDL

- Seeking funding for TMDL development



# Lower Fox River Basin TMDL

- Project 2006-2011; addressing TSS and TP
- Representatives from multiple sectors on technical and outreach teams
- Sources of TP: Agriculture (46%), Wastewater (37%), Urban (12%), Other (5%)
- Public Hearing in July 2010
- Awaiting US EPA Approval



# 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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- **Examination of Allocation Process**

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$$\text{TMDL} = \text{WLA} + \text{LA} + \text{MOS}$$

- Must meet WQS
- Science based approach
- Frames implementation



# TMDL Allocations

## Waste Load Allocation

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

## Load Allocation

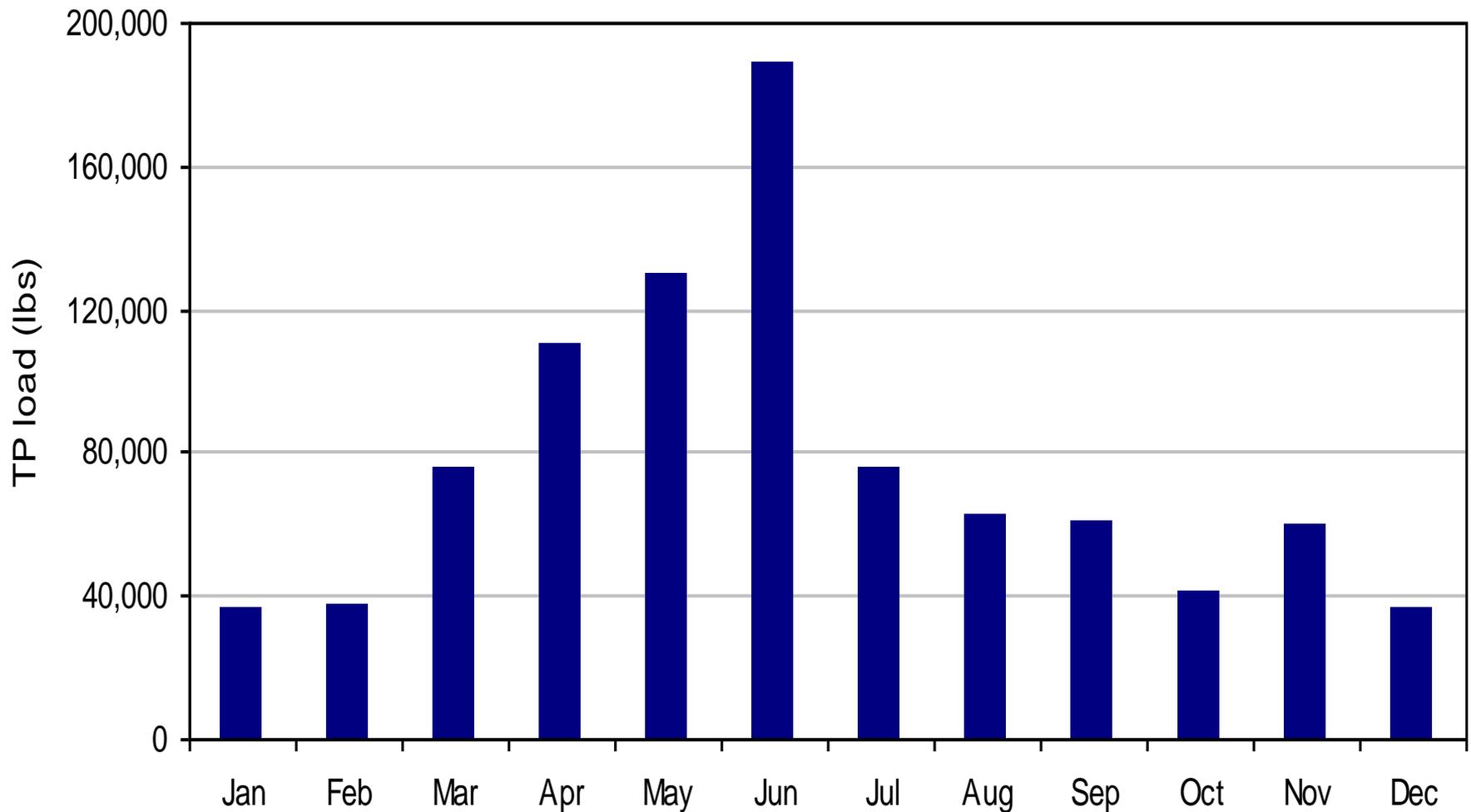
- Agricultural
- Non-permitted Urban
- Background

# Expression of Allocations

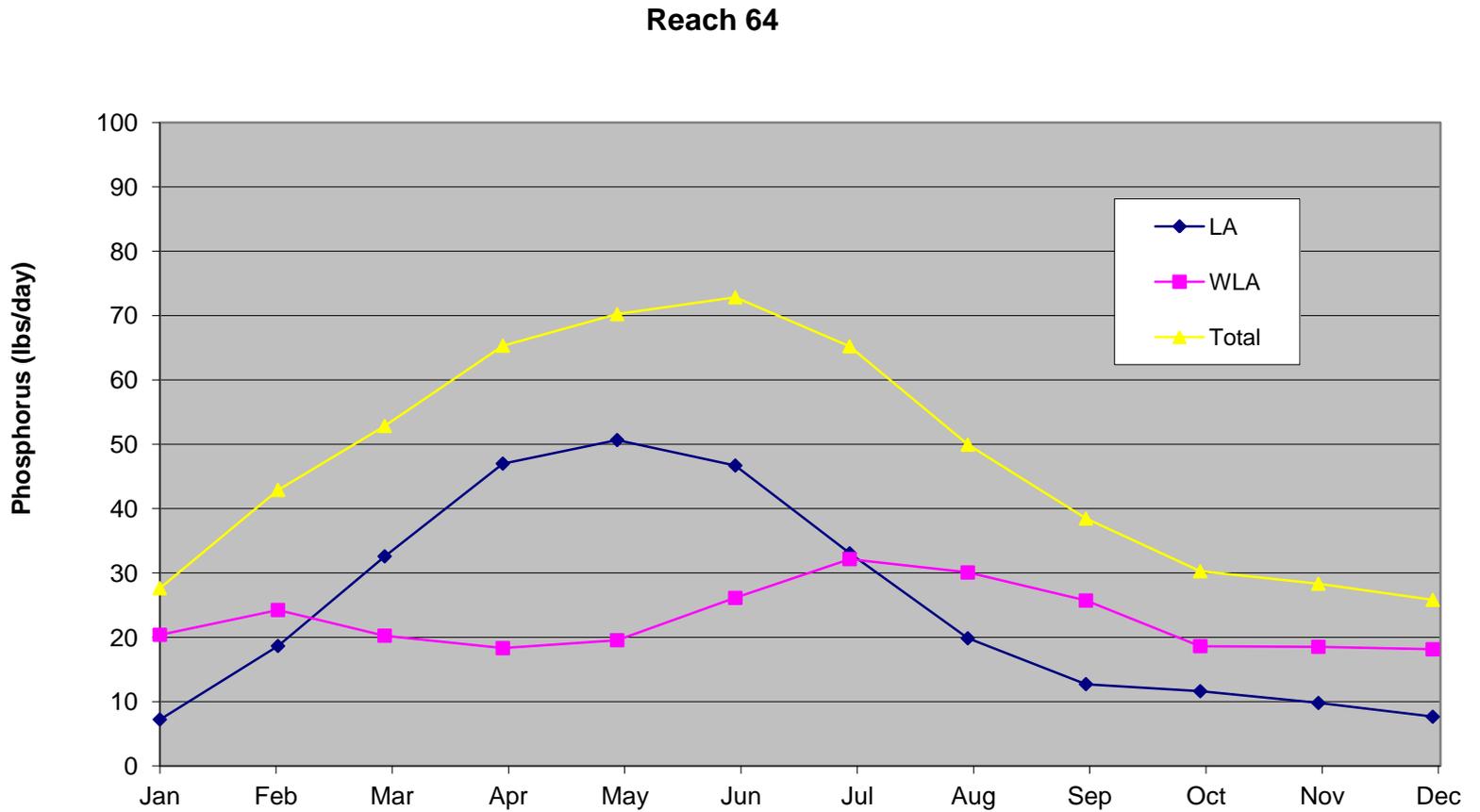
- TMDL must expression allocations by mass and on a daily basis (lbs./day).
- The TMDL can be implemented on different time steps such as monthly, seasonal, or annual.



# Seasonal Variation in Loadings



# Timing of Allocations



# Load Allocation Approach

## WPDES Permitted Point Sources



## Nonpoint Sources



Statewide Requirements

Implementation of TMDL Allocations

Target Values for Water Quality

Pollutant Levels



# Allocation Schemes

EPA's [Technical Support Document for Water Quality-based Toxics Control \(PDF\)](#) (26.6MB, 335 pages) (EPA/505/2-90-001) lists 19 allocation schemes for developing WLAs, but also indicates that any reasonable allocation scheme that *meets the antidegradation provisions and other requirements of State water quality standards* can be used. Examples of allocation schemes that can be applied to point and nonpoint sources are listed below. These *allocation objectives* focus on flexible endpoint measures such as source loads and cost.

- Equal Percent Overall Removal
- Equal Percent Incremental Removal
- Equal Overall Reduction of Raw Load
- Equal Incremental Reduction of Raw Load
- Equal Cost per Pound of Pollutant Removed
- Percent Removal Proportional to Raw Load per Day
- Seasonal Limits based on Cost-effectiveness
- Minimum Total Compliance Cost

Allocations must meet water quality standards



# EPA: Cost Optimization Model

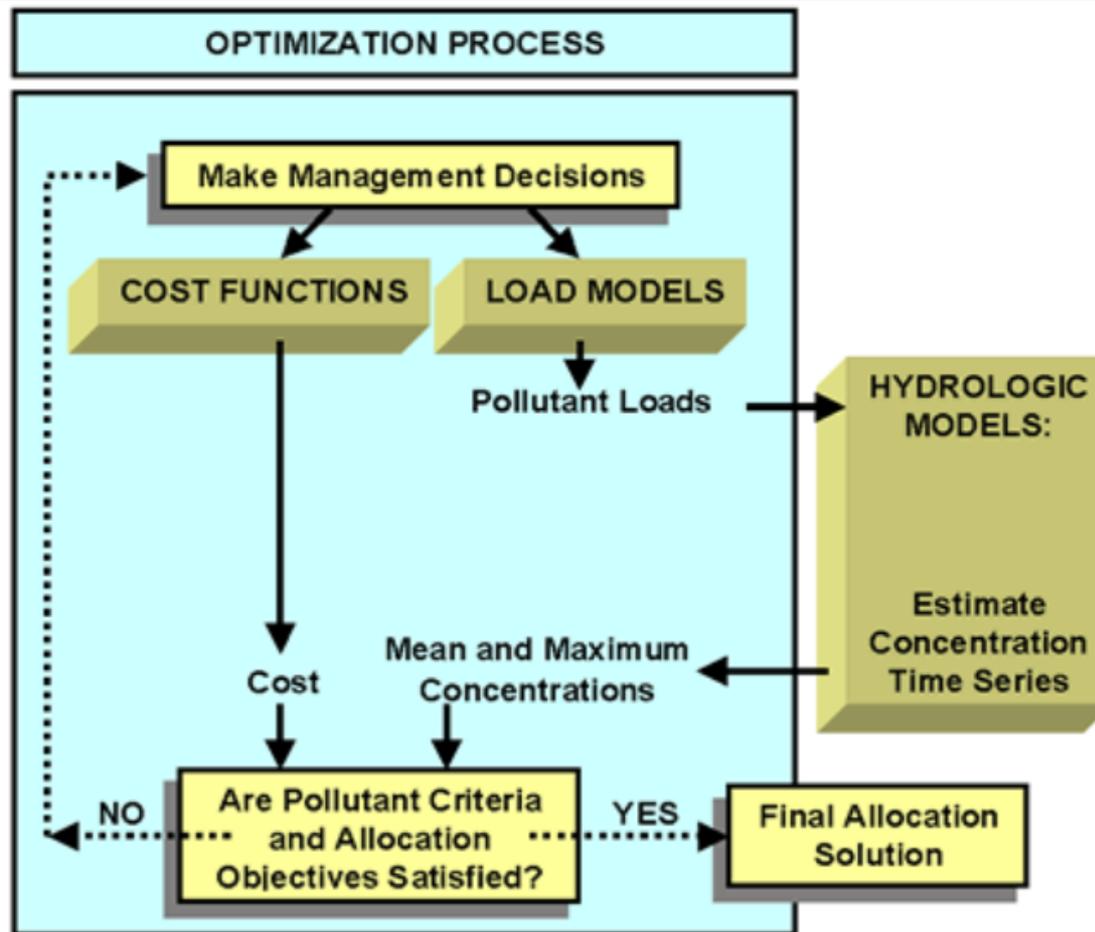
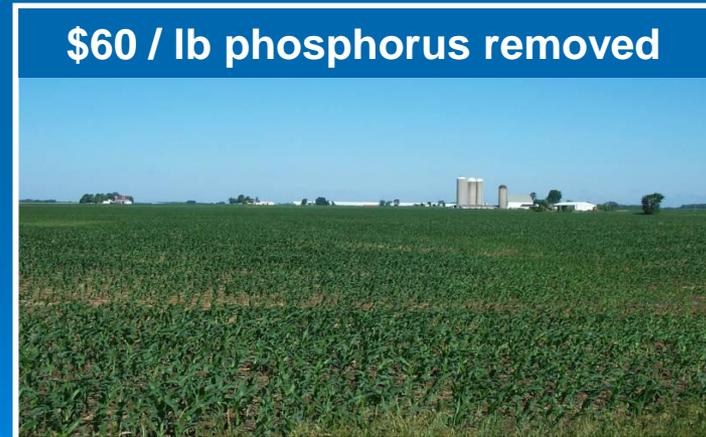
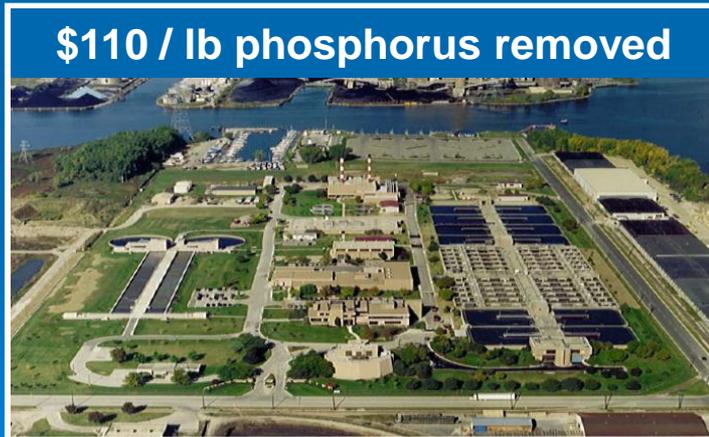


Figure 1: Flow chart explaining the relationship between load models, fate models, and cost models in the iterative optimization process.

# Trading is a Potential Tool

- Several options exist to meet TMDL allocations including:
  - Modifying wastewater treatment systems
  - Modifying your production process to limit additives or raw materials
  - Trading





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# Develop Implementation Plan

- TMDL serves as the foundation for developing a detailed implementation plan
- Development of an implementation plan begins during TMDL allocation process
  - Generating restoration scenarios
  - Conducting feasibility analysis
  - Selecting best option that achieves pollutant load reduction
- Form implementation team
  - Including affected stakeholders & partners



# 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

- TMDLs express pollutant discharges in mass/day but can implement as mass/year.
- NR 151 uses a percent reduction framework.
- Both are given in the TMDL as reference.



# Permit Issues

- Federal law requires allocations be reflected in permits.
- DNR is examining different permit structures to maintain a streamlined permit program and provide MS4s with flexible implementation mechanisms.
- For compliance periods DNR advocates using NR 217.16



# NR 217.16 and Compliance Periods

- Affords municipalities a 15 year compliance period and is consistent with other point source compliance periods.
- Compliance period requires a stormwater management plan similar to NR 151.13.
- Each 5 year permit term requires some interim progress to obtain another 5 year term.



# Permit and Compliance

- Compliance through modeling or monitoring.
- Build on existing modeling framework built for NR 151 compliance.
- If after 15 year permit cycle WLAs not achieved MS4 enters a more structured implementation agreement.
- No MEP for allocations – given more time.



# Linking TMDLs and MS4s

- Monitoring shows roughly 40% TSS reduction equates to 20-25% phosphorus reduction.
- Sources of phosphorus include leaves, pollen, fertilizers, and air deposition.
- Both soluble and “sediment” bound forms.



# 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 (segmentshed).



# TMDLs and Allocations

- Budget removal of 40%
- TMDLs are science based.
- TMDLs based on water quality standards.



# Treatment Plants and Industrial Discharges

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



# CAFOs

- Production area assigned a WLA = 0
- Spreading of manure accounted for in the LA as nonpoint.



# 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



# 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.



