Rock River Basin Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids

Rock River Permits Meeting
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WISCONSIN
DEPT. OF NATURAL RESOURCES

UNITED STATES • ENVIRONMENTAL PROTECTION AGENCY •

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

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 $_{\text{NR 102.06(3)(a)}}$ = 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

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 =

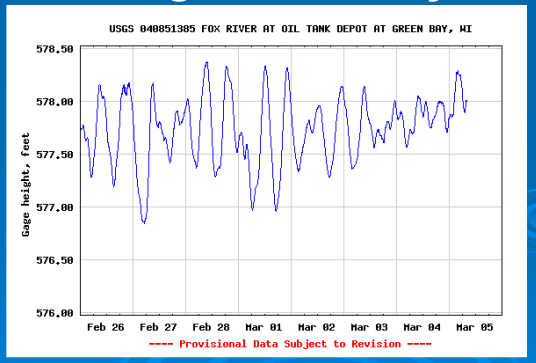
Load Allocation

+

Waste Load Allocation

+

Margin of Safety



TMDL Allocations

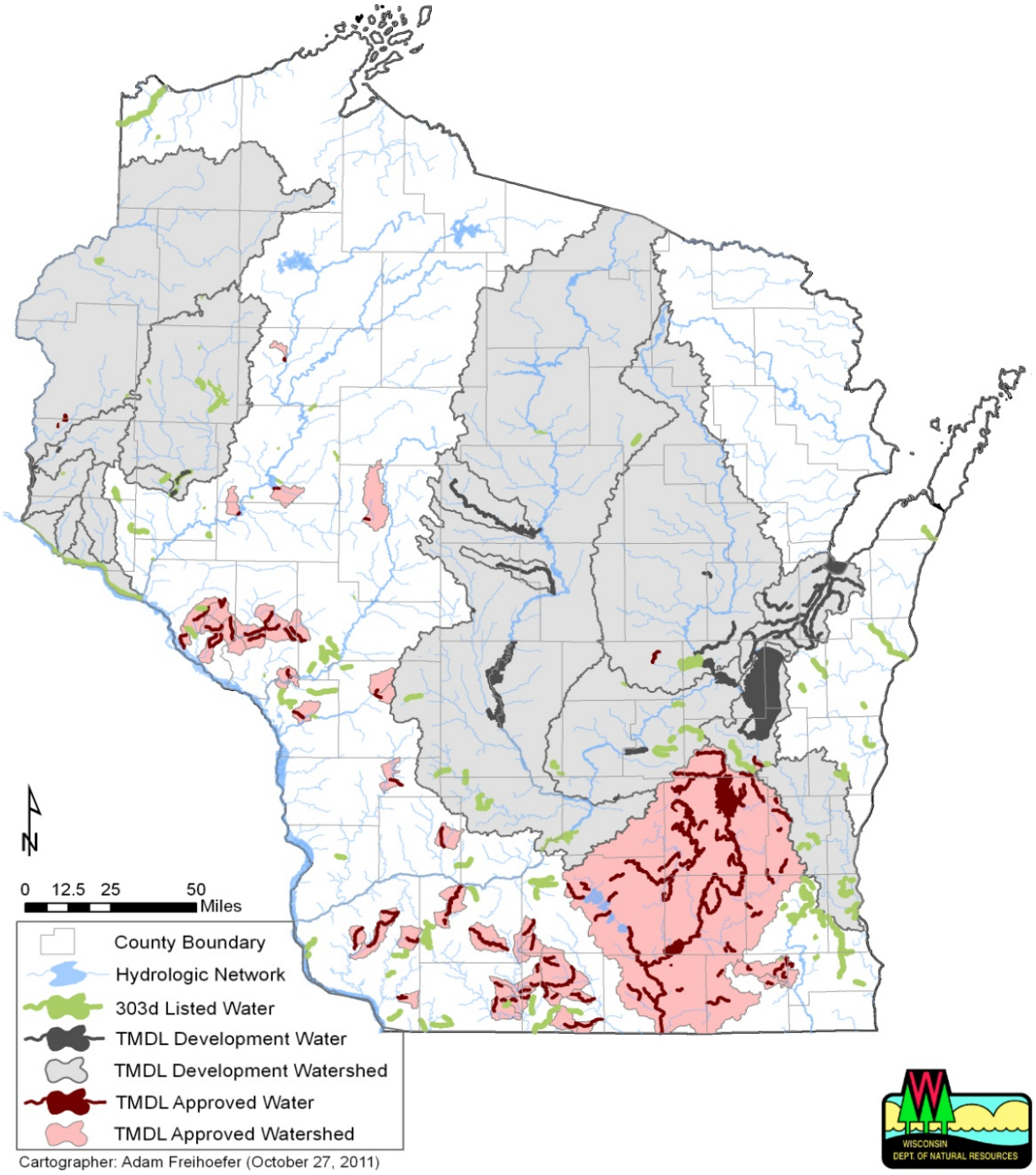
Waste Load Allocation

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

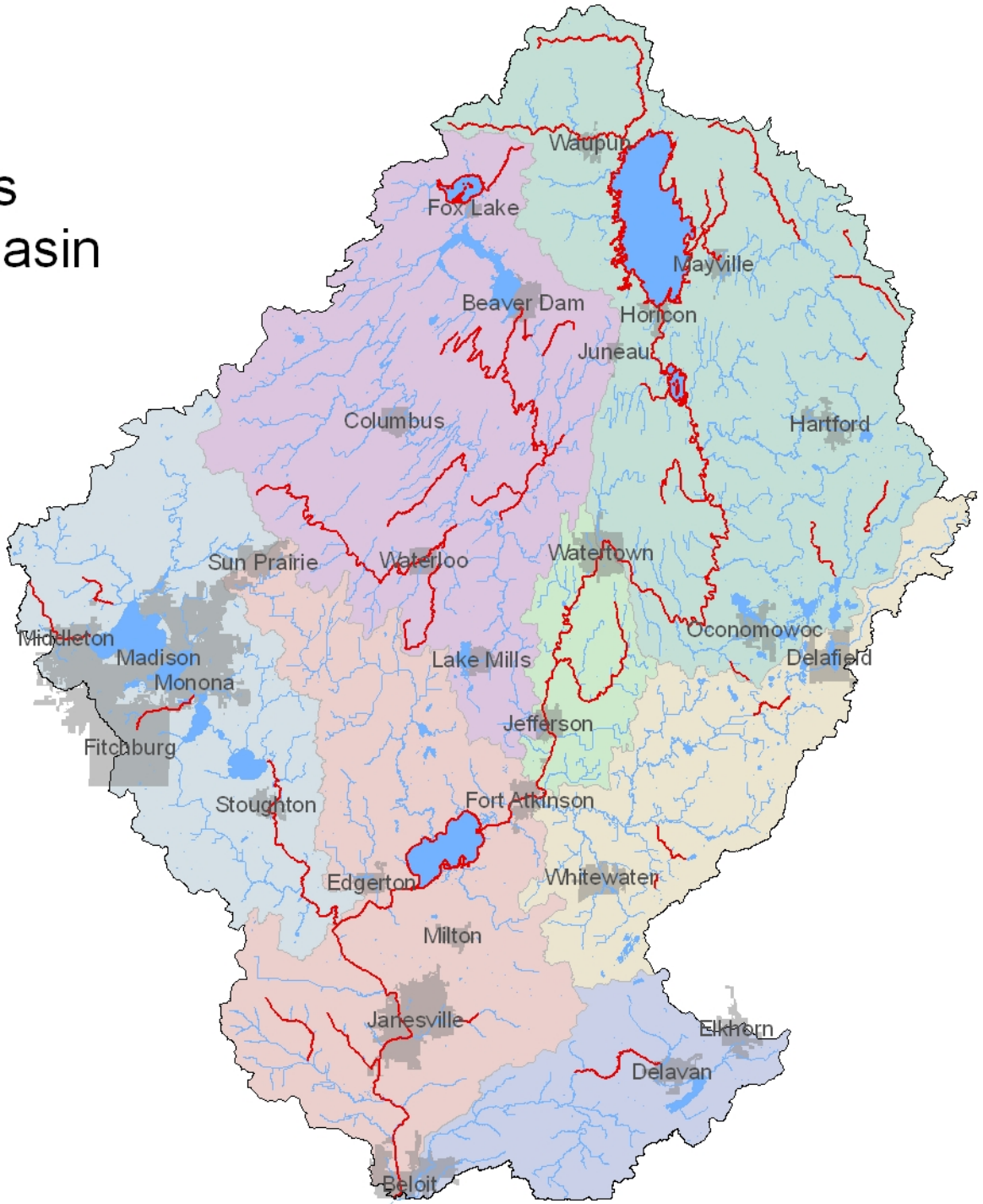
Load Allocation

- Agricultural
- Non-permitted Urban
- Background

Wisconsin Phosphorus TMDLs



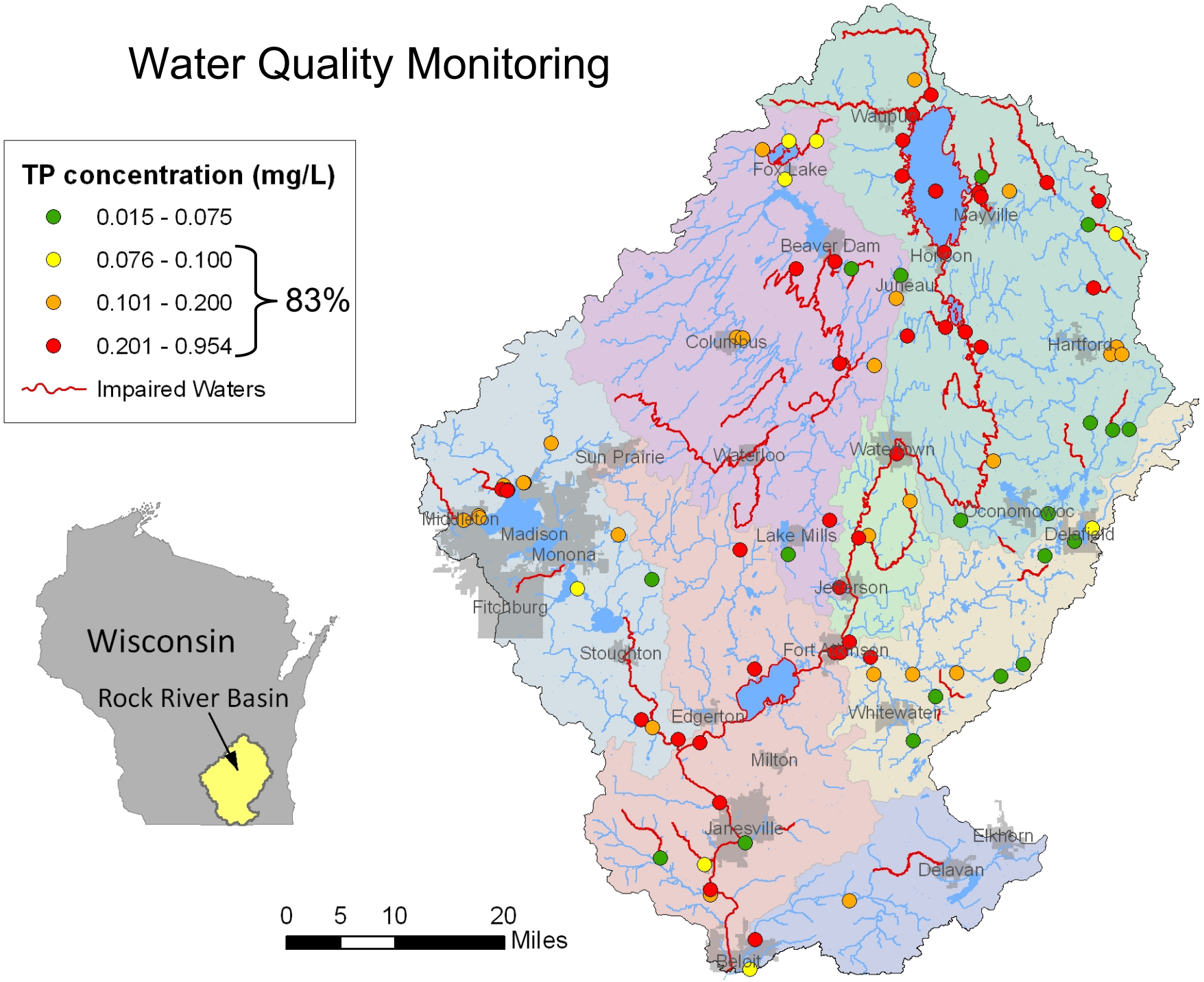
Impaired Waters in the Rock River Basin



Impaired Waters

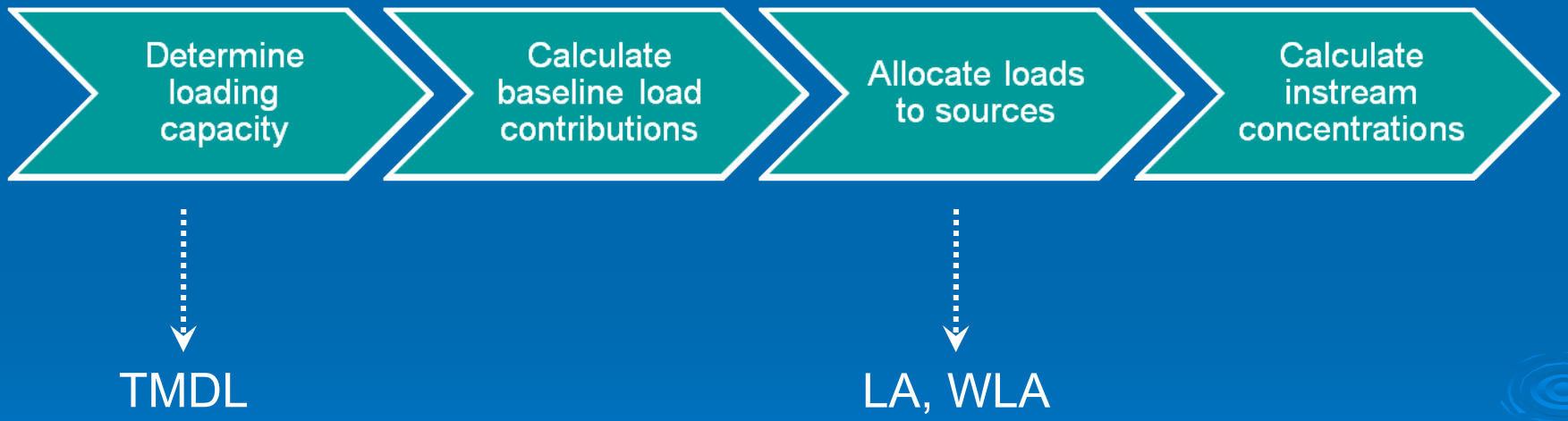
0 5 10 20 Miles

Water Quality Monitoring



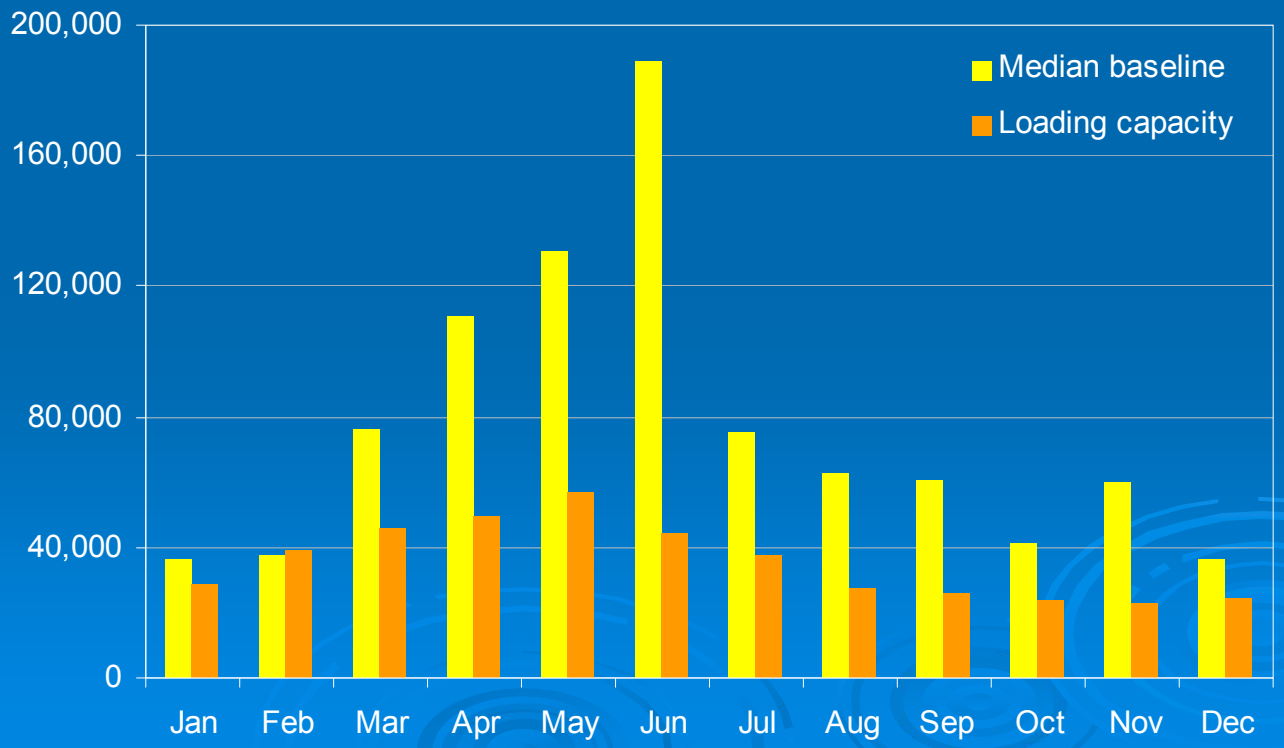
Rock River at Afton, WI

Rock River TMDL Development Approach

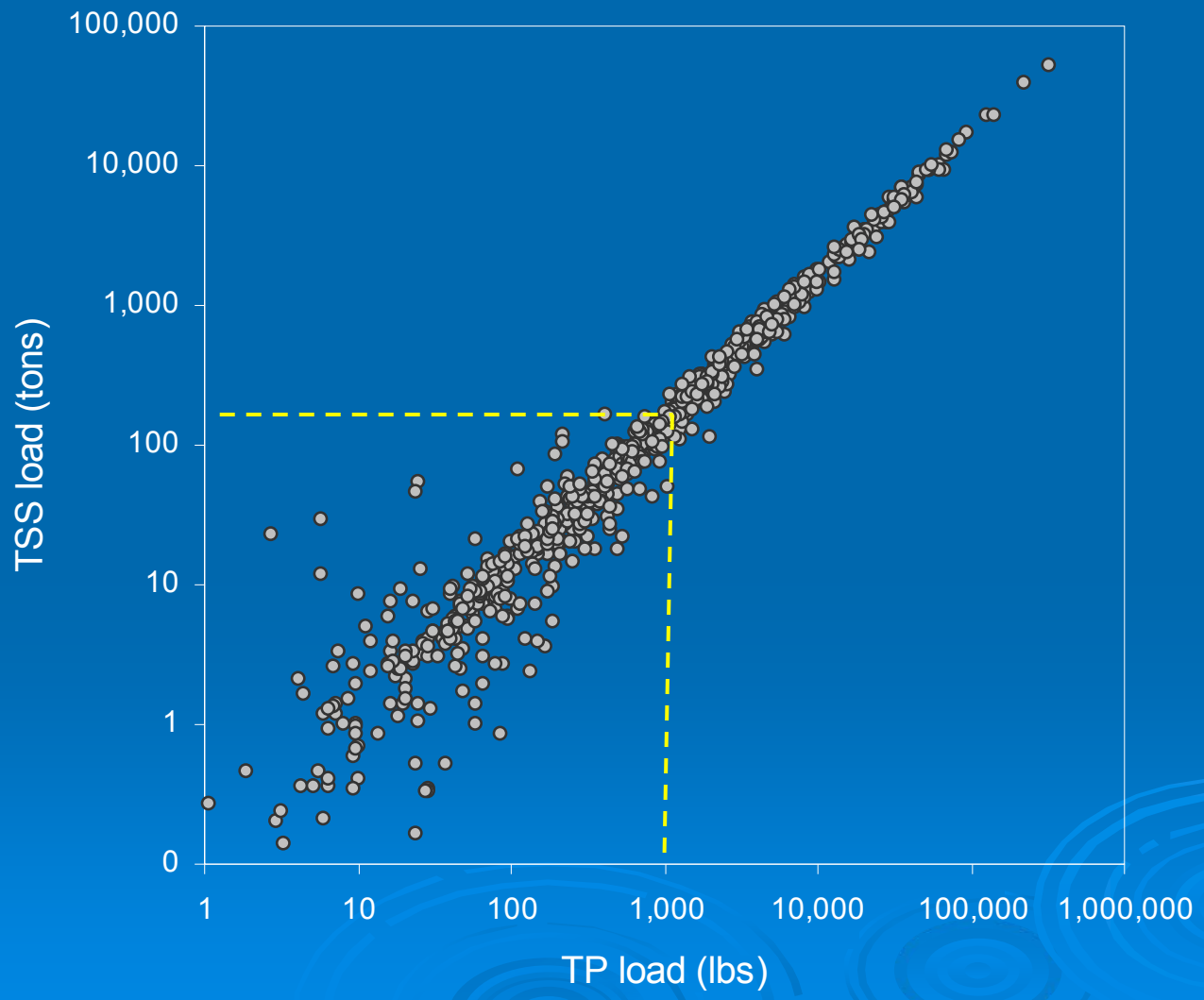


Phosphorus Loading Capacity

- Varies monthly to account for seasonal flow variation
- Goal: Meet concentration target in 9 out of 10 years



TSS Loading Capacity



Allocation Baseline

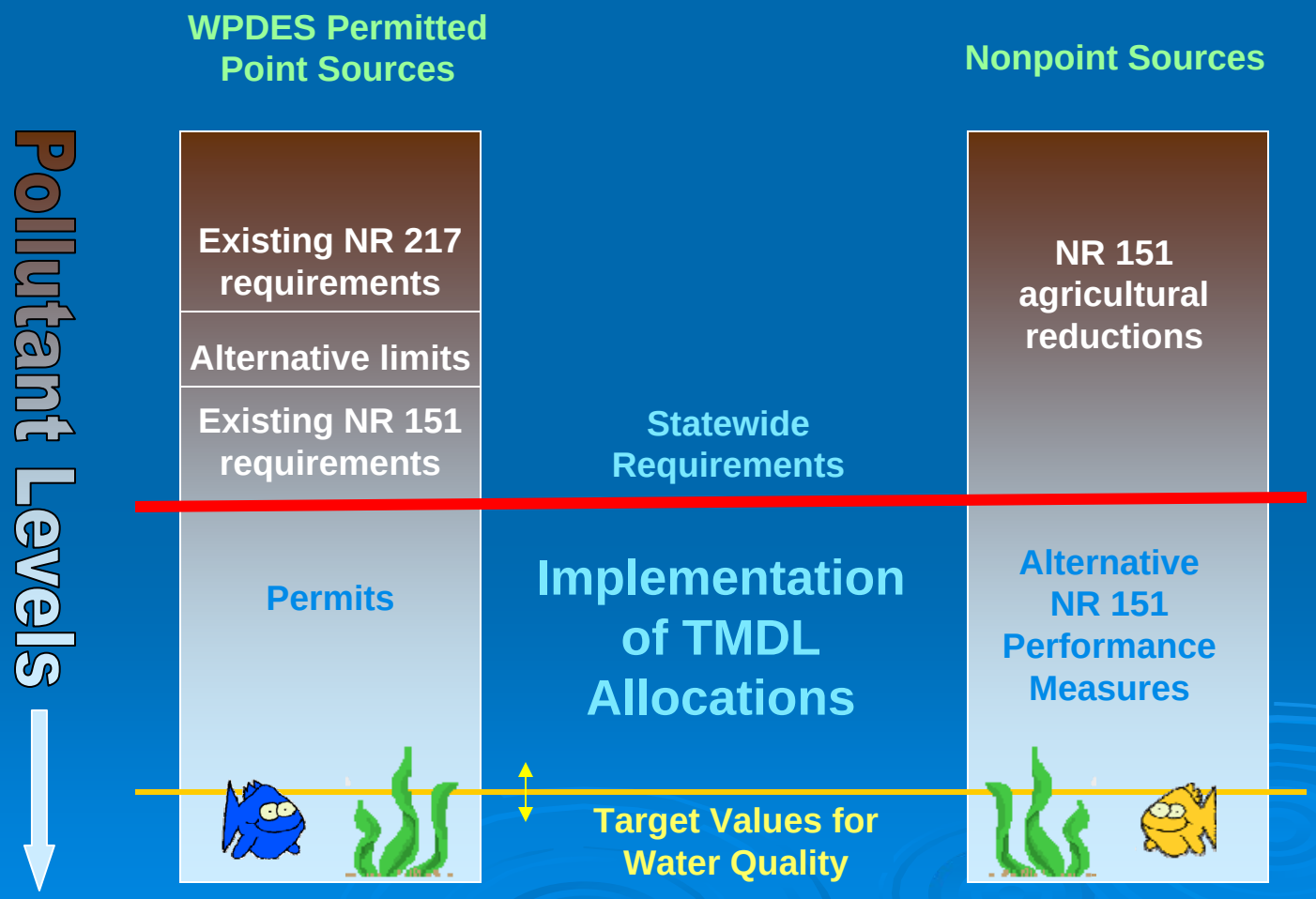
Baseline: compliance with current regulations

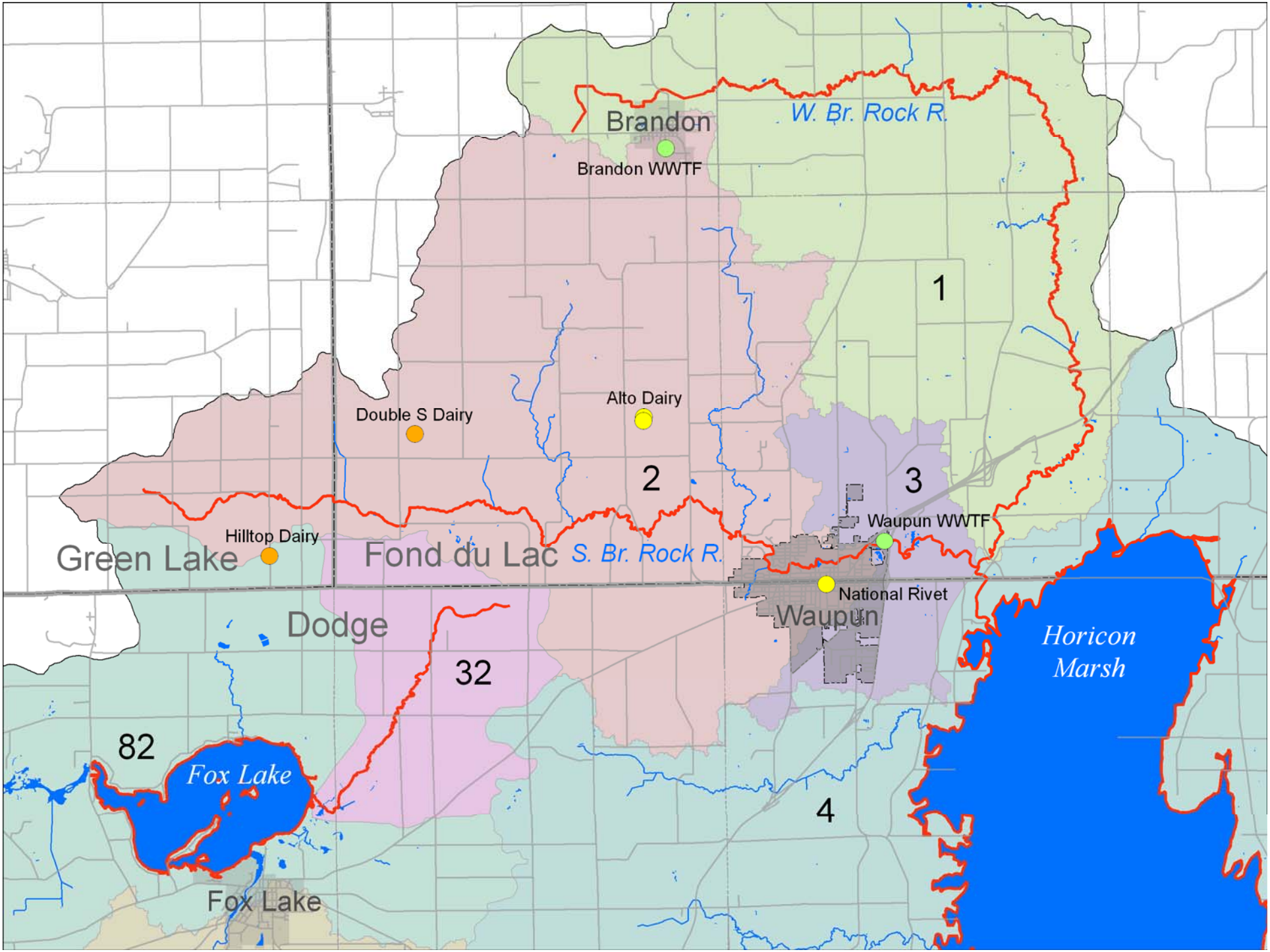
- WWTFs
  - Permitted discharges and NR 217 (TP ≤ 1 mg/L)
- Municipal stormwater
  - NR 216, 151 (40% TSS reduction from no controls)
  - Modeled with SLAMM
- Agriculture
  - NR 151 (P Index ≤ 6 lbs/acre)
  - Modeled with SWAT

Point Sources with Individual WPDES Permits (POTWs and Industrial Dischargers)

- Permits with numeric limits
  - Baseline flow = permitted design flow
  - Baseline load = permitted concentration * design flow
- Permits without numeric limits
  - Baseline load = measured concentration * flow

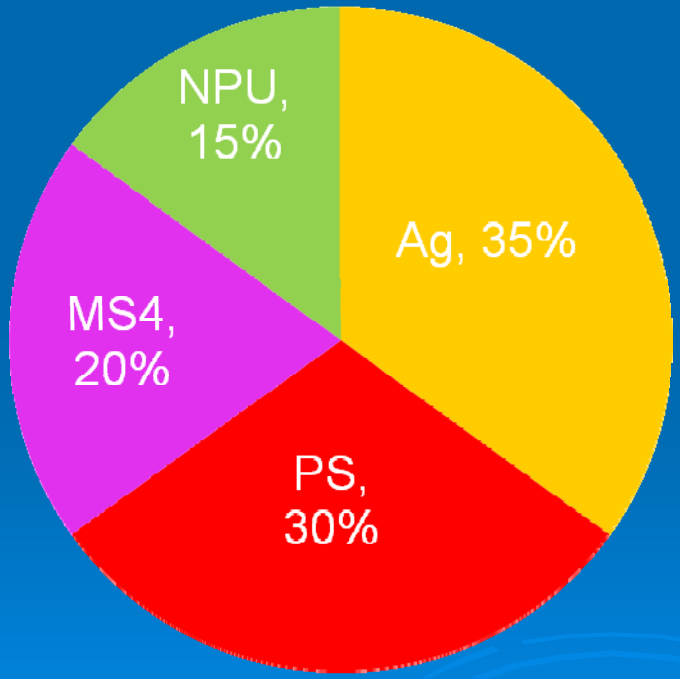
Allocation Baseline



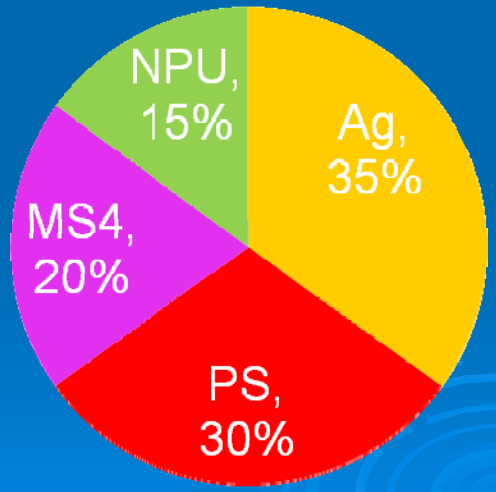

Brandon
W. Br. Rock R.
Brandon WWTF
1
Alto Dairy
Double S Dairy
2
3
Waupun WWTF
Hilltop Dairy
Green Lake
Fond du Lac
S. Br. Rock R.
National Rivet
Waupun
Dodge
Horicon Marsh
32
82
Fox Lake
4
Fox Lake

Allocation Approach and Baseline Loads

- Allowable loads for each reach will be divided proportionally according to the source's baseline load contribution

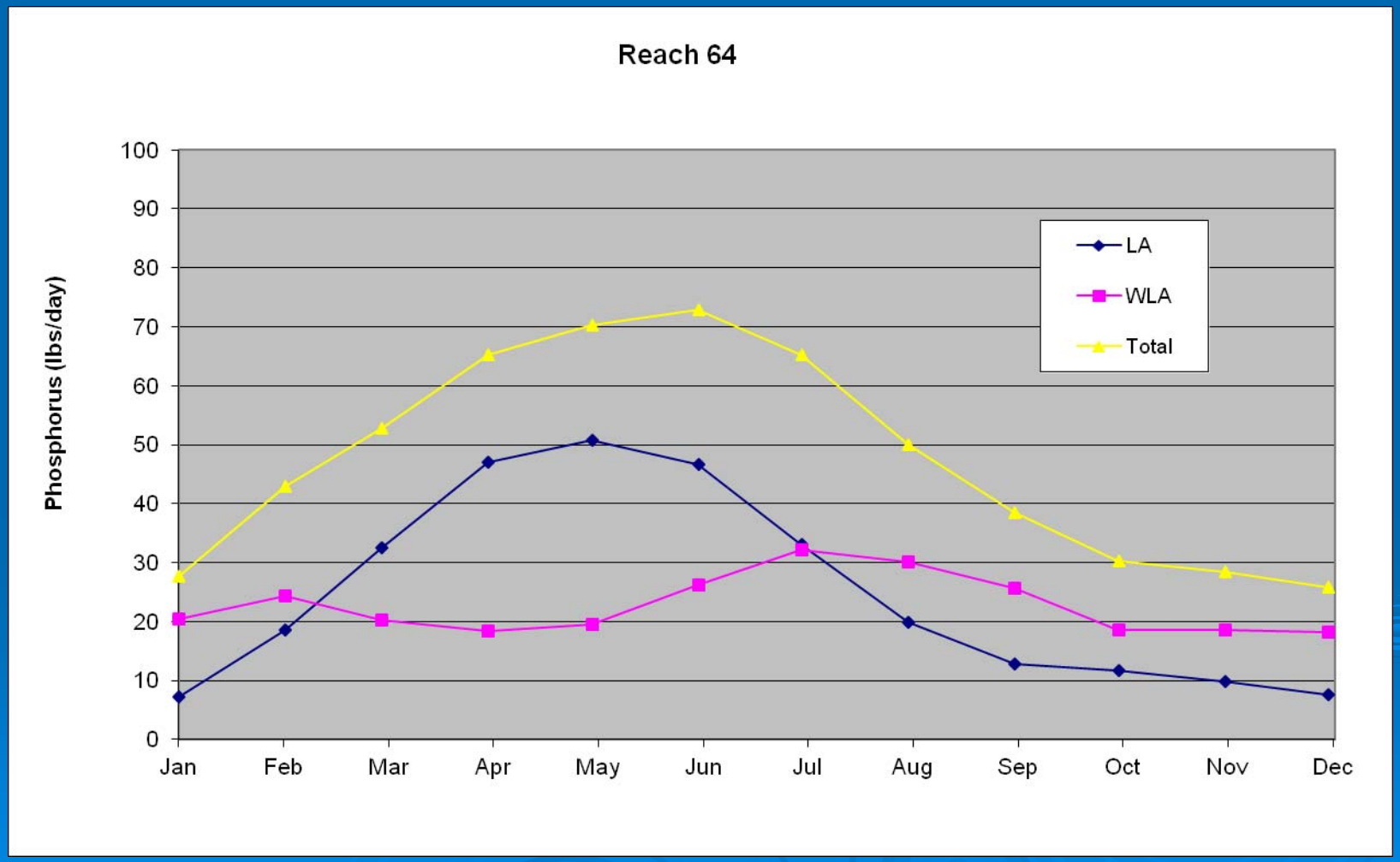


Baseline Load

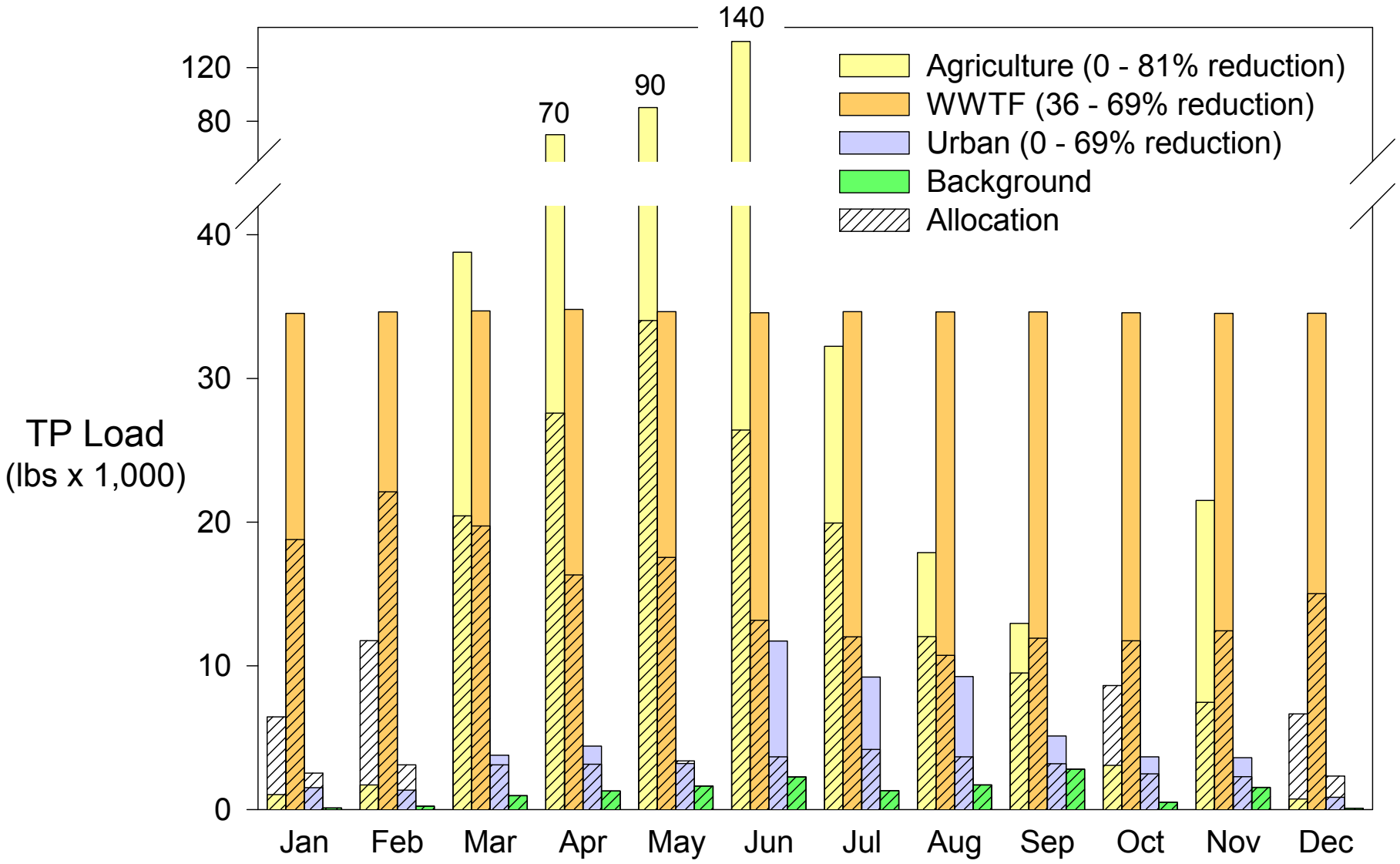


Allowable Load

Seasonal Variation in Loadings



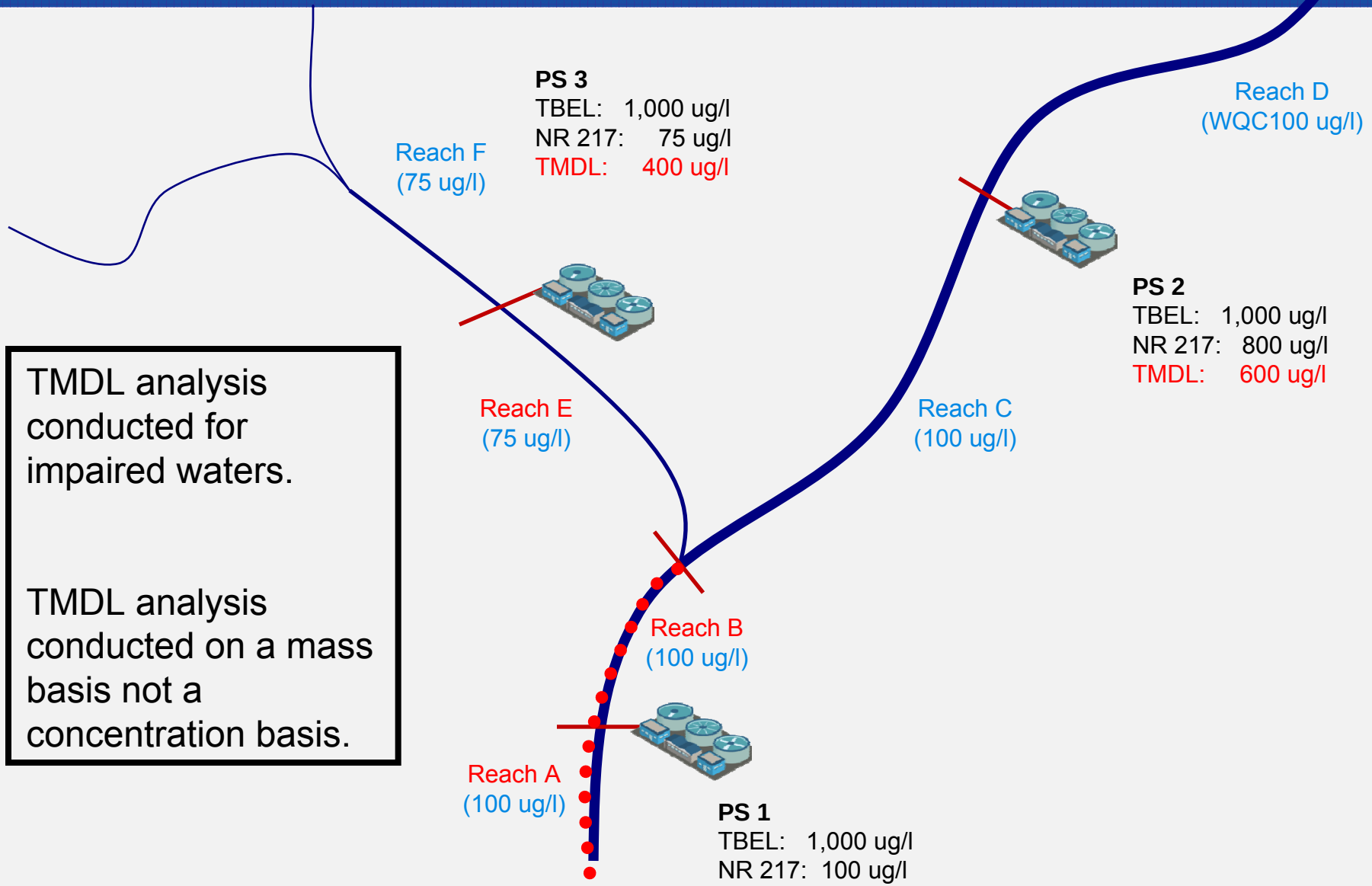
Baseline and Allocated Phosphorus Loads



Implementation Challenges

- A few point sources that did not get allocations for phosphorus or TSS. We are addressing this issue. WLAs will be assigned to these facilities.
- Allocations for impaired segments. TMDL conducted in typical fashion but nutrient criteria requires a modification to the process.

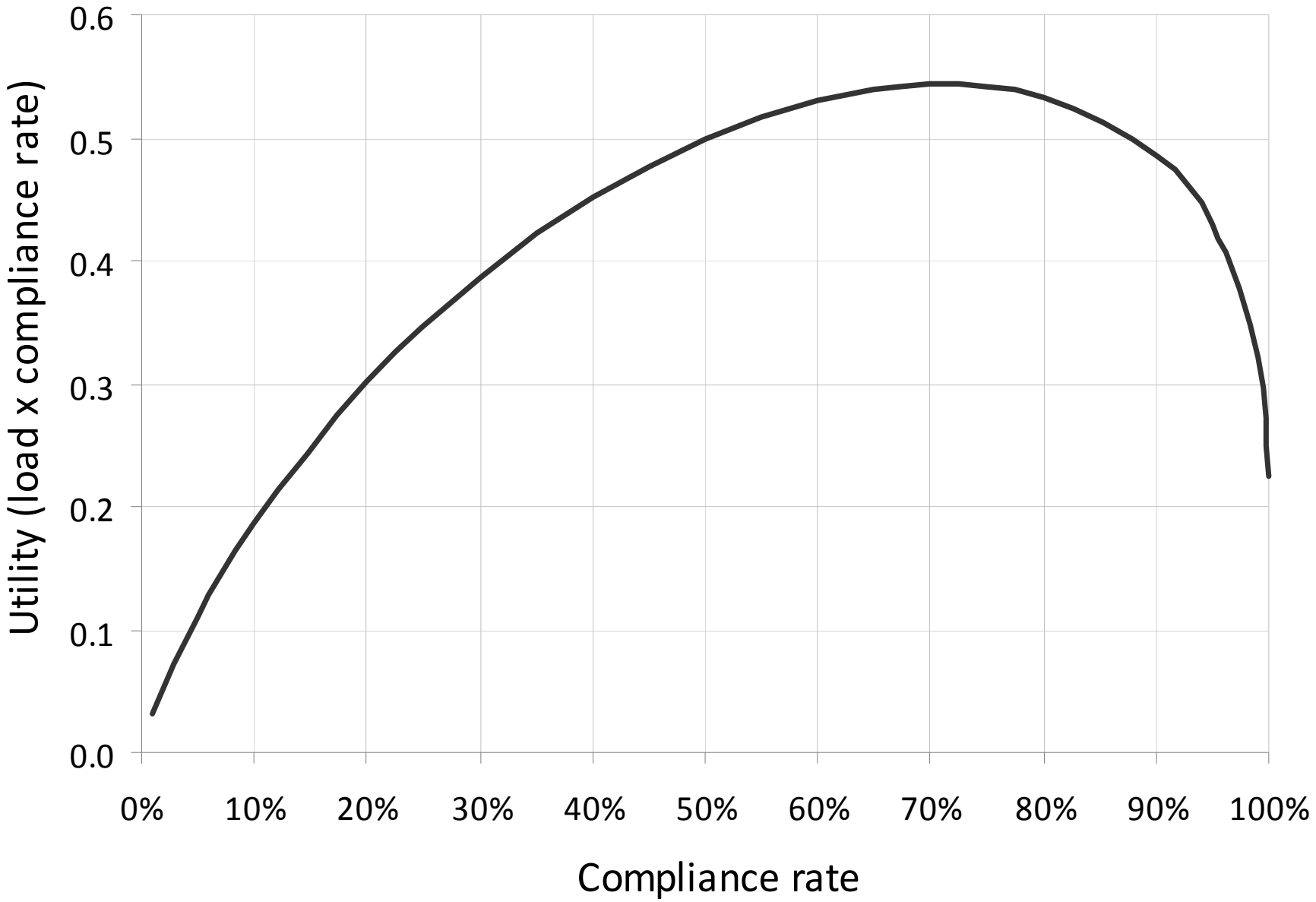
Allocations for Impaired Segements



TMDL analysis conducted for impaired waters.

TMDL analysis conducted on a mass basis not a concentration basis.

Questions


0.6
0.5
0.4
0.3
0.2
0.1
0.0
Utility (load x compliance rate)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Compliance rate

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

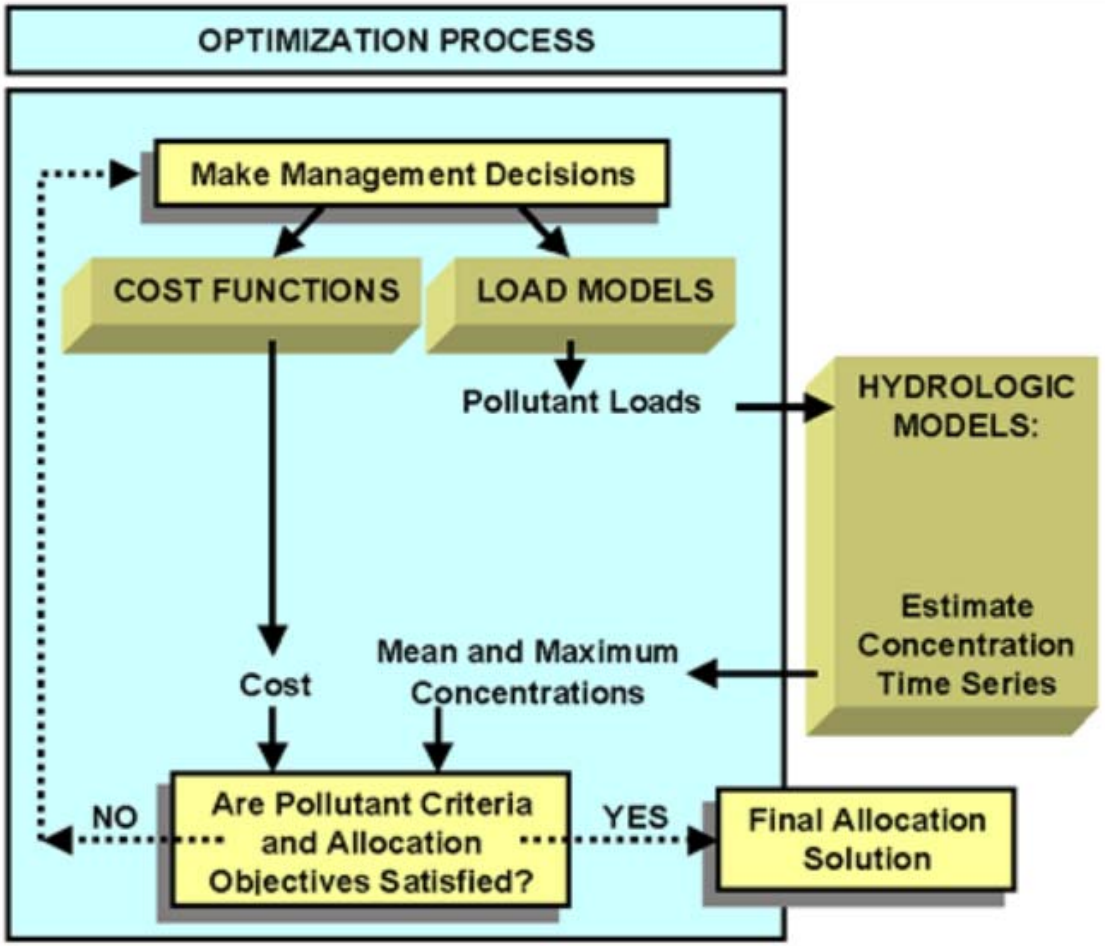


Figure 1: Flow chart explaining the relationship between load models, fate models, and cost models in the iterative optimization process.

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

$110 / lb phosphorus removed

$60 / lb phosphorus removed

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

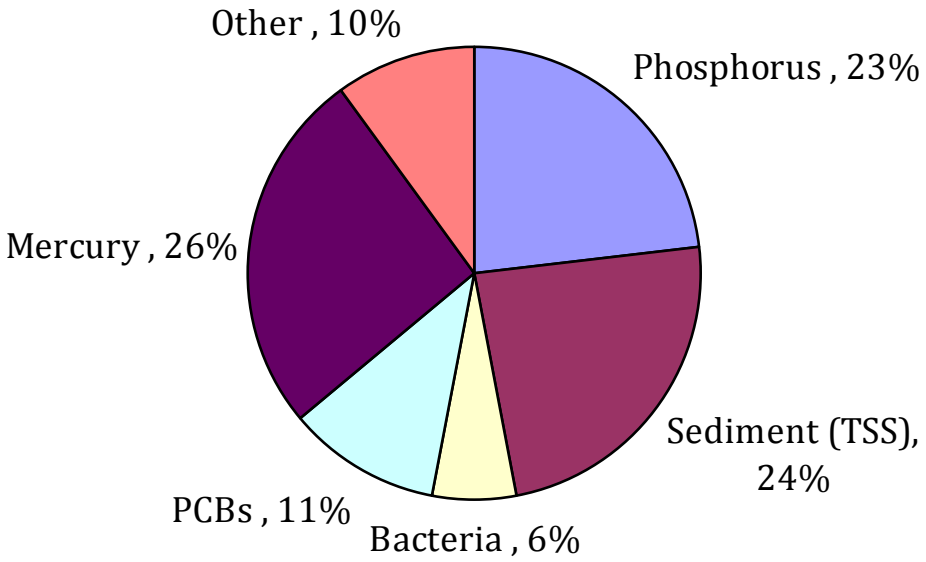
- Minimum data requirements for listing:
  - Phosphorus:
    - 2 years, 3 values/yr; Jun. 1 – Sept. 15
      - Minimum 3 values, separated by 15 days
      - Surface samples, from top 2m, deep hole
      - Station or whole lake average used
  - Chlorophyll a:
    - 6 sample min - 2 years, 3 values/yr; 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