

# MILWAUKEE RIVER BASIN TMDL DEVELOPMENT



## Stakeholder Workshop 5

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# Agenda

- TMDL Overview
- Work Since Last Meeting
- Technical Approach Overview
  - Allowable Load Development
  - Baseline Load Development
  - Load and Wasteload Allocation Development
- Walk-Through of Report and Allocation Tables
- Schedule and Next Steps
- Questions and Discussion

# Overview – What is a TMDL?

- Calculation of the amount (expressed in load per day) of a pollutant a waterbody can receive and still meet water quality standards or targets
  - Phosphorus
  - Sediment
  - Bacteria
- Developed for Impaired Waterbodies (303d)

# Overview – What is a TMDL?

- TMDL is a planning study
  - Evaluation of data and calculation for allowable loads
- Not a regulation
  - “Comply with the TMDL” is a misnomer
- Not new
  - >70,000 TMDLs completed nationwide since 1996
    - 250+ in Wisconsin

# Overview – What is a TMDL?

- $TMDL = LA + WLA + MOS + (RC)$ 
  - LA = Load Allocation (Nonpoint Sources)
  - WLA = Wasteload Allocation (Permitted Point Sources)
  - MOS = Margin of Safety
  - RC = Reserve Capacity

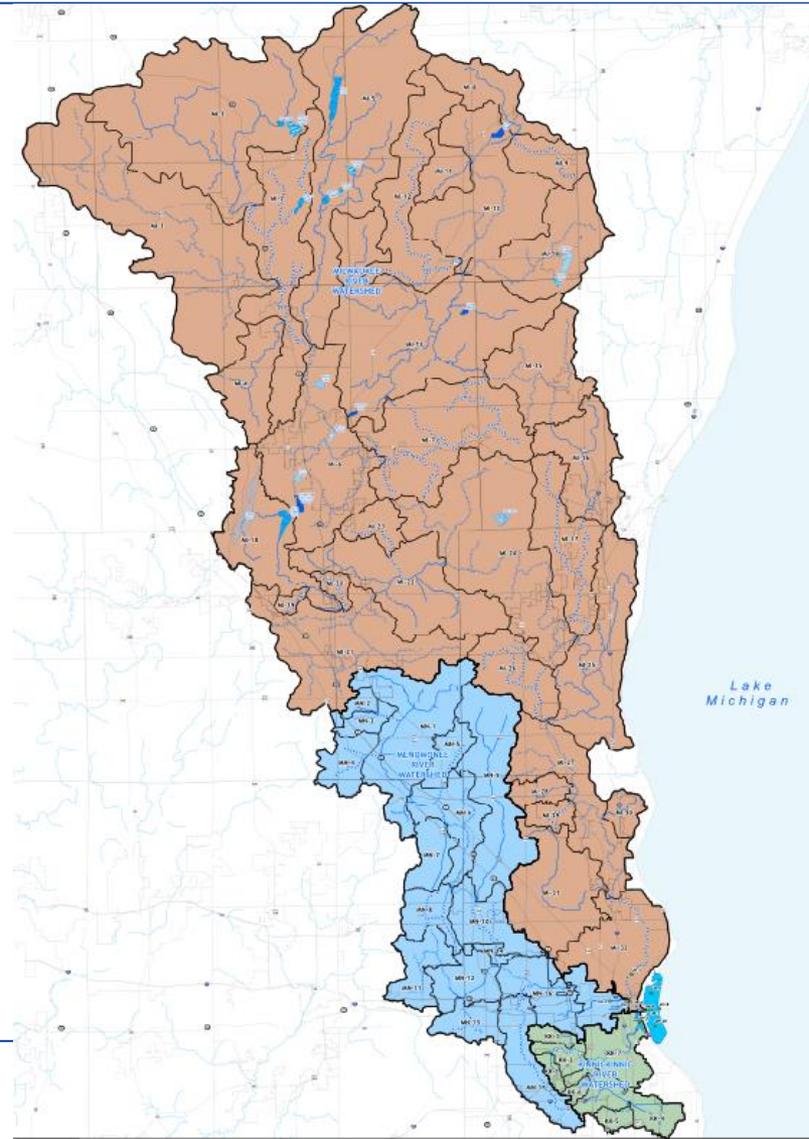
# Motivation – Why are we doing a TMDL?

- To target pollutant reductions, need to understand sources of pollution and their contributions
- Elevated phosphorus, sediment, and bacteria levels have led to beneficial use impairments
  - Low dissolved oxygen concentrations
  - Degraded habitat
  - Excessive algal growth
  - Turbidity
  - Recreational impairments



# Milwaukee River Basin TMDL Study Area

- Milwaukee River Watershed
- Kinnickinnic River Watershed
- Menomonee River Watershed
- Milwaukee Harbor Estuary



# TMDL Process

- Calculate loading capacity and allocations
  - Prepare Draft TMDL
  - Conduct public comment period
  - Submit TMDL to EPA for review
  - Prepare Implementation Plan
- All leading toward delisting the impaired waterbodies

# Work Since Last Meeting

- WQI model testing and refinements to output data for TMDL
- Approach adjustments to mirror those used in other Wisconsin TMDLs

# TECHNICAL APPROACH OVERVIEW

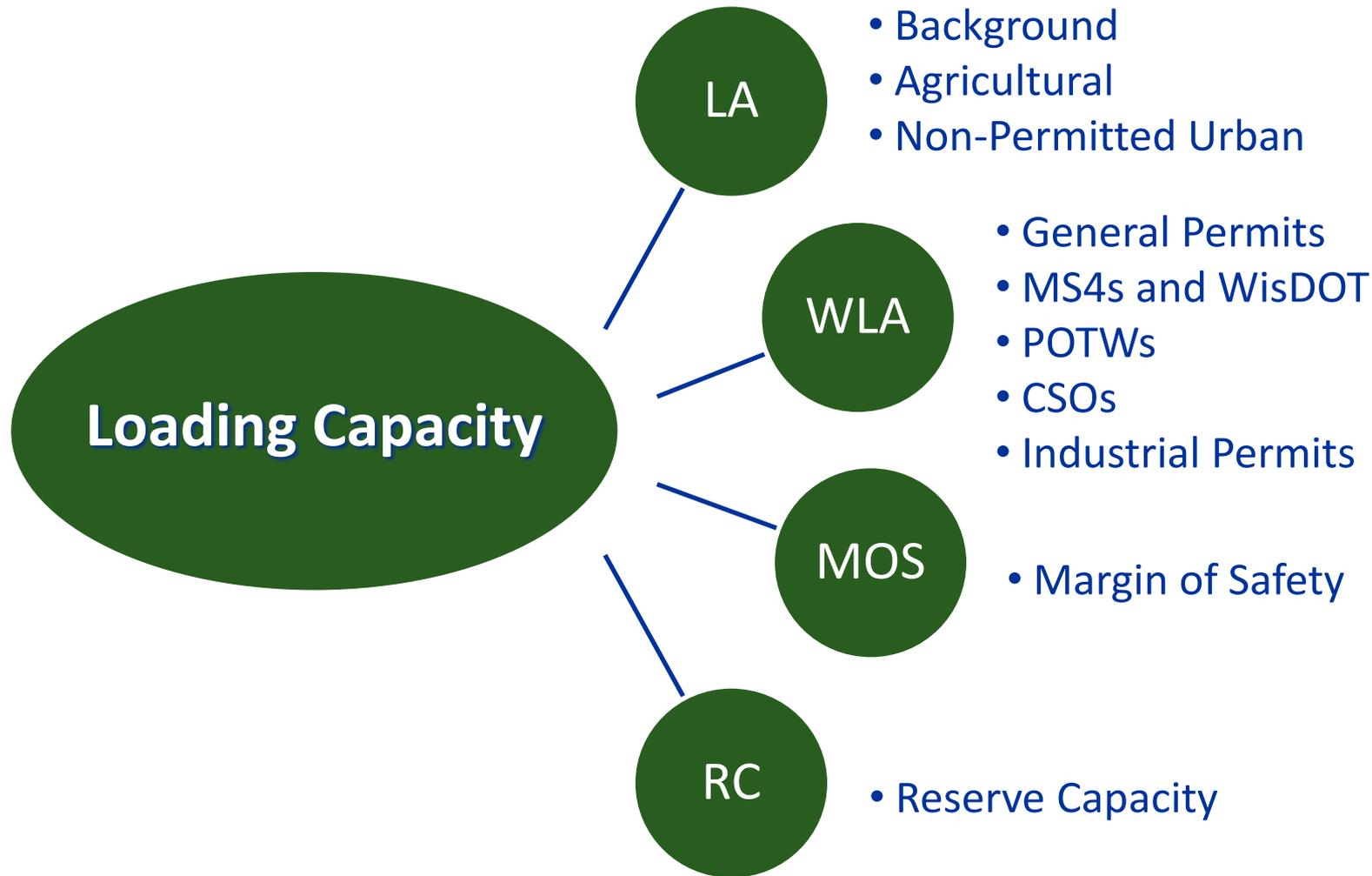
# TMDL Development Process



# Loading Capacity

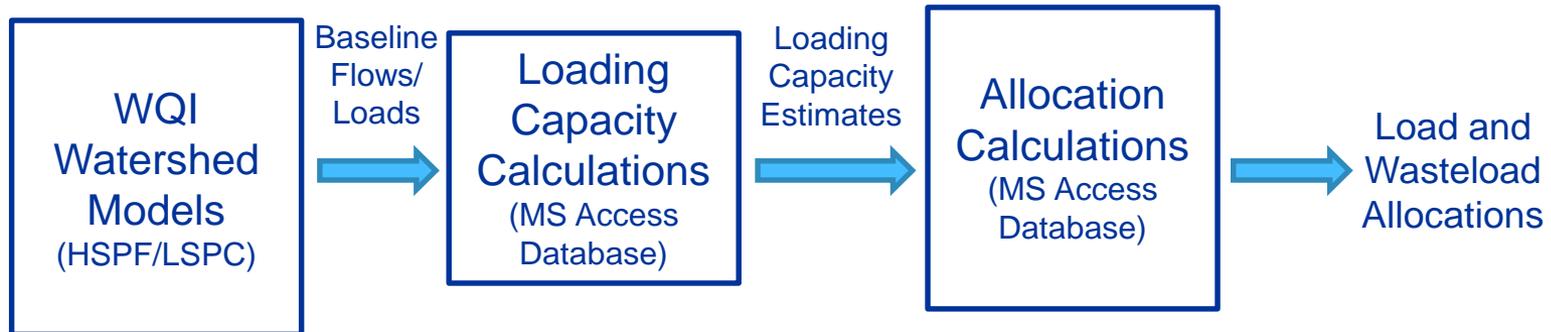
- Loading capacity = allowable load = TMDL
- For each reach:
  - Load = Concentration \* Flow
  - Loading capacity = Water Quality Target \* Flow

# Allocating Allowable Load to Sources

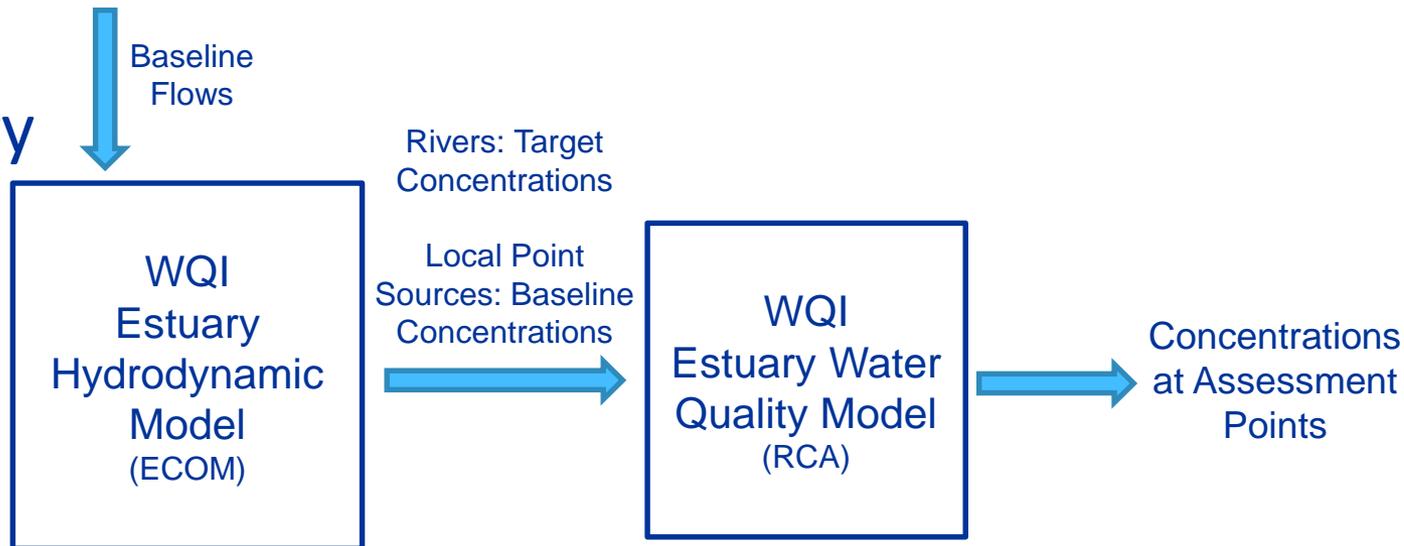


# TMDL Development Calculations

## Watersheds

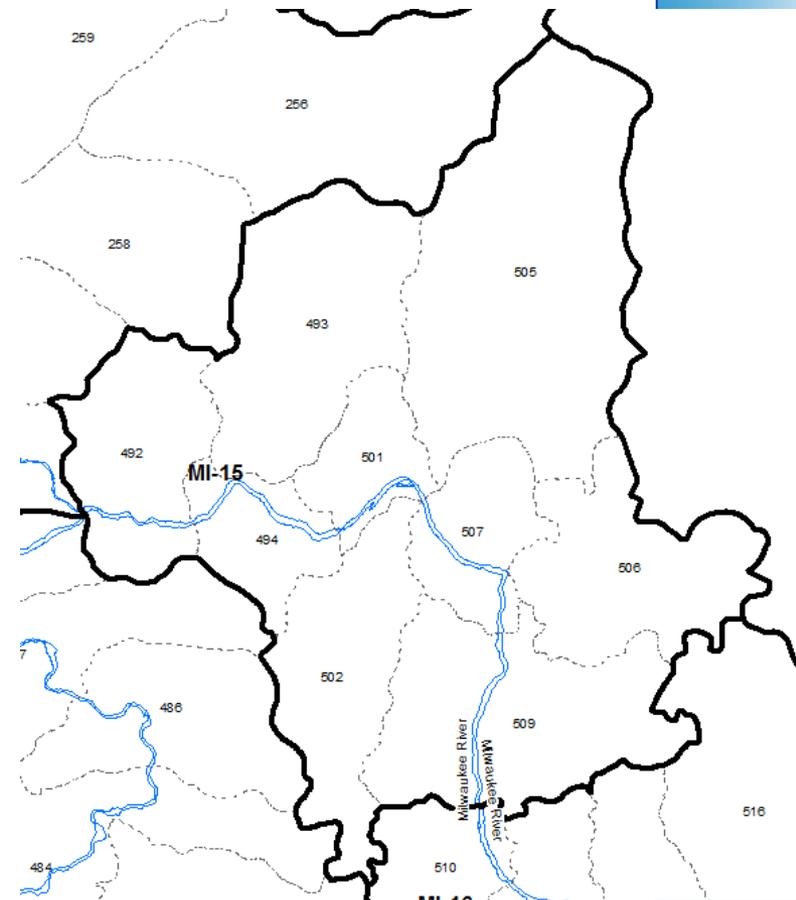


## Estuary



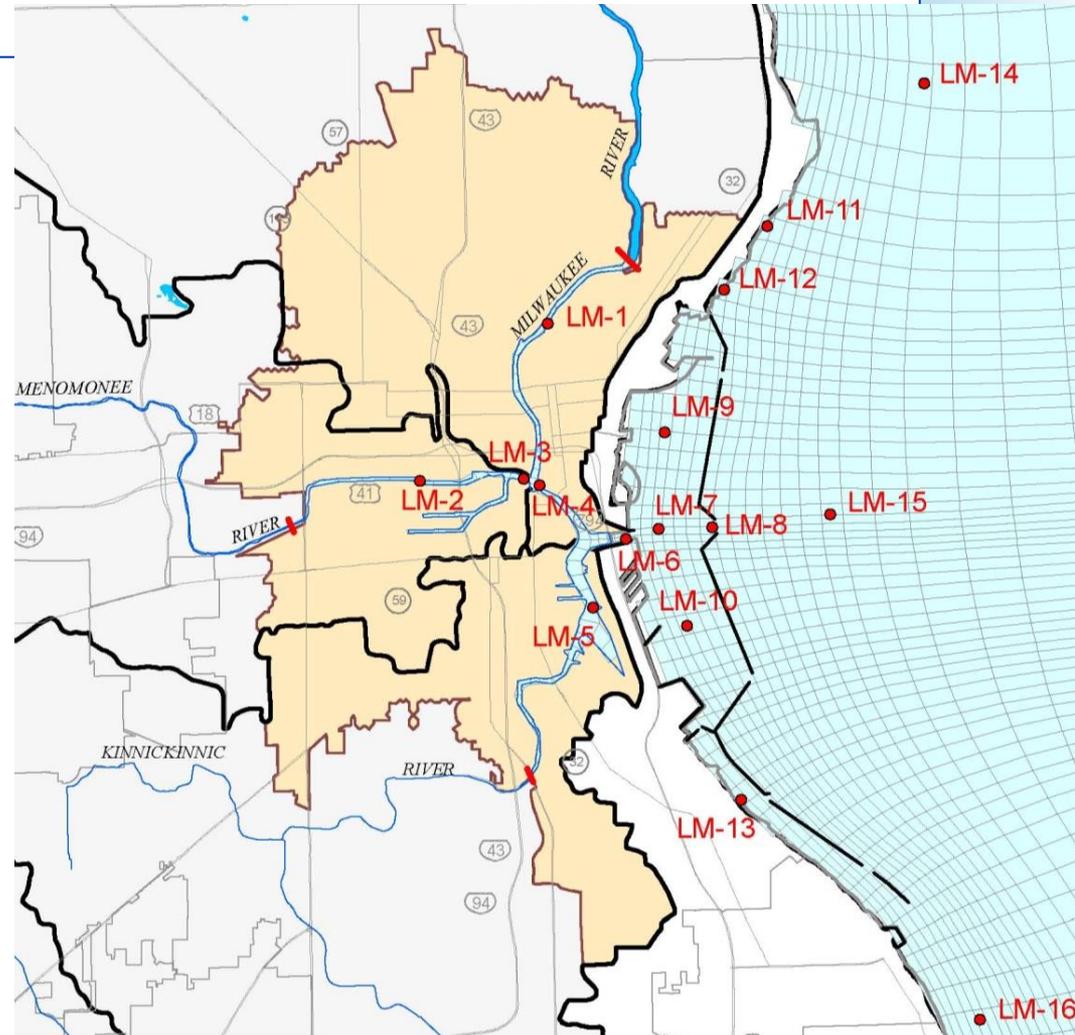
# TMDL Reaches

- TMDL reaches were developed by combining WQI model reaches
  - Increases flexibility for implementation
  - Reaches are unchanged in models
  - Most downstream model reach defines flow for TMDL reach
- Created by combining WQI model reaches based on:
  - 303(d) list extents
  - Water quality standard changes
  - Point source locations
  - Major flow changes



# Interaction Between Watersheds and Estuary

- Concentrations evaluated at select assessment point locations in estuary
  - Most downstream assessment point at the opening of the breakwall
  - Determine if reductions to local sources are required if rivers are at standards



Partial Figure from SEWRPC RWQMPU, 2007

# ALLOWABLE LOAD DEVELOPMENT

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graph LR; A[Determine loading capacity] --> B[Calculate baseline load contributions]; B --> C[Allocate loads to sources]; C --> D[Calculate instream concentrations];
```

Determine  
loading  
capacity

Calculate  
baseline load  
contributions

Allocate loads  
to sources

Calculate  
instream  
concentrations

# Allowable Load Development

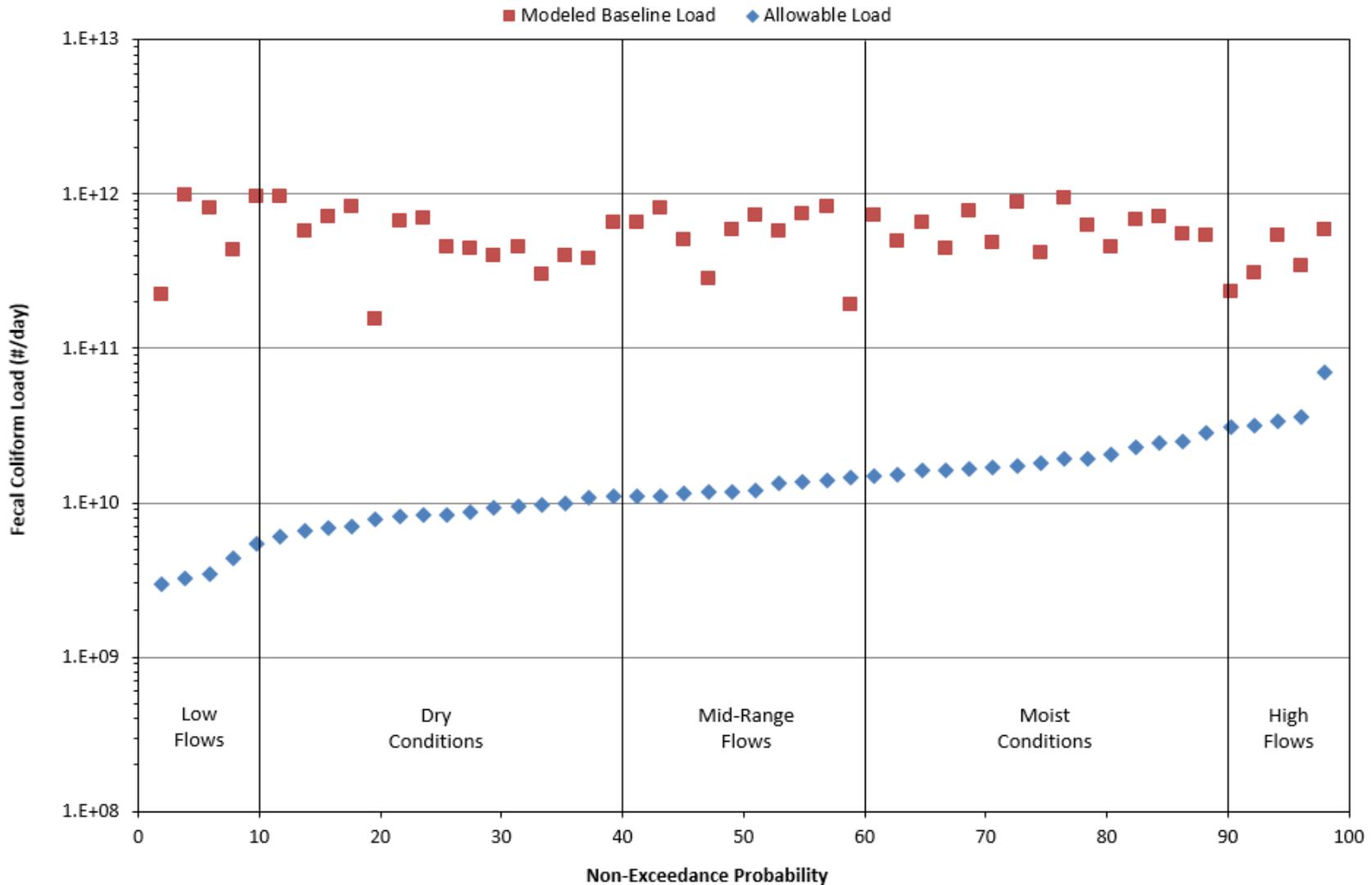
- Allowable loads are driven by flow
  - Loading capacity = Water Quality Target \* Flow
  - Flows for 1988 through 1997 output from WQI models
- Total Phosphorus and Total Suspended Solids TMDLs
  - Driven by set of monthly flow values selected from modeled flows
    - Similar approach to that used for Rock River TMDL
- Bacteria TMDL
  - Load duration methodology, driven by five flow regimes
    - Based on EPA guidance
    - Considers that loading capacity of a reach changes based on flow conditions

# Flow Conditions

- TP and TSS
  - 4<sup>th</sup> lowest monthly average flow for each calendar month over the 10-year modeling period (1988-1997)
  - Discharges from both point and non-point sources can be expected
  - Cumulative reach flows used for allowable TP and TSS load calculations
- Fecal Coliform
  - Flow duration curve defined by 5<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, and 95<sup>th</sup> percentile flows from the months of May through September
  - Incremental reach flows used for allowable fecal coliform load calculations

# Fecal Coliform Load Duration Curve

## Reach KK-1 - Fecal Coliform Load Duration Curve



# Water Quality Targets – TP

- Phosphorus
  - Rivers NR 102.06(3)(a) = 0.1 mg/L
  - Streams = 0.075 mg/L
    - All unidirectional flowing waters not in NR 102.06(3)(a)
  - Reservoirs
    - Stratified = 0.030 mg/L
    - Not Stratified = 0.040 mg/L
    - Lakes range from 0.015-0.030 mg/L

# Water Quality Targets – TSS

- TSS
  - Narrative criteria in s. NR 102.04, Wis. Adm. Code.
  - DNR developed, with USGS assistance, a numeric target using a multiple lines of evidence relating TSS concentrations to biotic impacts. Same methods were used to develop statewide phosphorus criteria.
  - Target: 12 mg/L expressed as a monthly median concentration. Concentrations higher than 12 mg/L can occur in the receiving water and still meet the narrative criteria.

# Water Quality Targets – Bacteria

- Fecal Coliform
  - 400 cfu/100 mL sample (10% threshold)
  - 200 cfu/100 mL (geometric mean)
  - Variance waters:
    - Estuary portions of Milwaukee and Menomonee River Canals
      - 1,000 cfu/100 mL sample (geomean)
    - All other variance waters
      - 1,000 cfu/100 mL sample (geomean) and 2,000 cfu/100 mL sample (10% standard)
- *E. coli* standards apply to the Estuary outer harbor
  - 126 cells/100 mL sample (geomean), 235 cells/100 mL max

# BASELINE LOAD DEVELOPMENT



# Baseline Loads

- Baseline loads set to represent compliance with existing regulations and permit limits
- Baseline loads are only used to allocate the allowable loads to sources -- they *do not* affect the allowable loads themselves
  - Allowable load = Water Quality Target \* Flow

# 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

*Baseline loads and flows for Point Sources with Individual Permits are found in Appendix A Table A.7 of the TMDL Report*



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

- Point source effluent concentrations calculated from allocated loads and checked to verify that they are not more restrictive than the water quality criteria

# Point Sources with General WPDES Permits

- General permitted sources covered by one WLA per reach
- A portion of the urban load is “set aside” to represent the general permit loads
  - Loads from general permitted sources within the MS4 area are covered by the MS4 WLA
  - Loads from general permitted sources outside of the MS4 area are covered by a WLA that is 5% of the non-permitted urban allowable load
- Many facilities meeting their permit will be considered to be meeting TMDL allocations



# General WPDES Permits

- Non Contact Cooling Water dischargers are assigned individual WLAs if their discharge contains phosphorus

*Baseline loads and flows for Non Contact Cooling Water discharges are found in Appendix A Table A.7 of the TMDL Report*

# Sanitary Sewer Overflows (SSOs)

- SSOs are not permitted
- Baseline load is set to 0
- WLA = 0



# Municipal Separate Storm Sewer Systems (MS4s)

- Baseline adjusted to reflect NR 151 requirements
- Current NR 151 Requirements (revised per 2011 State Budget Bill)
  - Permitted MS4s: minimum of 20% TSS reduction
  - Re-Development: 40% TSS reduction
  - New Development: 80% TSS reduction
- Each municipality is given a WLA for each reach to which they discharge

*Baseline MS4 loads are found in Appendix A Tables A.4 (TP), A.5 (TSS), and A.6 (Fecal Coliform) of the TMDL Report*



# Municipal Separate Storm Sewer Systems (MS4s) – WisDOT

- WisDOT does not currently have a WPDES permit, but has a memorandum of understanding (MOU) with WDNR and is considered to be regulated through the MOU.
- WisDOT is included in the MS4 allocations

# Nonpoint Source Loads

- Loads and flows are generated from WQI model output
- Loads are broken out by land use
  - Agricultural fields and pastures
  - Non-permitted urban areas
  - Woodland, natural areas, and background

*Baseline Nonpoint Source loads are found in Appendix A Tables A.1 (TP), A.2 (TSS), and A.3 (Fecal Coliform) of the TMDL Report*



# Concentrated Animal Feeding Operations (CAFOs)

- Discharges from CAFOs are not permitted
- Baseline load is set to 0
- Production area WLA = 0
- Spreading of manure is accounted for in the nonpoint source load allocation



# Combined Sewer Overflows (CSOs)

- CSO WLAs for all three pollutants are set at zero.
- The allocation of zero is not intended to translate into an immediate requirement for zero discharge, but rather, continued compliance with the approved MMSD Long-Term CSO Control Plan and WPDES permits, which are ultimately aimed at long-term goals for CSO abatement.

# LOAD AND WASTELOAD ALLOCATION DEVELOPMENT

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graph LR; A[Determine loading capacity] --> B[Calculate baseline load contributions]; B --> C[Allocate loads to sources]; C --> D[Calculate instream concentrations];
```

Determine  
loading  
capacity

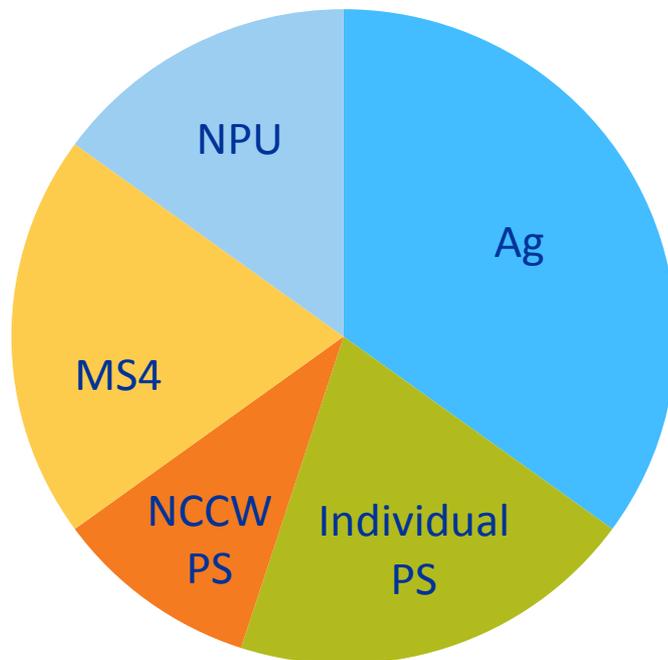
Calculate  
baseline load  
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Allocate loads  
to sources

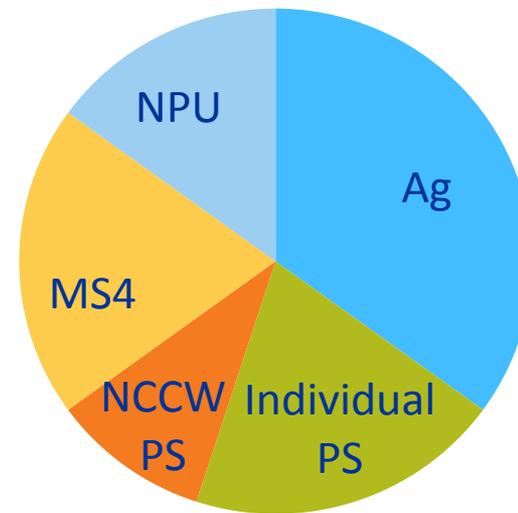
Calculate  
instream  
concentrations

# Allocation Approach

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



**Baseline Load**



**Allowable Load**

# WALK-THROUGH OF REPORT AND TABLES

# Report Outline

- Section 1 – Introduction
- Section 2 – Watershed Characterization
- Section 3 – Applicable Water Quality Standards
- Section 4 – Source Assessment
- Section 5 – Pollutant Loading Capacity
- Section 6 – Pollutant Load Allocations
- Section 7 – Implementation
- Section 8 – Public Participation
- Section 9 – References

# Appendices

- Appendix A – Allocation Tables per Watershed
- Appendix B – Large Format Maps
- Appendix C – TMDL Development Team Decision Memorandum
- Appendix D – Fecal Coliform Load Duration Curves per TMDL Reach
- Appendix E – Translator Development for Bacterial Indicator TMDLs
- Appendix F – Example Allocation Calculation

# Appendix A – Baseline Loads and Flows, and Allocation Summaries

- Tables A.1 through A.3 – Baseline Nonpoint Source Loads
- Tables A.4 through A.6 – Baseline MS4 Loads
- Table A.7 – Baseline Point Source Flows and Loads
- Table A.8 – Flows Used for Allowable TP and TSS Loads
- Table A.9 – Flows Used for Allowable Fecal Coliform Loads
- Tables A.10 and A.11 – TP Allocations (Daily and Monthly)
- Tables A.12 and A.13 – TSS Allocations (Daily and Monthly)
- Tables A.14 and A.15 – FC Allocations (Daily and Monthly)



# Appendix A – Wasteload Allocations by Discharger

- Tables A.16 and A.17 – TP Wasteload Allocations by Permitted Point Source (Daily and Monthly)
- Tables A.18 and A.19 – TSS Wasteload Allocations by Permitted Point Source (Daily and Monthly)
- Tables A.20 and A.21 – FC Wasteload Allocations by Permitted Point Source (Daily and Monthly)
- Tables A.22 and A.23 – TP Wasteload Allocations by MS4 (Daily and Monthly)
- Tables A.24 and A.25 – TSS Wasteload Allocations by MS4 (Daily and Monthly)
- Tables A.26 and A.27 – FC Wasteload Allocations by MS4 (Daily and Monthly)

# Appendix A – Percent Reduction of MS4, Agricultural, and Non-Permitted Urban Loads

- Table A.28 – Percent Reduction of MS4 TP and TSS by Reach and Municipality
- Table A.29 – Percent Reduction of MS4 TP and TSS by Municipality
- Table A.30 – Percent Reduction of Agricultural and Non-Permitted Urban TP and TSS by Reach

# SCHEDULE AND NEXT STEPS

# Schedule and Next Steps

- Focus Group Meetings – late Summer
- Public Hearing/Public Comment Period – To be determined
- EPA Review Period
- Implementation Plan Development

# QUESTIONS AND DISCUSSION

THANK YOU

<http://dnr.wi.gov/topic/TMDLs/Milwaukee/>