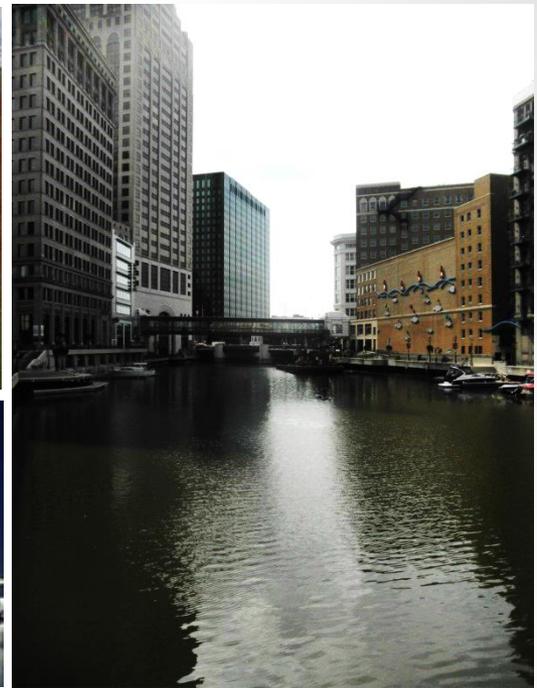


Source: milwaukeeeriverkeeper.org



# Milwaukee River Basin TMDL: Municipal Storm Water Outreach Session

MMSD Headquarters &  
Washington County Public Agency Center  
July 21, 2016

Bryan Hartsook, PE  
Bureau of Watershed Management  
Wisconsin DNR  
[bryan.hartsook@wisconsin.gov](mailto:bryan.hartsook@wisconsin.gov)

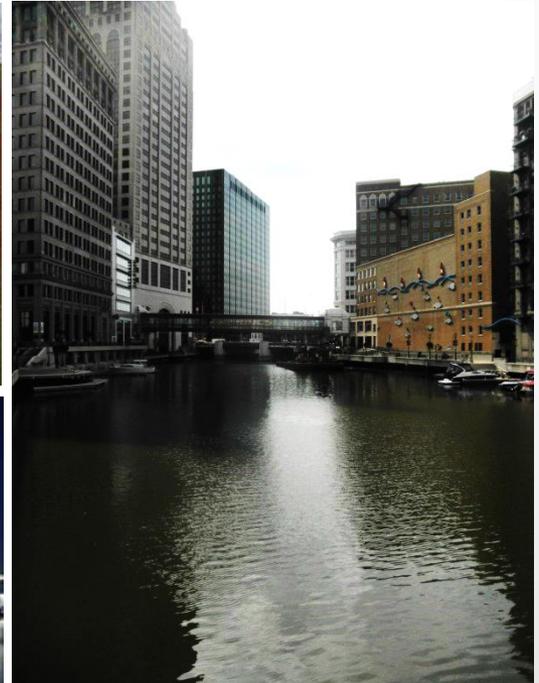
Kevin Kirsch, PE  
Bureau of Water Quality  
Wisconsin DNR  
[kevin.kirsch@wisconsin.gov](mailto:kevin.kirsch@wisconsin.gov)

# Agenda

- TMDL Background Information
- MS4 TMDL Implementation Guidance
  - Development Process
  - Guidance Structure
  - Modeling
- Present TMDL MS4 TMDL Wasteload Allocations
- MS4 TMDL Implementation Permit Framework
  - Compliance Points
  - Compliance Schedule
  - Demonstrating Compliance
- Moving Forward
- Discussion / Q&A

# TMDL Background

Source: milwaukeekeeper.org



# Actions Taken after Approval of Regional Water Quality Management Plan Update

1. SWWT\* formed
2. Watershed Restoration (WRP) Plans Developed by MMSD with public/stakeholder input for Menomonee River & Kinnickinnic River
3. Implementation Plans by SWWT for both
4. Discussion of TMDL

\*Southeastern Wisconsin Watersheds Trust (Sweet Water)

# Why 3<sup>rd</sup> Party TMDL?

1. Keep momentum of 2020FP and RWQMPU
2. Looming new phosphorous water quality standards
3. Development of sound basis for programs (Green Infrastructure/NR 151/Illicit discharges)
4. Models and data from RWQMPU available
5. GLRI Funding available
6. DNR support for the concept



# What are TMDLs?

- EPA requires that waters listed as impaired on Wisconsin's 303-d list have TMDLs developed.
- TMDLs determine the amount of a pollutant a waterbody can receive and still meet water quality standards.

**Total Maximum Daily Load =**

Load Allocation



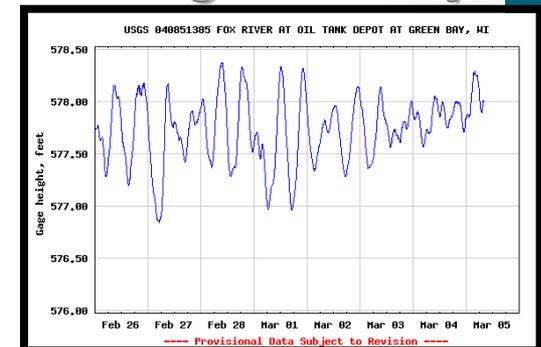
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Waste Load Allocation



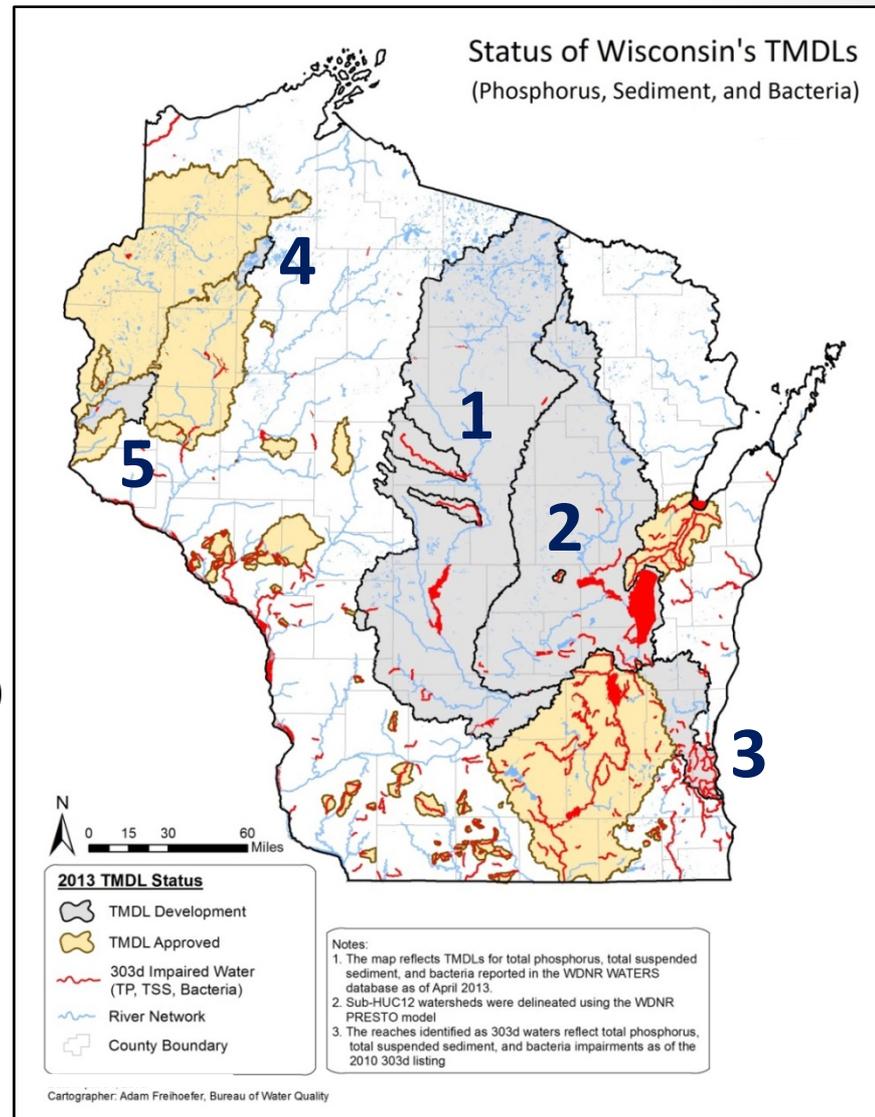
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Margin of Safety



# Statewide TMDL Development

1. Wisconsin River Basin  
Phosphorus and TSS
2. Upper Fox-Wolf Basin  
Phosphorus and TSS
3. Milwaukee River Basin  
Phosphorus, TSS, and Bacteria
4. Lac Courte Oreilles (9 Element Plan)  
Phosphorus
5. Lake Mallalieu  
Phosphorus



# 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 15-30  $\mu\text{g/L}$
- Lake Michigan = 7  $\mu\text{g/L}$
- Lake Superior = 5  $\mu\text{g/L}$
- Exclusions
  - Ephemeral Streams
  - Wetlands
  - Lakes <5 ac



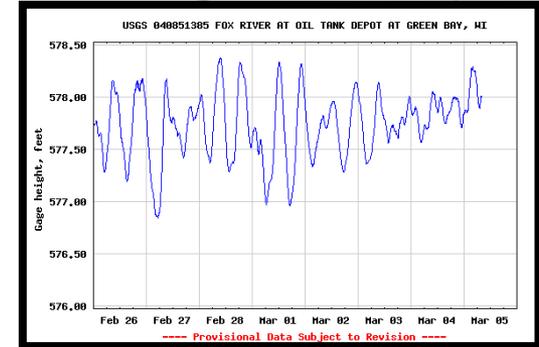
## Load Allocation



## Waste Load Allocation



## Margin of Safety



## Load Allocation

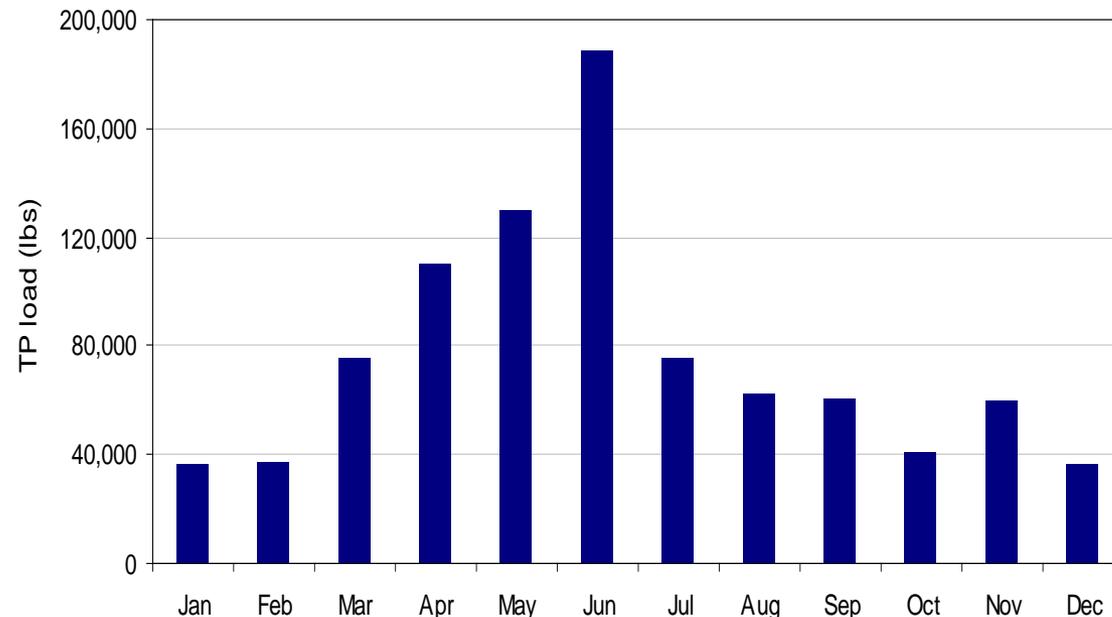
- Agricultural (includes load from CAFO land spreading)
- Non-permitted Urban
- Background

## Waste Load Allocation

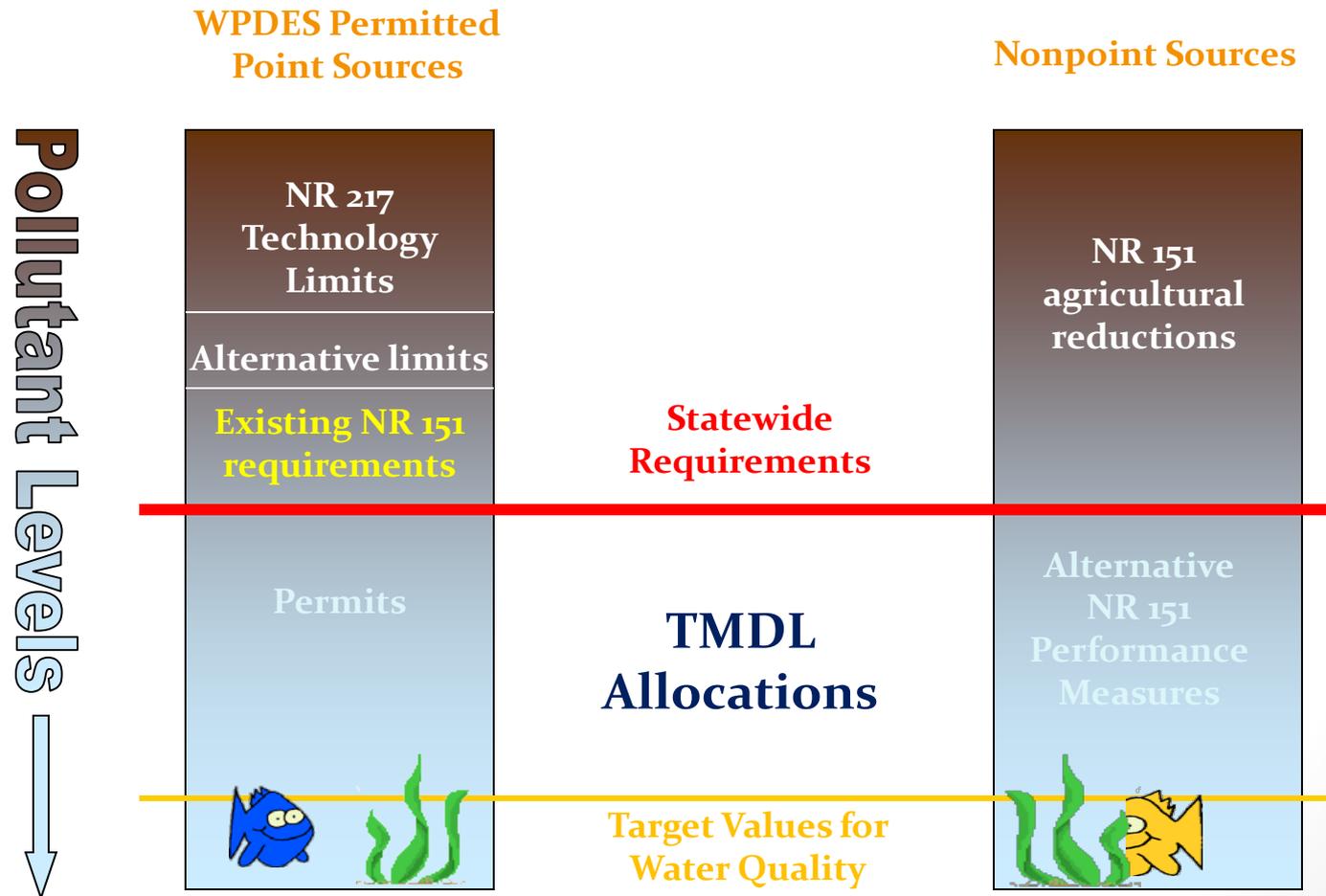
- WWTPs / POTWs
- Industries
- **Permitted MS4s**
- Non-Metallic Mines
- Construction Sites
- NCCWs

# Expression of Allocations

- TMDL must express allocations by mass and on a daily basis (lbs/day) but can be implemented on different time scales.
- Because of the baseline conditions and language in NR 151, allocations can be implemented using percent reduction approach.



# Define an Equitable Baseline Condition



(not to scale)

# TMDL Terminology for MS4s:

## No Controls

- Discharged from urban model area **with no stormwater controls**

## Existing Conditions

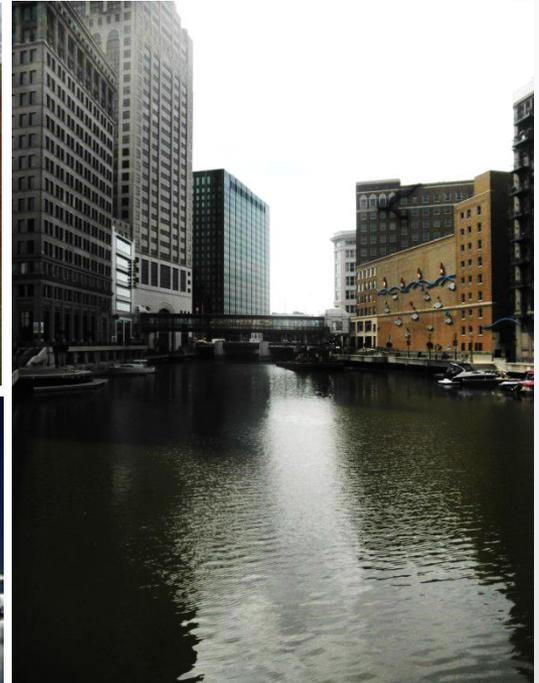
- Discharged from urban model area **with existing stormwater controls**

## Baseline Conditions

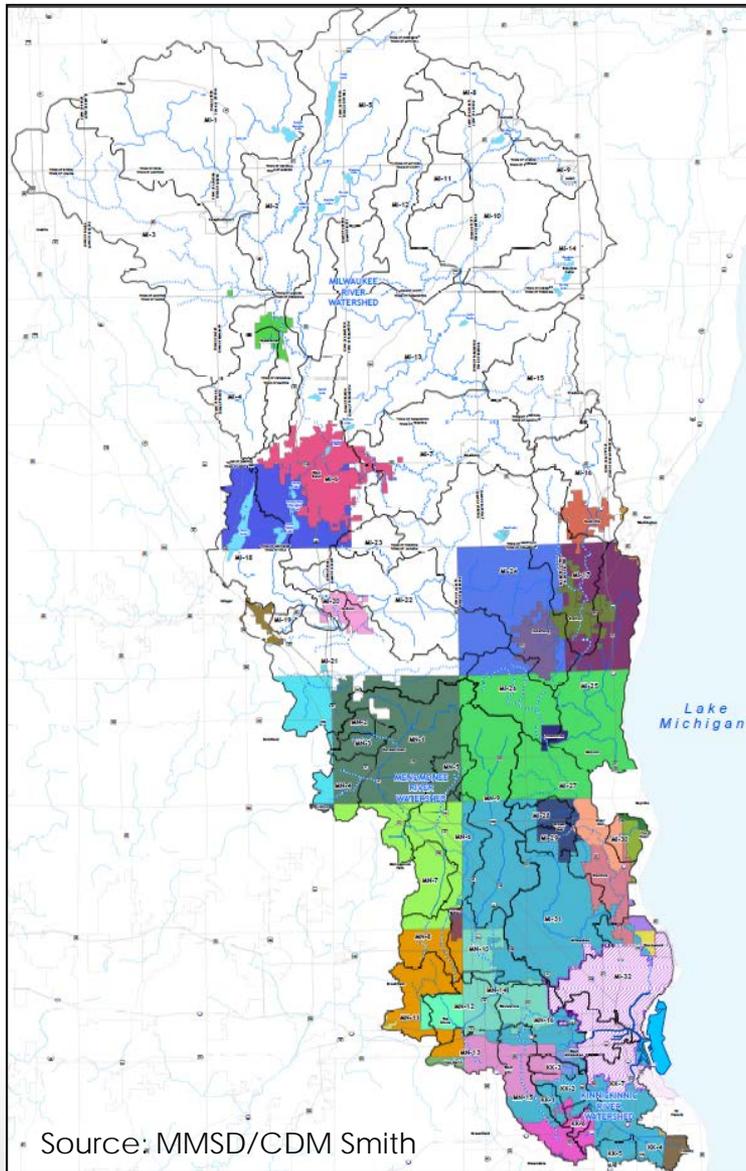
- Discharged from urban model area **with stormwater controls that achieve the 20% TSS reductions required by NR 151**

# TMDL MS4 Implementation: DNR Guidance

Source: milwaukeekeeper.com



# MS4s within the Basin



- 44 permitted MS4s  
(Sheboygan and Fond Du Lac Counties do not have permitted area in the Basin)
- 13 General Permits  
(3 '-01' permits)
- 7 Individual Specific  
(2 non-municipal)
- 24 Individual Group  
(5 groups total)



# Drafting MS4 TMDL Guidance

- Lengthy process. The final guidance differs substantially from the originally envisioned approach of using the mass allocation directly from the TMDL.
- DNR formed a team of stakeholders to provide input and assistance in drafting the guidance.
- DNR worked with EPA to create an approach that met Clean Water Act requirements but still provided a flexible implementation approach.

# Challenges with Expression of TMDL as Mass

- The aerial extent of the MS4 and its boundary may not match that of the TMDL due to incorporation of new areas, expansion of the municipal boundary and non-traditional MS4s (i.e. WisDOT & county highways).
- TMDLs are rarely able to account for watersheds modified by storm sewers.
- Difference between the tools used to create the TMDL versus the compliance tools used by the MS4 – will not calculate the same mass.



# Challenges with Expression of TMDL as Mass

Even if the TMDL used SLAMM or P-8 the rainfall record used in the TMDL will not match that required by NR 151



# WISCONSIN



# DNR

Department of Natural Resources

# You be the judge!

## Vote. Online. Now.

### Trout and Salmon Stamp Conte

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# Guidance Structure

**Part 1** – Expressing WLAs and Reduction Targets

**Part 2** - Implementation and Compliance

- TMDL SWMP Components
  - Ordinance updates, structural and non-structural controls, streambank stabilization, WQT and AM
- Benchmarks and tabular summary

**Part 3** - Modeling



# Percent Reduction Framework

- Builds on the existing MS4 modeling
- EPA will allow a percent reduction approach because DNR has a defined no controls scenario and defined climate files used in NR 151.13.
- The use of a percent reduction framework allows both the MS4 and DNR the ability to implement the reductions without having to reallocate and track WLAs across reachsheds, MS4s, and other land uses.

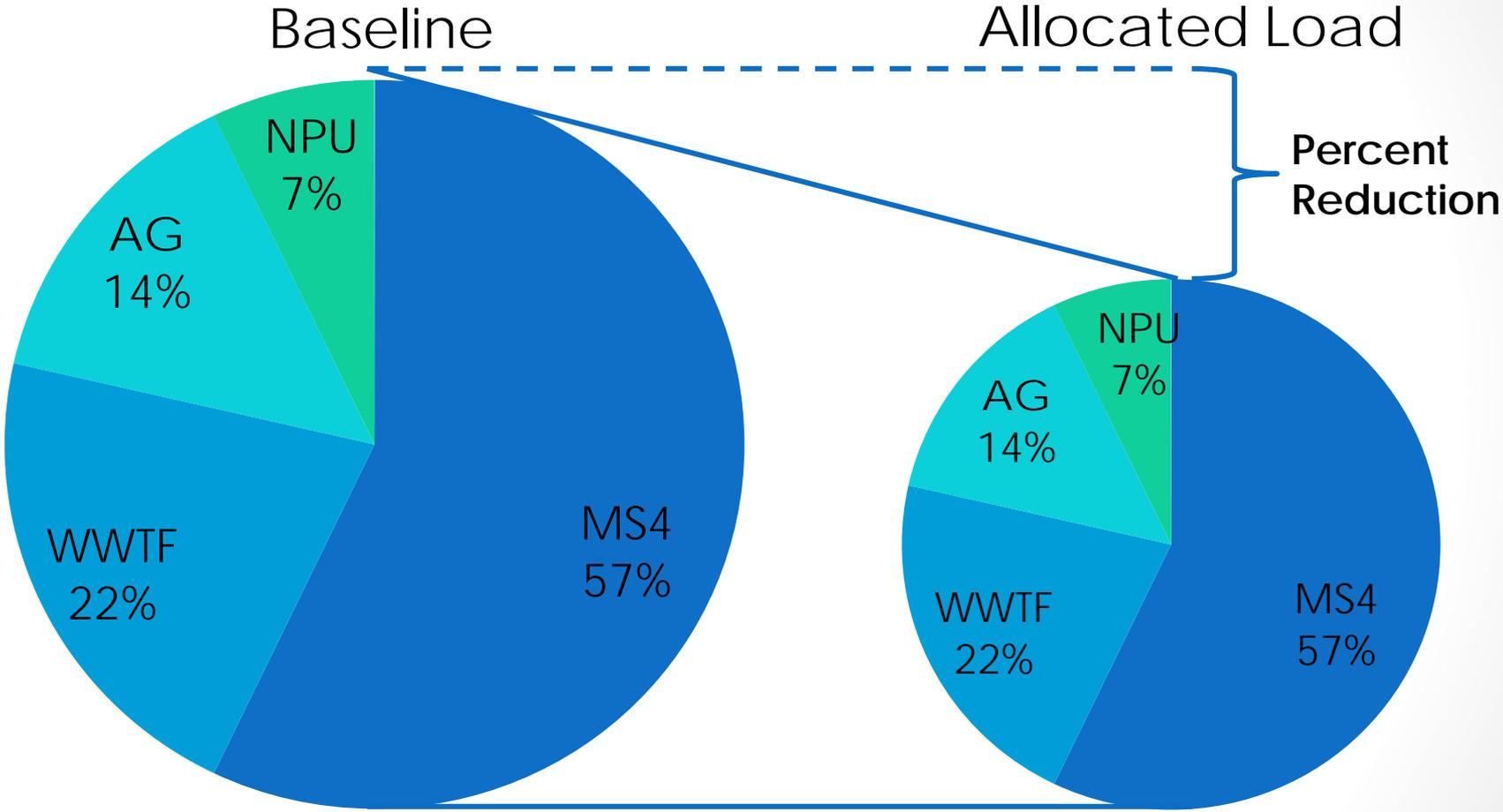
# Percent Reduction Framework

- Will minimize the need to continually update the TMDL as municipal boundaries evolve.
- Will ease reporting and tracking requirements.
- During the development of the TMDLs, the percent reduction is calculated using the following equation:

$$\text{Percent Reduction} = 100 \times \left( 1 - \left( \frac{\text{WLA Loading Allocation}}{\text{Baseline Loading Condition}} \right) \right)$$

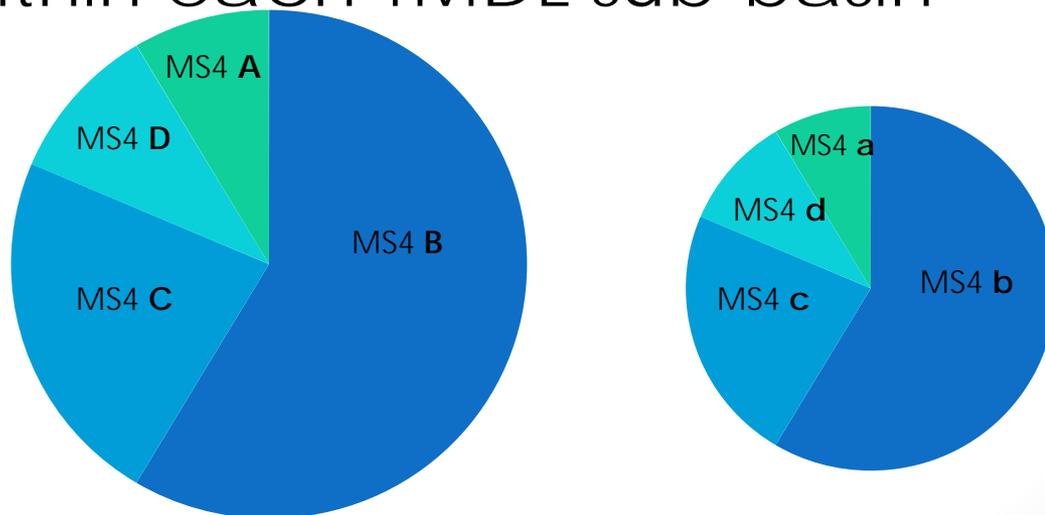
- Annual percent reductions are the average of the monthly percent reductions

# Percent Reduction Framework



# Percent Reduction Framework

- Wasteload allocations are given proportional to the percentage of an MS4s area to the total MS4 area in each TMDL sub-basin
- The **percent reductions** represent the percent reduction from baseline for all MS4s within each TMDL sub-basin





# Percent Reduction Framework

- Percent reduction expressed based on regulatory requirements.
- For a TMDL that uses 20% reduction as the baseline loading condition (TMDLs approved after January 1, 2012) the conversion to the NR 151.13 **no-controls** modeling condition is:

$$\text{TSS Percent Reduction} = 20 + (0.80 * \% \text{ control in TMDL})$$

$$\text{TP Percent Reduction} = 11 + (0.89 * \% \text{ control in TMDL})$$

- Relationship between TSS and TP set by TMDL modeling condition

Attachment C: Rock River TMDL MS4 Annual Average Percent Reductions

Reach	Appendix H TP reduction from baseline of 27%	Appendix I TSS reduction from baseline of 40%	Calculated TP reduction from no-controls	Calculated TSS reduction from no-controls
2	29%	1%	48%	41%
3	82%	26%	87%	56%
20	14%	0%	37%	40%
21	10%	0%	34%	40%
23	12%	11%	36%	47%
24	11%	12%	35%	47%
25	64%	32%	74%	59%
26	35%	29%	53%	57%
27	0%	0%	27%	40%
28	1%	0%	28%	40%
29	51%	7%	64%	44%
30	0%	0%	27%	40%
33	29%	9%	48%	45%
34	81%	31%	86%	59%
37	66%	54%	75%	72%
39	0%	0%	27%	40%
45	13%	8%	36%	45%
51	14%	0%	37%	40%
54	61%	6%	72%	44%
55	68%	43%	77%	66%
56	19%	0%	41%	40%
59	54%	15%	66%	49%
60	29%	1%	48%	41%
61	6%	2%	31%	41%
62	70%	70%	78%	82%
63	14%	11%	37%	47%
64	47%	55%	61%	73%
65	49%	46%	63%	68%
66	37%	37%	54%	62%
67	0%	0%	27%	40%
68	52%	18%	65%	51%
69	72%	21%	80%	53%
70	1%	1%	28%	41%
71	29%	31%	48%	59%
72	0%	0%	27%	40%
73	51%	49%	64%	69%
74	17%	20%	39%	52%
75	15%	19%	38%	51%
76	75%	29%	82%	57%
78	4%	0%	30%	40%
79	54%	37%	66%	62%
81	20%	7%	42%	44%
83	37%	25%	54%	55%

- Tables for Rock and Lower Fox River TMDLs are already contained in the guidance document.
- Reductions given from both baseline and no-controls condition.

Baseline reductions of TP = 27% & TSS = 40% were identified in the RR TMDL report on pages 25 & 27.

% TP reduction from no-controls =  $27 + [0.73 \times (\% \text{ TP control in Appendix H})]$

% TSS reduction from no-controls =  $40 + [0.60 \times (\% \text{ TSS control in Appendix I})]$

Reaches that are not listed above did not have a permitted MS4 within the reach.

Table developed by: Eric Rortvedt, DNR Stormwater Engineer

Dated: 9/16/2014

# Implementation of Percent Reduction Framework

- The percent reduction calculated to meet the TMDL is applied to the no controls load, which provides the mass that needs to be controlled by the MS4. This mass will be different from that stipulated by the TMDL WLA.
- The corresponding mass calculated using that percent reduction should be used in any accounting required through water quality trading and/or adaptive management.



# Implementation of Percent Reduction Framework

- For the MS4 area contained in each reachshed, the no controls load is calculated using SLAMM, P-8, or equivalent.
- The MS4 area includes the entire acreage that the MS4 is responsible for; subtract areas not under the jurisdiction of the permittee.
- As new MS4 area is added or subtracted, the same TMDL percent reduction is applied to these new areas.



# Implementation of Percent Reduction Framework

## NEW GUIDANCE DRAFTED for:

- Calculating MS4 percent reduction where TMDL did not allocate WLA for permitted MS4 (February 2016)

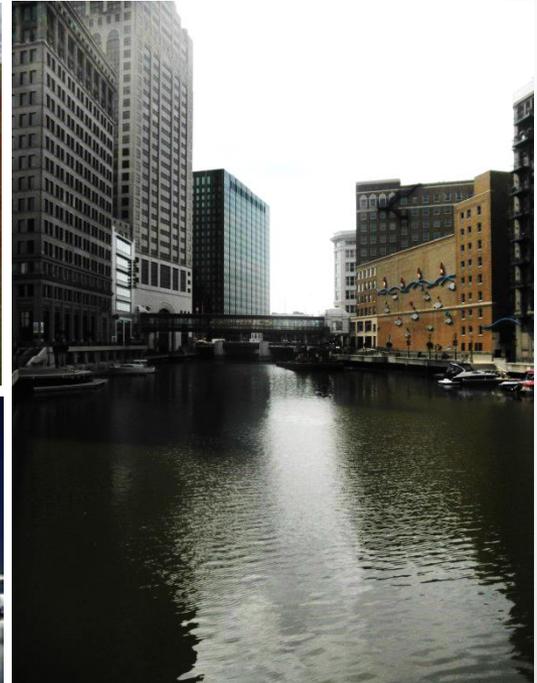
*TSS % Reduction = 20 + (0.80 × %NPU reduction from baseline in TMDL)*

*NPU = non-permitted urban*

- Internally Drained Areas (May 2016)
- Urbanized Area Inclusion (just noticed)

# MS4 TMDL Tables: Baseline, Wasteload Allocations, and Percent Reductions

Source: [milwaukeekeeper.org](http://milwaukeekeeper.org)





# MS4 Baseline Condition

- MS4 baseline loads are presented in Appendix A, table series:

**A.4** – Phosphorus (lbs/month and lbs/yr)

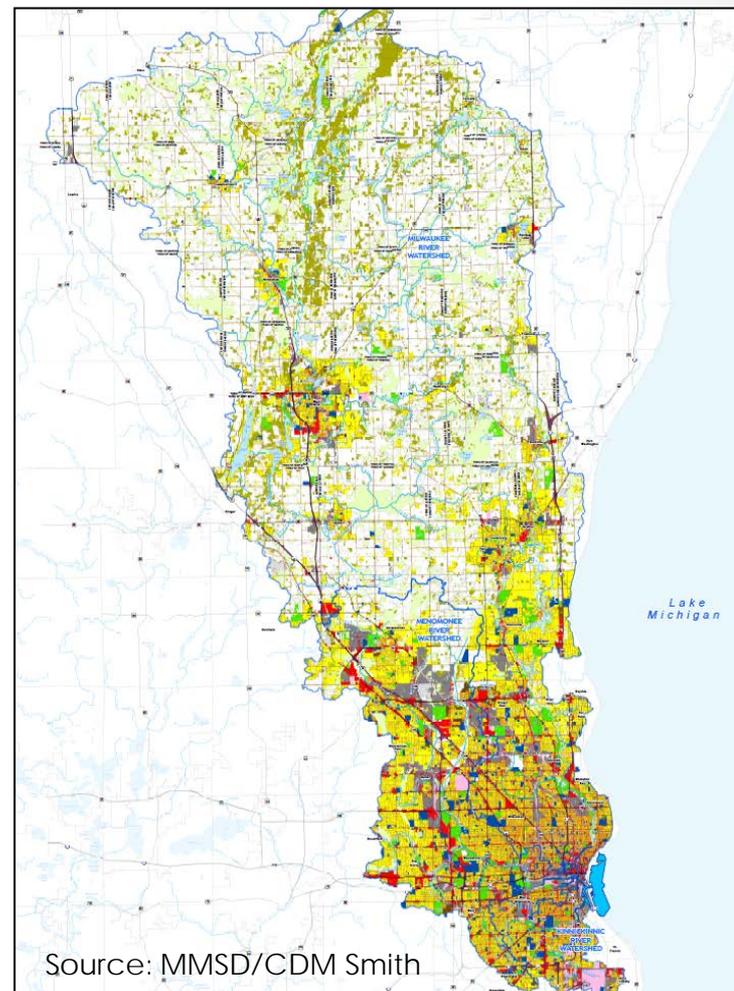
**A.5** – TSS (lbs/month and lbs/yr)

**A.6** – Fecal Coliform (billion cells/mo and billion cells/season\*)

\*recreational season standard for May through September, but allocations apply year round

# MS4 Baseline Condition

- Input loading parameters for land cover classes were calibrated to SLAMM and then adjusted to match collected water quality data
- Factors adjusted to represent a 20 percent reduction in TSS and associated reductions for TP and fecal coliform bacteria





# MS4 Baseline Condition

- Associated watershed scale relative pollutant removal rates assumed in model:

Pollutant	Median removal relative to TSS	Percent removal relative to baseline
Total Suspended Solids	1.000	20%
Total Phosphorus	0.565	11.3%
Fecal Coliform	0.778	15.6%

Based on information on nine Midwestern studies summarized in Winer, R., 2000, *National Pollutant Removal Performance Database for Stormwater Treatment Practices, 2<sup>nd</sup> Edition* (Center for Watershed Protection. Ellicott City, MD)



# MS4 Baseline Condition

- Fecal coliform loading from illicit connections, exfiltration from laterals into storm, and other dry-weather sources **are included** in baseline
- Including in baseline allows for crediting management practices that reduce bacteria by addressing these sources
- **Important implementation consideration:**
  - *The pollutant of concern* is the bacteria indicator organism – Fecal Coliform or E.coli
  - *The impairment* is Recreational Restriction due to Pathogens in the water

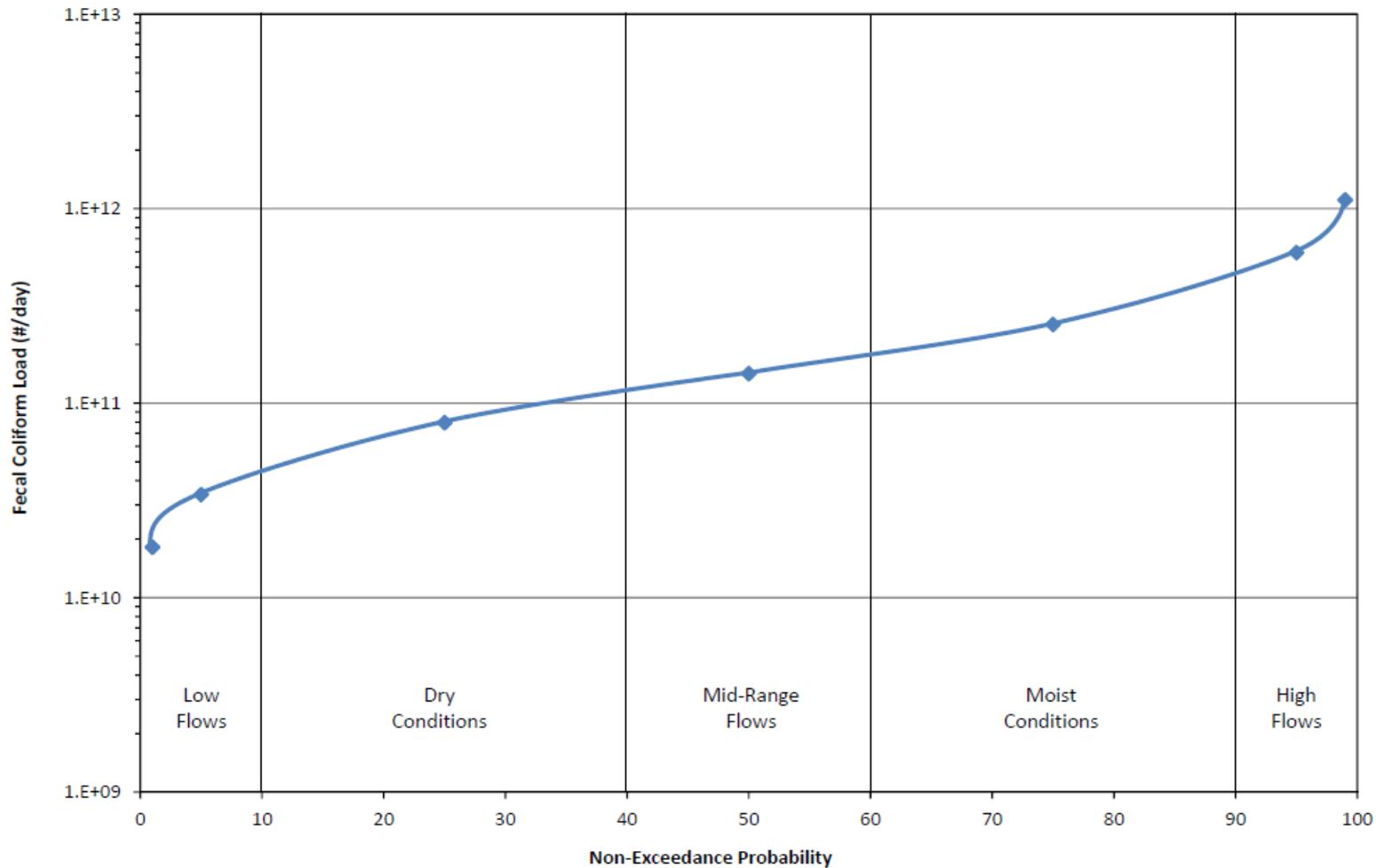


# MS4 Wasteload Allocations

- MS4 wasteload allocations are presented in **Appendix A**, table series:
  - A.22** – Phosphorus (lbs/day)
  - A.23** – Phosphorus (lbs/month)
  - A.24** – TSS (lbs/day)
  - A.25** – TSS (lbs/month)
  - A.26** – Fecal Coliform (billion cells/day)
  - A.27** – Fecal Coliform (billion cells/month)
  - A.28** – Percent Reductions (TP and TSS) by reach
  - A.29** – Percent Reductions (TP and TSS) by MS4
- Fecal coliform load duration curves are presented in **Appendix D**

# Load Duration Curves

Reach MI-25 - Fecal Coliform Load Duration Curve

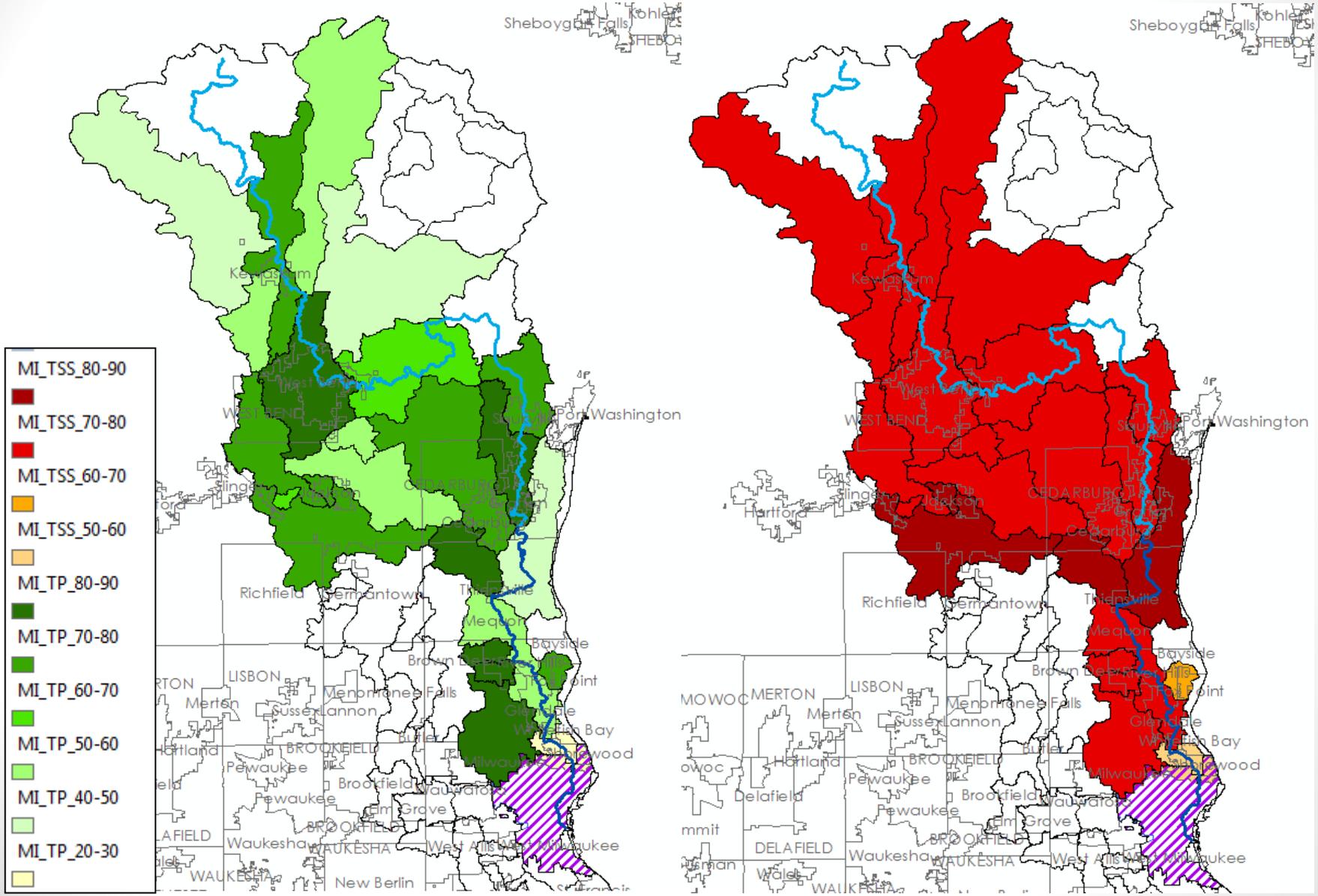




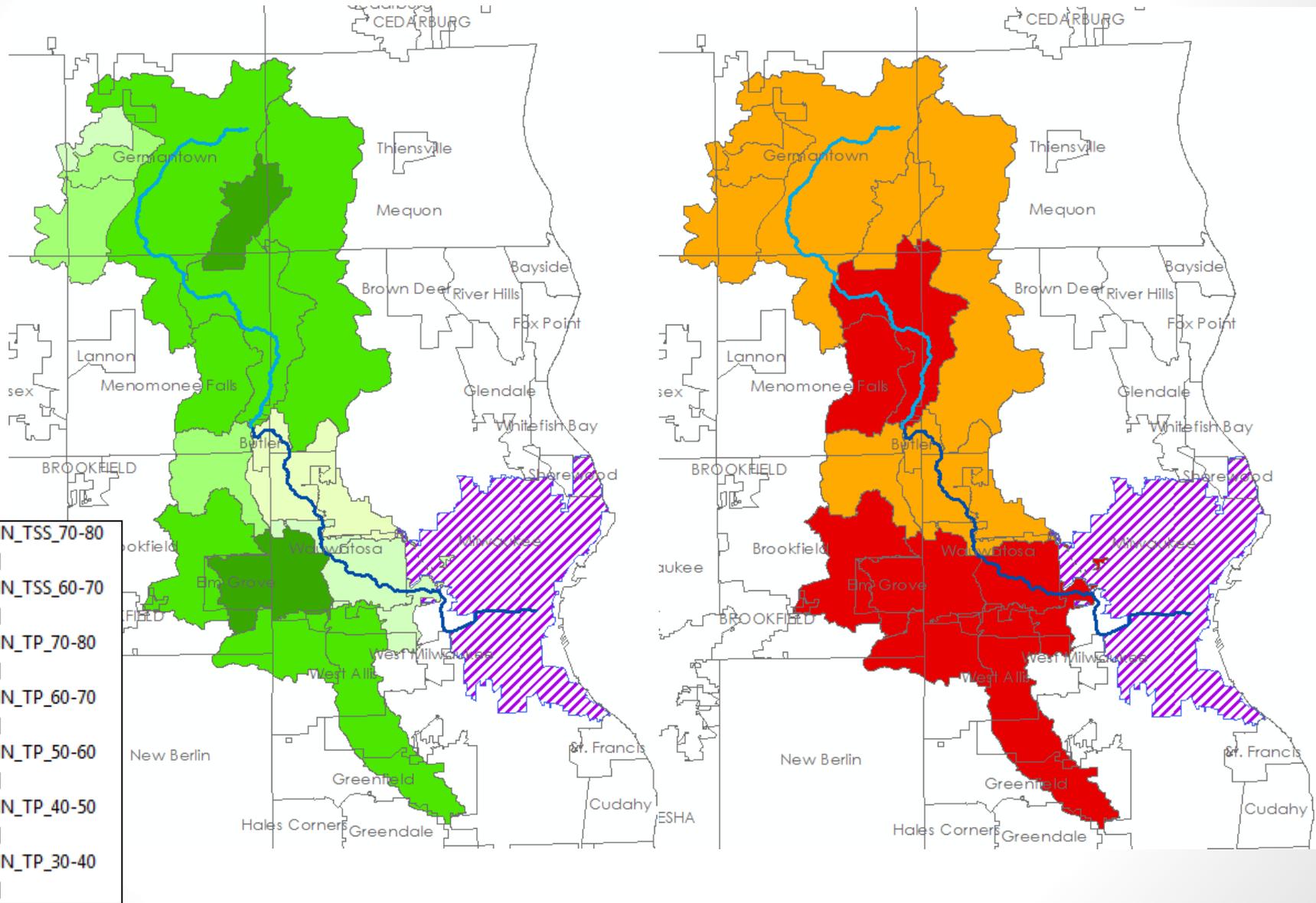
# MS4 Percent Reductions

- TSS percent reductions range – 58% to 90%  
(includes baseline, i.e. “no-controls” condition)
- TP percent reductions range – 14% to 88%  
(includes baseline, i.e. “no-controls” condition)

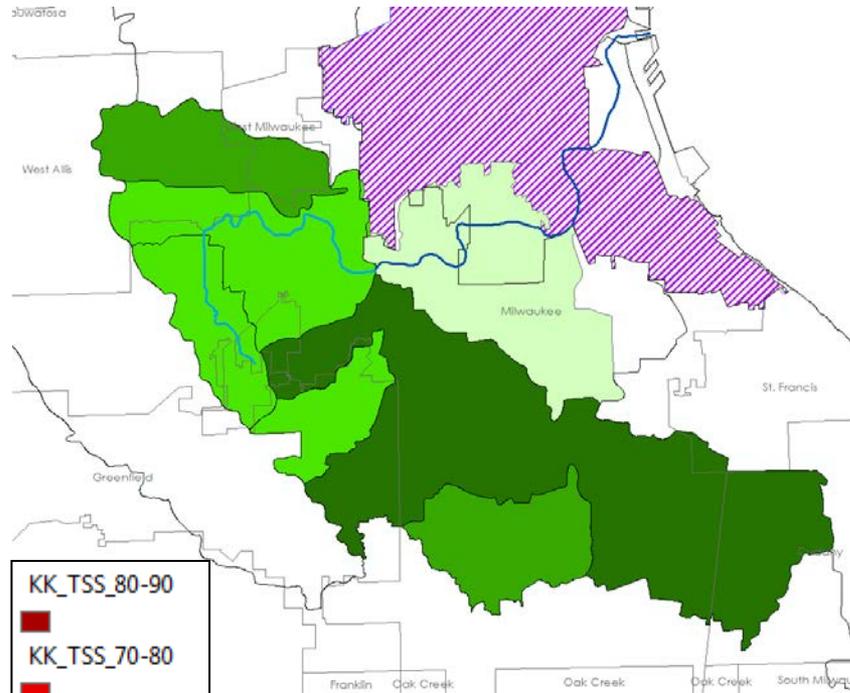
# Milwaukee River Watershed



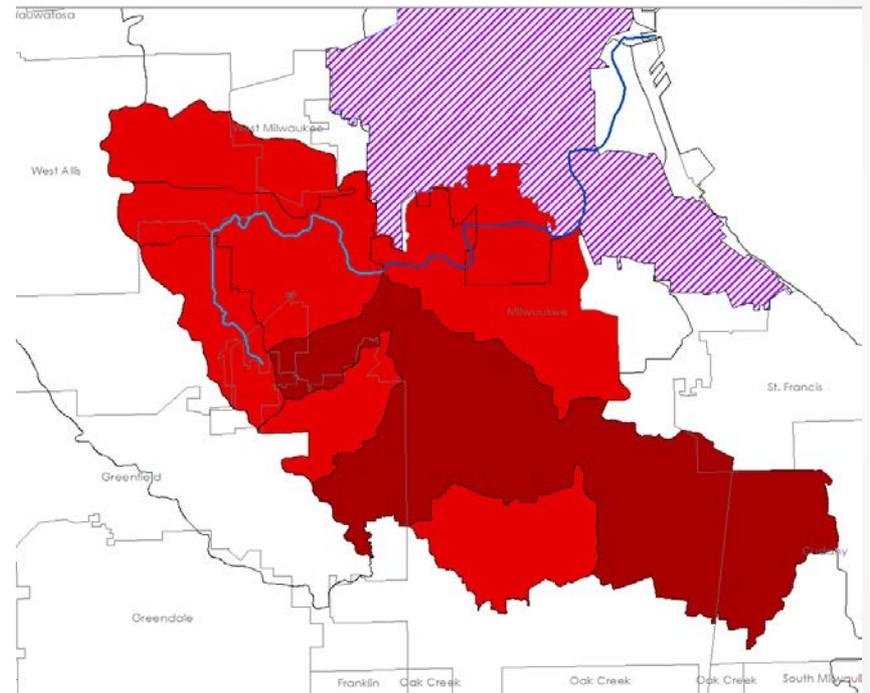
# Menomonee River Watershed



# Kinnickinnic River Watershed

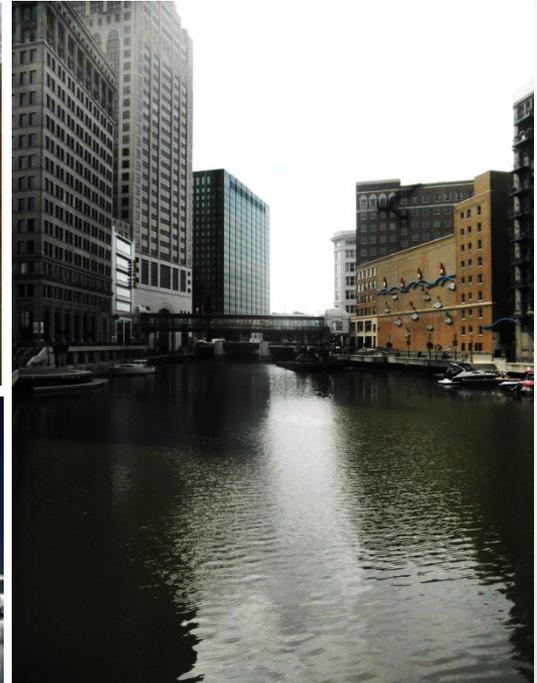


- KK\_TSS\_80-90
- KK\_TSS\_70-80
- KK\_TP\_80-90
- KK\_TP\_70-80
- KK\_TP\_60-70
- KK\_TP\_40-50



# MS4 TMDL Implementation: Permit Framework

Source: [milwaukeekeeper.org](http://milwaukeekeeper.org)



# TMDL Permit Requirements

- Once EPA has approved a TMDL that contains permitted MS4s, the next permit issued must contain **an expression of the WLAs consistent** with the assumptions and requirements contained in the TMDL.
- Plan, implement, and demonstrate progress



# SMART Permitting

**S**pecific

**Who?** and **What?**  
DNR lead

**M**easurable

**A**ttainable

**R**ealistic

**Why? How?** and **Where?**

Science, planning and collaboration.

Organizations and municipalities lead

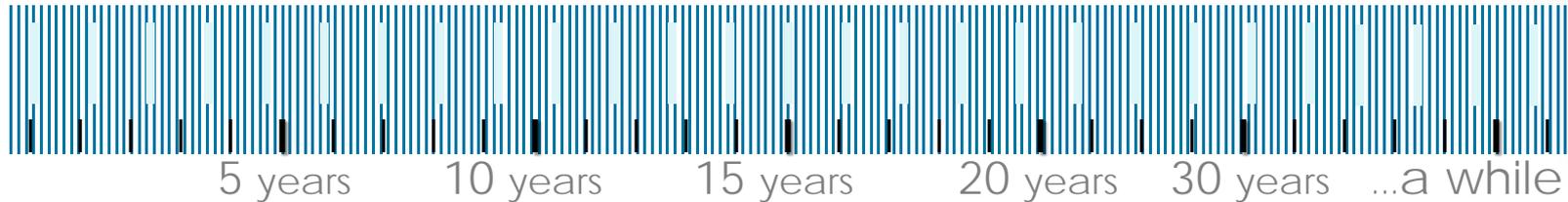
FRAMEWORK FROM REAL EXPERIENCE: WQ data, studies and planning, pilot projects, etc.

**T**ime-bound

**When?**

DNR lead through establishing benchmarks

# Compliance Schedule



- DNR will work with MS4s to establish benchmarks for each 5-year permit term. **Benchmarks** are to be identified prior to each 5-year permit reissuance.
- It is possible that certain benchmarks will not be easily quantifiable but there needs to be documentation that achieving such benchmarks will reduce the discharge of pollutants of concern.

TMDL Reach  
MS4 TMDL  
MS4 Existing  
Modeled MS4  
Modeled MS4

Benchmark  
(BM)

N/A

1

2

3

4

5

6

7

\* The TSS and

Descripti	Outf Affecte BM co	Aff Draina (as m	Impleme Da	BM	MS4 Cumulative % Control (from no controls)
Existing	All	A	Ongoing		TSS: 32% TP: 24%
Increase Roadwa	All	A	1/1/2	(30%	TSS: 35% TP: 26% (Accounts for 5 years of reduction)
Impleme Clea	00 00 00 00	1A 3A 4C 8	1/1/2	(eff. r	TSS: 44% TP: 32%
Impleme Waste C	All	A	1/1/2	(eff. r	TSS: 46% TP: 37%
Ordinanc Redevel	All	A	1/1/2	(30%	TSS: 49% TP: 39% (Accounts for 5 years of reduction)
Retrofit 2'	00	F	1/1/2		TSS: 51% TP: 40%
New	00	5B	1/1/2		TSS: 54% TP: 42%
Stabilize M between	00	3D a	1/1/2	Streaml count ag	TSS: 54% TP: 42%

Control  
(s)

reduction)

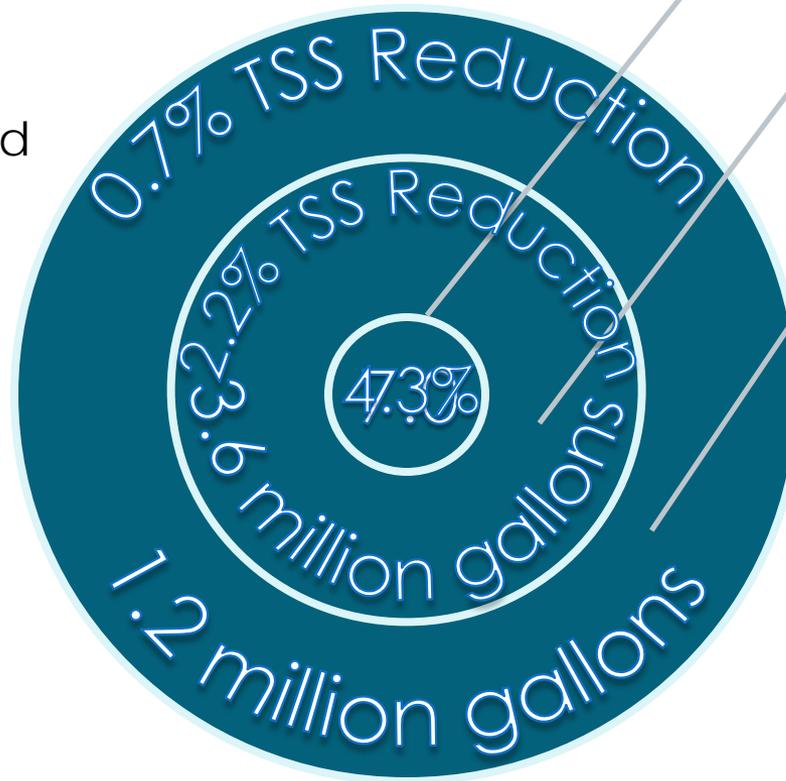
reduction)

# SMART Benchmarks

**MEASURABLE GOAL:** Reduce total connected imperviousness by **30%** in drainage areas K-1 and K-2 through implementation of *Downspout Disconnection Program* and *Green Streets*

On the ground:

- 100 ac watershed
- 1.4 acres of permeable pavement (4,850 linear ft)
- ~180 homes outfitted



3<sup>rd</sup> Permit  
Term: 30%

2<sup>nd</sup> Permit  
Term: 15%

1<sup>st</sup> Permit  
Term: 5%

# Compliance Points

- Unlike the requirements contained in NR 151.13, individual MS4s may be divided in multiple reachsheds.
- Compliance with TMDL requirements will need to be achieved on a reach by reach basis.
- **Ultimately water quality standards must be met in-stream at the compliance point for each reachshed.**

# Demonstrating Compliance

- Compliance is with water quality standards.
  - The TMDL reductions are the best estimate for meeting water quality standards and are modeled or simulated predictions.
  - Ambient stream monitoring will ultimately be required to de-list impaired waters and show compliance with the TMDL.
- Under a TMDL, EPA does not acknowledge the concept of maximum extent practicable as defined in s. NR 151.006, Wis. Adm. Code, but rather compliance schedules can be structured in SWMPs and permits to allow MS4s time to meet TMDL goals.

# TMDL : Moving Forward

July 25: Public Informational Meeting and Workshop

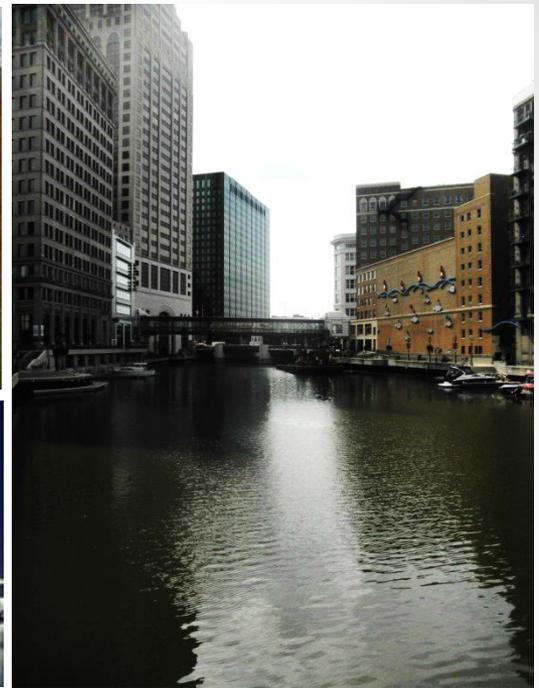
The July 25<sup>th</sup> workshop will be held from 9:00 to 1:00 at the Wauwatosa City Hall building.

Late summer: Focused stakeholder meetings with point source dischargers, agricultural interests, and other stakeholder groups (details forthcoming).

Fall: Public hearing and official 30 day public comment period before submittal of TMDL to EPA.

Implementation Planning: Detailed planning will commence once TMDL is approved.

Source: milwaukeekeeper.org



# Milwaukee River Basin TMDL: Municipal Storm Water Outreach Session

Please direct feedback to:

[DNRMilwaukeeBasinTMDL@wisconsin.gov](mailto:DNRMilwaukeeBasinTMDL@wisconsin.gov)