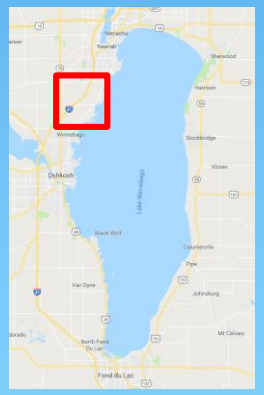
Lake Winnebago

near Indian Point

Video taken on June 27th, 2018 by
Professor Bob Stelzer of UW-Oshkosh



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Upper Fox & Wolf TMDL Development

WELCOME

CADMUS

USGS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WISCONSIN DEPT. OF NATURAL RESOURCES

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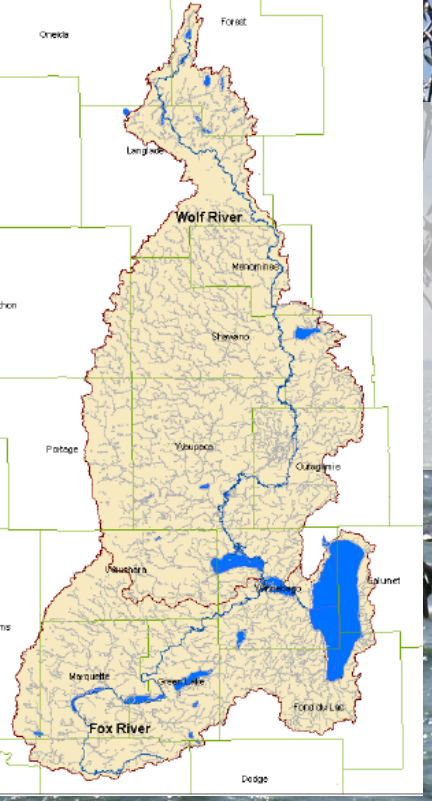

Upper Fox Wolf Basin TMDL

July 11, 2018

Informational Meeting – Review of Draft TMDL

WISCONSIN DEPT. OF NATURAL RESOURCES

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Total Maximum Daily Load

Presenters

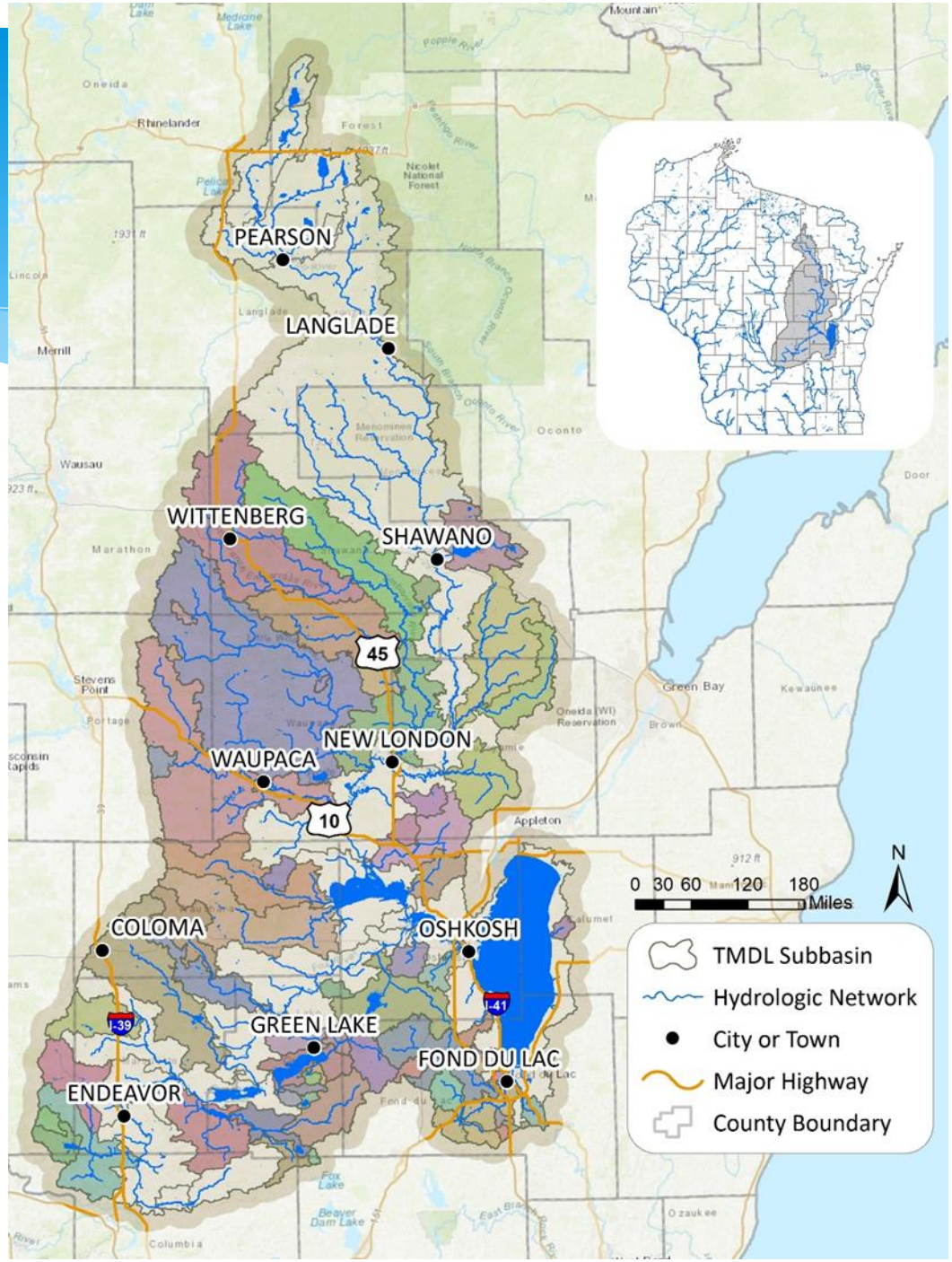
The Cadmus Group and Wisconsin Department of Natural Resources

Kevin Kirsch

Andrew Somor

Andrew Craig

Emma Lorenzen



DRAF 1, 2

CADMUS

Presentation Outline

1. Overview of Impaired Waters Program
2. Overview of TMDL Development and Allocations
3. Discuss Point Source Implementation
4. Discuss Nonpoint Source Implementation
5. Outline Funding Assistance and Grant Programs
6. Outline Next Steps

Background Information

* DNR website: dnr.wi.gov
  * Search Upper Fox Wolf TMDL
* Copy of earlier presentations (slides and recording)
* Report and supporting material

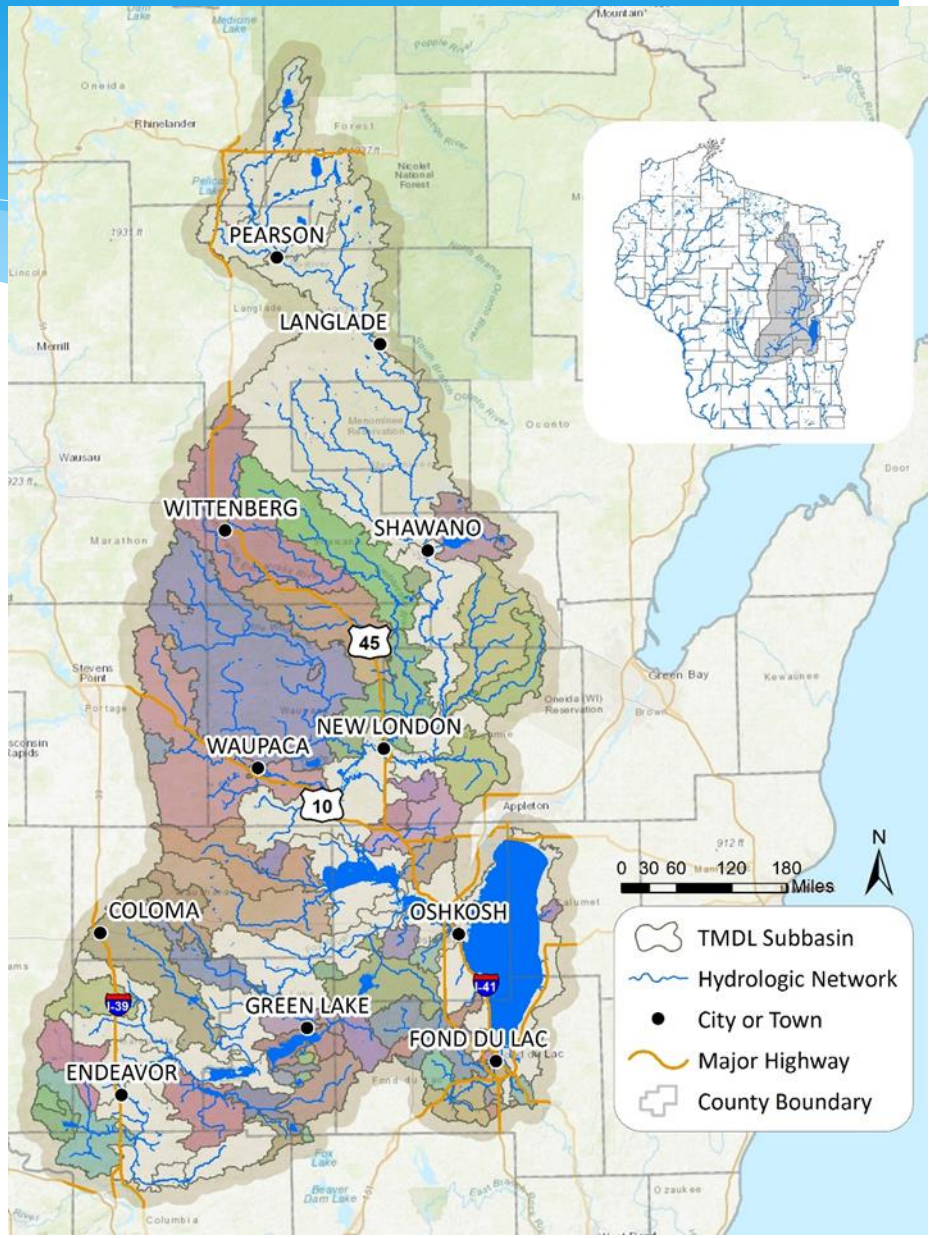
Informational Meeting

* This is an informational meeting on the draft TMDL study.
* Comments can be submitted until 4:30 on August 5, 2018 to KeithA.Marquardt@Wisconsin.gov or by mail.
* Official Public Hearing with 30-day comment period tentatively planned for September.

Upper Fox-Wolf Basin TMDLs

* TMDL development funded by US EPA through GLRI funding with US EPA providing contractor support.
  * The Cadmus Group, Inc.
  * USGS

* RFPs released in fall of 2012 with contracts awarded in January of 2013.

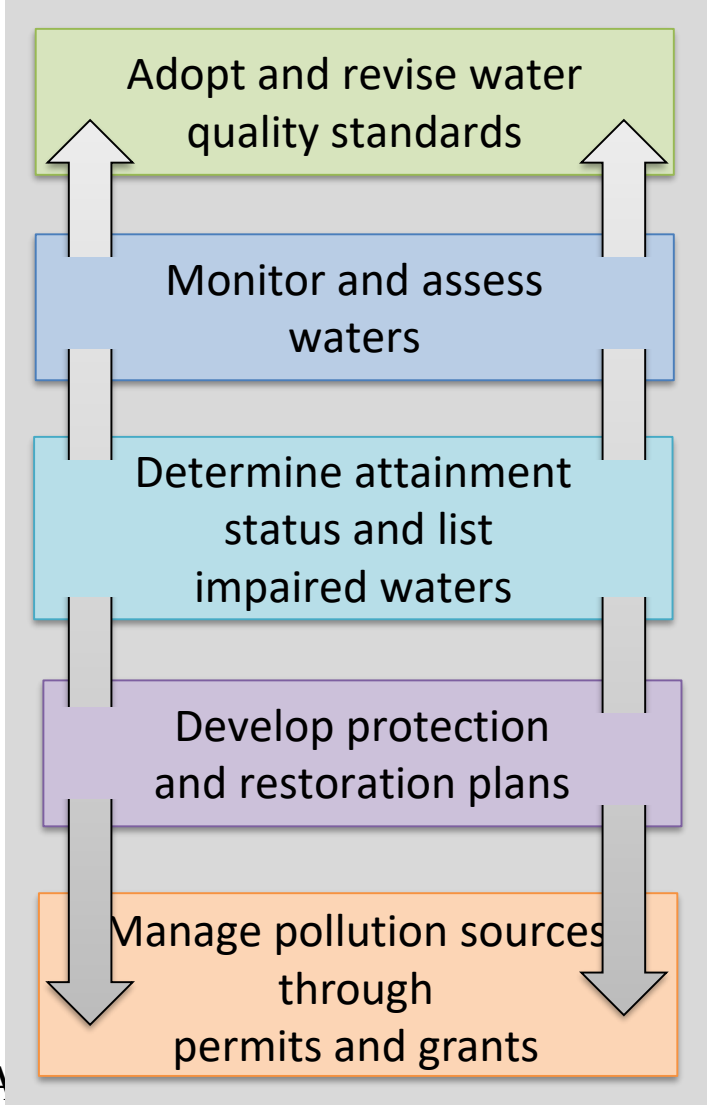


CADMUS

USGS science for a changing world

Onterra, LLC Lake Management Planning

Clean Water Act Requirements



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."
* Per Wis. Stat. s. 281.15 water quality standards must be adopted by rule.

Public Health – Drinking Water

* **Lake Winnebago**, Lake Michigan, and Lake Superior are Wisconsin's surface water drinking water sources. 250,000 people get drinking water from Lake Winnebago.

* No assessment procedure for drinking water designated use for surface waters:
  * World Health Organization has outdated standard based on microcystins (toxins)
  * EPA is working on but has not promulgated an updated standard

* The drinking water program prefers multi-barrier protection in which the source water is meeting or is as close to meeting the designated use as possible prior to treatment.

* Current treatment technology has not shown breakthrough of toxins; however, still a concern that it can occur. The 1993 Milwaukee Cryptosporidiosis outbreak shows problems in treatment can occur and the August 2014 algal bloom on Lake Erie resulted in 400,000 people having to drink bottled water due to microcystins.

North End Winnebago Lake Aerial Photo

Recreational Use

Allowable phosphorus concentrations calculated to support recreational use by preventing excessive algae blooms.

(Chlorophyll *a* shall not exceed 20 µg/L more than 30% of days during July 15 – Sept 15).

Statewide Phosphorus Criteria

Rivers

100 µg/L

Streams [1]

75 µg/L

Reservoirs

- Not Stratified = 40 µg/L
- Stratified = 30 µg/L

Inland Lakes[2]

Ranges from 15-30 µg/L

Great Lakes

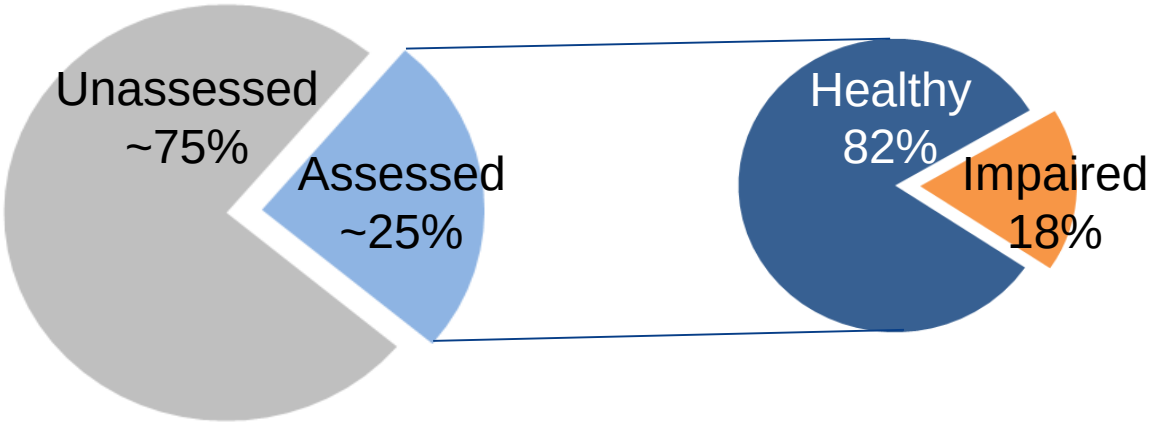
- Lake Michigan = 7 µg/L
- Lake Superior = 5 µg/L

[1]All unidirectional flowing waters not in NR 102.06(3)(a). Excludes Ephemeral Streams.

[2]Excludes wetlands and lakes less than 5 acres

Assessing and Listing of Impaired Waters

* Required under 33 USC 1313(d)
* Impaired Waters List updated every 2 years based on monitoring data.
* Public comment period and submitted to U.S. EPA for approval. EPA can be petitioned to add waters if we do not.



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What are TMDLs?

* EPA requires that waters not meeting water quality standards be listed as impaired on Wisconsin's 303-d list and have TMDLs or a comparable water quality restoration plan developed.
* TMDLs determine the amount of a pollutant a waterbody can receive and still meet water quality standards.
* TMDLs **do not** create new rules or regulatory requirements but rather rely on existing rules for implementation.

Total Maximum Daily Load =

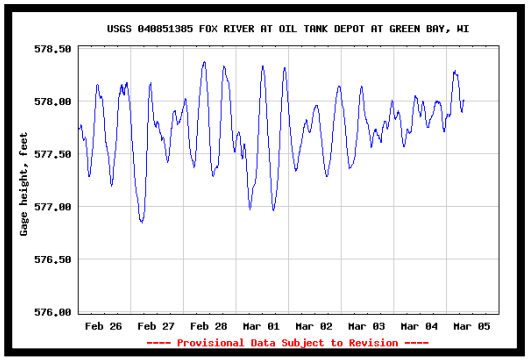
Load Allocation

+

Waste Load Allocation

+

Margin of Safety



TMDL Implementation

* Wis. Stat. s. 283.31(3)(d)3 requires DNR to include effluent limits in permits to meet TMDL wasteload allocations. Chapter NR 217 and NR 212 implements wasteload allocations in wastewater permits.

* Chapters NR 151 (NR 151.004 and NR 151.005) and NR 216 implement TMDL allocations for nonpoint and permitted stormwater sources.

Upper Fox-Wolf River Basins

* **18 Counties and 70+ cities and villages**

- **76 Permitted Wastewater Facilities**

  56 municipal POTWs

Permitted MS4s

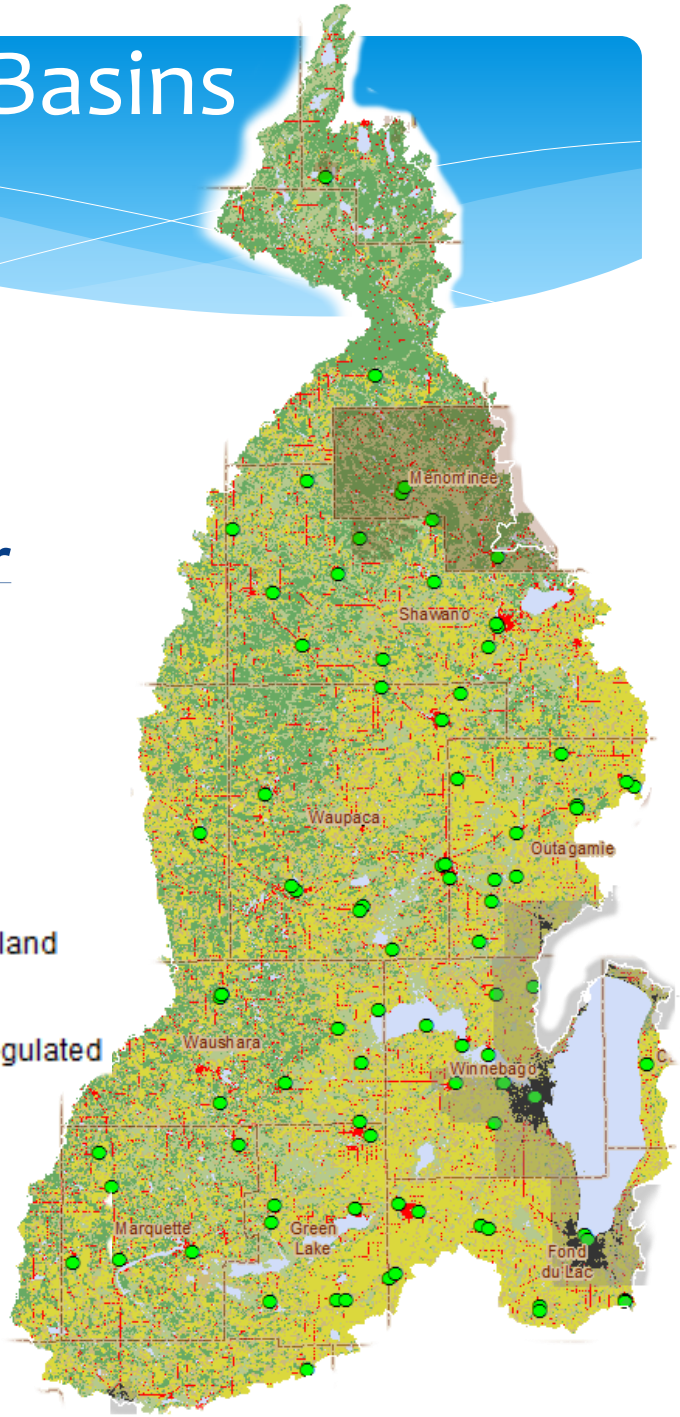
24 municipalities

Tribal Lands

5 Tribes

Land Cover

- Open Water
- Forest
- Wetland
- Pasture/Grassland
- Urban Non-Regulated
- Urban MS4
- Agriculture



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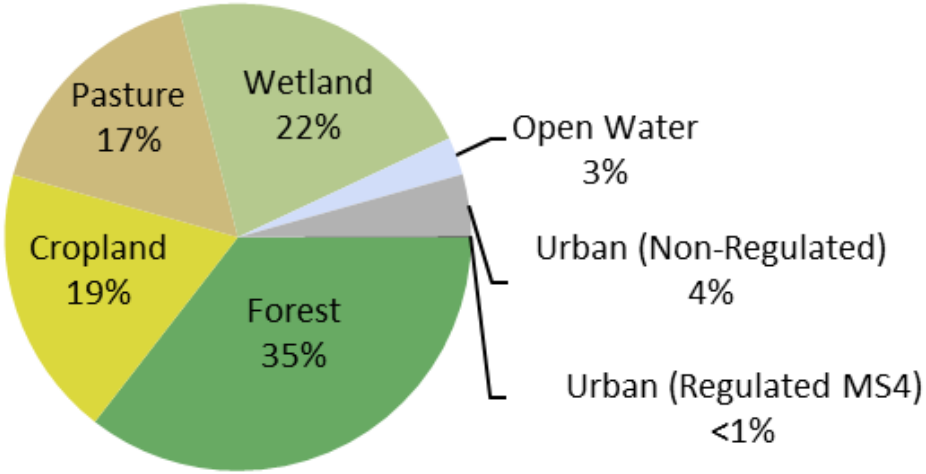
* **Wolf River Basin**
  * 3,700 square miles

Impaired Stream/ River Segments (19 TP, 3 TSS)

Impaired Lakes/ Reservoirs (11 TP)

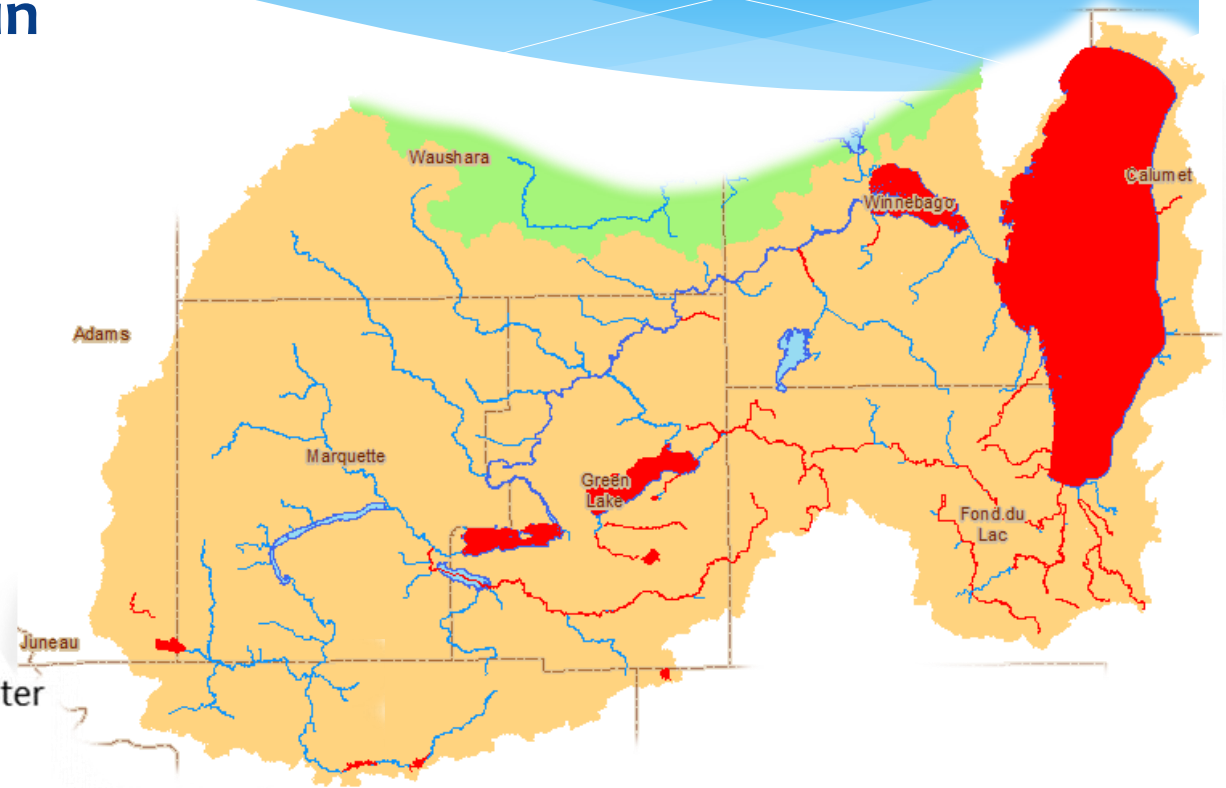


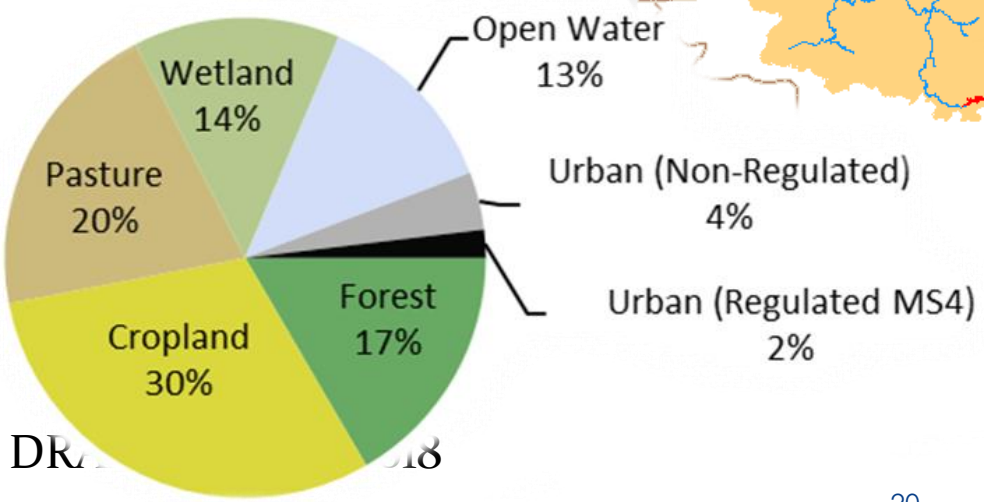
Upper Fox River Basin

* 2,200 square miles

Impaired Stream/ River Segments (19 TP, 16 TSS)

Impaired Lakes/ Reservoirs (10 TP)





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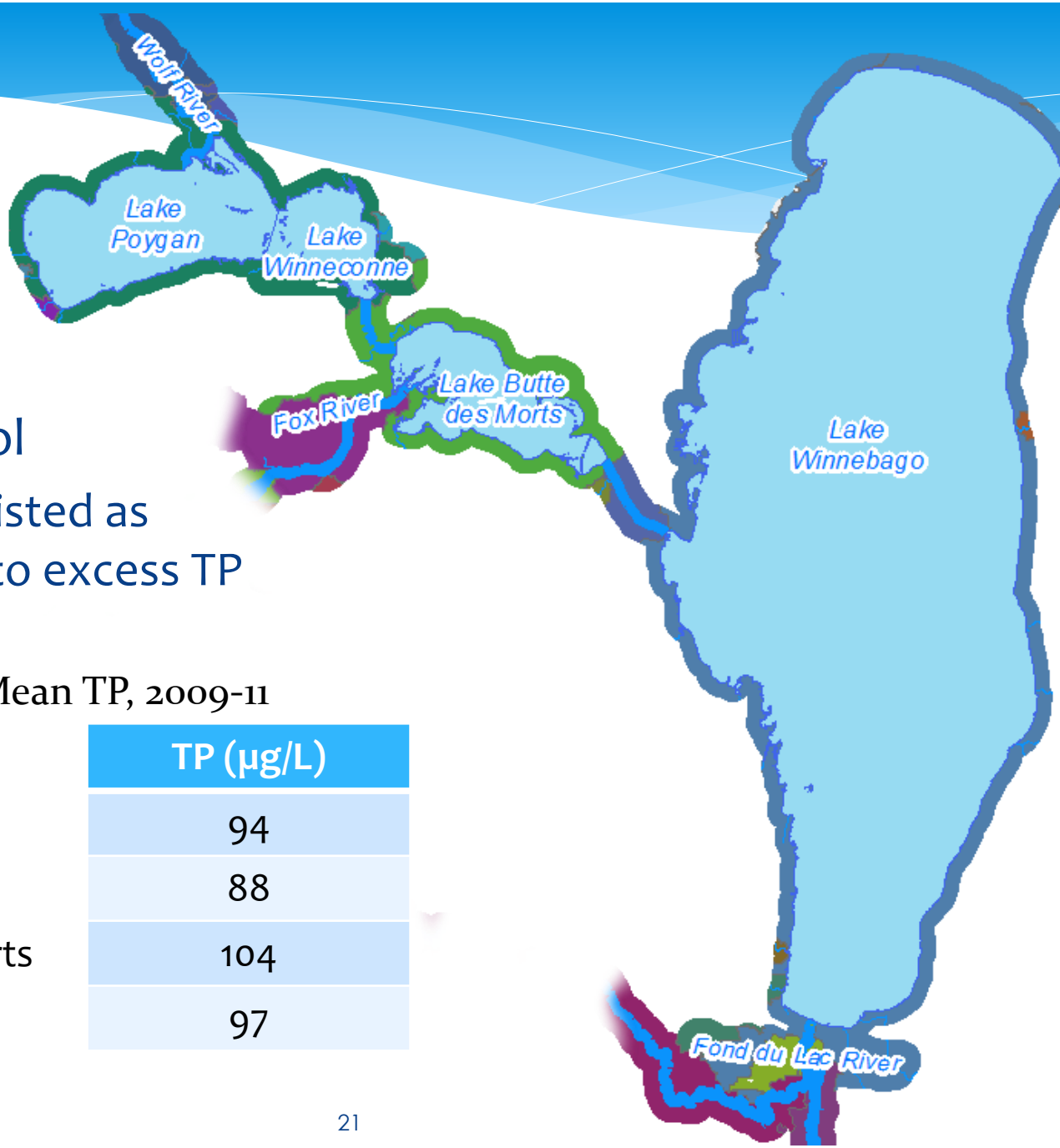

* Winnebago Pool
  * All four lakes listed as impaired due to excess TP

Summer Mean TP, 2009-11

	TP (µg/L)
Lake Poygan	94
Lake Winneconne	88
Lake Butte des Morts	104
Lake Winnebago	97

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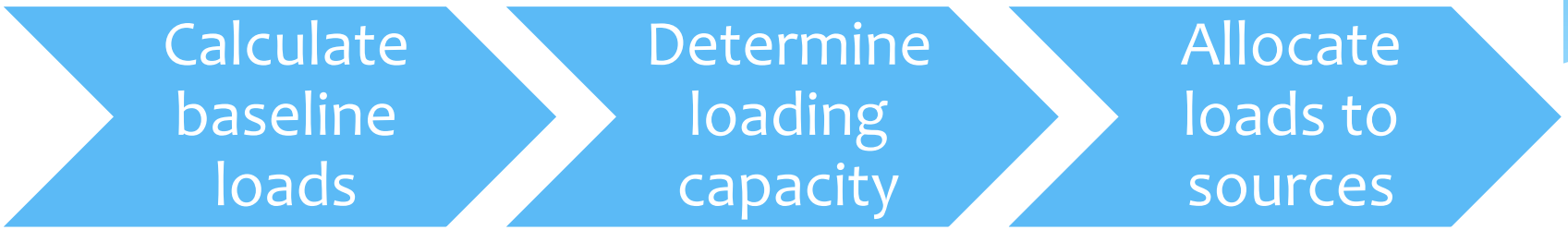
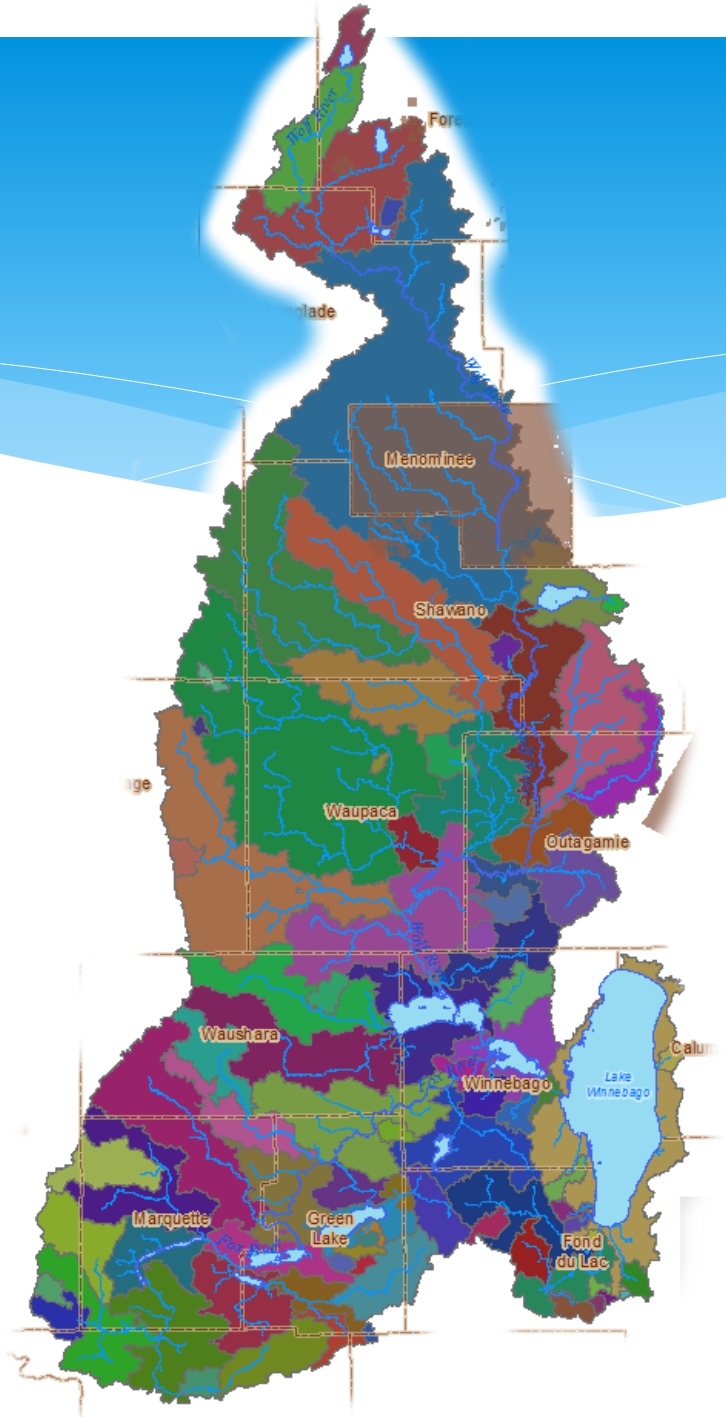
TMDL Development Process



* Baseline load analysis:
  * Understand relative contribution of sources to total loading
  * Starting point for TMDL allocations
  * Foundation for TMDL implementation
* Loading capacity analysis:
  * Amount of a pollutant that a waterbody can receive and still meet water quality standards

Analysis Units

* Entire UFWB subdivided into 89 “TMDL Subbasins”
* Breakpoints based on:
  * Impaired waters
  * Point source outfalls
  * TP criteria
  * Hydrologic regimes
  * Land cover



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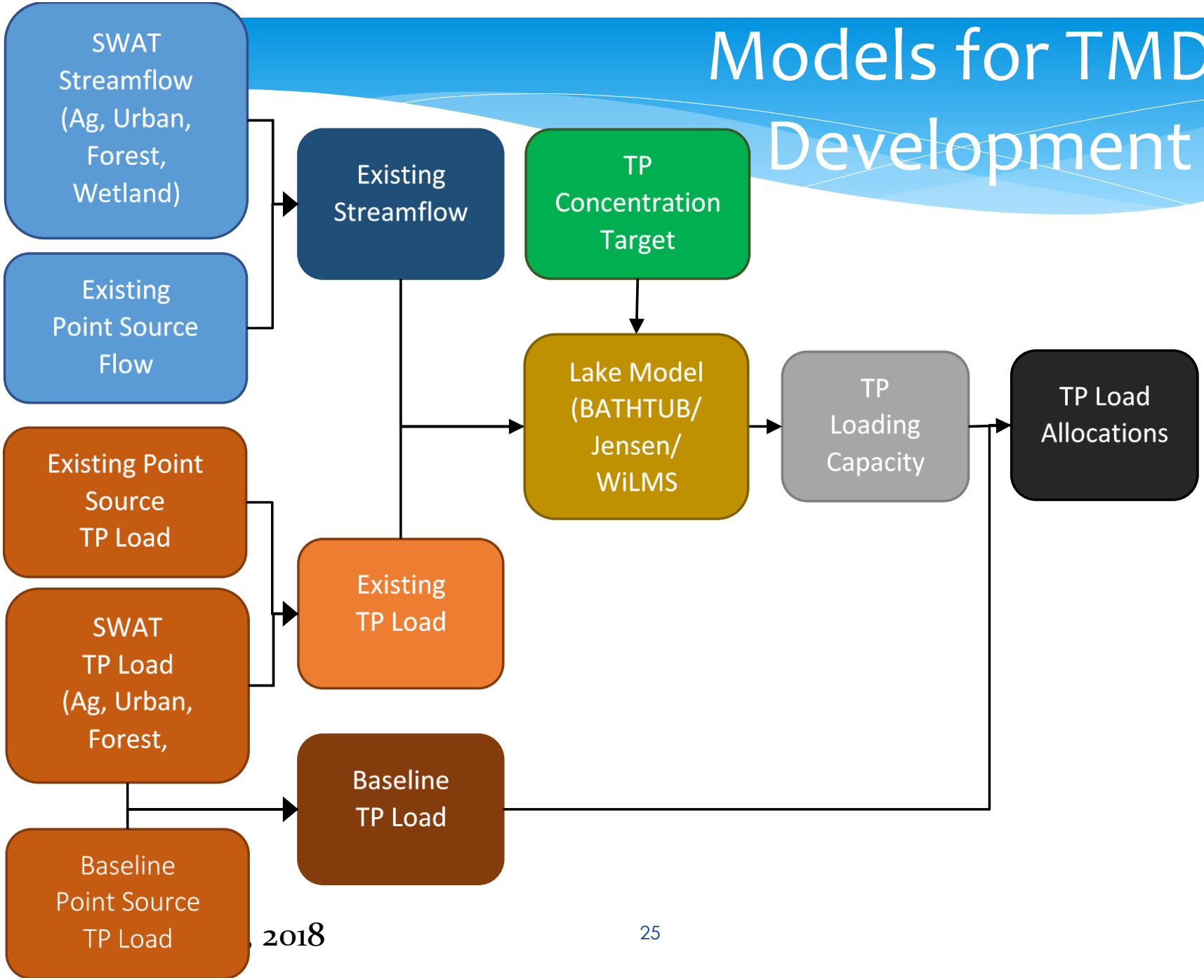
Models for TMDL Development

	SWAT	BATHTUB	Jensen	WiLMS
Model Type:	Watershed	Lake/Reservoir	Lake/Reservoir	Lake/Reservoir
Applied To:	89 Subbasins	Winnebago Pool	Winnebago Pool	18 Lakes
Key Outputs:	Streamflow, Nonpoint TP Loads, Nonpoint TSS Loads	Lake TP Conc.	Lake TP Conc.	Lake TP Conc.
Output Uses:	Baseline Loading Analysis; Loading Capacity Analysis; Lake Model Setup	Loading Capacity Analysis	Loading Capacity Analysis	Loading Capacity Analysis

Models for TMDL Development

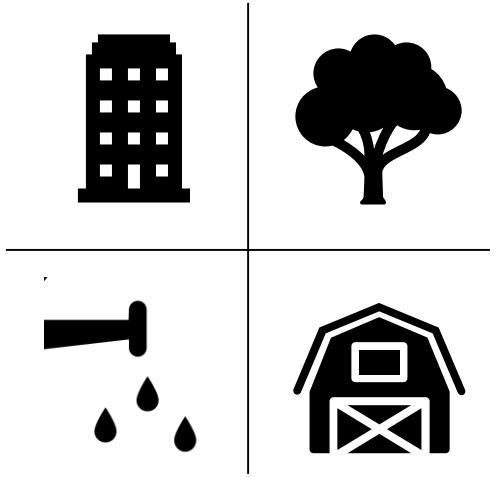


Calculate baseline loads → Determine loading capacity → Allocate loads to sources

Source Assessment

Identify and classify sources of phosphorus and sediment to surface waters

1. Natural/background (uncontrollable)
   * Runoff from forests and wetlands
   * Atmospheric phosphorus deposition
2. Anthropogenic (controllable)
   * Nonpoint source agriculture
   * Nonregulated urban runoff
   * Regulated MS4 stormwater discharge
   * Municipal/industrial wastewater discharge



Quantifying Baseline Load

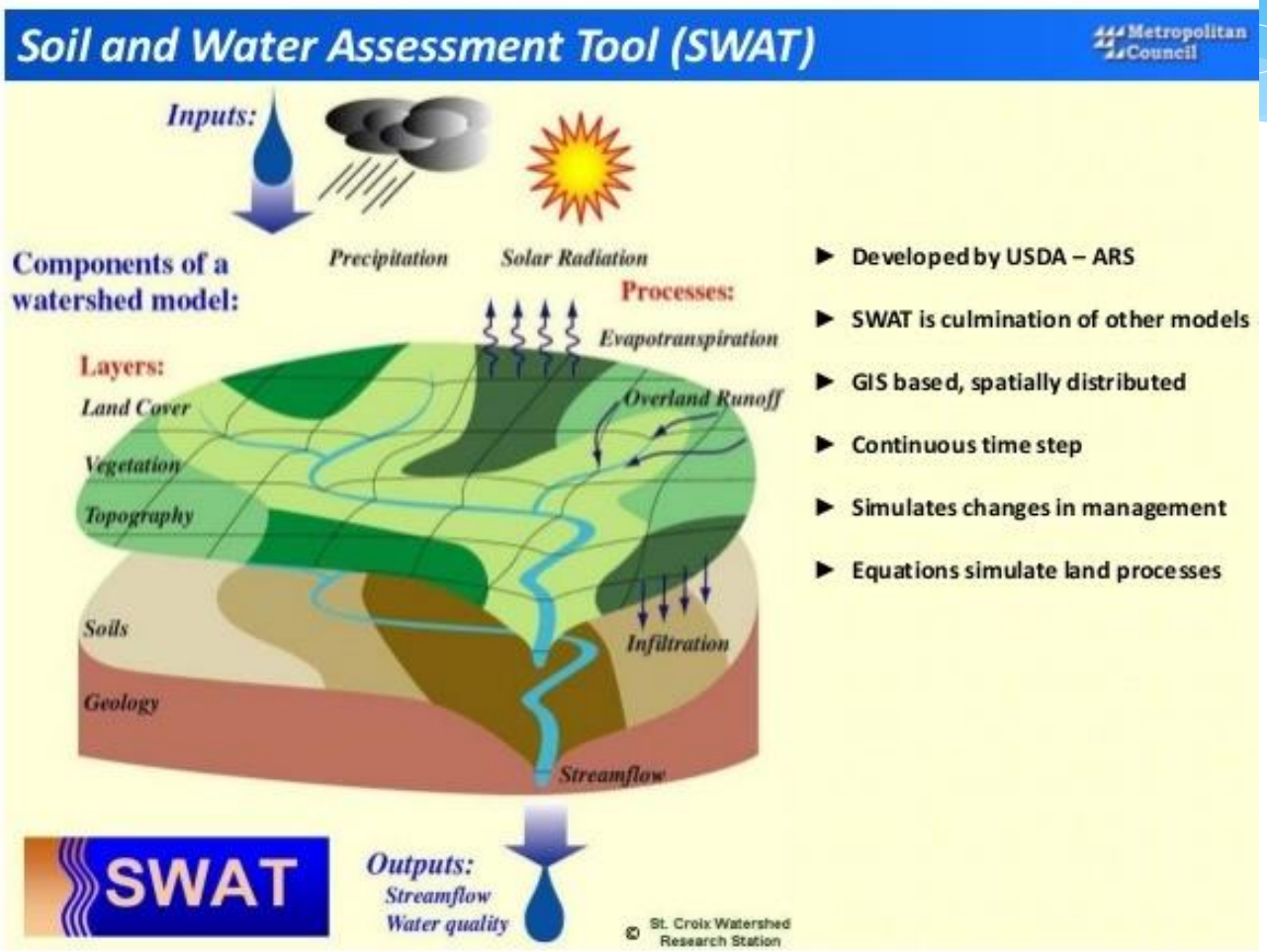
* Point sources
  * Based on existing regulatory requirements or current discharge.
* Nonpoint sources
  * Set to estimates of existing average annual loading during 2009-2013.

Wastewater Baseline

* Procedures for calculating individual permit baseline loads vary by facility type and parameter
* Flow
  * Municipal = average annual design flow
  * Industry = highest average annual flow during period
* TP
  * Current limit or 1 mg/L
* TSS
  * Current limit, measured data, or estimated value

* Baseline flow, TP, and TSS discharge magnitudes are listed in the draft TMDL report for each facility

Nonpoint & MS4 Baseline



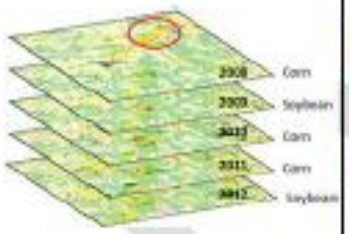
* SWAT model used for estimating urban, agricultural, and forest/ wetland loading
* Calibrated to 2000-2013 measured data

SWAT Input - Land Management

1

Define Crop Rotations

To define the crop rotations in each field, satellite-derived landcover maps were used showing the types of crops growing each year over a five year period (2008–12).



2

Define Field Rotations

Crop rotations were then grouped into specific field rotations, such as dairy, cash grain, continuous corn, or potato/vegetable.

3

Meet with Counties

Meetings were held with local experts (county conservationists and agricultural professionals) to confirm and/or refine crop rotations, and to specify management practices (e.g., tillage and nutrient application).

Described in detail in Appendix C of draft TMDL report

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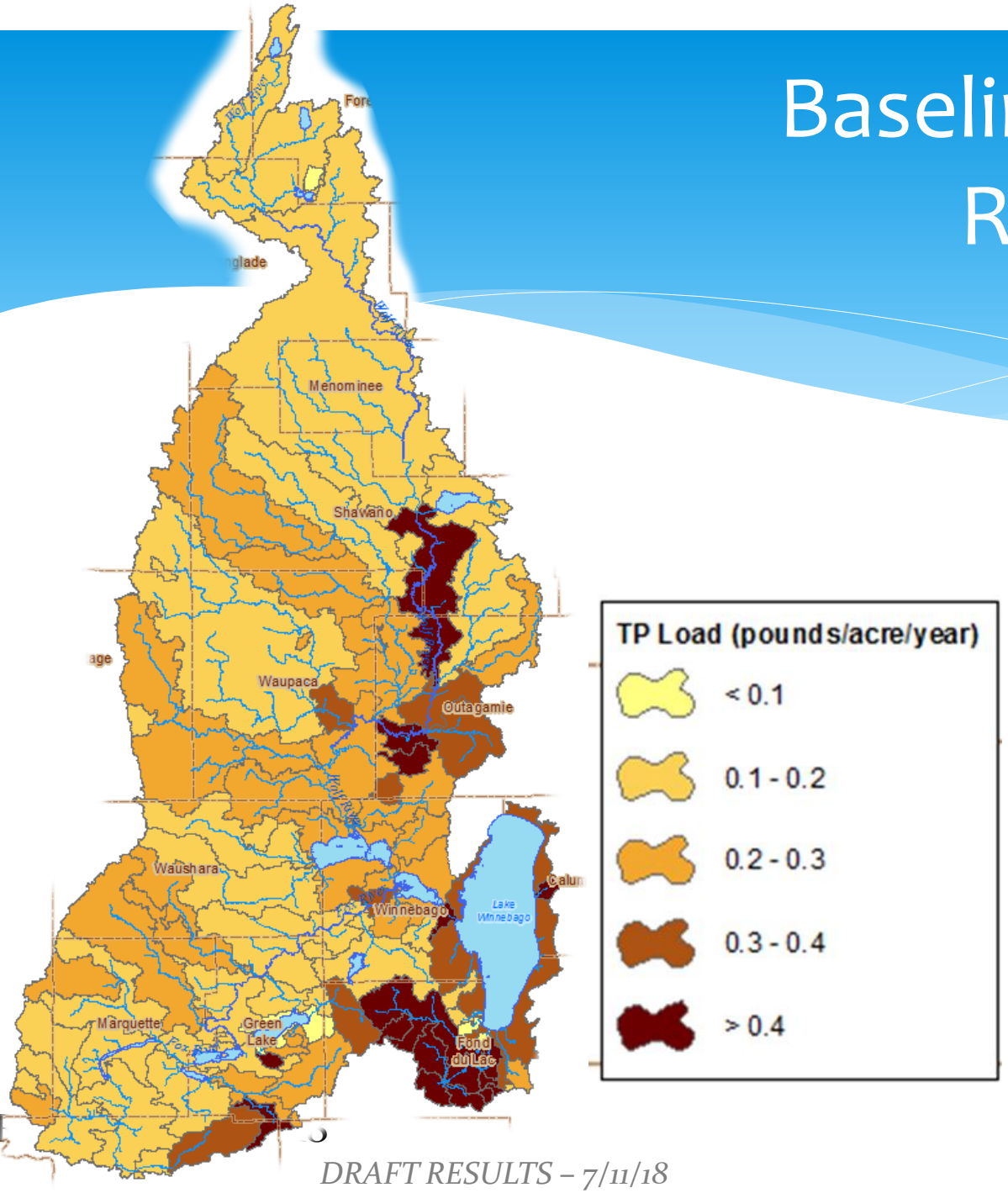
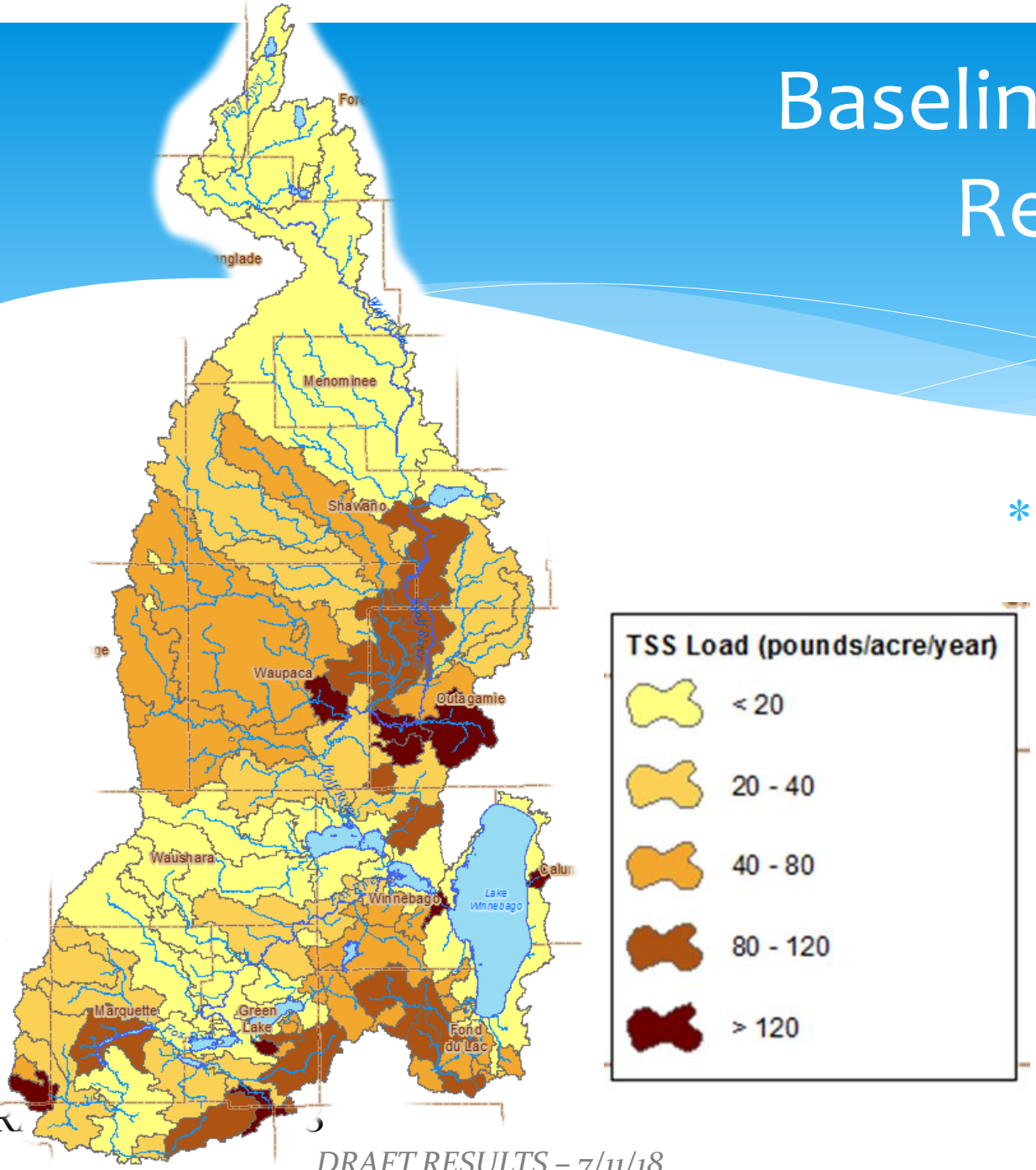
Baseline Loading Results



* Streamflow, TP and TSS loads per subbasin

Baseline Loading Results



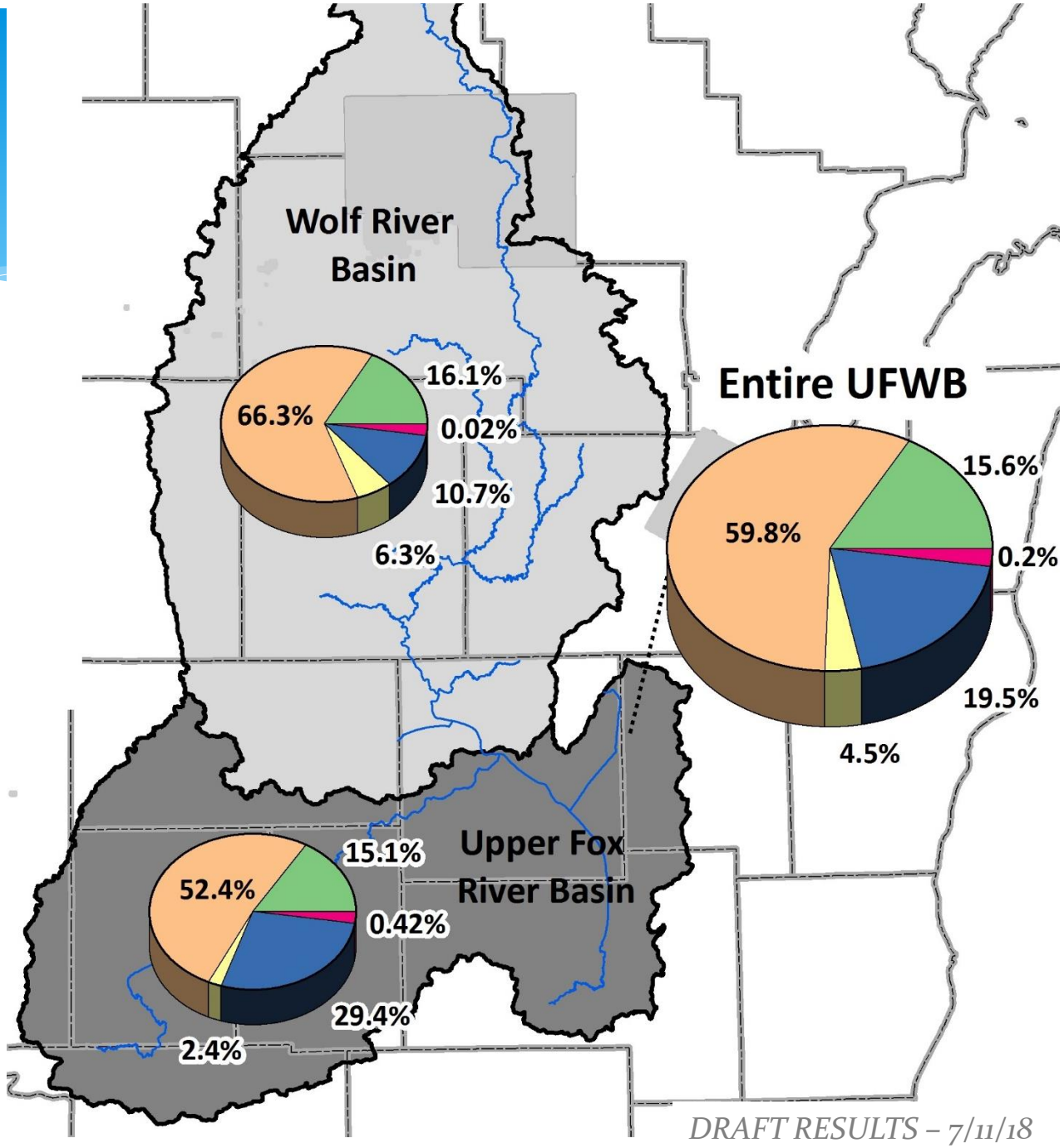
* Streamflow, TP and TSS loads per subbasin

DRAFT RESULTS – 7/11/18

Baseline Loading Results

* TP loads by source

- Background
- Agriculture
- Non-MS4 Urban
- Individual Permits
- MS4 Urban



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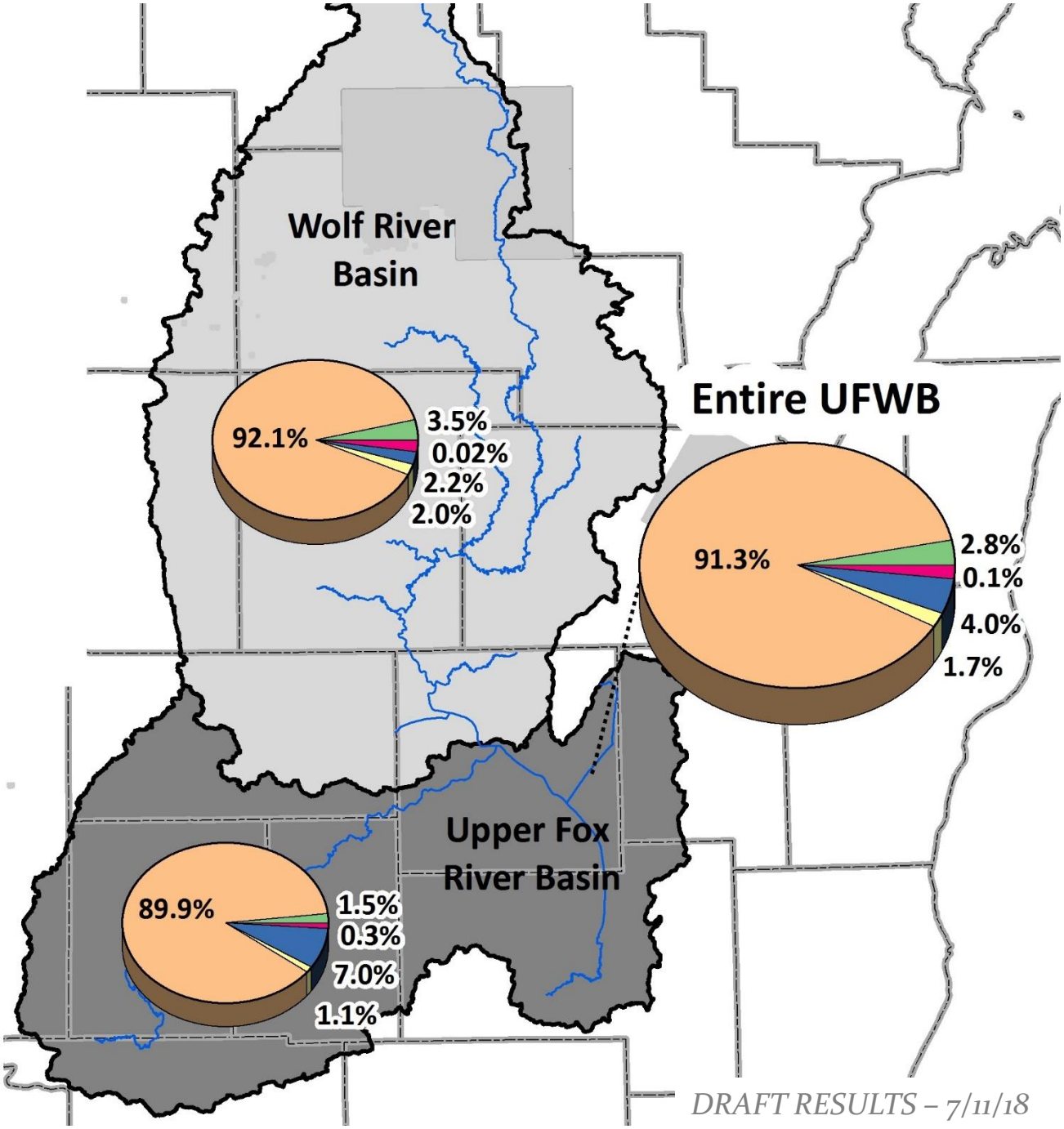
DRAFT RESULTS – 7/11/18

Baseline Loading Results

* TSS loads by source

- Background
- Agriculture
- Non-MS4 Urban
- Individual Permits
- MS4 Urban



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DRAFT RESULTS – 7/11/18

Loading Capacity Analysis

Calculate baseline loads → **Determine loading capacity** → Allocate loads to sources

* Amount of a pollutant that a waterbody can receive and still meet water quality standards

Numeric Water Quality Targets

* Total Phosphorus
  * Targets are equal to State of Wisconsin phosphorus criteria.
  * Expressed as growing season median (May through October) in streams/rivers and summer mean (June 1 through September 15) in lakes.

* Total Suspended Solids
  * Target equal to 12 milligrams per liter for all stream & river reaches.
  * Based on analysis of water clarity, algae growth, fish, and macroinvertebrate metrics.
  * Expressed as growing season median (May through October).

Statewide Phosphorus Criteria

Rivers

100 µg/L

Streams [1]

75 µg/L

Reservoirs

- Not Stratified = 40 µg/L
- Stratified = 30 µg/L

Inland Lakes[2]

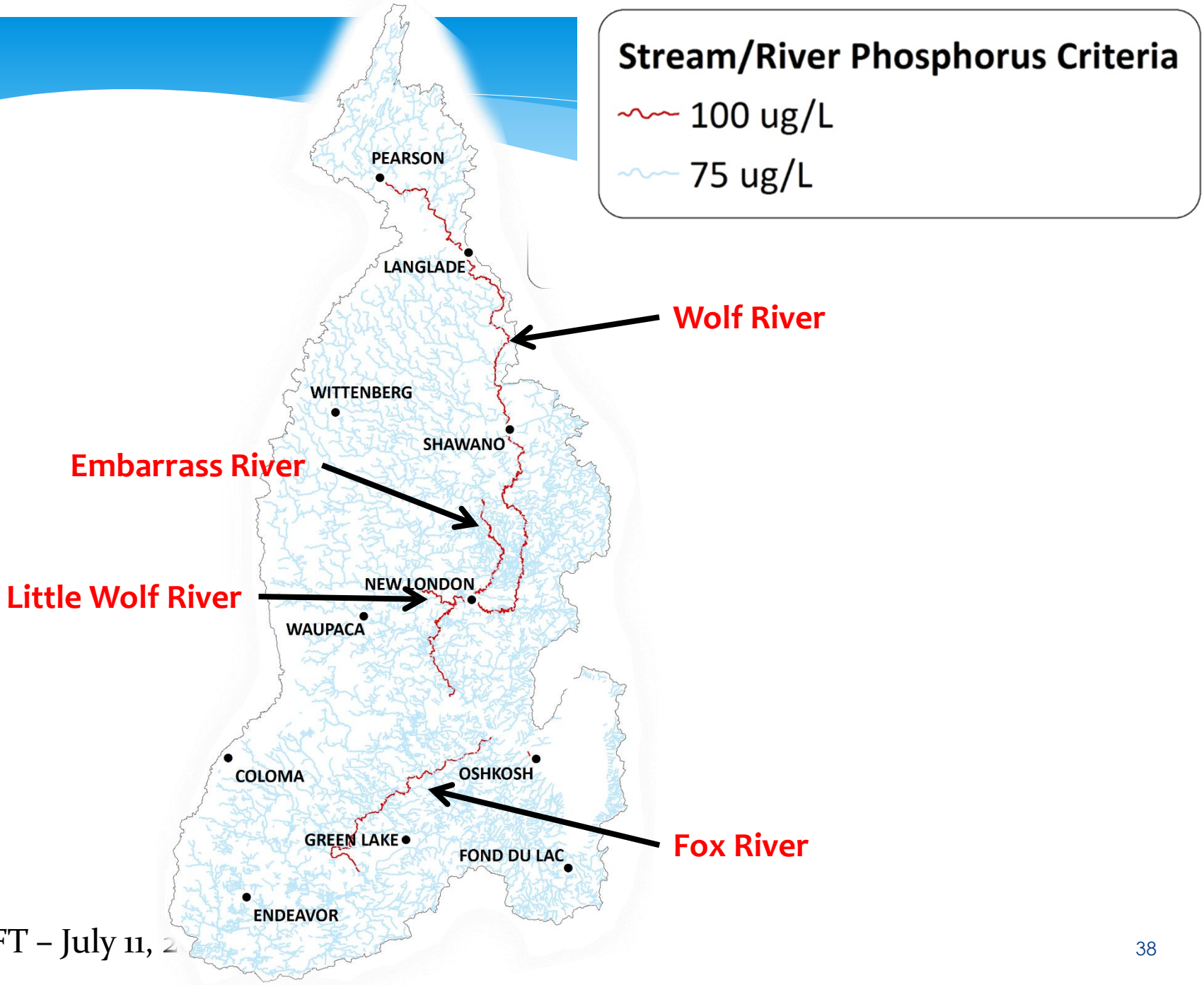
Ranges from 15-30 µg/L

Great Lakes

- Lake Michigan = 7 µg/L
- Lake Superior = 5 µg/L

[1]All unidirectional flowing waters not in NR 102.06(3)(a). Excludes Ephemeral Streams.

[2]Excludes wetlands and lakes less than 5 acres


Stream/River Phosphorus Criteria
100 ug/L
75 ug/L
PEARSON
LANGLADE
Wolf River
WITTENBERG
SHAWANO
Embarrass River
Little Wolf River
NEW LONDON
WAUPACA
COLOMA
OSHKOSH
GREEN LAKE
FOND DU LAC
Fox River
ENDEAVOR

Stream/River Loading Capacity

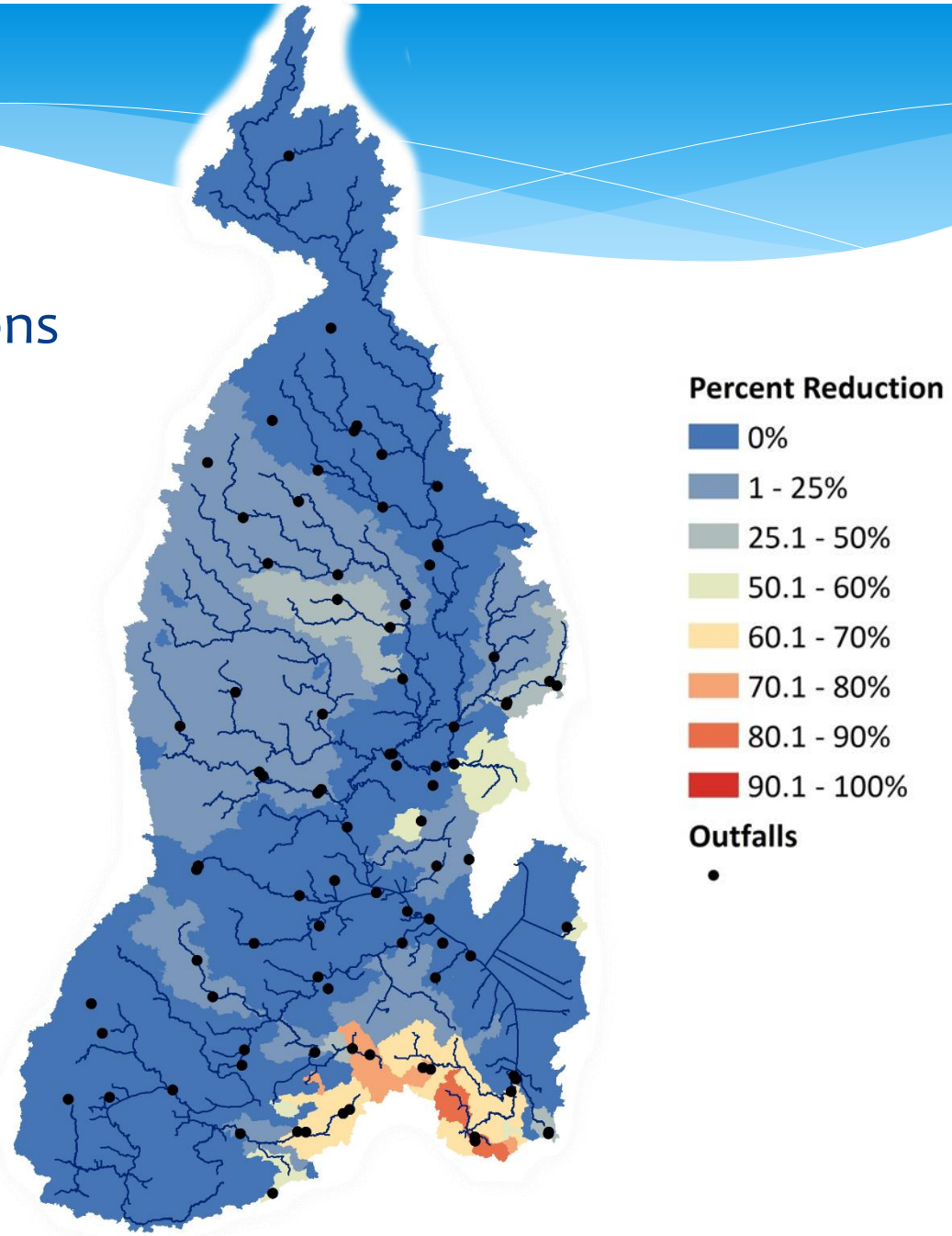
Loading Capacity = Water Quality Target * Streamflow

(lbs/year) (µg/L) (ft^3/year)

* Percent reductions are calculated as reductions from baseline controllable source load needed to achieve loading capacity
  * Nonpoint source agriculture, Nonregulated urban
  * Regulated MS4 urban, Individual wastewater permits
* Also factor in set asides for reserve capacity and general permits

Stream/River TP % Reductions

% Reduction	# of Subbasins
0%	53
1% - 25%	14
26% – 50%	5
51% - 60%	6
61% - 70%	5
71% - 80%	4
81% - 90%	2
>90%	0



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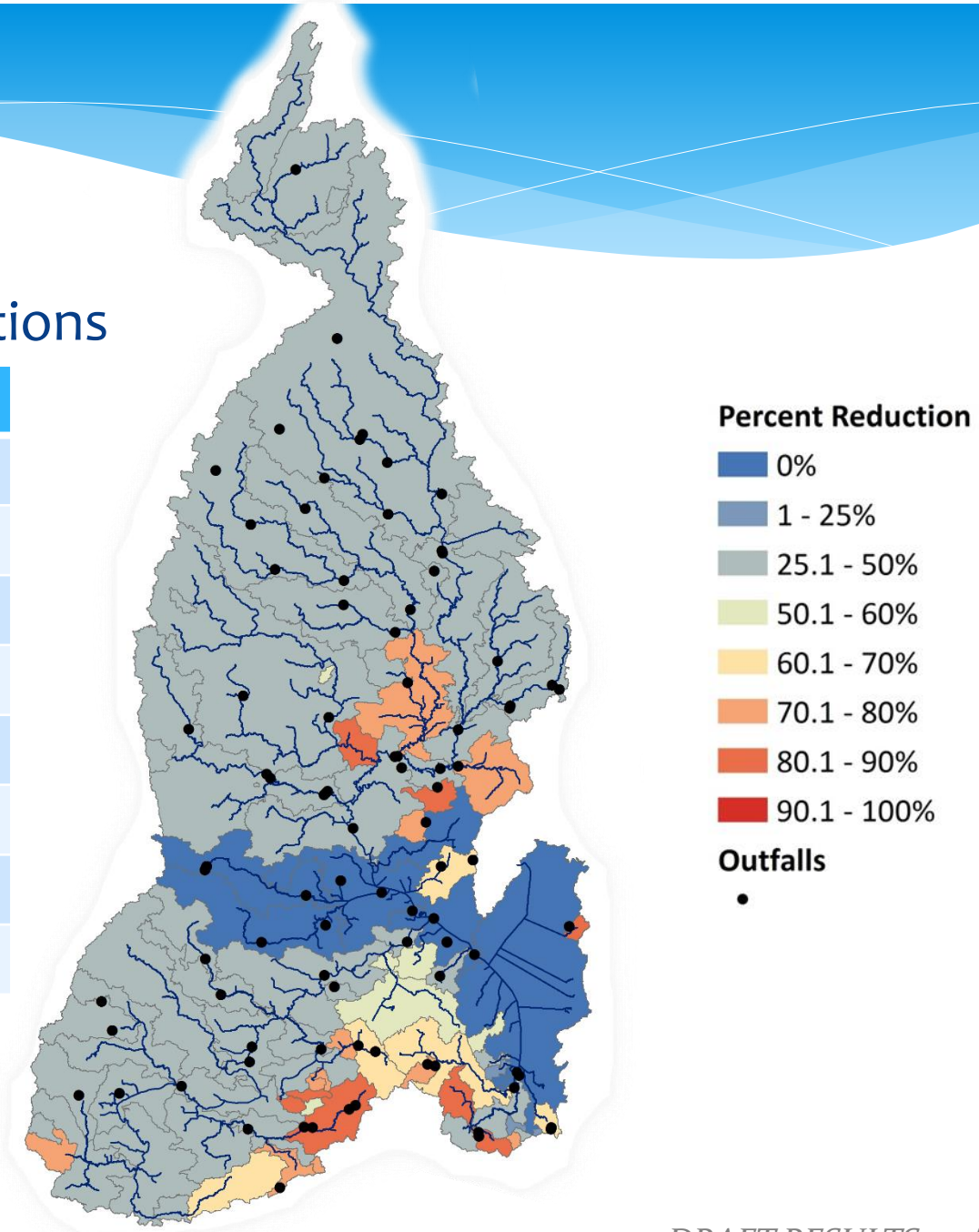
Stream/River TSS % Reductions

% Reduction	# of Subbasins
0%	9
1% - 25%	3
26% – 50%	48
51% - 60%	5
61% - 70%	5
71% - 80%	11
81% - 90%	8
>90%	0



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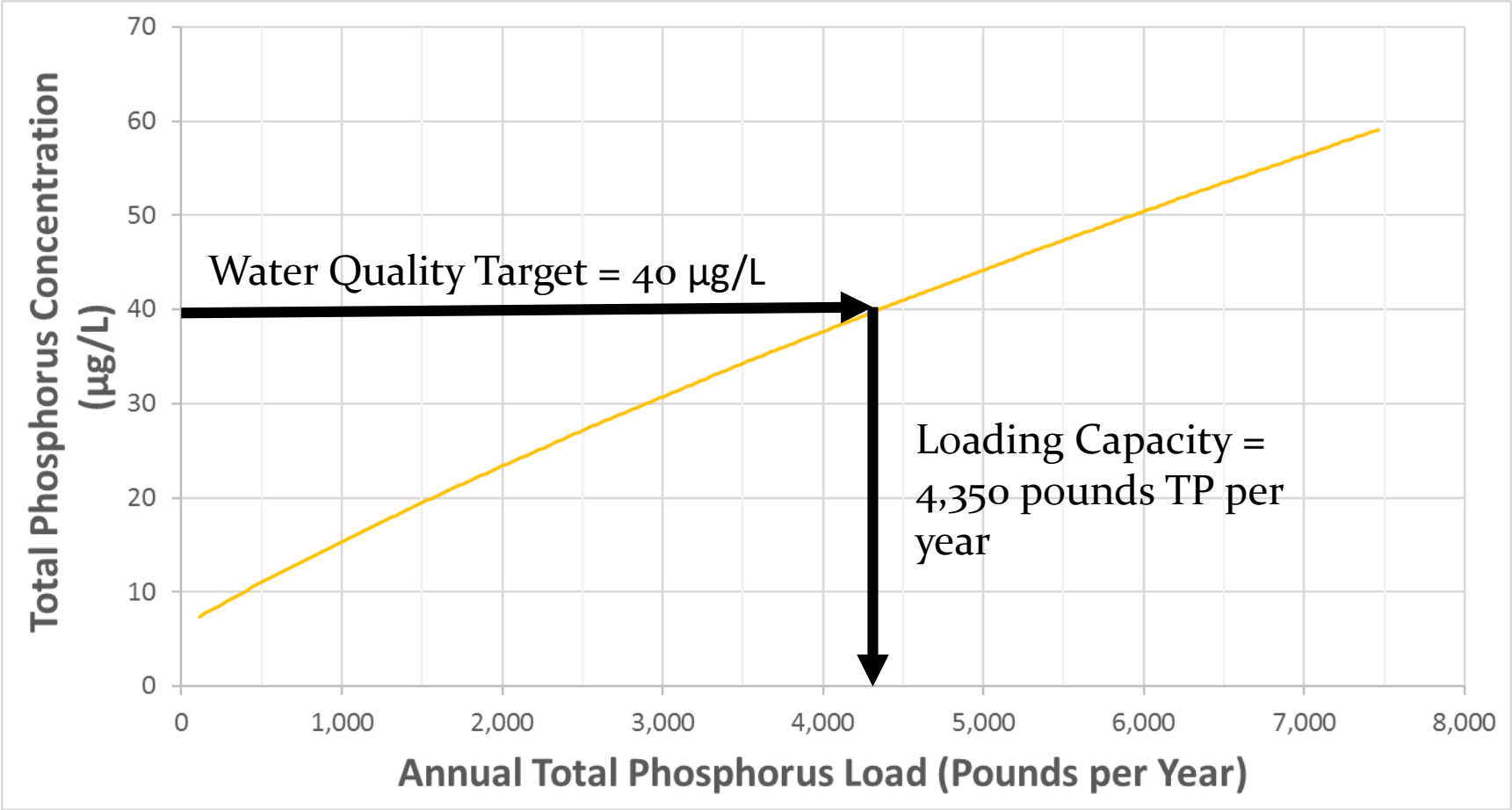
Loading Capacity – WiLMS Lakes



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Reductions listed here are additional %'s to meet lake targets (in addition to local stream/river reach reductions)

Name	County	(µg/L)	(lbs/yr)	Reduction
Mason Lake	Adams, Marquette	40	1,312	79%
Park Lake	Columbia	40	3,316	74%
Swan Lake	Columbia	30	11,402	0%
Lake Emily	Dodge	40	207	54%
Big Twin Lake	Green Lake	30	327	34%
Green Lake	Green Lake	15	9,319	0%
Little Green Lake	Green Lake	40	134	72%
Upper Post Lake	Langlade, Oneida	40	5,485	34%
Buffalo Lake	Marquette	40	13,694	88%
Puckaway Lake	Marquette, Green Lake	40	27,594	83%
Black Otter Lake	Outagamie	40	1,749	69%
Collins Lake	Portage	20	359	38%
Spring Lake	Portage	15	622	55%
Long Lake	Shawano	30	812	32%
Shawano Lake	Shawano	40	5,619	20%
White Clay Lake	Shawano	30	319	31%
Old Taylor Lake	Waupaca	20	8	90%
School Section Lake	Waupaca	30	297	25%

Loading Capacity – Winnebago Pool

- Alternative TP target evaluated for Lake Winnebago
- Wisconsin Administrative Code NR 102.06(7) states that site-specific criteria (SSC) for TP may be adopted:
  - Site-specific data and analysis
  - Scientifically defensible methods and sound scientific rationale
  - Protective of the designated use of the waterbody

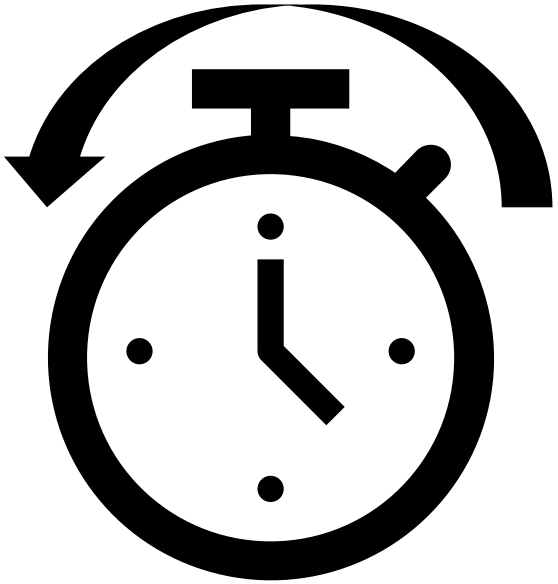
Lake Winnebago Sediment Core Analysis

- Sediment cores collected from Lake Winnebago north & south basins
- Microscopic algae (diatom) communities analyzed in top and bottom core sections
- Diatoms used to estimate TP concentrations at time of deposition

	Bottom Section TP Concentration	Time of Deposition
North Basin	40 µg/L	1720's
South Basin	47 µg/L	1310's

Lake Winnebago Reference TP Modeling

- Lake models used to estimate reference TP concentration in Lake Winnebago
- Tributary TP set to 20 µg/L, no point source loads
- BATHTUB = 32 µg/L
- Jensen =33 µg/L



Lake Winnebago Algae Response

- SSC must be protective of designated uses of waterbody
- Chlorophyll a target for attaining recreation use:
  shall not exceed 20 µg/L more than 30% of days during July 15 – Sept 15
- Analyzed relationship between TP and chlorophyll-a

	TP Conc.
North Station	35 µg/L
Middle Station	41 µg/L
South Station	47 µg/L

Maximum TP that meets chlorophyll-a target

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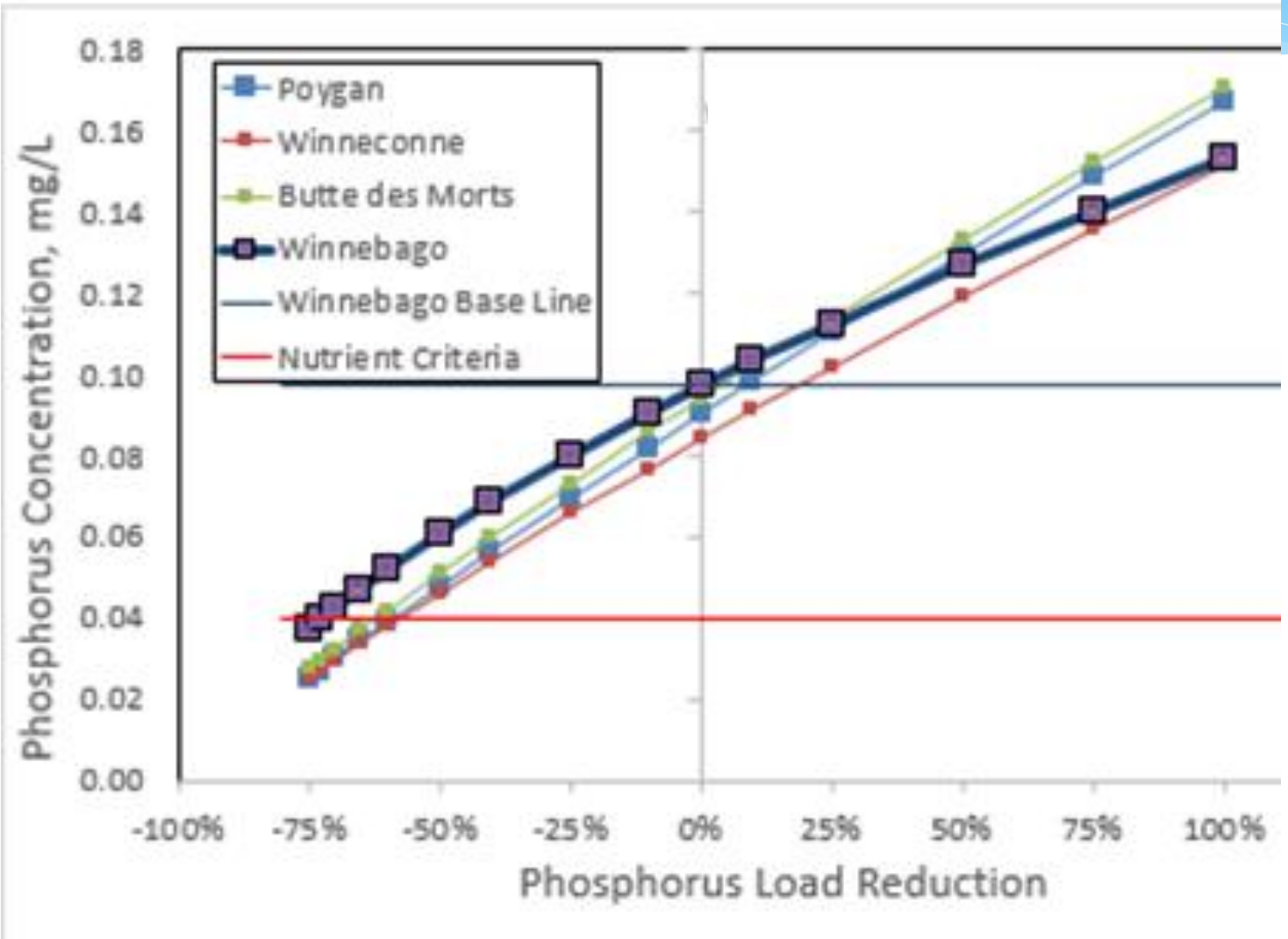
Summary of Potential SSC Analysis

- Lake Winnebago reference TP estimates range from 33 to 47 µg/L
- TP concentrations below 35 to 47 µg/L are needed to meet recreation use chlorophyll-a target in Lake Winnebago
- Current Lake Winnebago TP criterion (40 µg/L) is within both ranges
- Site-specific criteria not used for Lake Winnebago

Loading Capacity – Winnebago Pool



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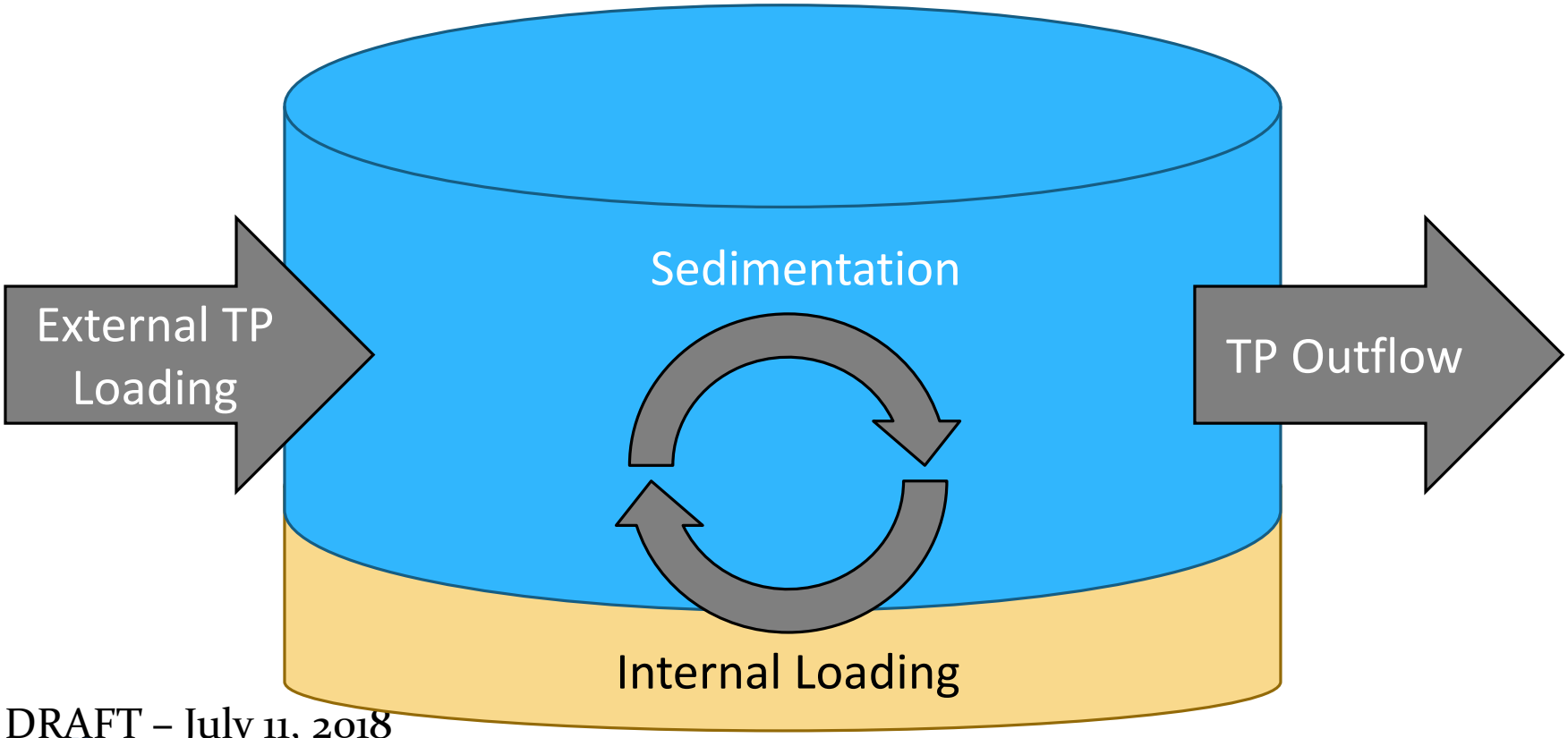
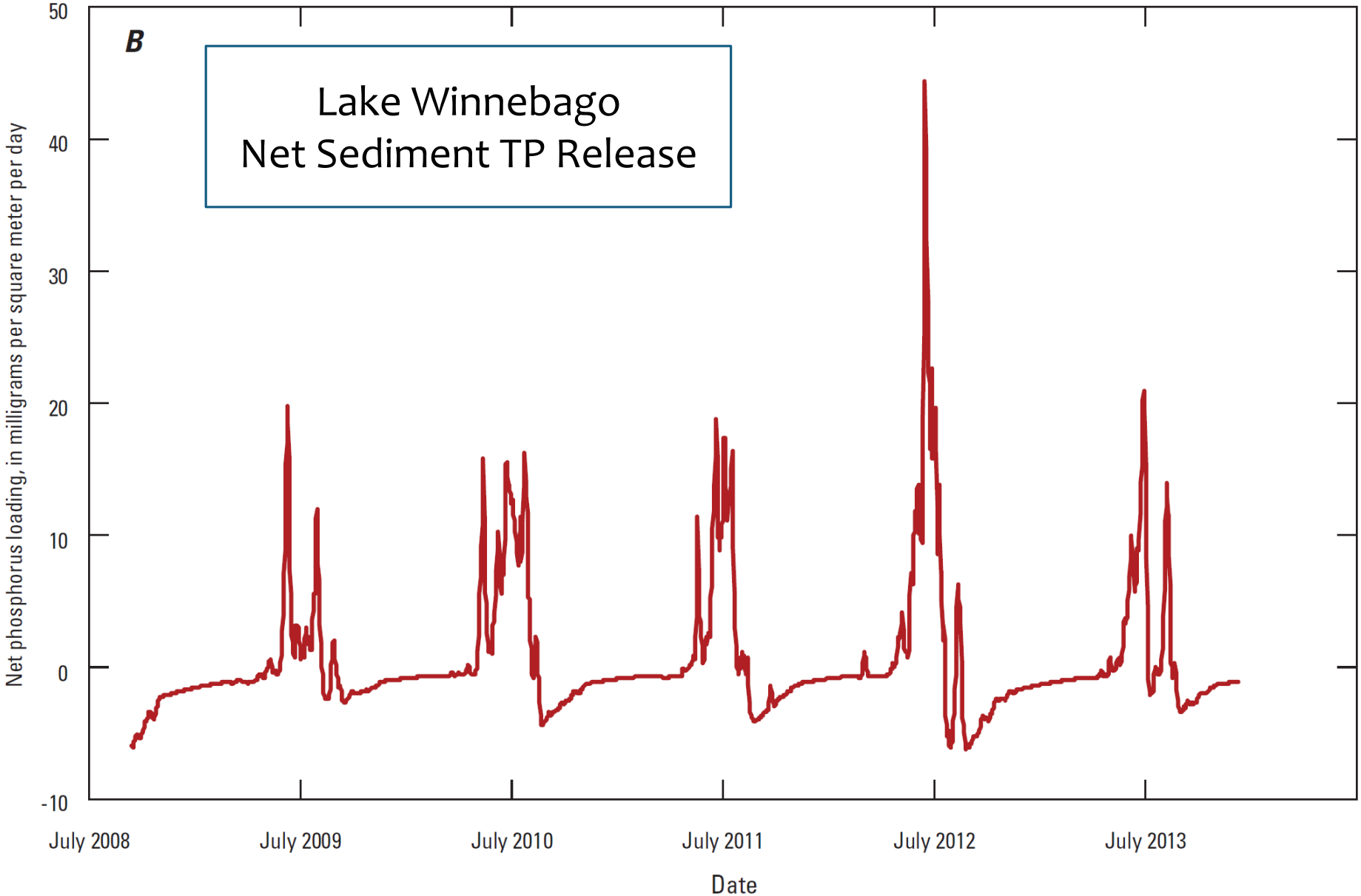
Internal Phosphorus Loading





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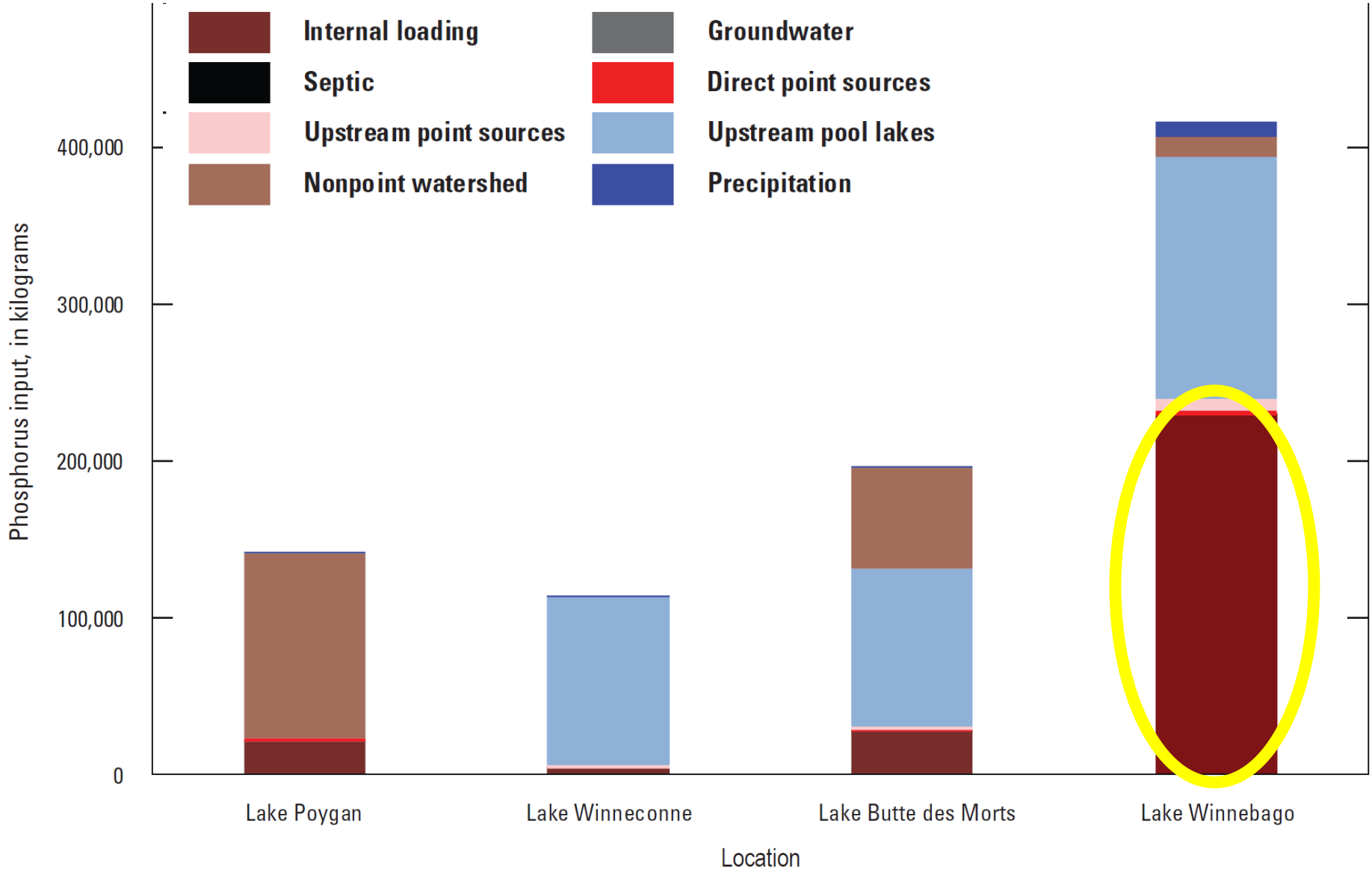
Winnebago Pool May-September TP Load



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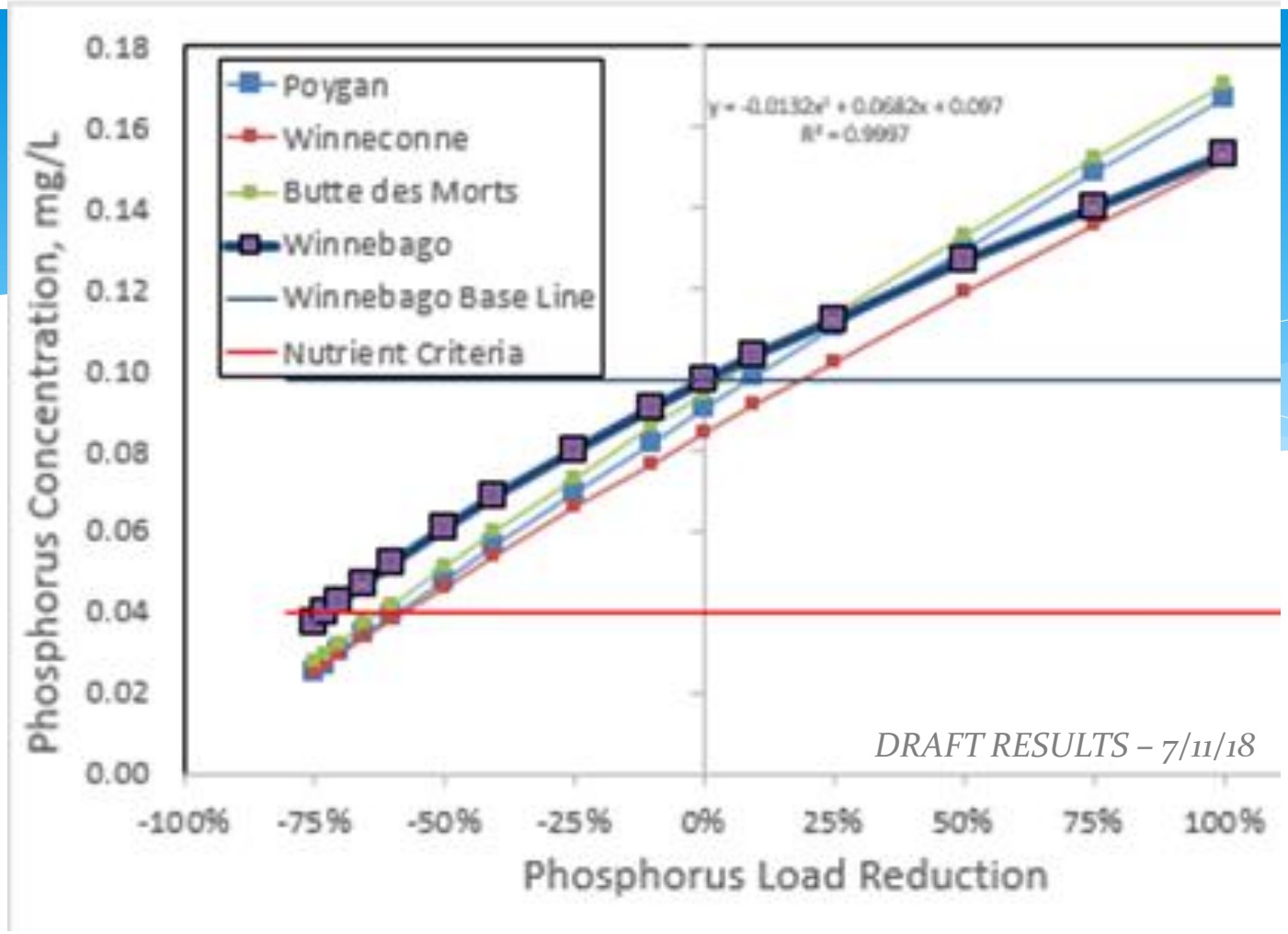
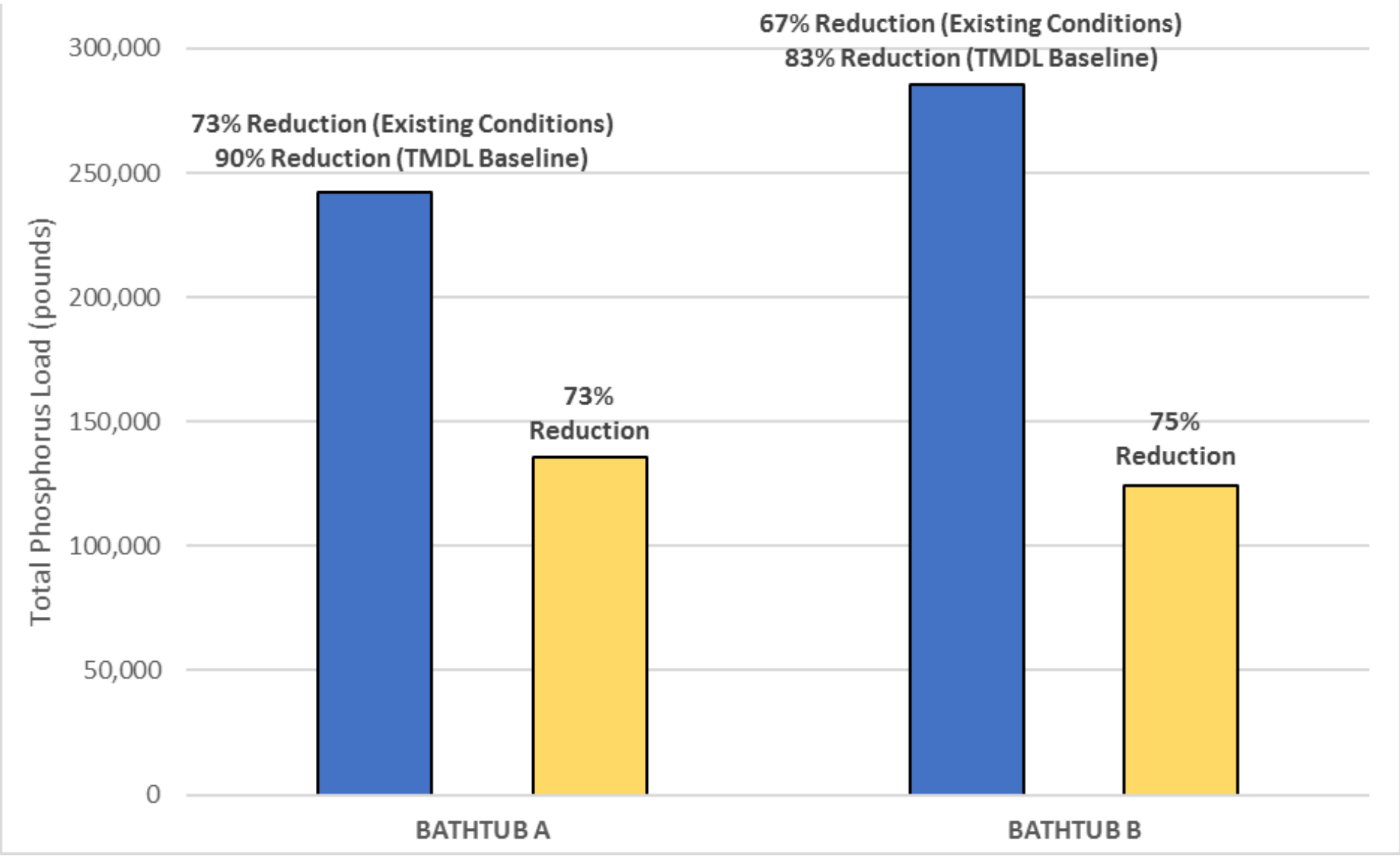
Internal Phosphorus Loading

- Internal loading contributes to high TP concentrations in Lake Winnebago during the growing season
  - Estimated Lake Winnebago TP with no growing season internal loading = 45 µg/L
- Internal loading is linked to external TP loading
- Loading capacity analysis accounts for response of internal TP loading to external TP reductions



* In BATHTUB model, specific magnitude of internal growing season TP load is entered
* Assume internal load reductions occur with external load reduction

Winnebago Pool Loading Capacity – BATHTUB Model



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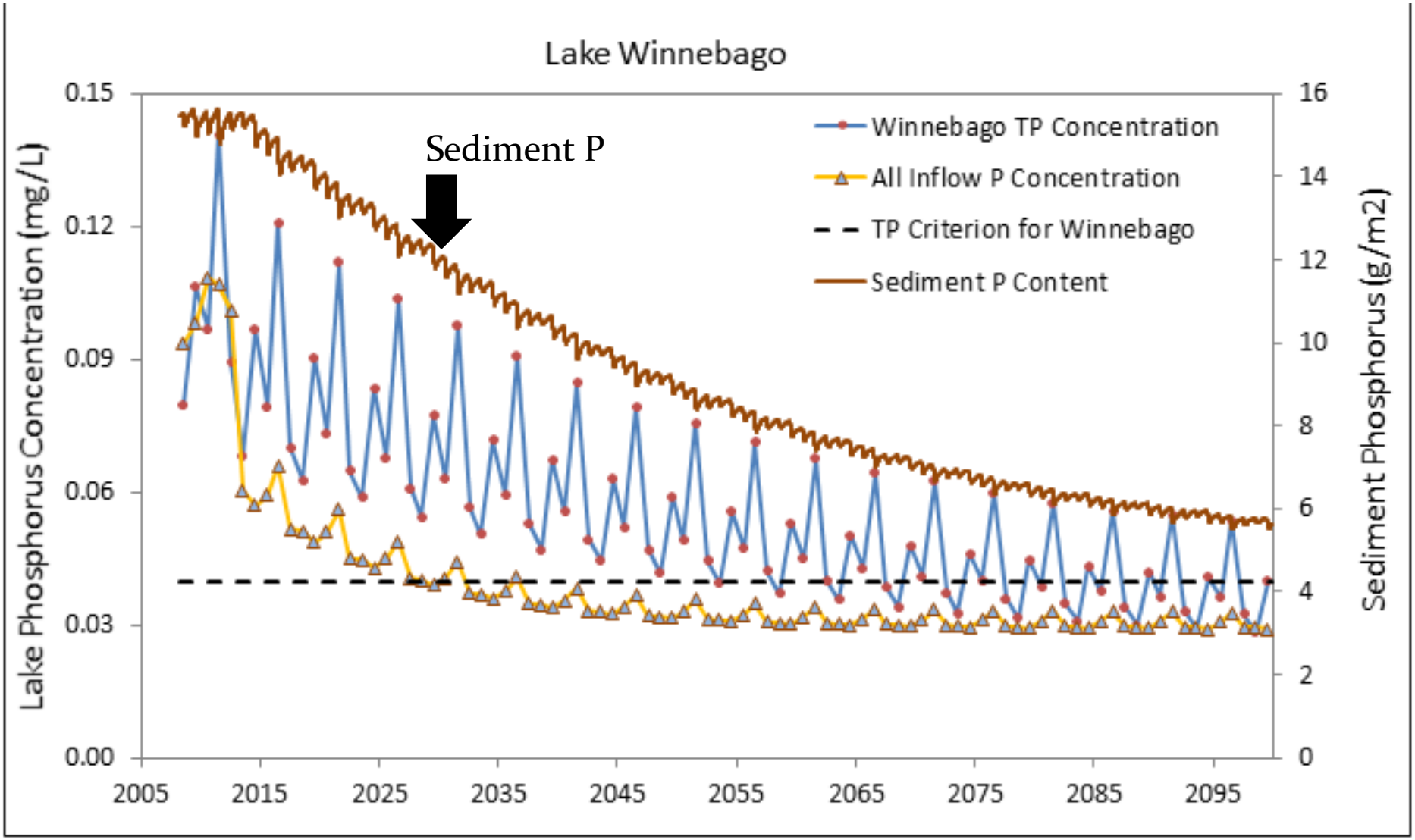
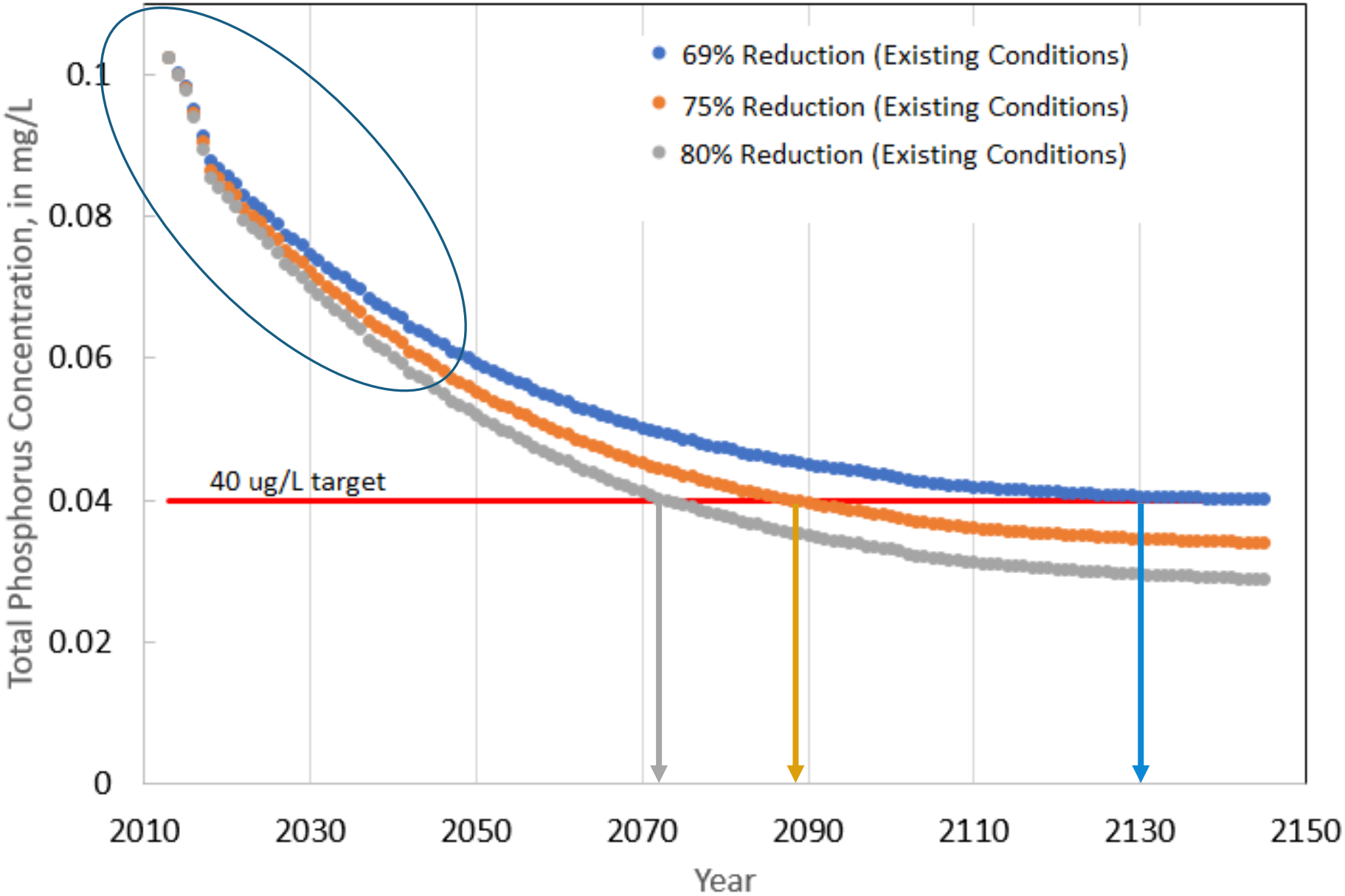


* In Jensen model, daily internal TP load is auto-calculated from calibrated model equations

Lake Winnebago TP response – Jensen Model

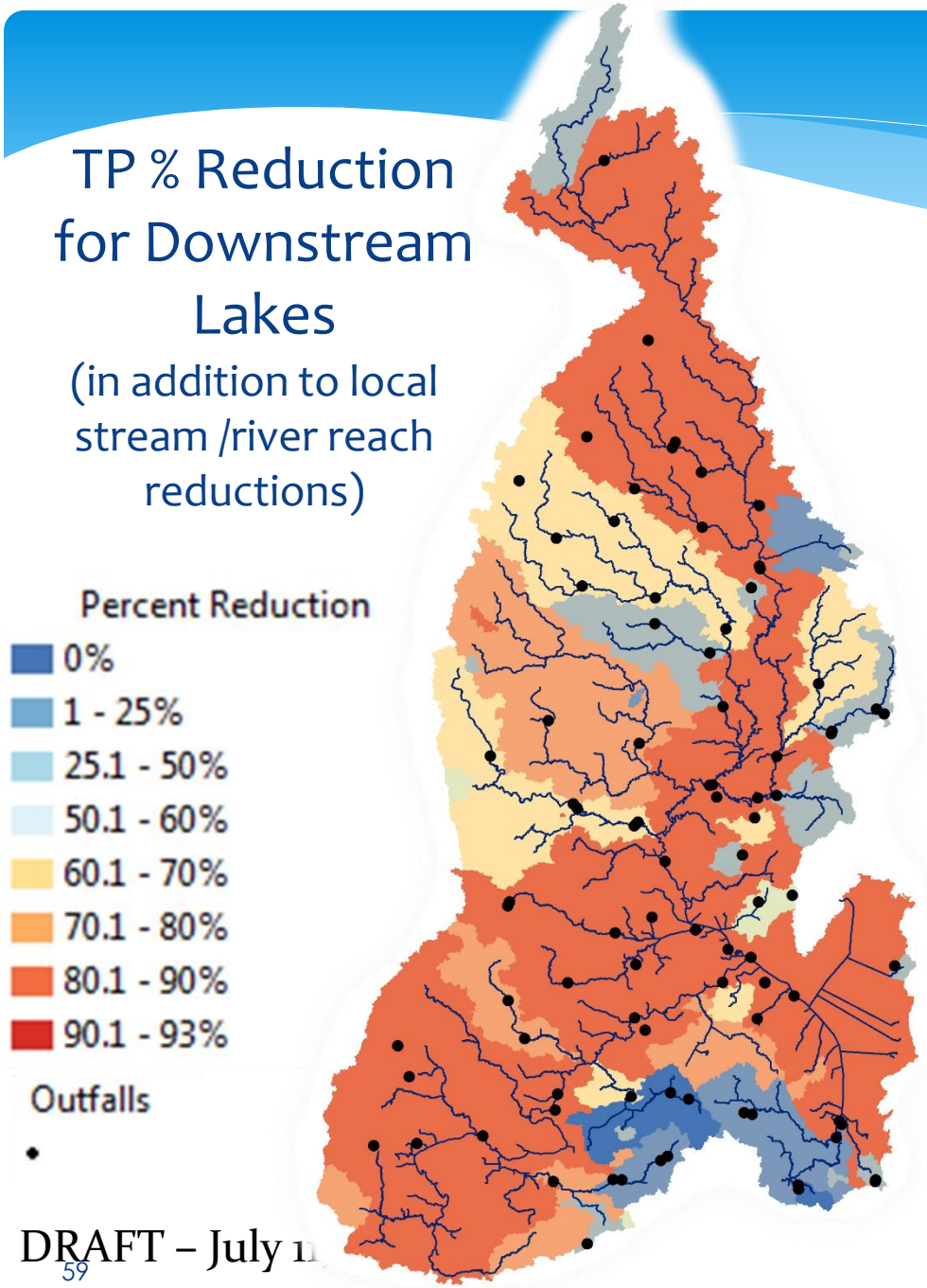


Winnebago Pool Loading Capacity Summary

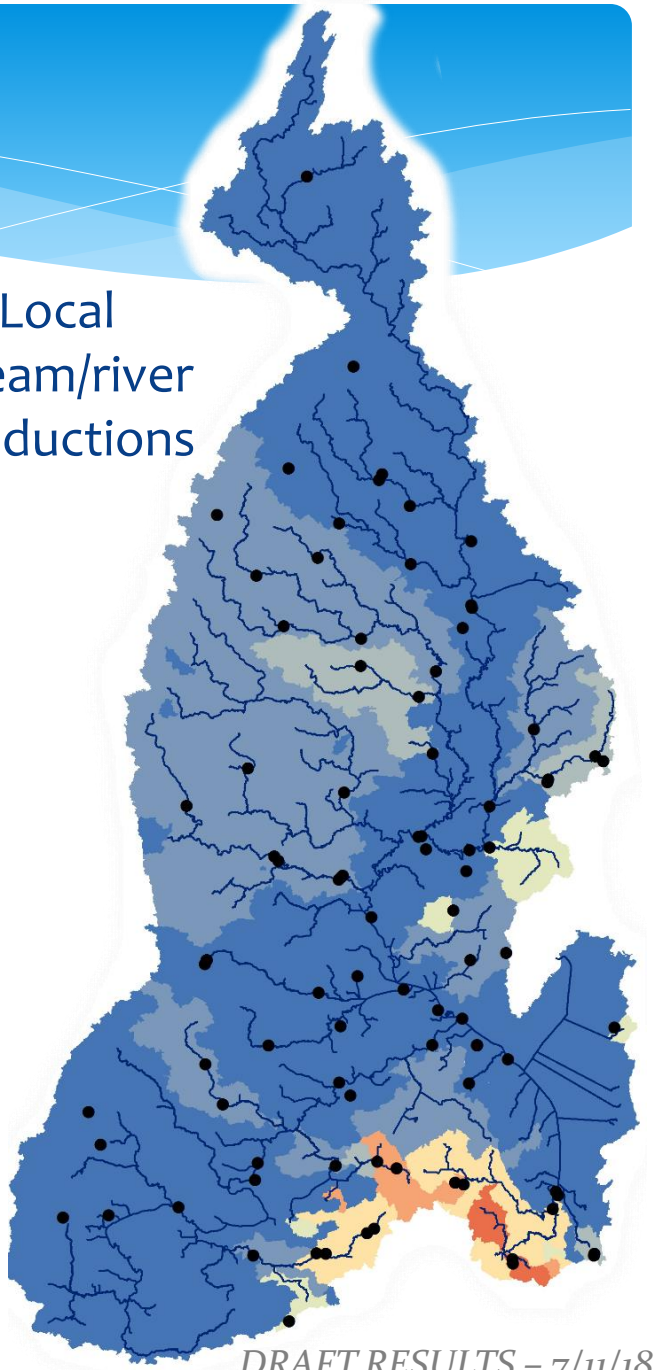
- Lake Winnebago is the limiting factor, requires the greatest load reductions to reach TP target
- Attaining the in-lake TP target of 40 mg/L will require 67-75% reduction from "existing condition" external TP loading
- TMDL is based on 67% reduction from existing condition load
  - Equates to **83%** reduction from **baseline controllable source load**
  - Requires ~75% reduction in internal growing season TP load
  - Expect greatest improvement in water quality within first 20-30 years of external load reductions; but will take many more years to reach target because of internal loading

TP % Reduction for Downstream Lakes

(in addition to local stream /river reach reductions)



Local stream/river % reductions



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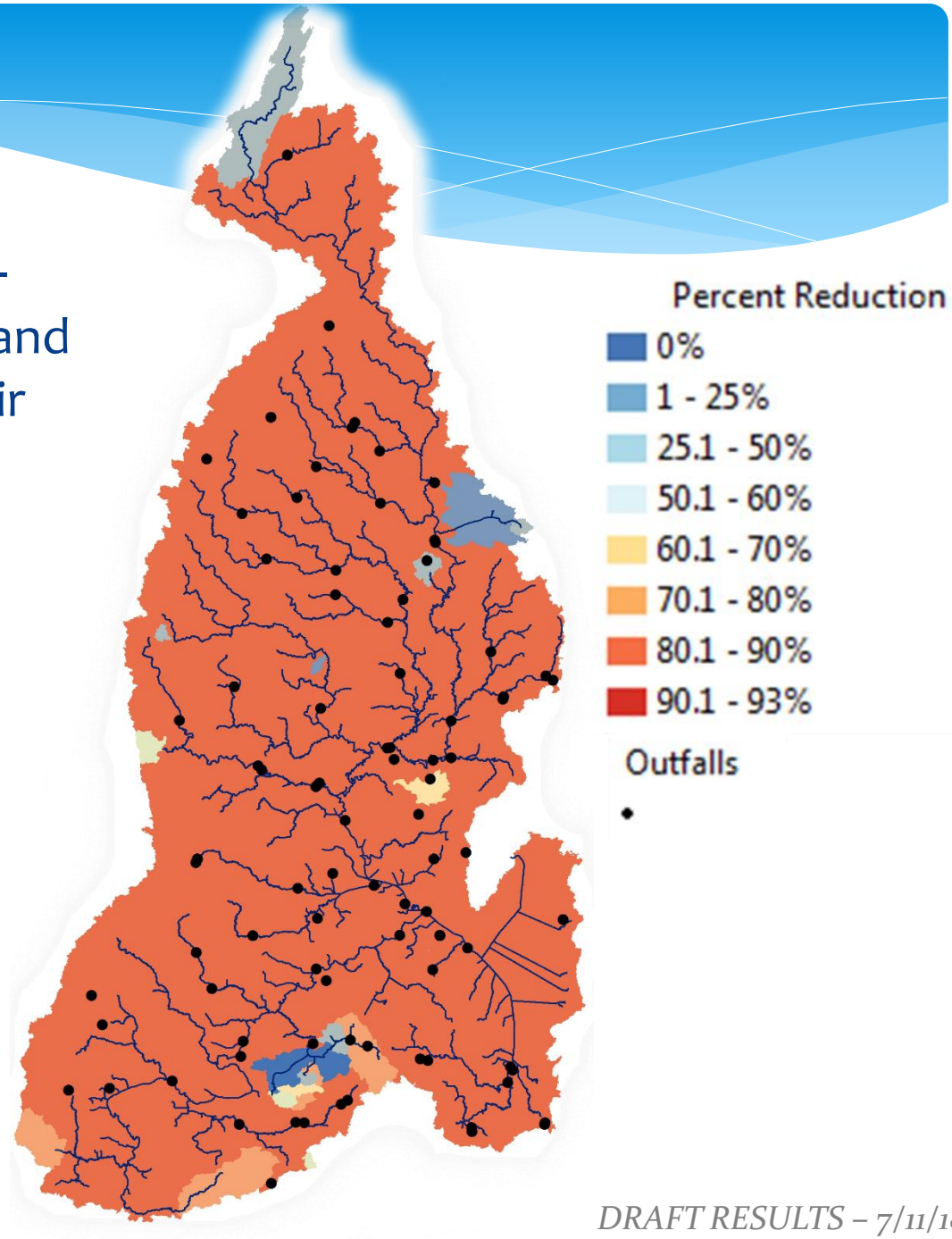
Total TP % Reductions – Combine local stream/river and downstream lake/reservoir

% Reduction	# of Subbasins
0%	1
1% - 25%	2
26% – 50%	7
51% - 60%	3
61% - 70%	2
71% - 80%	6
81% - 90%	68
>90%	0



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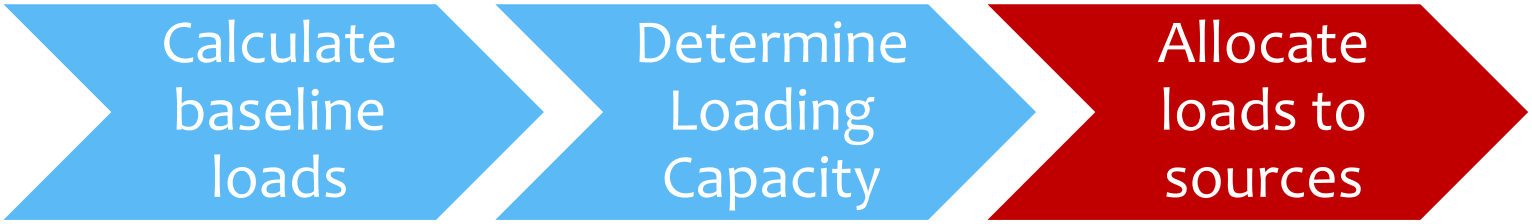
TMDL Development Process

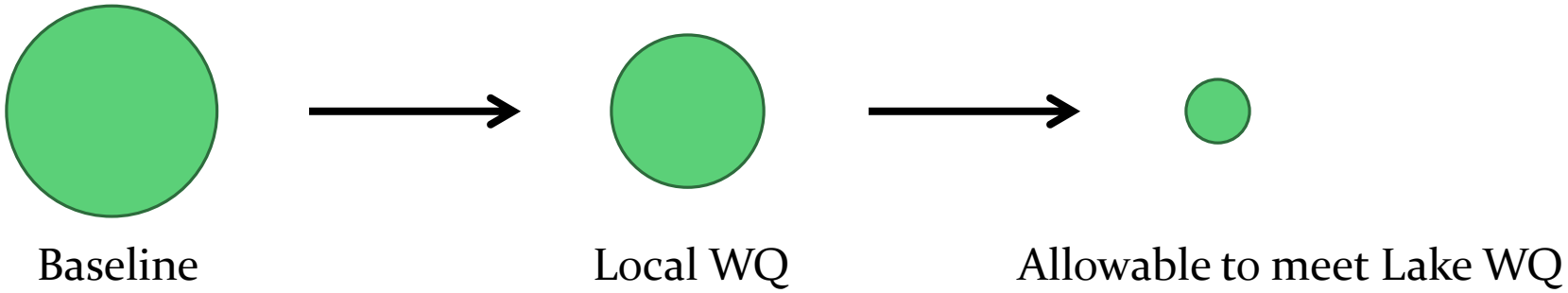


* Allocation strategy consistent with other TMDLs using a proportional reduction approach.
* Allocations driven by local water quality requirements **and** downstream reservoirs.
* Calculated allocations with assumption of additional reductions in internal loadings for Lake Winnebago.

Allocation Process

Two-stage process:

1. Reductions (if needed) to meet local criteria in each subbasin
2. Reductions to meet criteria in downstream lake(s)

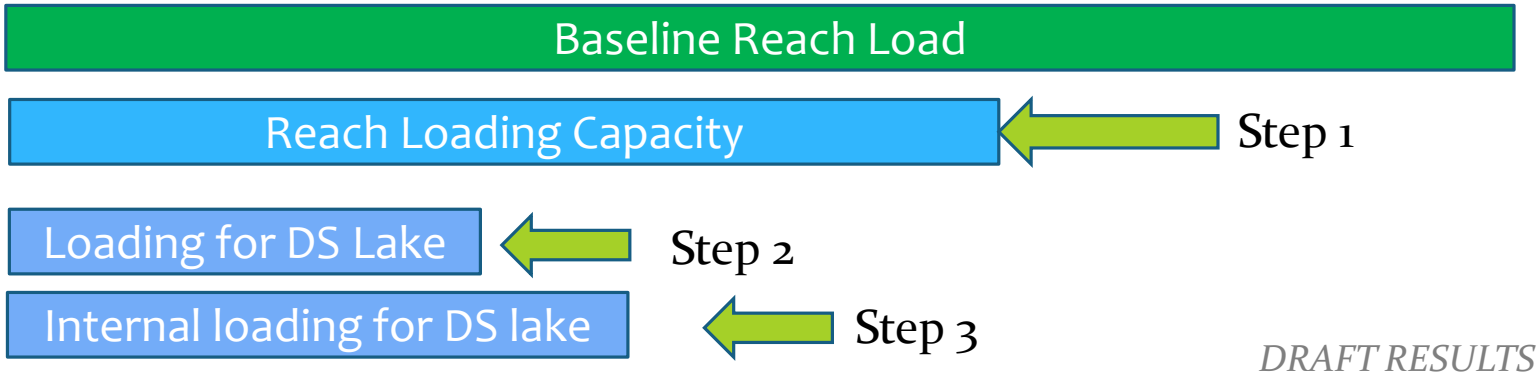


Allocation Process for Lakes

1. Using model output determine additional load reduction needed for each lake

2. Apply percent reduction to controllable load for each subbasin upstream of the applicable lake

3. Factor in reductions to internal loading



Load Allocation

+

Waste Load Allocation

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
- CAFOs

Reserve Capacity and MOS

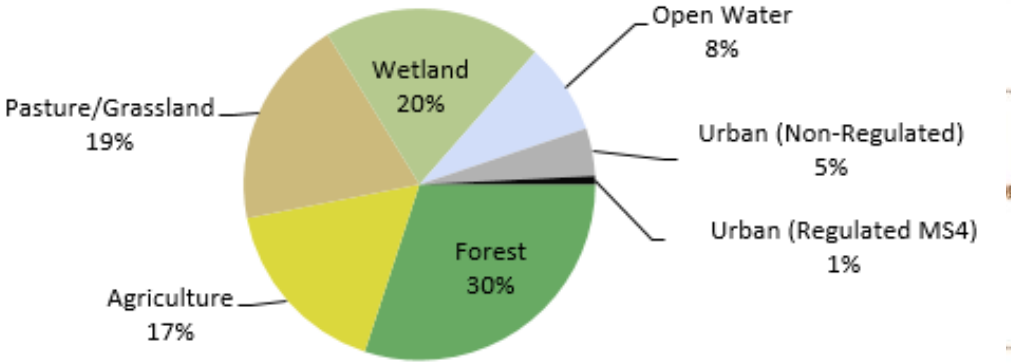
Reserve Capacity

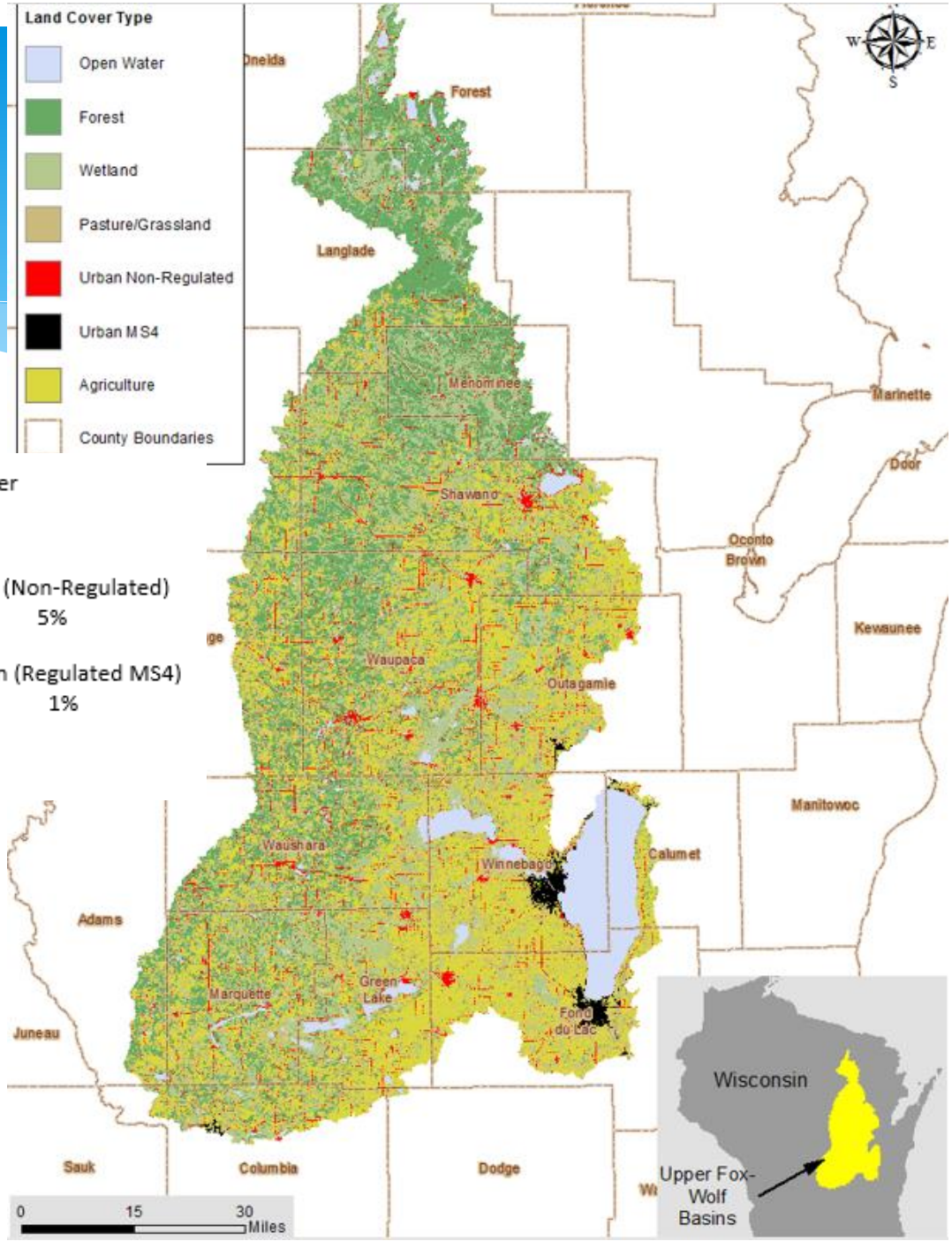
* A set aside of the portion of the allocation to allow for future growth and new dischargers.
* Evaluated different options and selected an option that allows a flexible approach for growth.

Margin of Safety

* Required by EPA; the MOS accounts for uncertainty in the modeling, monitoring, and allocation process.
* Can be implicit or explicit; we are working to document an implicit MOS.

Land-use





The **67%** reduction in total load translates to a **83%** reduction in controllable sources which includes point sources, MS4s, and agricultural sources.

Allocations to MS4s & NPS

Permitted MS4s:

* Apply percent reduction to "no-controls"/baseline condition as outlined in the TMDL MS4 guidance.
  * Extended compliance option with agreed upon benchmarks for each permit term
  * WisDOT and others that did not receive an explicit allocation use the percent reduction for that MS4 or subbasin.

Nonpoint:

* Compliance with more stringent performance standards is voluntary unless promulgated through NR 151.004 to become a performance standard. Cost share requirements still in place.

TMDL Implementation

* Wis. Stat. s. 283.31(3)(d)3. requires DNR to include effluent limits in permits to meet TMDL wasteload allocations. Chapter NR 217 implements wasteload allocations for phosphorus in wastewater permits.

* Chapters NR 151 (NR 151.004 and NR 151.005) and NR 216 implement TMDL allocations for nonpoint and permitted stormwater sources.

Wastewater Implementation Individual Permits

* Due to the uncertainty of TMDL approval timelines and the department's commitment to permit backlog reduction, prior to TMDL approval permits will be issued based on the requirements of NR 217 Wis. Admin. Code.

* After TMDL approval, inclusion of TMDL-based limits will take place at either the next permit issuance or as part of a permit modification depending on permit timing and other site-specific factors.

* Because the allocations are protective of both local and downstream water quality, the department intends to issue/modify permits with TMDL-based limits in lieu of NR 217.13 derived limits after TMDL approval.

Wastewater Implementation Limit Calculation

* WLAs in the TMDL are expressed as long term loads.
* Permit limits must be consistent with TMDL, but not necessarily identical to WLAs.
* Permit limits based on WLAs are Water Quality-Based Limits (WQBELs).
* Concentration based TBELs will continue to be put in permits to prevent backsliding

Expression of TMDL-based Phosphorus limits in WPDES Permits – Continuous Dischargers

* Limit expression dependent on stringency of limit
* Equivalent Effluent Concentration = WLA ÷ (365 days/yr * design flow (MGD) * 8.34)
* Only used as a guide for limit expression, not actual limit

Equivalent Effluent Concentration	Limit Expression
> 0.3 mg/L	Monthly Avg.
≤ 0.3 mg/L	6-Month Avg. and Monthly Avg. (3 x 6-Month Avg.)

Expression of TMDL-based TSS limits in WPDES Permits – Continuous Dischargers

* Limit expression not dependent on stringency of limit
* Weekly average and Monthly average limits for Municipal dischargers
* Daily maximum and Monthly average limits for Industrial dischargers
* Method of calculation the same for TSS and TP

Calculating Permit Limits from WLAs

Permit Limit (lbs/day) =

Annual WLA ÷ 365.25 days/year x WLA Multiplier

Where:

WLA Multiplier = multiplier based on the variability of the effluent data and monitoring frequency in the permit.

WLA Multiplier Formula

$$WLA\ Multiplier = e^{[z\sigma_n - 0.5\sigma_n^2]}$$

Where: z = 2.326 for 99th percentile

$$\sigma_n^2 = ln\left[\frac{CV^2}{n} + 1\right]$$

n = number of samples collected during the limit averaging period

CV = coefficient of variation = standard deviation ÷ mean of <u>representative</u> discharge data on a mass basis

Multiplier vs. Effluent Variability & Monitoring Frequency

Effluent CV = 0.6

Effluent Monitoring Frequency	6-Month Average Permit Limits	Monthly Average Permit Limits	Weekly Average Permit Limits	Daily Average Permit Limits
Daily	1.11	1.28	1.64	3.11
5 Times per Week	1.13	1.35	1.78	3.11
3 Times per Week	1.17	1.45	2.07	3.11
Twice per Week	1.21	1.57	2.37	3.11
Weekly or Less	1.30	1.85	3.11	3.11

Effluent CV = 0.4

Effluent Monitoring Frequency	6-Month Average Permit Limits	Monthly Average Permit Limits
Daily	1.07	1.18
5 Times per Week	1.08	1.18
3 Times per Week	1.11	1.29
Twice per Week	1.14	1.36
Weekly or Less	1.20	1.53

Permit Limit Derivation Steps

* Determine Wasteload Allocation from TMDL
* Calculate equivalent effluent concentration to determine limit form (monthly only or 6-month & monthly combo) (TP Only)
* Determine monitoring frequency in new permit
* Determine effluent variability (CV)
* Calculate multiplier

Example Calculations: Facility A

TP WLA	Design Flow	TP Monitoring Frequency	CV
274 lbs/yr	0.25 MGD	3 times per week	0.4

Equivalent TP Concentration:

= 274 lbs/yr ÷ (365.25 days/yr *0.25 MGD *8.34) = 0.36 mg/L

Monthly Average Effluent Limit:

= 1.29 * 274 lbs/yr ÷ 365.25 days/yr = 0.968 lbs/day

Example Calculations : Facility B

TP WLA	Design Flow	TP Monitoring Frequency	CV
305 lbs/yr	0. 50 MGD	5 times per week	0.6

Equivalent TP Concentration:
= 305 lbs/yr ÷ (365.25 days/yr *0.50 MGD *8.34) = 0.20 mg/L

6-Month Average Effluent Limit:
= 1.13 * 305 lbs/yr ÷ 365.25 days/yr = 0.944 lbs/day

Monthly Average Effluent Limit:
= 0.944 lbs/day * 3 = 2.83 lbs/day

Example Calculations : Facility B

TSS WLA	Design Flow	TSS Monitoring Frequency	CV
12,298 lbs/yr	0. 50 MGD	5 times per week	0.6

Monthly Average Effluent Limit:

= 1.35 * 12,298 lbs/yr ÷ 365.25 days/yr = 45.45 lbs/day

Weekly Average Effluent Limit:

= 1.78 * 12,298 lbs/day ÷ 365.25 days/yr = 59.93 lbs/day

Non-continuous Dischargers

* Discharge only on week days: Use continuous discharge approach
* Short-term discharges of less than 3 months: Use annual WLA as limit (lbs/year)
* Seasonal discharge of greater than 3 months: Case-by-case determination whether to use continuous discharge or annual WLA approach

Wastewater Implementation Compliance Strategies

* TMDL-based limits are water quality-based limits, therefore the same suite of compliance approaches apply pre- and post TMDL
  * Traditional alternatives:
    * Treatment optimization, upgrade or regionalization
  * Innovative alternatives:
    * Water quality trading
  * Variance alternatives:
    * Individual or multi-discharger variance

Wastewater Implementation: Timing

* TMDL-based limits cannot be implemented in WPDES permits until TMDL is approved by U.S. EPA.
* Permits will continue to be issued prior to TMDL approval based on the requirements of NR 217 Wis. Admin. Code.
* After TMDL approval, permits will be modified where appropriate to include TMDL-based limits.
* Reissued permits will include TMDL-based limits and compliance schedules were appropriate

Wastewater Implementation: Planning Considerations

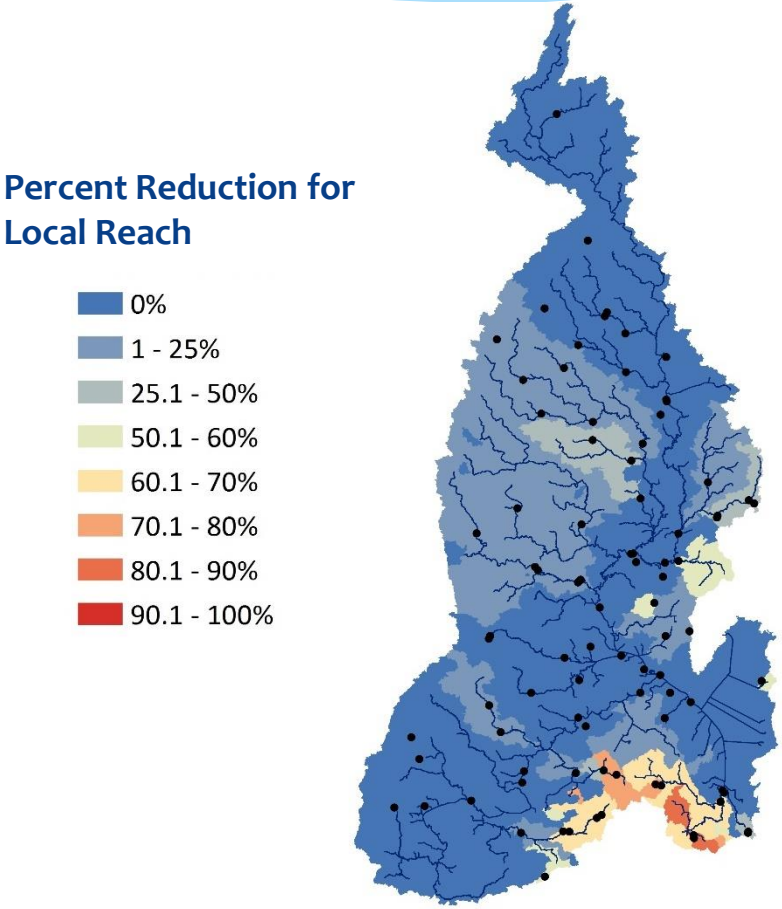
* Permittees with existing compliance schedules to meet phosphorus limits under NR 217.13z:
  * TMDL provides some level of "relief" to 26 facilities.
  * Evaluate and carefully consider the impacts of the TMDL on Compliance Alternatives Plan.
    * Impacts on treatment technology selection and associated economics.
    * Impacts on water quality trading/adaptive management alternative implementation costs.
  * Keep in contact with your local DNR representative during plan development

* Permittees facing phosphorus WQBELs for the first time:
  * New permit will contain compliance schedules as appropriate to allow for Compliance Alternatives Plan development.

Wastewater Implementation: Water Quality Trading

* TMDL appendices provide information on reductions needed to meet local water vs. downstream quality.

* In many locations, reductions are largely driven by downstream water quality ⇒ flexibility in where trading partners are located.



Wastewater Implementation: Water Quality Trading

* Point-to-point trading
  * Credit threshold: TMDL-based limit
* Point-to-nonpoint trading
  * Credit threshold for long-term credits: TMDL Load Allocation
  * 5-yr Interim Credit: Reduction from Existing Pollutant Load

Wastewater Implementation General Permits

* TMDL contains aggregate WLAs for general permits

* General permits will be evaluated to determine if additional requirements are necessary to ensure that discharges remain consistent with TMDL goals

Could include issuing individual WPDES permits to facilities that currently hold general permits

Nonpoint Source Implementation

* TMDLs do not create new rules or regulatory requirements for nonpoint sources
* TMDLs do not provide additional staff funding or other resources for implementation
* TMDLs rely upon existing rules, programs and staff resources for implementation
  * NR 151 Nonpoint Performance Standards - compliance
  * DNR and DATCP Grants, Cost sharing, and County programs – LW plans, FPP
  * Watershed Based plans, Farmer Led Councils
* TMDL nonpoint reductions are not regulatory, unless promulgated through NR 151.004
  * WDNR must determine, via monitoring or modeling, that substantial implementation of existing rules will not meet water quality standards

Nonpoint Source Implementation

* **Nonpoint sources have mass load allocations (LAs) by sub-basin to meet water quality standards for both local waters and downstream reservoir**

* **Nonpoint sources first need to meet existing agricultural performance standards and prohibitions – may require cost sharing; grants**

* **DNR recognizes there may be significant challenges to achieve nonpoint reductions within some sub-basins**

* **It will take time to develop plans and coordinate efforts to implement nonpoint reductions**

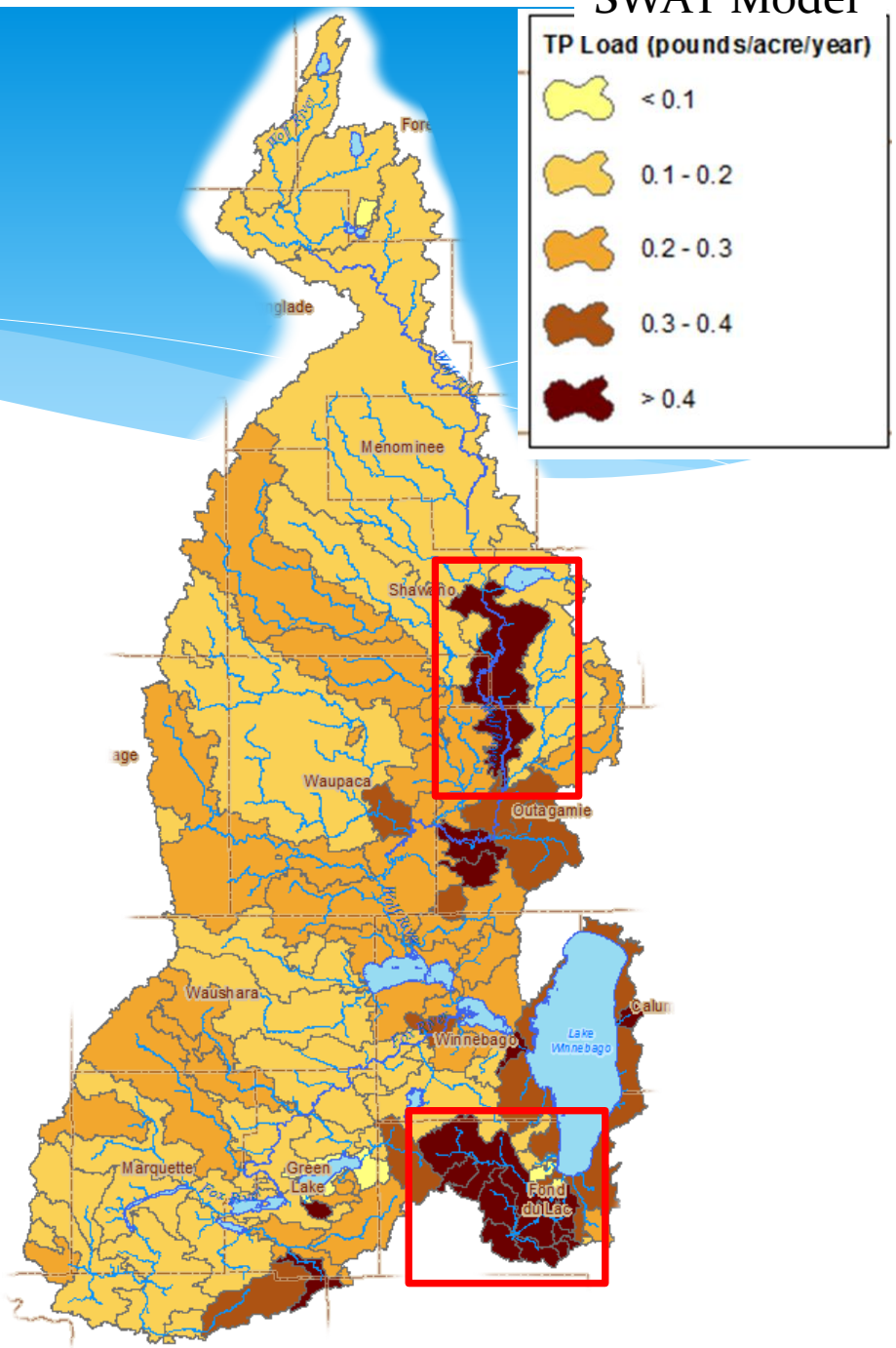
Nonpoint Source Implementation

* **TMDL reductions for agricultural sources range between 20% to 90% for TP and 16% to 89% for TSS from TMDL baseline load conditions**

* **Reducing agricultural loads will require:**
  * **Patience and making incremental progress over time**
  * **Coordination (10 years or longer) between agricultural producers and county, state and local stakeholders**
  * **Focus existing resources within selected sub-basins**
  * **Additional or new cropland practices**
  * **More adoption/compliance with existing standards and programs**
  * **Tracking efforts by sub-basin**

Nonpoint Source Implementation

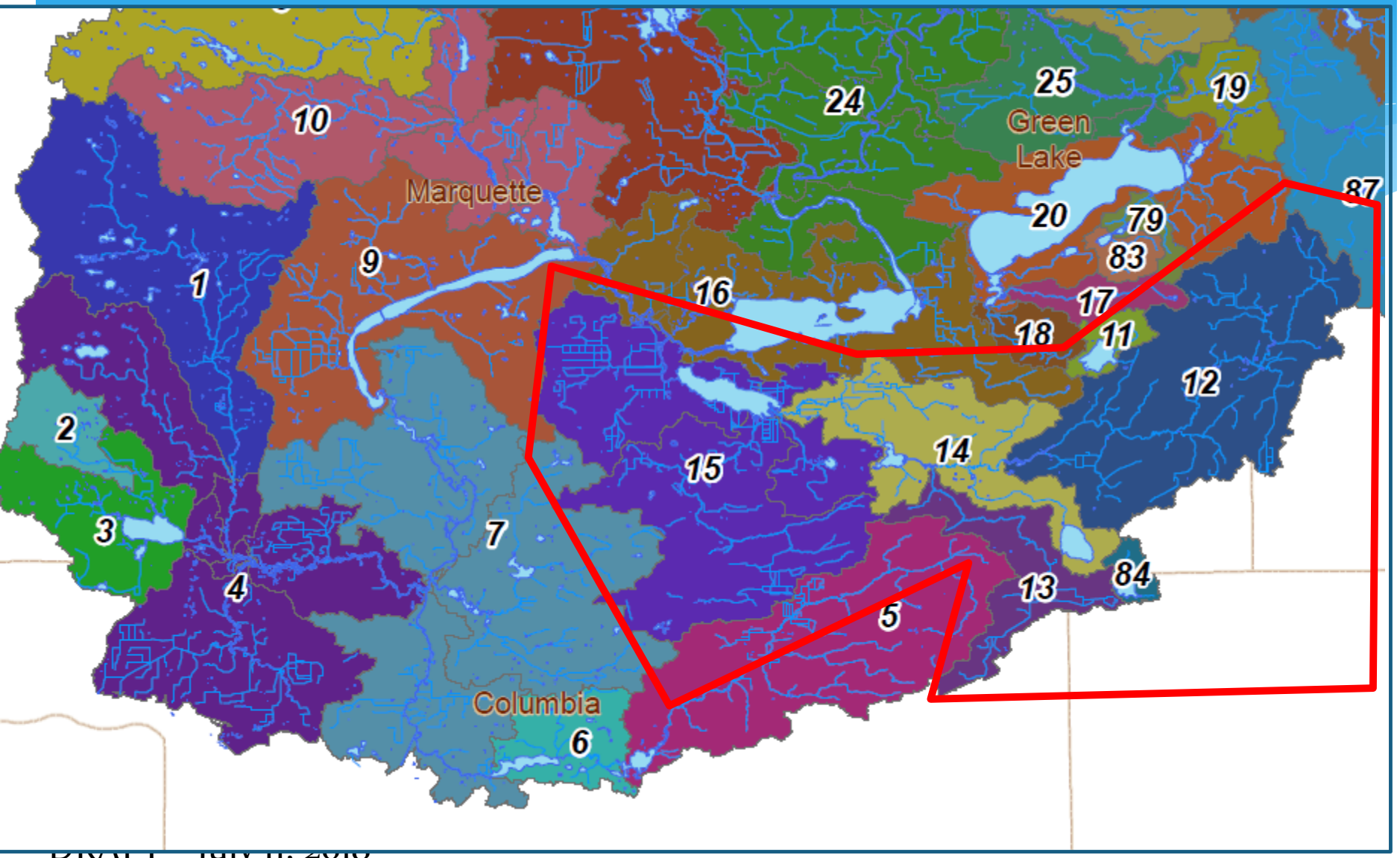
SWAT Model



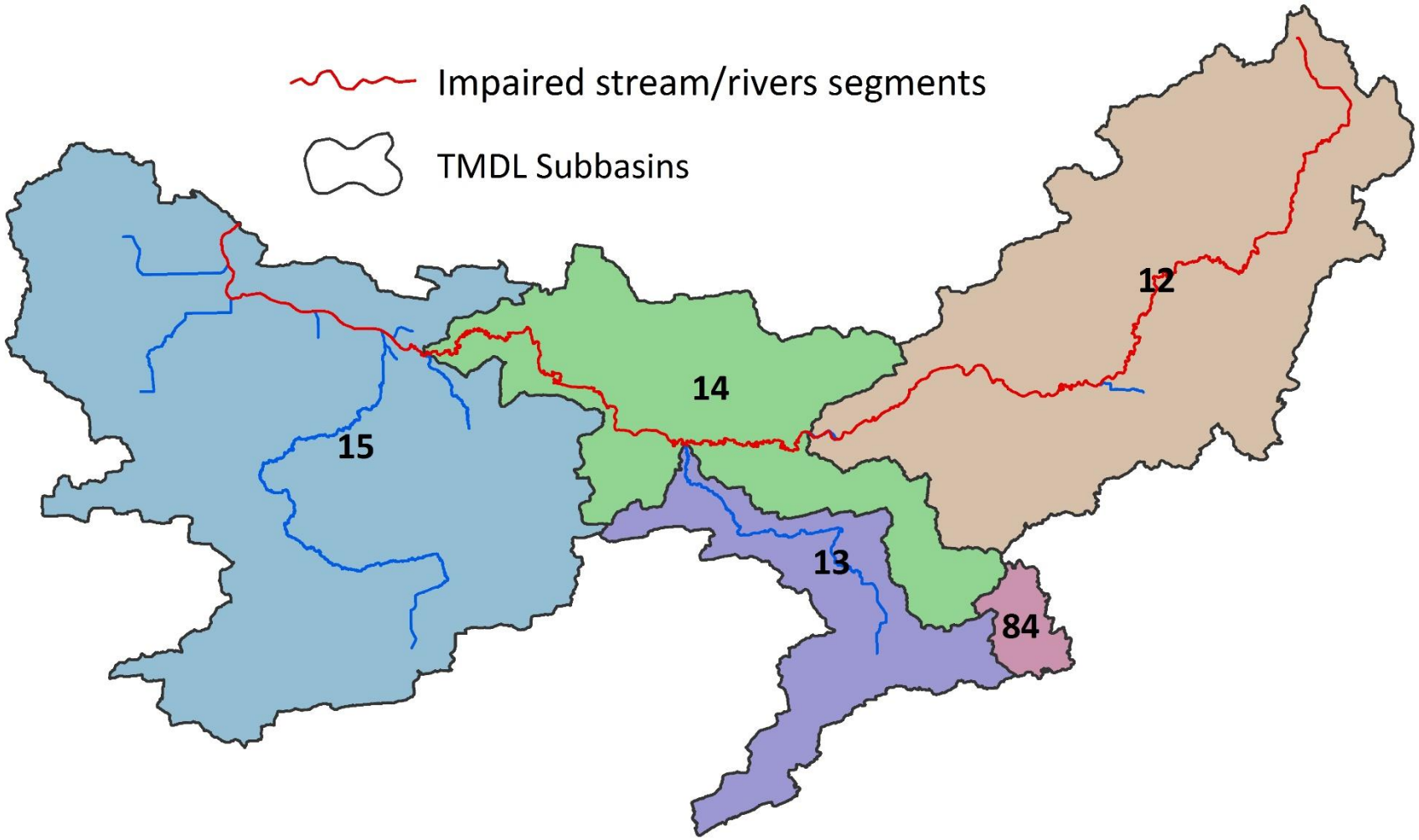
* **TMDL can help prioritize existing resources and programs within a county or watershed**

* **Red Areas = TMDL sub-basins with high TP loads**

TMDL Sub-Basins – Grand River Wshed



TMDL Sub-Basins - Grand River Wshed



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TMDL Sub-Basins - Grand River Wshed Reductions

TMDL Subbasin	Waterbody	Local Reduction TP		Downstream Reduction TP		Downstream Waterbody	Total Reduction TP	
		lbs/yr	%	lbs/yr	%		lbs/yr	%
12	Upper Grand River	7,376	68%	1,583	15%	Lake Puckaway	8,959	83%
13	Trib to Grand River	2,343	53%	1,333	30%	Lake Puckaway	3,677	83%
14	Middle Grand River	196	5%	2,935	78%	Lake Puckaway	3,131	83%
15	Lower Grand River	0	0%	6,937	83%	Lake Puckaway	6,937	83%
84	Lake Emily	0	0%	234	54%	Lake Emily	234	54%

Nonpoint Source Implementation

* **Existing Nonpoint efforts that will help implement the TMDL:**
  * **County LW plans – annual updates and 10 year revisions**
    * reflect TMDL findings and focus resources in specific areas
  * **Watershed Based Plans or Efforts**
    * **Waupaca County** - Bear Lake-Little Wolf - 9 Element Plan
    * **Fond Du Lac County** – Lake Winnebago – 9 Element Watershed Plans for 3 HUC 12's along lakeshore
    * **Winnebago Waterways Lake Management Plan** – Fox Wolf Watershed Alliance – four counties – 24 HUC 12's
    * **Multi-Discharge Variance funded projects**
    * **Farm Producer Led Councils ??**

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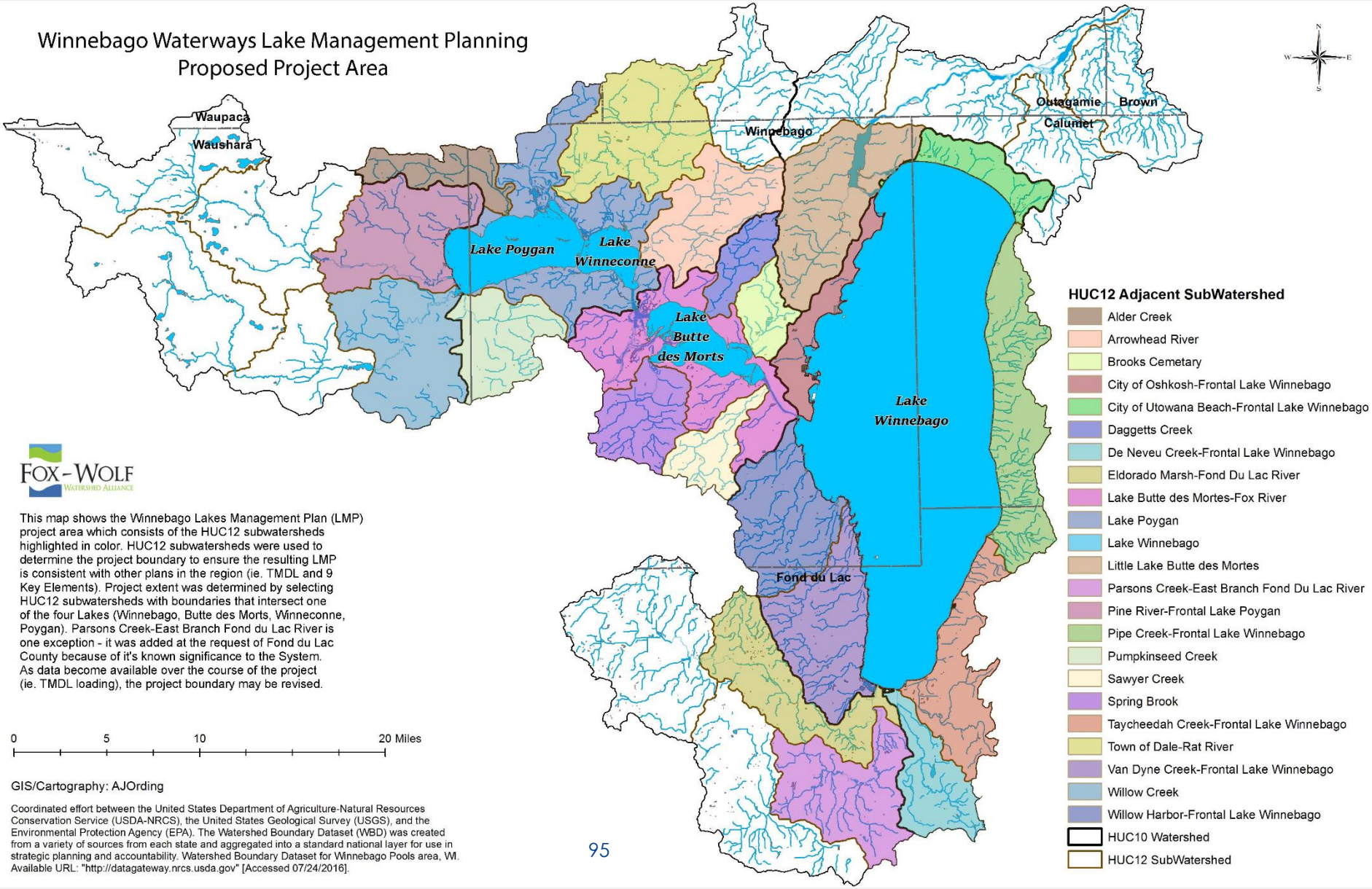
Nonpoint Source Implementation



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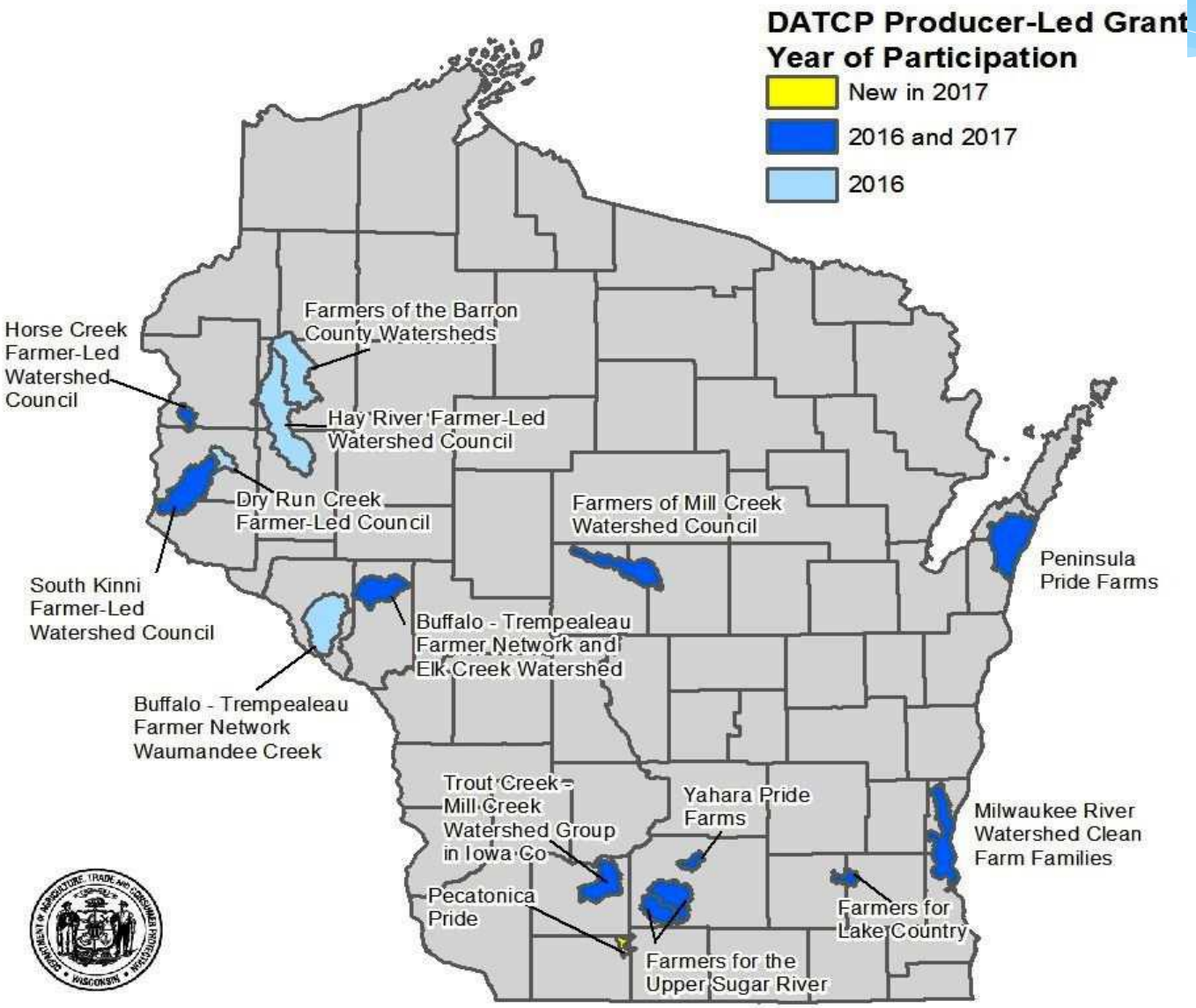
Nonpoint Source Implementation



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Nonpoint Source Implementation

Future TMDL implementation effort from WDNR - August 2018

* **Translate TMDL model variables within SnapPlus to:**
  * **Define baseline P loads and reduction target for TMDL sub-basin - express as P lbs/acre/year**
  * **Allow comparison current and future management to TMDL sub-basin reduction goal**
  * **Help prioritize fields for practices and measure progress on meeting TMDL reductions – by individual field or farm wide**
  * **Assist WQ Trading – ID threshold for generating interim and long term credits**

Nonpoint Source Implementation

UFWB_AgPracticeClass_Summaries

Class Name	Crop Sequence	Tillage (% Residue Remaining)	Manure
Dairy 1	2 years corn silage followed by winter wheat and alfalfa	0-15%	Daily Haul
Dairy 2			Storage
Dairy 3		16-30%	Daily Haul
Dairy 4			Storage
Dairy 5		>30%	Daily Haul
Dairy 6			Storage
Dairy 7	1 year corn silage, 1 year corn grain followed by winter wheat and alfalfa	0-15%	Daily Haul
Dairy 8			Storage
Dairy 9		16-30%	Daily Haul
Dairy 10			Storage
Dairy 11		>30%	Daily Haul
Dairy 12			Storage
Cash Grain 1	Continuous corn	0-15%	-
Cash Grain 2		16-30%	-
Cash Grain 3		>30%	-
Cash Grain 4	Continuous soybean	0-15%	-
Cash Grain 5		16-30%	-
Cash Grain 6		>30%	-
Potato/Vegetable	1 year potato followed by 2 years vegetable	0-15%	-

Funding Sources for Municipalities

* Clean Water Fund Subsidized loans to municipalities for water infrastructure projects (0% or 33% of Market Rate)

* A portion of a loan may be awarded as "principal forgiveness" (PF) – acts like grant funding – no repayment

* Four agencies provide funding for various water infrastructure projects
    * Comm. Dev. Block Grant (CDBG)
    * USDA Rural Development (grant and loan)
    * DNR (loan and principal forgiveness)
    * Bd of Comm. of Public Lands (BCPL) - state trust fund loan

BUNDLE AND SAVE

Questions and Comments

Comments accepted through August 5th, 2018

Search for Upper Fox Wolf TMDL or

https://dnr.wi.gov/topic/TMDLs/FoxWolf/

Comments can be submitted until 4:30 p.m. on August 5, 2018 to KeithA.Marquardt@Wisconsin.gov or by mail to:

Wisconsin Department of Natural Resources
Attn: Keith A. Marquardt,
625 E. County Road Y, Suite 700
Oshkosh, WI 54901.