Western Lake Erie Basin Far-Field Phosphorus Allocation Project

December 12, 2018

Ohio Environmental Protection Agency

Lake Erie Impairment – What's Next

- We have Lake Erie impairment – Algae
- Great Lakes Water Quality Agreement
  - Targets have been set – Annex 4 for Phosphorus reductions
- Ohio's Domestic Action Plan – Vehicle to get things done
- Developing a methodology to meet Annex 4 targets and also aims to fix impairments
- Near-field vs Far-field

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Lake Erie 303(d) Impairments

Use Designation Impairment	Western Shoreline	Western Open Water	Islands Shoreline	Sandusky Shoreline	Sandusky Open Water	Central Shoreline	Central Open Water
Aquatic Life Use (*Biological Community/Diversity*)	✓		✓	✓		✓	
Public Drinking Water Supply (*Microcystins*)	✓	✓	✓	✓	✓		✓
Human Health (*Fish Tissue*)	✓		✓	✓		✓	
Recreation (*E. coli*)	✓		✓	✓		✓	
Recreation (*Algae*)	✓	✓	✓				

Learn more about the impairment listings:

http://www.epa.ohio.gov/Portals/35/tmdl/2018intreport/SectionF.pdf

https://www.youtube.com/watch?v=nlKoBZSQwYU

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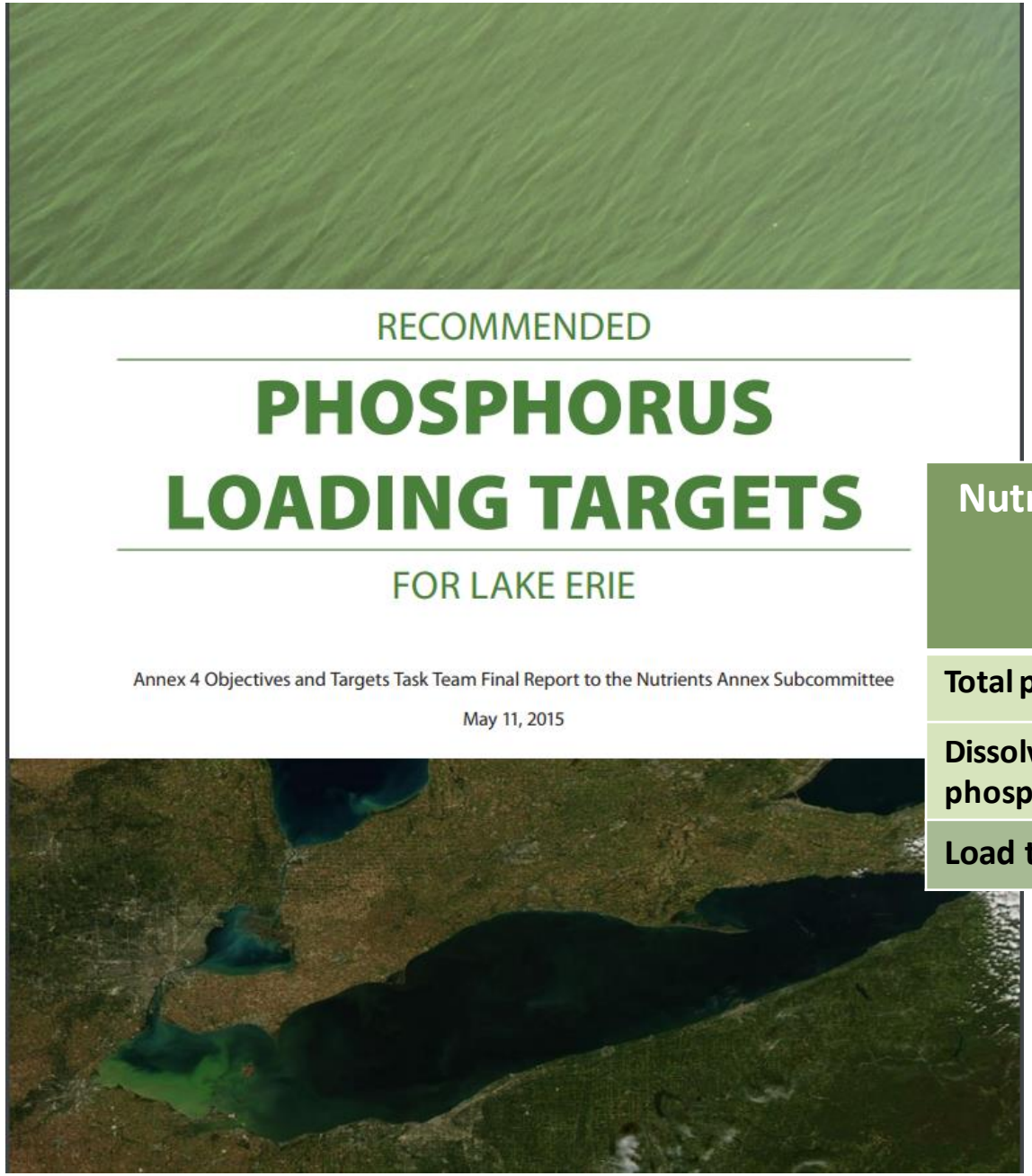
Targets



Nutrient type	Maumee Basin Spring (March - July)	
	Load target (MT)	Concentration (mg/L)
Total phosphorus	860	0.23
Dissolved reactive phosphorus	186	0.05
Load targets can be exceeded 10% of the time.		

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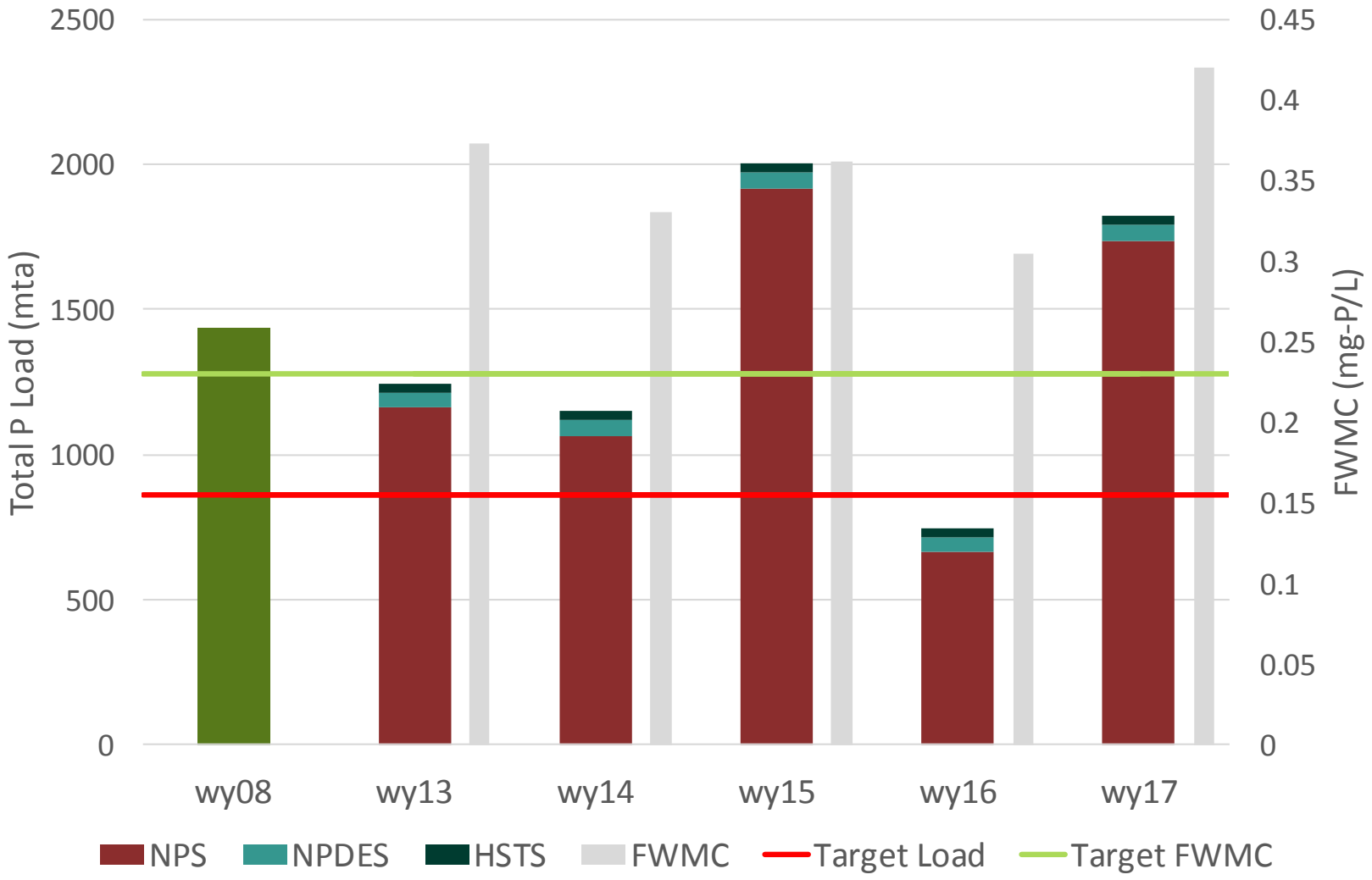
Current Maumee Spring Load



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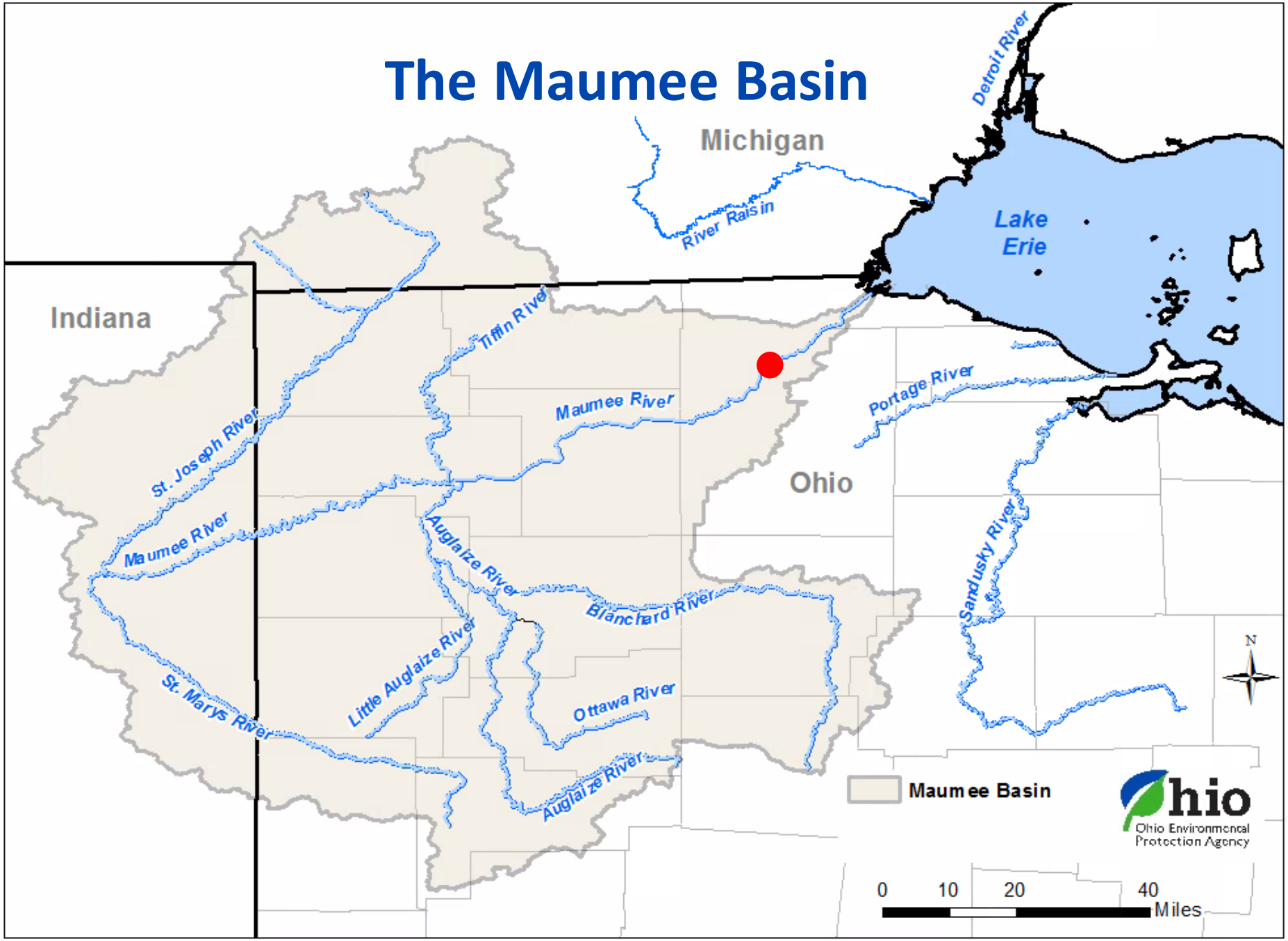
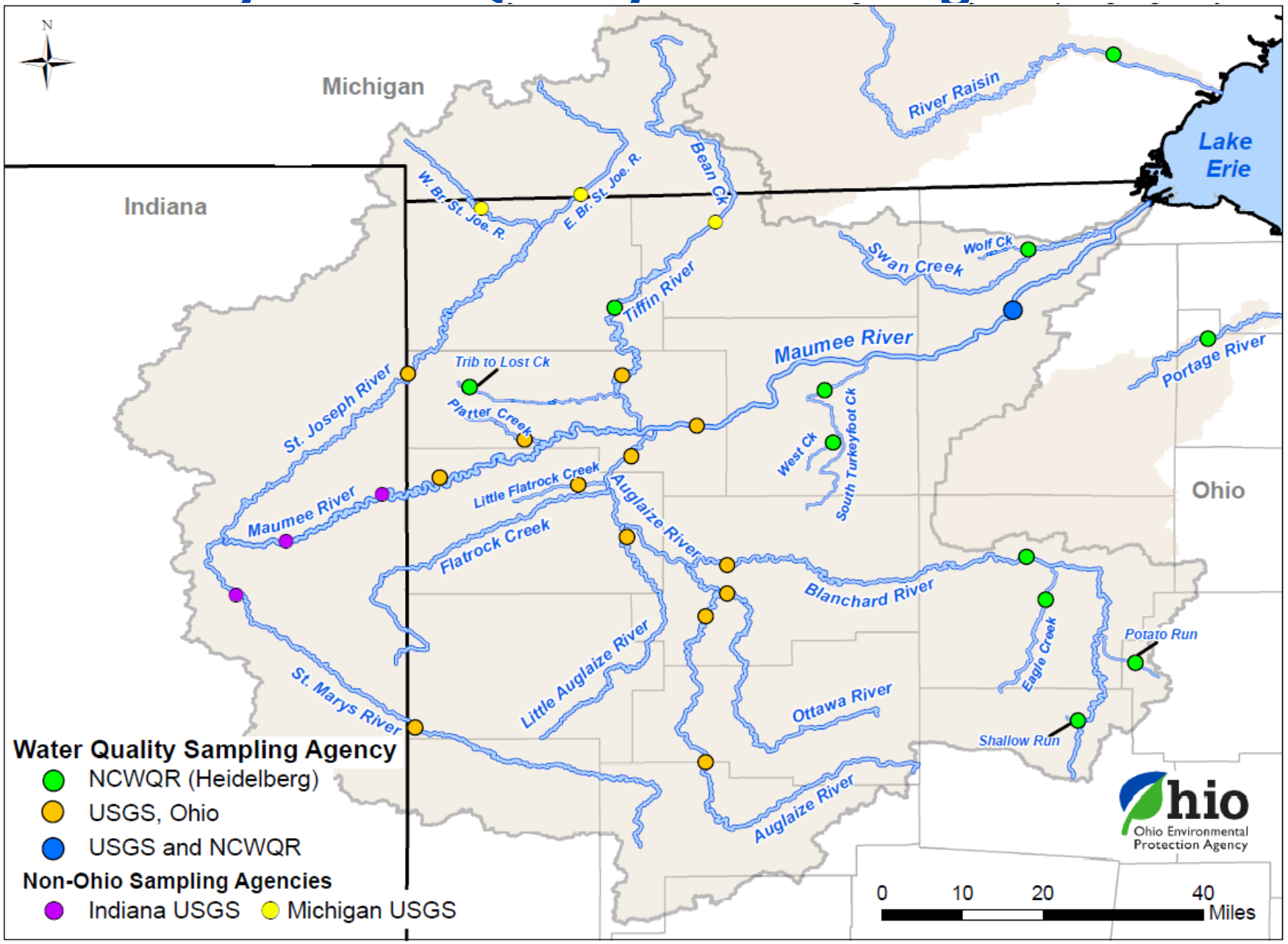
The Maumee Basin



Tributary Water Quality Monitoring in the Western Lake Erie Basin



- 29 stations in the Maumee River basin.
- 2 additional western basin sites (River Raisin and the Portage River).
- 4 sites in the Sandusky River watershed and 6 more in Ohio draining to the Central Basin (not shown).

Connecting Annex 4 Lake Erie Targets to Near-Field TMDLs

- Contractor (TetraTech) developed project funded by US EPA Region 5 that included Ohio, Michigan and Indiana.

- **Phosphorus near-field TMDLs were not abundant enough to meet Annex 4 targets.**
  - Not all existing TMDLs even have P targets

- Developed methodology to distribute Annex 4 targets to major tributaries (HUC-8s) of the Maumee River.
  - **Far-field targets**

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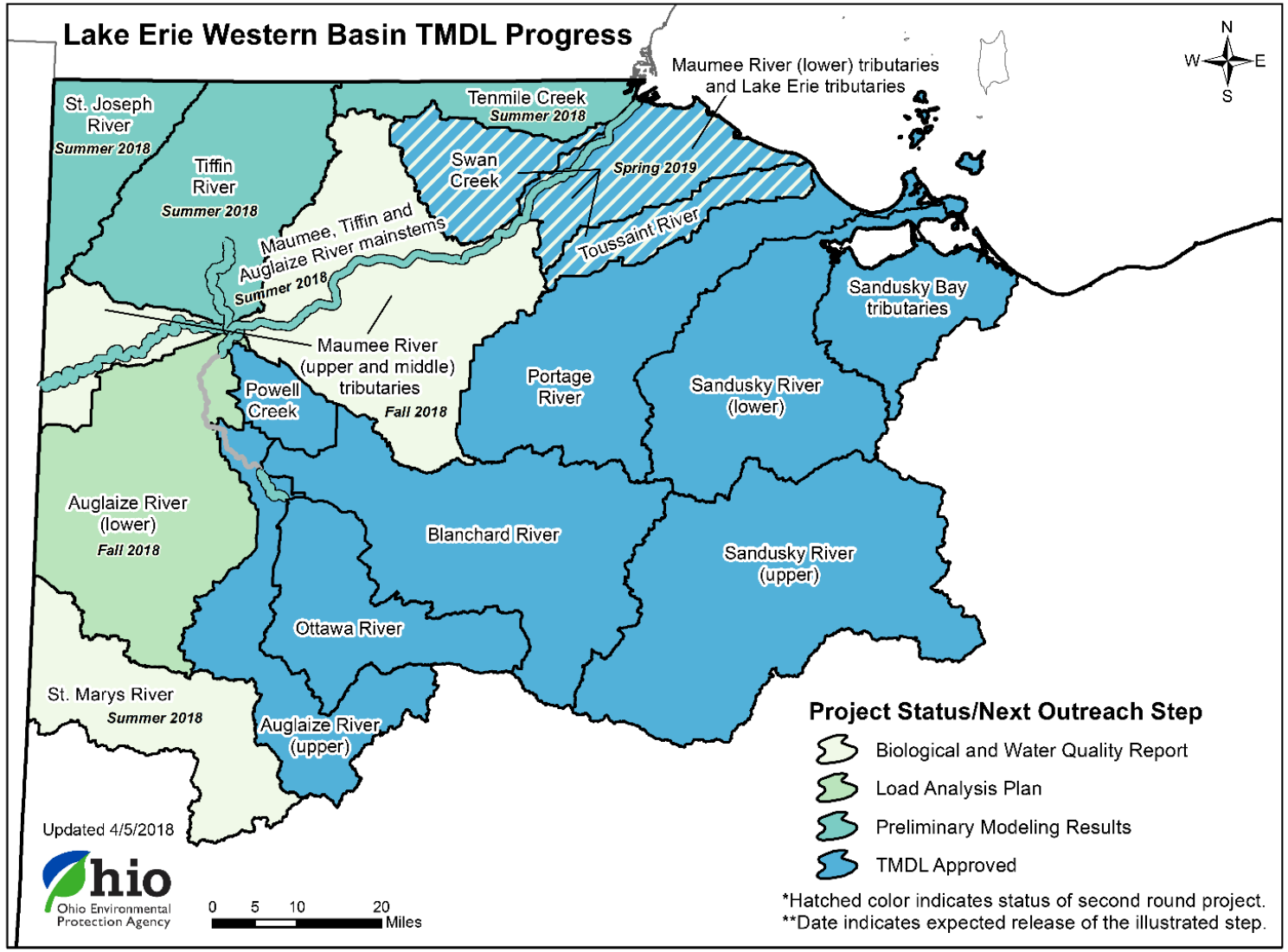
Status of Near-Field Nutrient Impairment



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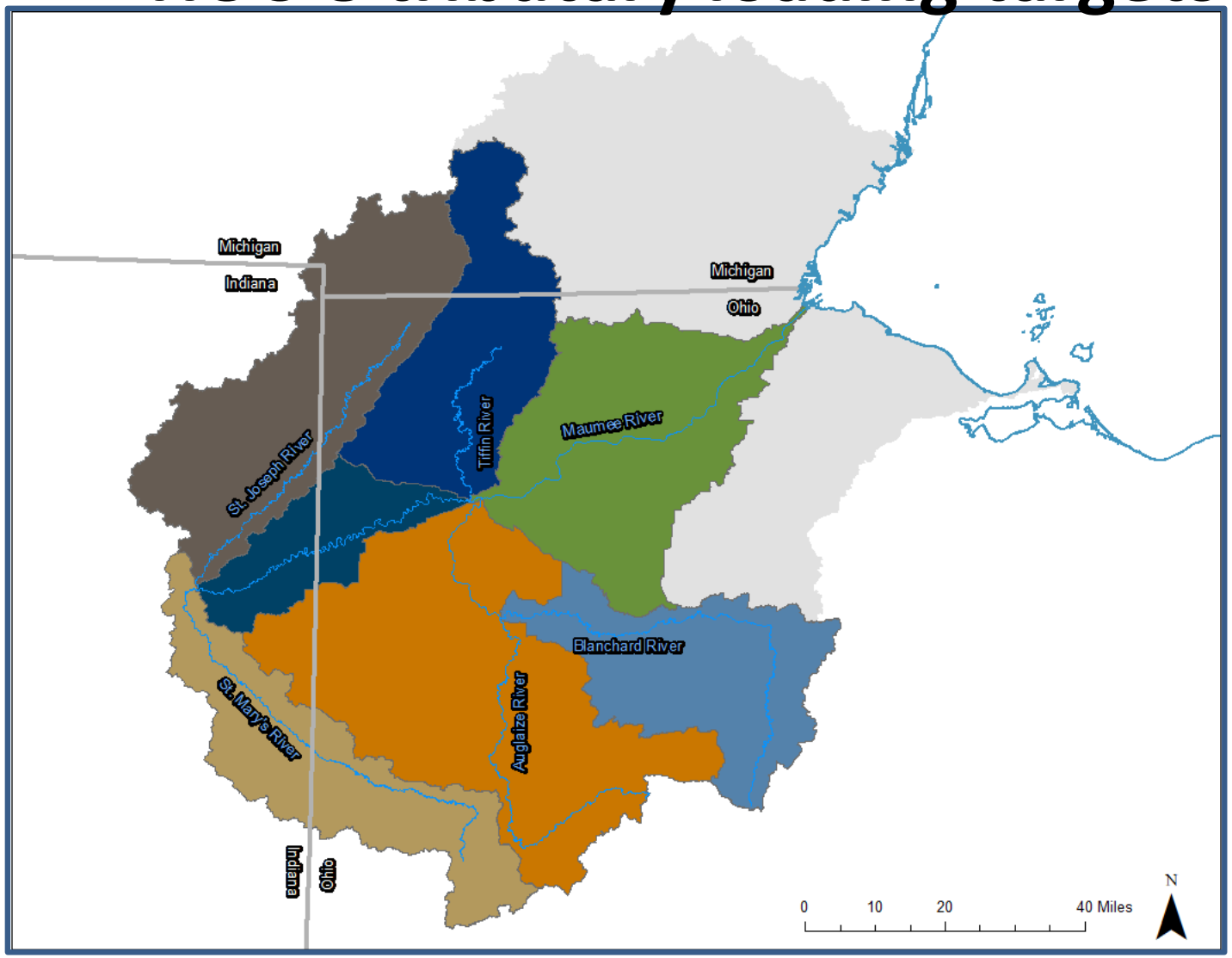
From the TetraTech Project: HUC-8 tributary loading targets



Annex 4 Targets

Spring TP Load (MT)

- 58
- 87
- 104
- 114
- 121
- 137
- 239

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From the TetraTech Project: HUC-8 tributary loading targets

Target		St. Joseph	St. Mary's	Upper Maumee	Tiffin	Auglaize	Blanchard	Lower Maumee (above Waterville)	Maumee River at Waterville
HUC-8		*04100003*	*04100004*	*04100005*	*04100006*	*04100007*	*04100008*	*04100009*	*Annex 4 targets*
Spring TP	(MT)	137	121	58	87	239	104	114	860
Spring SRP	(MT)	30	26	12	19	52	22	25	186
Annual TP	(MT)	373	326	146	221	655	294	273	2288

This calculative exercise was the first time Annex 4 targets at Waterville had been extrapolated to upstream HUC-8 pour points

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Maumee Basin Far-Field Allocations

- Ohio EPA is working on a new project to that allocates phosphorus loads to all sources in 186 HUC 12s within the Maumee Basin (within Ohio).

- Existing loads for all sources can be determined by our Nutrient Mass Balance methods.

- Adds granularity to allocations based on differences in each HUC 12s (i.e. differences in land use and wastewater discharges).

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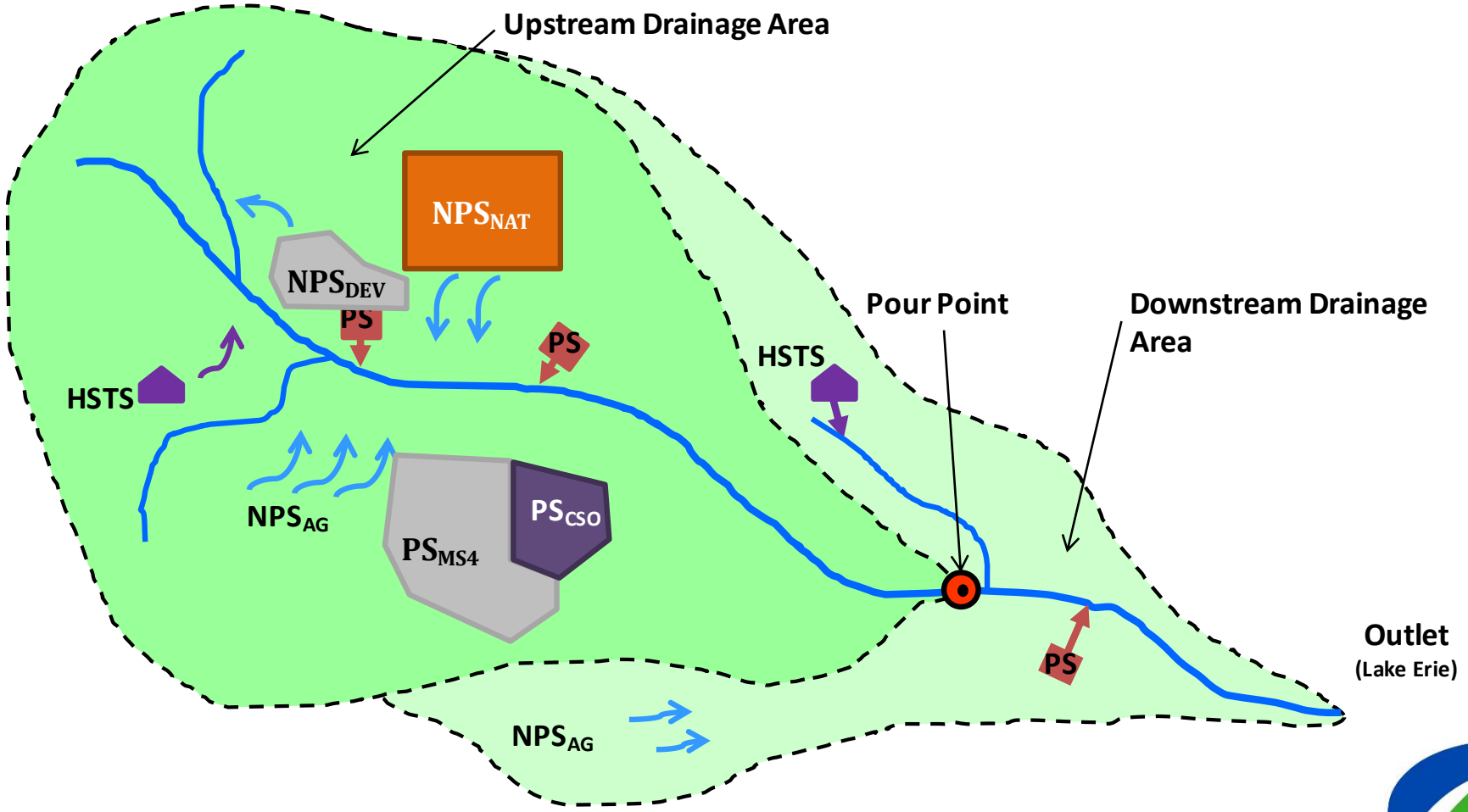
Maumee Basin Far-Field Allocation Method



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"Far field" HUC 12 Nutrient Allocations Based on Annex 4 Targets

Maumee Basin	Acres/people	Spring load yield lb./acre, pop		Required reduction
		Existing	Allocated	
Ag. land	3.1 million	0.83	0.48	43%
Dev. land	0.4 million	0.40	0.23	43%
Natural land	0.4 million	0.08	0.08	0%
NPDES *	0.6 million	0.17	0.13	20%
HSTS	0.3 million	0.23	0.18	22%
TOTAL LOAD 3,170,248 lbs. (1438 MT)			1,895,976 lbs. (860 MT)	

2008 Load from nutrient mass balance methods.

Annex 4 Target!

* NPDES load reductions include CSOs

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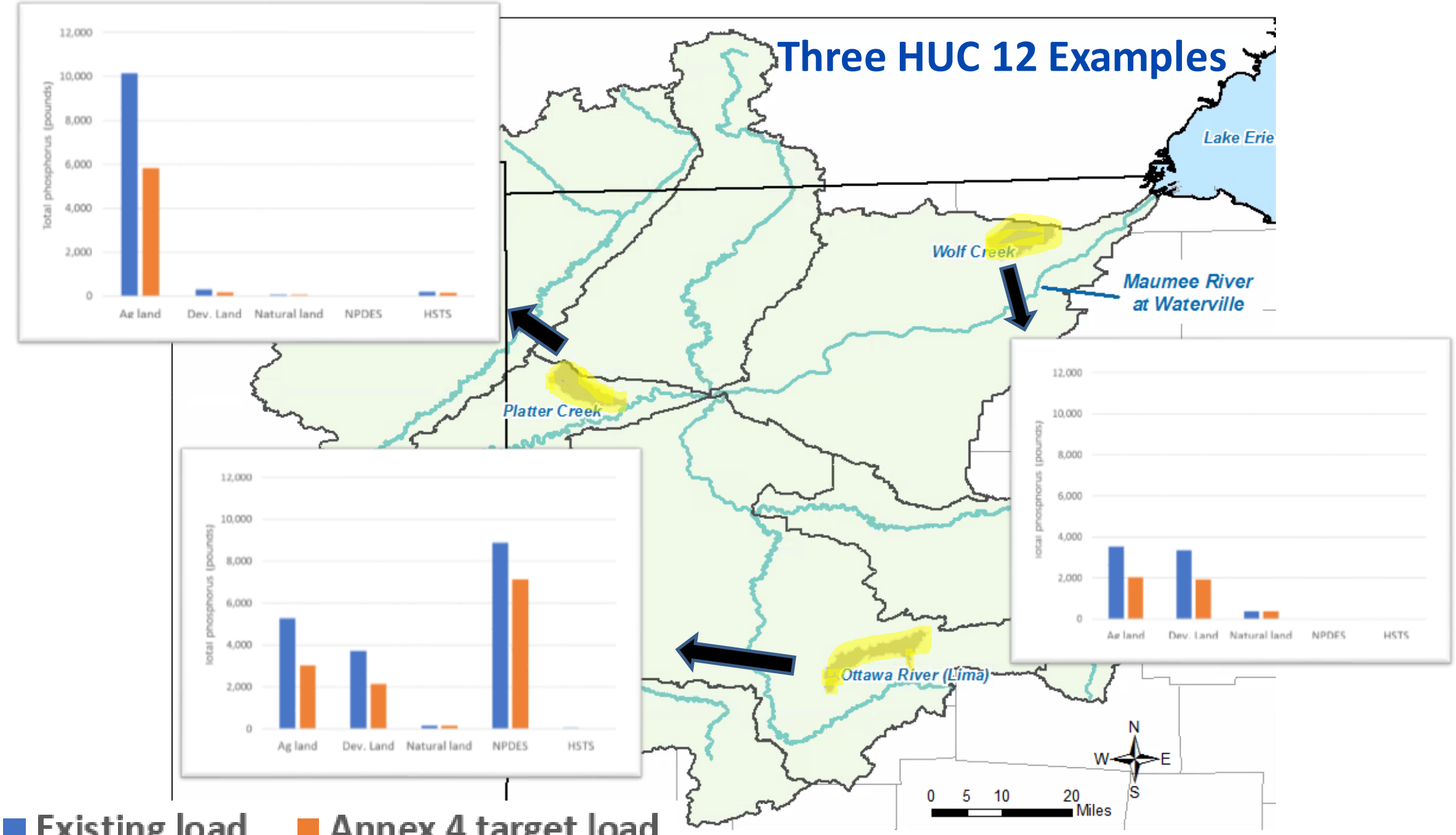
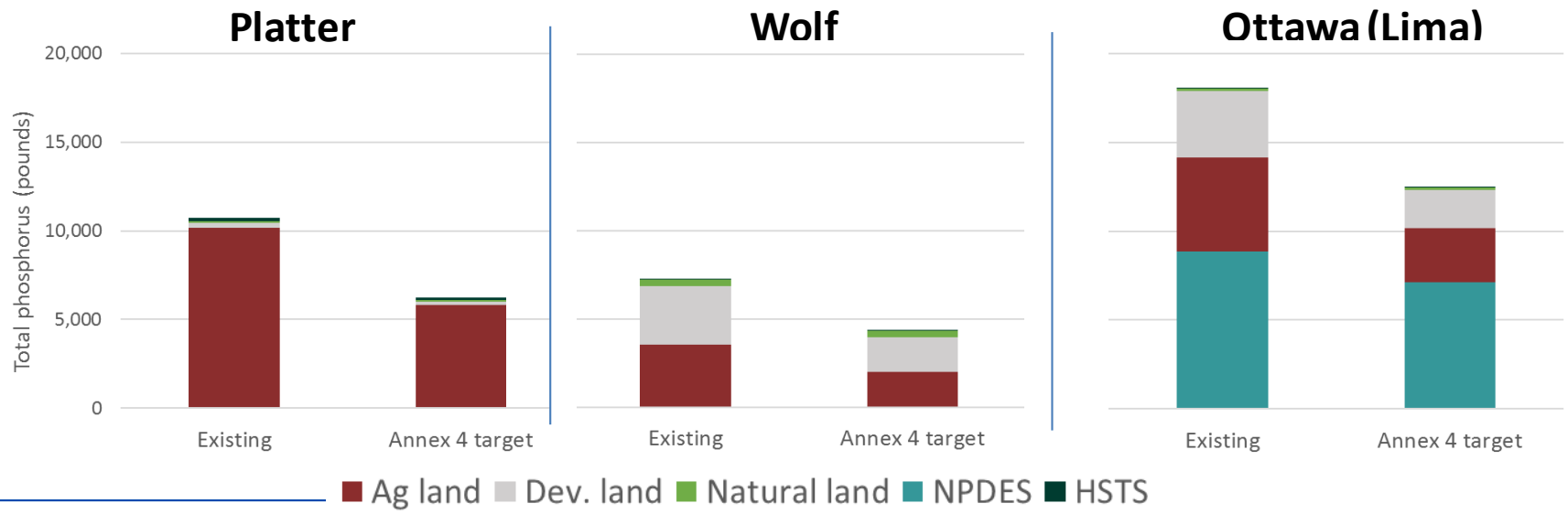
Three HUC 12 Examples



Three HUC 12 Examples

HUC 12 Existing total load	Existing conditions % of total phosphorus load					Total existing load (lbs.)	% of existing load to be reduced
	Ag land	Dev. Land	Natural land	NPDES	HSTS		
Platter	95%	3%	1%	0%	2%	**10,707**	**42%**
Acres or population	12,211	763	888	0	800		
Wolf	48%	46%	5%	0%	0%	**7,275**	**40%**
Acres or population	4,242	8,397	4,746	0	50		
Ottawa (Lima)	29%	21%	1%	49%	0%	**18,060**	**31%**
Acres or population	6,339	9,315	1,856	53,771	200		



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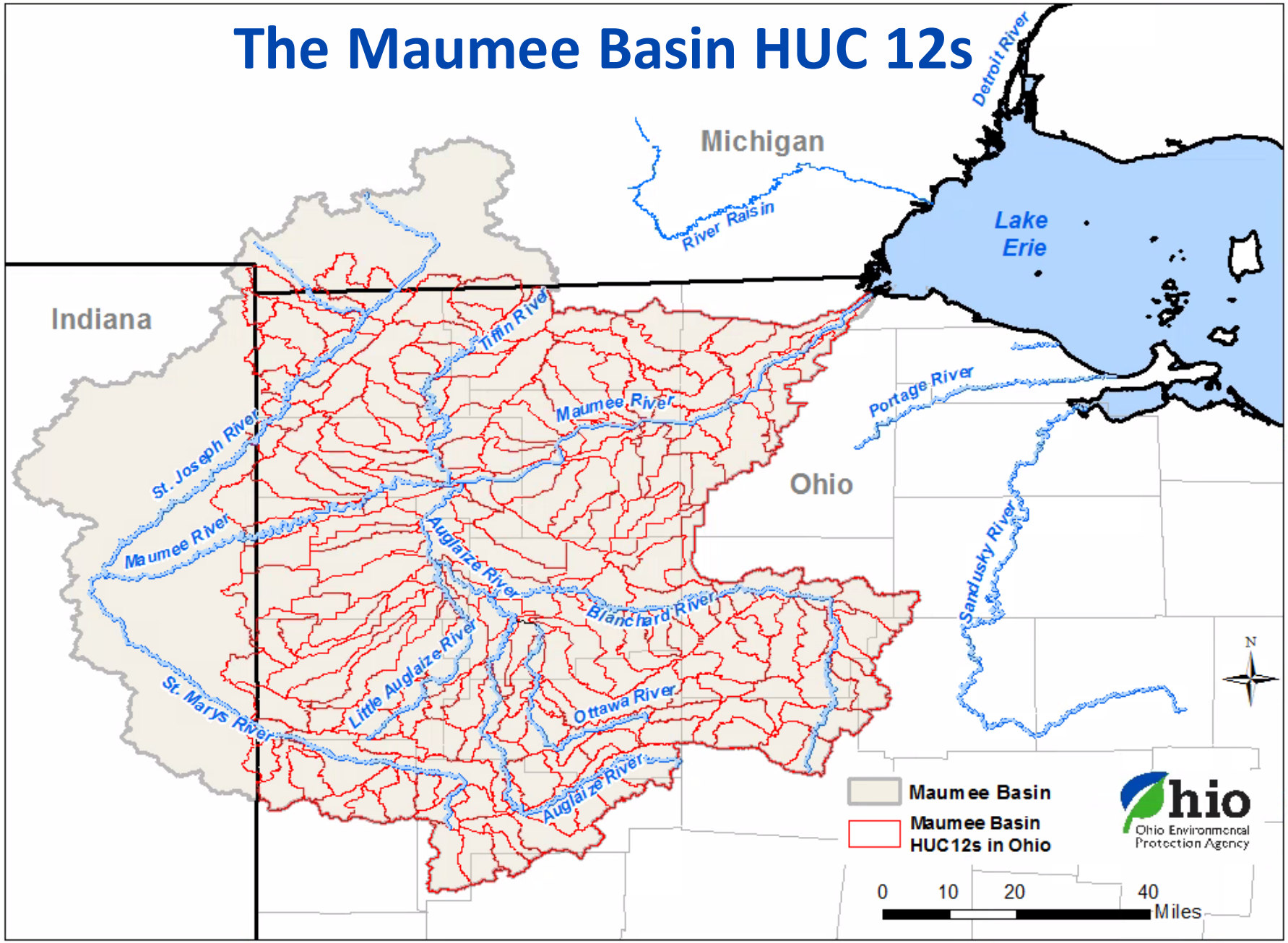
The Maumee Basin HUC 12s



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Ohio's 9-Element Nonpoint Source Implementation Plans

Photo Courtesy of Black Swamp Conservancy

Rick Wilson, Ohio EPA—Division of Surface Water

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EPA's 2013 NPS Program Guidance

"…a strong emphasis on taking a watershed-based approach to restore impaired waters"

In early 2016, with direction from U.S. EPA Region 5, Ohio moved beyond the Watershed Action Planning (WAP) framework—that had stagnated. These new strategic plans are now focused on the water quality problems:

- What's impaired; What needs to be done; and What can be done at the HUC-12 scale
- Required for funding — §319 & Great Lakes Restoration Initiative (GLRI)

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EPA's 2013 NPS Program Guidance
Watershed-based Planning

"…planning at the watershed **(HUC-12)** scale is needed to provide a comprehensive analysis and approach to…"

- Identify **causes and sources** of pollution;
- Develop **critical areas**;
- Establish water quality **goals**; and
- Establish strategic quantitative **objectives**

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What are the 9-Elements

Criteria	US EPA Definition
a	Identify the causes and sources of pollution that need to be controlled
b	Determine load reductions needed ...and Biological Metrics
c	Describe management measures to achieve improvements in targeted critical areas
d	Identify technical and financial assistance and authorities needed to implement the plan *
e	Develop an information/ education component
f	Develop implementation schedule
g	Describe the interim, measureable milestones
h	Identify indicators to measure progress
i	Develop monitoring component.

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Ohio's 9-Element Process—Keeping it Simple

Summarize Watershed Characteristics

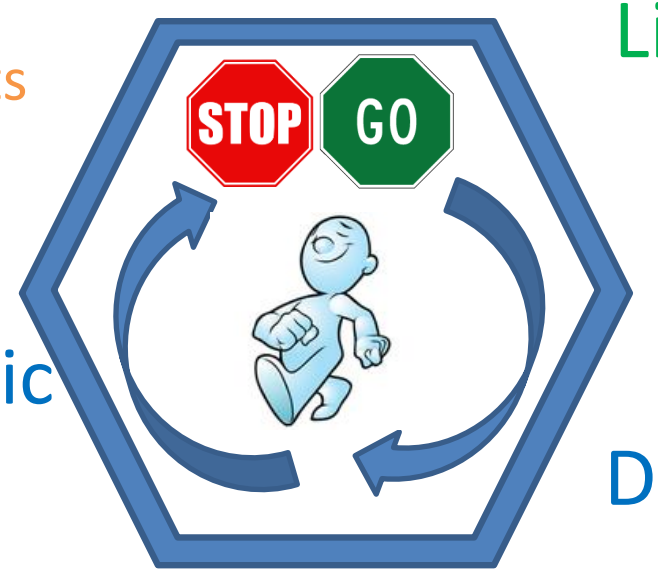
List Causes and Sources of Impairment

Develop and Describe Critical Areas

Establish Strategic Goals

Establish Strategic Objectives

Develop Projects (9-Elements)



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9-Element Plan

Chapter 1

- Introduction
  - Report Background
  - Watershed Profile and History
  - Public Participation and Involvement

Who was involved, describe public meetings, and outreach efforts. This is especially important for project development and buy-in

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9-Element Plan

Chapter 2

- Watershed Characterization
- Monitoring/Modeling Assessment Summary (HUC-12-scale)
  - Biological Trends
  - *Loading Assessment*→
  - Causes and Sources of Impairment
    - Near-field and far-field
    - Aquatic life use, recreational use, drinking water use

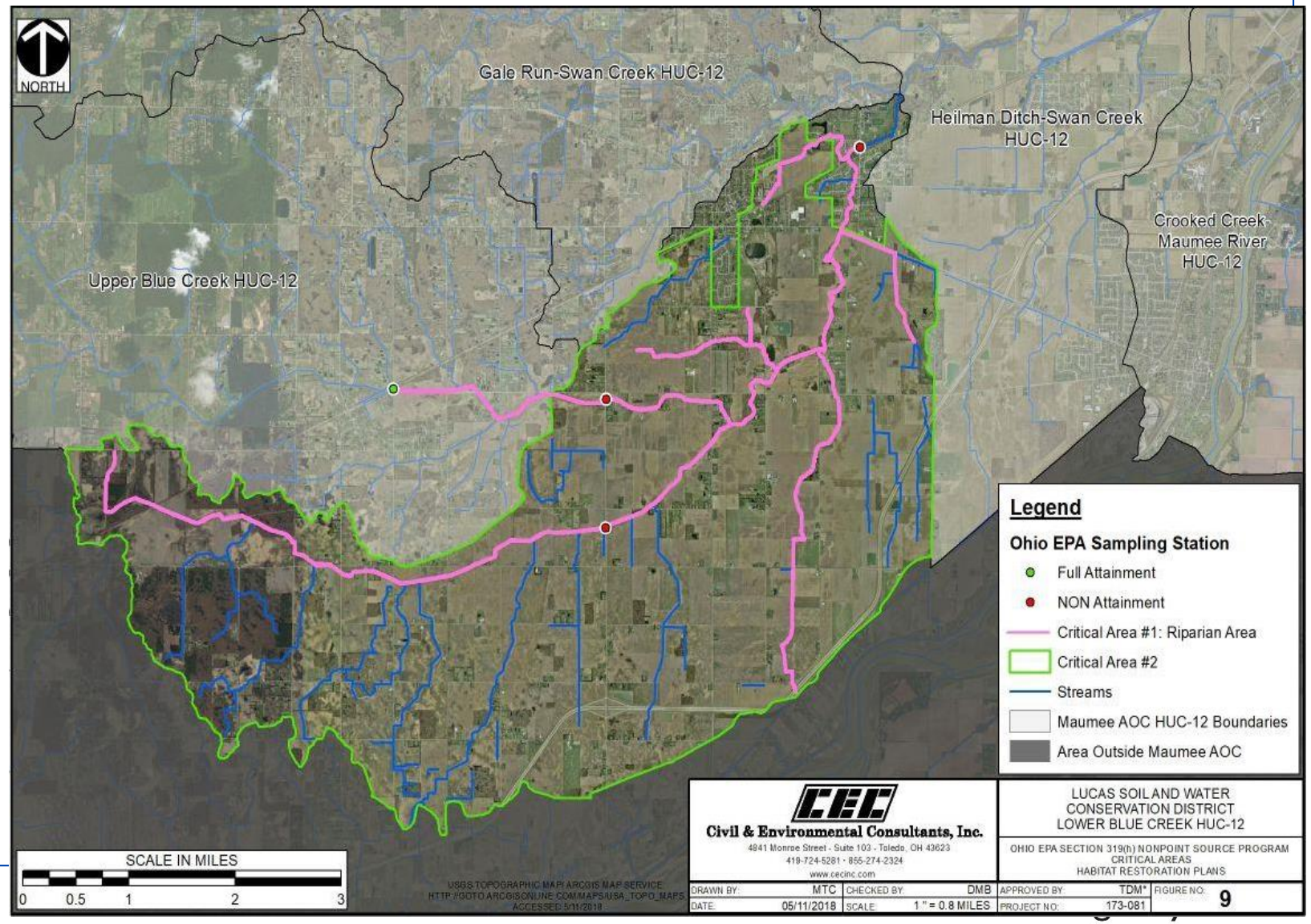
HUC-12 Baseline annual load	Source
	Agricultural Load (NPS) — #/year
	Urban (NPS) — #/year
	Natural (NPS) — #/year
	Home Sewage Treatment Systems/Unsewered (NPS) — #/year
	Treatment Plants (Point Source) — #/year
	Total Baseline P-Load (#/year)

9-Element Plan

Chapter 3-Critical Areas

Provides maps and overviews of Critical Areas addressing both **near-field and far-field** WQ impairment

Example HUC-12 critical area map for Lower Blue Creek →



Near-Field Impairment

- **Near Field:** localized impairment at HUC-12 watershed scale is related to:
  - Aquatic Biometric Assessments that don't meat water quality threshold metrics:
    - altered hydrology (NPS), channelization, absence of riparian habitat (NPS), sedimentation (NPS and PS); or
  - Chemical Loading:
    - Low-flow (i.e., non-runoff) Point Source-related loading and is addressed through NPDES permitting

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Far-Field impaired waters

- **Far Field**

  —Impairment that is downstream from multiple* HUC-12 scale watershed units; and

  —Usually involves important water resources including:

  - Lake Erie,
  - Gulf of Mexico, and
  - other inland reservoirs and lakes

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Far Field Impairment:

Almost always related to annual and/or seasonal nutrient loading from both Nonpoint and Point sources:

- Point Sources:
  - Involves regulatory permitting of dischargers (NPDES)
- Nonpoint Sources:
  - Involves strategic implementation of voluntary measures to address land-use related impairment:
  - Examples include: Strategies for row crop agriculture, urban impervious surfaces, AFOs, and unsewered homes/communities

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9-Element Plan

Chapter 3-Goals

- Outline of Measurable Goals
  - Usually to attain or maintain **aquatic life use (ALU) designation** by meeting threshold water quality **index values**
  - Also should focus on attaining or maintaining **Public Drinking Water and/or Recreational use designations** in *far field* locations
    - Especially in downstream lakes and reservoirs that are impaired by algae and **where nutrient (e.g., phosphorus) load reductions** are needed to remove impairment.

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9-Element Plan

Chapter 3-Objectives

- Outline of Quantifiable Objectives
  - What are the **technical solutions?**
  - What are the activities, management practices, administrative measures?; and
  - **How many of each can be reasonably accomplished in the near term?**

Using an adaptive management approach

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Objectives:

Quantifiable —What can be accomplished in near term so that **incremental progress toward water quality goal(s)** will occur.

Examples:

- Restore 3000 feet of severely eroded streambank
- Restore at least 6400 linear feet of Tenmile Creek using natural channel design features
- Establish riparian floodplain on 6400 feet of Tenmile Creek
- Plant 10 acres of wooded riparian buffer
- Enroll 100 acres into Conservation Reserve Program

ADAPTIVE

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The Nonpoint Source Implementation Strategy Template

FINAL Template with Descriptions for
Ohio's Nonpoint Source Pollution Implementation Strategies (NPS-IS)
(Ohio's Nine-Element Plans)

Overall this document should be written in concise yet detailed manner using paragraphs, not pages, to convey information. When possible, it is preferred that information be incorporated into this document by reference with a brief explanation, rather than writing all details in this document In Ohio, the NPS-IS is meant to closely align with *Ohio's Nonpoint Source Management Plan Update (FY2014 to FY2018)*. When creating a NPS-IS in Ohio, this *NPS Update* should be utilized and referenced. It is recommended that this NPS-IS be written for a single HUC-12.

https://www.epa.state.oh.us/dsw/nps/index
Ohio's NPS program 9-Element Planning assistance page
Template is available as a pdf or Word (docx) file

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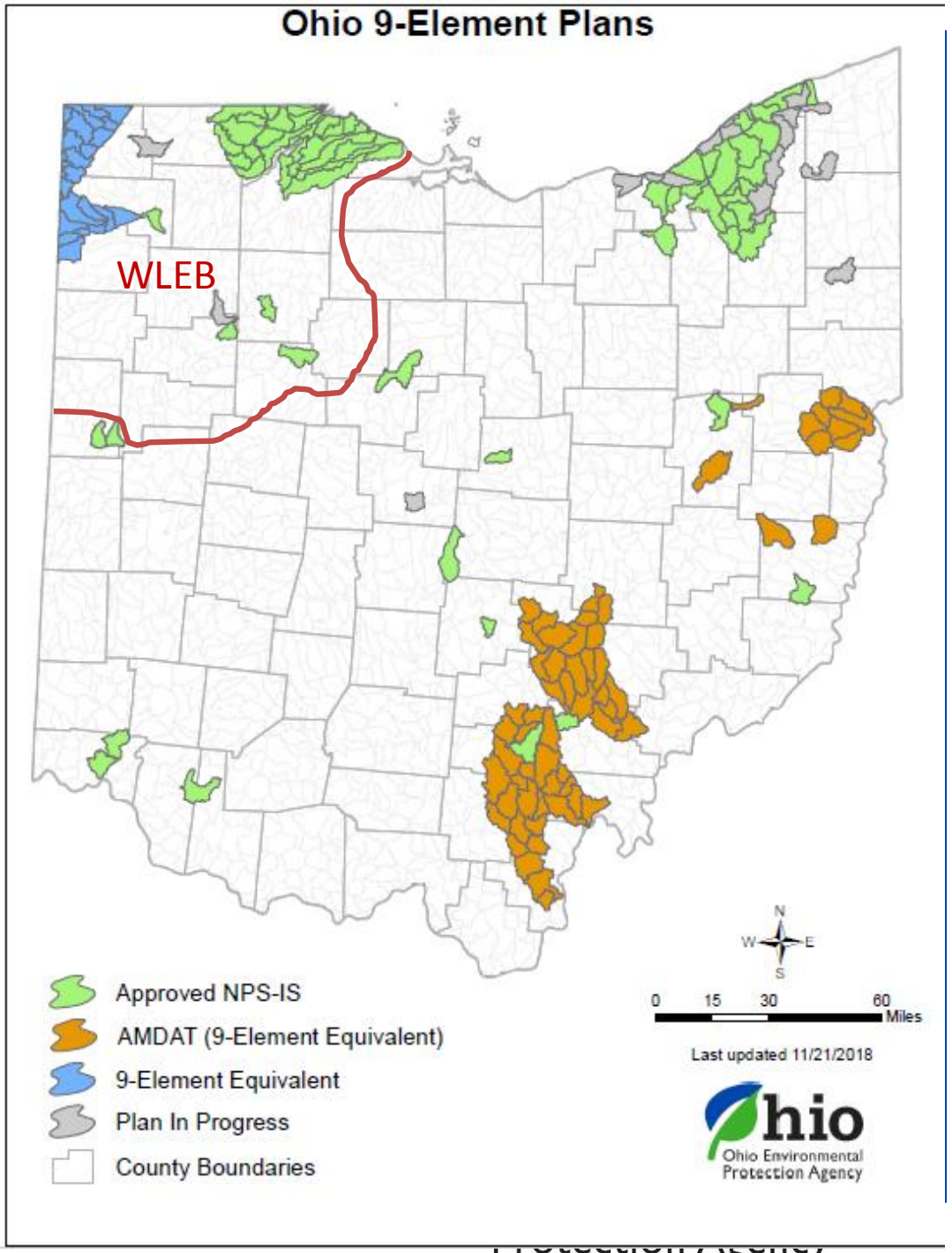
9-Element Planning Status

Approved 9-Element Plans	62
Equivalent Plans (w/ Indiana)	25
Acid Mine Drainage (AMDAT) plans	62
Plans-in-Progress	17
As of December 11, 2018	

* Note: there are already some *Approved* or *Equivalent* plans in the Western Lake Erie Basin (WLEB)*

- There are a lot more 9-element plans that need to be developed; and
- Those <u>already-approved and equivalent plans need to be updated consistent with new **far-field** targets</u>



Conclusion:

Ohio's 9-Element NPS Implementation plans…

- are an effective, integrated approach to address the diverse realities and needs of each watershed – HUC-12 scale
- allow for project eligibility and funding;
- establish goals, objectives, projects, and timelines; and
- is the tool Ohio can rely upon to implement nonpoint source strategies in the Western Lake Erie Basin

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