

# Total Maximum Daily Load and Implementation Recommendations to Improve Water Quality In Ox Creek



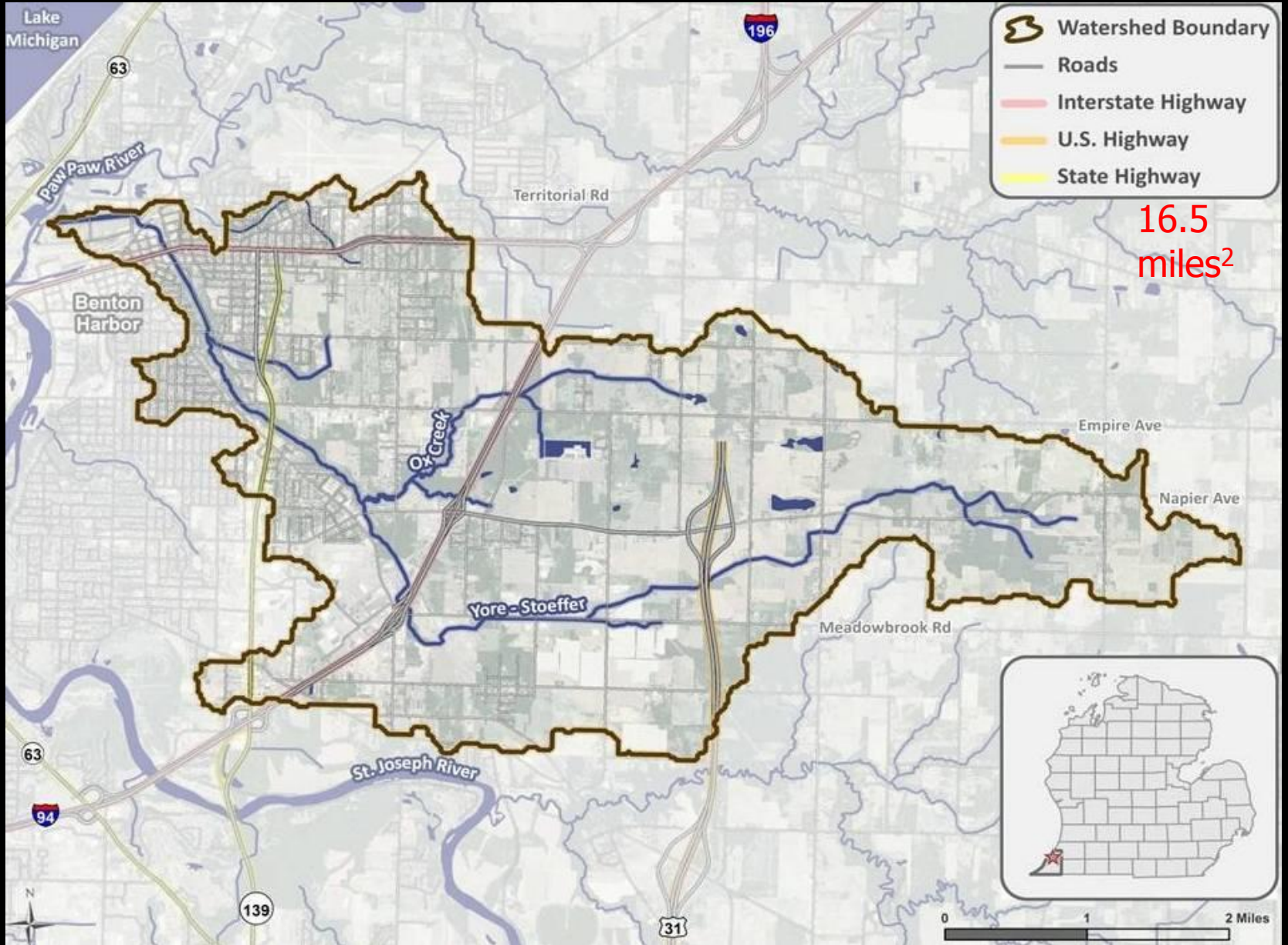
Public Meetings  
March 7, 2013  
Benton Harbor, MI



# Overview

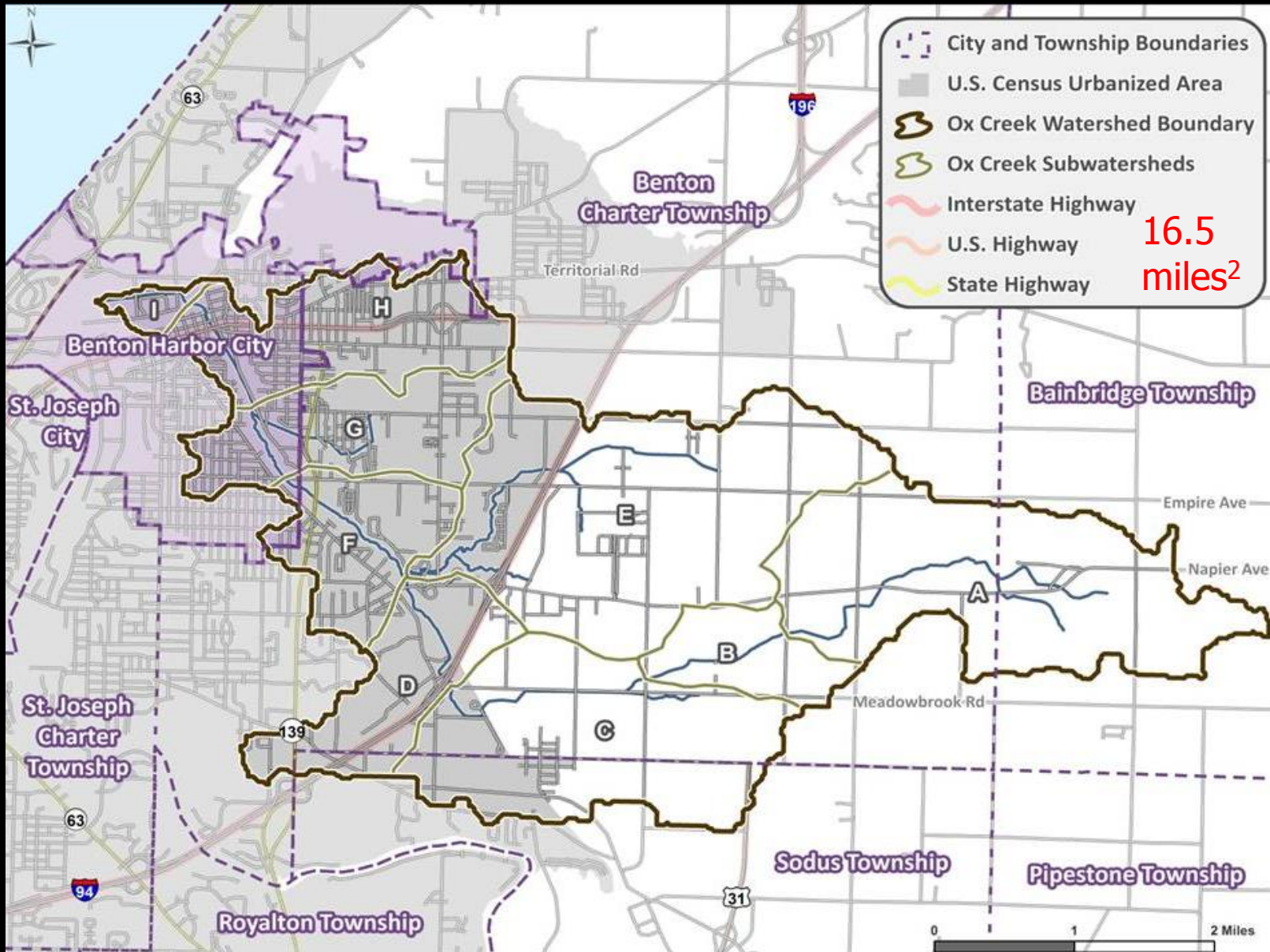
- Why are we concerned about Ox Creek?
- What is a TMDL and why is it needed?
- TMDL Target Development
- What does this TMDL mean for point sources and non-point sources (allocations)?
- What assurance do we have that the TMDL will be implemented?
- Implementation recommendations.
- Future Monitoring
- Questions and Comments.
- Open time to look at maps and ask further questions.

# Ox Creek Watershed





# Ox Creek Watershed



# Ox Creek Concerns

- Impaired (not healthy)
- “Poor” bug community throughout the watershed 2001, 2006
- Designated Uses not being met
- Requires a TMDL
  - scheduled 2013



# Why do we use macroinvertebrates (bugs)?

- Types and diversity of bug community reflects water quality and habitat quality
- Different kinds of bugs are more or less sensitive to pollution/habitat disturbance

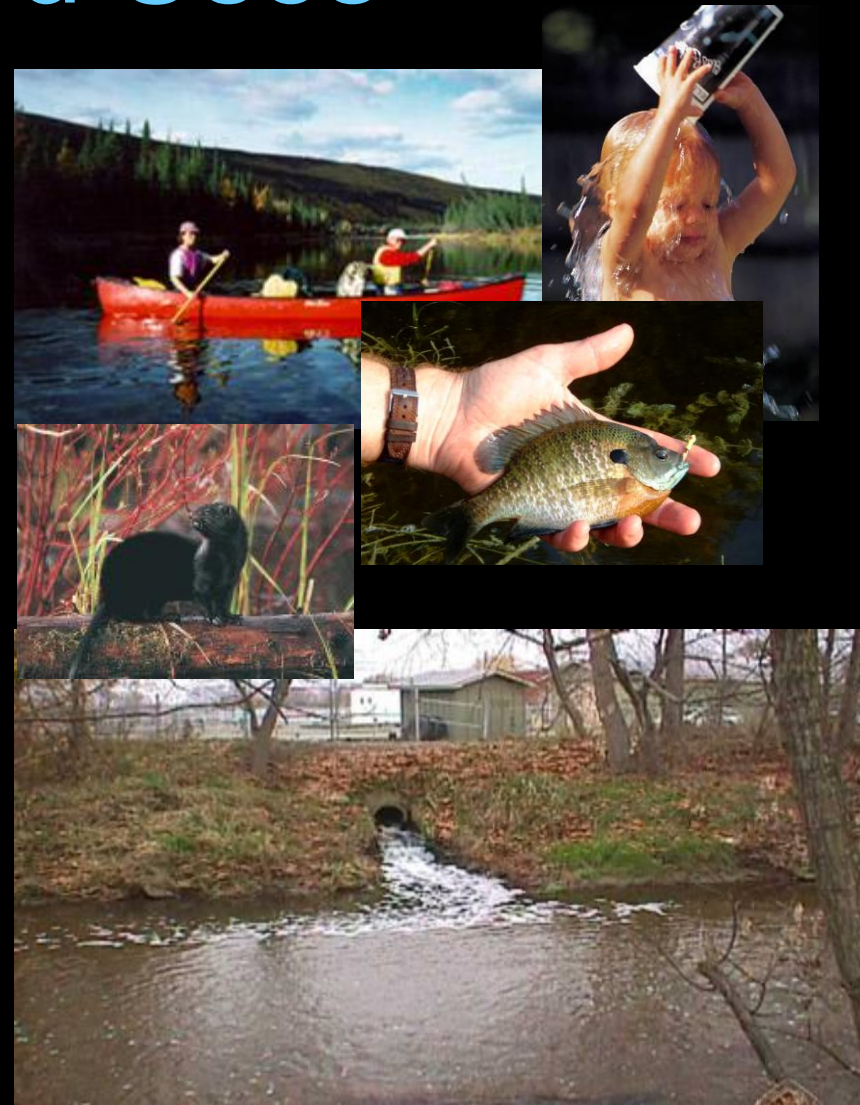


- Bugs live there throughout the year vs. a water sample which is a “snapshot” of water quality.



# Designated Uses

- Agriculture
- Navigation
- Industrial Water Supply
- Fish consumption
- Other Indigenous Aquatic Life and Wildlife
- Partial body contact recreation
  - Total body contact (seasonally)
- Warmwater Fishery
  - Coldwater Fishery



# Why the Poor Scores?

- Causes: other flow regime alterations, sedimentation/siltation, and solids (suspended/bedload)
- Source: stream bank modifications, storm water quality and quantity





# Evidence

## – Based on observations

- Turbid flows during high flow events
- 4 foot rise in water during relatively moderate rain event
- Fine layer of silt on most substrates throughout watershed

## - Supported by data

- suspended solid loads higher in Ox Creek; compared to streams with acceptable bugs



# Why is Sediment Bad for Bugs?

- Sediment covers habitat
- Scours biota
- Sediment causes turbidity
  - Impacts plant growth
- Changes channel shape
- Sediment can harm fish
  - Habitat for spawning
  - Egg development
  - Harms Fish Food (bugs)

# Why is Excessive Flow Bad for Bugs?

- Wash Bugs off substrate
- Don't have time to recolonize
- Cause erosion of stream banks
- Storm water flows bring in sediment and other contaminants (nutrients, oil, gasoline, residuals from exhaust) from upland sources.





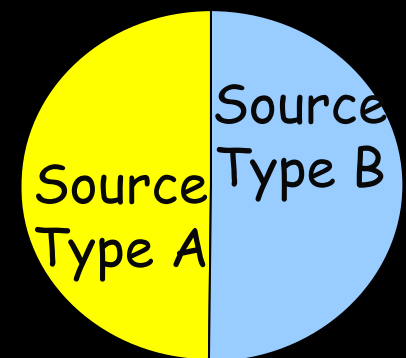
# Additional Possible Causes

- Contaminated sediment
- Chronic WQS exceeded for PAHs
- Possible sources included storm water runoff, contaminated venting groundwater, old industrial contaminated sites.
- **Not enough evidence/data to develop TMDL**



# Total Maximum Daily Load = TMDL

- Calculation of **maximum amount of a pollutant** that a waterbody can receive and still meet water quality standards
- An **allocation** of that amount to the pollutant's sources.
  - Point sources (NPDES permits)
  - Non-point sources (everything else, including unregulated storm water)
- **Required** by Clean Water Act and USEPA for waterbodies that are not meeting designated uses [Section 303(d)]



# TMDL Process



Designated Use  
Not Being Met



Pollutant Identified and  
Allowable Levels Calculated



Allocations Made to Source  
Types



Document Written:  
Explains Actions occurring or  
needed to restore quality of the  
resources



# TMDL Development

## Regulatory Framework

### ★ TMDL Report -- Required Elements



✓ Applicable WQ Standards

✓ Loading Capacity

✓ Source Assessment

✓ Allocations

✓ Seasonal Variation

✓ Margin of Safety

$$\text{TMDL} = \text{WLA}_{\text{Point Sources}} + \text{WLA}_{\text{MS4}} + \text{LA} + \text{MOS}$$

# TMDL Development

## Problem Solving Framework

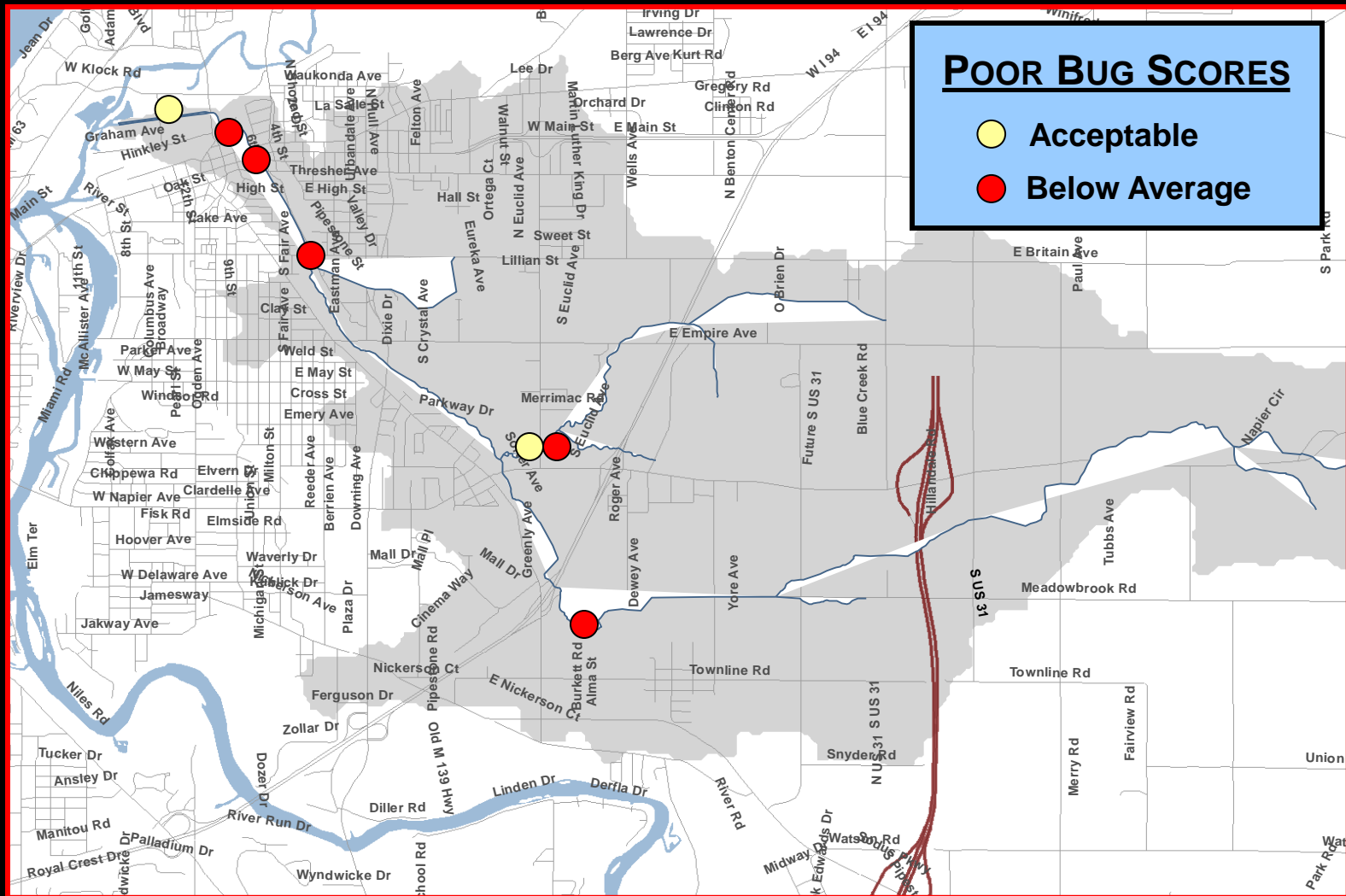
★ Practical approach using key questions ...

- ✓ WHY the concern
- ✓ WHAT reductions are needed
- ✓ WHERE are the sources
- ✓ WHO needs to be involved
- ✓ WHEN will actions occur



# Ox Creek TMDL

## WHY the Concern



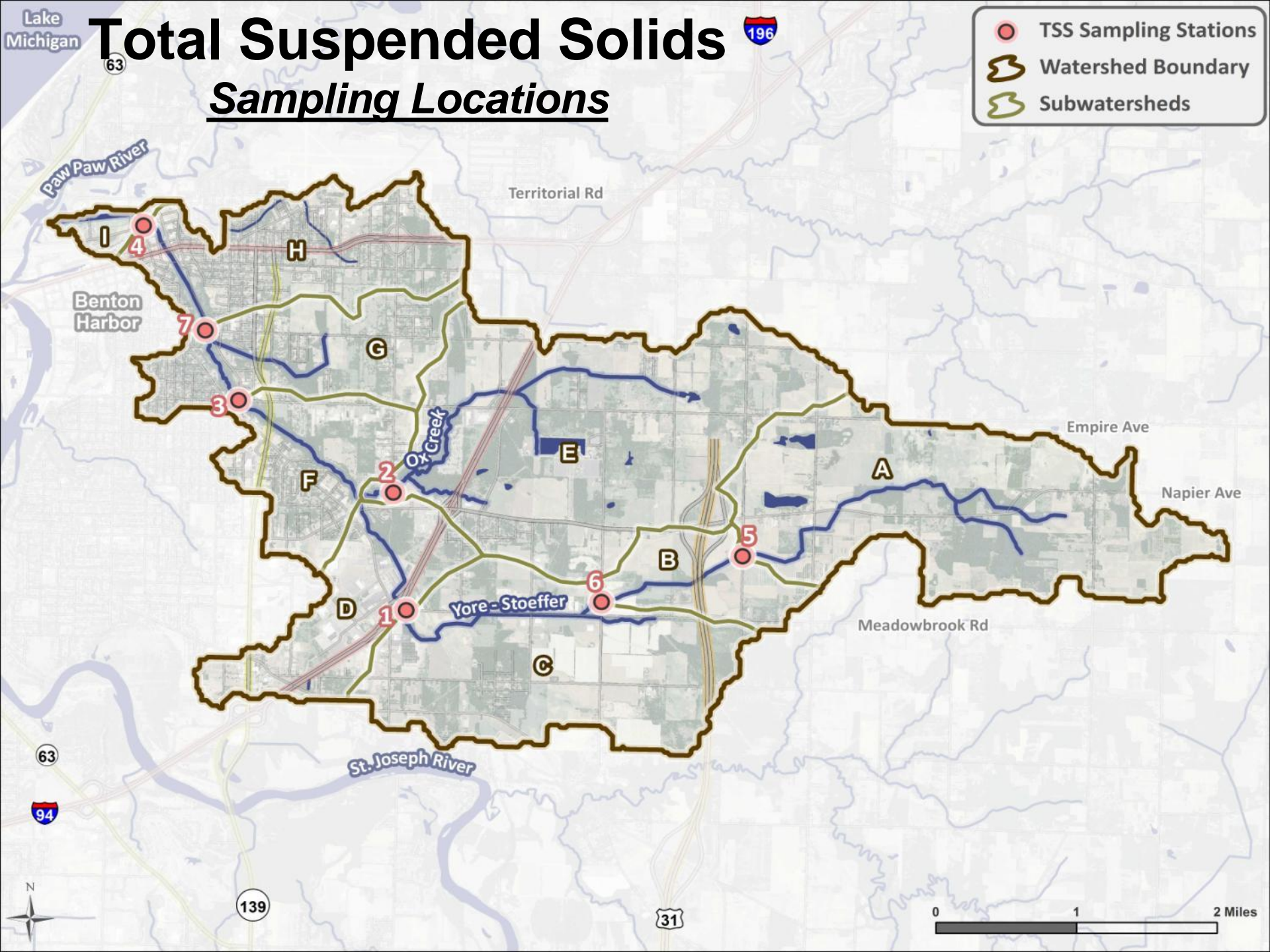


# Total Suspended Solids



## Sampling Locations

- TSS Sampling Stations
- Watershed Boundary
- Subwatersheds





# Ox Creek TMDL

## WHAT are the Targets

★ **Total Suspended Solids (TSS):**

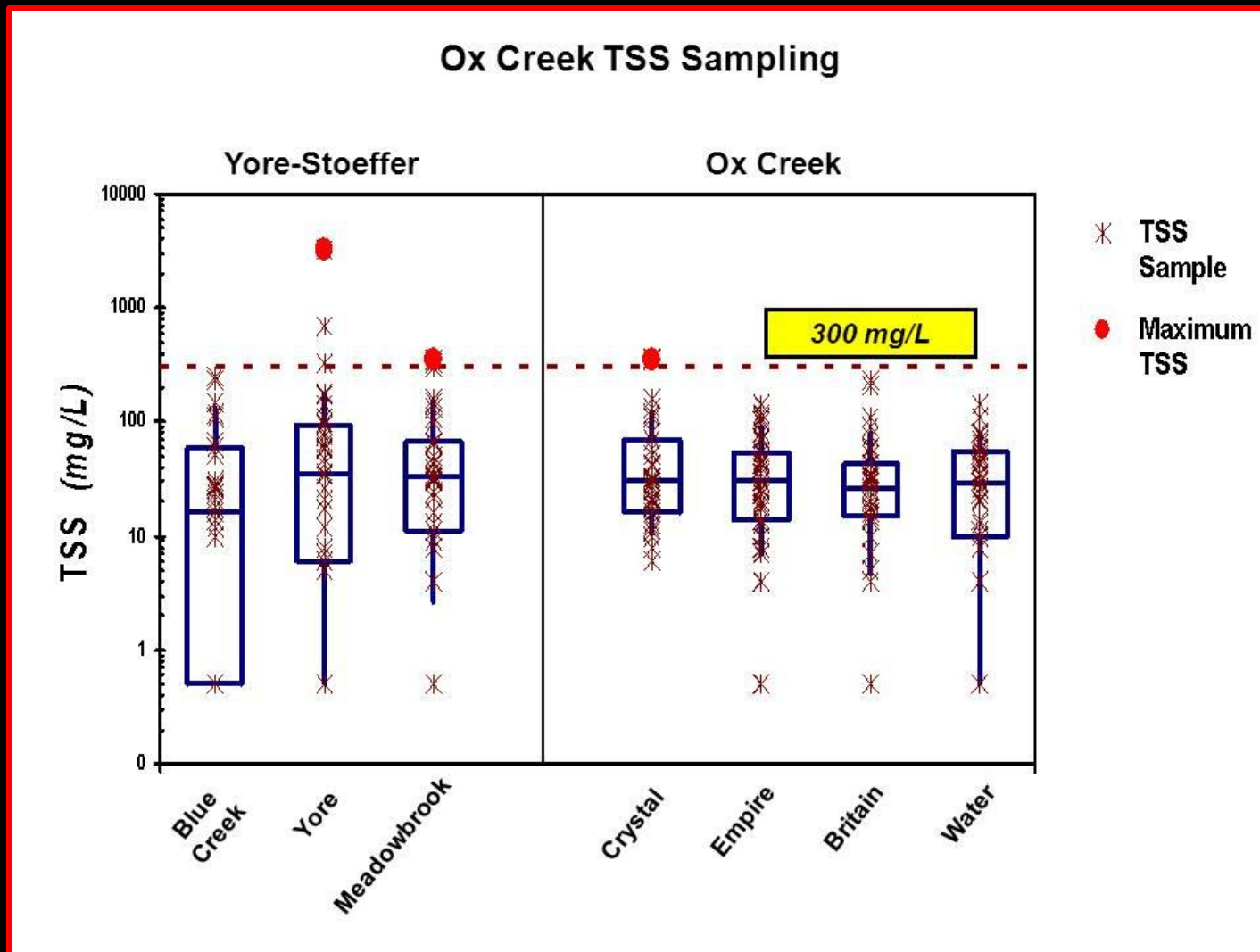
**300 mg/L Daily Maximum**

★ **Flow: *Affects both bugs and TSS Loads***



# Total Suspended Solids

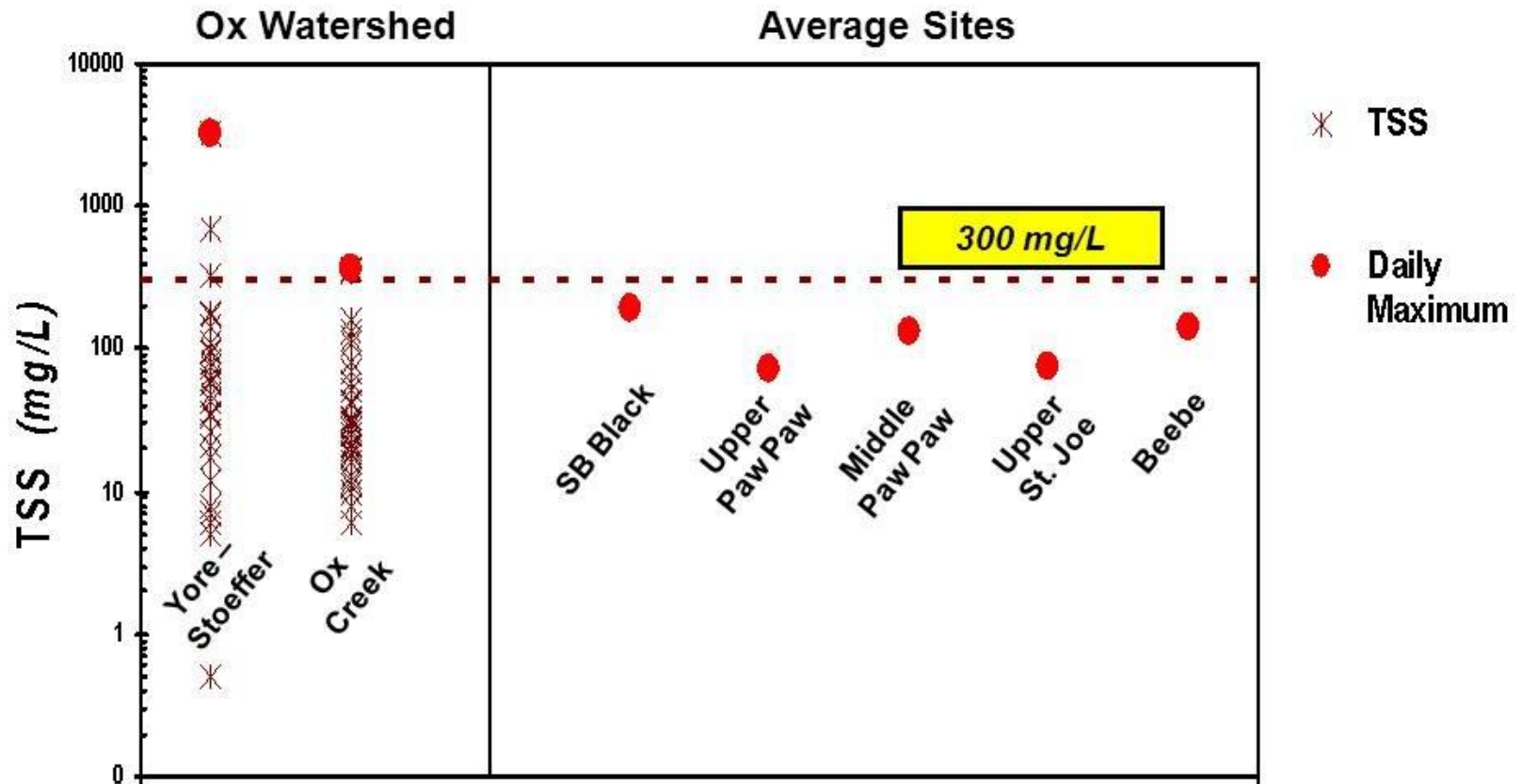
## What is Ox Creek's condition?



# Total Suspended Solids

## How does Ox Creek compare?

Ox Creek Compared to "Average" Bug Sites





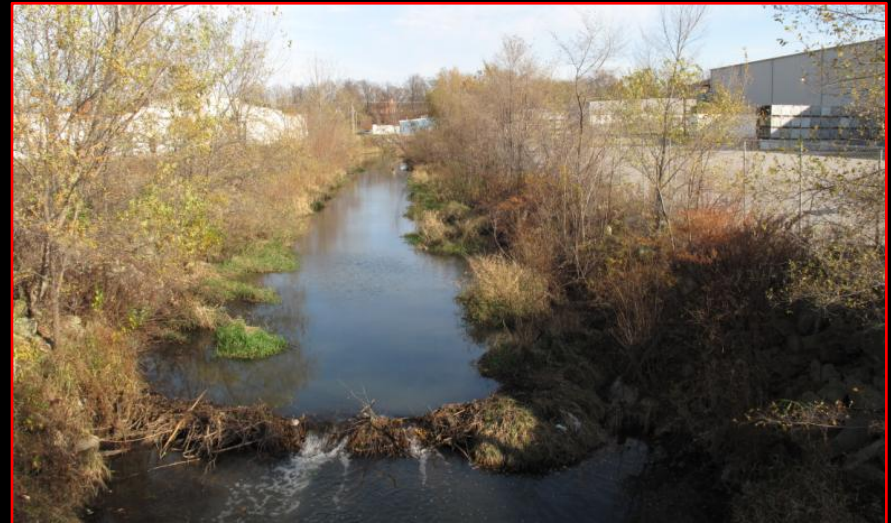
# Ox Creek TMDL

## Why is Flow Important?

- ★ Used to calculate loads

$$\text{Load} = \text{Flow} * \text{TSS} * \text{Conversion Factor}$$

- ★ Affected by impervious cover  
(*amount of runoff & “flashiness”*)



# Ox Creek

## Identifying Representative Flow



**Galien River** *(located south of Ox Creek near Sawyer)*

- ✓ **Monitored daily for 16 years by US Geological Survey**
- ✓ **Has acceptable bug scores based on DEQ sampling**
- ✓ **Used to identify representative 1-day maximum flow**

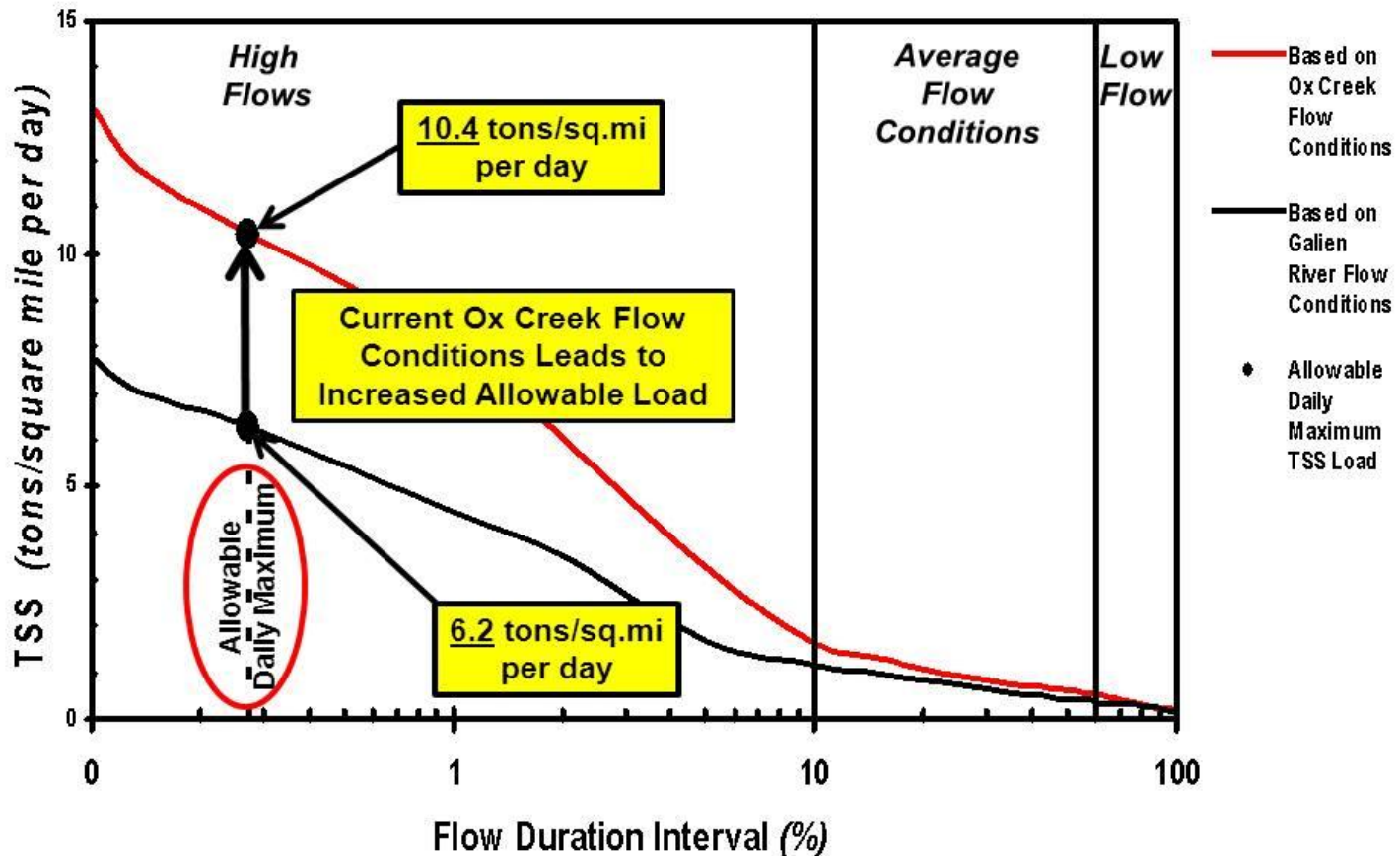


# Flow

## How does it affect the TMDL?

$$\text{Load Capacity} = \text{Flow} * \text{300 mg/L} * 0.002697$$

*Target*                      *Conversion Factor*





# Ox Creek TMDL

## WHERE are the Sources

### ★ Nonpoint

✓ *Land Related (Agriculture, Urban)*

### ★ Point

✓ *Regulated Stormwater*





# Ox Creek TMDL

## Regulatory Framework

★  $\text{TMDL} = \text{WLA}_{\text{Point Sources}} + \text{LA} + \text{MOS}$

183

=

71

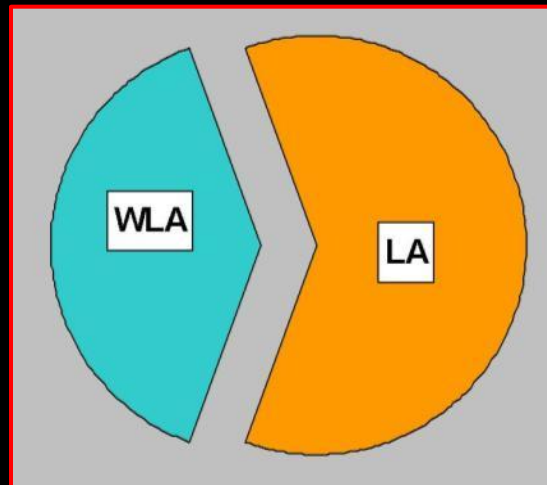
+

112

(Implicit)

Total Suspended Solids (tons/day)

TMDL Allocations



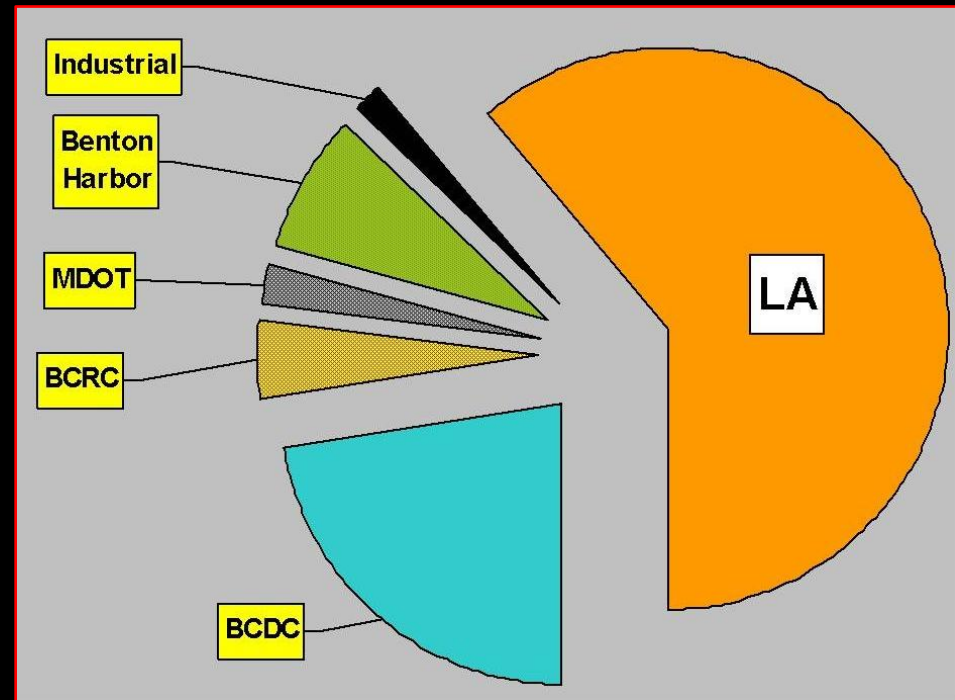
# Ox Creek TMDL

## WHO Needs to be Involved



### Wasteload Allocations

- ✓ *Berrien County Drain Commission*
- ✓ *Berrien Co. Road Commission*
- ✓ *Michigan DOT*
- ✓ *Benton Harbor*
- ✓ *Industrial*

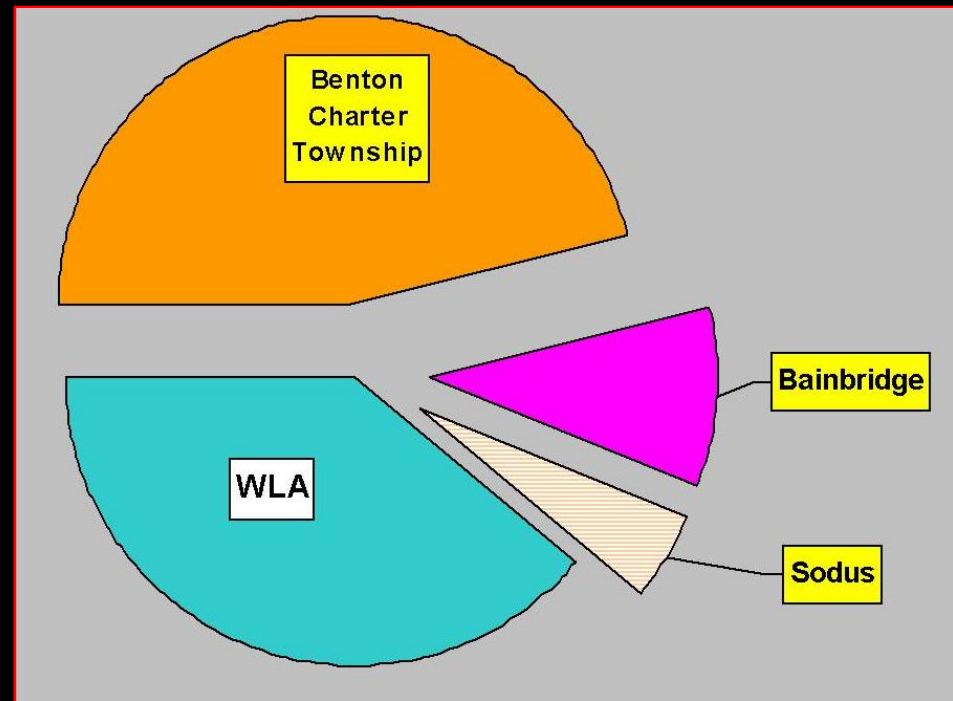


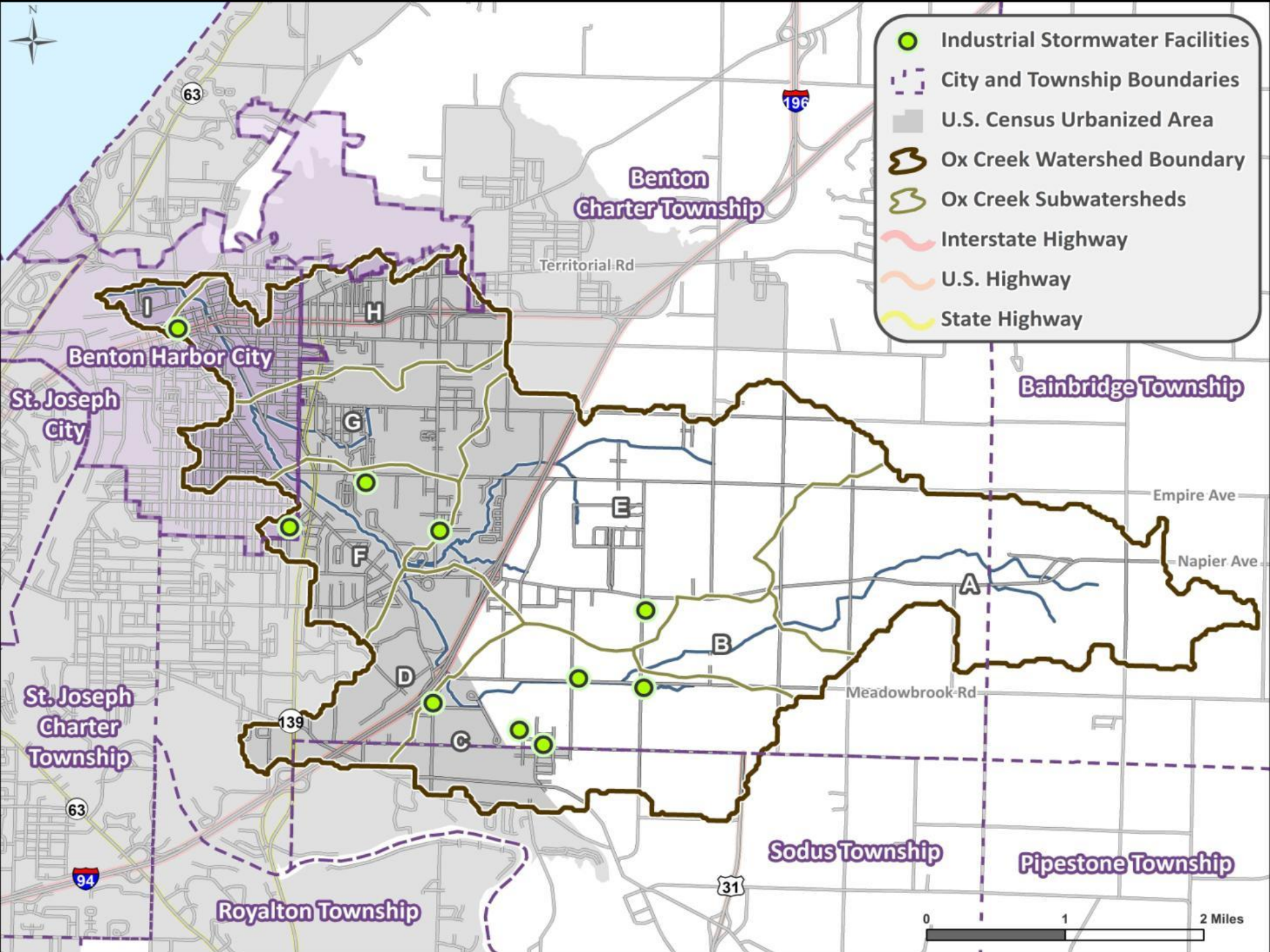
# Ox Creek TMDL

## WHO Needs to be Involved

### ★ Load Allocations

- ✓ *Benton Charter Township*
- ✓ *Bainbridge Township*
- ✓ *Sodus Township*

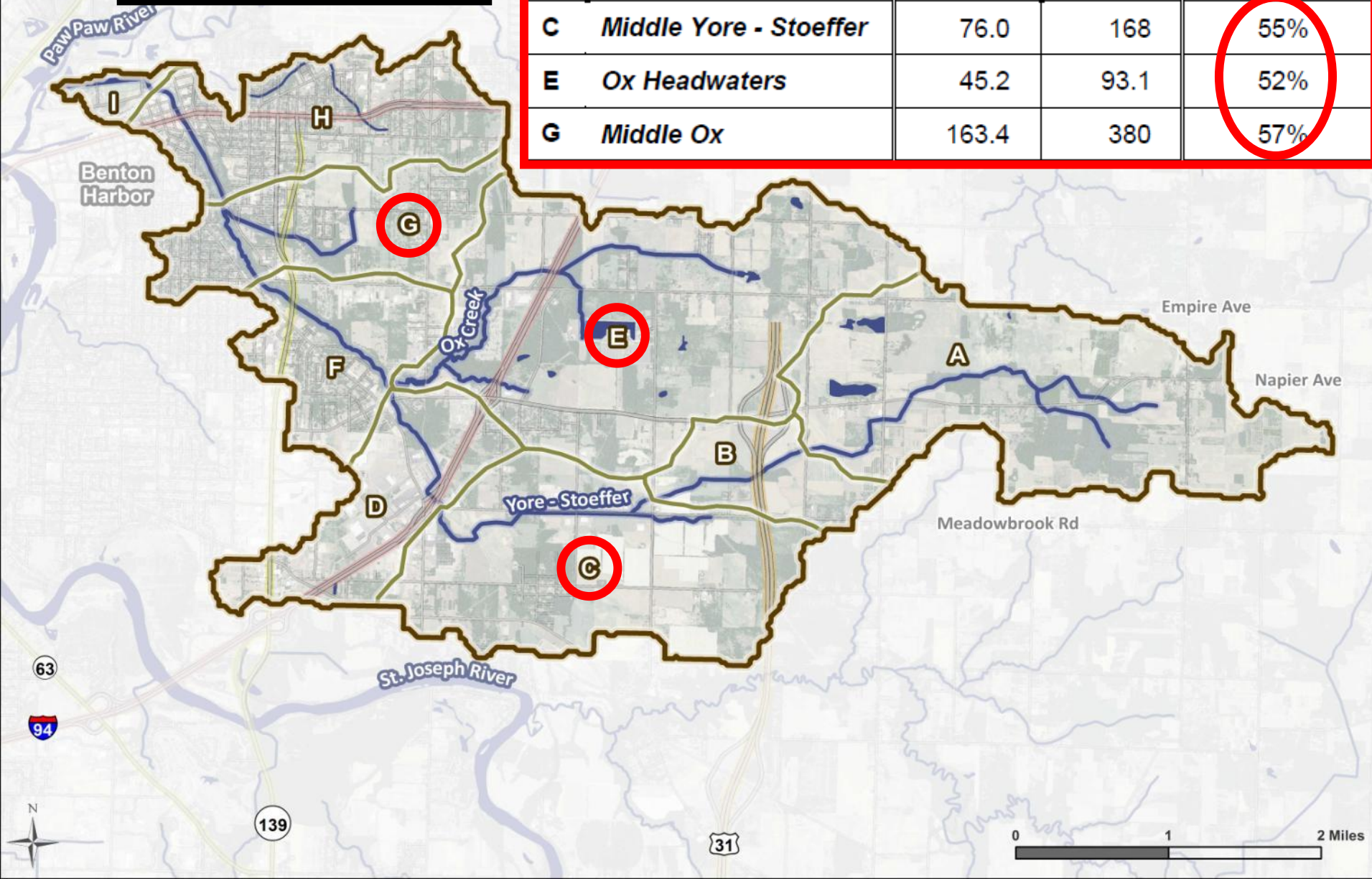






# Needed Reductions

Subwatershed	Load (tons/day)		Load Reduction
	Capacity	Existing	
<b>C</b> <i>Middle Yore - Stoeffler</i>	76.0	168	55%
<b>E</b> <i>Ox Headwaters</i>	45.2	93.1	52%
<b>G</b> <i>Middle Ox</i>	163.4	380	57%



# What a TMDL Can and Can Not Do

- TMDL can
  - Exercise regulatory authority over point source discharges
  - Regulations require permit limits to be consistent with TMDL
  - Provide available information on potential sources of contaminants
- TMDL Can **NOT**
  - Exercise authority over non-point sources (LAs)

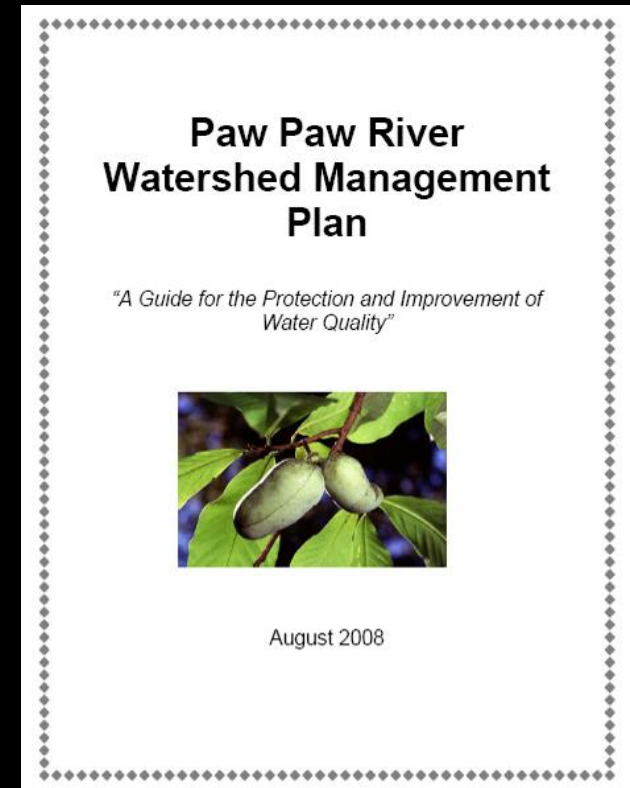
Cooperation is the goal!

# Ox Creek TMDL

## Reasonable Assurance

### ★ Current programs help meet TMDL targets

- ✓ **Stormwater permits**  
*- Must be consistent with TMDL*
- ✓ **MI Agriculture Environmental Assurance Program**
- ✓ **Two Rivers Coalition**
- ✓ **Paw Paw River Watershed Management Plan**



[http://www.swmpc.org/pprw\\_mgmt\\_plan.asp](http://www.swmpc.org/pprw_mgmt_plan.asp)



# Ox Creek TMDL

## Implementation Recommendations

### ★ Paw Paw River Watershed Plan Priorities

- ☑ ***Wetlands Protection & Restoration***
- ☑ ***Stormwater Management***
- ☑ ***Erosion Reduction***
  - *Field BMPs*
  - *Riparian Buffers*
  - *Stabilize streambanks*





# Ox Creek TMDL

## Implementation Recommendations

### ★ Wetlands Protection & Restoration



***Provides:***

- ***Floodwater Storage***
- ***Sediment Retention***

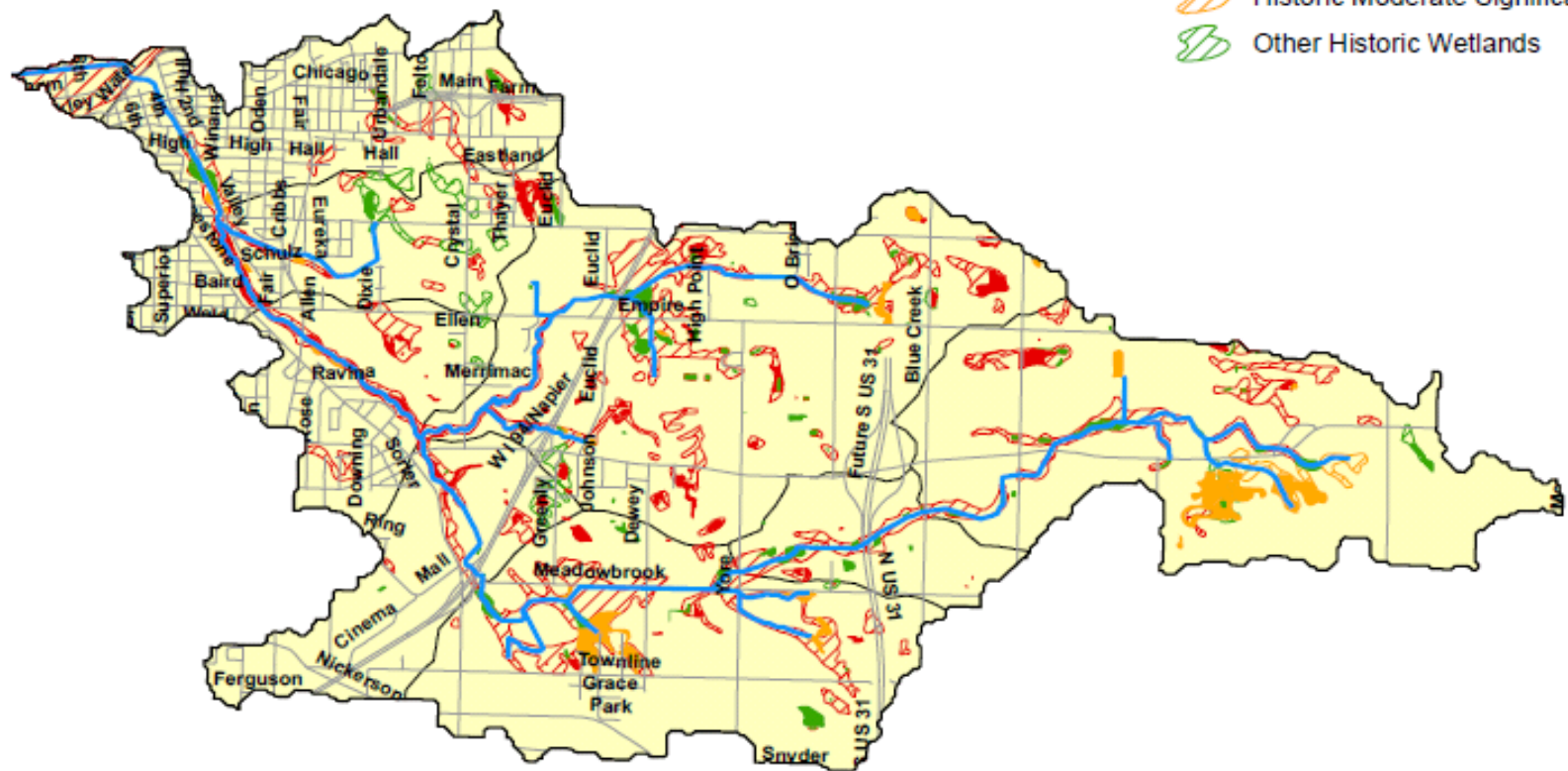


***Paw Paw WMP effort  
identifying  
potential  
opportunities***



## Sediment Retention Wetlands

- Existing High Significance
- Existing Moderate Significance
- Other Existing Wetlands
- Historic High Significance
- Historic Moderate Significance
- Other Historic Wetlands



"Sediment Retention" refers to the ability of the wetland to retain sediment and other particulates that would otherwise be transported downstream. Sediment retention significance is based on the Landscape Level Wetland Functional Assessment performed by the Michigan Department of Environmental Quality to rank historic and existing wetlands based on their ability to perform certain functions. The extent of Existing Wetlands is based on the 2005 National Wetland Inventory and these wetlands are assumed to be performing these functions currently. The extent of Historic Wetlands is based on NRCS hydric soil data. It is assumed that these areas have been filled or drained, but they have the potential to serve this function if restored.

# Ox Creek TMDL

## Implementation Recommendations



### Stormwater Management



#### *Best Management Practices*

- *Vegetated Swales*
- *Rain Gardens*
- *Pervious Pavement*
- *Silt Fences*
- *Road Maintenance Practices*



#### *Local Stormwater and Post-construction Ordinances*





# Ox Creek TMDL

## Implementation Recommendations



### Agricultural Erosion Reduction



#### ***Best Management Practices***

- ***Riparian Buffers***
- ***Filter Strips***
- ***Grassed Waterways***
- ***Conservation Tillage***
- ***Ditch Management***



***Cost-effective targeting  
for BMP implementation  
(Paw Paw WMP effort)***

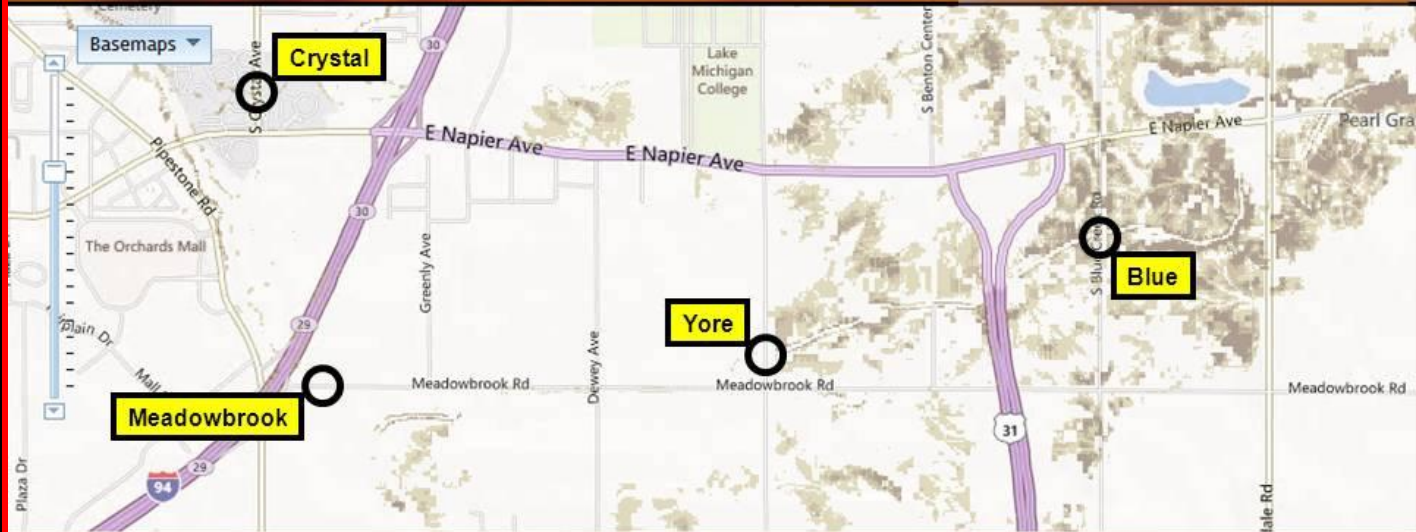




# Implementation Recommendations

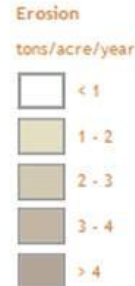
## Targeting High Impact Areas

### Sediment Calculator for the Paw Paw River Watershed



Developed by the Institute of Water Research at Michigan State University

Base map from the HIT tool adapted for Paw Paw River Watershed.  
Institute of Water Research  
Michigan State University  
The Nature Conservancy  
Southwest Michigan Planning Commission  
<http://38.8.121.111/sedcalc/>



○ Denotes location of MDEQ TSS monitoring sites

# Implementation Opportunities

## Getting Started



### Potential Collaboration Partners

- Southwest Michigan Planning Commission*
  - Berrien County Drain & Road Commissions*
  - Berrien County Conservation District*
  - City of Benton Harbor & Benton Charter Township*
  - Land Owners*
- Cooperation is the goal!***

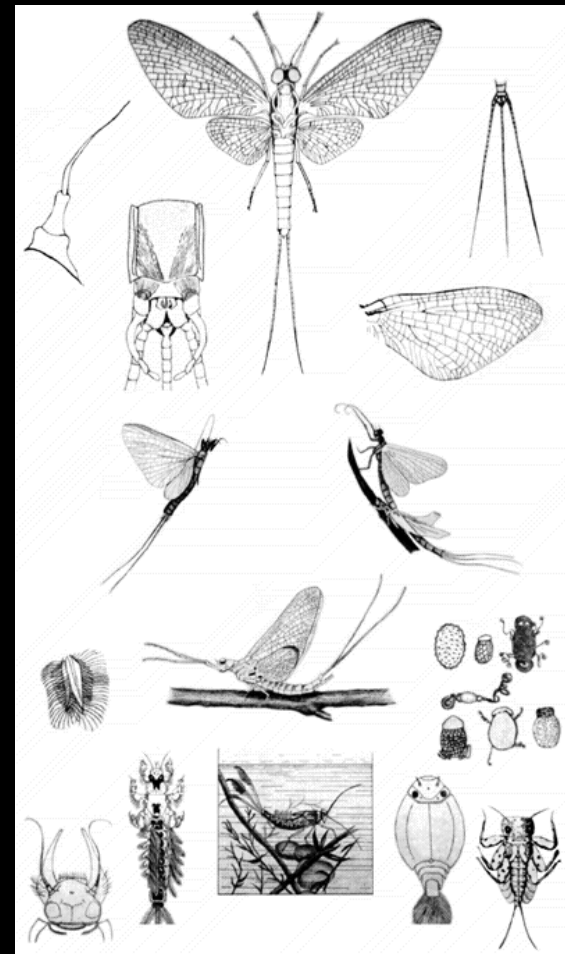


### Potential DEQ Funding Sources

- Clean Michigan Initiative*
- Federal Clean Water Act Section 319 Grants*

# Goal of OX Creek TMDL

- To restore biological communities to meet Michigan Water Quality Standards.
- Repeatable “acceptable” macroinvertebrate community scores throughout watershed.
- If TSS targets are met and macroinvertebrates score poor, TMDL targets will be revisited.



# What is next?

- Draft TMDL on public notice through March 26, 2013.
- <http://michigan.gov/waterquality>
- Respond to comments and submit to EPA for final approval.



# More Information

- **Watershed Characterization Report (2010)**
  - Landuse, geology, soils,
  - Data summary of all data collected
  - Source Assessment
    - Point Sources, Remediation Sites, Storage Tanks
- **Linkage Analysis Report (2012)**
  - Potential Stressors
  - Flow
  - Sediment Quality, Suspended Sediment
  - Target Development

<http://michigan.gov/waterquality>

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