Maumee Watershed Alliance

partnerships for healthy rivers

Water Quality Monitoring Series: Cedar Creek

Sharon Partridge, Project Manager

Maumee Watershed Alliance

This project made possible by a

Conservation Technology Assistance grant from the

Natural Resources Conservation Service, and a 319 Grant from the Indiana Dept. of

Environmental Management

What is the most common cause of pollution in streams, rivers, and oceans?

Point Source Pollution

- 25% of pollution in the U.S.
- Direct discharge from industry, sewage treatment plants, etc.
- Easier to identify due to “end of pipe”
- Usually regulated and controlled

Nonpoint Source Pollution

- 75% of pollution in the US
- General runoff of water contaminated by poor land use, homes, streets, air, etc.
- Difficult to identify
- Only partially regulated

Sediment is the # 1 pollutant by volume

Common NPS Pollutants

- Excess fertilizers, herbicides and insecticides from agricultural lands and residential areas
- Oil, grease, heavy metals, and toxic chemicals from urban runoff
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks
- Bacteria and nutrients from CSOs, livestock, pet waste, and faulty septic systems
- Atmospheric deposition
- Increased water temperature, or “thermal pollution”

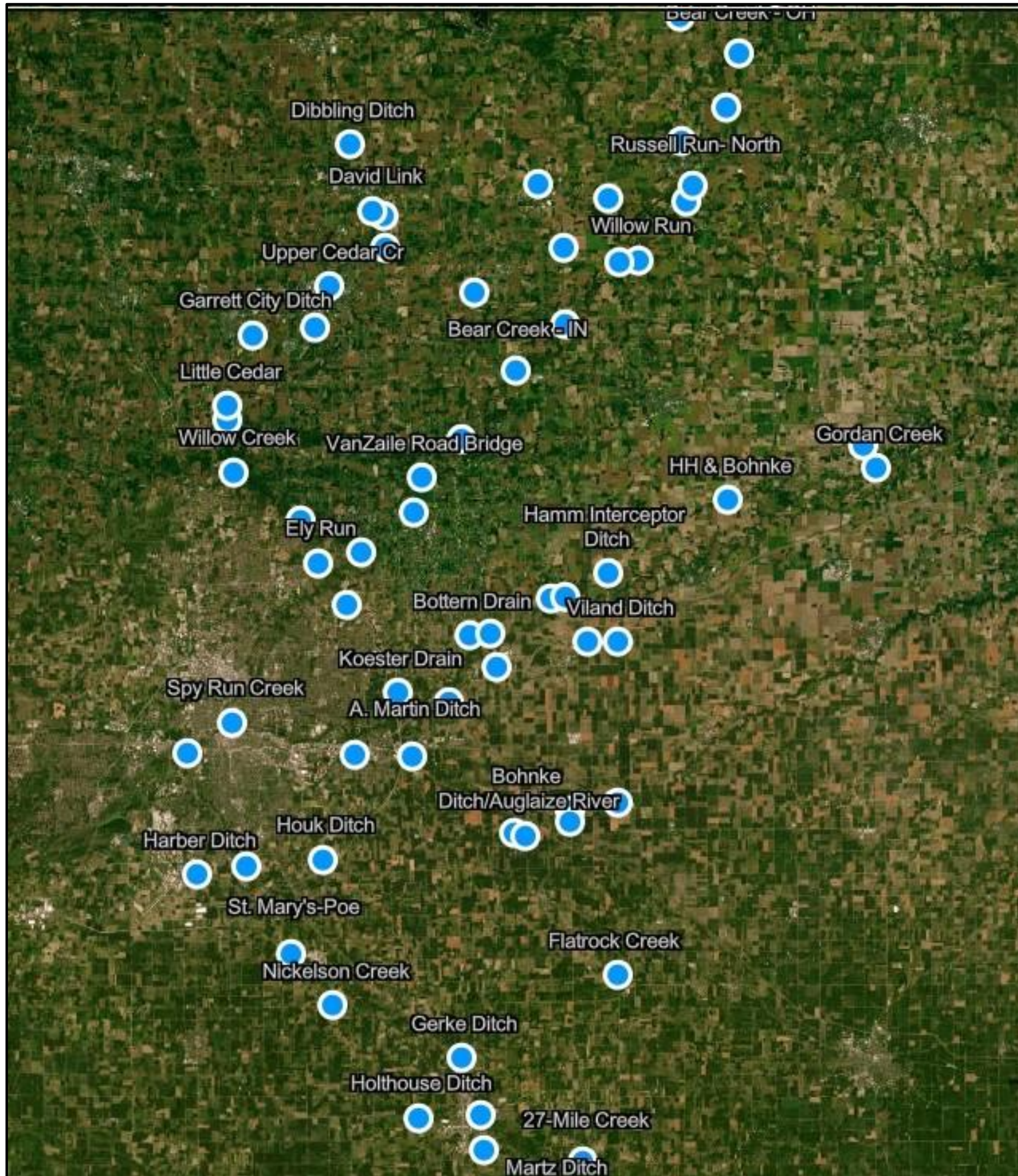
Who Monitors

- Federal Agencies
  - U.S. EPA
  - USGS
  - Forest Service
  - NOAA
  - Fish and Wildlife
- States
  - IDEM
  - DNR
  - Health Department
  - Drinking Water Agencies
- Universities
- Counties
- Municipalities
- Tribes
- Regulated Communities
- Advocacy Organization
  - Nature Conservancy
- Watershed Organizations
- Hoosier Riverwatch and similar Citizen Science programs

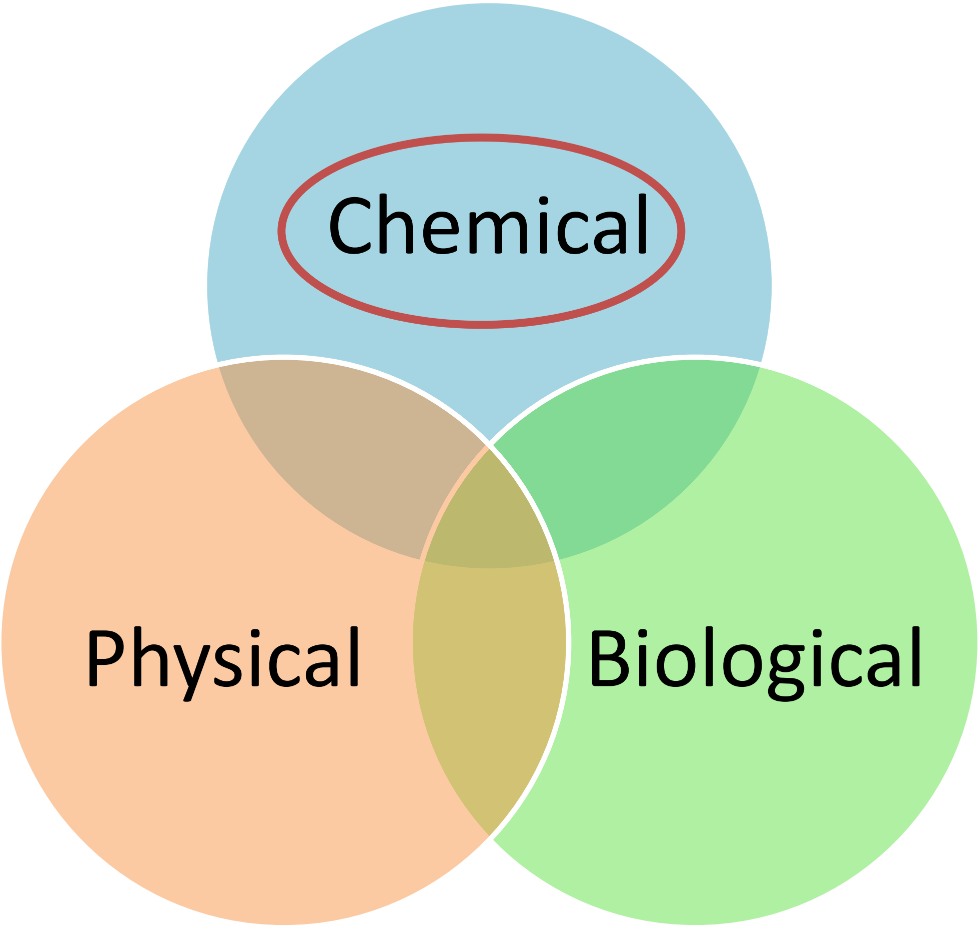
Local Water Quality Monitoring Project

Water quality monitoring program made possible by a partnership between the St. Joseph River Watershed Initiative, Allen County SWCD, City of Fort Wayne, Maumee Watershed Alliance, PFW Environmental Resource Center

> $100,000/yr



Measuring Water Quality



Why We Monitor

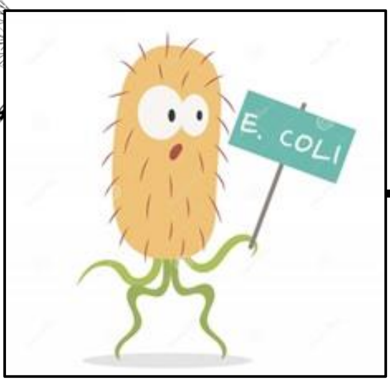
- Identify pollutants and sources
- Establish baseline data
- Document changes and trends
- Measure effectiveness
- Inform stakeholders
- Provide information and data to support modeling
- Characterize watershed…..

When we monitor

- April through October of each year
- Once/week. Typically, every Tuesday
  - Before and after a large rain is optimal, but not practical for the monitoring program
  - Useful for determining types of pollutants washed into stream after rain and reveals changes that occur as result of new land use

What we monitor

- Air & Water Temperature
- Dissolved Oxygen
- pH
- Atrazine (agricultural herbicide)
- Turbidity/Total Suspended Solids
- Total & Dissolved Reactive Phosphorus
- Nitrate/Nitrite
- E. coli and general coliforms



E.coli: Bacteria that is present in the feces of warm-blooded animals. Indicates the presence of pathogens that can cause illness in humans

Turbidity: The measure of clarity often caused by suspended sediment and algae. Problem for water treatment plants. Effects aquatic creatures causing feeding problems, heated water, clogged gills, smothered habitat

Total/Dissolved Reactive Phosphorus & Nitrogen: Promotes plant growth. Excessive amounts can cause algae blooms which effect the amount of oxygen in water and decrease light penetration. Some algae blooms contain toxins that are detrimental to aquatic organisms, wildlife, pets, and humans

Water Quality Targets
Maximum Contaminant Level (MCL)

E.Coli
235 CFU/100 ml

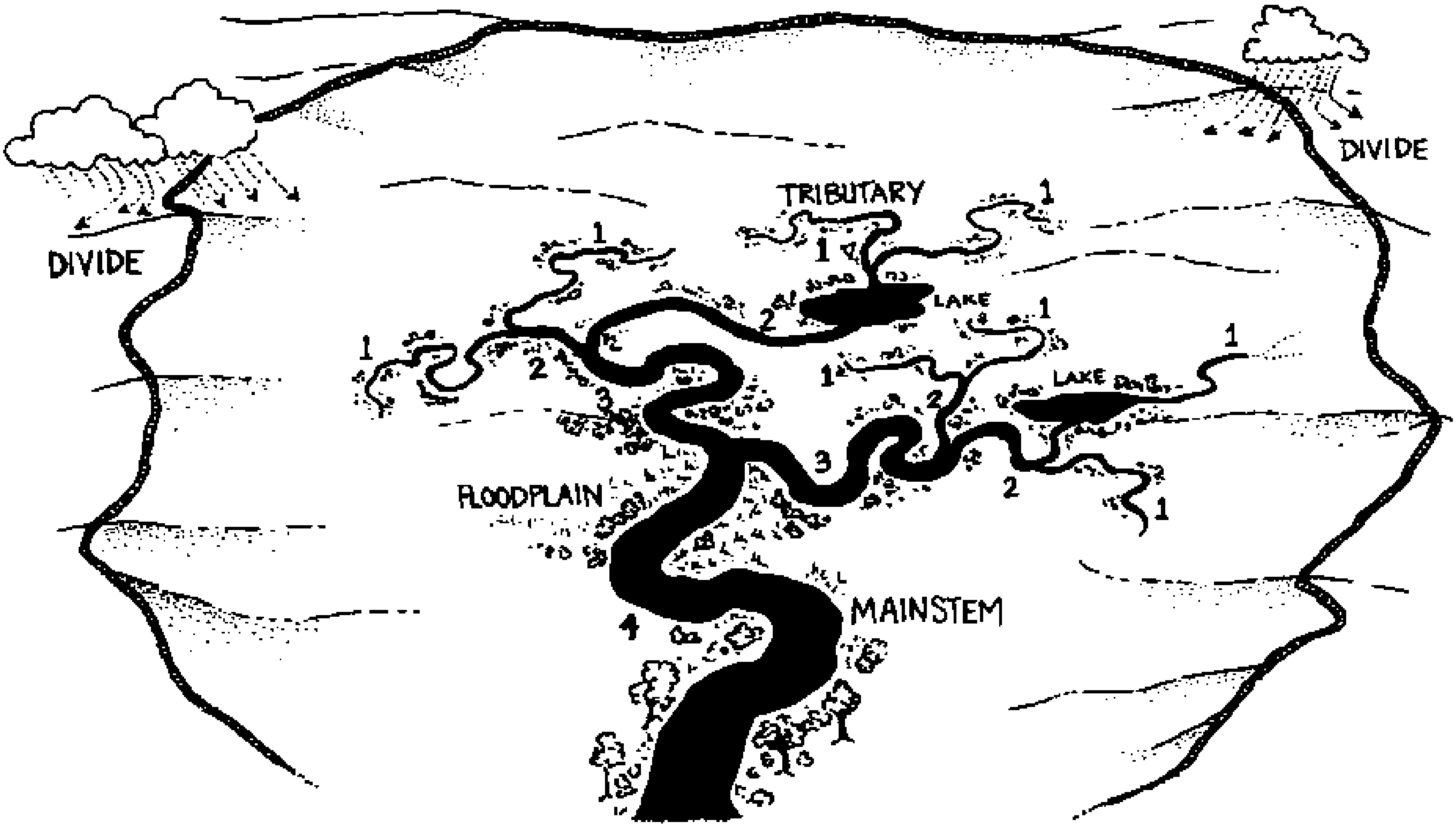
Nitrate/Nitrite
<1.6 mg/L

Total Phosphorus
<0.08 mg/L tributaries
<0.30 mg/L Mainstem

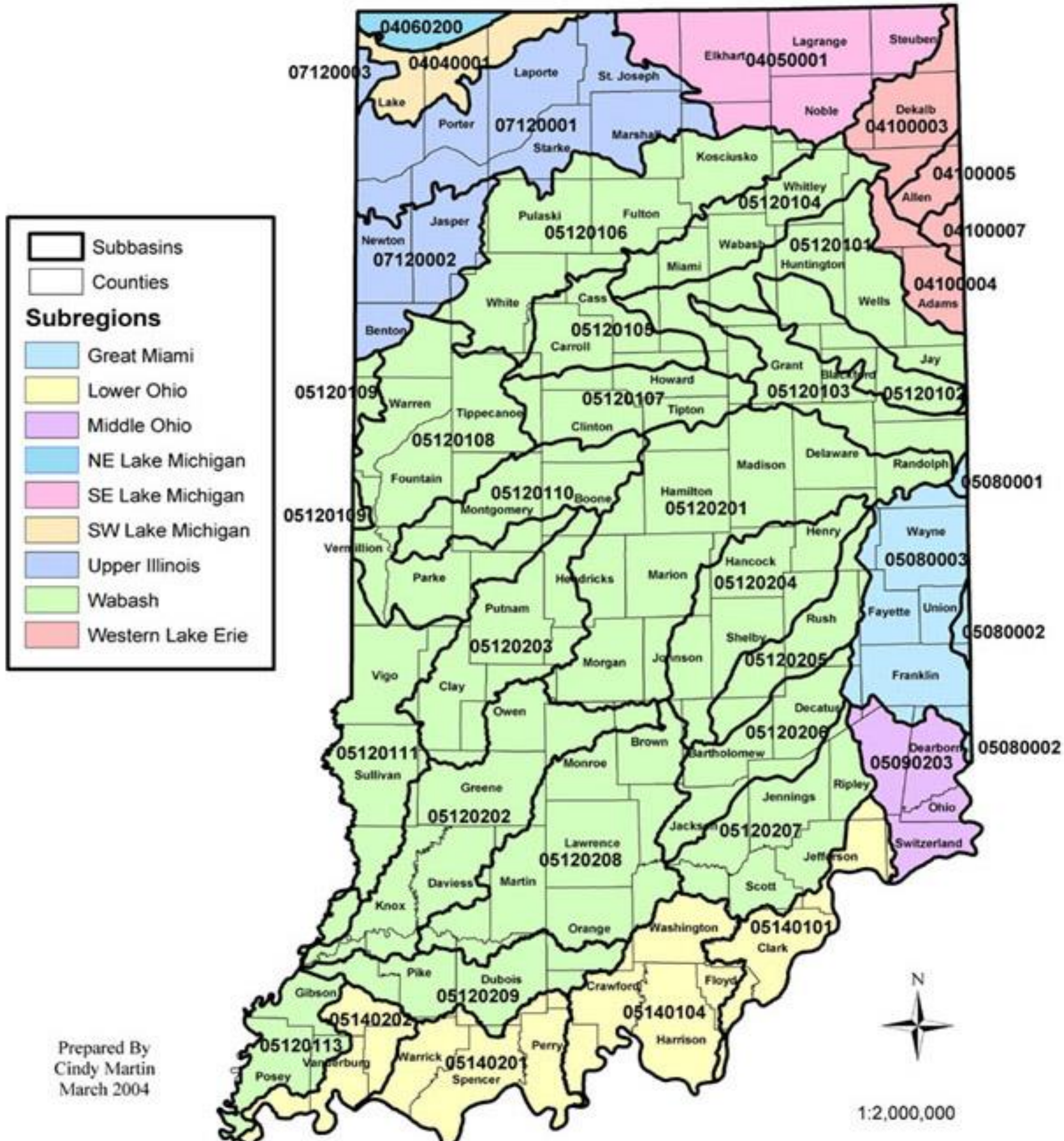
Dissolved Reactive Phosphorus
<0.05 mg/L

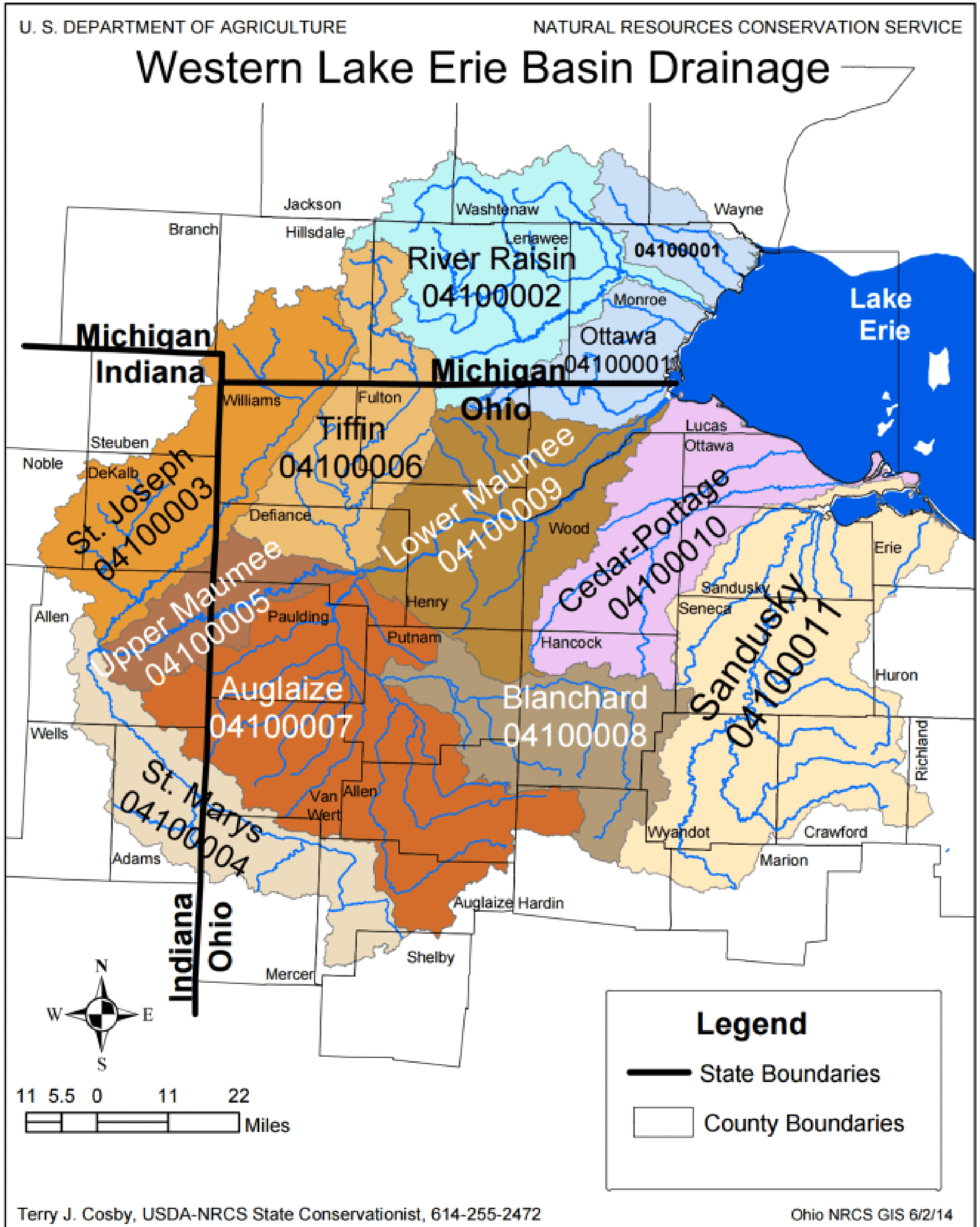
Turbidity
<10.4 NTU

WATERSHED

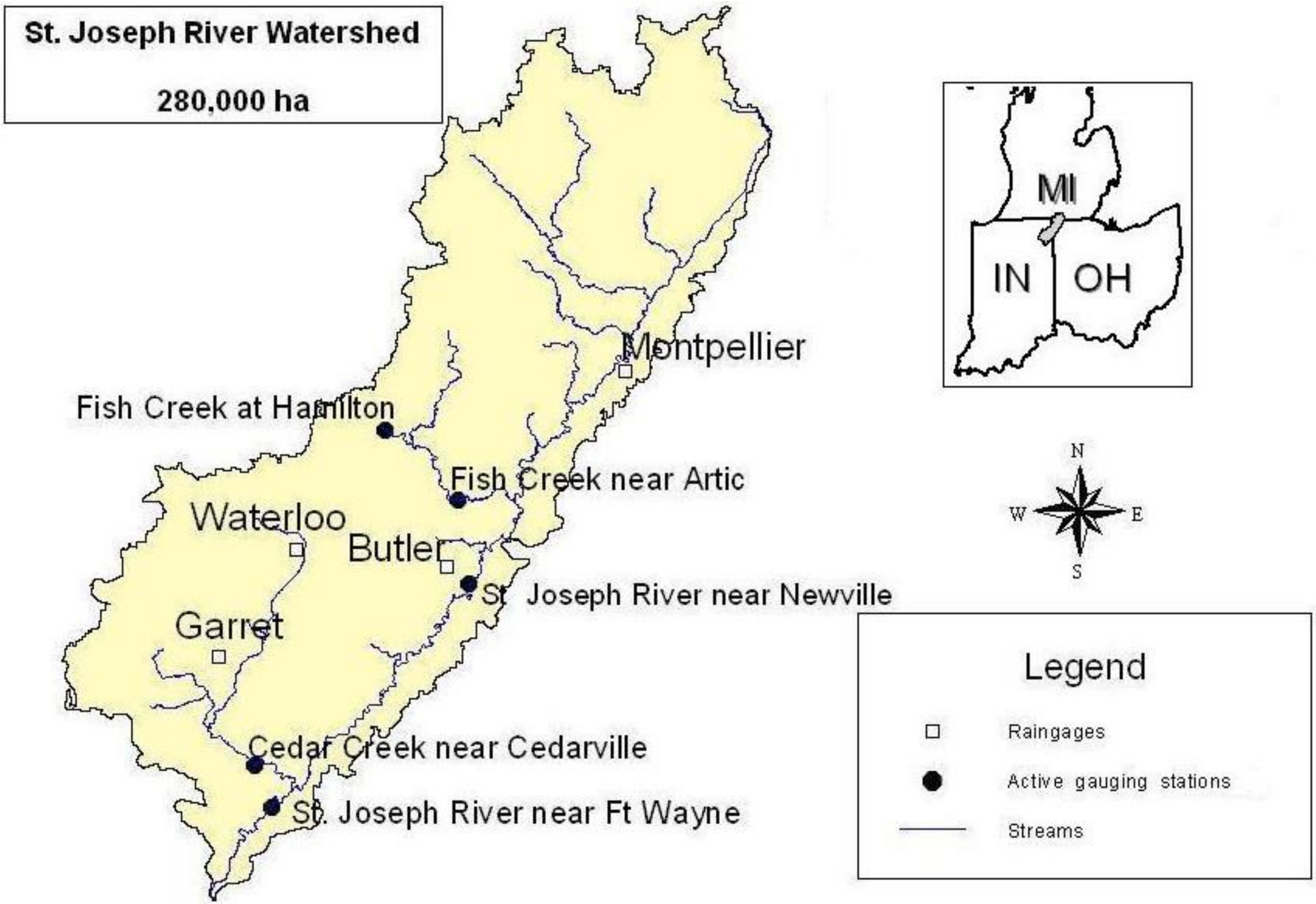


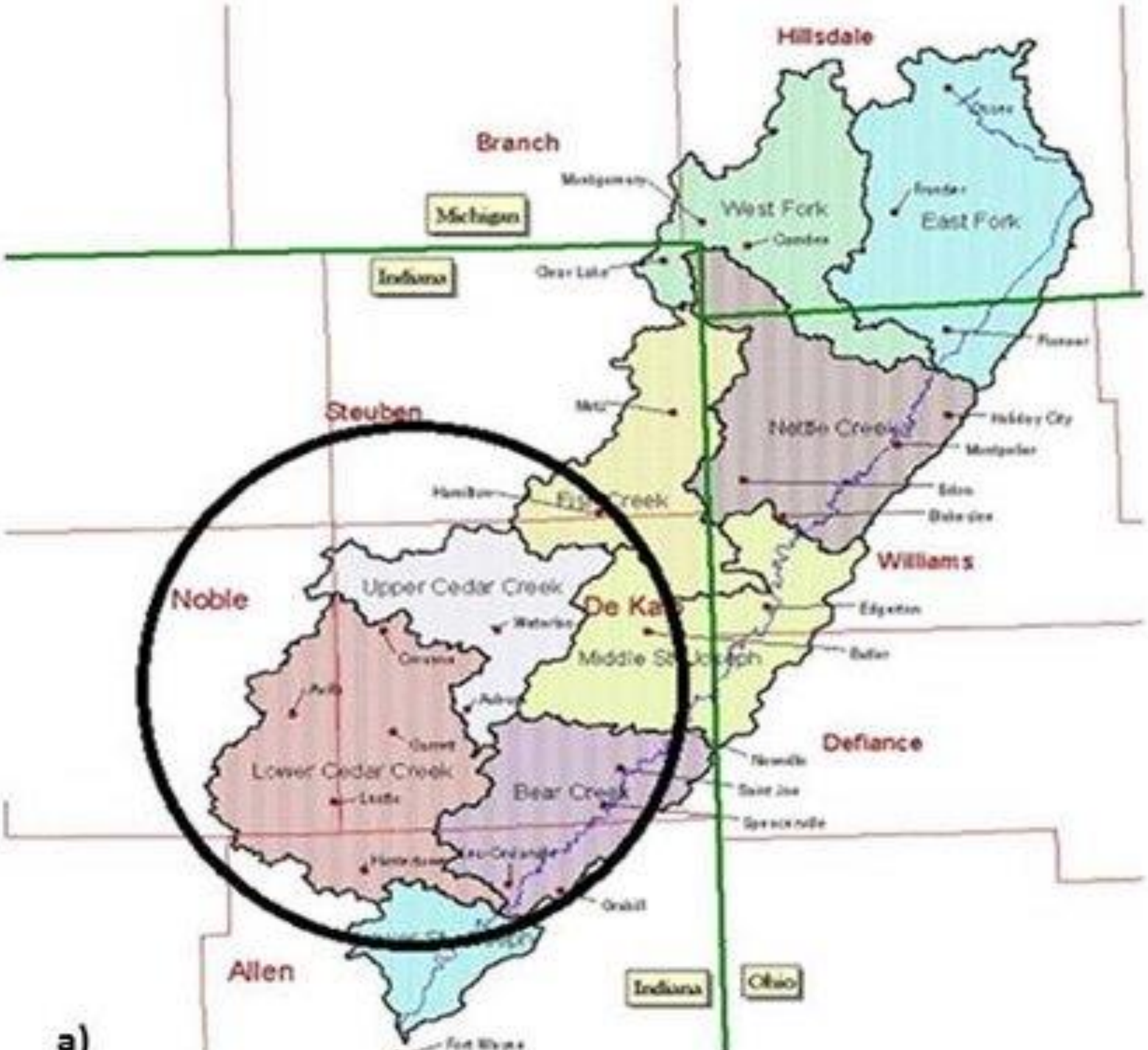
DIVIDE
DIVIDE
TRIBUTARY
LAKE
LAKE
FLOODPLAIN
MAINSTEM
1
1
1
1
1
1
1
1
2
2
2
2
3
3
4


Subbasins
Counties
Subregions
Great Miami
Lower Ohio
Middle Ohio
NE Lake Michigan
SE Lake Michigan
SW Lake Michigan
Upper Illinois
Wabash
Western Lake Erie
04060200
04040001
07120003
Lake
Porter
Laporte
St. Joseph
07120001
Starke
Marshall
Elkhart
04050001
Lagrange
Steuben
Noble
Dekalb
04100003
04100005
Allen
04100007
04100004
Adams
Kosciusko
Whitley
05120104
05120101
Huntington
Wabash
Miami
Fulton
Pulaski
05120106
Jasper
Newton
07120002
White
Cass
05120105
Carroll
Benton
Wells
Grant
Blackford
Jay
05120103
05120102
Howard
05120107
Tipton
05120109
Warren
Tippecanoe
05120108
Clinton
Fountain
05120110
Boone
Montgomery
Delaware
Madison
Randolph
05080001
Hamilton
05120201
Henry
Wayne
05080003
Vermillion
Parke
Putnam
Hendricks
Marion
Hancock
05120204
Fayette
Union
05080002
Rush
Shelby
05120203
Morgan
Johnson
05120205
Vigo
Clay
Owen
Franklin
Decatur
05120206
Brown
Bartholomew
Dearborn
05080002
05090203
05120111
Sullivan
Monroe
Greene
Ripley
Jennings
Ohio
05120202
Jackson
05120207
Switzerland
Lawrence
05120208
Jefferson
Daviess
Martin
Scott
Knox
Orange
Washington
05140101
Clark
Pike
Dubois
Floyd
Crawford
Gibson
05120209
05140202
05140104
Harrison
Perry
05120113
Vanderburg
Warrick
05140201
Spencer
Posey
Prepared By
Cindy Martin
March 2004
N
1:2,000,000

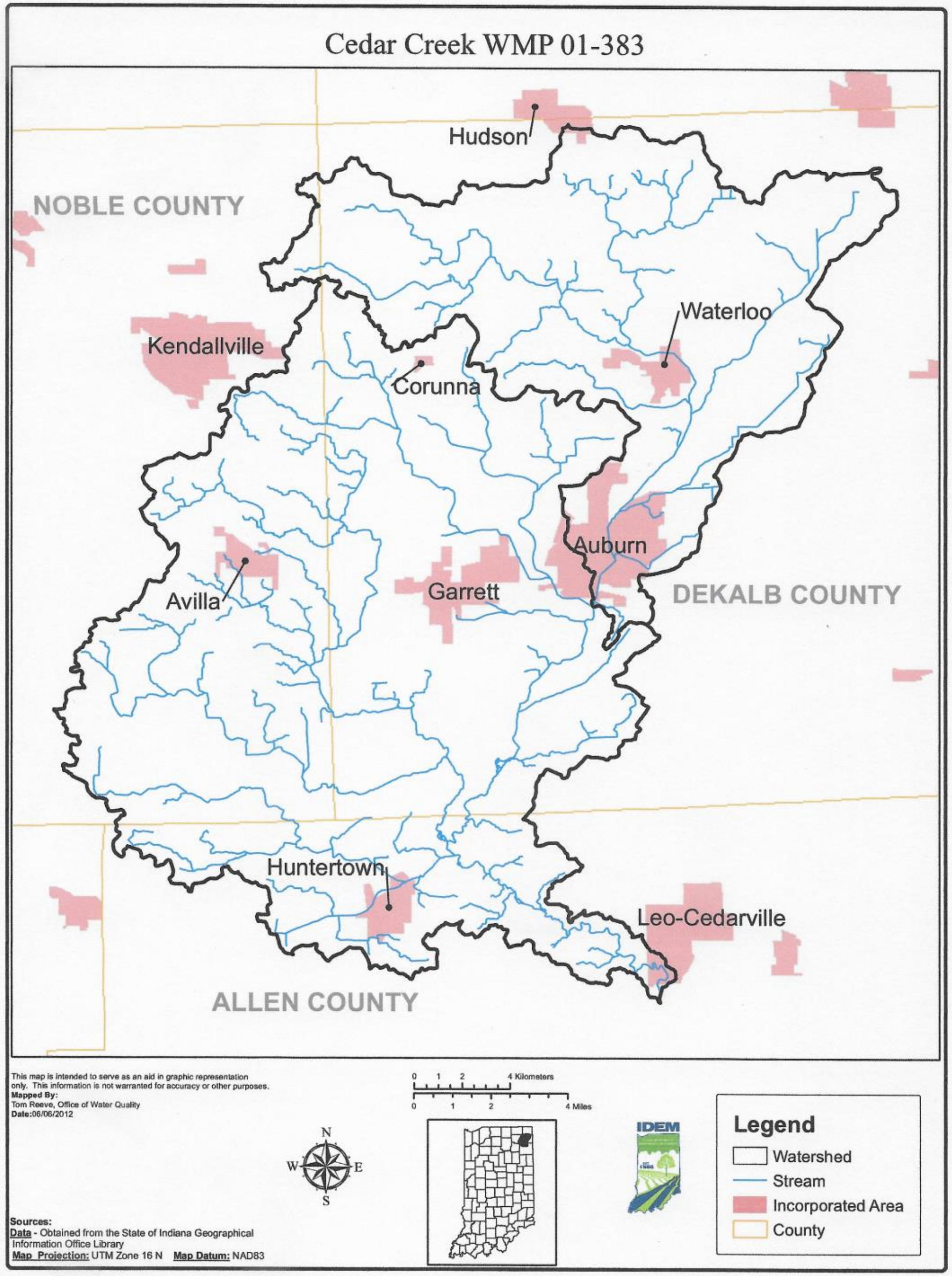

U. S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
Western Lake Erie Basin Drainage
Jackson
Washtenaw
Wayne
Branch
Hillsdale
Lenawee
04100001
River Raisin
04100002
Monroe
Lake
Erie
Michigan
Indiana
Ottawa
04100001
Michigan
Ohio
Williams
Fulton
Lucas
Ottawa
Steuben
Tiffin
04100006
Noble
DeKalb
St. Joseph
04100003
Lower Maumee
04100009
Defiance
Wood
Cedar-Portage
04100010
Erie
Sandusky
Seneca
Sandusky
04100011
Allen
Upper Maumee
04100005
Paulding
Henry
Putnam
Hancock
Huron
Auglaize
04100007
Blanchard
04100008
Wells
Richland
St. Marys
04100004
Van Wert
Allen
Wyandot
Crawford
Adams
Marion
Auglaize
Hardin
Indiana
Ohio
Shelby
Mercer
N
W
E
S
11 5.5 0 11 22
Miles
Legend
State Boundaries
County Boundaries
Terry J. Cosby, USDA-NRCS State Conservationist, 614-255-2472
Ohio NRCS GIS 6/2/14

St. Joseph River Watershed
Approx. 700,000 acres




Hillsdale
Branch
Michigan
Indiana
West Fork
East Fork
Steuben
Williams
Noble
Upper Cedar Creek
Lower Cedar Creek
Bear Creek
Defiance
Edgerton
Allen
Indiana
Ohio

a)

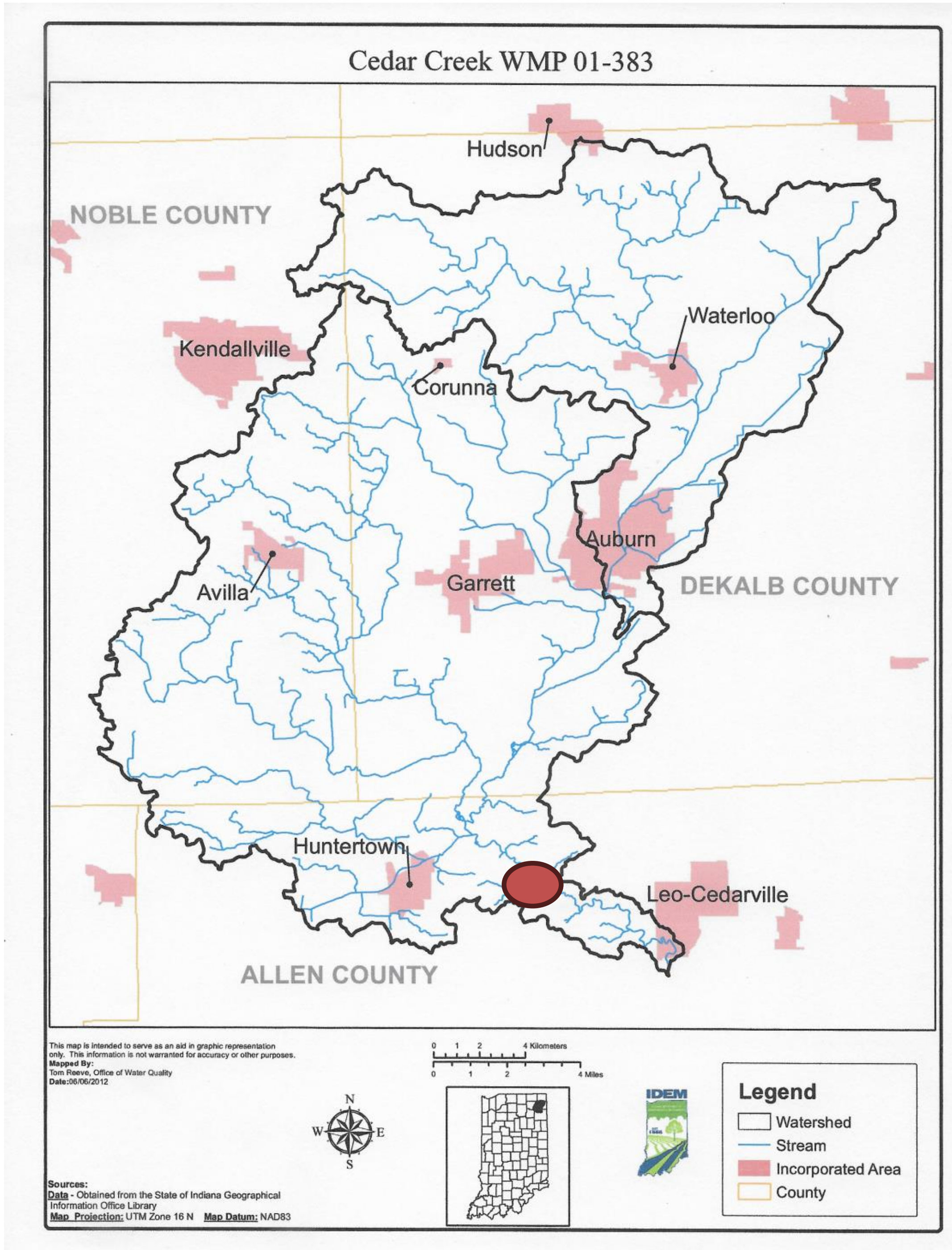

Cedar Creek WMP 01-383
Hudson
NOBLE COUNTY
Waterloo
Kendallville
Corunna
Auburn
Avilla
Garrett
DEKALB COUNTY
Huntertown
Leo-Cedarville
ALLEN COUNTY
This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.
Mapped By:
Tom Reeve, Office of Water Quality
Date:06/06/2012
0 1 2 4 Kilometers
0 1 2 4 Miles
N
W
E
S
IDEM
Legend
Watershed
Stream
Incorporated Area
County
Sources:
Data - Obtained from the State of Indiana Geographical Information Office Library
Map Projection: UTM Zone 16 N Map Datum: NAD83

Cedar Creek Watershed

Analyzing land use helps us understand where pollutants are coming from

174,725 Total Watershed Acres
Land Use
Row Crops & CRP = 65%
Developed = 4%
Forest = 10%
Wetlands = 13%

For more information, see the Cedar Creek Watershed Management Plan


Cedar Creek WMP 01-383
Hudson
NOBLE COUNTY
Waterloo
Kendallville
Corunna
Auburn
Avilla
Garrett
DEKALB COUNTY
Huntertown
Leo-Cedarville
ALLEN COUNTY
This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.
Mapped By:
Tom Reeve, Office of Water Quality
Date:06/06/2012
0 1 2 4 Kilometers
0 1 2 4 Miles
N
W
E
S
IDEM
Legend
Watershed
Stream
Incorporated Area
County
Sources:
Data - Obtained from the State of Indiana Geographical Information Office Library
Map Projection: UTM Zone 16 N Map Datum: NAD83

Cedar Creek, Site 100

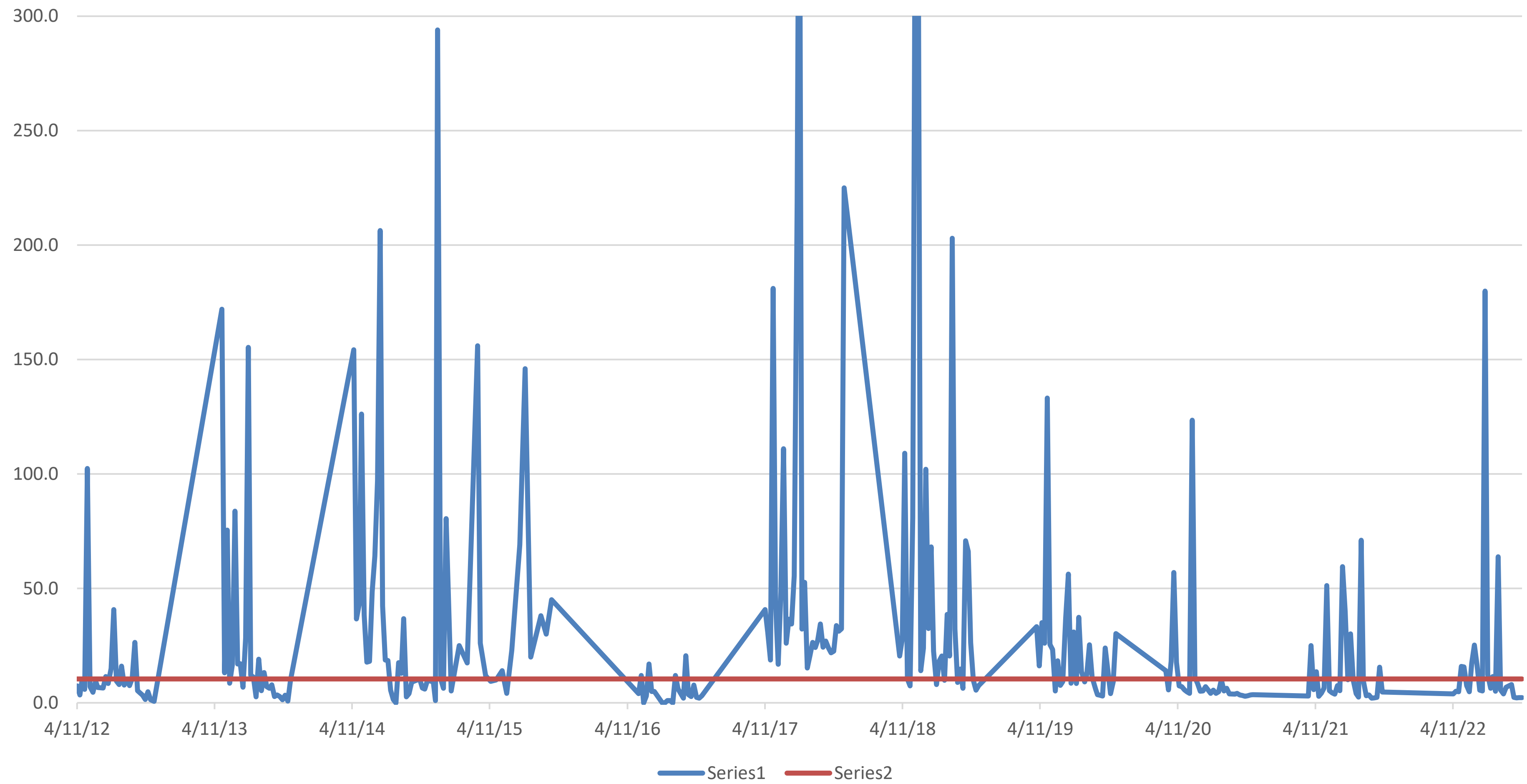
Turbidity

Data range: April 11, 2012 – Oct. 11, 2022

Turbidity MCL <10.4 NTU

308 sampling events

152 exceedances of the MCL = 49%



Cedar Creek, Site 100

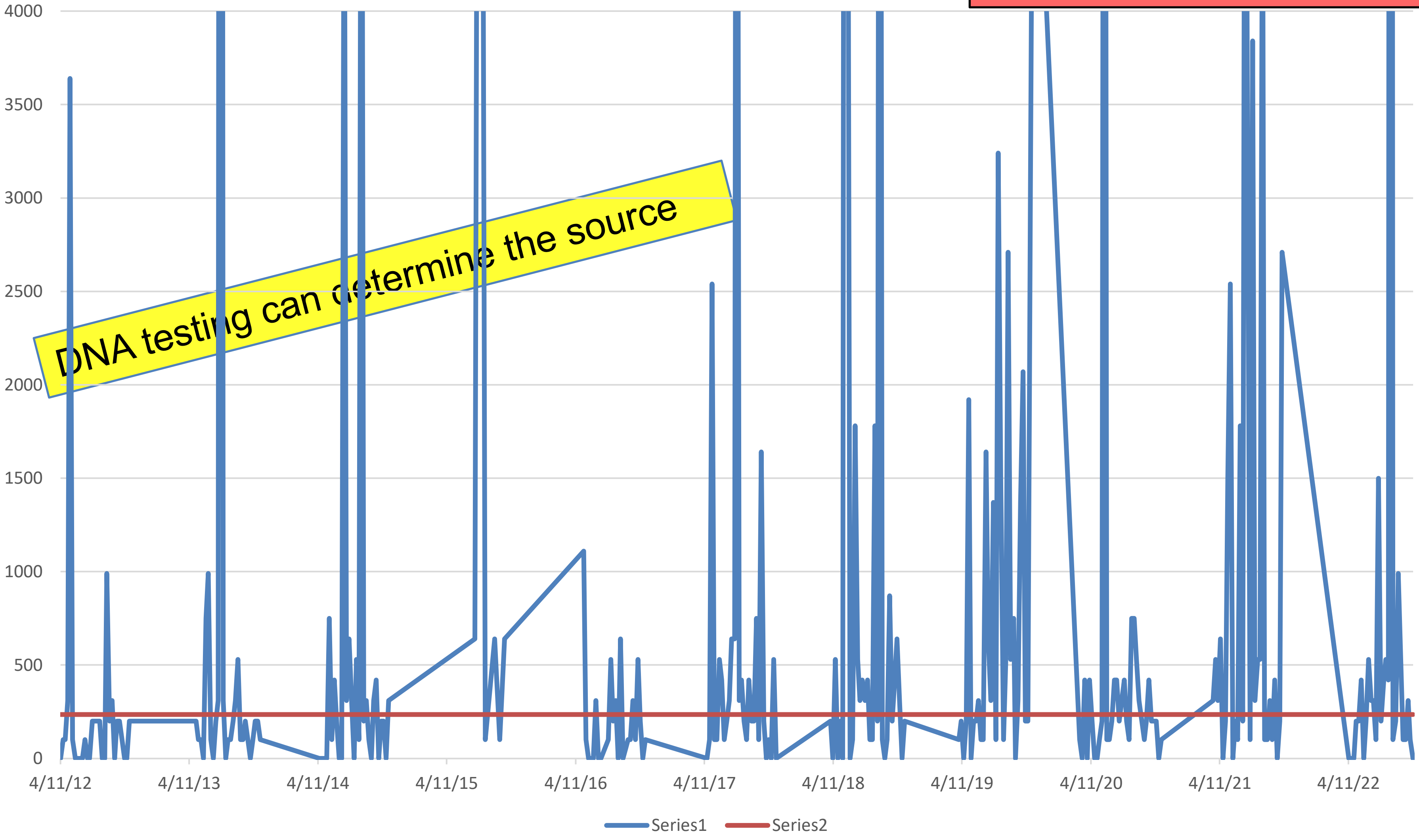
E.coli

Data range: April 11, 2012 – Oct. 11, 2022

E.Coli MCL 235 CFU/100ml

293 sampling events

118 exceedances of the MCL = 40%



Cedar Creek, Site 100

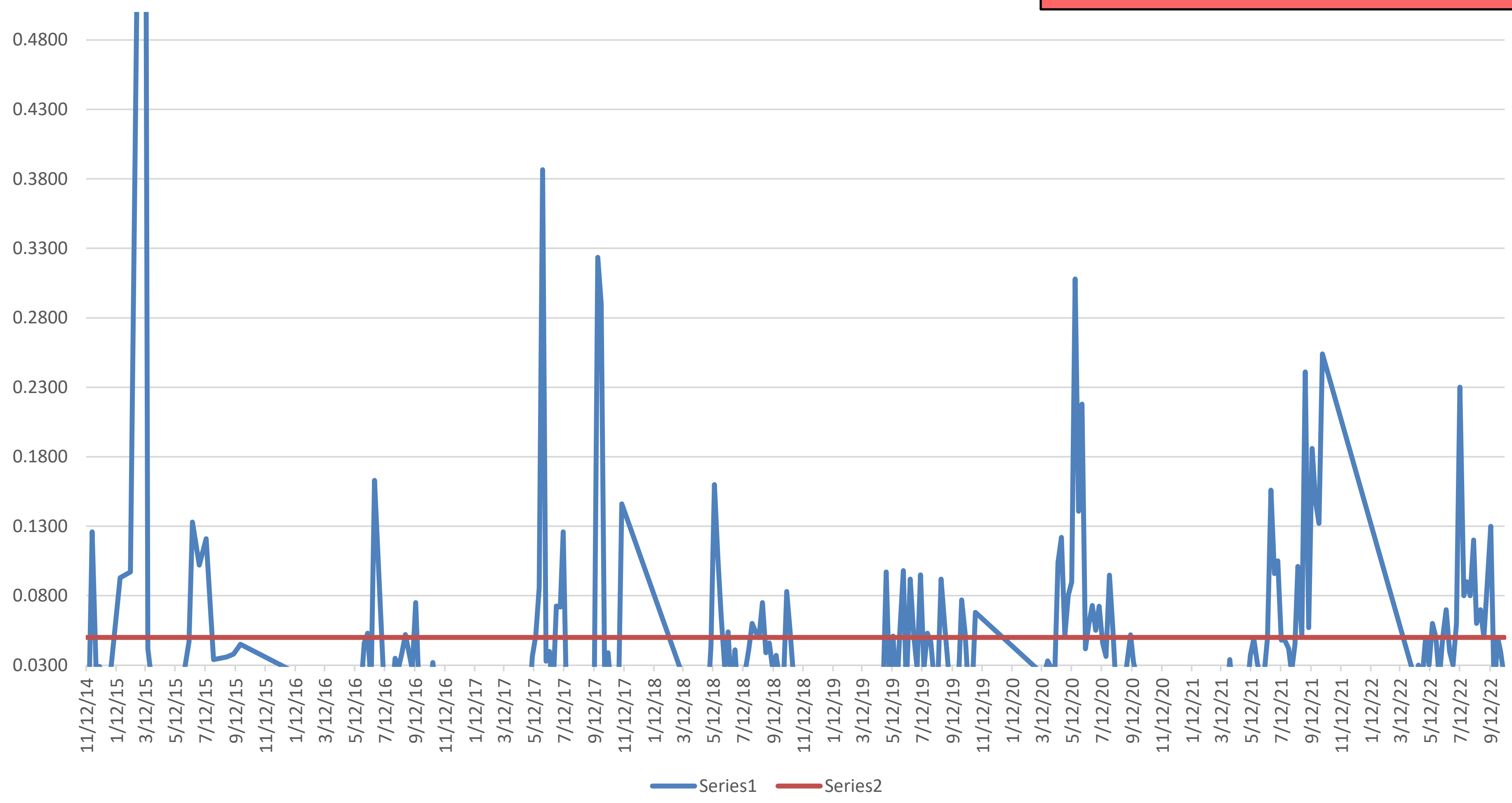
Total Phosphorus

Data range: April 15, 2014 – Oct. 11, 2022

TP MCL <0.08 mg/L

251 sampling events

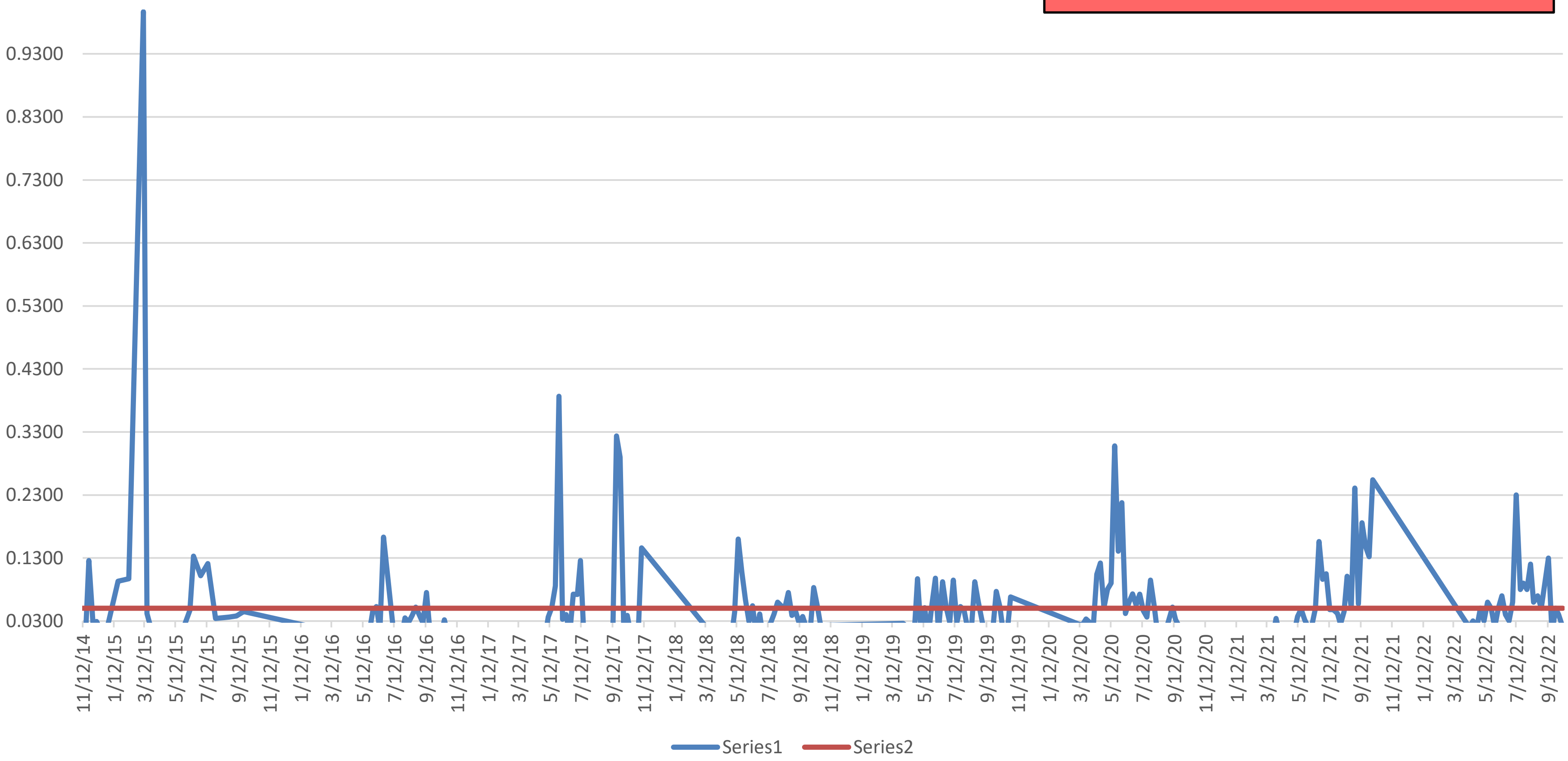
144 exceedances of the MCL = 57%



Cedar Creek, Site 100
Dissolved Reactive Phosphorus

Data range: Nov. 12, 2014 – Oct. 11, 2022
DRP MCL <0.05 mg/L
230 sampling events

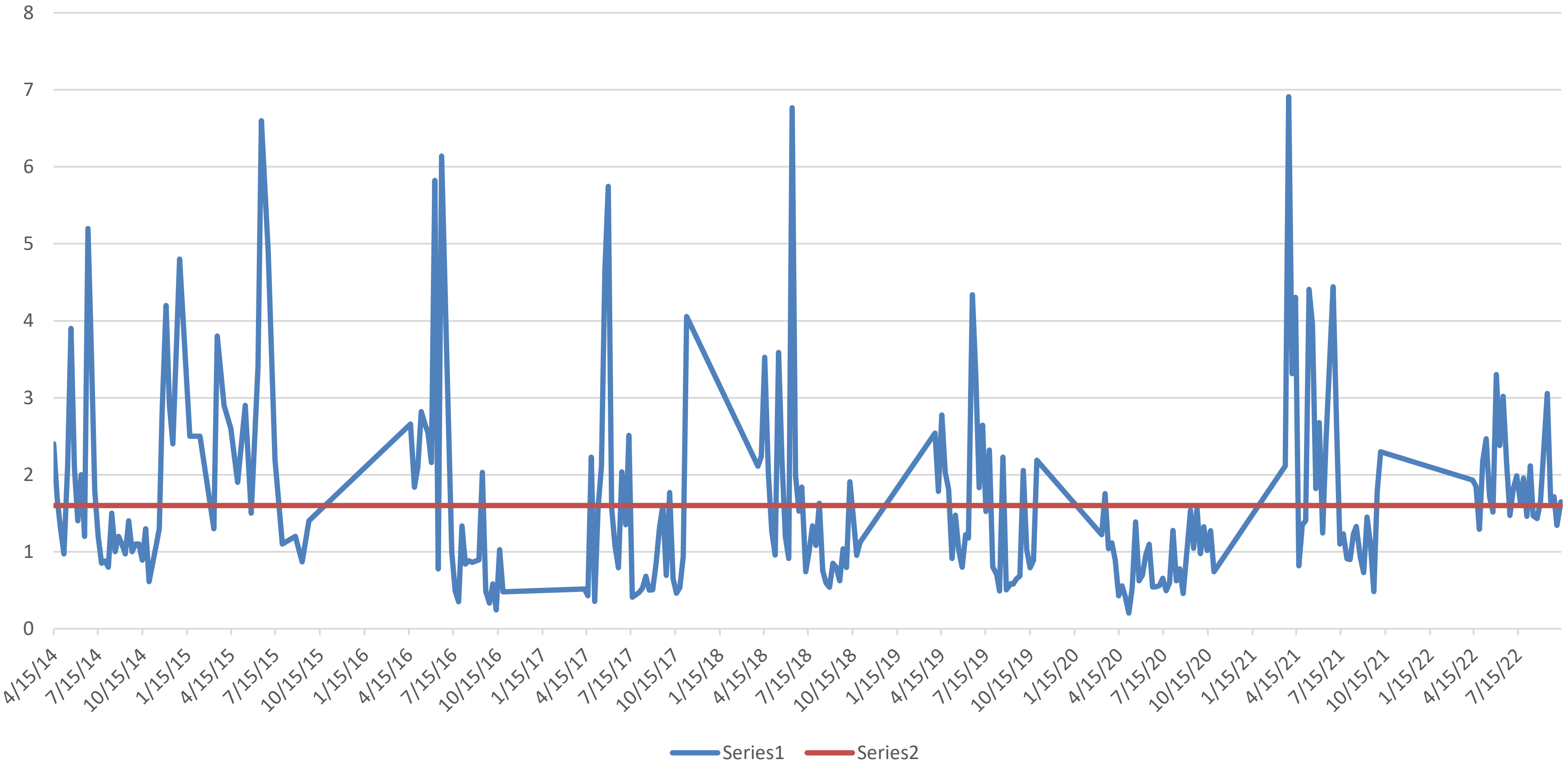
85 exceedances of the MCL = 34%

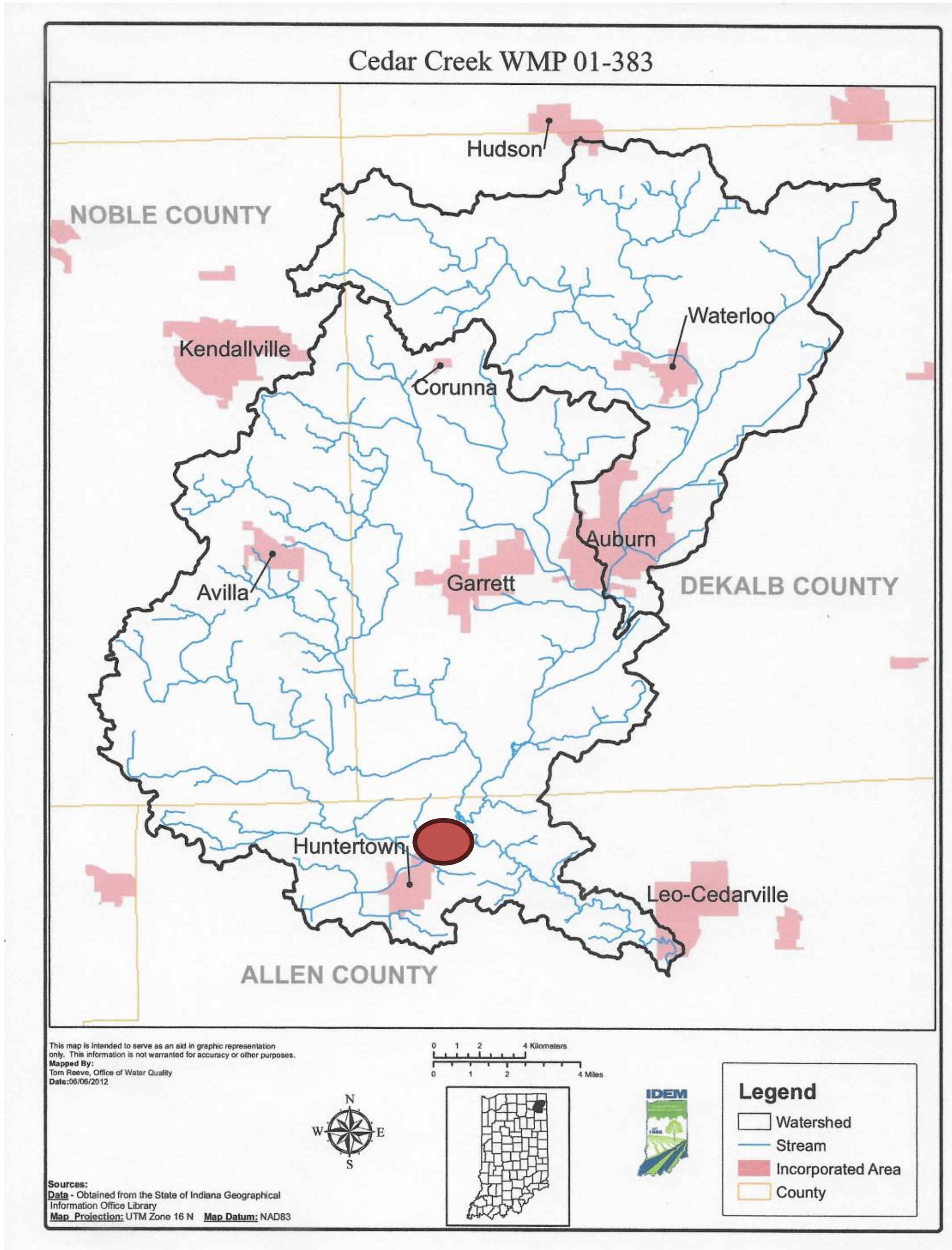


Cedar Creek, Site 100
Nitrogen

Data range: April 15, 2014 – Oct. 11, 2022
Nitrogen MCL <1.6 mg/L
258 sampling events

101 exceedances of the MCL = 39%




Cedar Creek WMP 01-383
Hudson
NOBLE COUNTY
Waterloo
Kendallville
Corunna
Auburn
Avilla
Garrett
DEKALB COUNTY
Huntertown
Leo-Cedarville
ALLEN COUNTY
This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.
Mapped By:
Tom Reeve, Office of Water Quality
Date:06/06/2012
0 1 2 4 Kilometers
0 1 2 4 Miles
N
W
E
S
Sources:
Data - Obtained from the State of Indiana Geographical Information Office Library
Map Projection: UTM Zone 16 N Map Datum: NAD83
IDEM
Legend
Watershed
Stream
Incorporated Area
County

Willow Creek, Site 101

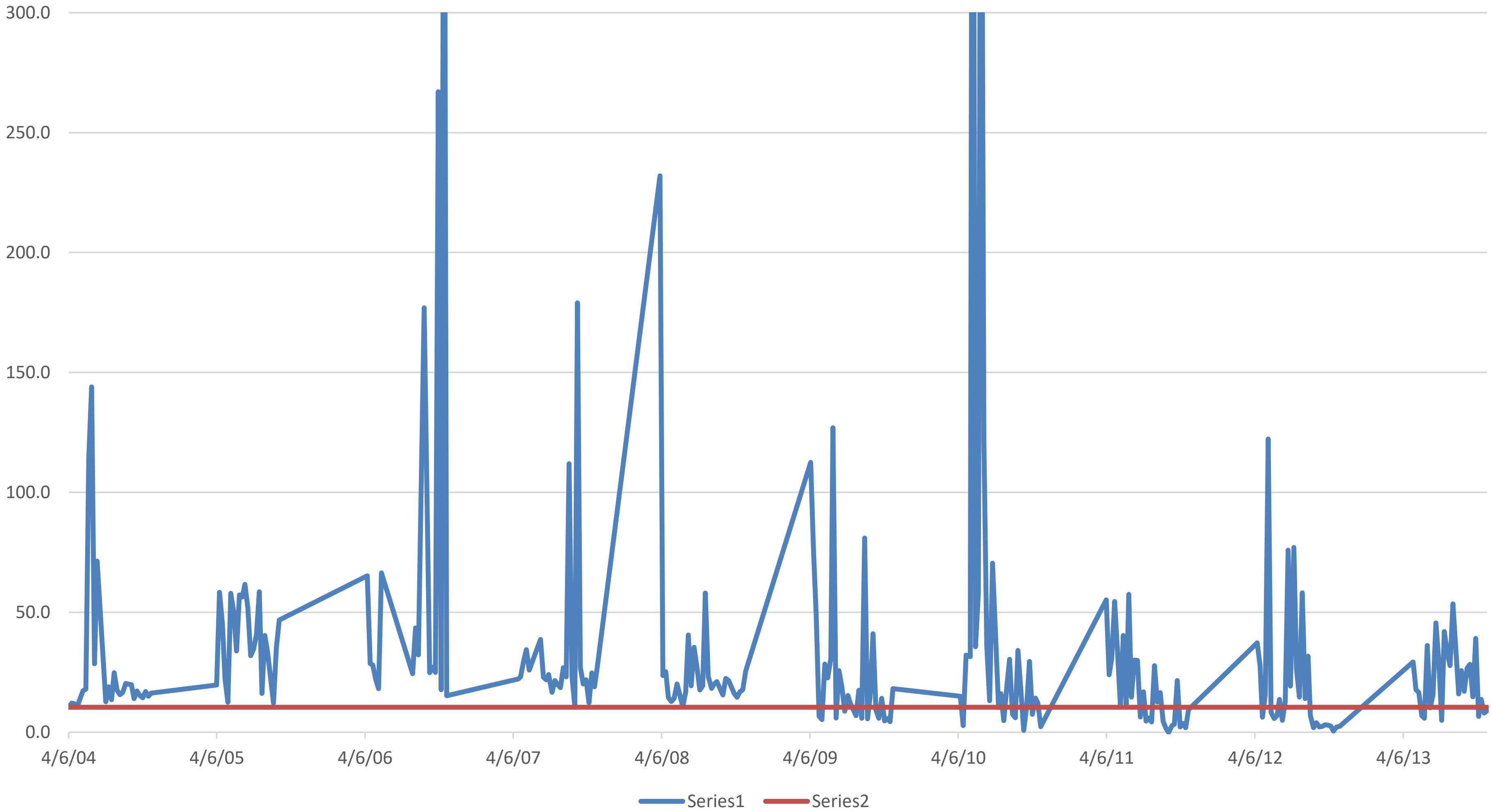
Turbidity

Data range: April 6, 2004 – Oct, 29, 2013

Turbidity MCL <10.4 NTU

269 sampling events

210 exceedances of the MCL = 78%



Willow Creek, Site 101

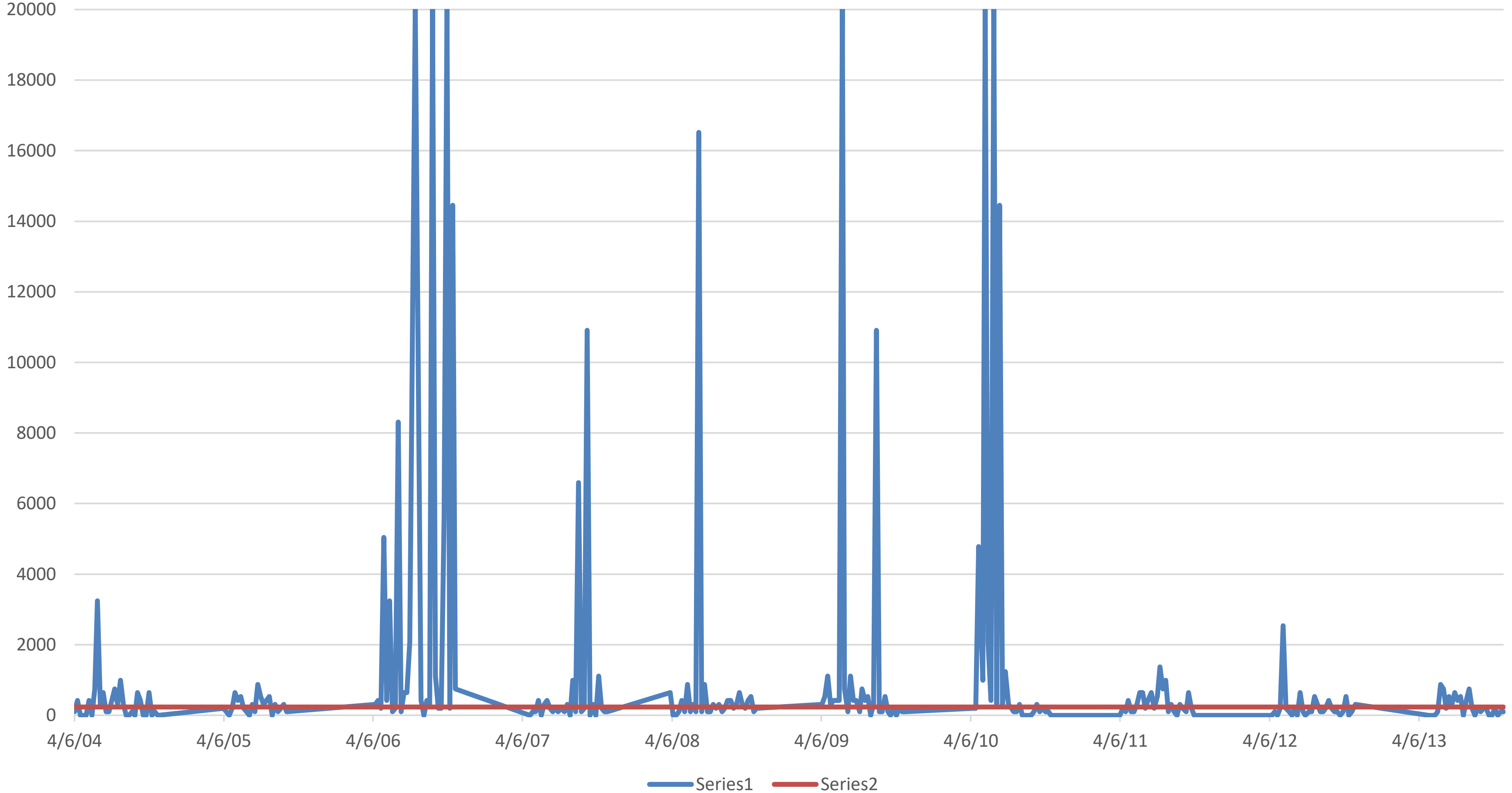
E.coli

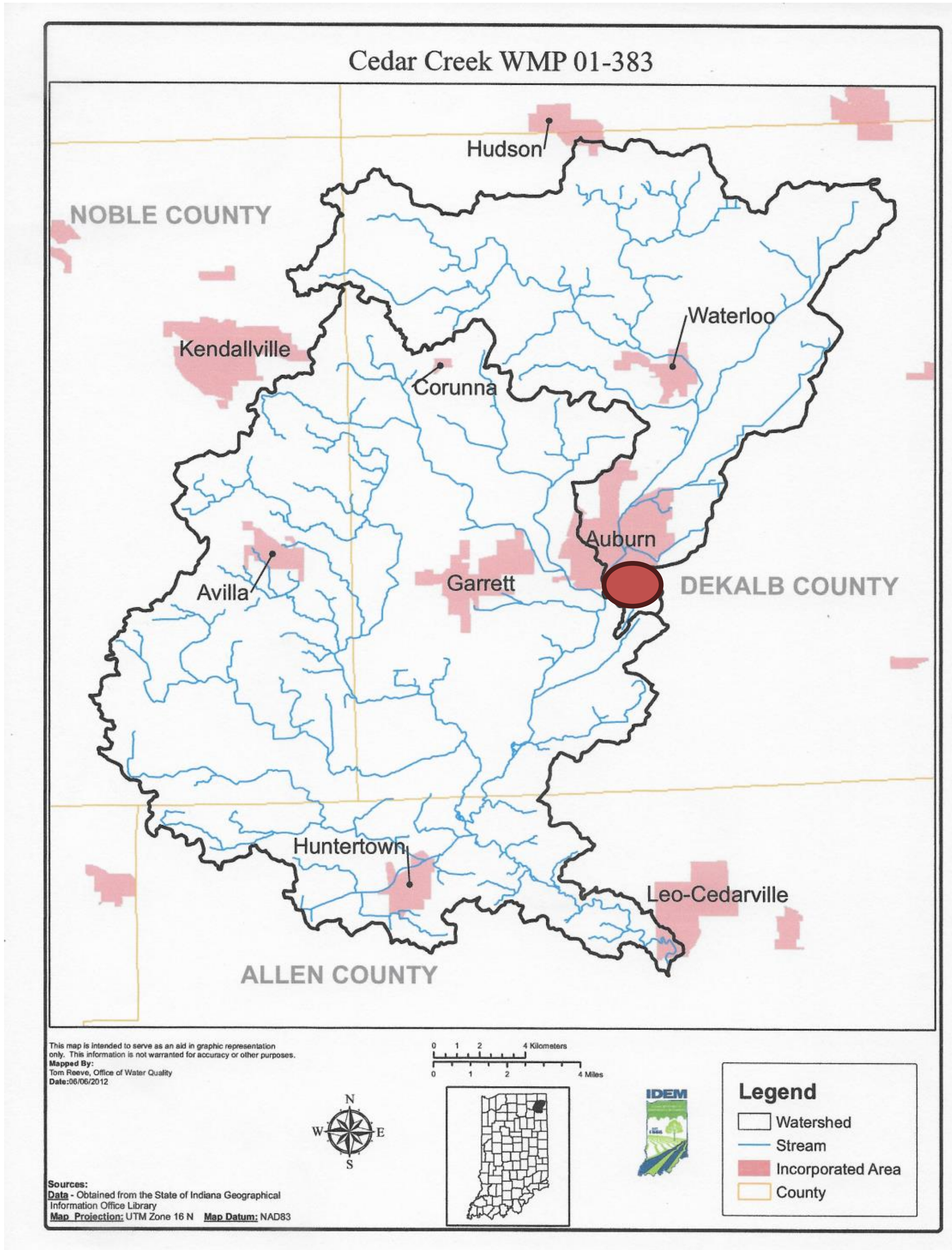
Data range: April 6, 2004 – Oct. 29, 2013

E.Coli MCL 235 CFU/100ml

285 sampling events

128 exceedances of the MCL = 45%




Cedar Creek WMP 01-383
Hudson
NOBLE COUNTY
Waterloo
Kendallville
Corunna
Auburn
Avilla
Garrett
DEKALB COUNTY
Huntertown
Leo-Cedarville
ALLEN COUNTY
This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.
Mapped By:
Tom Reeve, Office of Water Quality
Date:06/06/2012
Sources:
Data - Obtained from the State of Indiana Geographical Information Office Library
Map Projection: UTM Zone 16 N Map Datum: NAD83
0 1 2 4 Kilometers
0 1 2 4 Miles
N
W
E
S
IDEM
Legend
Watershed
Stream
Incorporated Area
County

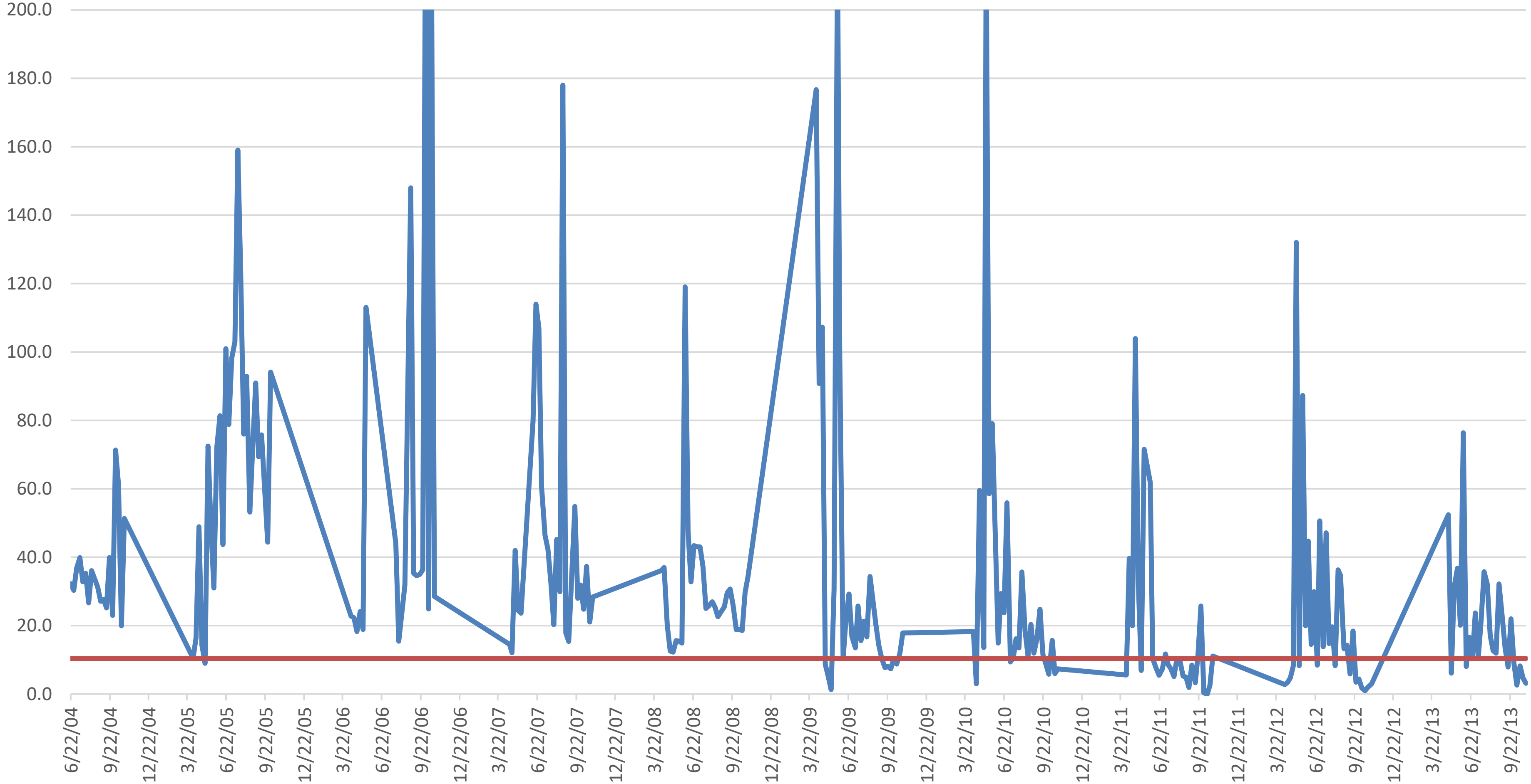
Little Cedar Creek, Site 103
Turbidity

Data range: June 15, 2004 – Oct. 29, 2013

Turbidity MCL <10.4 NTU

260 sampling events

205 exceedances of the MCL = 79%



Little Cedar Creek, Site 103

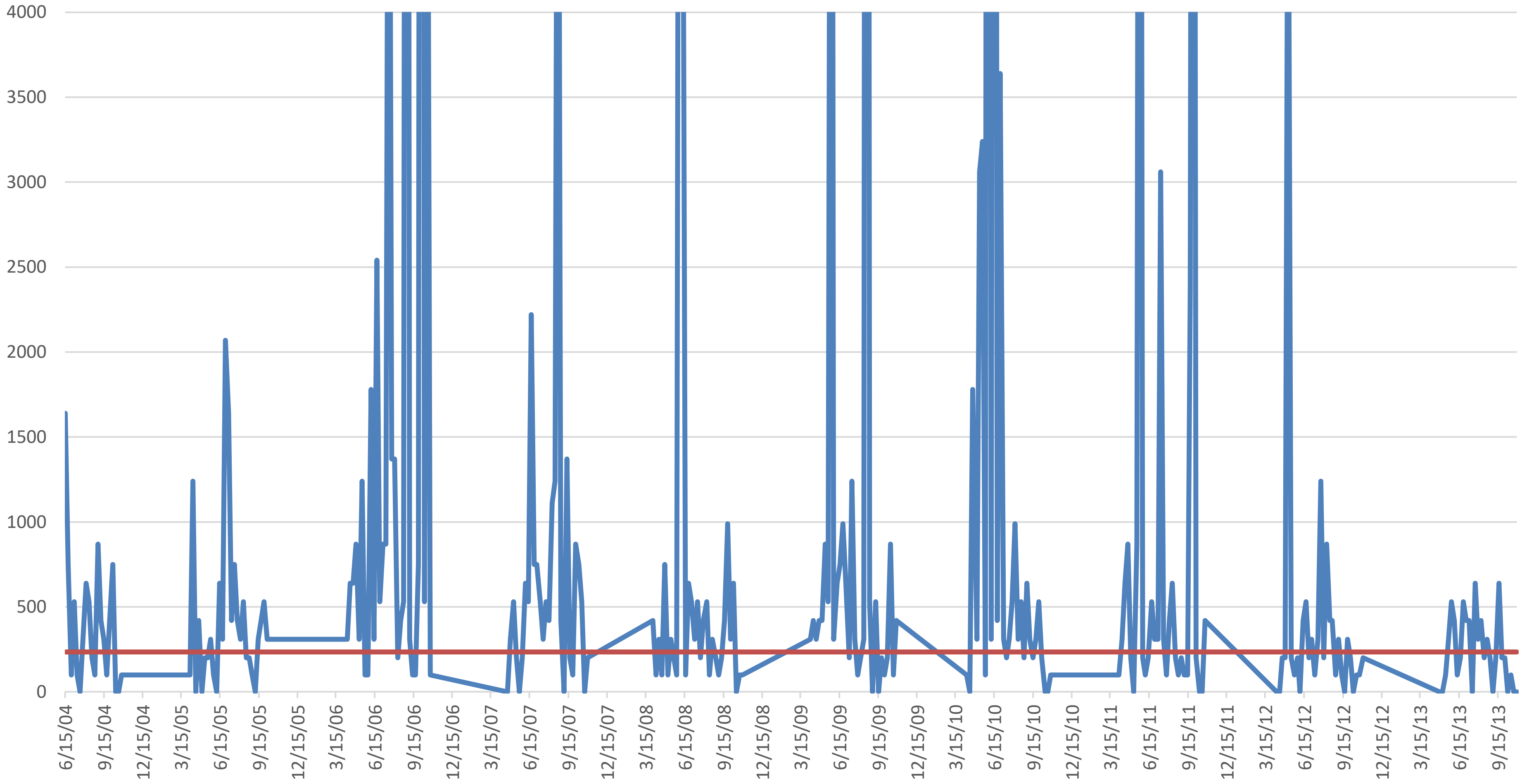
E.coli

Data range: June 14, 2004 – Oct. 29, 2013

E.Coli MCL 235 CFU/100ml

280 sampling events

162 exceedances of the MCL = 58%



Little Cedar Creek, Site 103

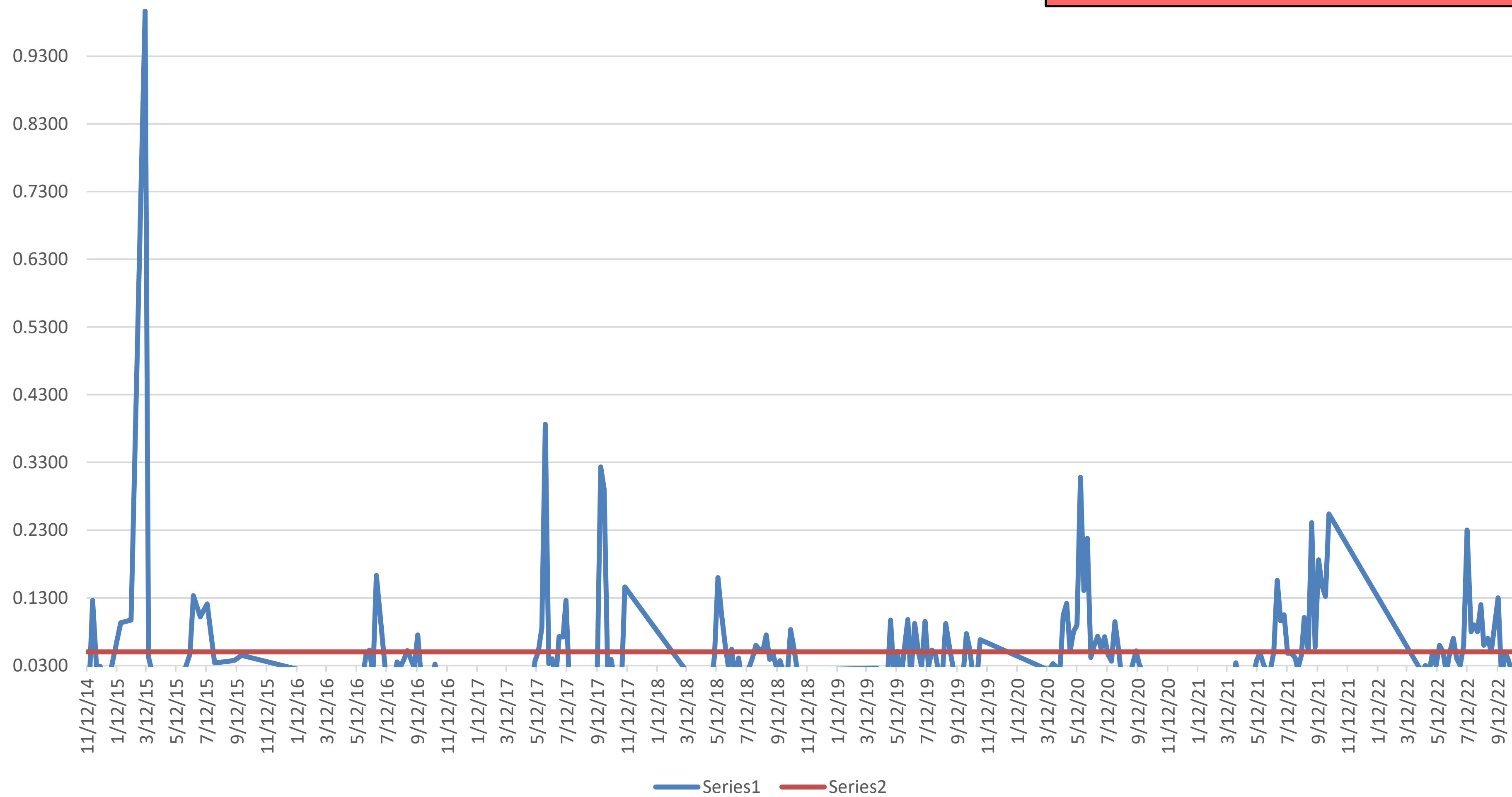
Total Phosphorus

Data range: April 15, 2014 – Oct. 11, 2022

TP MCL <0.08 mg/L

251 sampling events

144 exceedances of the MCL = 57%



Little Cedar Creek, Site 103

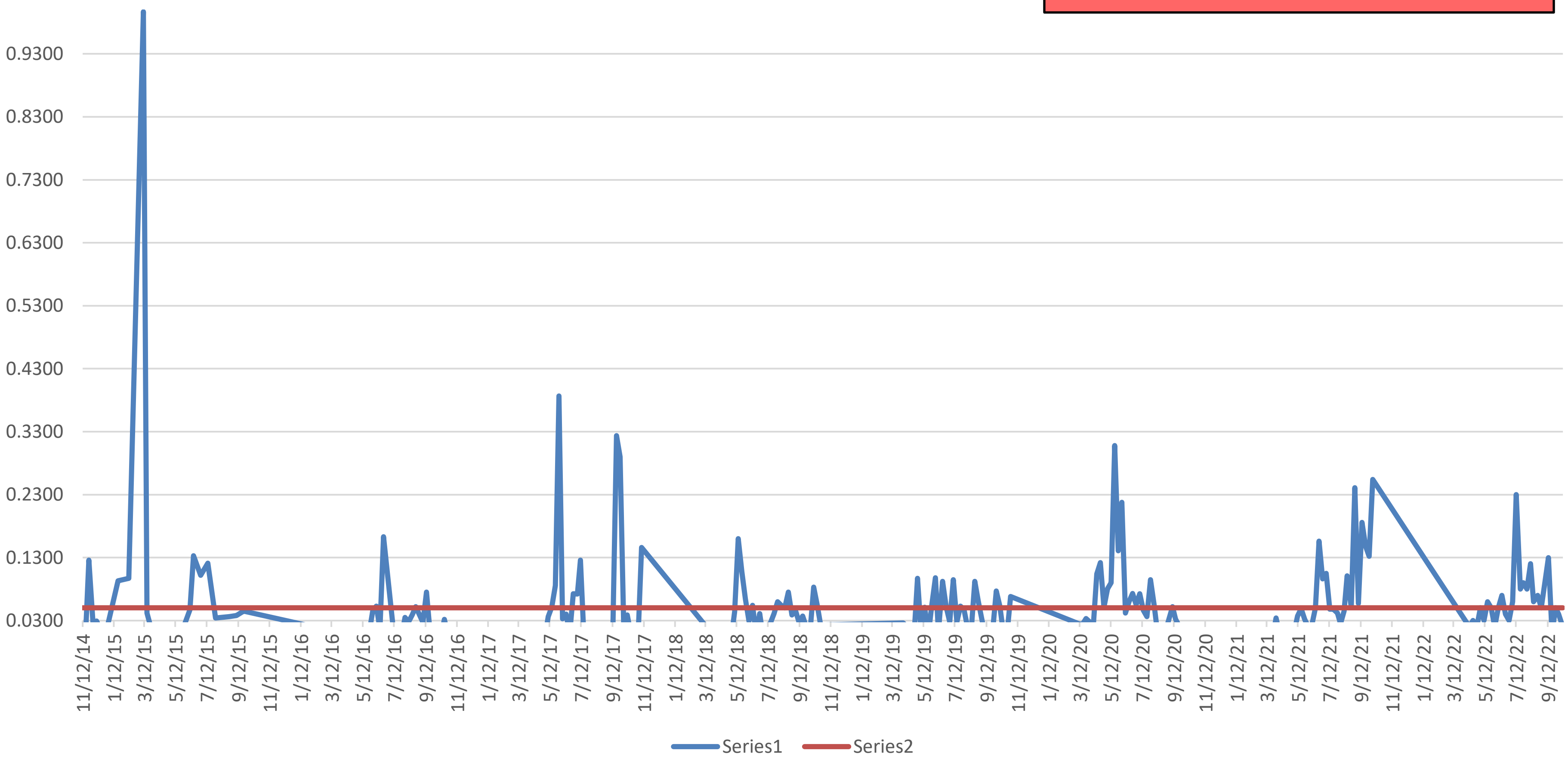
Dissolved Reactive Phosphorus

Data range: Nov. 12, 2014 – Oct. 11, 2022

DRP MCL <0.05 mg/L

230 sampling events

85 exceedances of the MCL = 34%

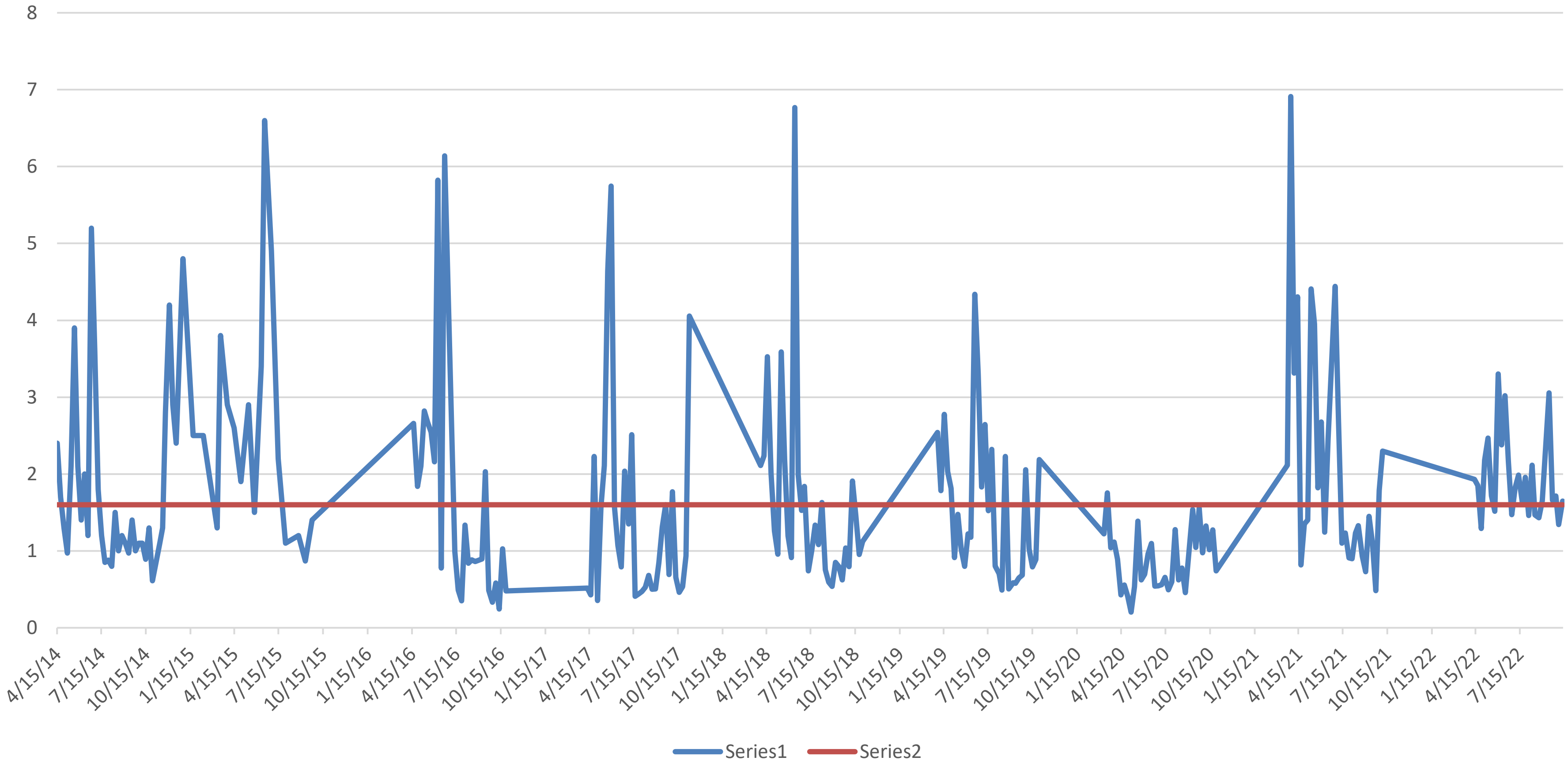


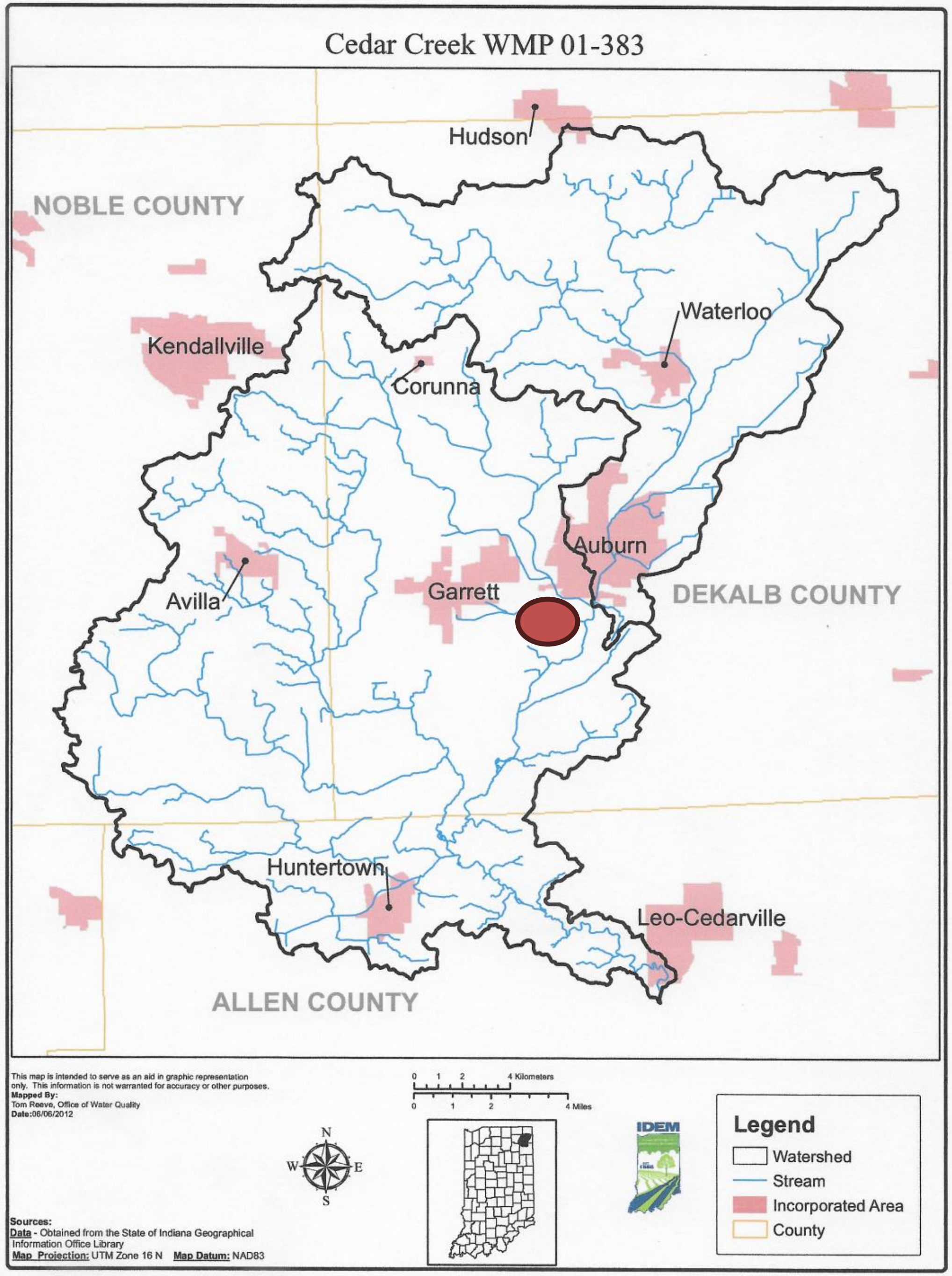
Little Cedar Creek, Site 103

Nitrogen

Data range: April 15, 2014 – Oct. 11, 2022
Nitrogen MCL <1.6 mg/L
258 sampling events

101 exceedances of the MCL = 39%




Cedar Creek WMP 01-383
Hudson
NOBLE COUNTY
Waterloo
Kendallville
Corunna
Auburn
Garrett
Avilla
DEKALB COUNTY
Huntertown
Leo-Cedarville
ALLEN COUNTY
This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.
Mapped By:
Tom Reeve, Office of Water Quality
Date:06/06/2012
0 1 2 4 Kilometers
0 1 2 4 Miles
N
W
E
S
IDEM
Legend
Watershed
Stream
Incorporated Area
County
Sources:
Data - Obtained from the State of Indiana Geographical Information Office Library
Map Projection: UTM Zone 16 N Map Datum: NAD83

Garrett City Ditch, Site 117

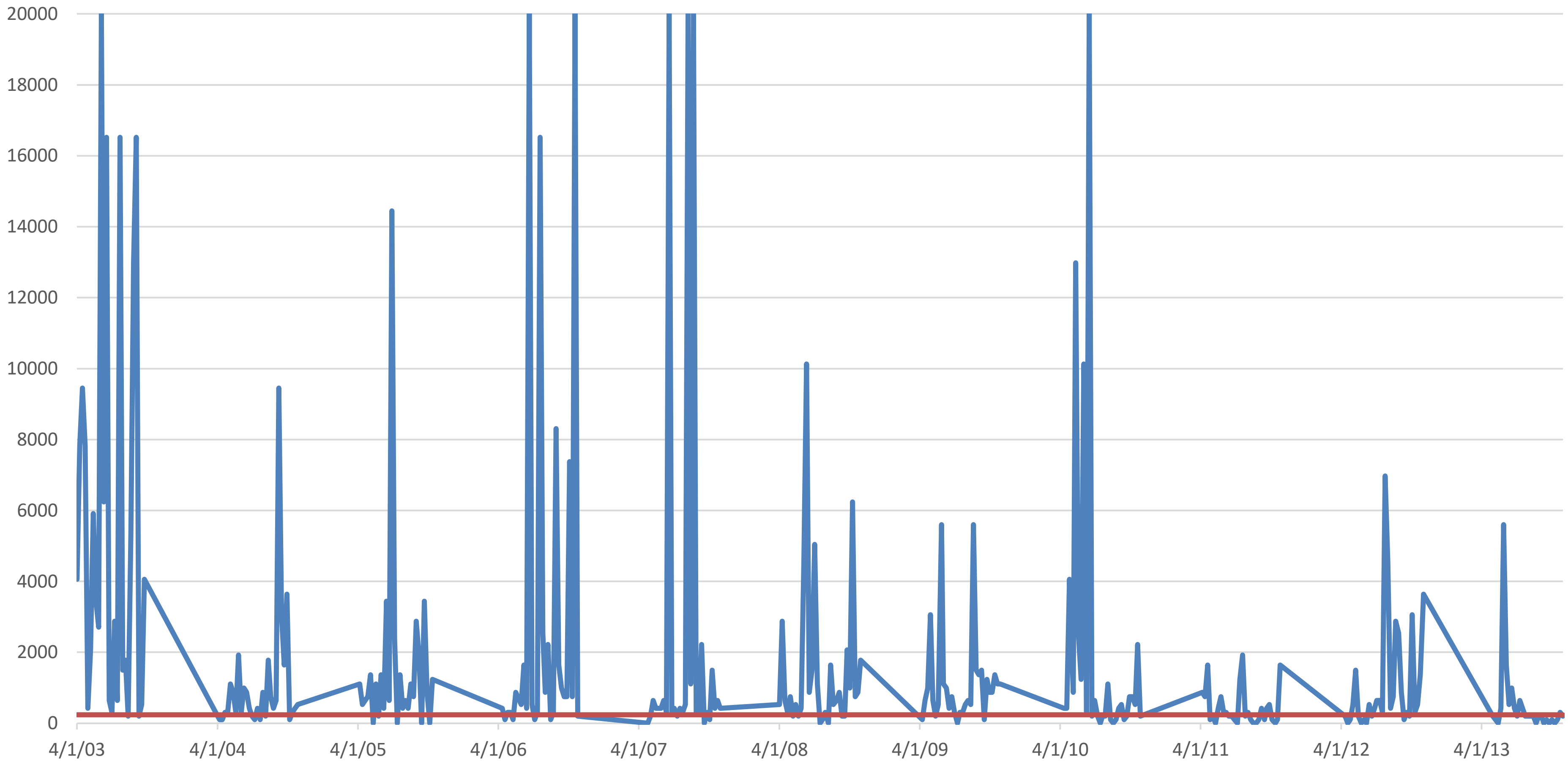
E.coli

Data range: April 1, 2003 – Oct. 29, 2013

Nitrogen MCL <1.6 mg/L

317 sampling events

227 exceedances of the MCL = 72%



Garrett City Ditch, Site 117

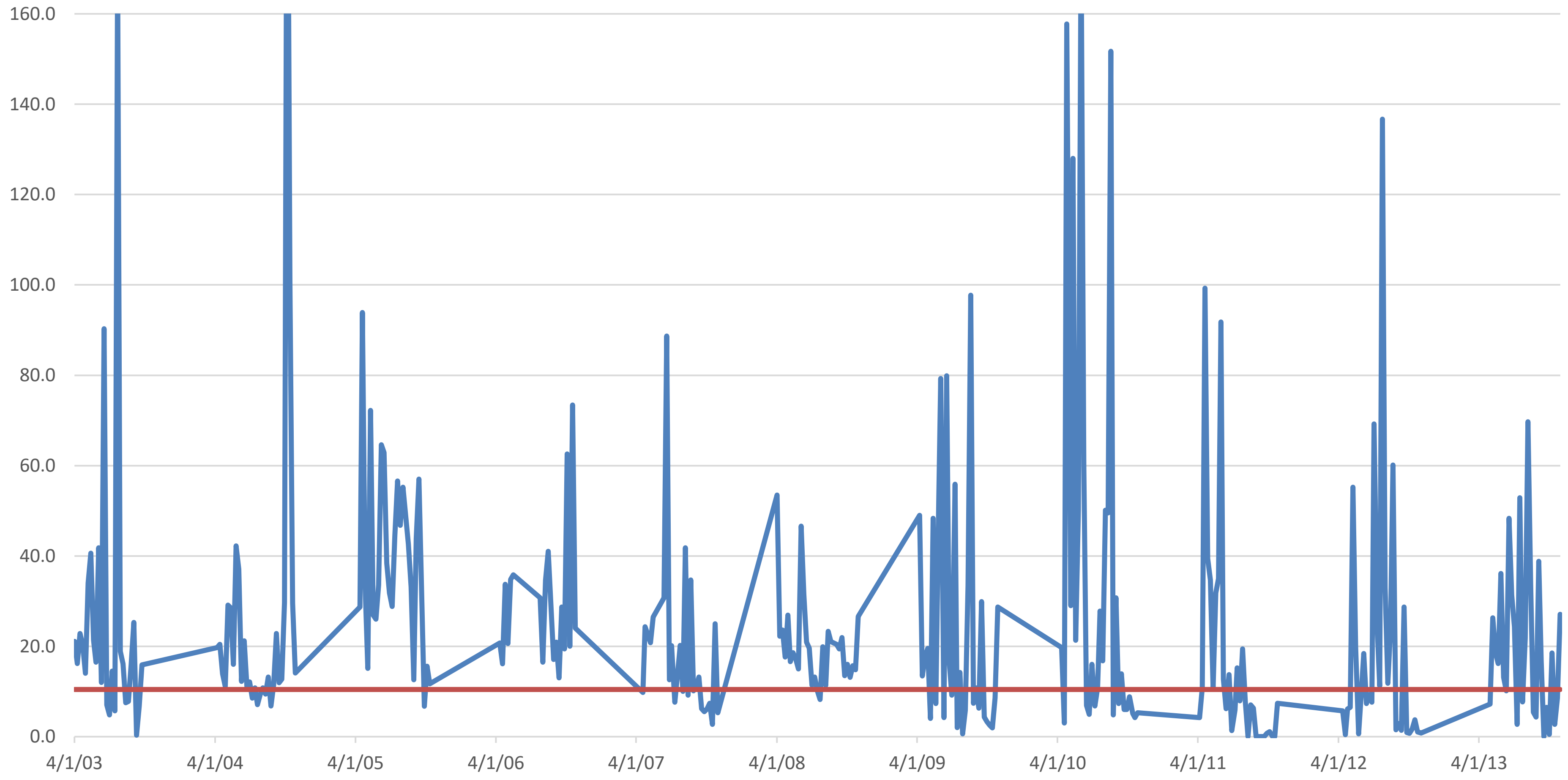
Turbidity

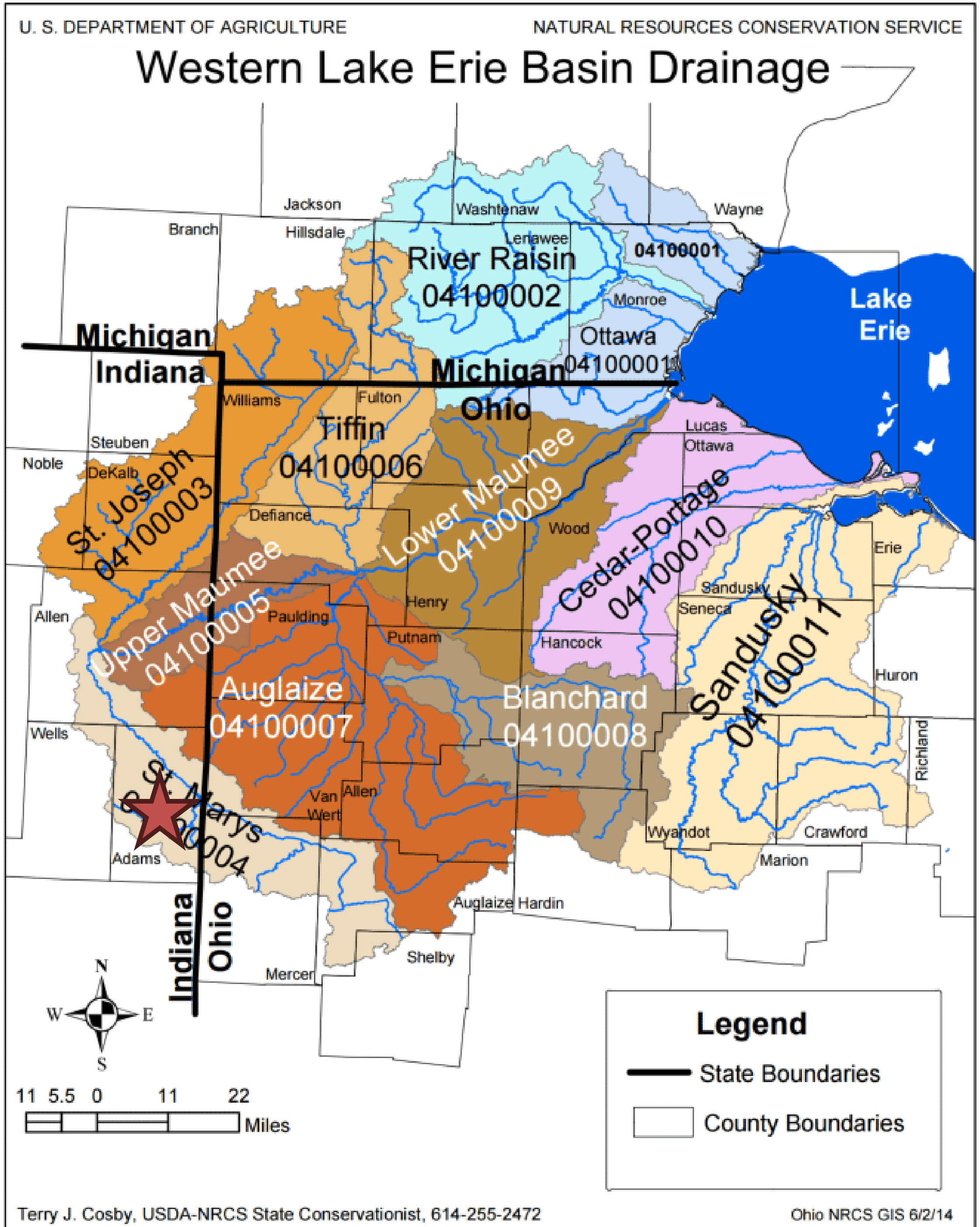
Data range: April 1, 2003 – Oct. 29, 2013

MCL <10.4 mg/L

302 sampling events

203 exceedances of the MCL = 67%





U. S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
Western Lake Erie Basin Drainage
River Raisin
04100002
04100001
Ottawa
04100001
Lake
Erie
Michigan
Indiana
Michigan
Ohio
Tiffin
04100006
St. Joseph
04100003
Lower Maumee
04100009
Cedar-Portage
04100010
Upper Maumee
04100005
Auglaize
04100007
Blanchard
04100008
Sandusky
04100011
St. Marys
04100004
Indiana
Ohio
Jackson
Washtenaw
Wayne
Branch
Hillsdale
Lenawee
Monroe
Williams
Fulton
Lucas
Ottawa
Steuben
Noble
DeKalb
Defiance
Wood
Erie
Sandusky
Seneca
Allen
Henry
Paulding
Putnam
Hancock
Huron
Wells
Van
Wert
Allen
Richland
Wyandot
Crawford
Adams
Marion
Auglaize
Hardin
Shelby
Mercer
N
W
E
S
11 5.5 0 11 22
Miles
Legend
State Boundaries
County Boundaries
Terry J. Cosby, USDA-NRCS State Conservationist, 614-255-2472
Ohio NRCS GIS 6/2/14

Little Blue Creek, Site 203

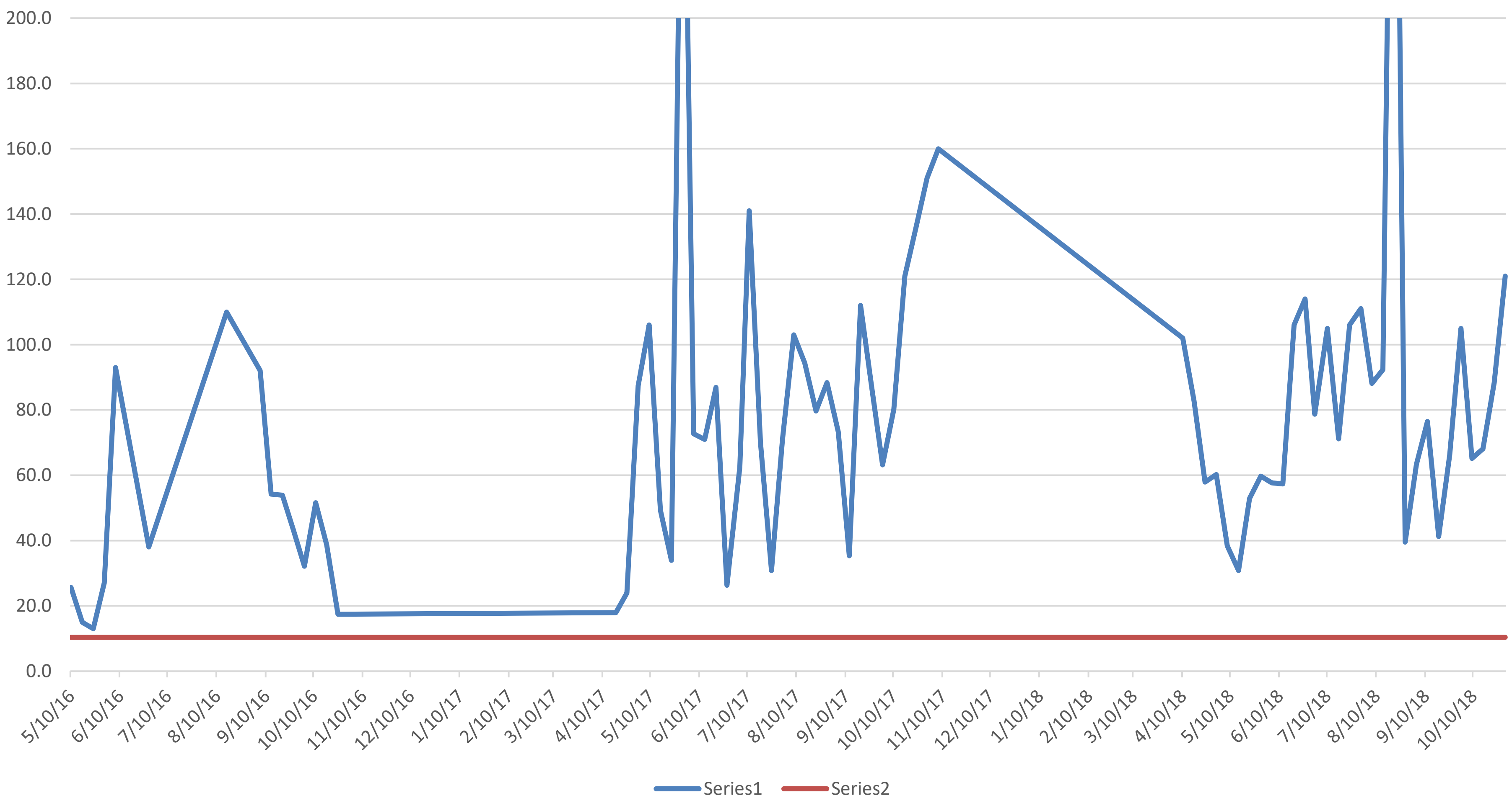
Turbidity

Data range: May 10, 2016 – Oct. 30, 2018

Turbidity MCL <10.4 NTU

77 sampling events

77 exceedances of the MCL = 100%



Little Blue Creek, Site 203

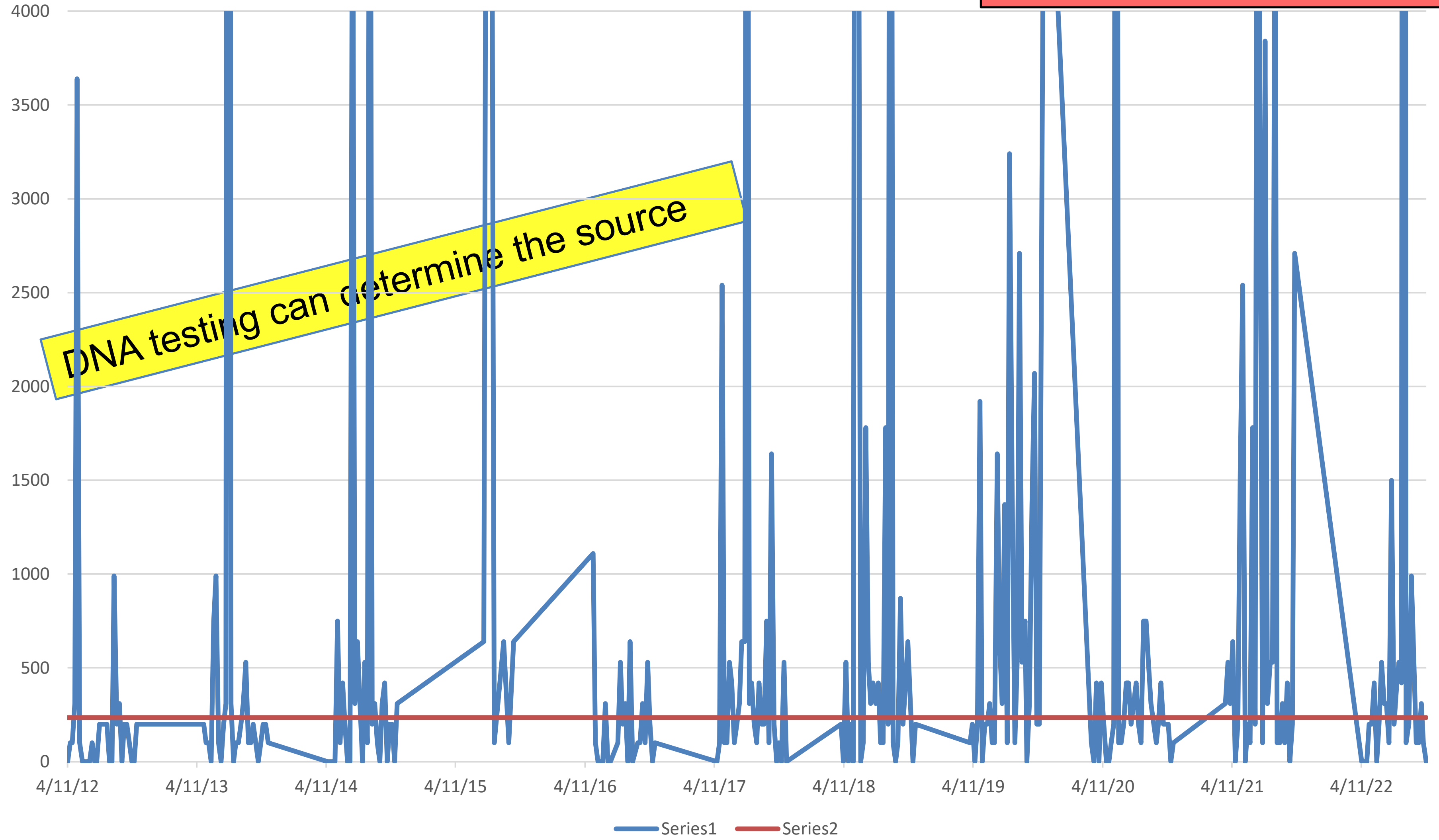
E.coli

Data range: May 29, 2012 – Oct. 30, 2018

E.Coli MCL 235 CFU/100ml

96 sampling events

70 exceedances of the MCL = 73%



Little Blue Creek, Site 203

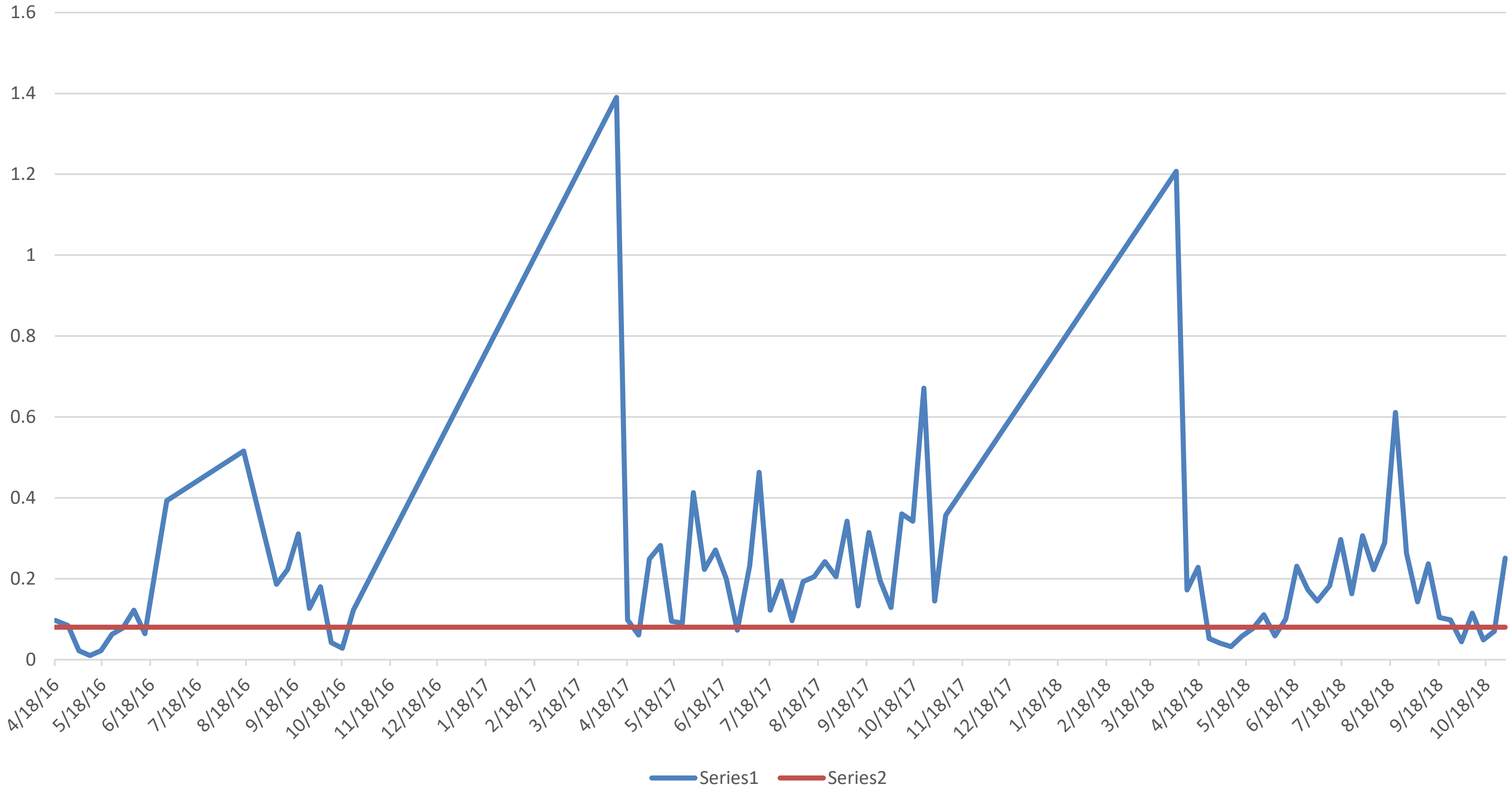
Total Phosphorus

Data range: April 18, 2016 – Oct. 30, 2018

TP MCL <0.08 mg/L

81 sampling events

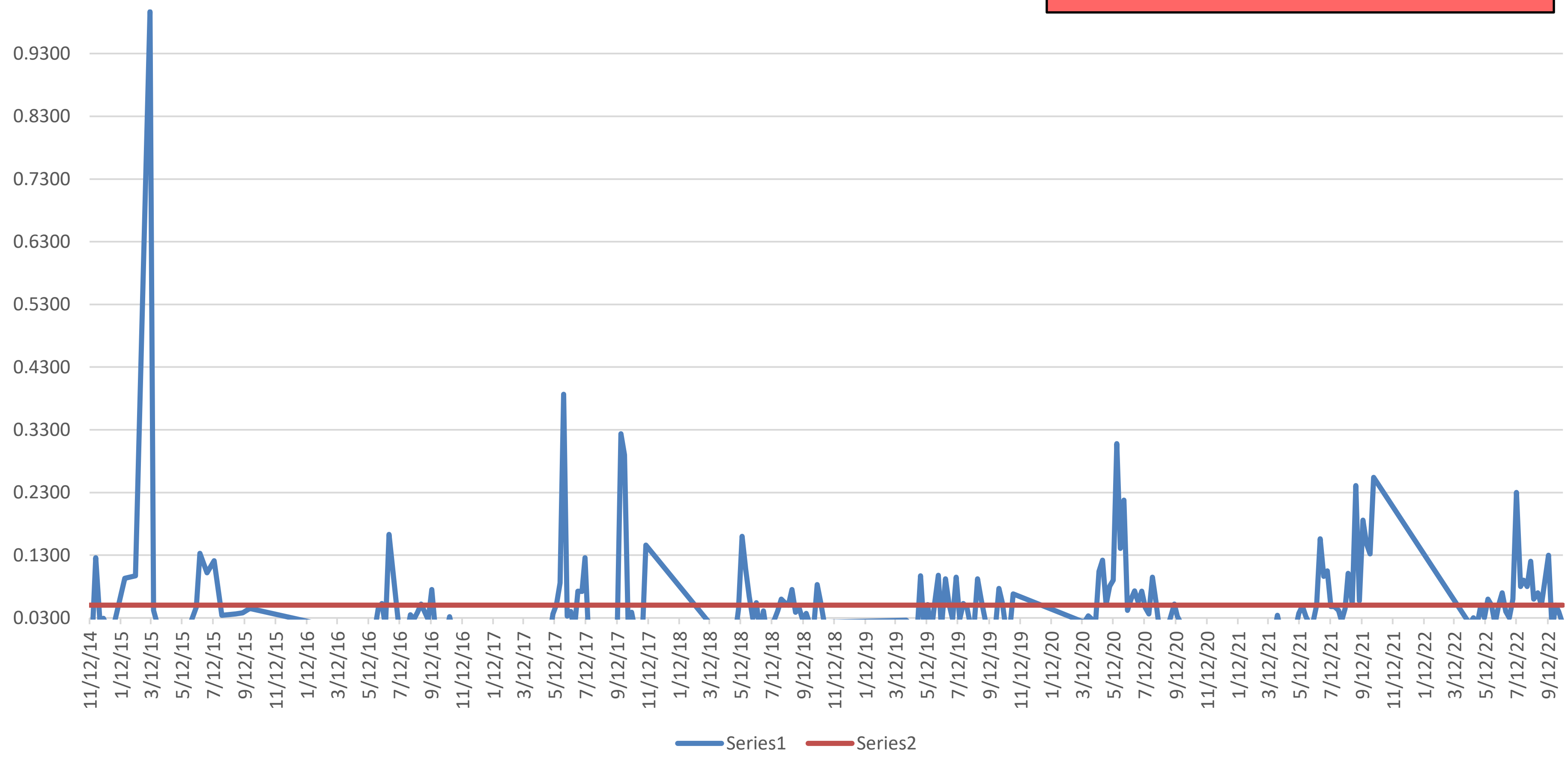
62 exceedances of the MCL = 77%



Little Blue Creek, Site 203
Dissolved Reactive Phosphorus

Data range: April 18, 2016 – Oct. 30, 2018
DRP MCL <0.05 mg/L
80 sampling events

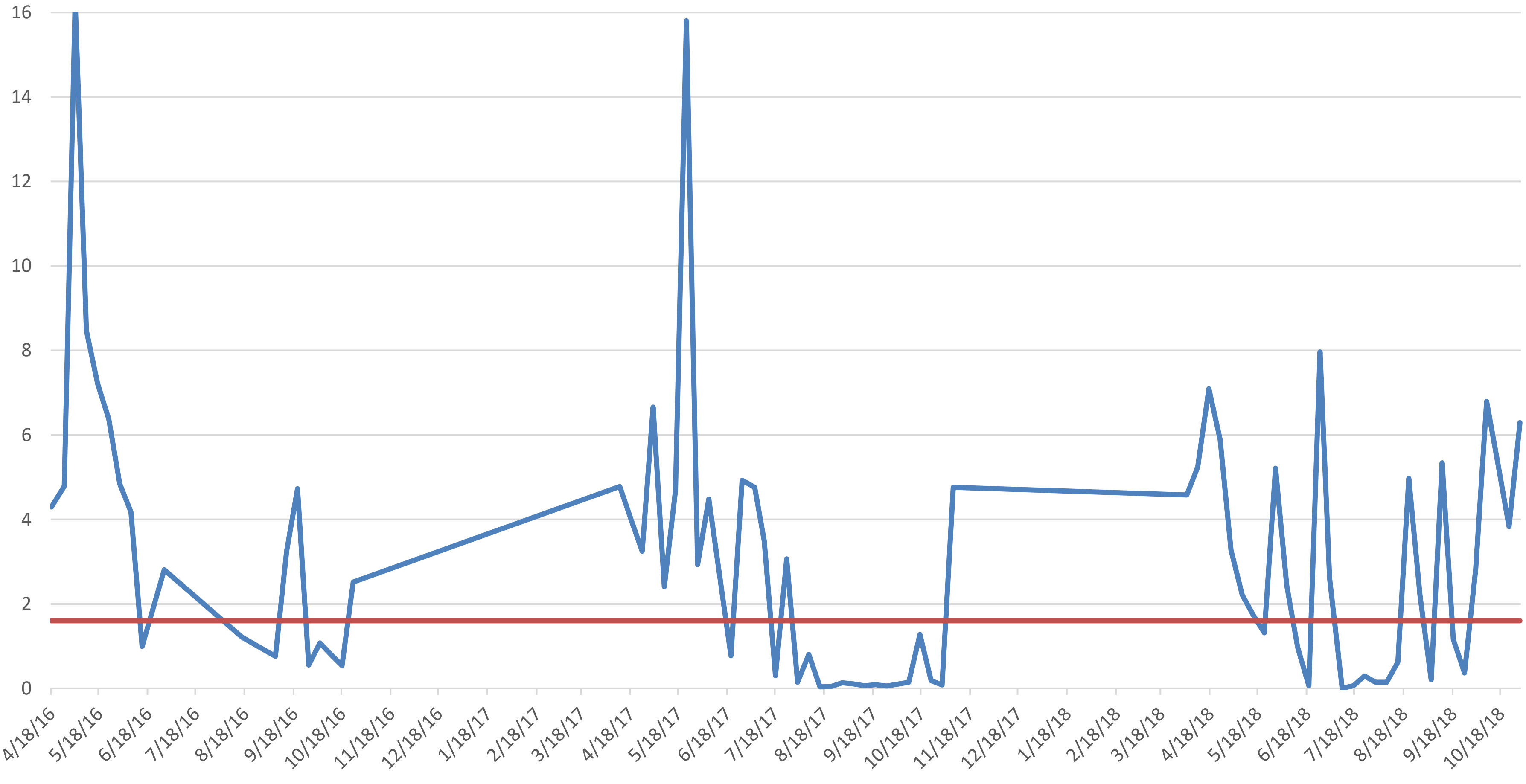
46 exceedances of the MCL = 57%



Little Blue Creek, Site 203
Nitrogen

Data range: April 18, 2016 – Oct. 30, 2018
Nitrogen MCL <1.6 mg/L
79 sampling events

45 exceedances of the MCL = 57%



Water Body	Turbidity	E.coli	Nitrogen	TP	DRP
Little Blue	100	73	57	77	57
Little Cedar Creek	79	58			
Willow Creek	78	45			
Cedar Creek	49	40	39	57	34
Garrett City Ditch	67	72			
St Joe Ohio St Line	91	35	20	11	
St Marys Ohio Line	99	49	49	27	

Nonpoint Source Pollution. Where is it coming from?

- 75% of pollution in the US
- General runoff of water contaminated by agriculture, residential areas, cities
- Only partially regulated
- Personal responsibility, voluntary

Sediment is the # 1 pollutant by volume

Solutions

Urban Areas

Reducing impervious areas reduces contaminants and thermal pollution

Solving water quality and quantity problems

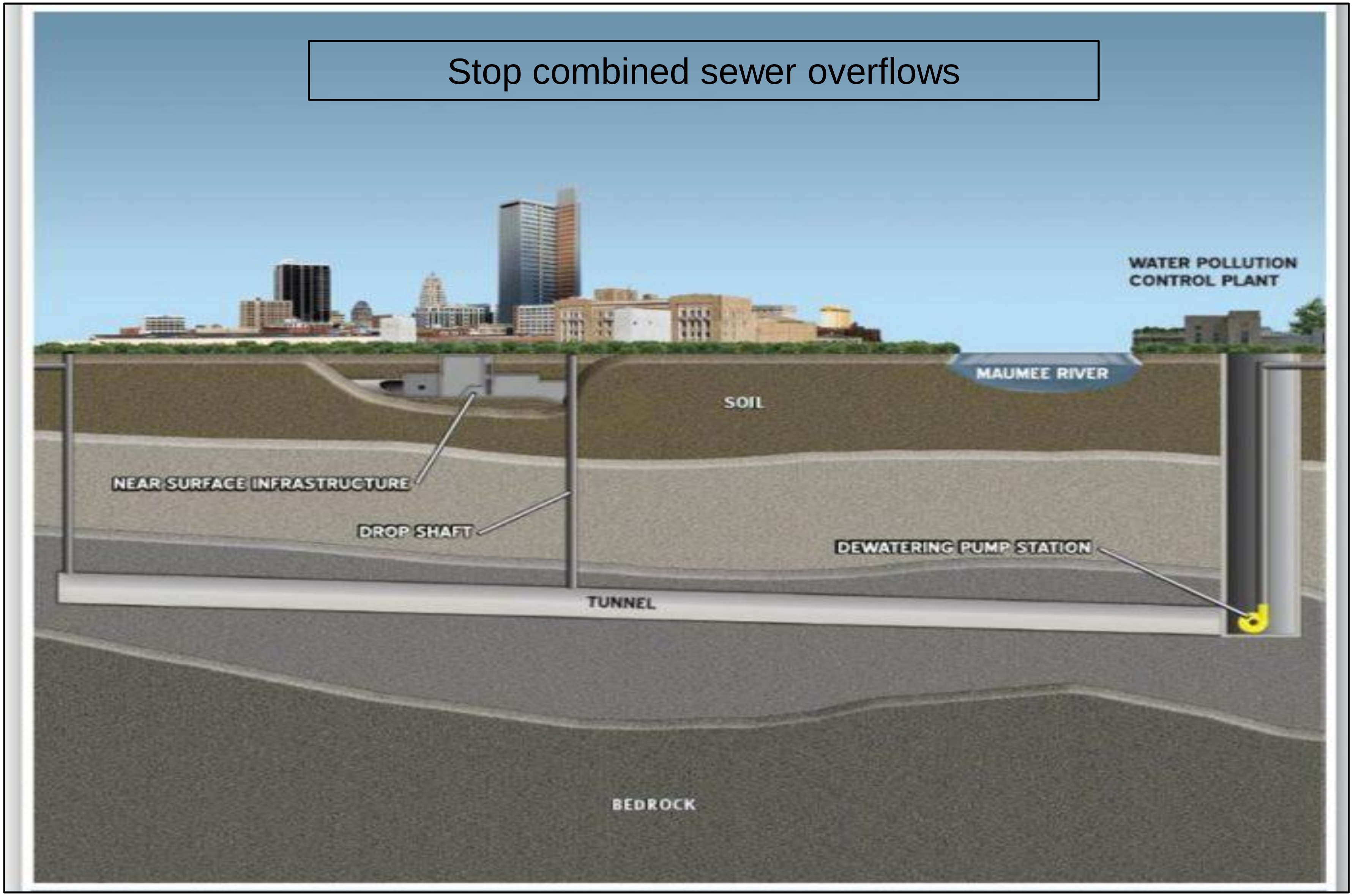
Solutions

Urban Areas

Let water soak into the ground

Solutions

Urban Areas



Solutions

Agriculture

Healthy soil is the foundation of productive, sustainable agriculture.

Managing for soil health allows producers to work with the land – not against – to reduce erosion, maximize water infiltration, improve nutrient cycling, save money on inputs, and ultimately improve the resiliency of their working land.

Solutions

Agriculture

Fight Erosion: When soil stays in the field, it not only provides better soil for crop production, but also reduces sediment entering the water table

No Till

Cover Crops

Grass Waterway

Solutions

Agriculture

Improve Filtration: In field practices can help reduce runoff, but filtering the runoff to remove sediment, chemicals, and waste can improve downstream water quality

Tile inlet buffer

Filter Strip

Forested Riparian Buffer

Solutions

Agriculture

Enhance Management of fertilizers and pesticides to keep them on the field or pasture can reduce costs as well as potential for loss. (4Rs)

Components of a Nutrient Management Plan

- (1) Field Map
- (2) Soil Tests
- (3) Crop Sequence
- (4) Estimated Yield
- (5) Sources and Forms
- (6) Sensitive Areas
- (7) Recommended Rates
- (8) Recommended Timing
- (9) Recommended Methods
- (10) Annual Review and Update

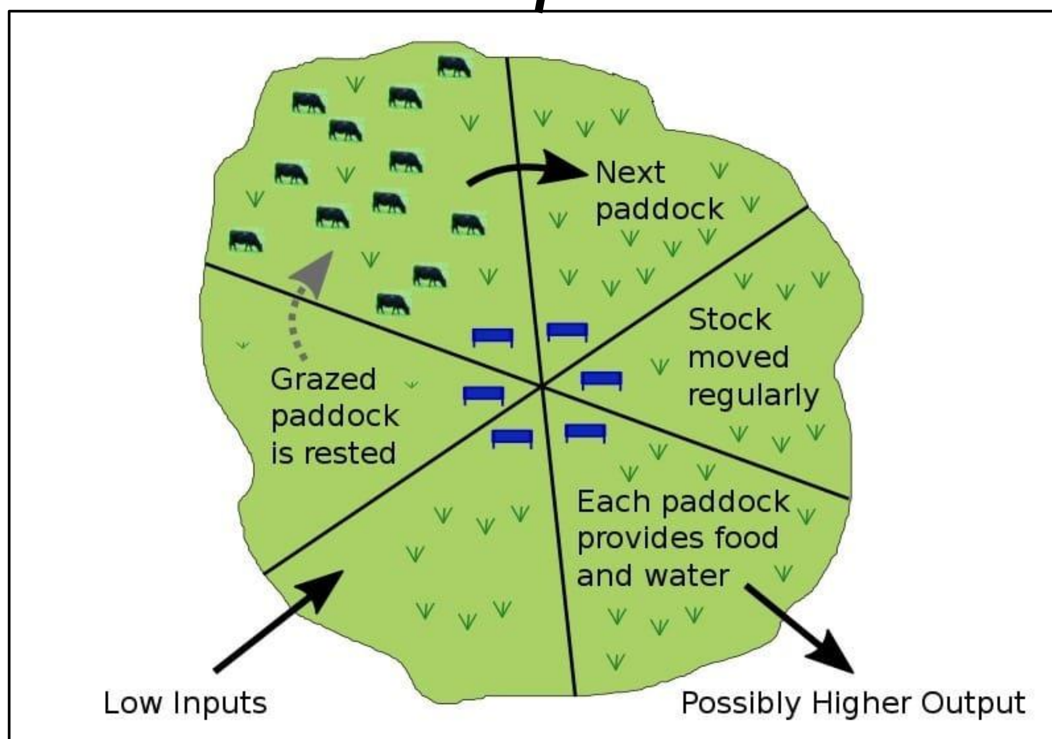
Solution

Agriculture

Manage Animal Waste: Preventing animal waste from entering water sources is a critical to protecting water quality.

Proper manure storage

Rotational Grazing



Solutions

Citizens

Lawn fertilization (4Rs = right source, rate, time, place)

Not within 3 days of rain. Zero phosphorus fertilizer.

Applies to golf courses too

Solutions

Citizens

Wash your car at a car wash

Keep your car drip-free

Only rain down storm drains

Solutions

Citizens

Use rain barrels

Install rain gardens

Minimize hard surfaces

Solutions

Citizens

Clean up after your pet

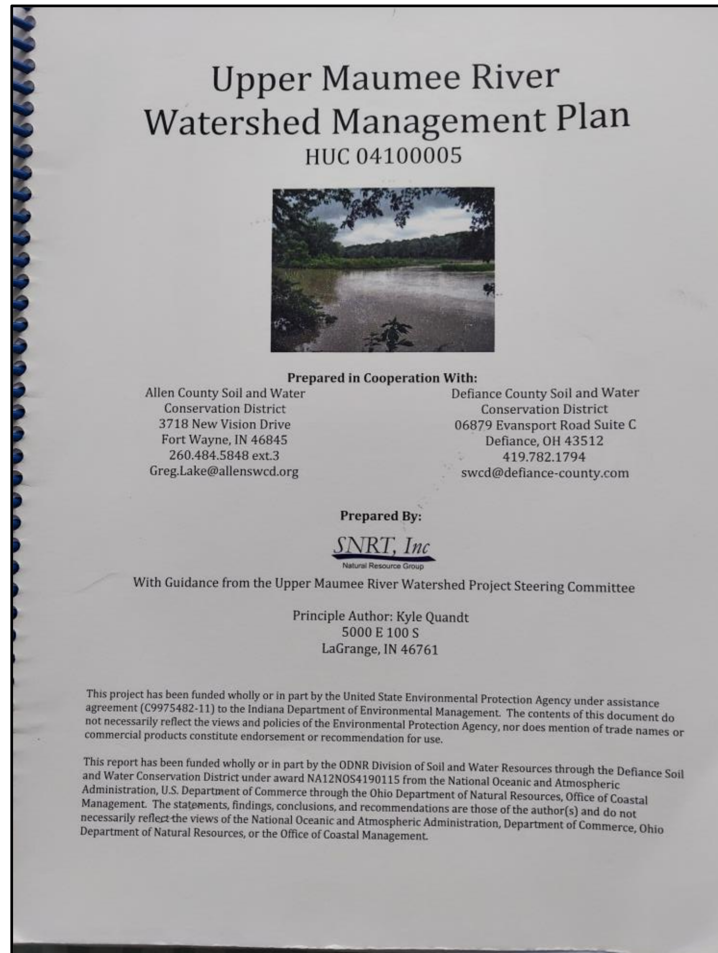
Goose-proof your detention ponds

Dispose of household chemicals properly

Solutions

Participate and Educate!

Join/support watershed organizations. Attend clean-up and invasive species removal events. Educate yourself and others.



Upper Maumee River
Watershed Management Plan
HUC 04100005

Prepared in Cooperation With:

Allen County Soil and Water Conservation District
3718 New Vision Drive
Fort Wayne, IN 46845
260.484.5848 ext.3
Greg.Lake@allenswcd.org

Defiance County Soil and Water Conservation District
06879 Evansport Road Suite C
Defiance, OH 43512
419.782.1794
swcd@defiance-county.com

Prepared By:

SNRT, Inc
Natural Resource Group

With Guidance from the Upper Maumee River Watershed Project Steering Committee

Principle Author: Kyle Quandt
5000 E 100 S
LaGrange, IN 46761

This project has been funded wholly or in part by the United State Environmental Protection Agency under assistance agreement (C9975482-11) to the Indiana Department of Environmental Management. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

This report has been funded wholly or in part by the ODNR Division of Soil and Water Resources through the Defiance Soil and Water Conservation District under award NA12NOS4190115 from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce through the Ohio Department of Natural Resources, Office of Coastal Management. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the National Oceanic and Atmospheric Administration, Department of Commerce, Ohio Department of Natural Resources, or the Office of Coastal Management.

Resources

Sharon Partridge
ssp2655@gmail.com

Hoosier Riverwatch
Hoosierriverwatch.com

Maumee Watershed Alliance
maumeewatershedalliance.org

Save Maumee Grassroots Organization
savemaumee.org

Water Quality Information System, (WQIS)
wqis.cityoffortwayne.org/WQIS/

L-thia
lthia.agriculture.purdue.edu/