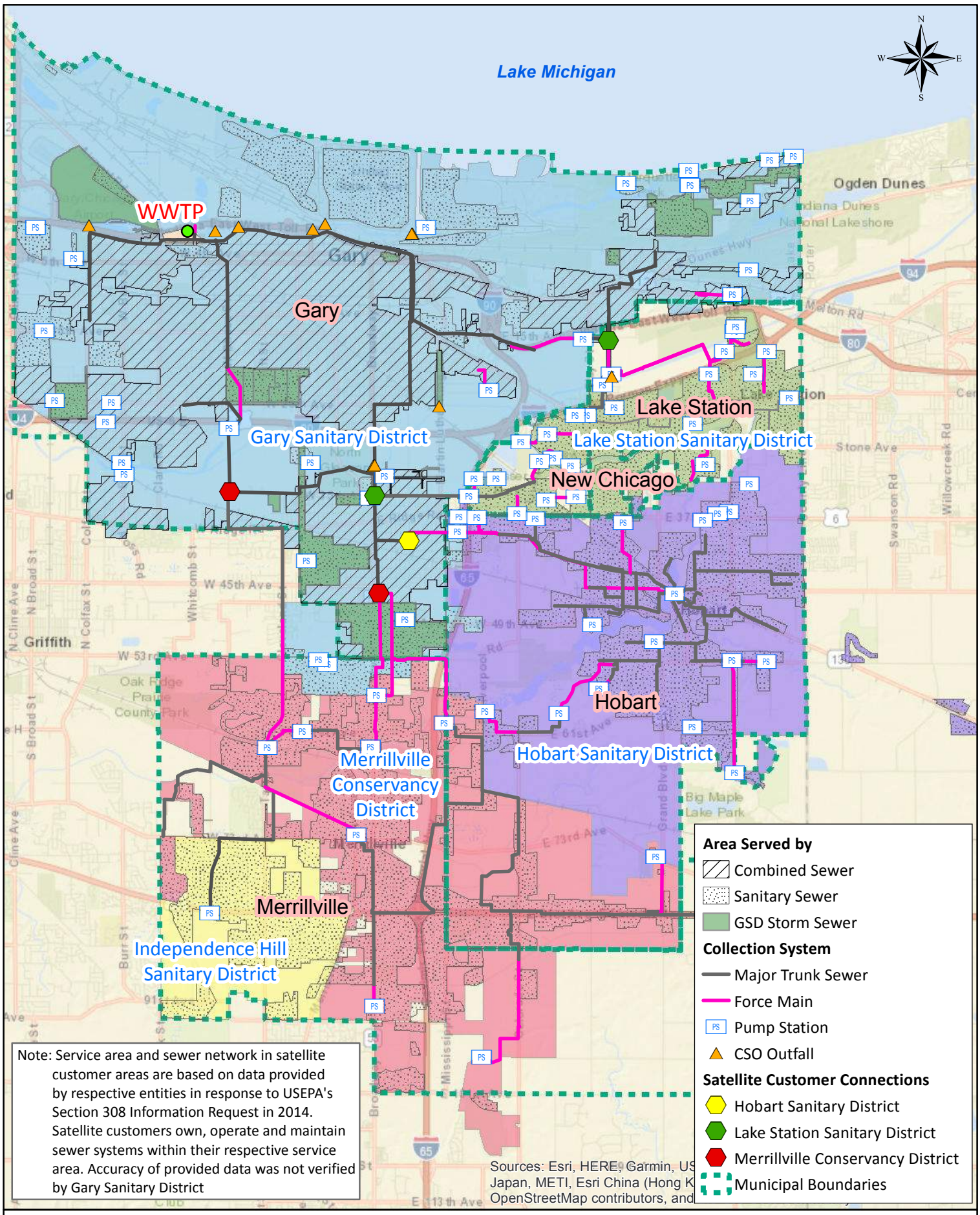
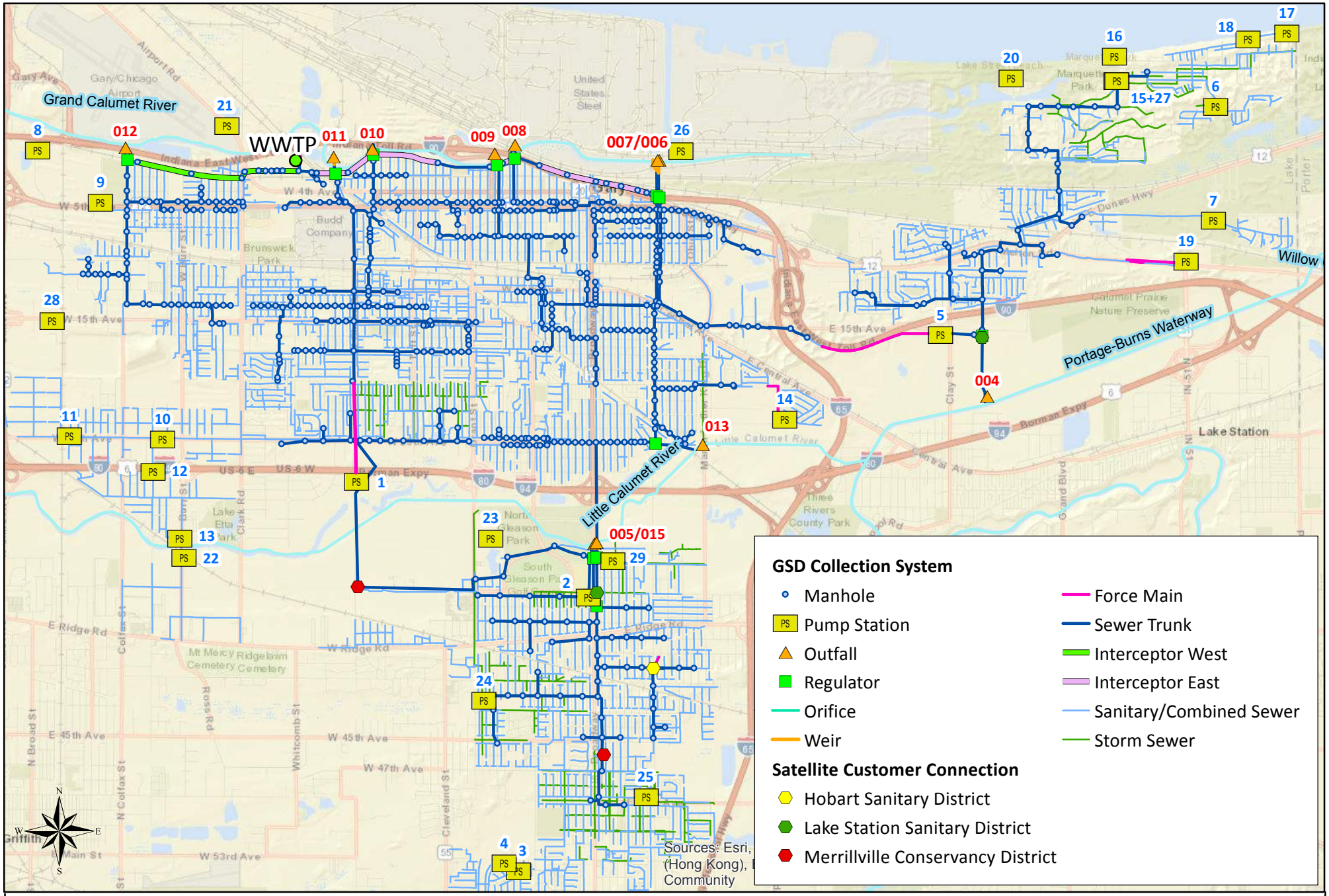
Figures



CDM Smith

2 1 0 2 Miles

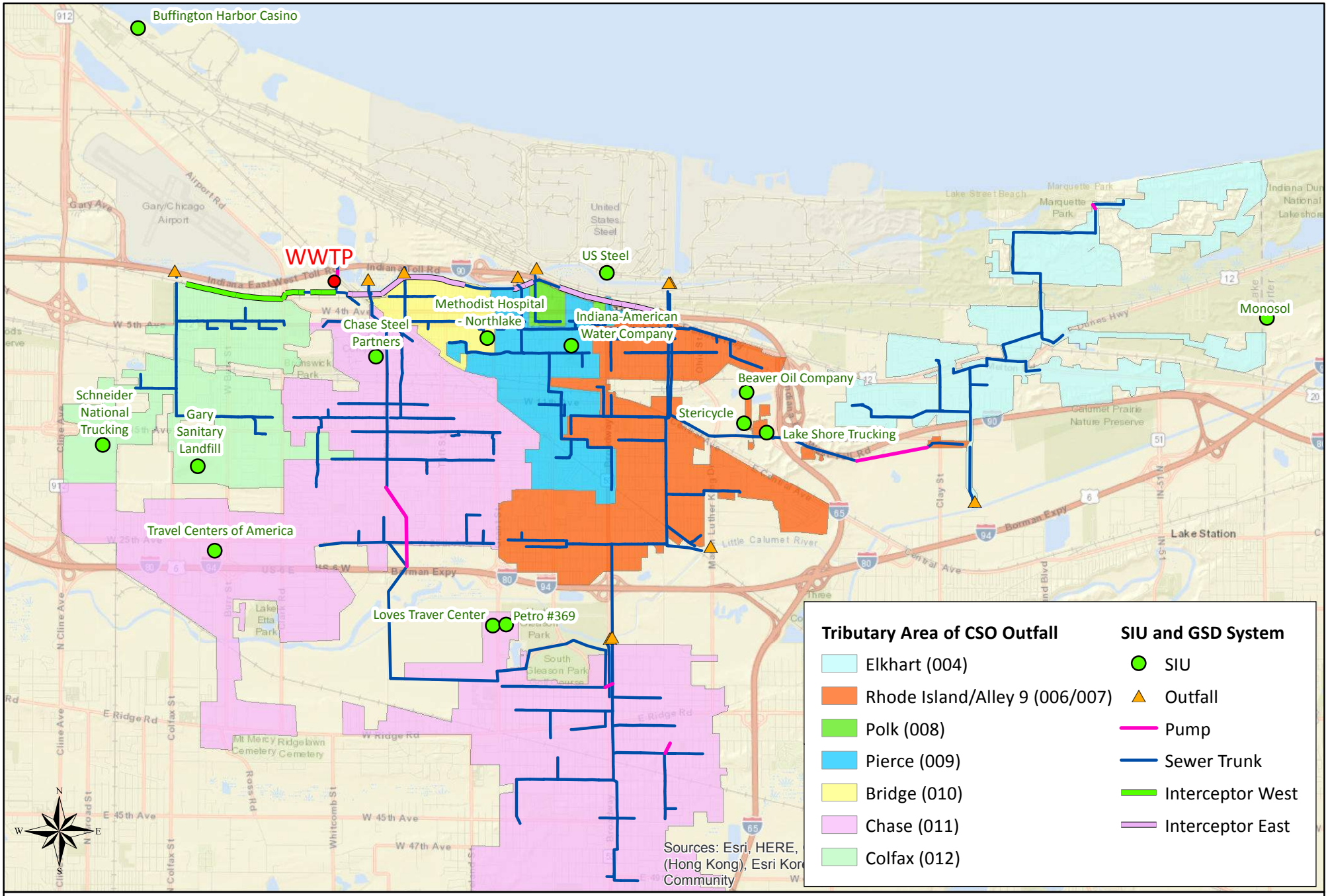
Figure 2-1
Gary Sanitary District Collection System Service Areas including Satellite Communities



CDM Smith

0 1 2 4 Miles

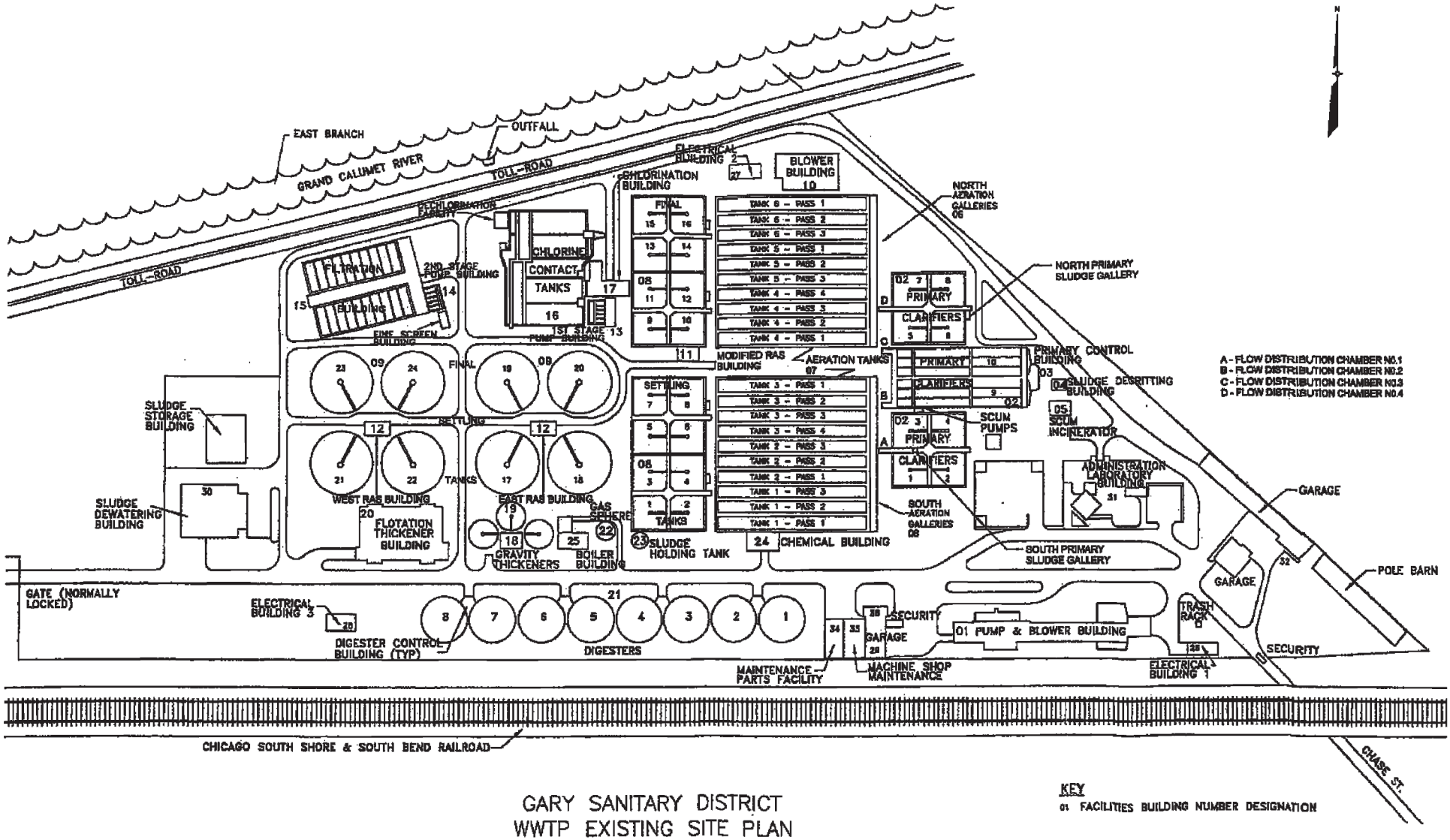
Figure 2-2
Gary Sanitary District Collection System
System Components



CDM Smith

2 1 0 Miles

Figure 2-3
Gary Sanitary District Collection System
Significant Industrial Users (SIU)



GARY SANITARY DISTRICT
WWTP EXISTING SITE PLAN

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY:
DRAWN BY:
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE:

CDM Smith
429 North Pennsylvania Street, Suite 409
Indianapolis, Indiana 46204
Tel: (317) 829-9600

FIGURE 2-4 WWTP SITE PLAN

PROJECT NO.
FILE NAME:
SHEET NO.

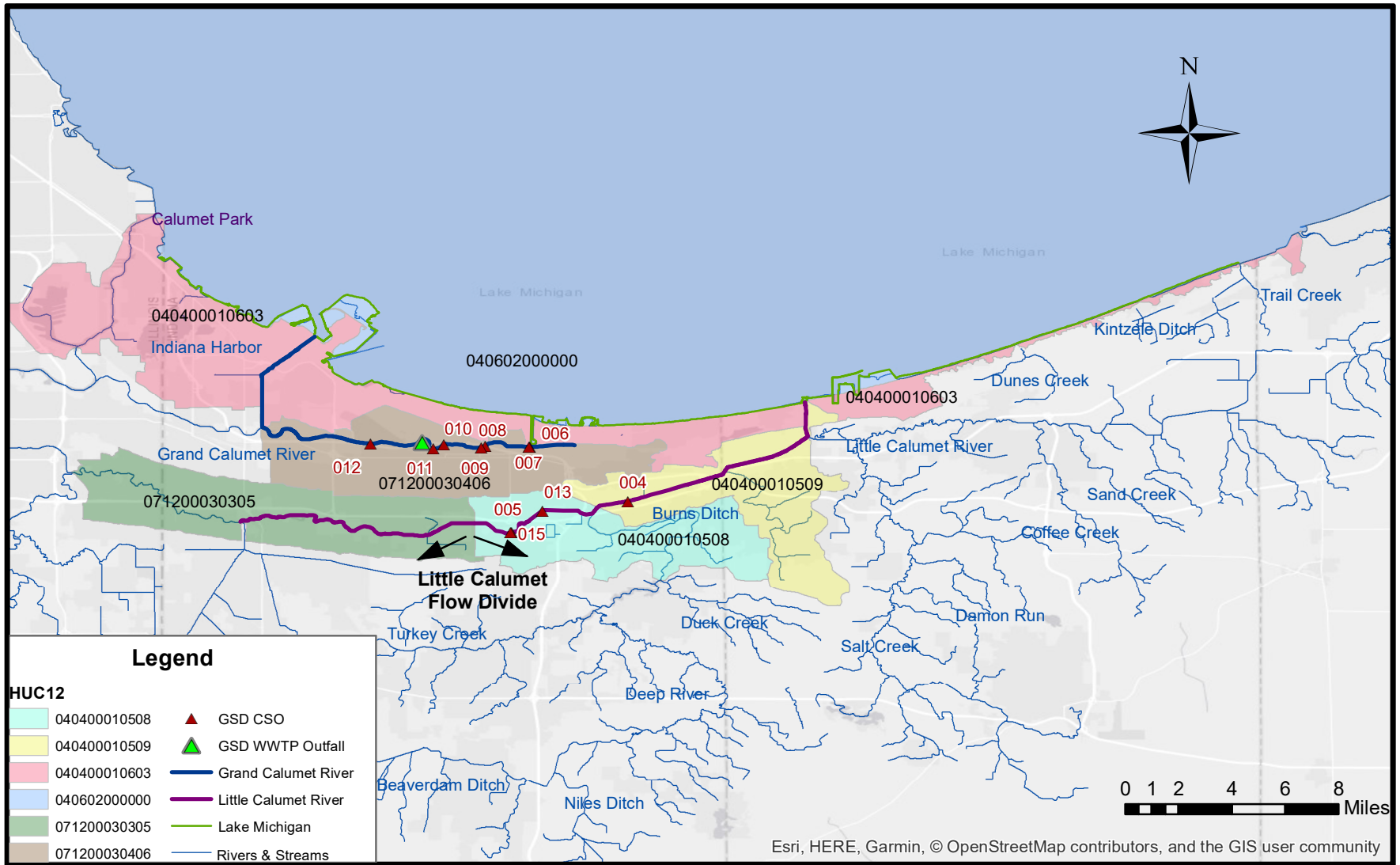


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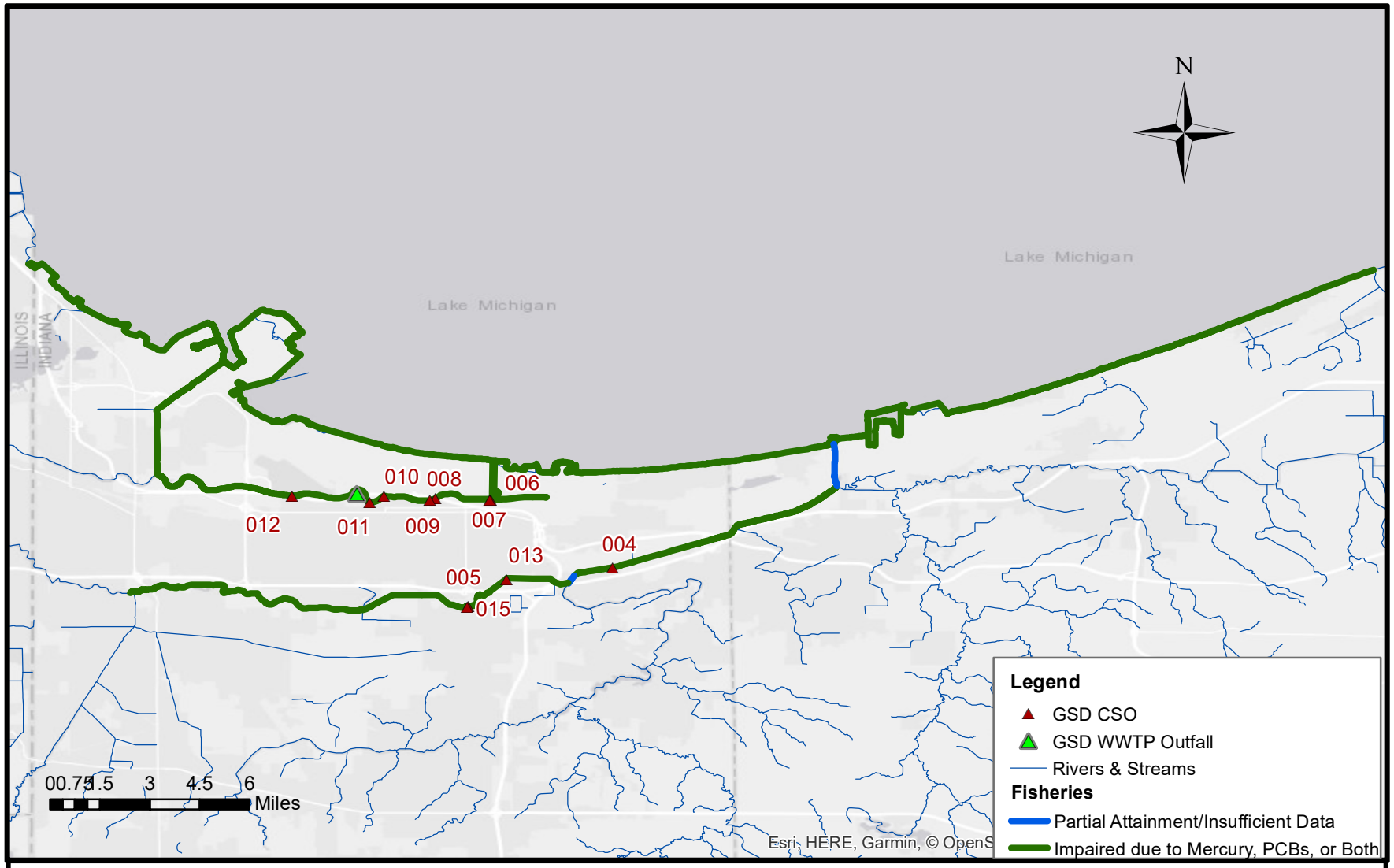
Figure 3-1
HUC 12 Watershed Boundaries and Receiving Waters



CDM Smith

Figure 3-2
Fisheries 303d Listing

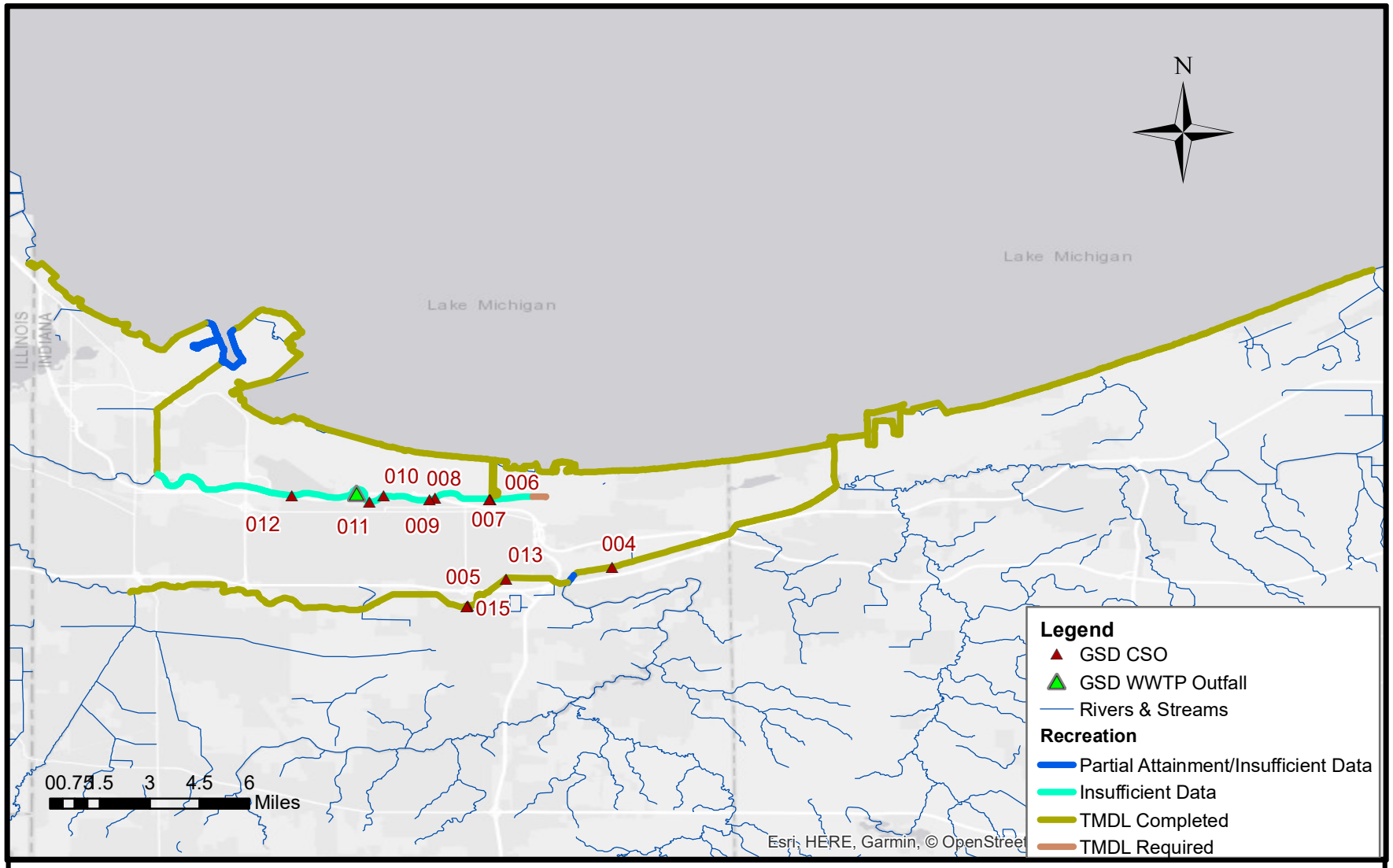


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Figure 3-3
Recreation 303d Listing

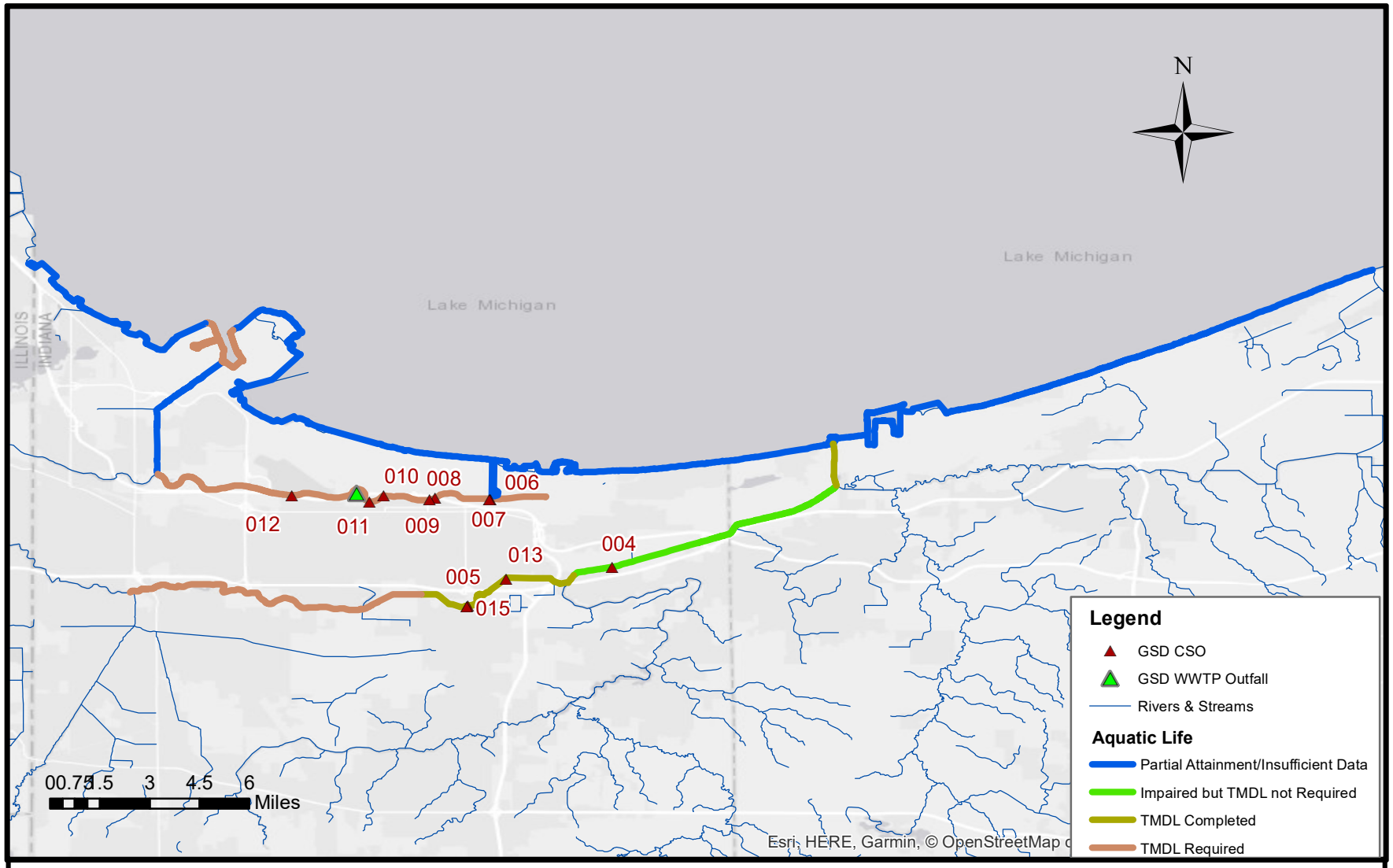

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Figure 3-4
Aquatic Life 303d Listing

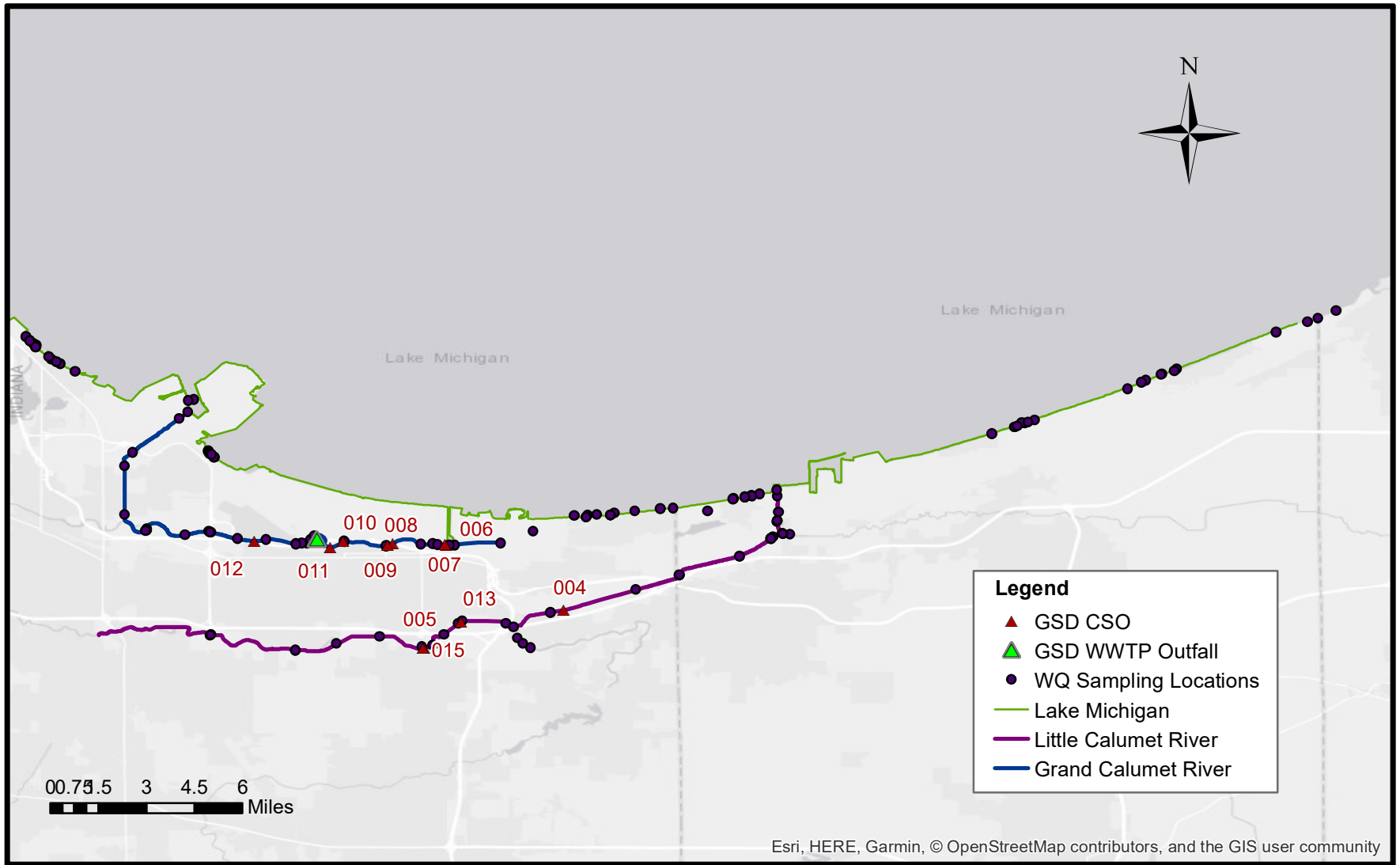

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Figure 3-5
All Water Quality Data Locations

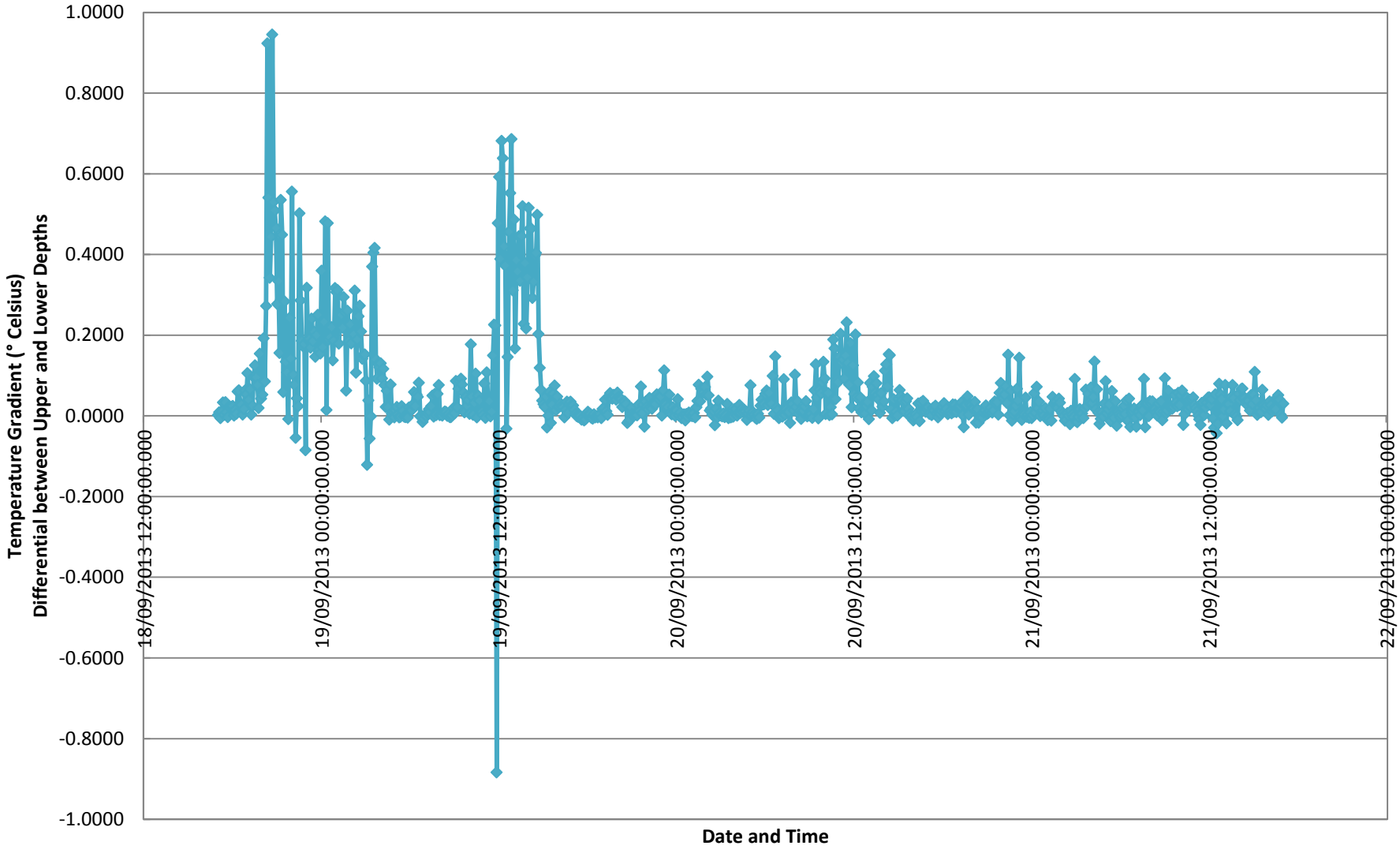

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Figure 3-6
Temperature Gradient at Buchanan Street Bridge, Grand Calumet River
September 18, 2013 Wet Weather Event

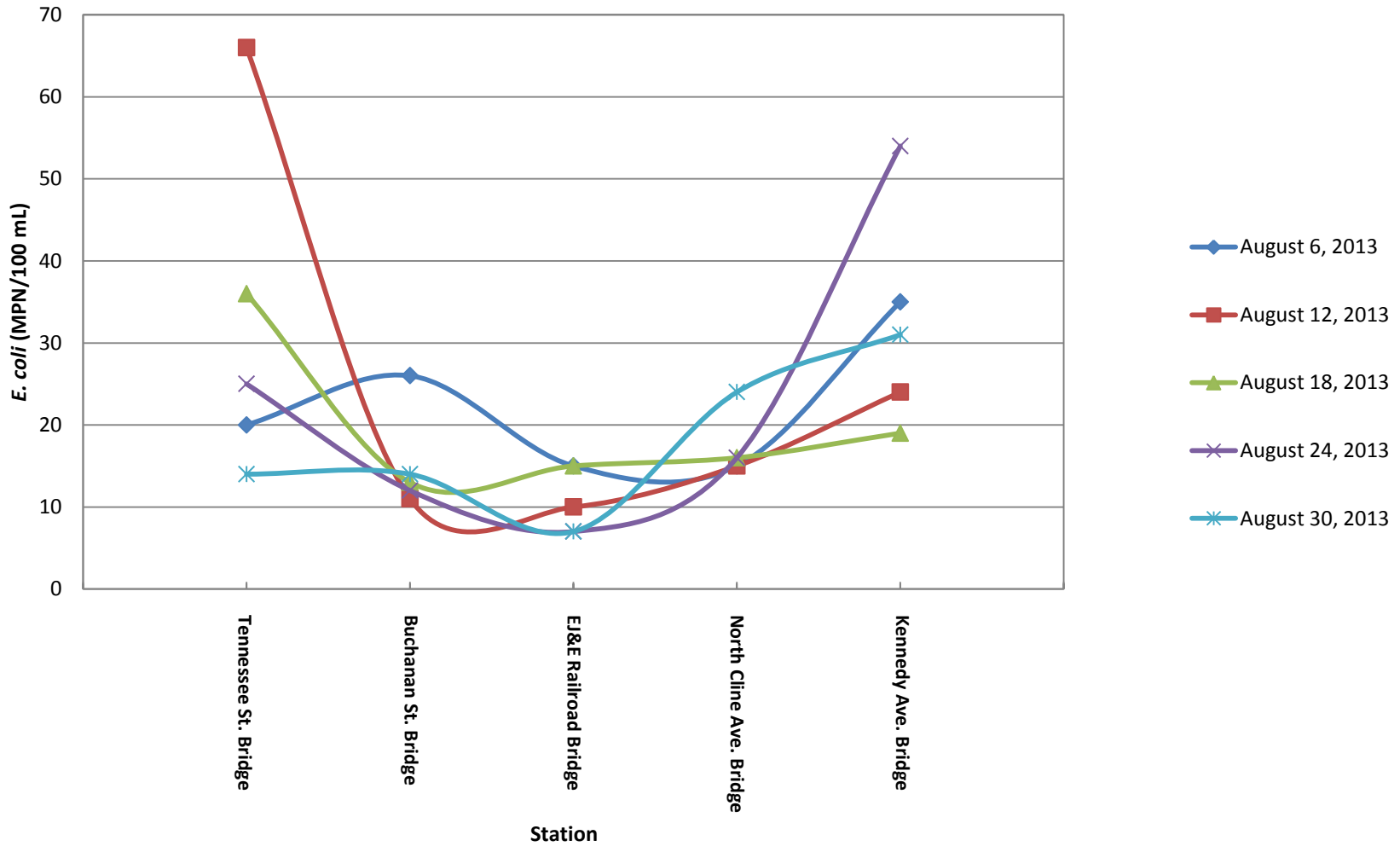

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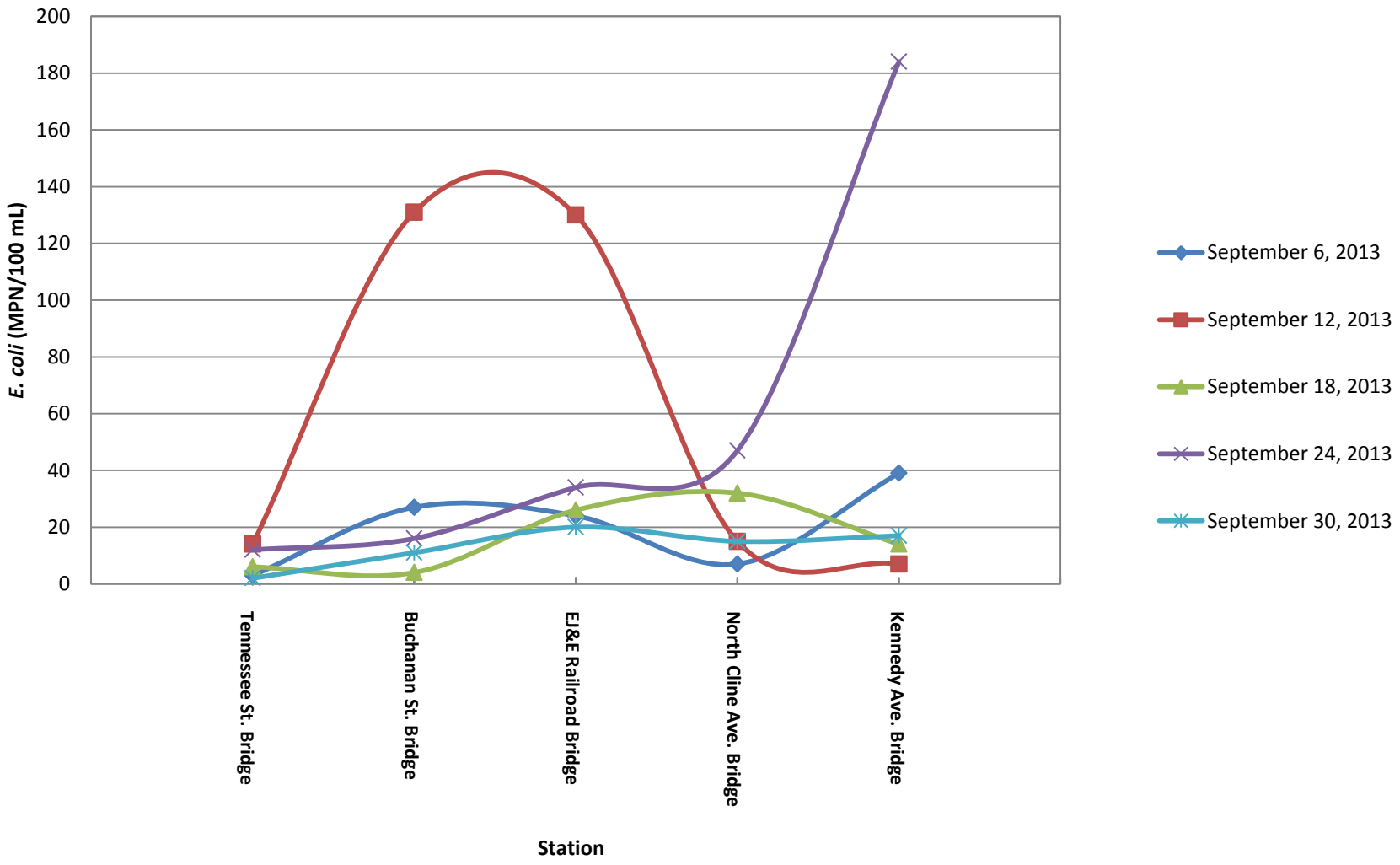
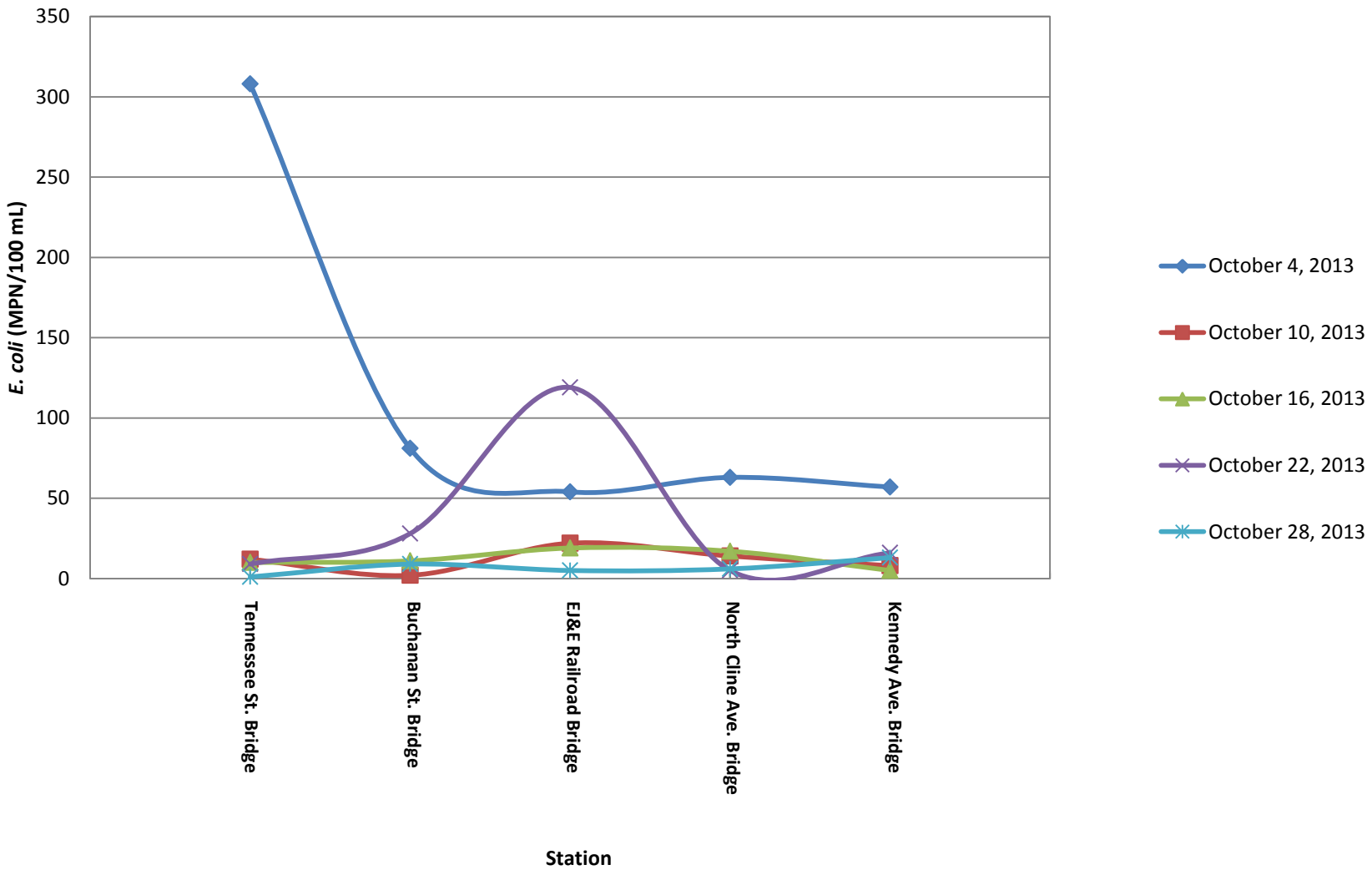
Figure 3-7
2013 Water Sampling Program
Grand Calumet River *E. coli* (MPN/100 mL)
at Sampling Time, t



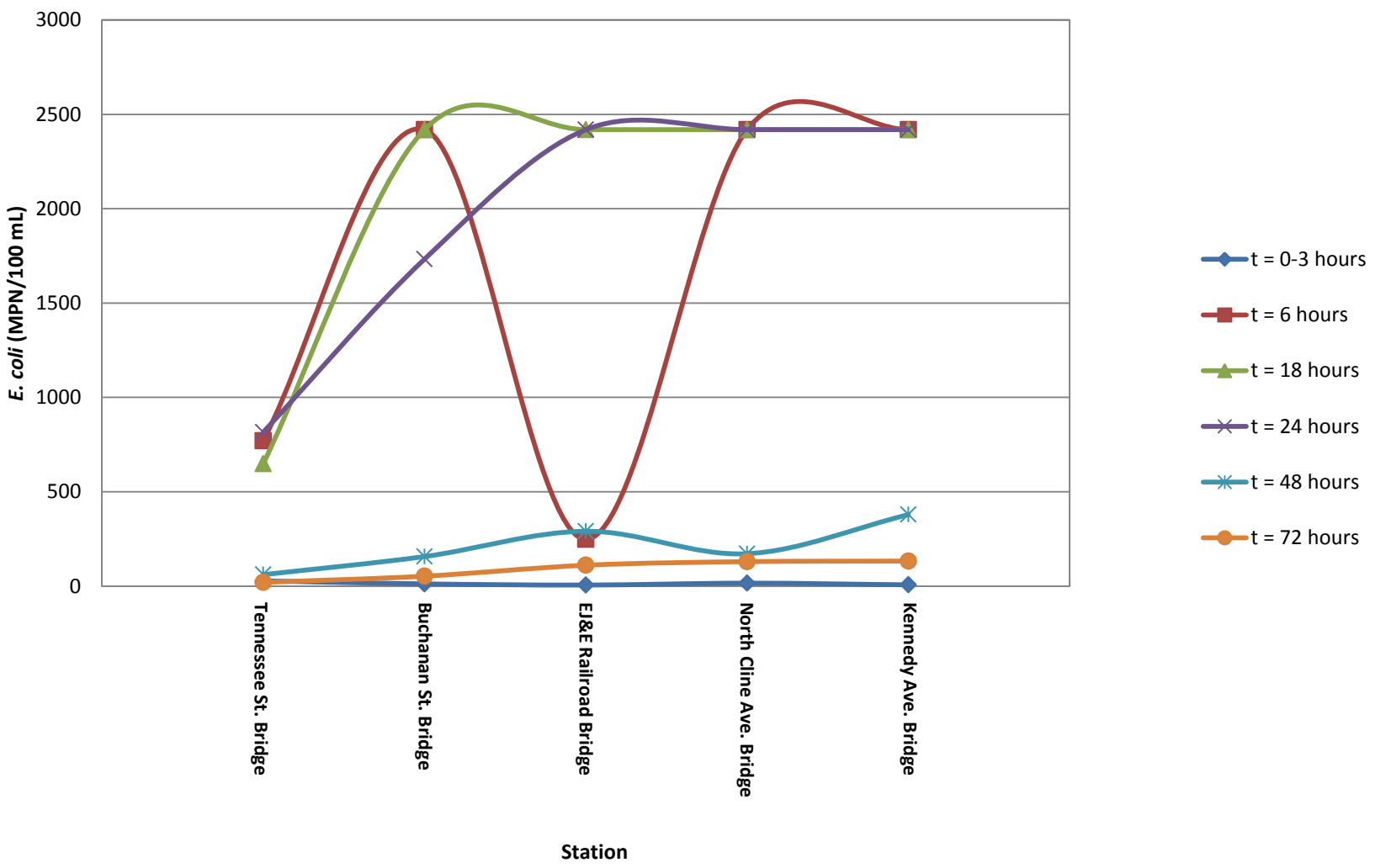
CDM Smith

Figure 3-8
2013 Water Sampling Program
Grand Calumet River *E. coli* (MPN/100 mL)
at Sampling Time, t



CDM Smith

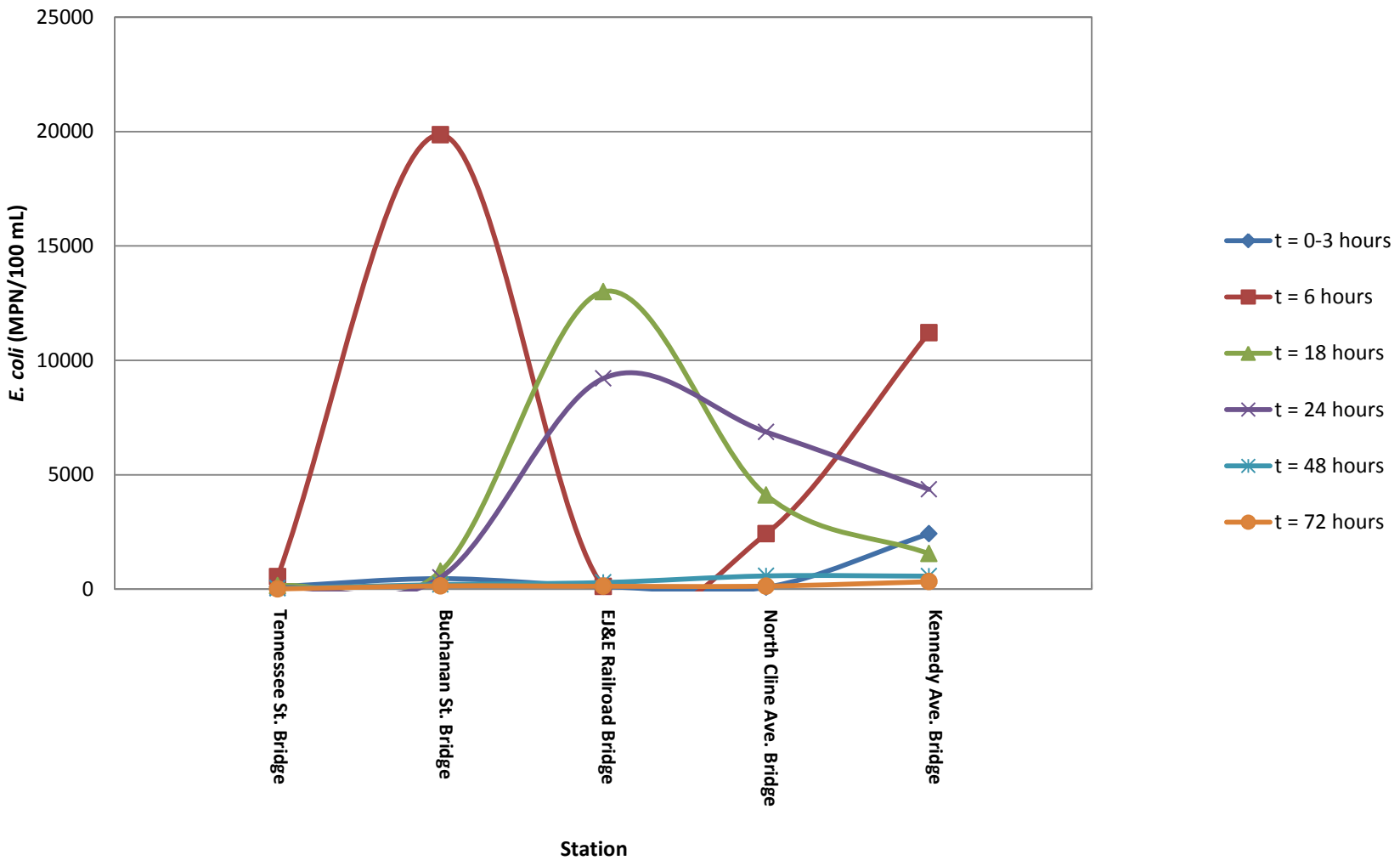
Figure 3-9
2013 Water Sampling Program
Grand Calumet River *E. coli* (MPN/100 mL)
at Sampling Time, t



CDM Smith

Note: Laboratory analysis of the data for this event recorded some values as ">2419" as reported in the submittal of these data (November 1, 2013 letter to Mr. William Jones) and for graphical depiction of the data these values are plotted here as 2419. Figures 5-23 through 5-26 in this report (and the November 1 letter report) can be referenced for identification of the specific values affected.

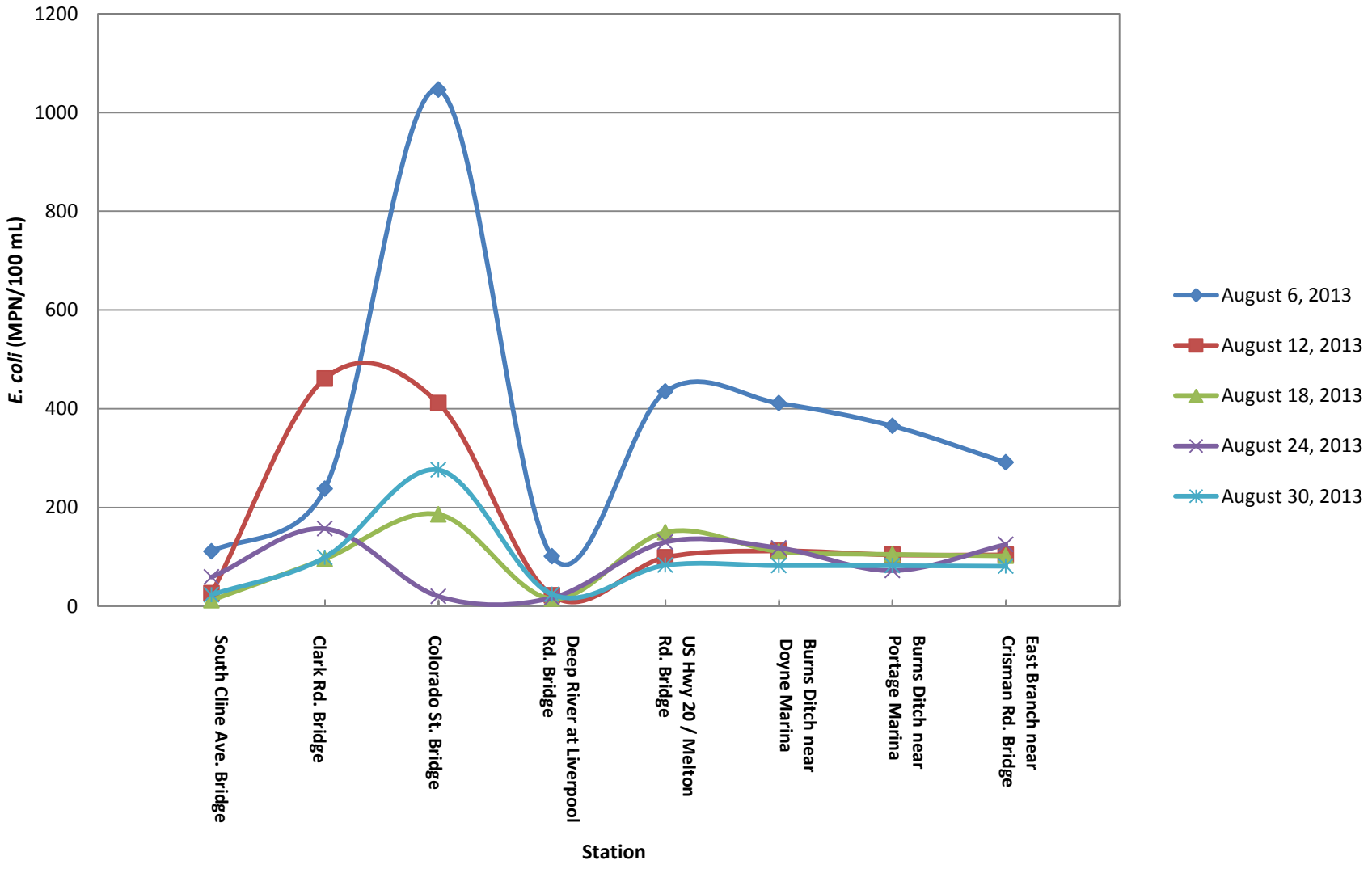
Figure 3-10
2013 Water Sampling Program
Grand Calumet River *E. coli* (MPN/100 mL)
at Sampling Time, t (9/18/2013 Event)



CDM Smith

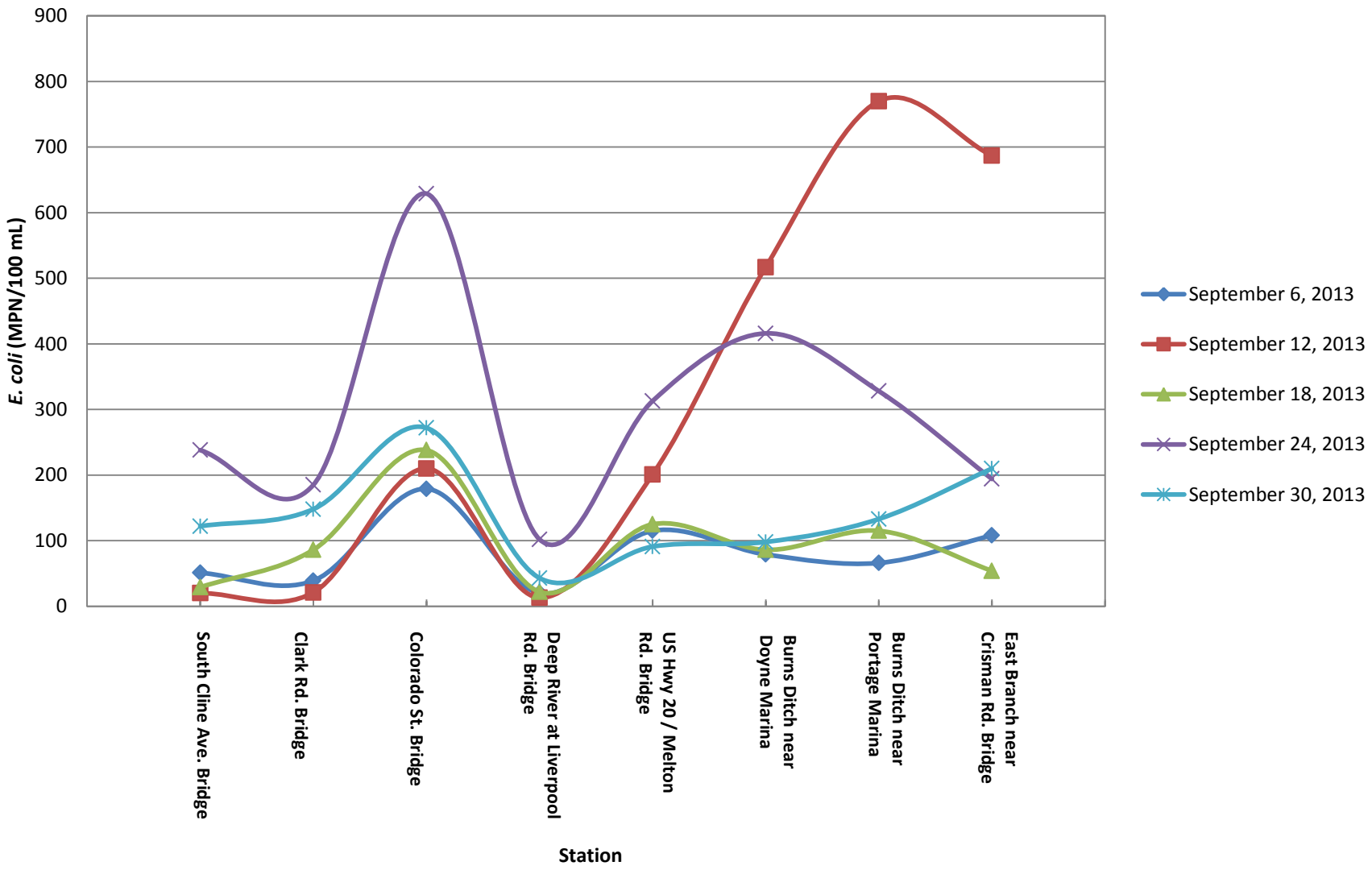
Note: Laboratory analysis of the data for this event recorded some values as exceeding a specified count and use the ">" symbol where this applies, as reported in the submittal of these data (November 1, 2013 letter to Mr. William Jones) and for graphical depiction of the data these values are plotted here using the numeric value recorded. Figures 5-23 through 5-26 in this report (and the November 1 letter report) can be referenced for identification of the specific values affected.

Figure 3-11
2013 Water Sampling Program
Grand Calumet River *E. coli* (MPN/100 mL)
at Sampling Time, t (10/30/2013 Event)



CDM Smith

Figure 3-12
2013 Water Sampling Program
Little Calumet River *E. coli* (MPN/100 mL)
at Sampling Time, t



CDM Smith

Figure 3-13
2013 Water Sampling Program
Little Calumet River *E. coli* (MPN/100 mL)
at Sampling Time, t

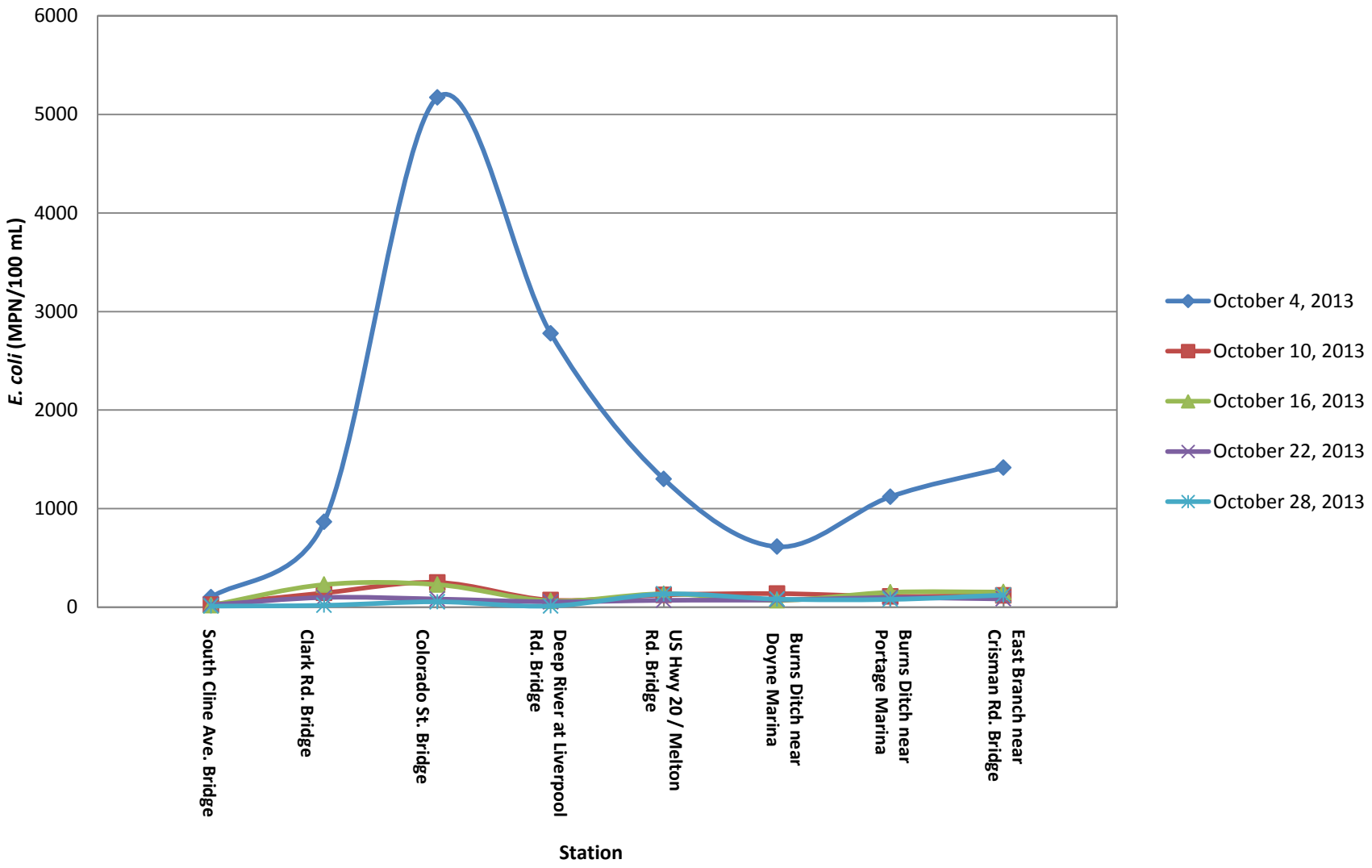


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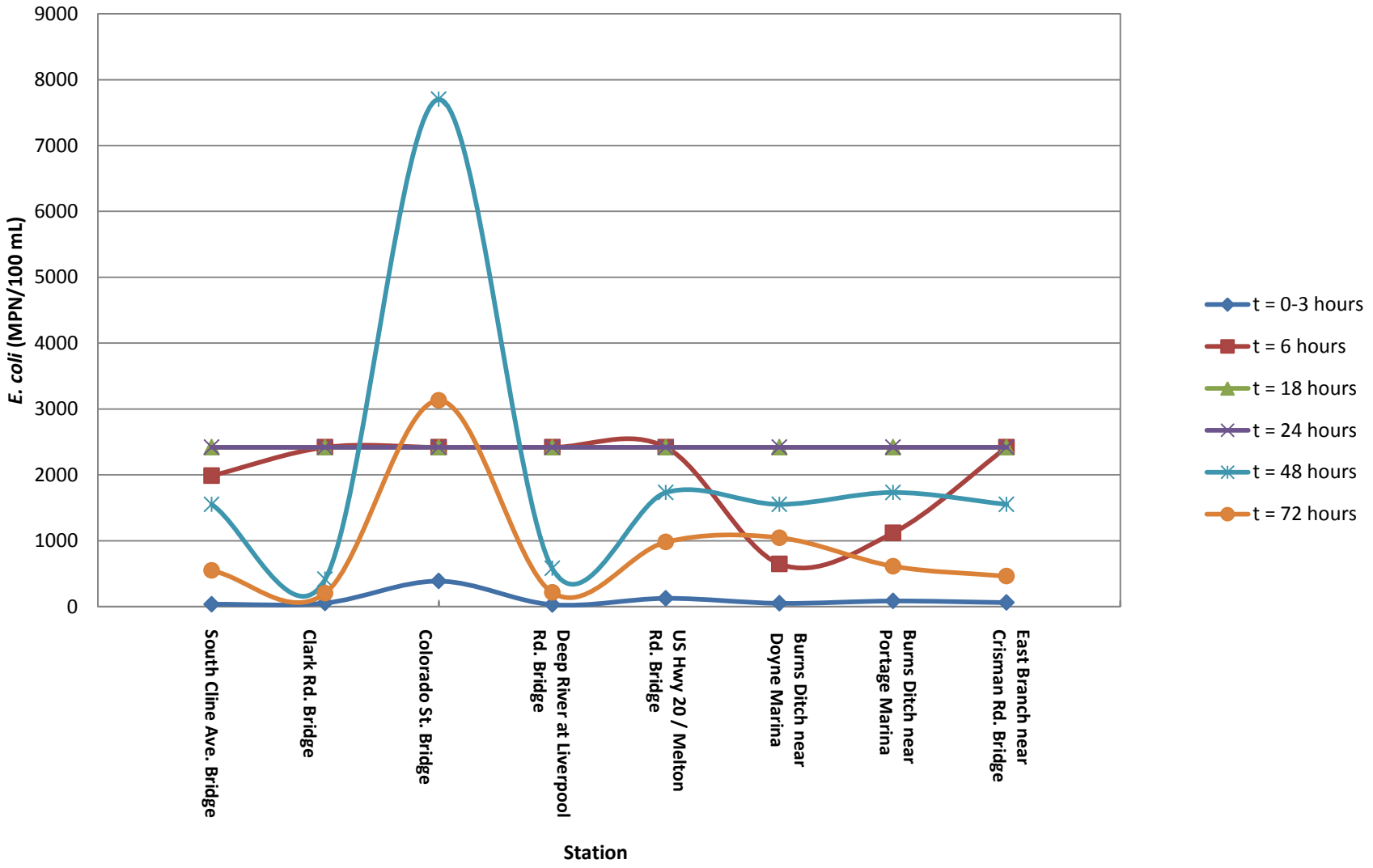
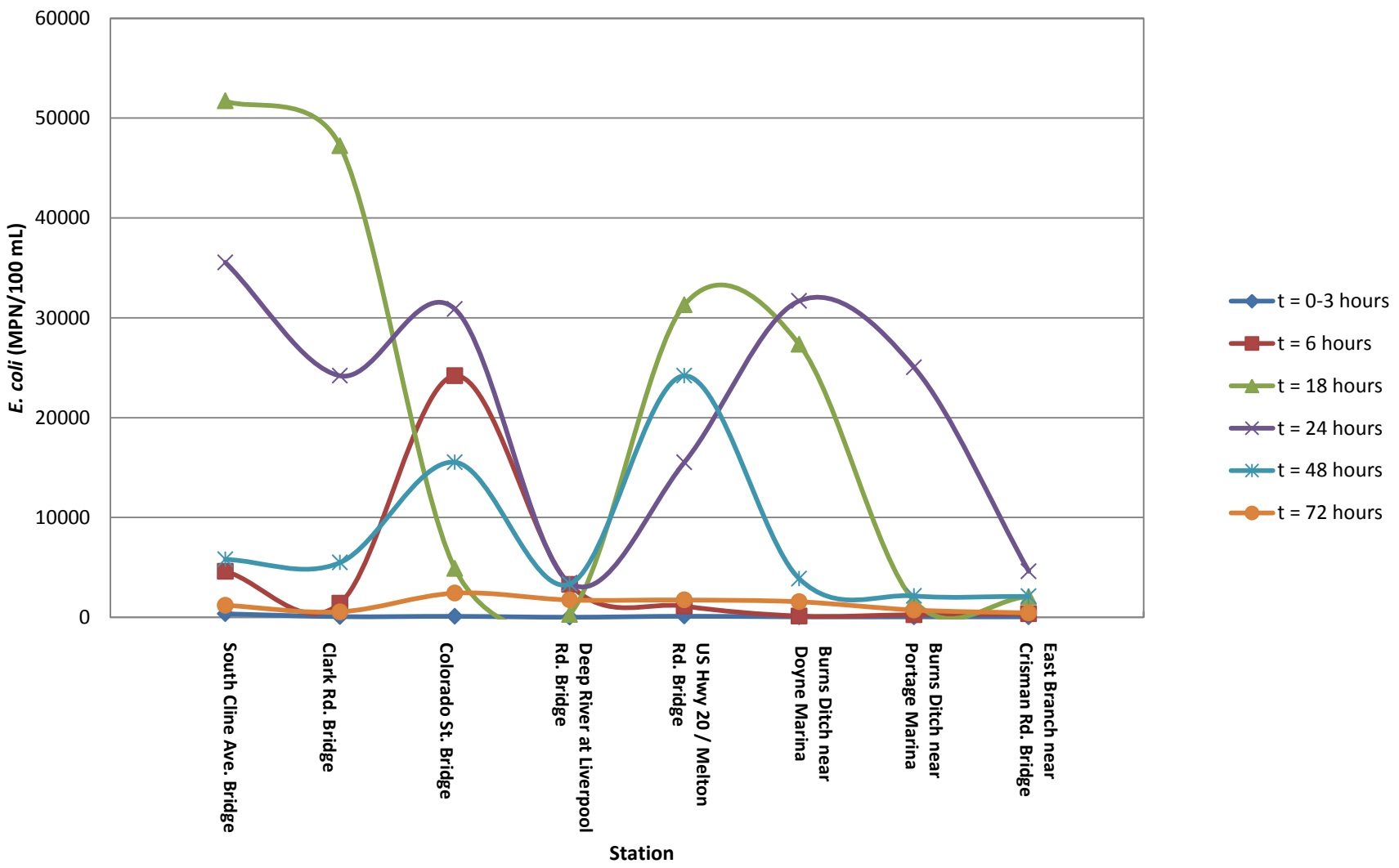
Figure 3-14
2013 Water Sampling Program
Little Calumet River *E. coli* (MPN/100 mL)
at Sampling Time, t



CDM Smith

Note: Laboratory analysis of the data for this event recorded some values as ">2419" as reported in the submittal of these data (November 1, 2013 letter to Mr. William Jones) and for graphical depiction of the data these values are plotted here as 2419. Figures 5-23 through 5-26 in this report (and the November 1 letter report) can be referenced for identification of the specific values affected.

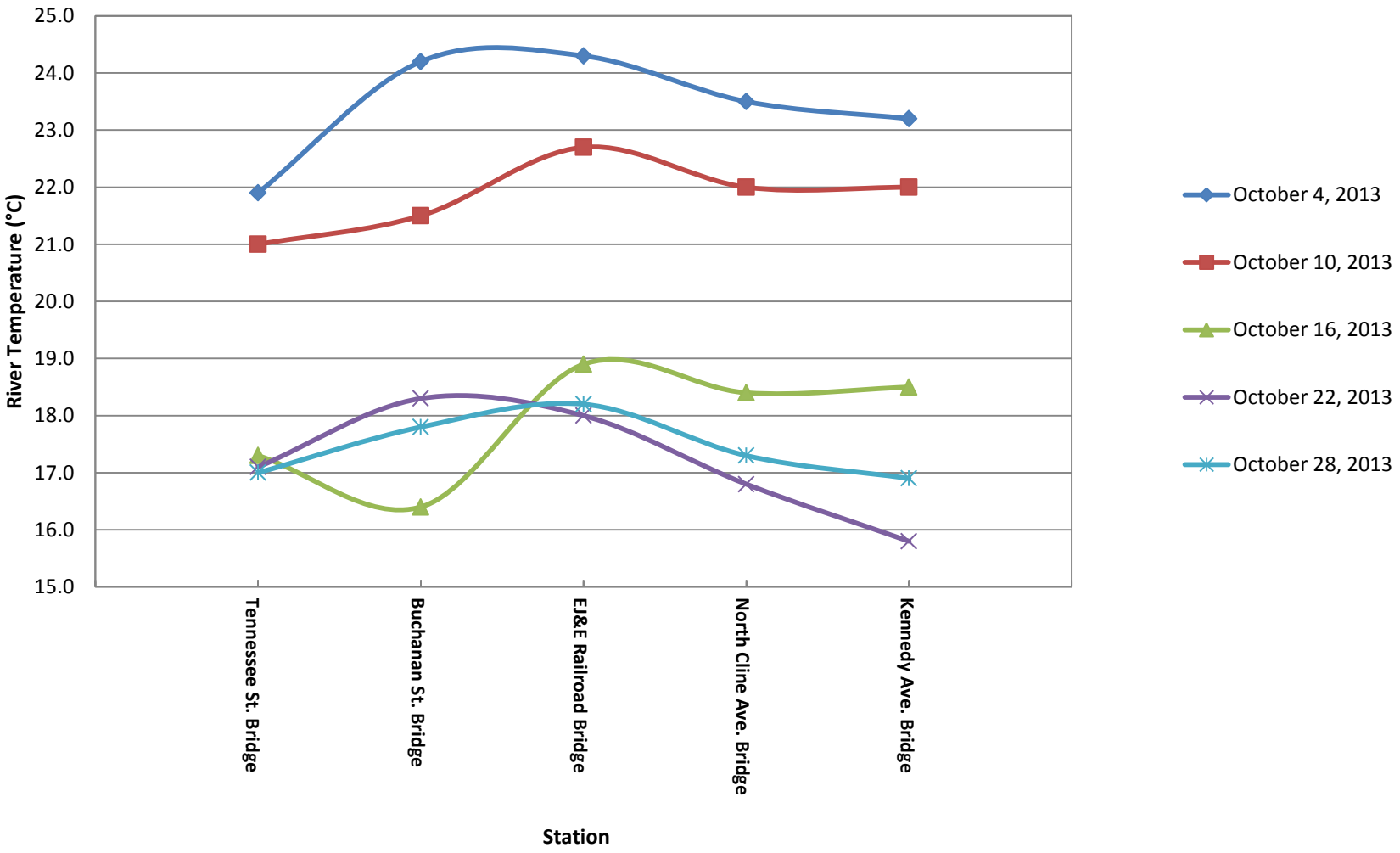
Figure 3-15
2013 Water Sampling Program
Little Calumet River *E. coli* (MPN/100 mL)
at Sampling Time, t (9/18/2013 Event)



CDM Smith

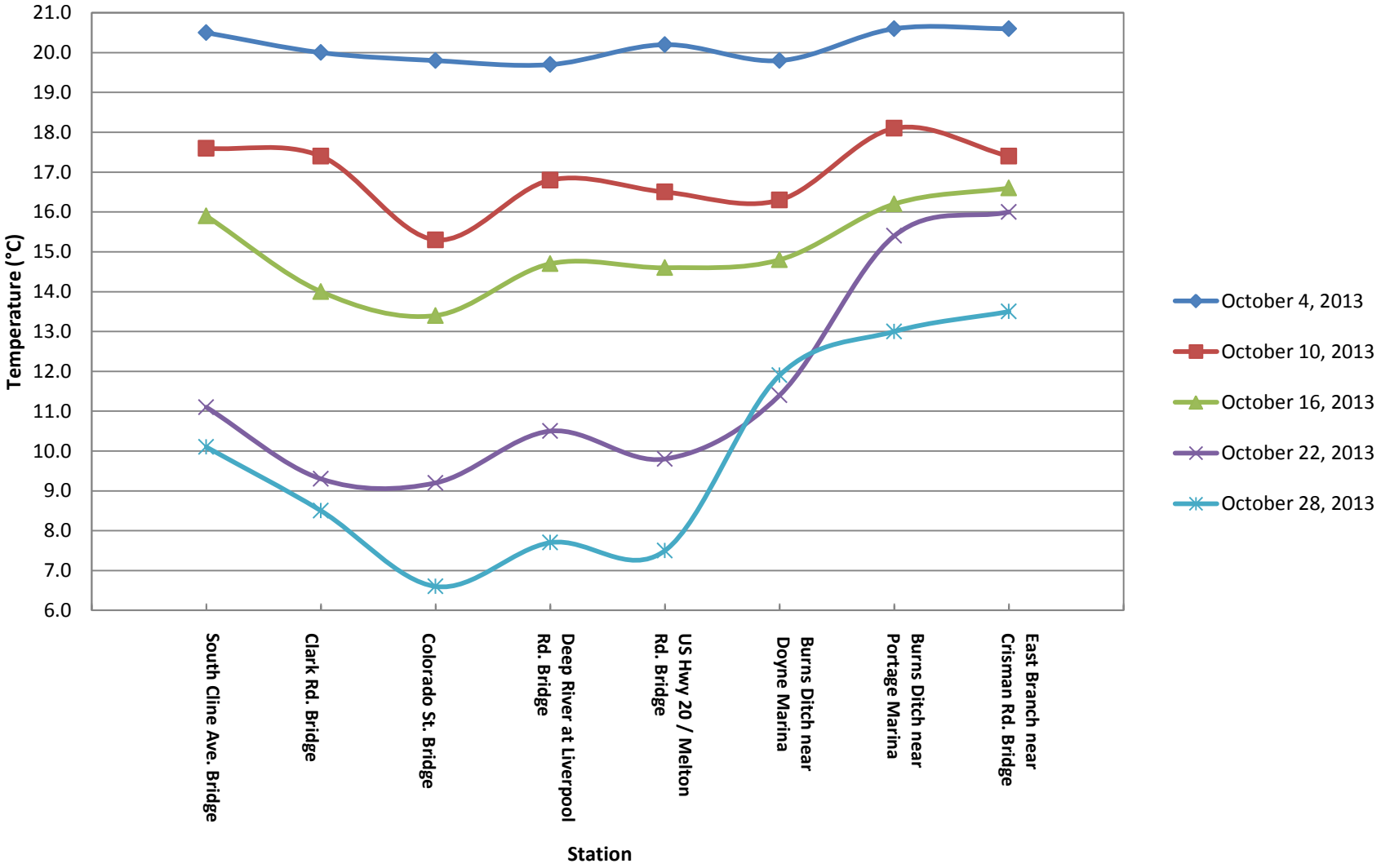
Note: Laboratory analysis of the data for this event recorded some values as exceeding a specified count and use the ">" symbol where this applies, as reported in the submittal of these data (November 1, 2013 letter to Mr. William Jones) and for graphical depiction of the data these values are plotted here using the numeric value exceeded. Figures 5-23 through 5-26 in this report (and the November 1 letter report) can be referenced for identification of the specific values affected.

Figure 3-16
2013 Water Sampling Program
Little Calumet River *E. coli* (MPN/100 mL)
at Sampling Time, t (10/30/2013 Event)



CDM Smith

Figure 3-17
2013 Water Sampling Program
Grand Calumet River Temperature (°C)
at Sampling Time, t



CDM Smith

Figure 3-18
2013 Water Sampling Program
Little Calumet River Temperature (°C)
at Sampling Time, t

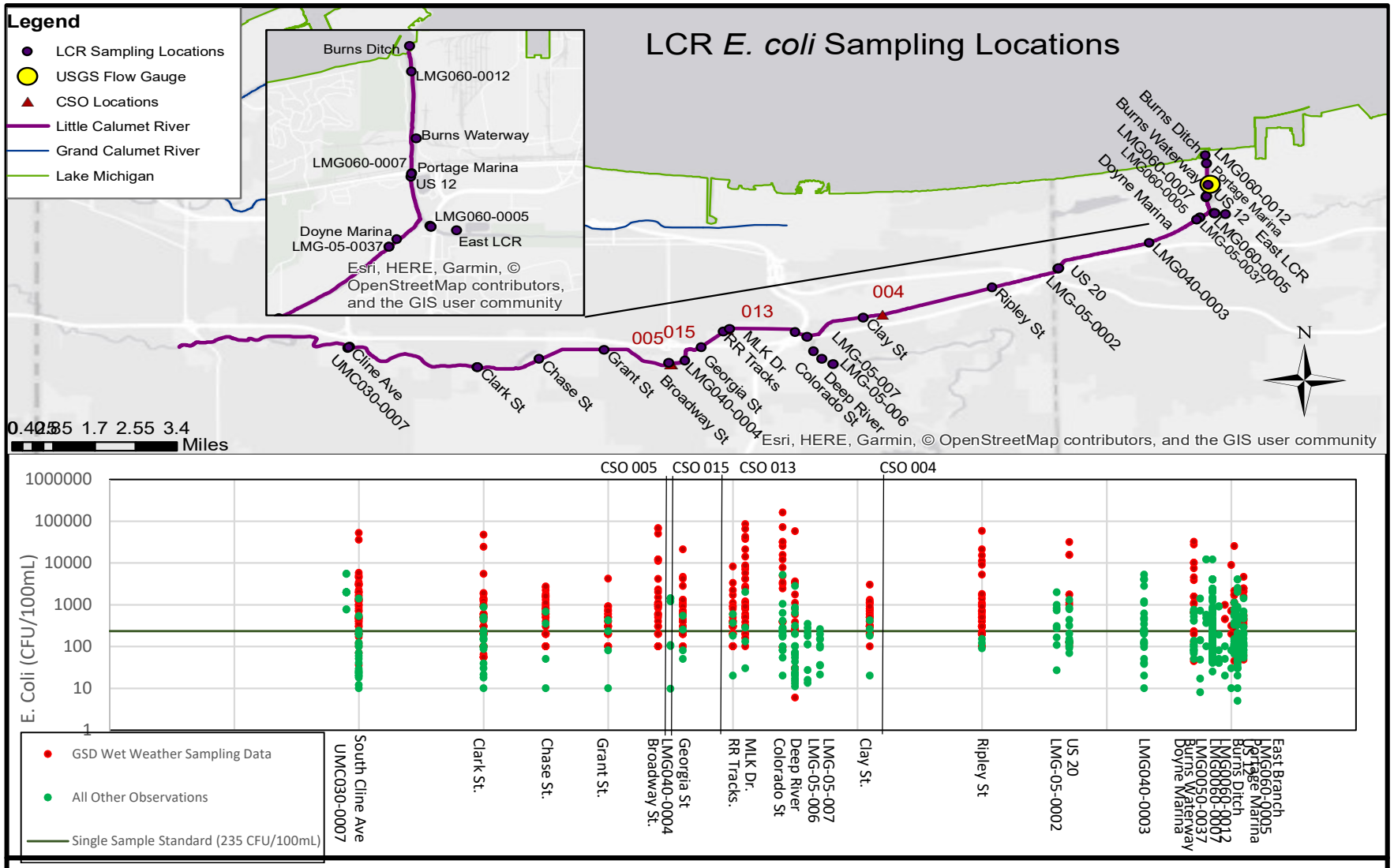


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Figure 3-19
Single Sample *E. coli* Results from 1998 to 2018 in the Little Calumet River and Tributaries

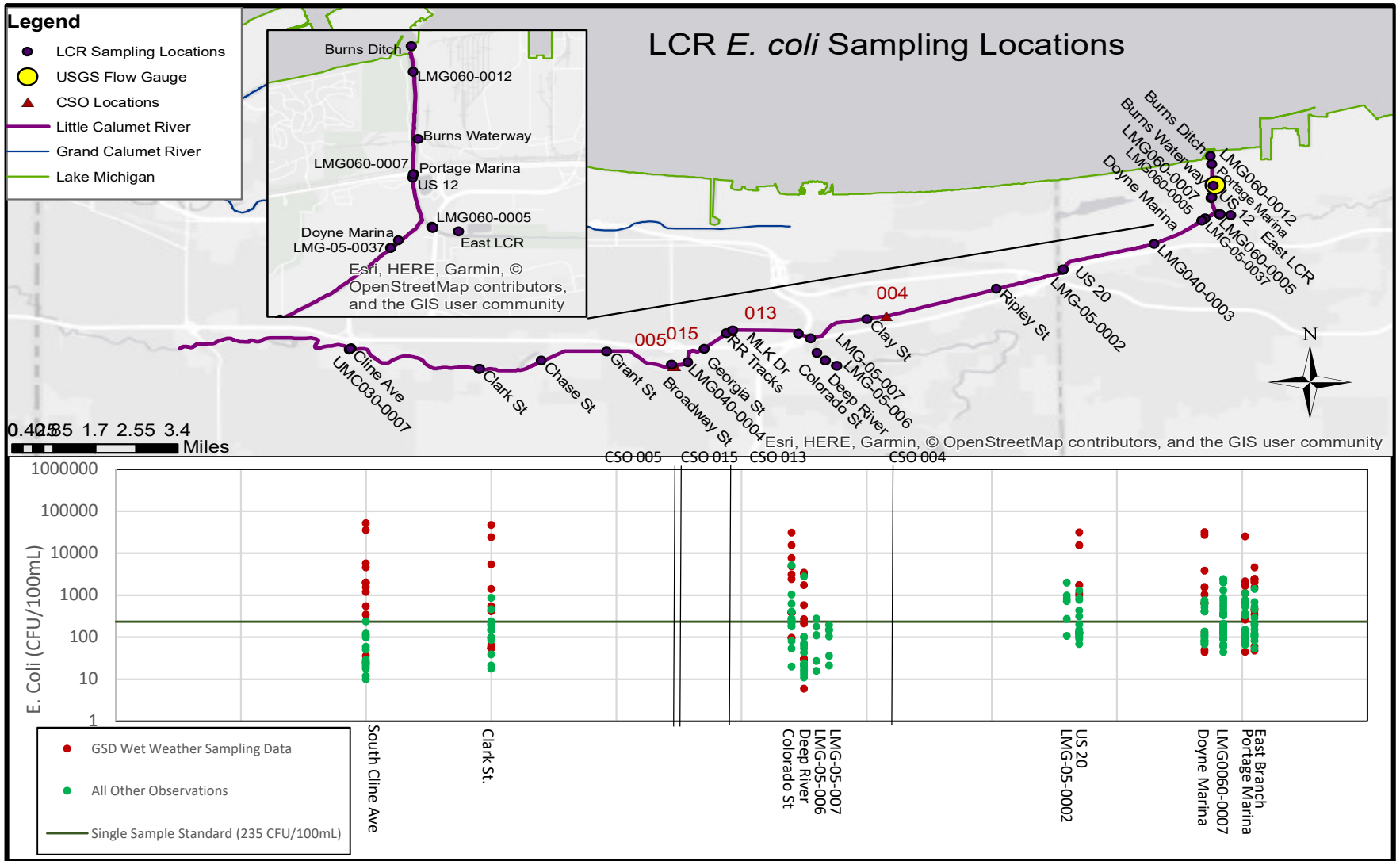

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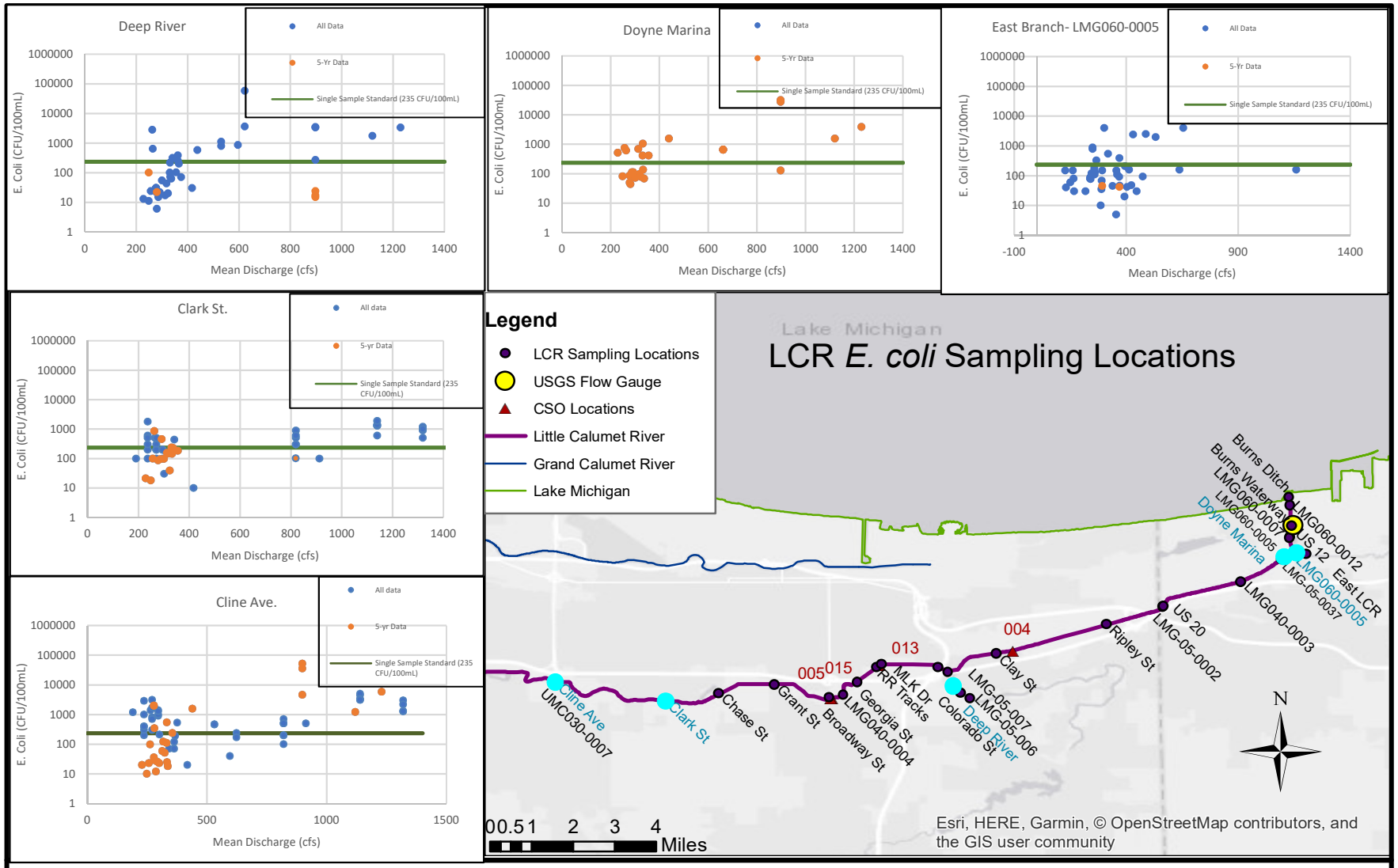
Figure 3-20
Single Sample *E. coli* Results from 2013 to 2018 in the Little Calumet River and Tributaries



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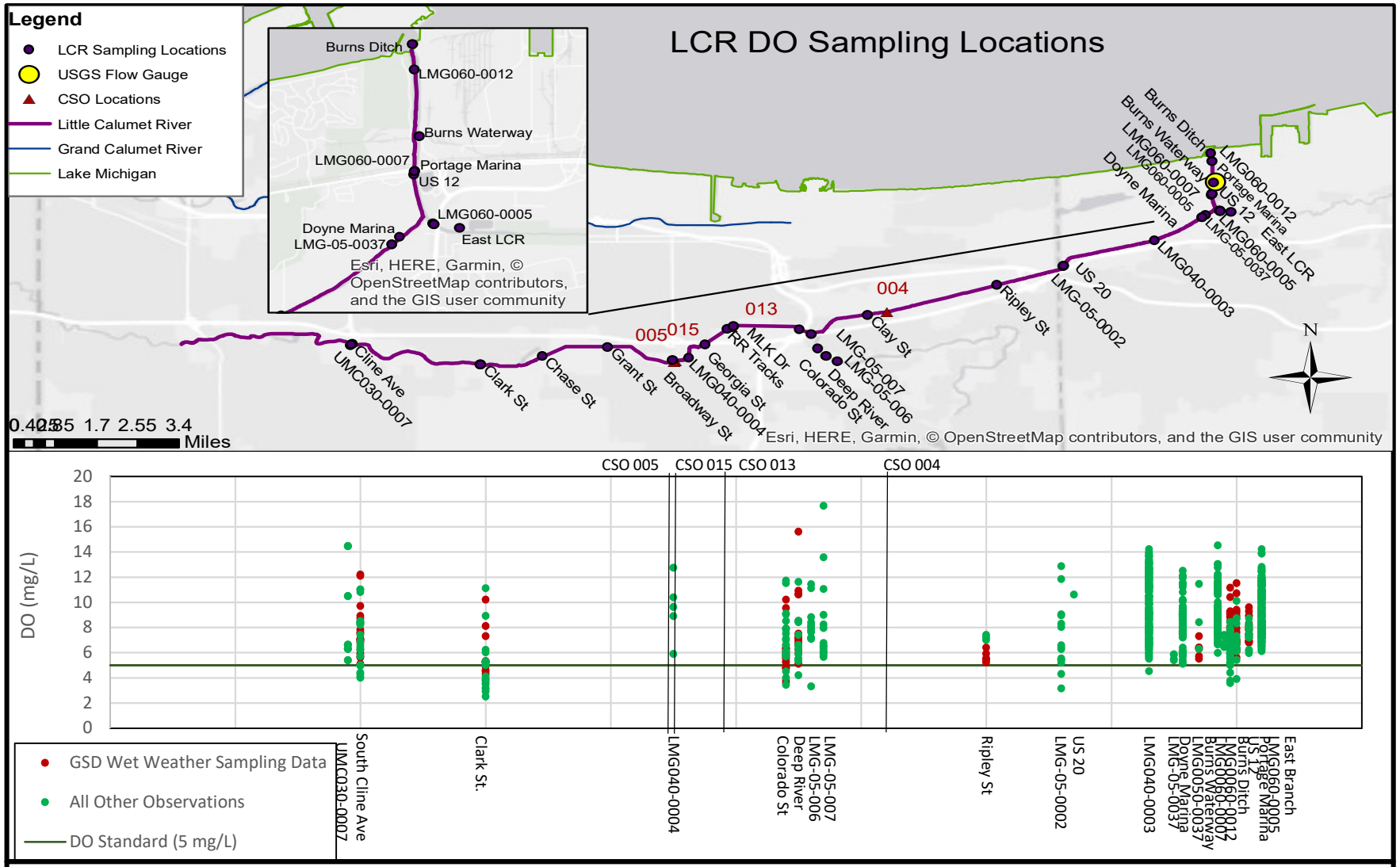
Discharge data taken from USGS Gauge 04095090, located on Burns Ditch

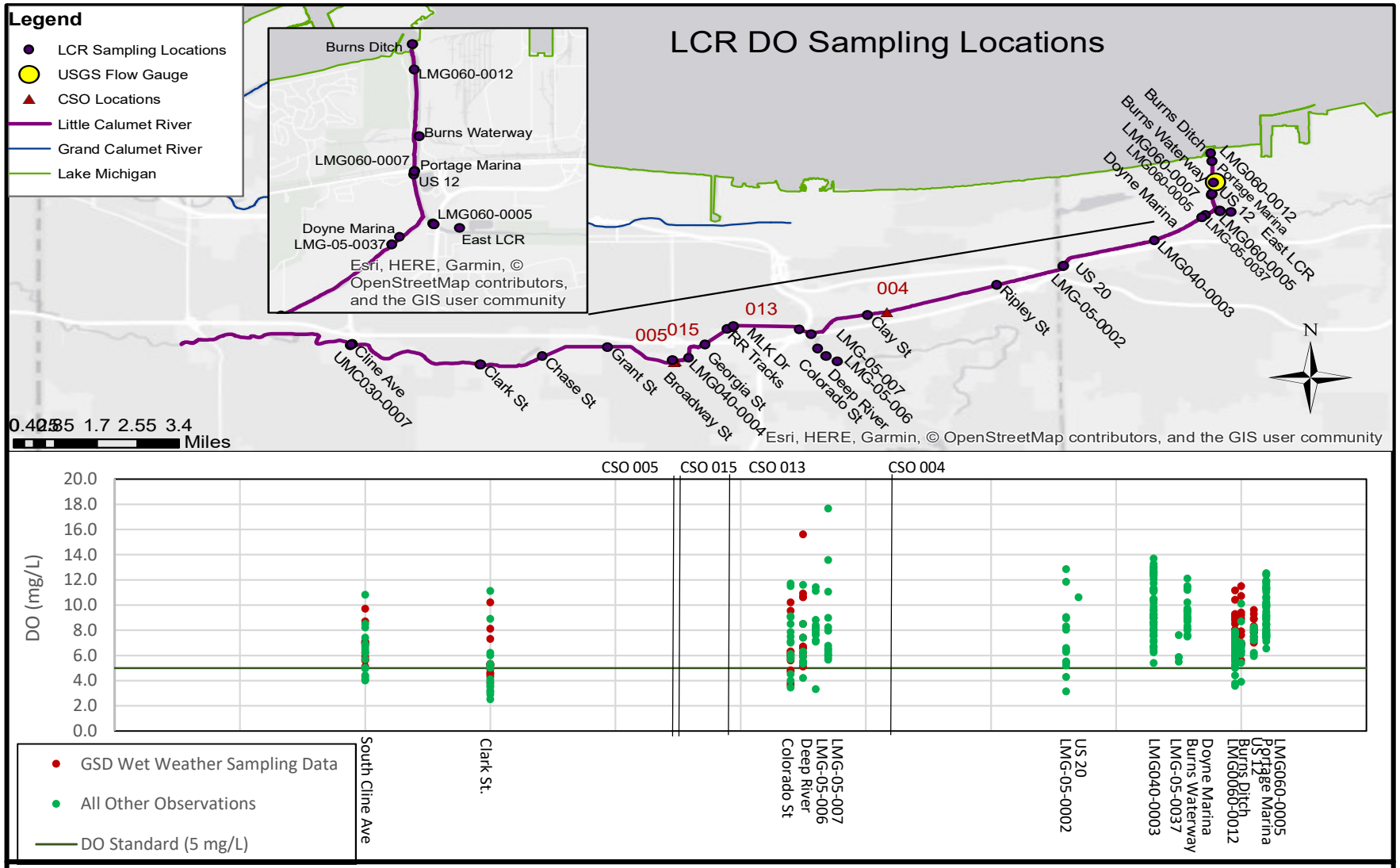
Figure 3-21

Single Sample *E. coli* Results versus Mean Daily Discharge at Selected Locations in the Little Calumet River and Tributaries



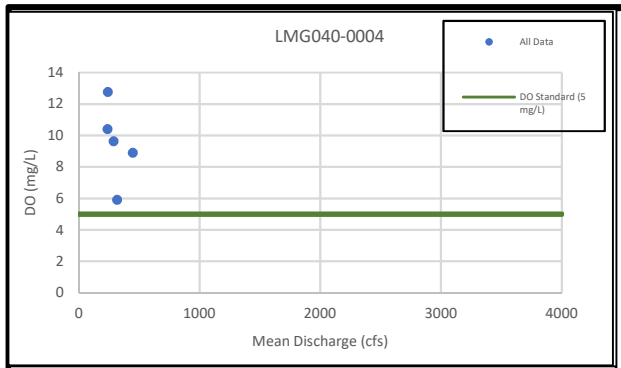
CDM Smith

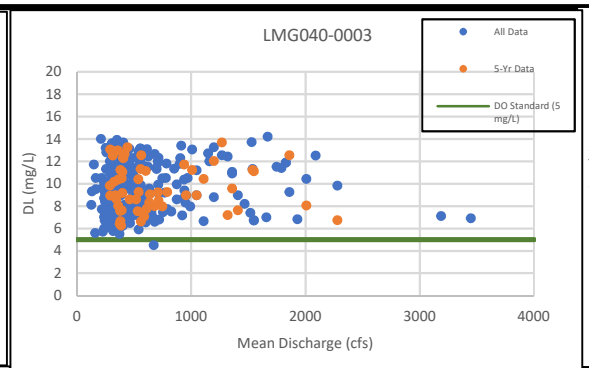
Figure 3-22
Single Sample Dissolved Oxygen Results from 1998 to 2018 in the Little Calumet River and Tributaries

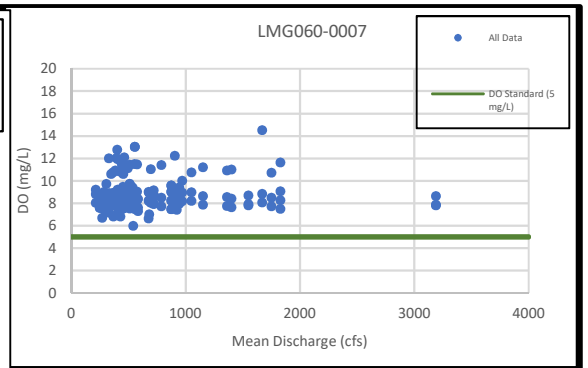


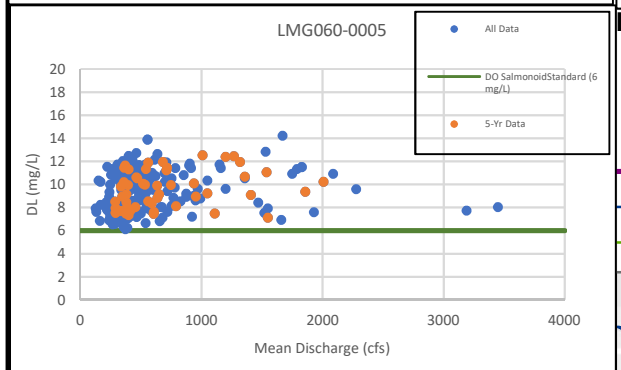
CDM Smith

Figure 3-23
Single Sample Dissolved Oxygen Results from 2013 to 2018 in the Little Calumet River and Tributaries

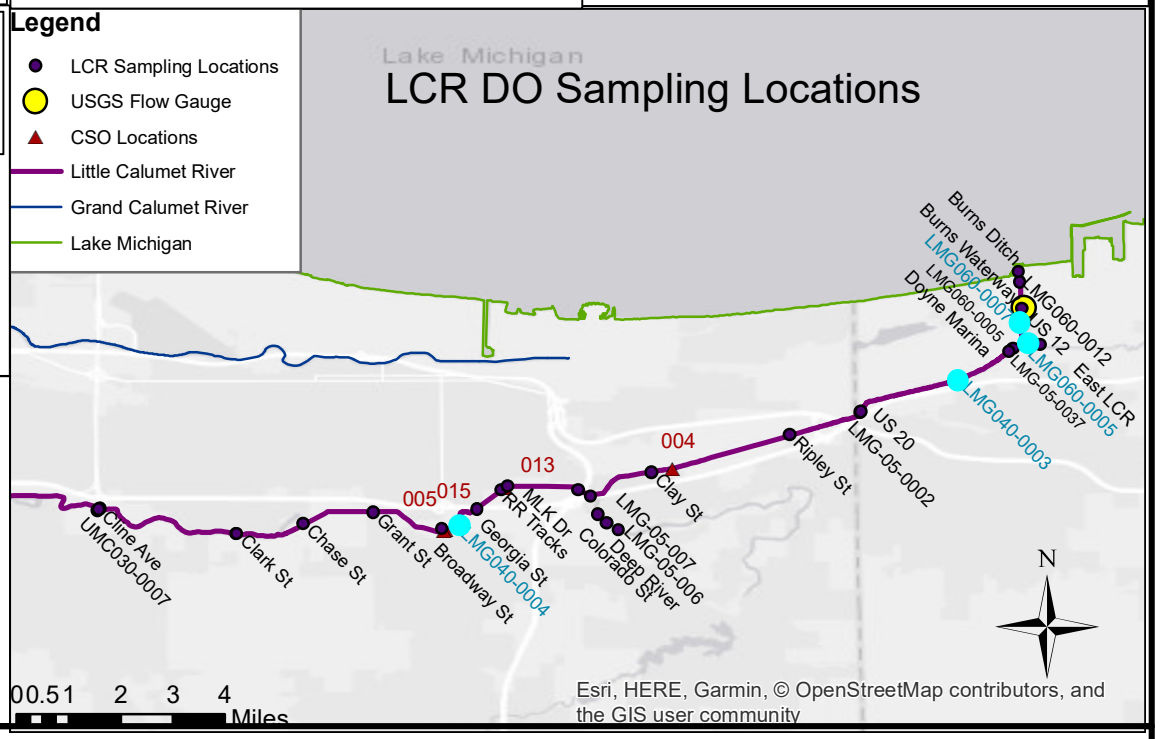








*Because location LMG060-0005 is classified as a salmonoid stream, the DO standard is 6 mg/L.



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Discharge data taken from USGS Gauge 04095090, located on Burns Ditch

Figure 3-24
Single Sample Dissolved Oxygen Results versus Mean Daily Discharge at Selected Locations in the Little Calumet River and Tributaries

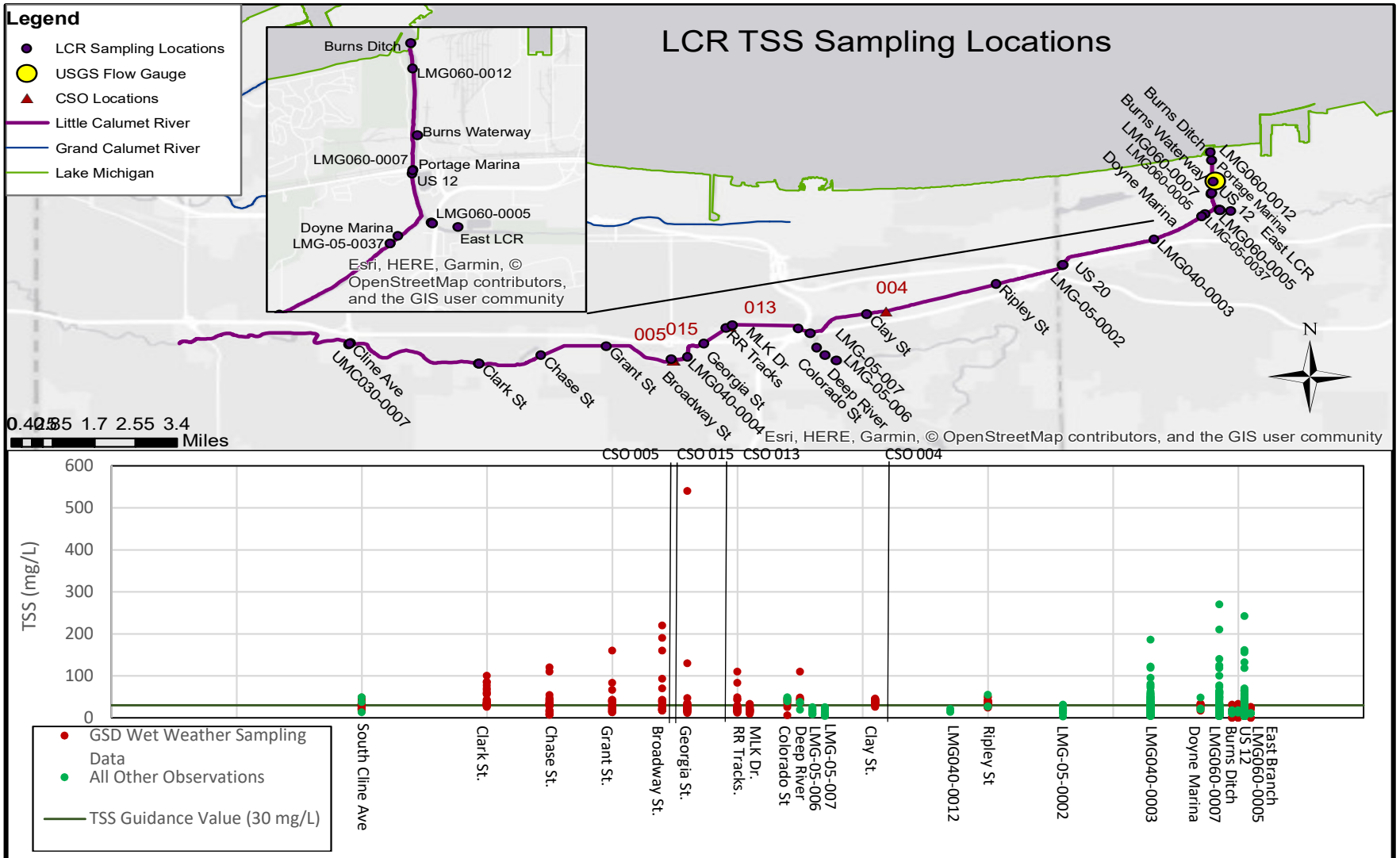

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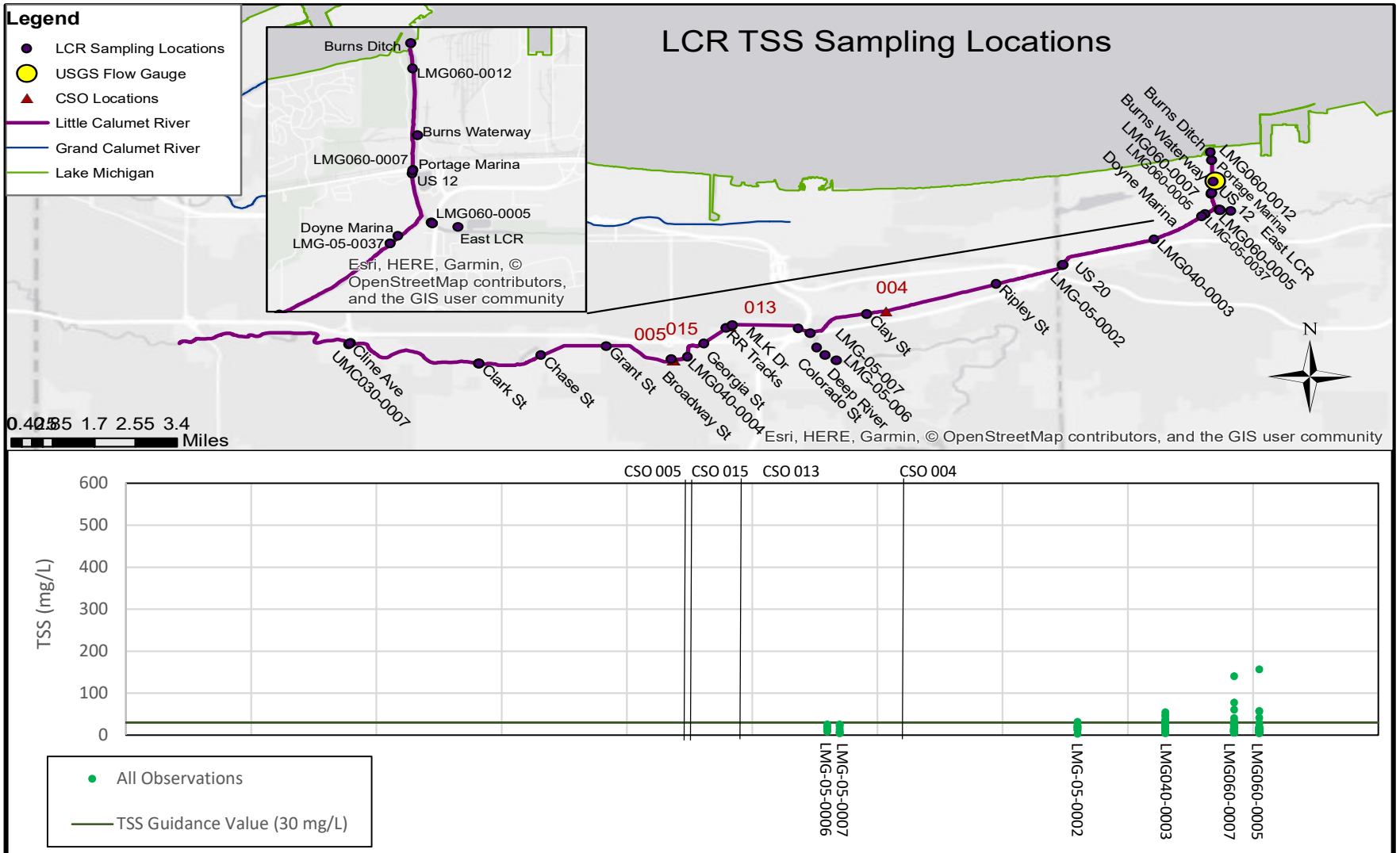
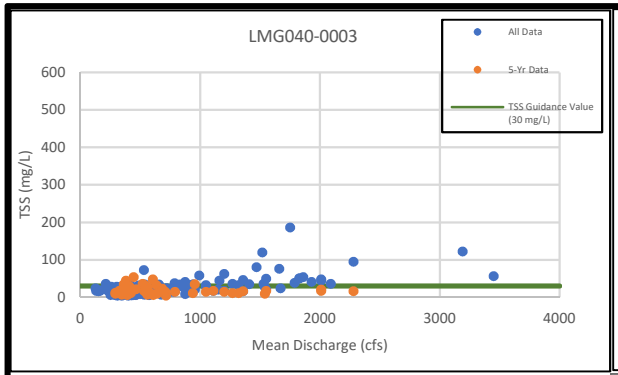
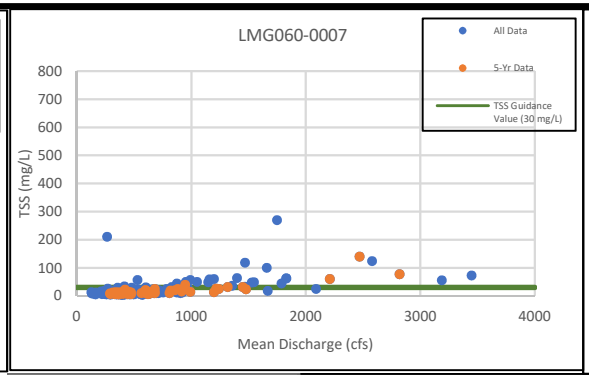
Figure 3-25
Single Sample Total Suspended Solids Results from 1998 to 2018 in the Little Calumet River and Tributaries

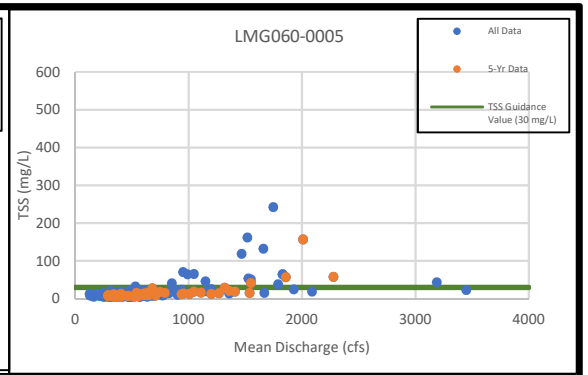


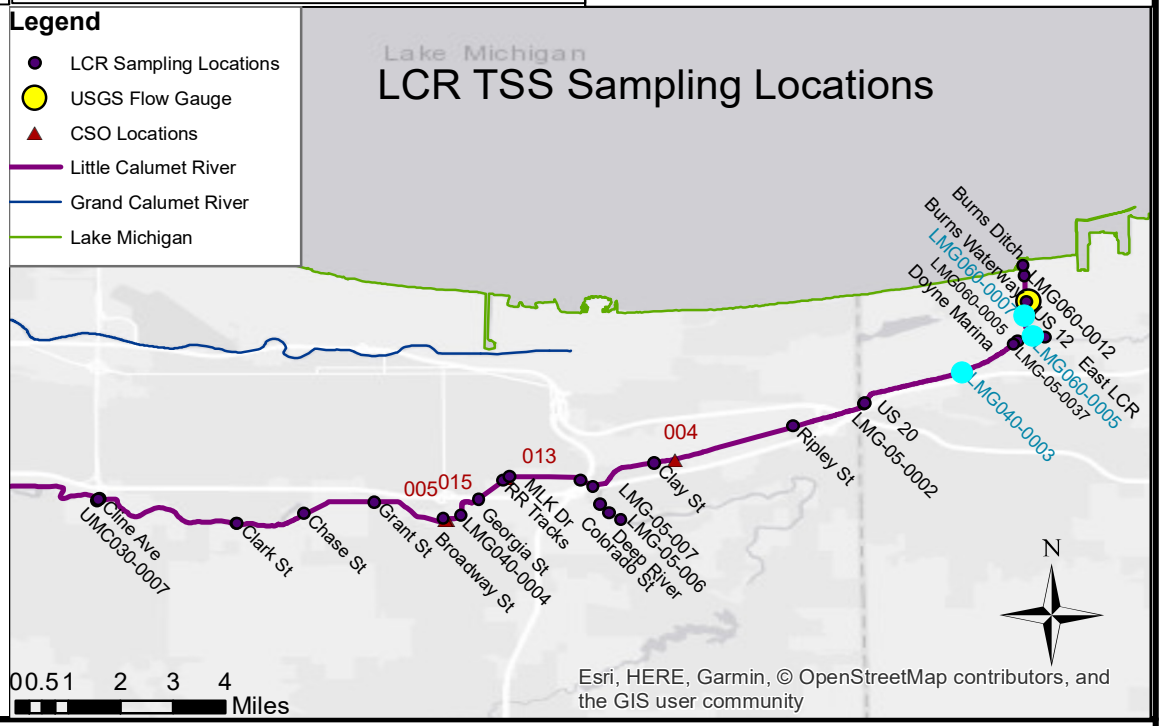
CDM Smith

Figure 3-26
Single Sample Total Suspended Solids Results from 2013 to 2018 in the Little Calumet River and Tributaries





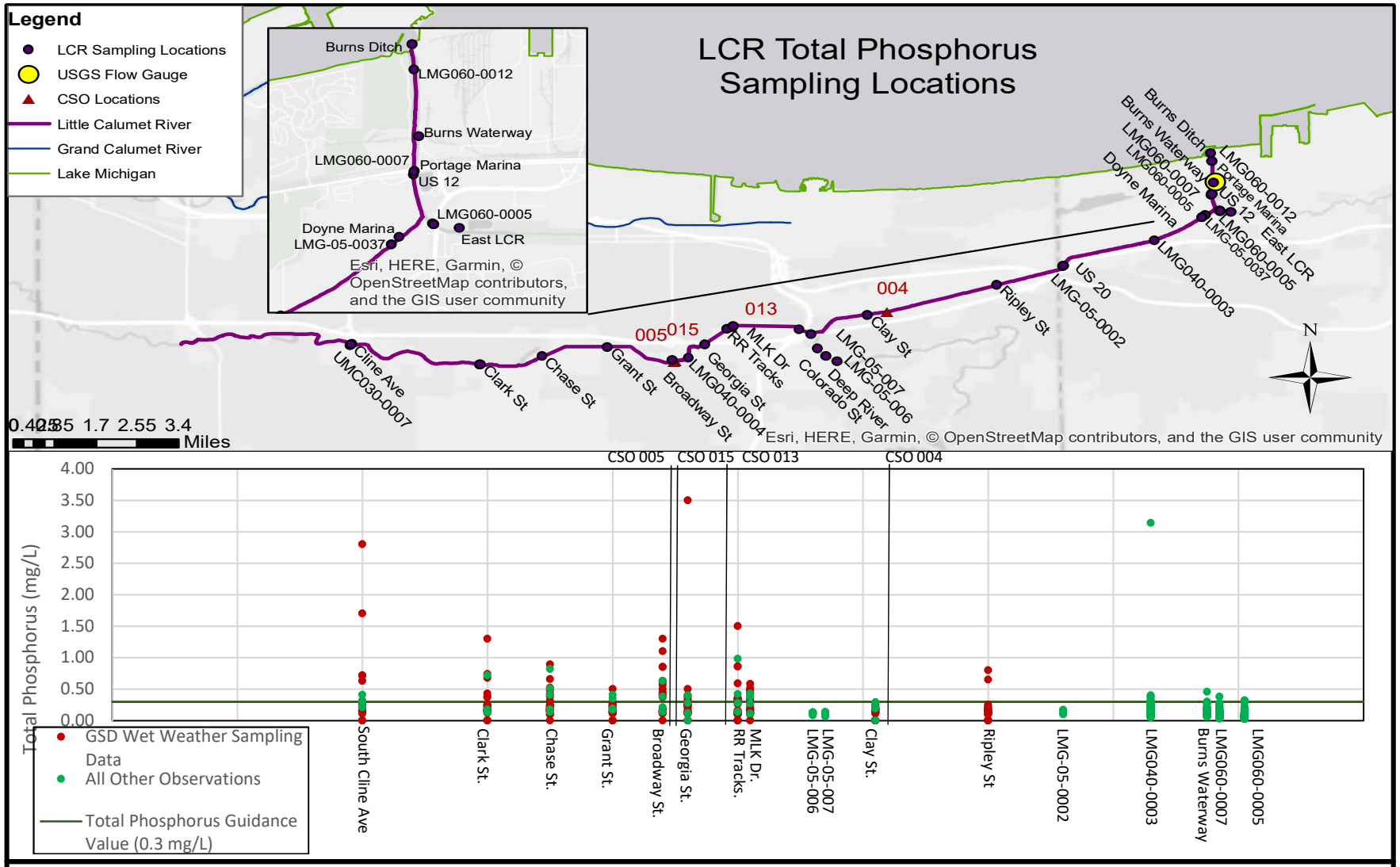




CDM Smith

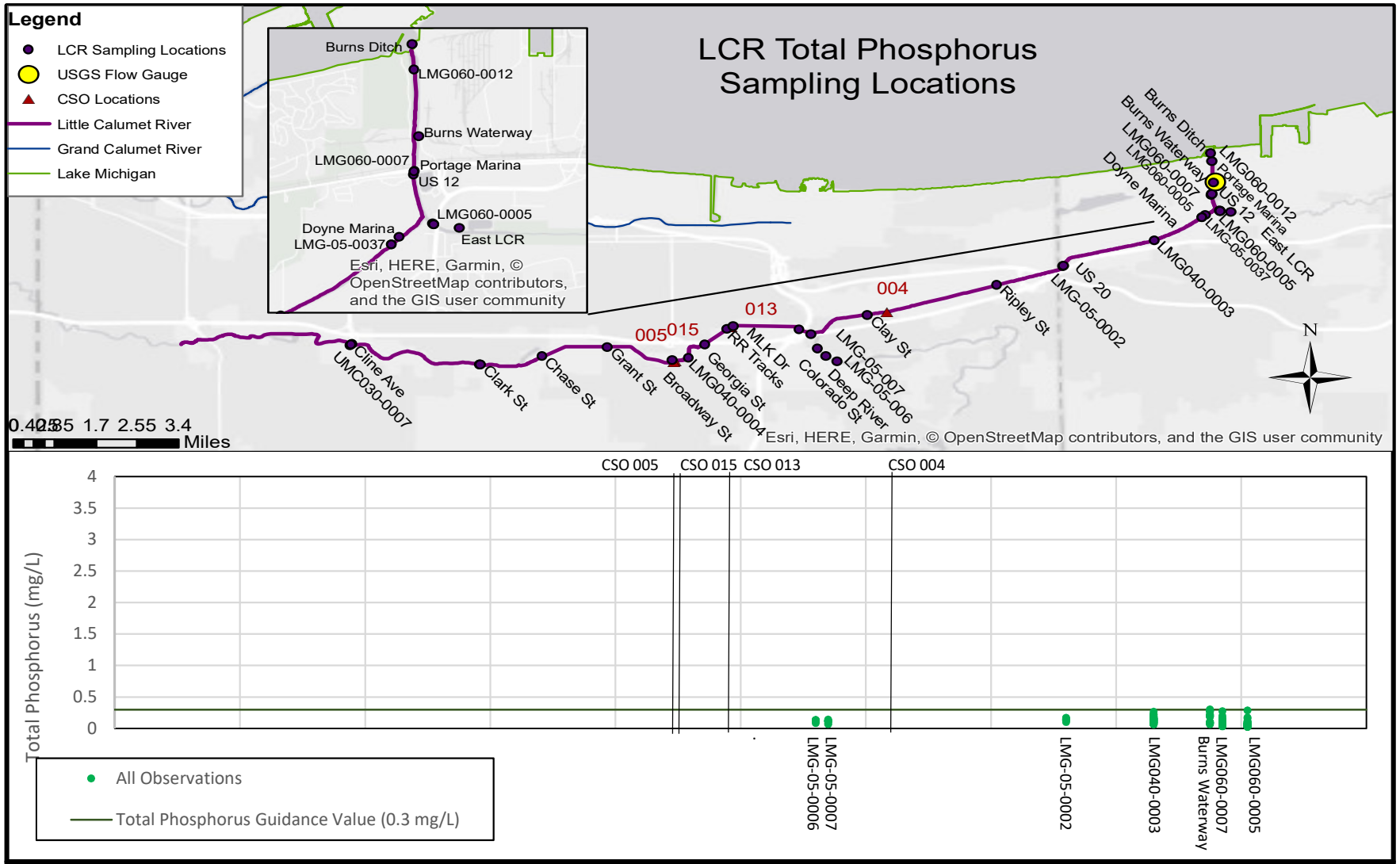
Discharge data taken from USGS Gauge 04095090, located on Burns Ditch

Figure 3-27
Single Sample Total Suspended Solids Results versus Mean Daily Discharge at Selected Locations in the Little Calumet River and Tributaries



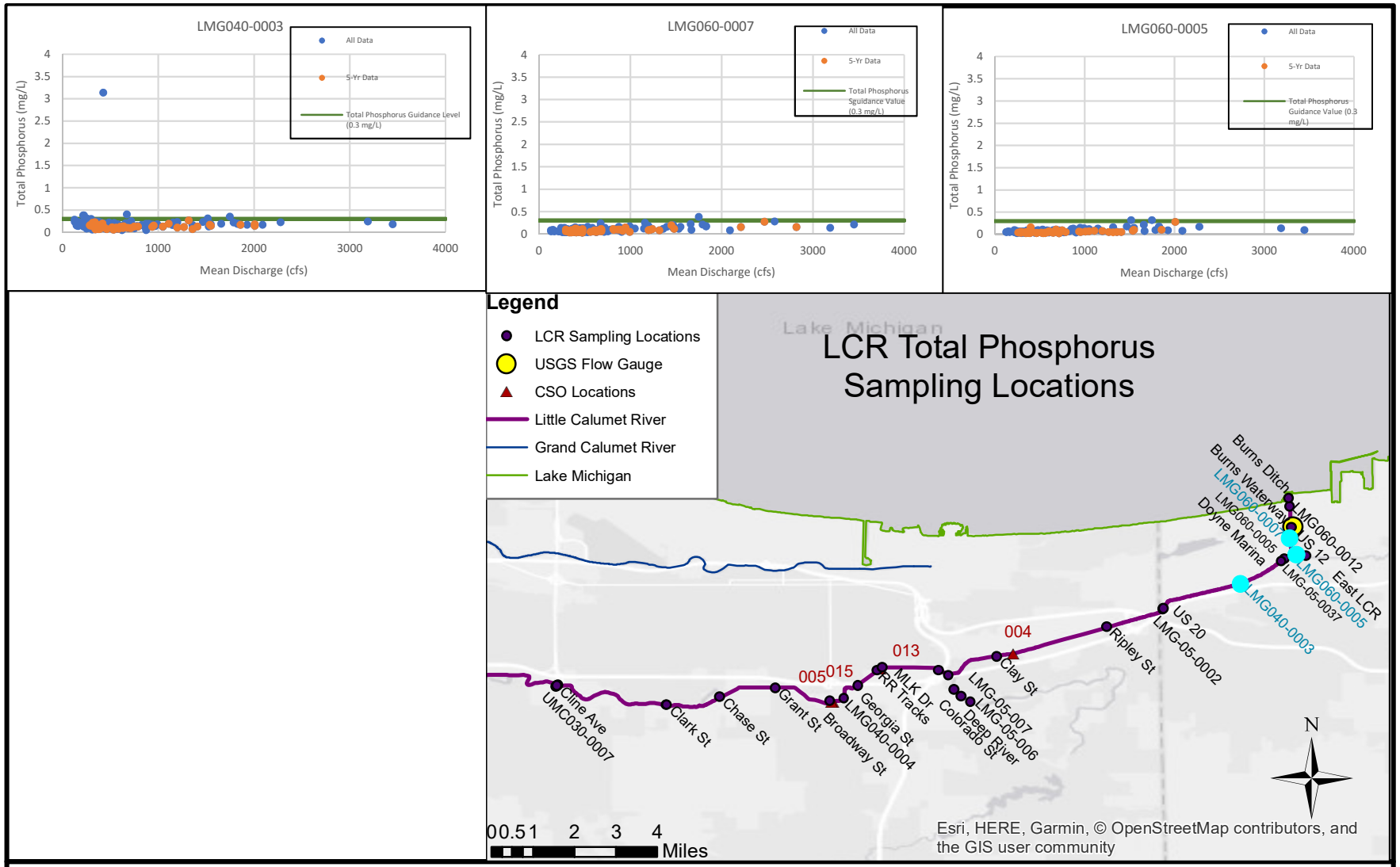
CDM Smith

Figure 3-28
Single Sample Total Phosphorus Results from 1998 to 2018 in the Little Calumet River and Tributaries



CDM Smith

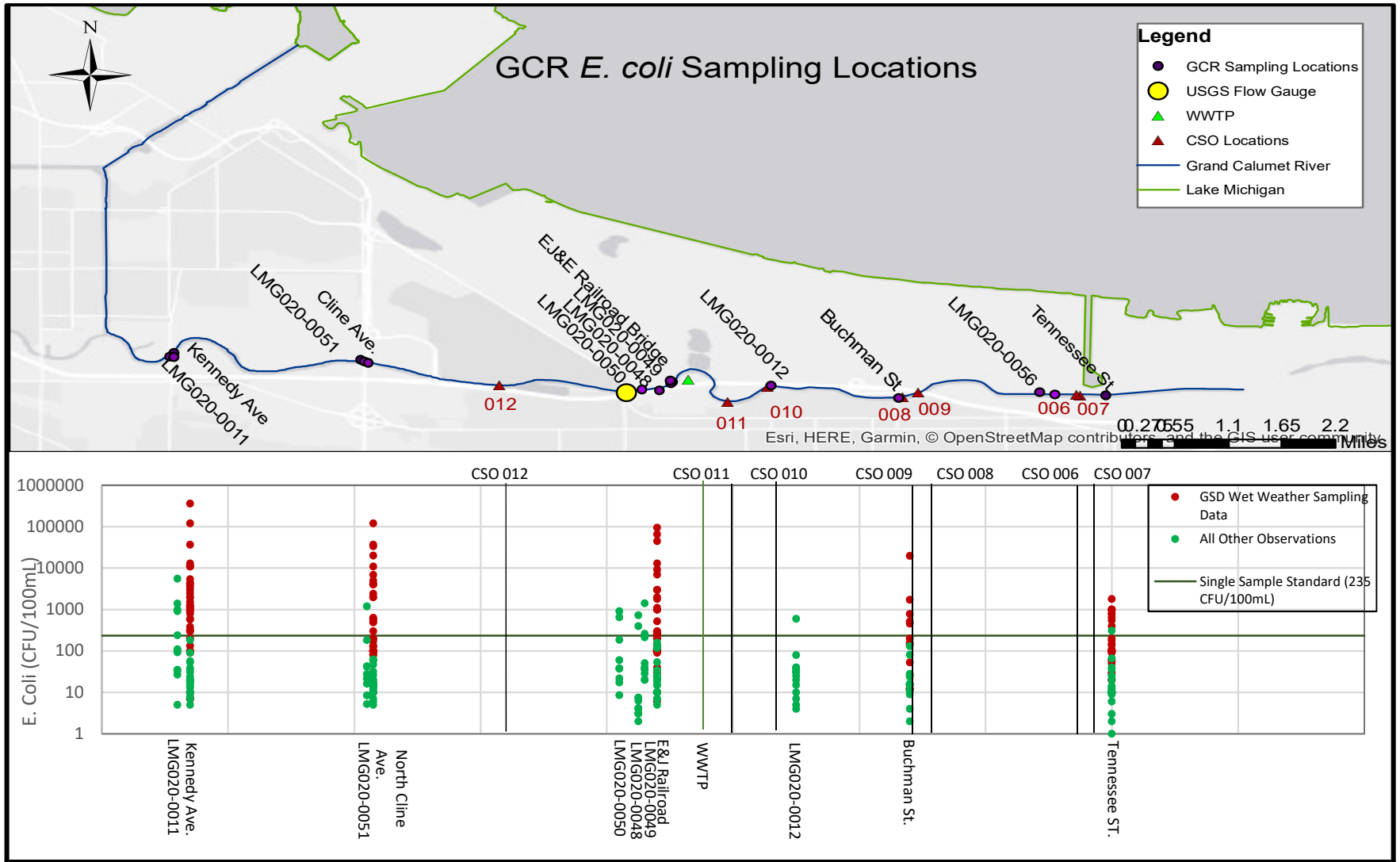
Figure 3-29
Single Sample Total Phosphorus Results from 2013 to 2018 in the Little Calumet River and Tributaries



CDM Smith

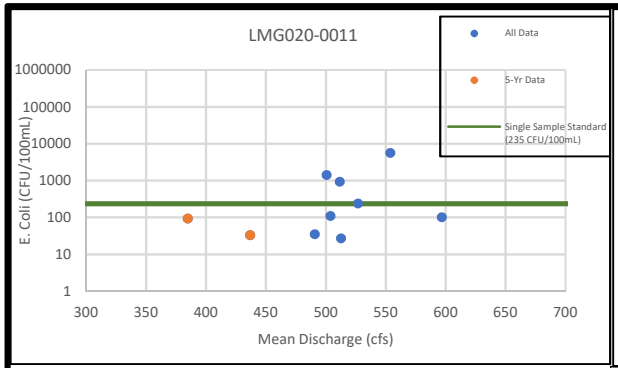
Discharge data taken from USGS Gauge 04095090, located on Burns Ditch

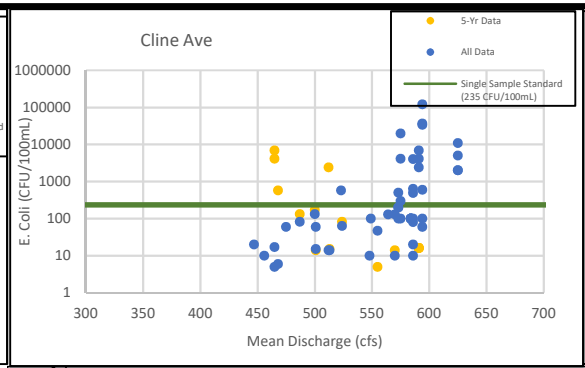
Figure 3-30
Single Sample Total Phosphorus Results versus Mean Daily Discharge at Selected Locations in the Little Calumet River and Tributaries

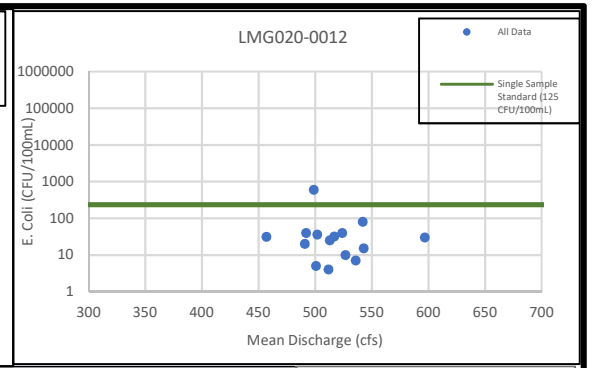


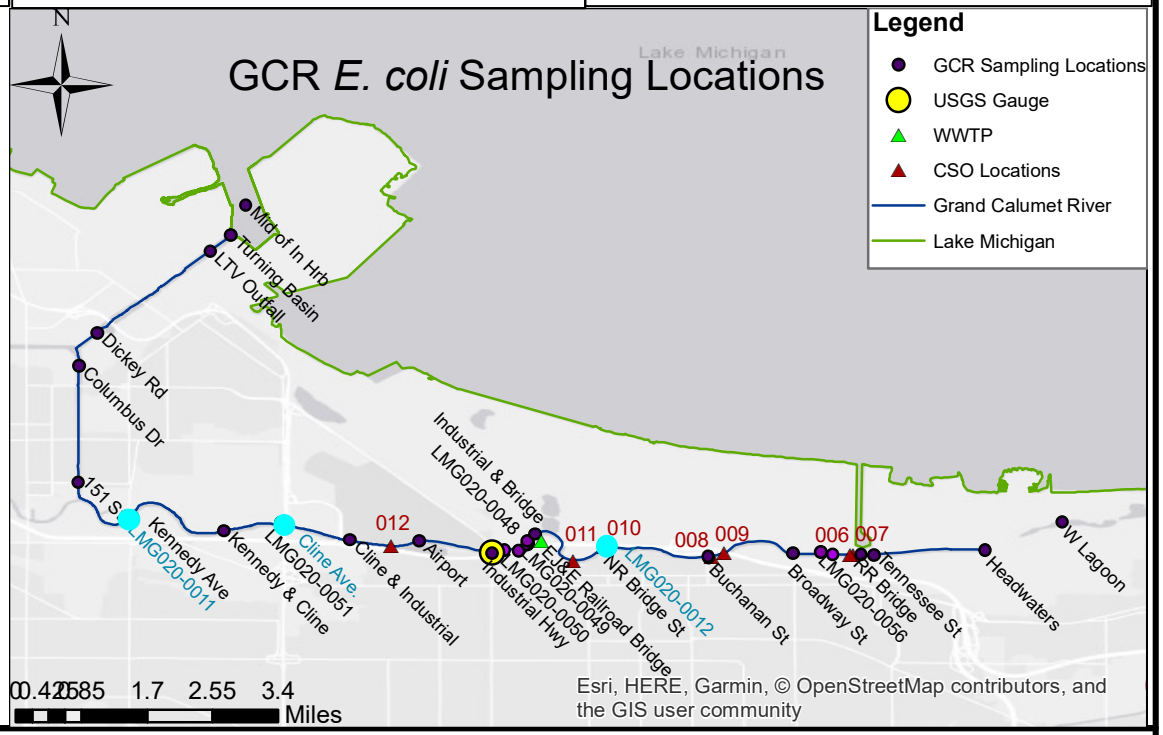
CDM Smith

Figure 3-31
Single Sample *E. coli* Results from 1998 to 2018 in the Grand Calumet River









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Discharge data taken from USGS Gauge 04092677, located on the Grand Calumet River

Figure 3-32
Single Sample *E. coli* Results versus Mean Daily Discharge at Selected Locations in the Grand Calumet River

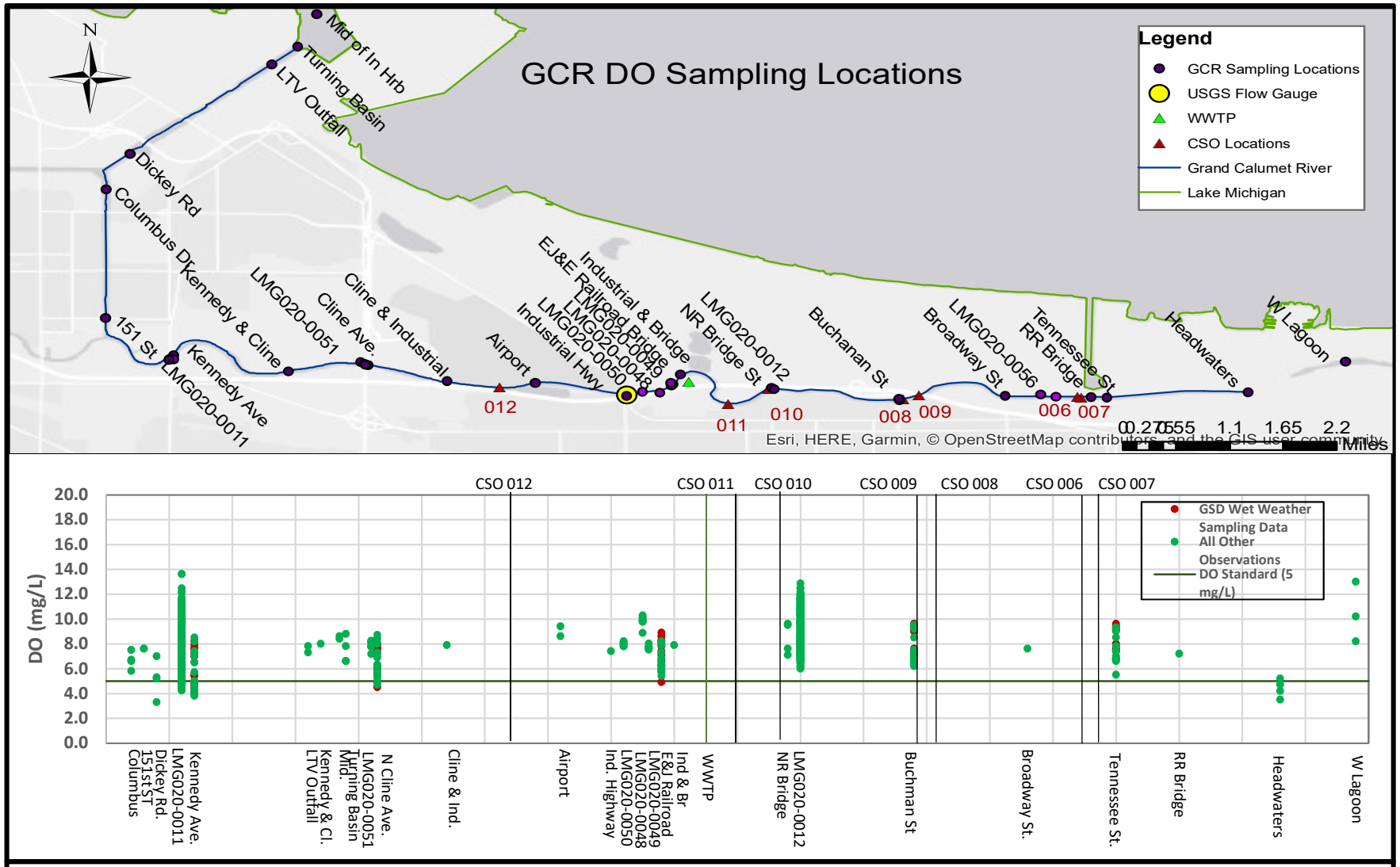

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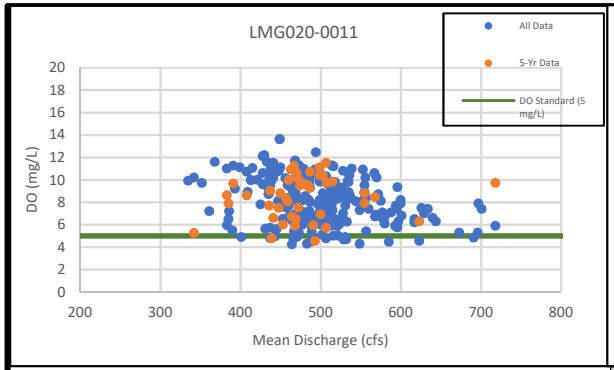
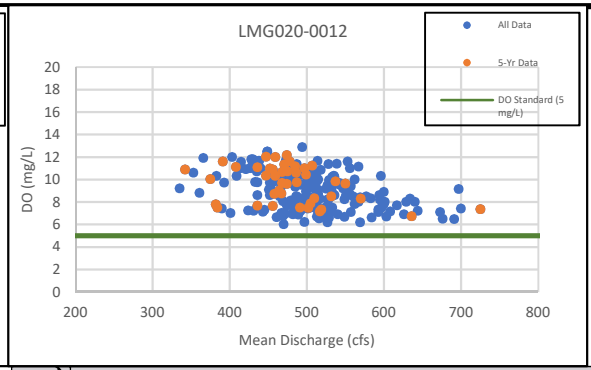
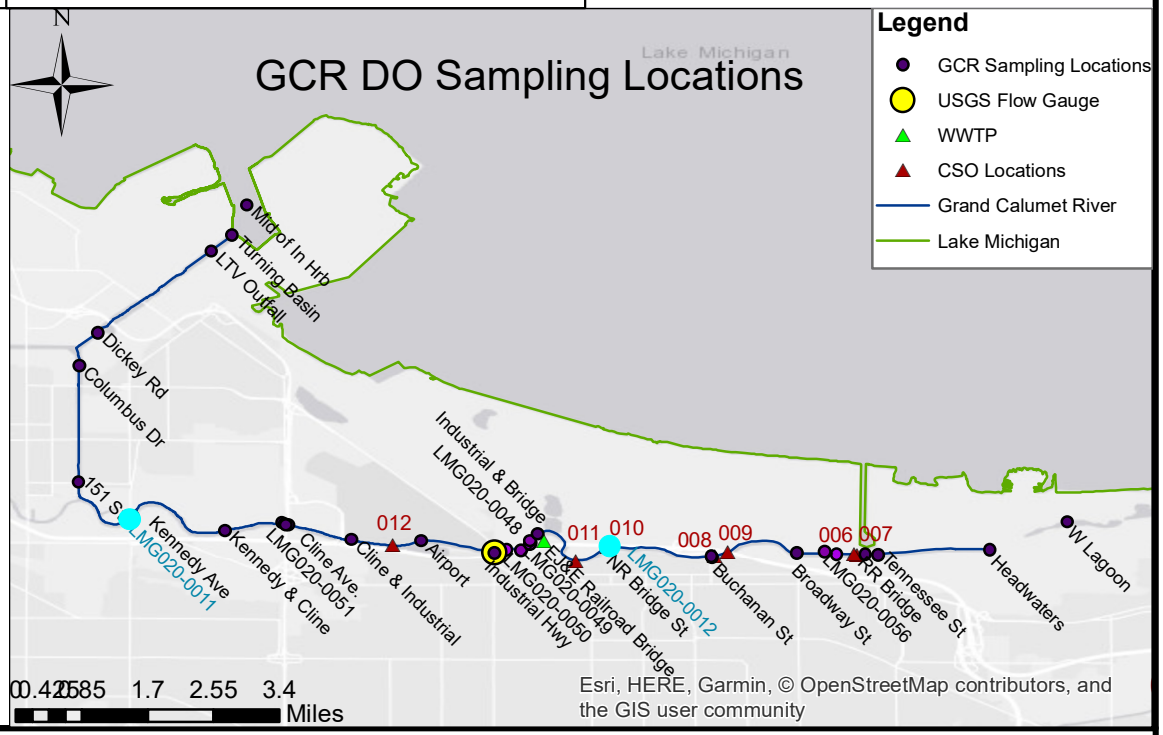
Figure 3-33
Single Sample Dissolved Oxygen Results from 1998 to 2018 in the Grand Calumet River



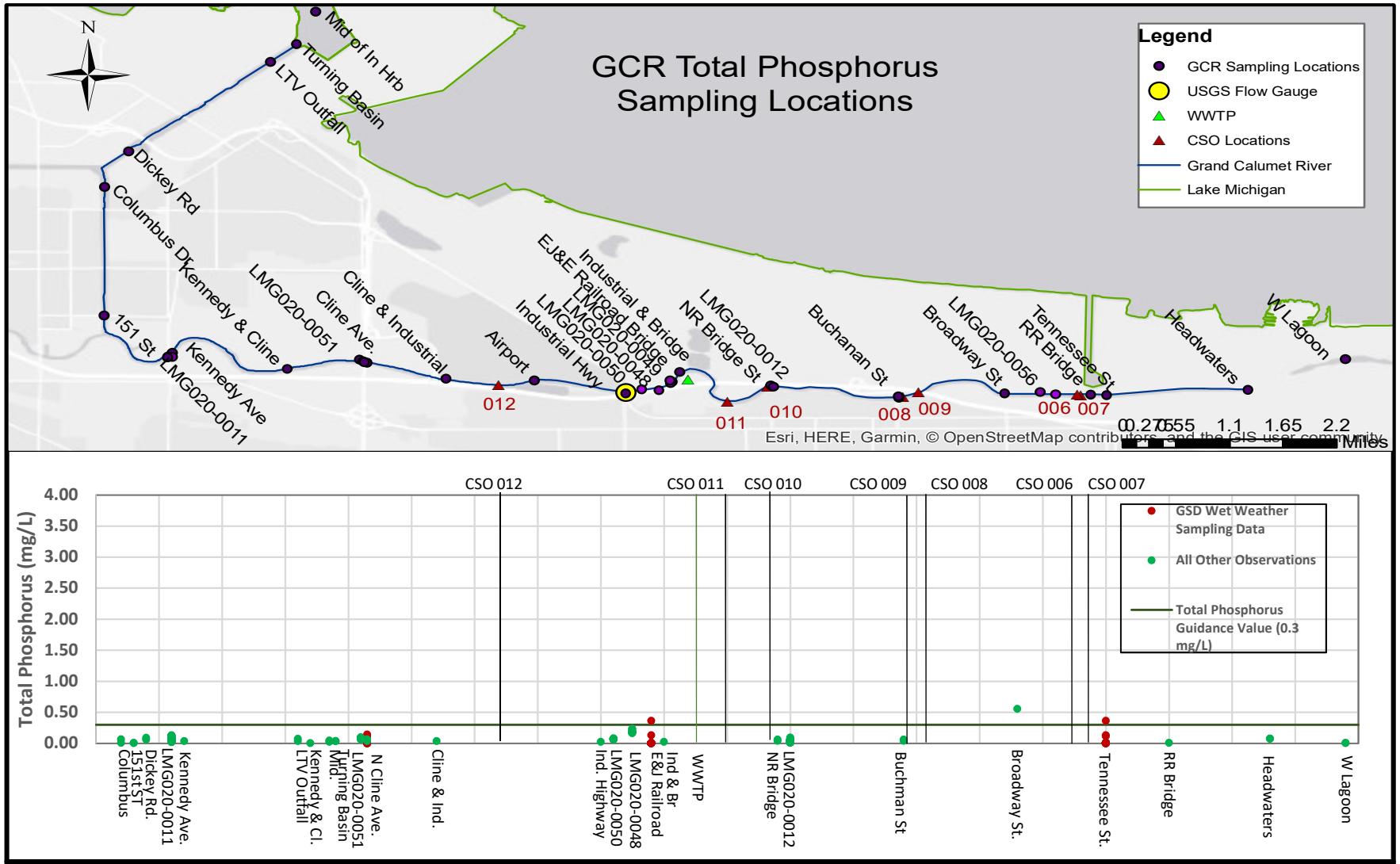




CDM Smith

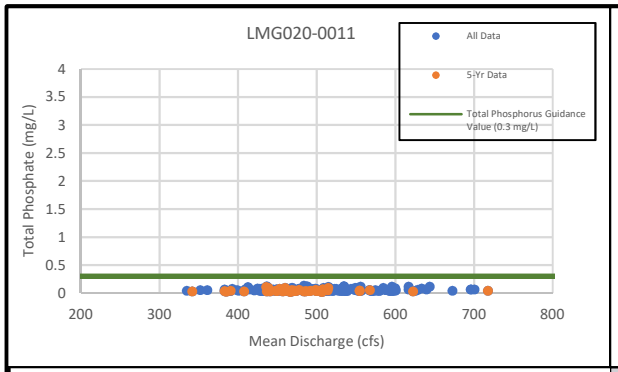
Discharge data taken from USGS Gauge 04092677, located on the Grand Calumet River

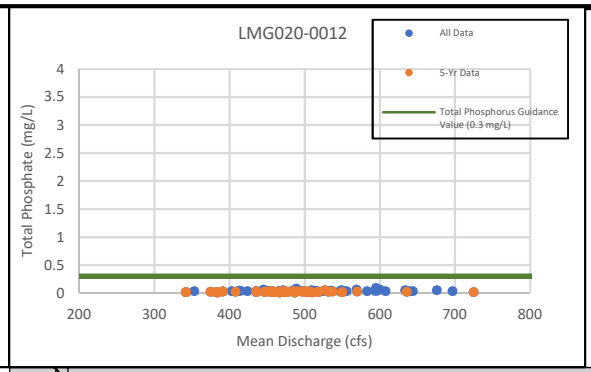
Figure 3-34
Single Sample Dissolved Oxygen Results versus Mean Daily Discharge at Selected Locations in the Grand Calumet River

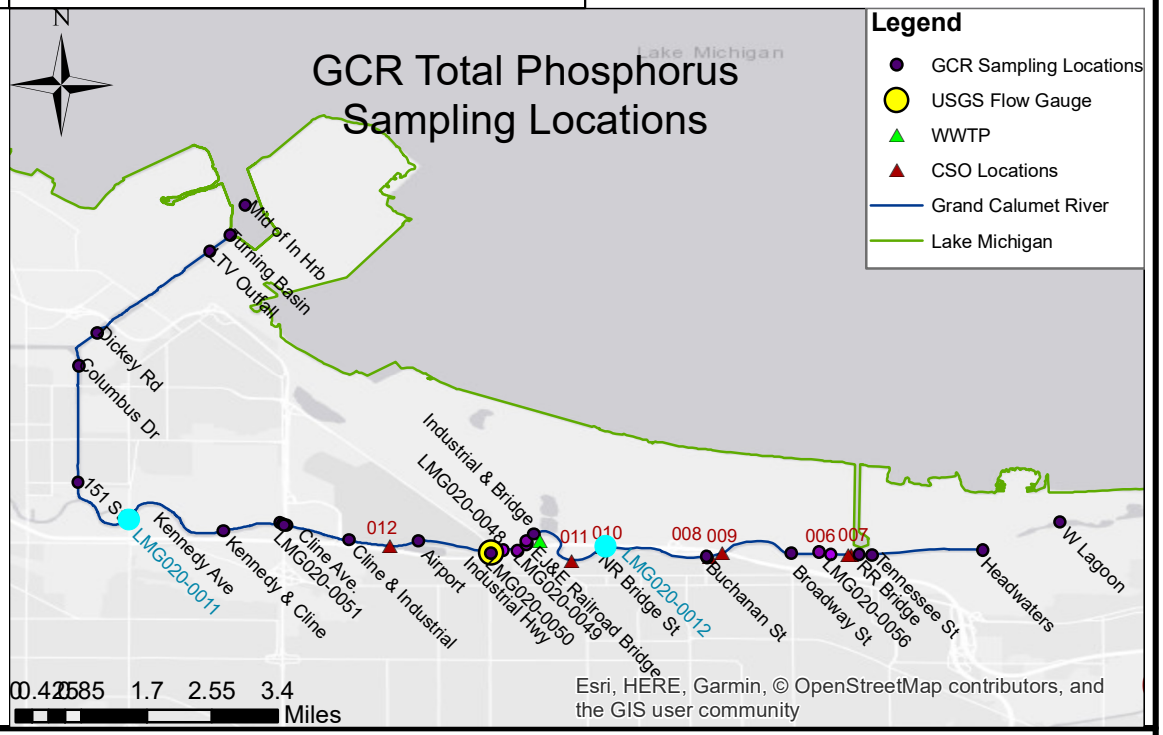


CDM Smith

Figure 3-35
Single Sample Total Phosphorus Results from 1998 to 2018 in the Grand Calumet River



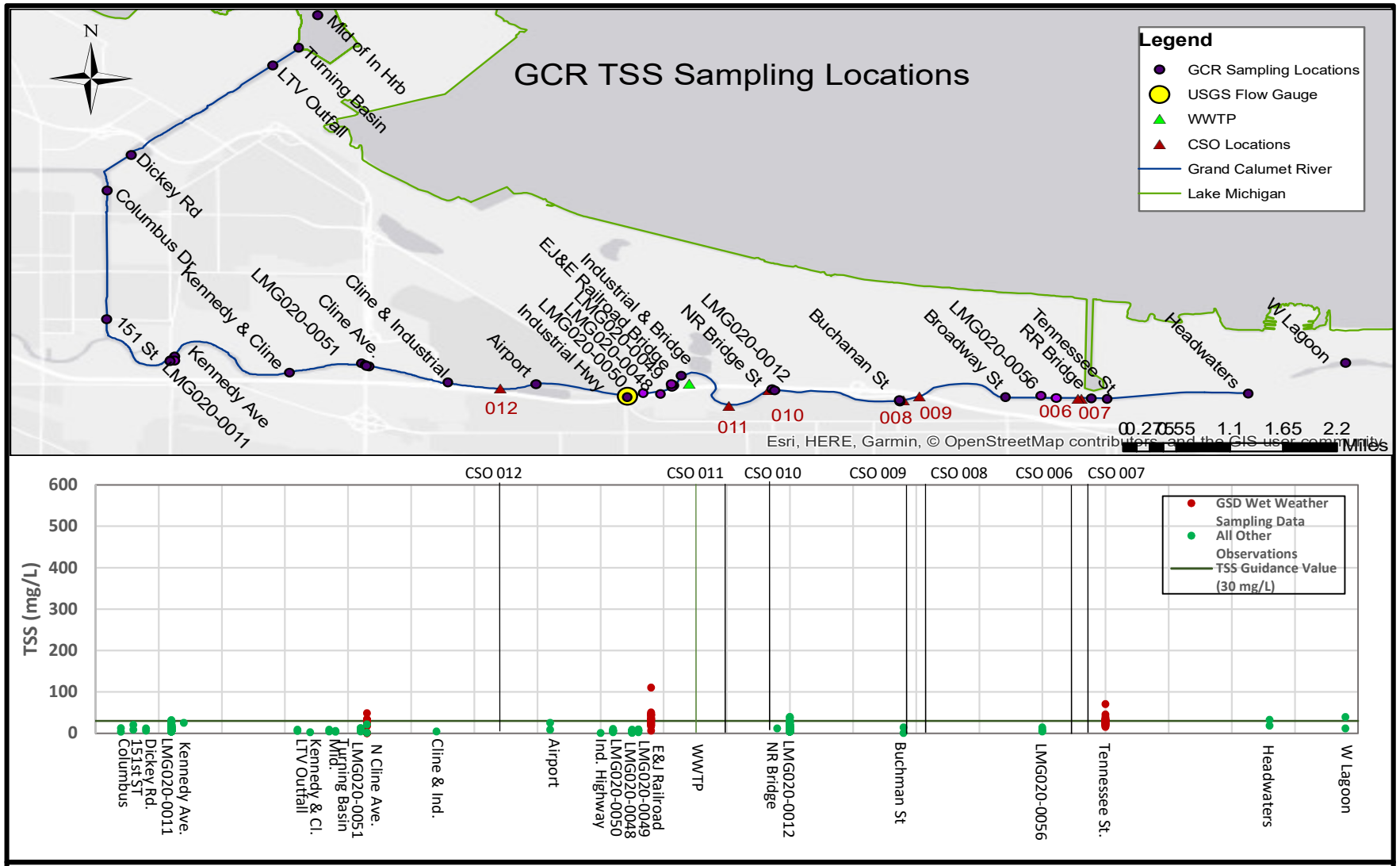




CDM Smith

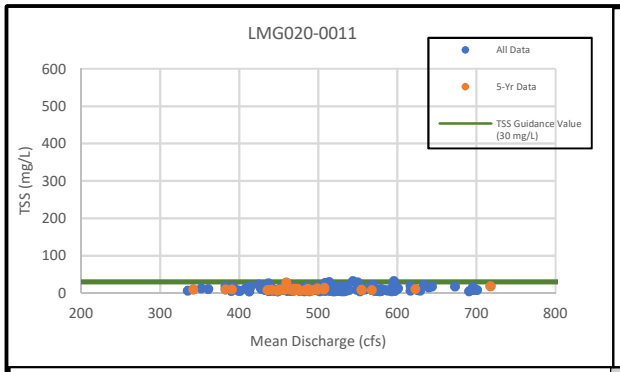
Discharge data taken from USGS Gauge 04092677, located on the Grand Calumet River

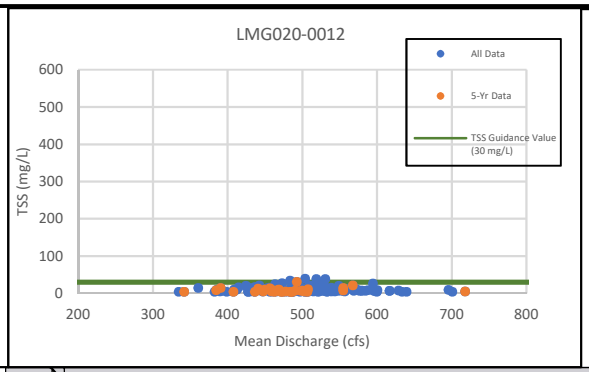
Figure 3-36
Single Sample Total Phosphorus Results versus Mean Daily Discharge at Selected Locations in the Grand Calumet River

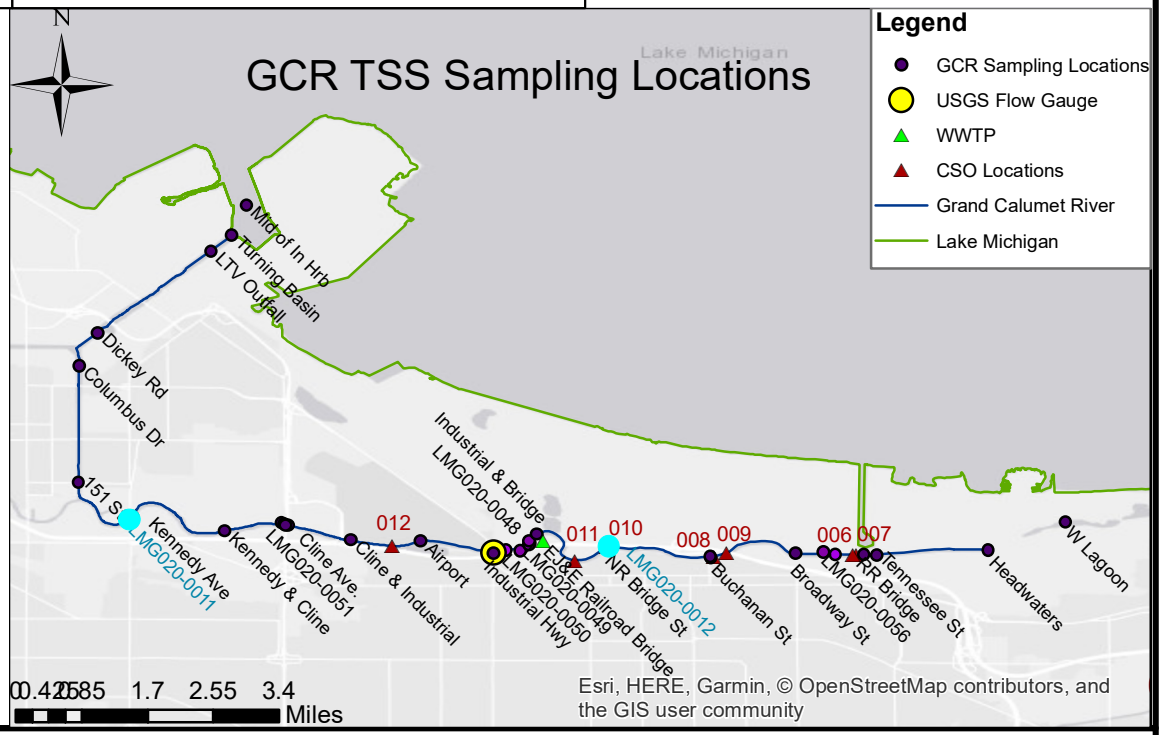


CDM Smith

Figure 3-37
Single Sample Total Suspended Solids Results from 1998 to 2018 in the Grand Calumet River



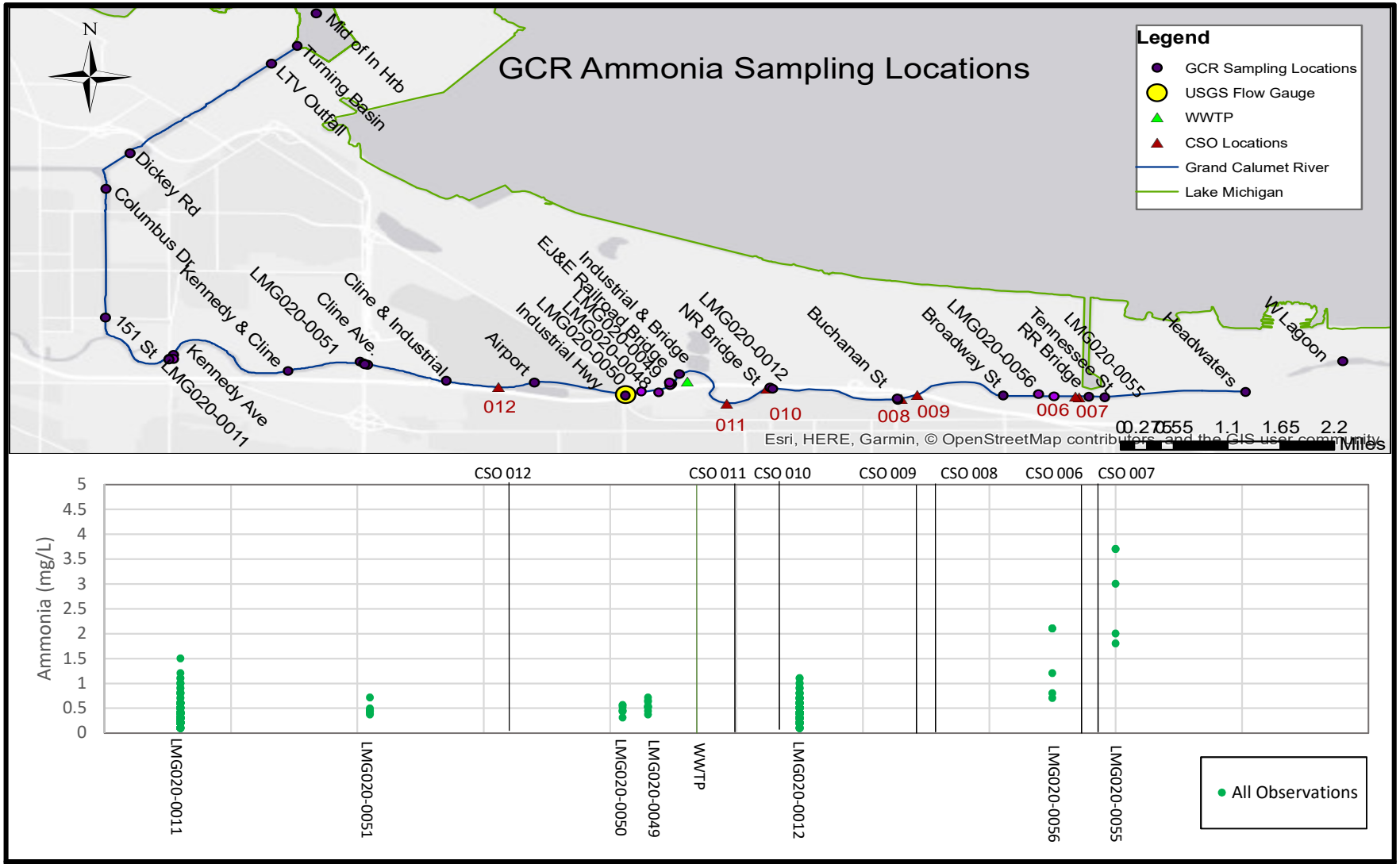




CDM Smith

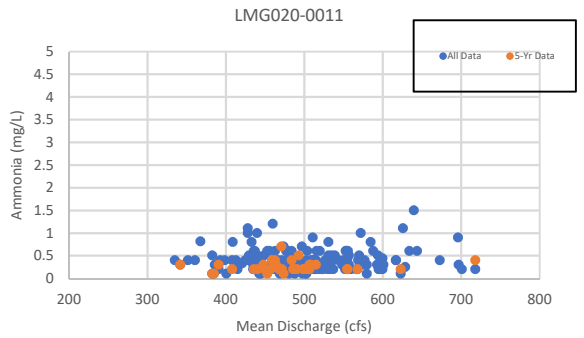
Discharge data taken from USGS Gauge 04092677, located on the Grand Calumet River

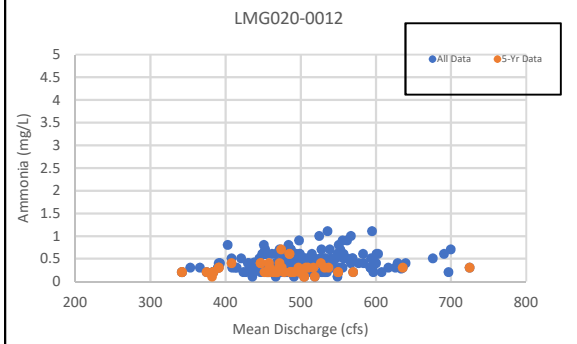
Figure 3-38
Single Sample Total Suspended Solids Results versus Mean Daily Discharge at Selected Locations in the Grand Calumet River

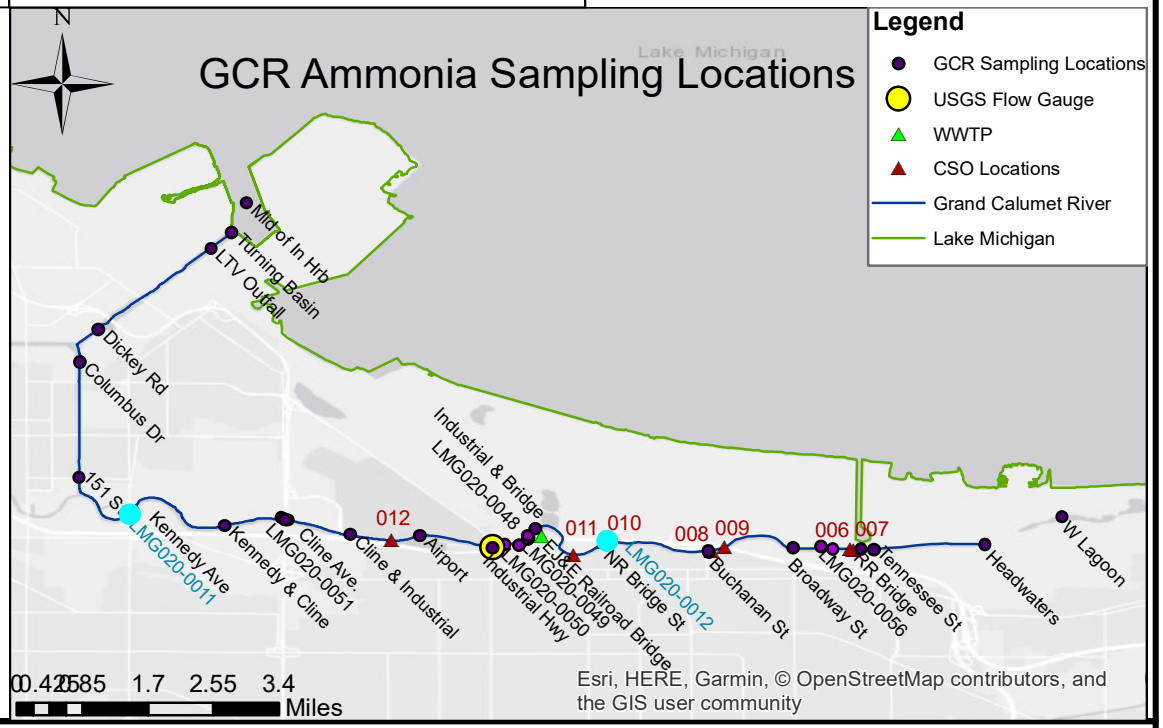


CDM Smith

Figure 3-39
Single Sample Ammonia Results from 1998 to 2018 in the Grand Calumet River



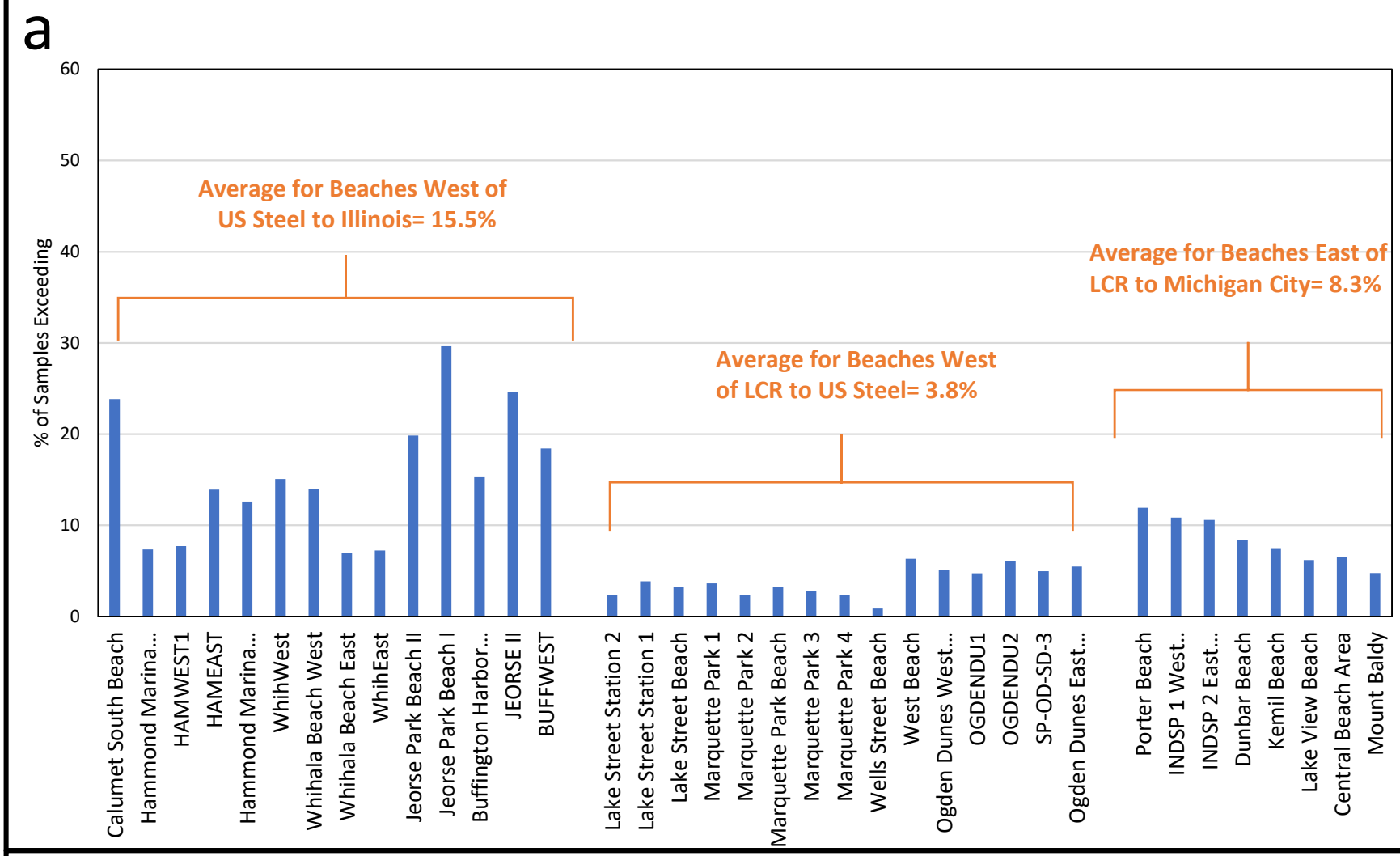




CDM Smith

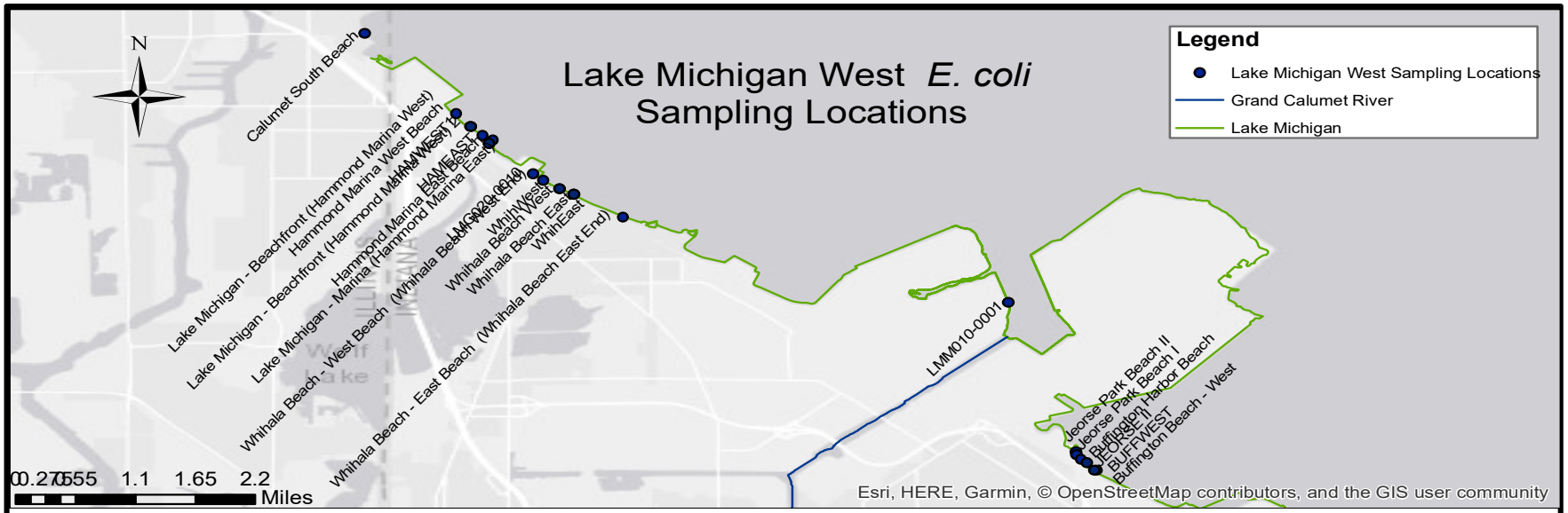
Discharge data taken from USGS Gauge 04092677, located on the Grand Calumet River

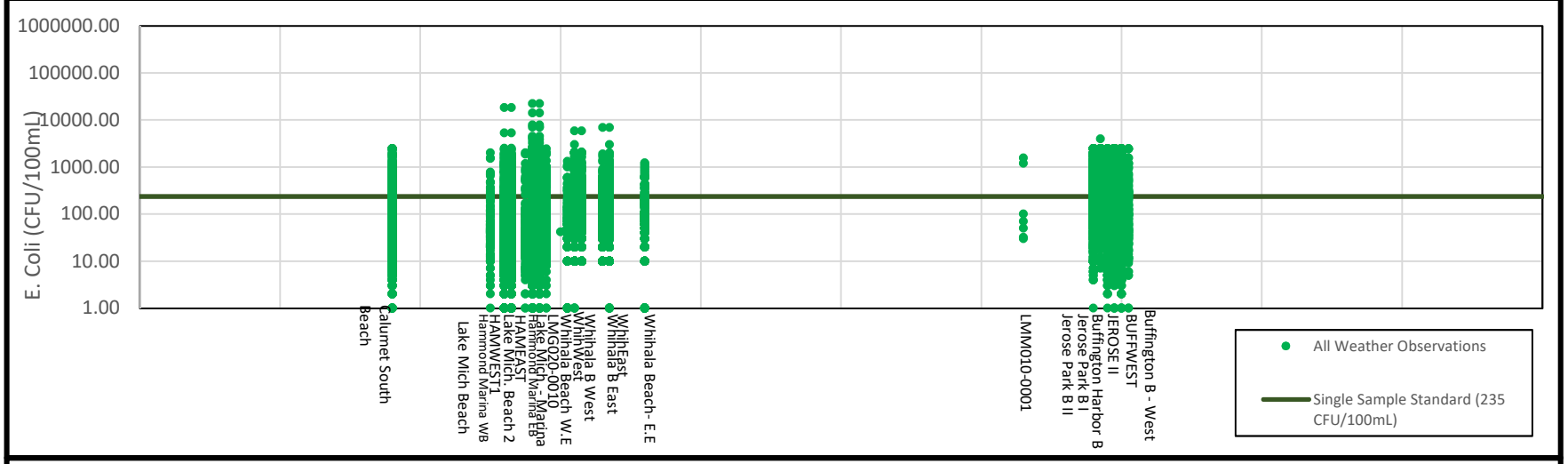
Figure 3-40
Single Sample Ammonia Results versus Mean Daily Discharge at Selected Locations in the Grand Calumet River



CDM Smith

Figure 3-41
Percent of Water Quality Samples Exceeding *E. coli* Single Sample Maximum Standard (235 cfu/100mL) – Data from 2013 - 2018



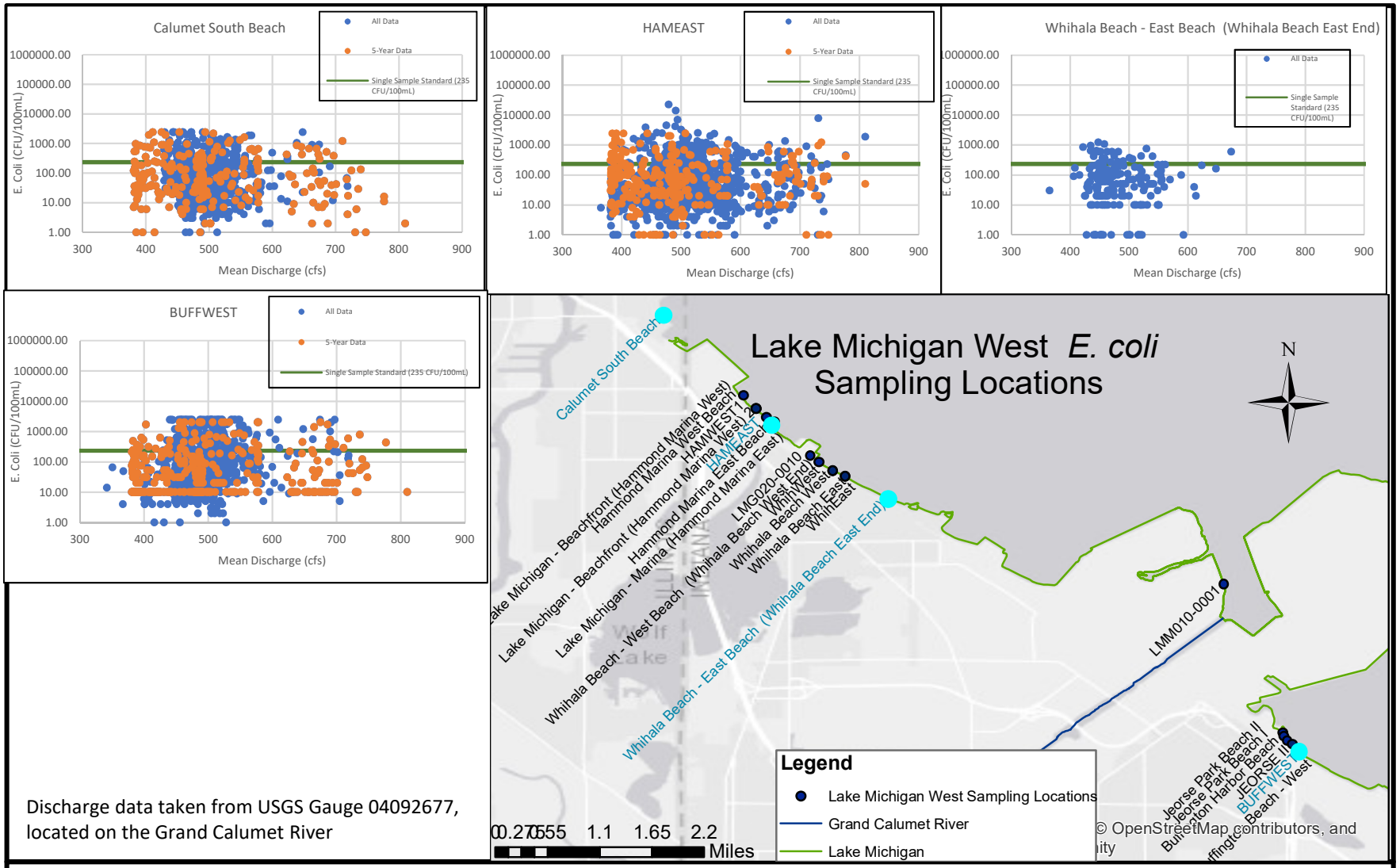


CDM Smith

Figure 3-42

Single Sample *E. coli* Results from 1998 to 2018 for the Lake Michigan Shoreline between Illinois and the US Steel Facility in Gary, Indiana

Data labeled as "To Numerous to Count" are shown at the maximum reported value.



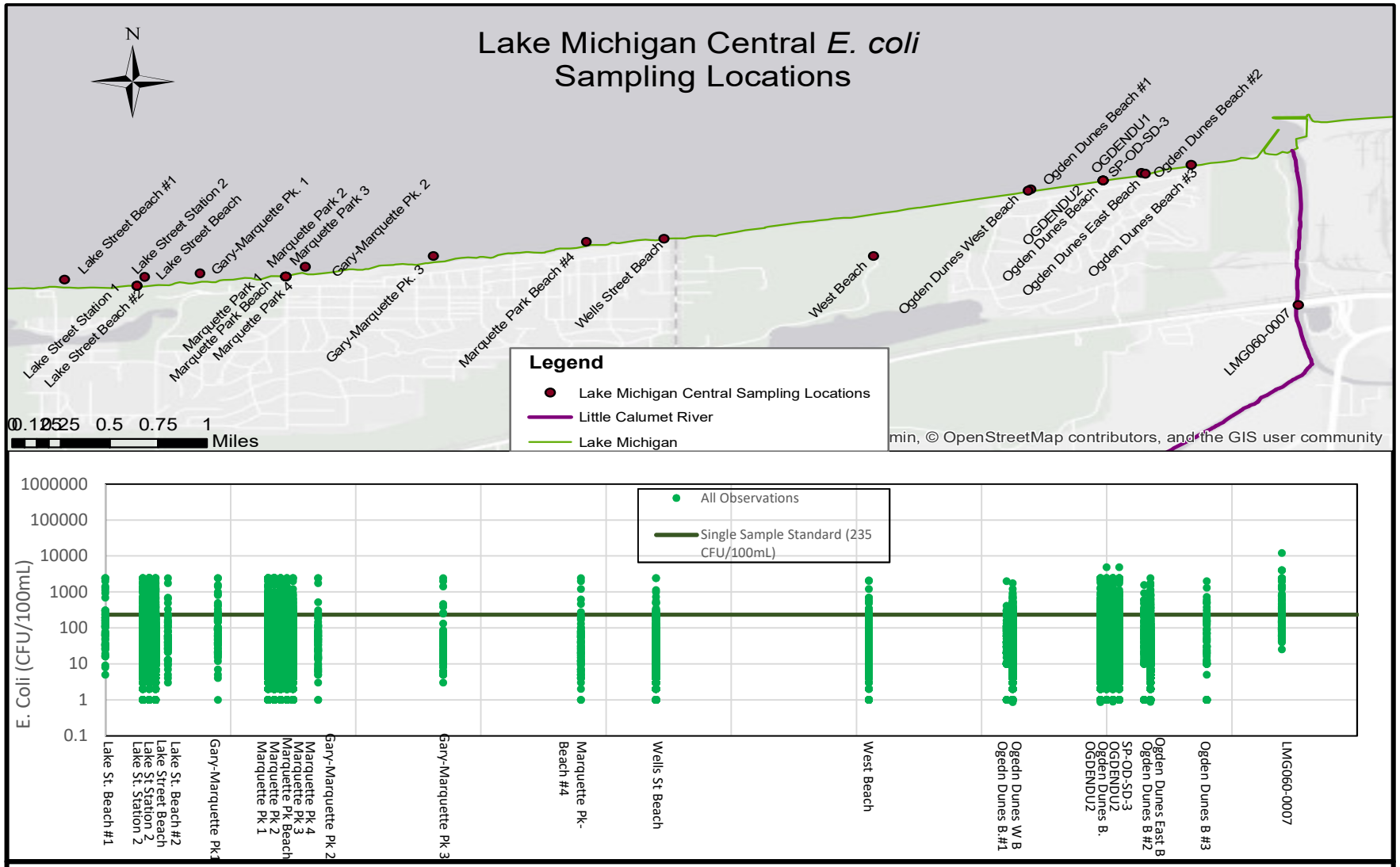
Discharge data taken from USGS Gauge 04092677, located on the Grand Calumet River

CDM Smith

Data labeled as "To Numerous to Count" are shown at the maximum reported value.

Figure 3-43

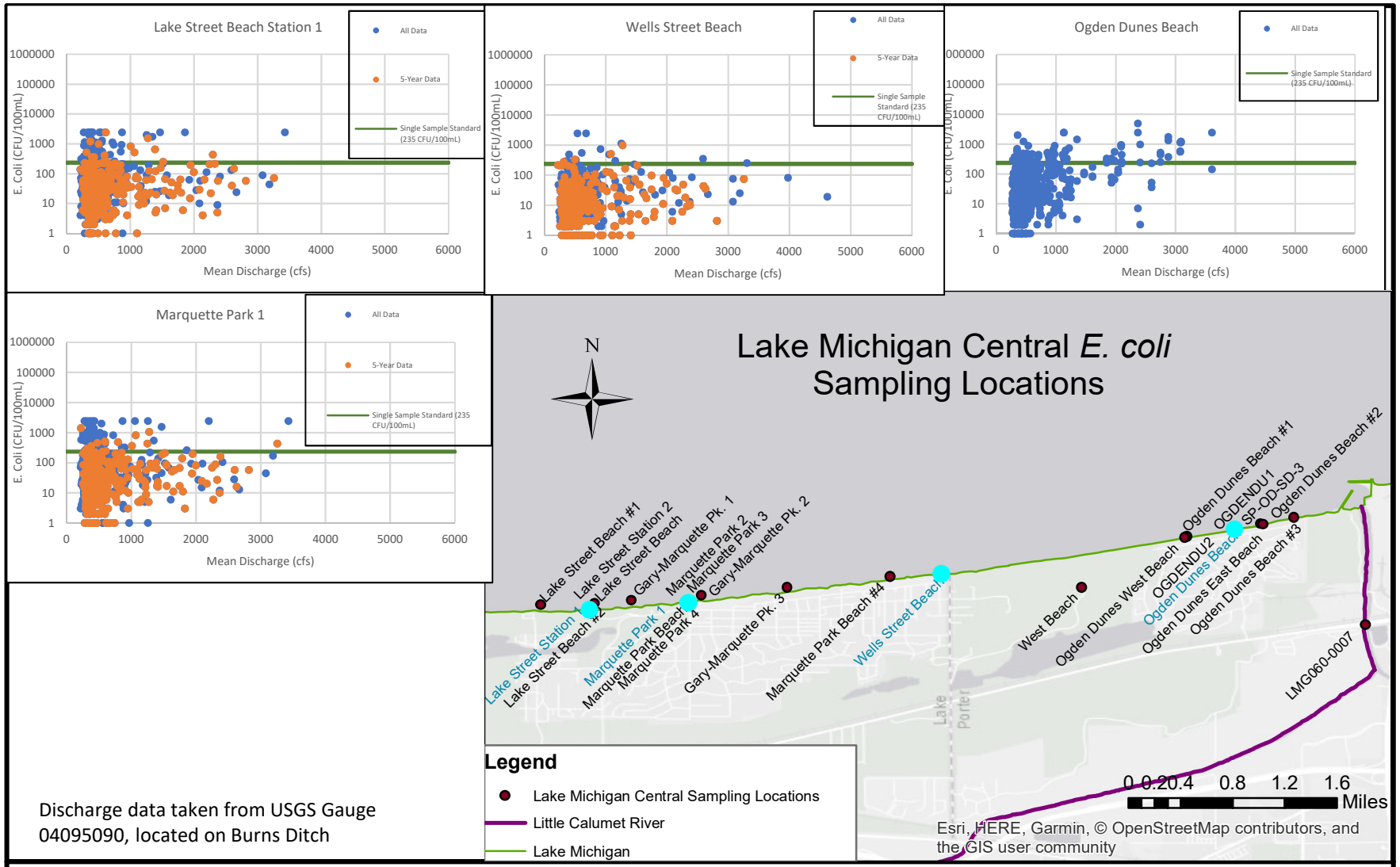
Single Sample *E. coli* Results versus Mean Daily Discharge at Selected Locations along the Lake Michigan Shoreline between Illinois and the US Steel Facility in Gary, Indiana



CDM Smith

Data labeled as "To Numerous to Count" are shown at the maximum reported value.

Figure 3-44
Single Sample *E. coli* Results from 1998 to 2018 for the Lake Michigan Shoreline between the US Steel Facility in Gary, Indiana and the Little Calumet River



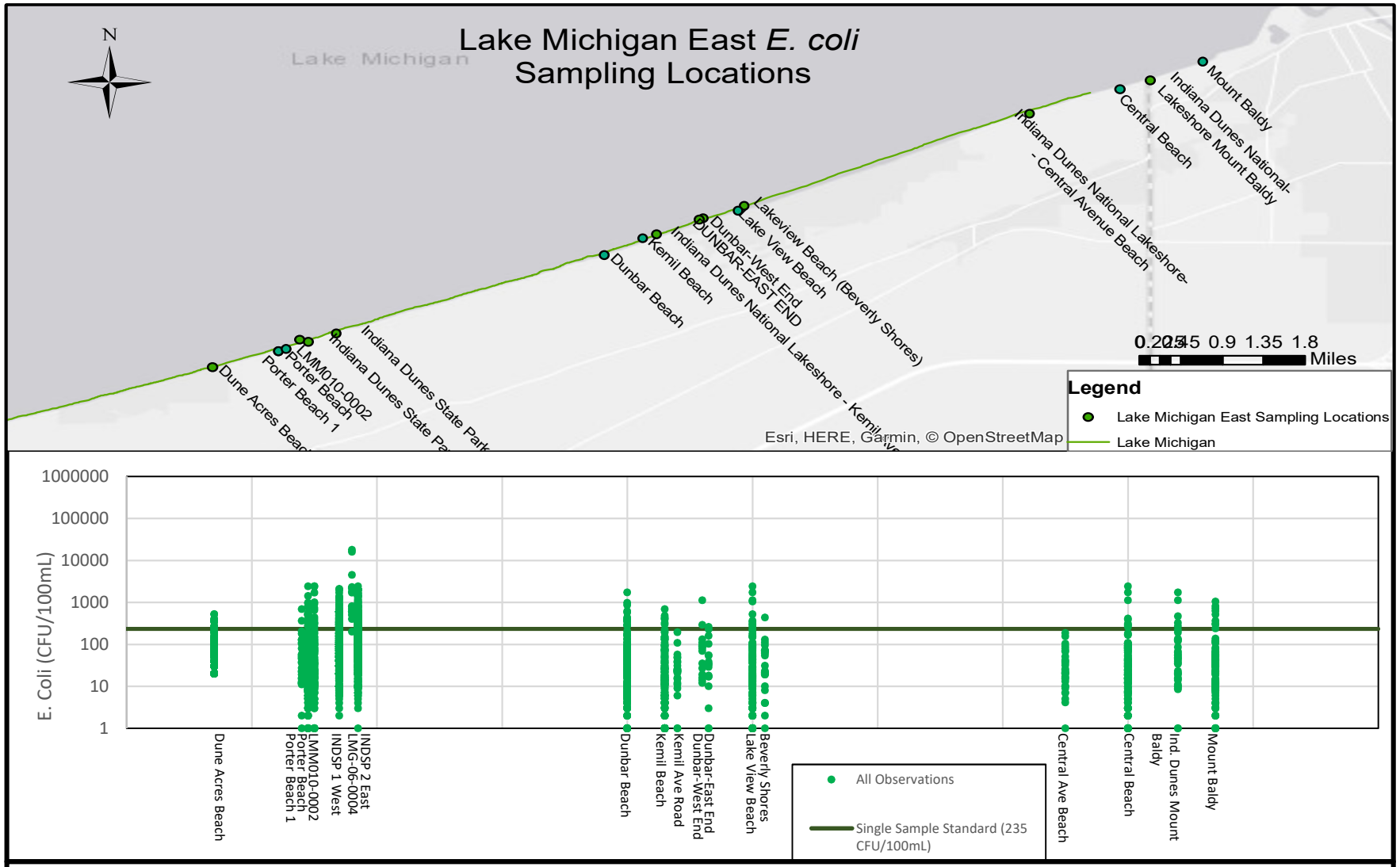
Discharge data taken from USGS Gauge 04095090, located on Burns Ditch

CDM Smith

Data labeled as "To Numerous to Count" are shown at the maximum reported value.

Figure 3-45

Single Sample *E. coli* Results versus Mean Daily Discharge at Selected Locations along the Lake Michigan Shoreline between the US Steel Facility in Gary, Indiana and the Little Calumet River

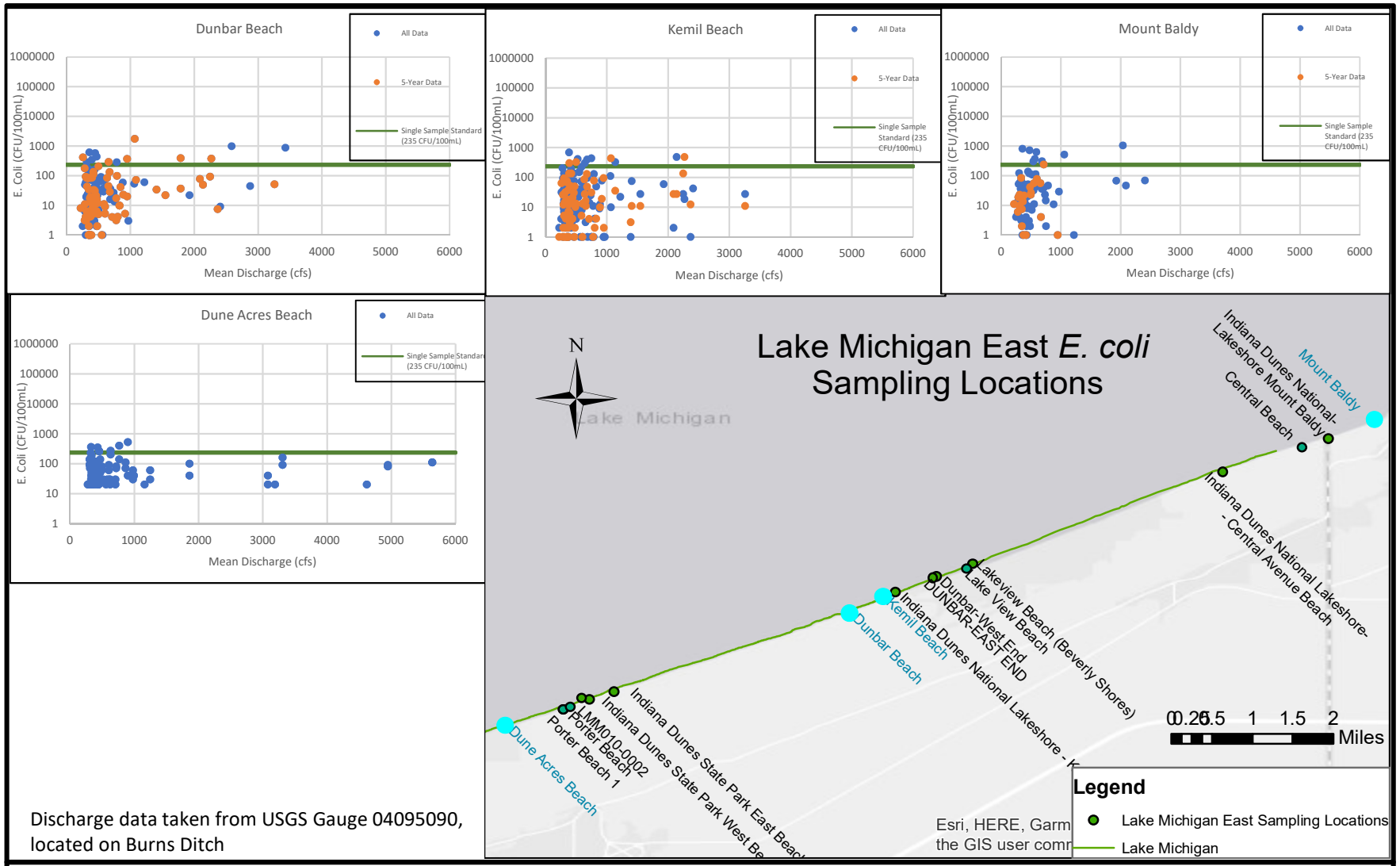


CDM Smith

Data labeled as "To Numerous to Count" are shown at the maximum reported value.

Figure 3-46

***Single Sample E. coli* Results from 1998 to 2018 for the Lake Michigan Shoreline between the Little Calumet River and Michigan City**



Discharge data taken from USGS Gauge 04095090, located on Burns Ditch

CDM Smith

Data labeled as "To Numerous to Count" are shown at the maximum reported value.

Figure 3-47

Single Sample *E. coli* Results versus Mean Daily Discharge at Selected Locations along the Lake Michigan Shoreline between the Little Calumet River and Michigan City

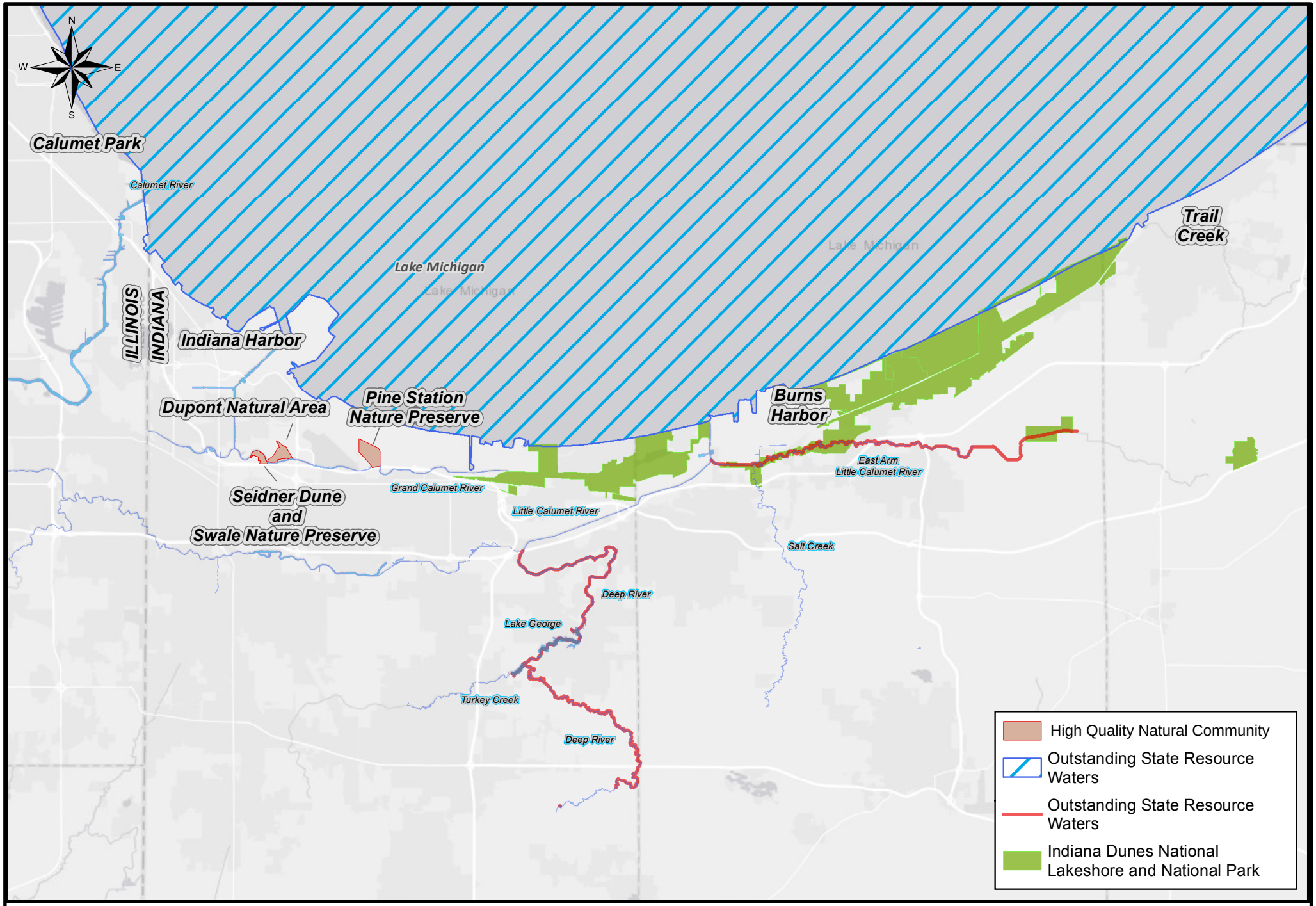
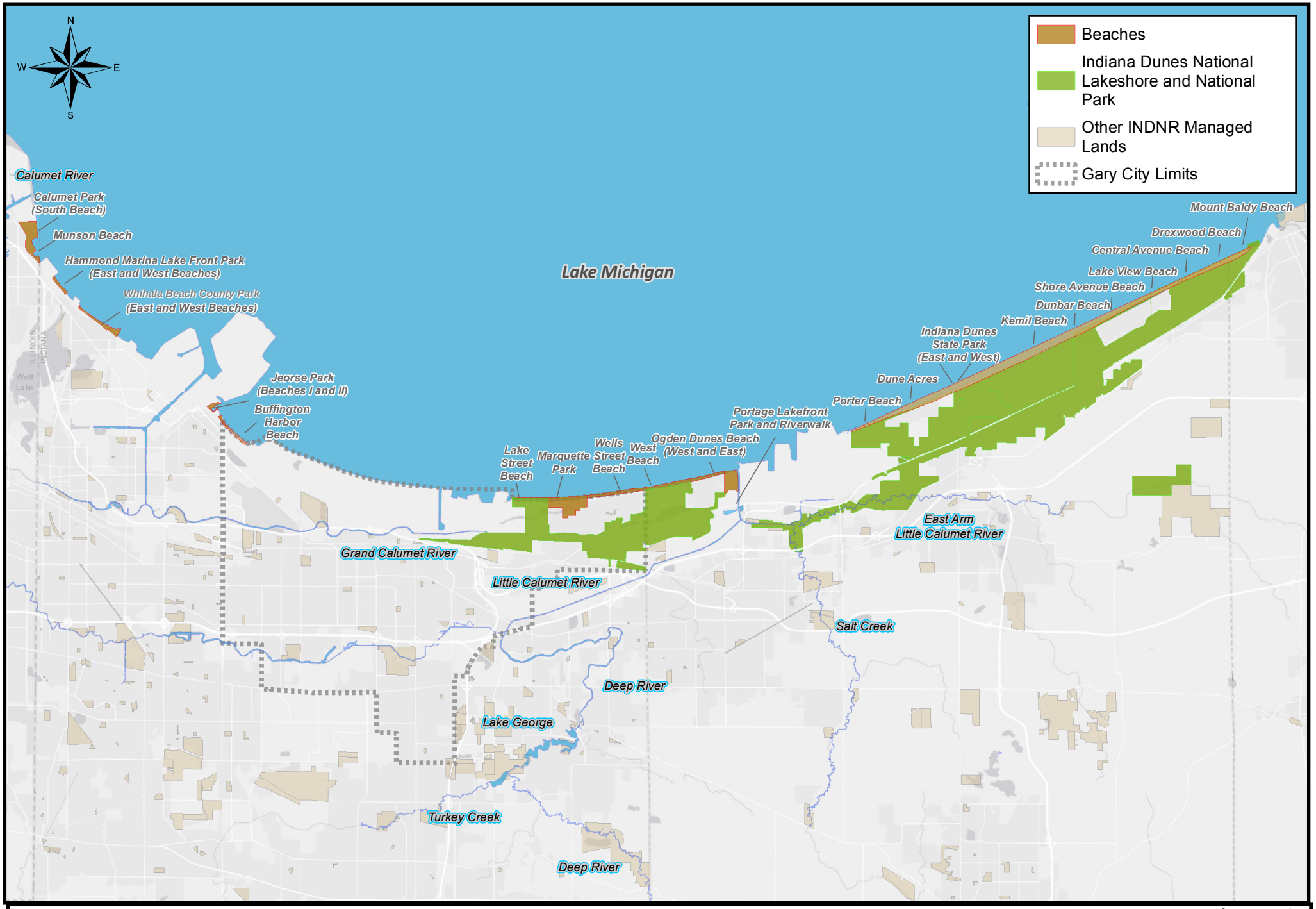


Figure 4-1
Study Area and Special Designations

CDM Smith

Sources:
National Resource Commission, maps.indiana.edu

0 2.5 5 Miles



CDM Smith

Sources:
Indiana Department of Natural Resources, Division of Outdoor Recreation, 2017 (maps.indiana.edu)
Indiana Dunes National Lakeshore (nps.gov)
Indiana Department of Environmental Management (in.gov/idem)
Google Earth (earth.google.com)

Figure 4-2
Swimming Beaches

0 2 4 Miles

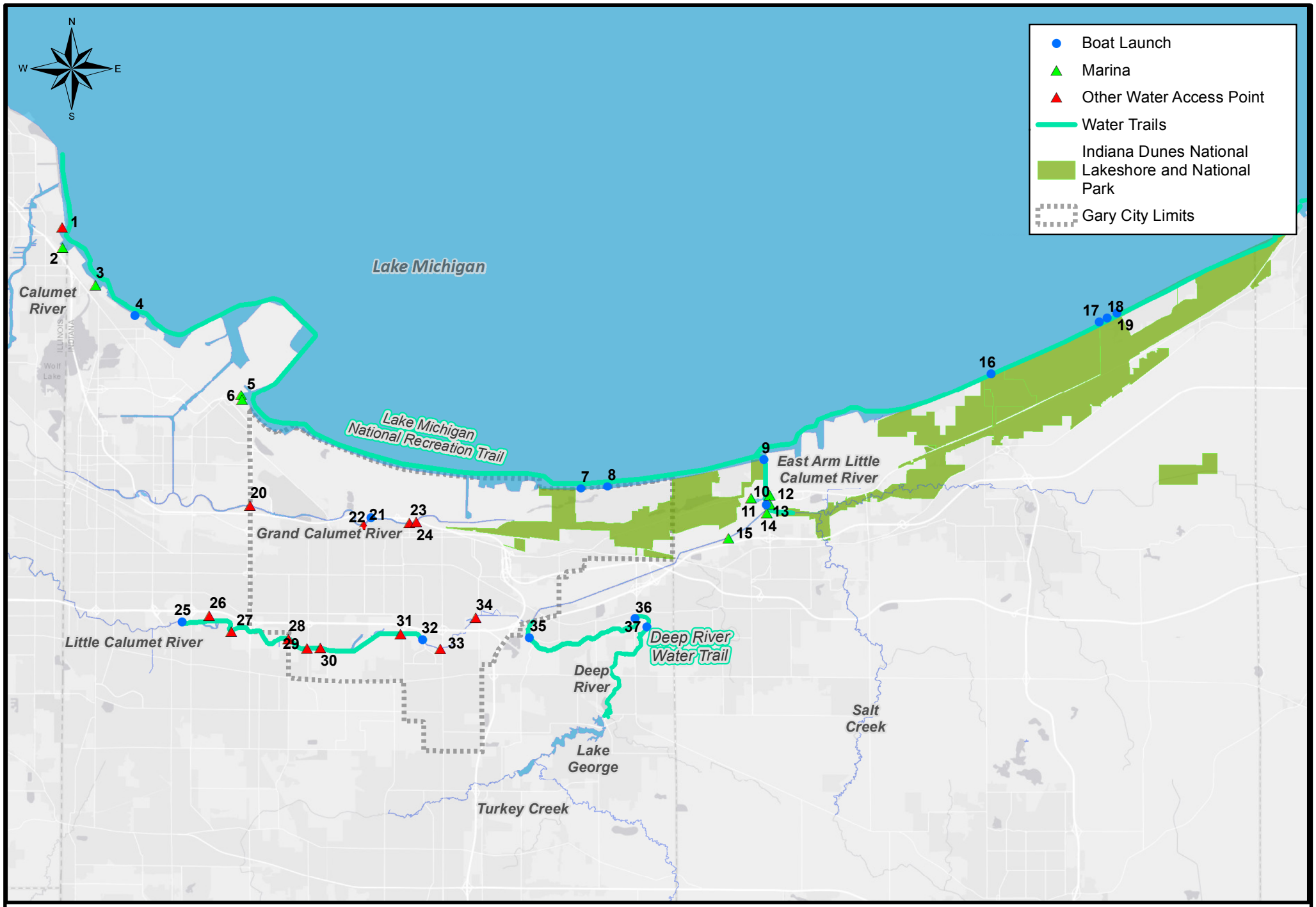


Figure 4-3

Water Access, Water Trails, and Fishing

Sources:
Indiana Department of Natural Resources, Division of Outdoor Recreation, 2017 (maps.indiana.edu)
Stream Reach Characterization and Evaluation Reports (SRCER), Little Calumet River, Greeley and Hansen LLC, October 2002
Google Earth (earth.google.com)

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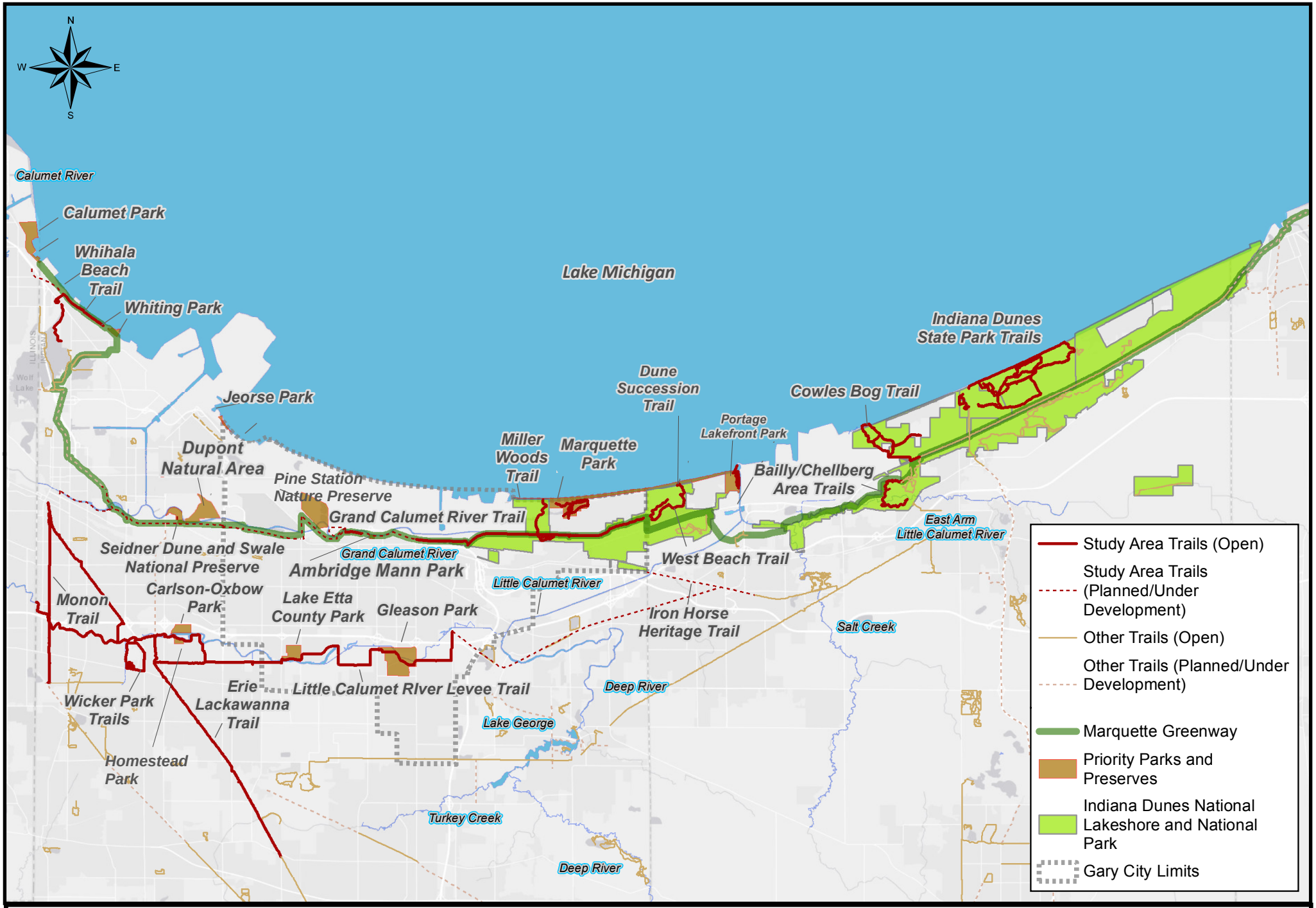
0 2 4 Miles



CDM Smith

Sources:
Indiana Department of Natural Resources, Division of Outdoor Recreation, 2017 (maps.indiana.edu)
Indiana Dunes National Lakeshore (www.nps.gov)
Northwestern Indiana Regional Planning Commission, 2016 (www.nirpc.org)
City of Gary Parks and Recreation (garyin.us/parks)

Figure 4-4
Parks and Trails

0 2.5 5 Miles

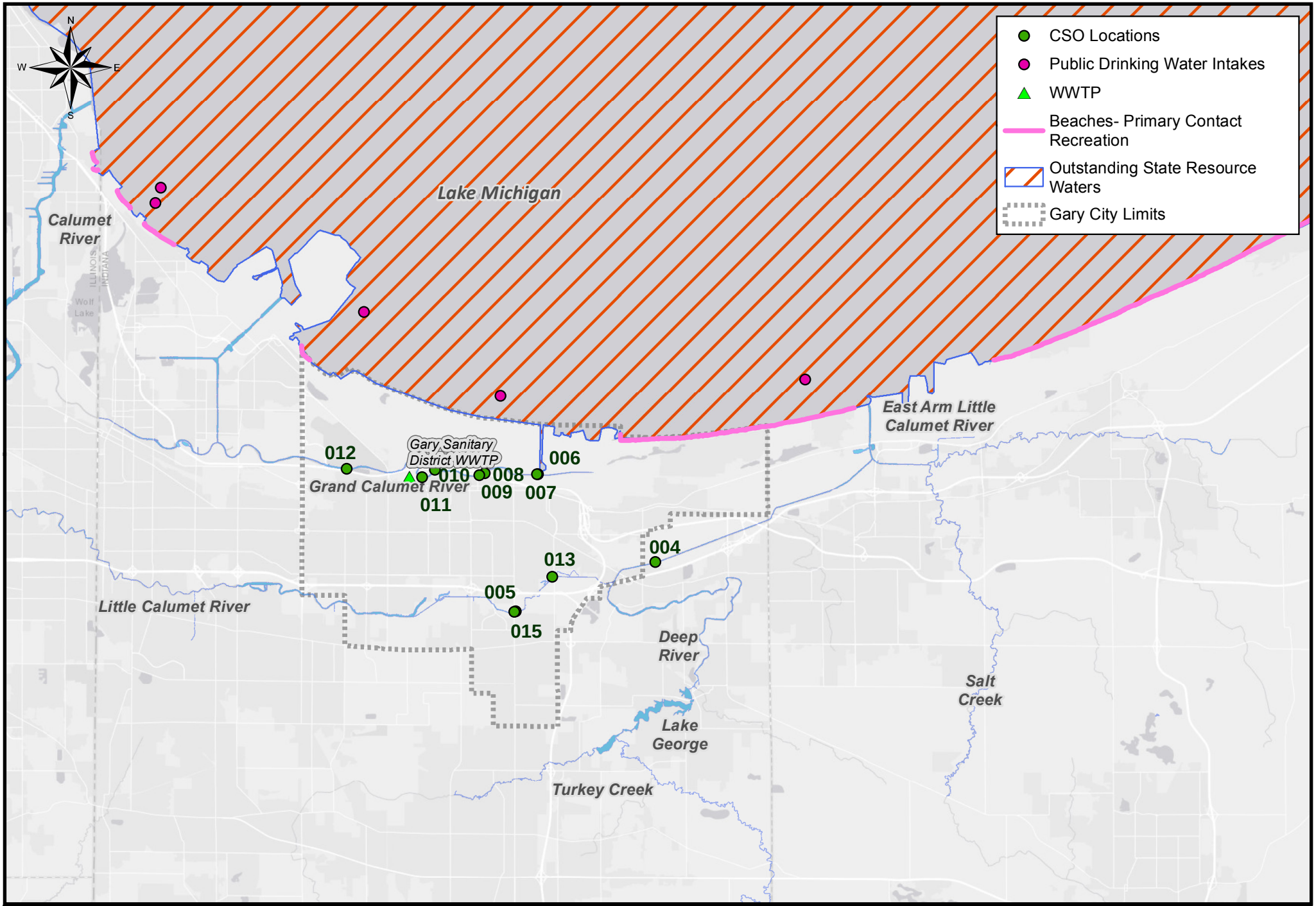


Figure 4-5
Sensitive Areas

CDM Smith

Sources:
National Resource Commission, maps.indiana.edu
DHS Homeland Infrastructure Foundation-Level Data (HIFLD)

0 2 4 Miles

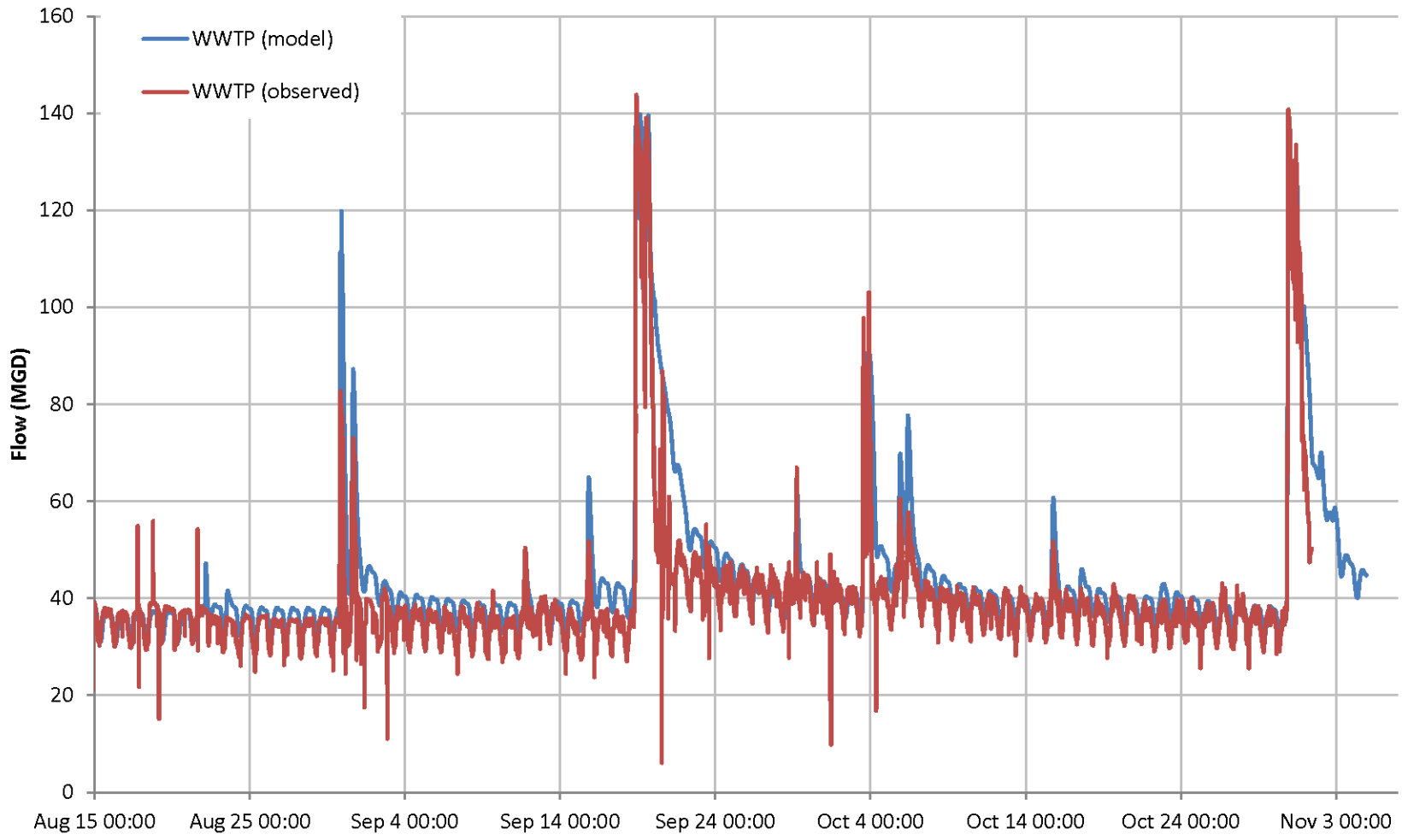


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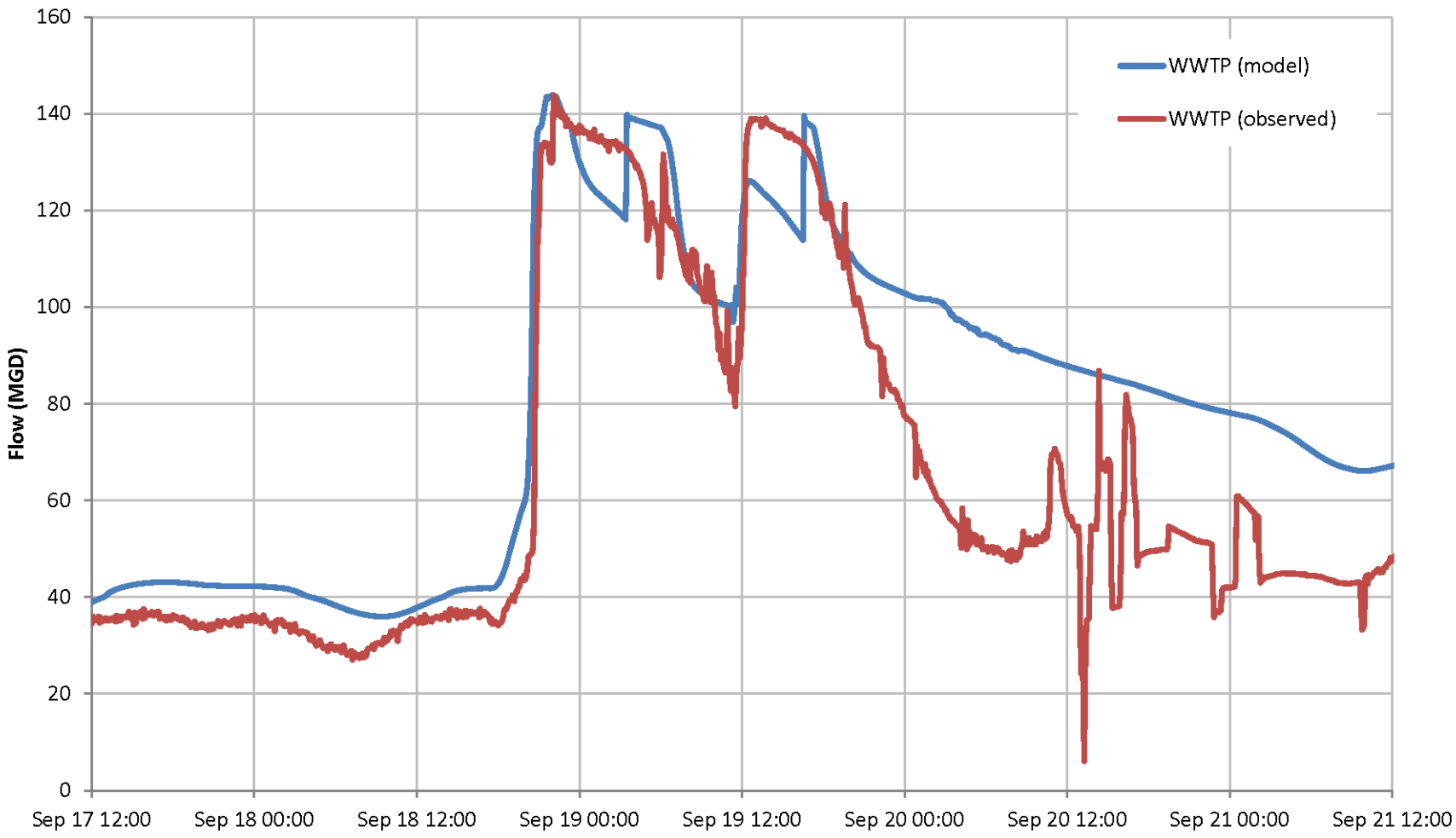
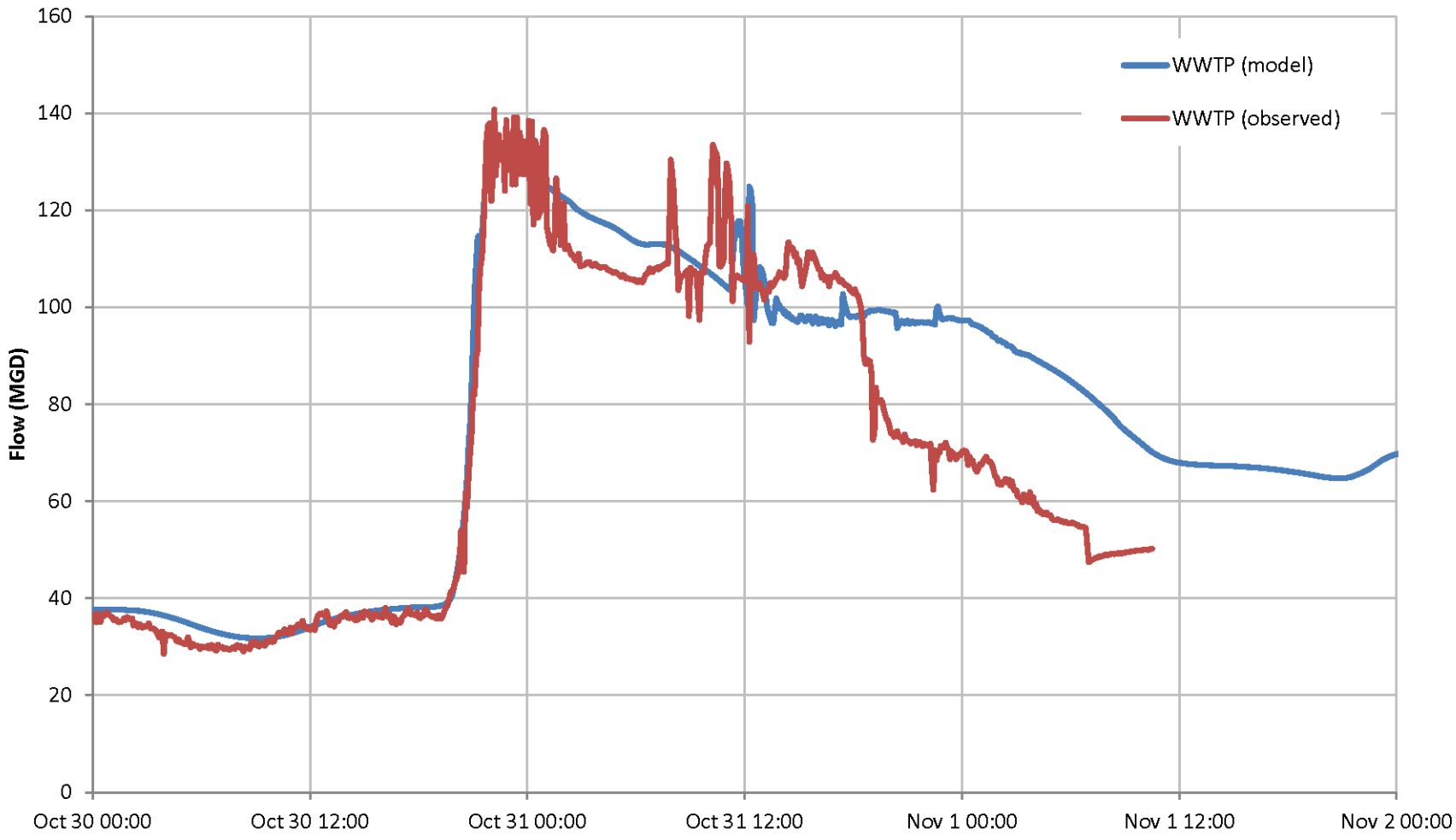
Figure 5-1
2013 Water Sampling Program
Flow at GSD WWTP



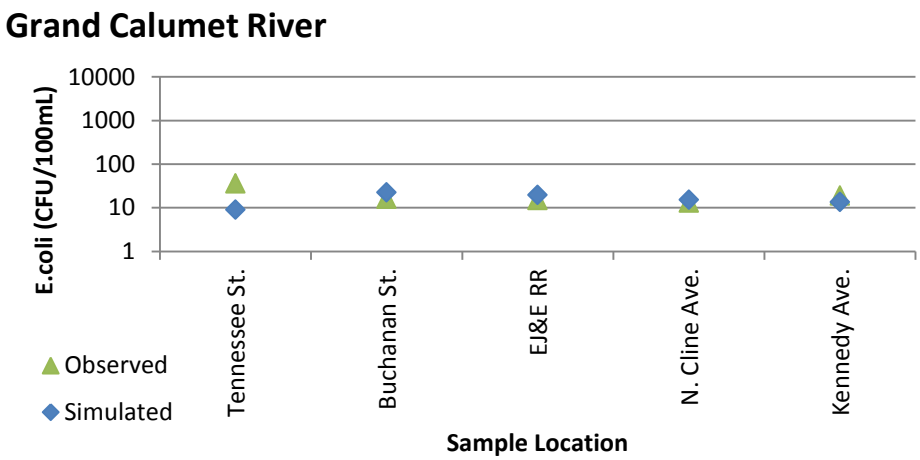
CDM Smith

Figure 5-2
2013 Water Sampling Program
September 2013 Wet Weather Event
Flow at GSD WWTP



CDM Smith

Figure 5-3
2013 Water Sampling Program
October 2013 Wet Weather Event
Flow at GSD WWTP



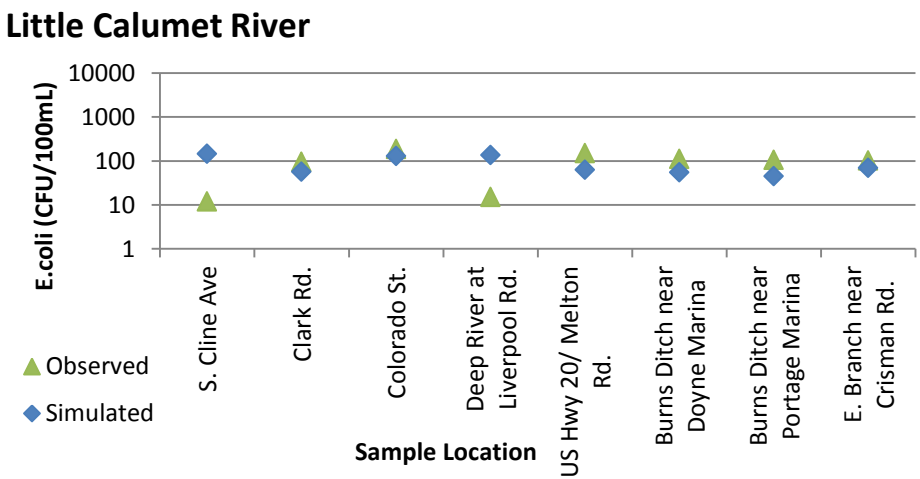
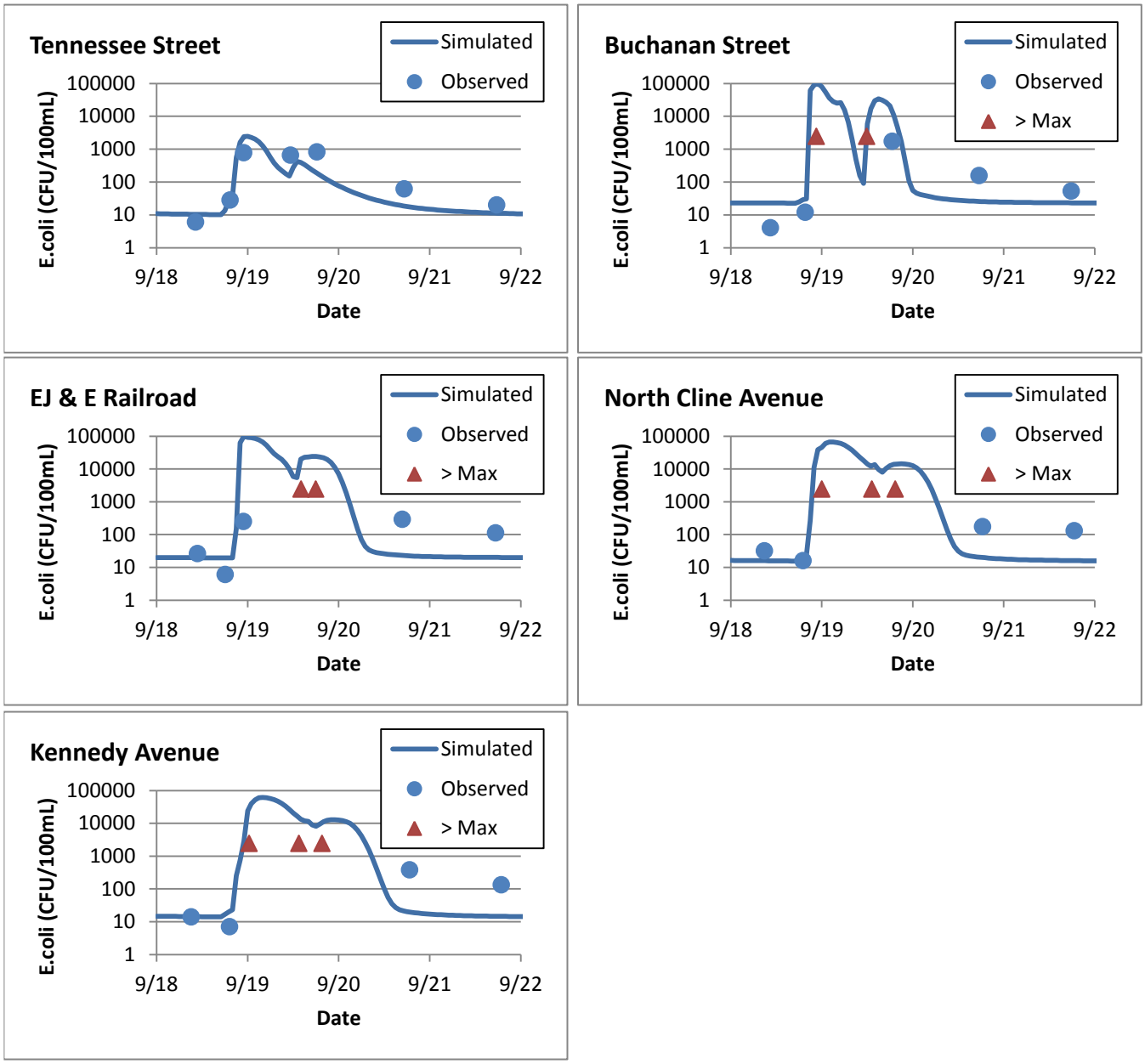


Figure 6-1
Fixed Day Sampling: August 18, 2013
Simulated and Observed E. coli Concentrations

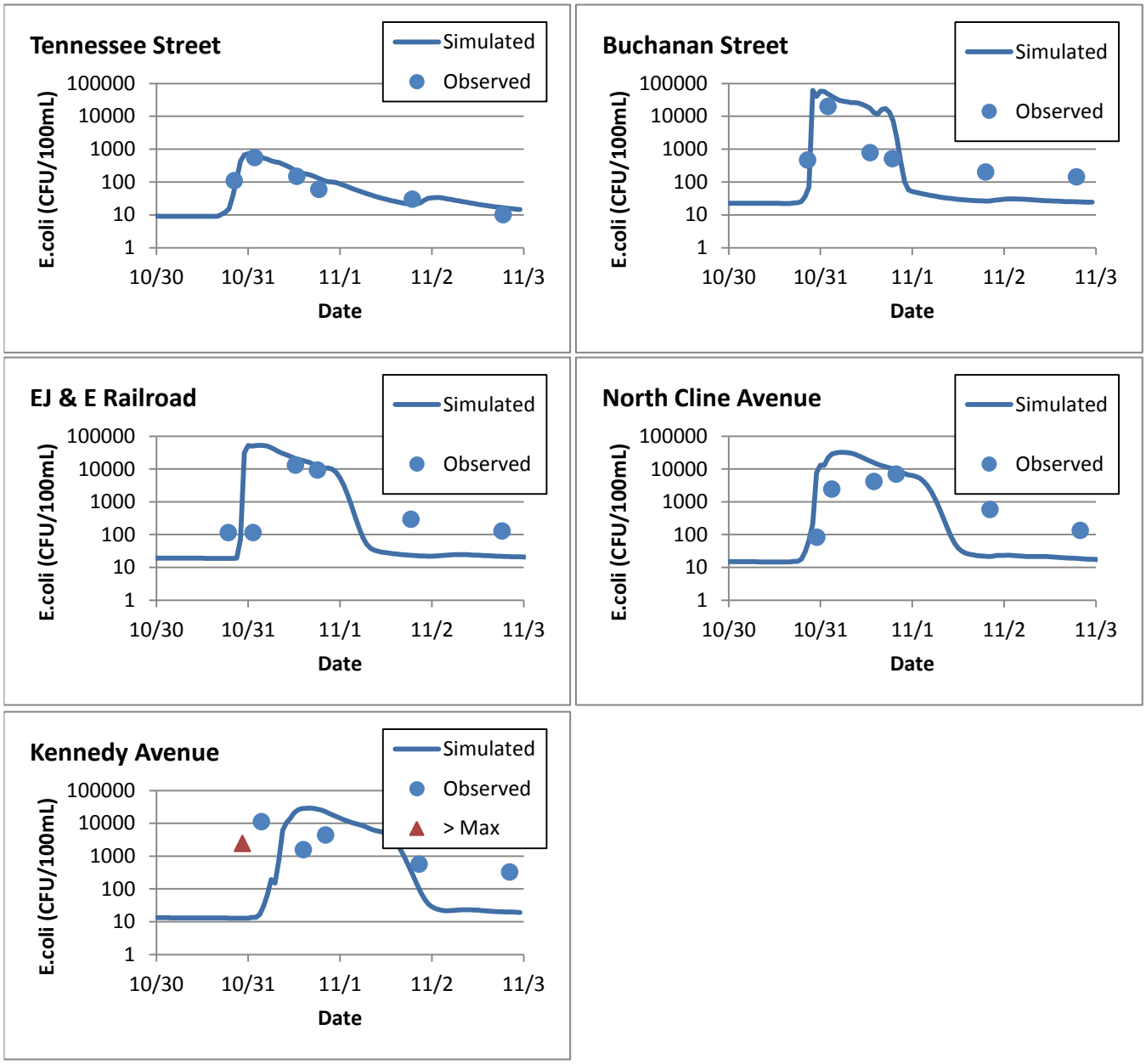
CDM Smith

Figure 6-2
Grand Calumet River Wet Weather Sampling: September 18, 2013
Simulated and Observed E.coli Concentrations



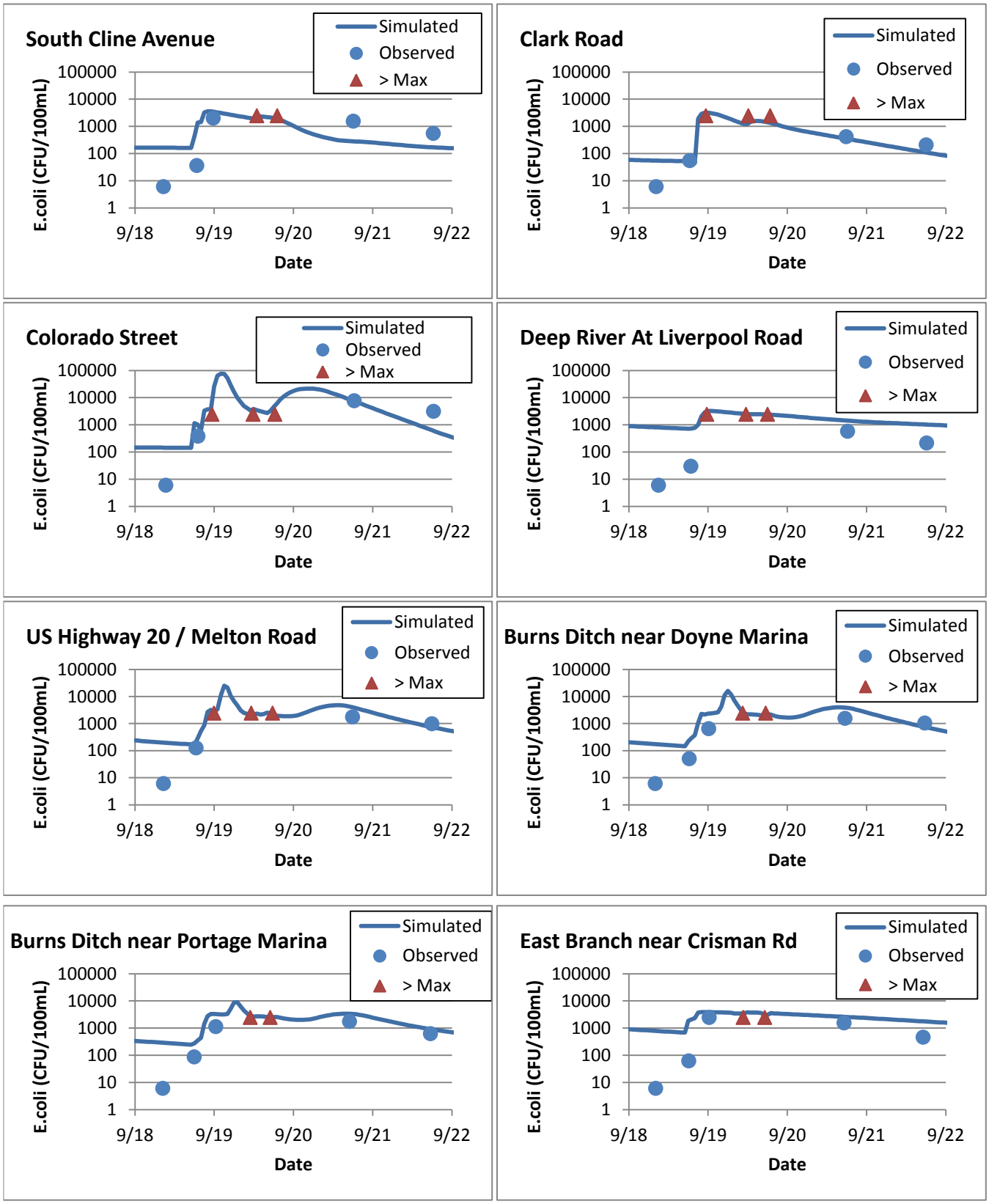
CDM Smith

Figure 6-3
Grand Calumet River Wet Weather Sampling: October 30, 2013
Simulated and Observed E.coli Concentrations



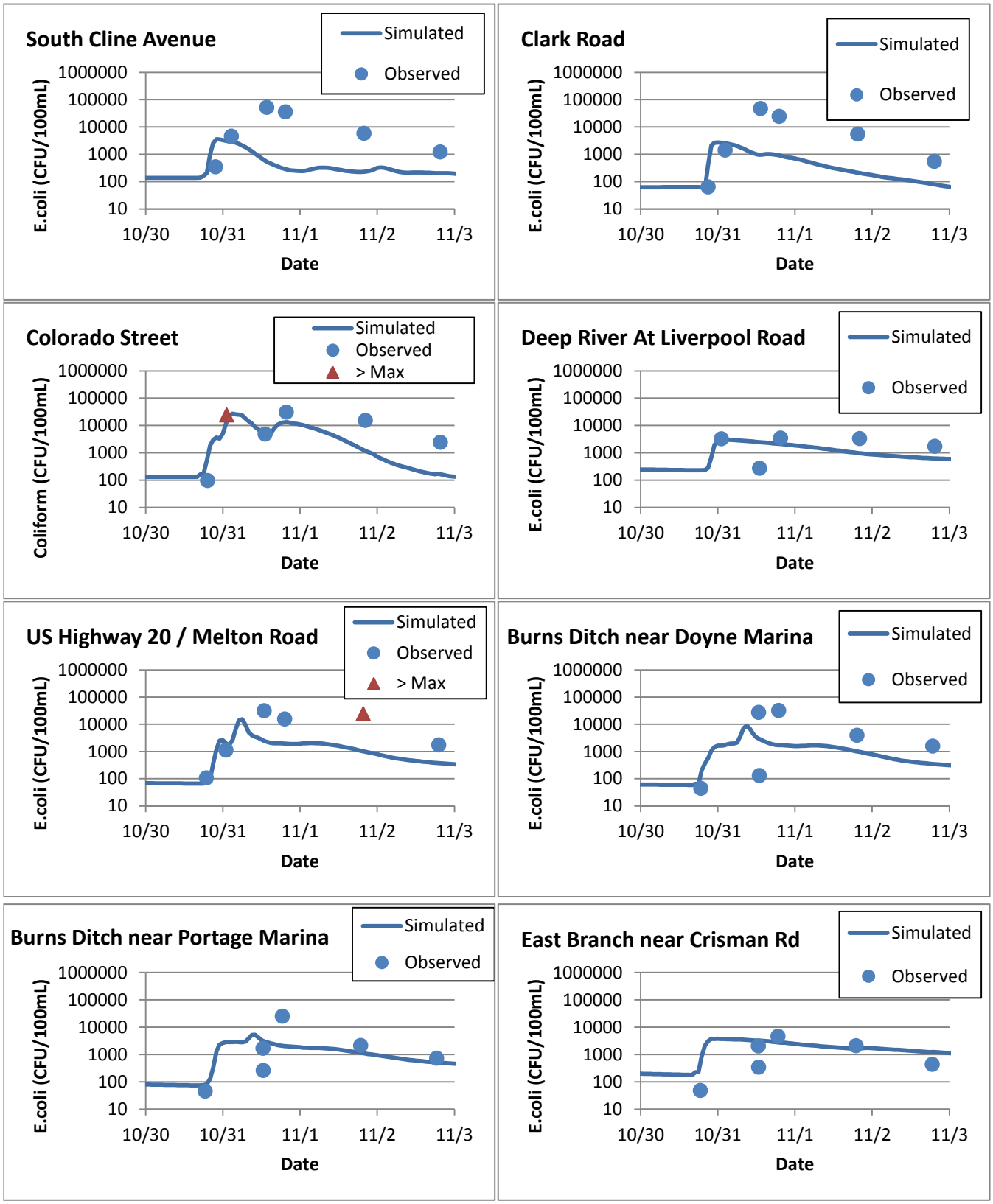
CDM Smith

Figure 6-4
Little Calumet River Wet Weather Sampling: September 18, 2013
Simulated and Observed E.coli Concentrations

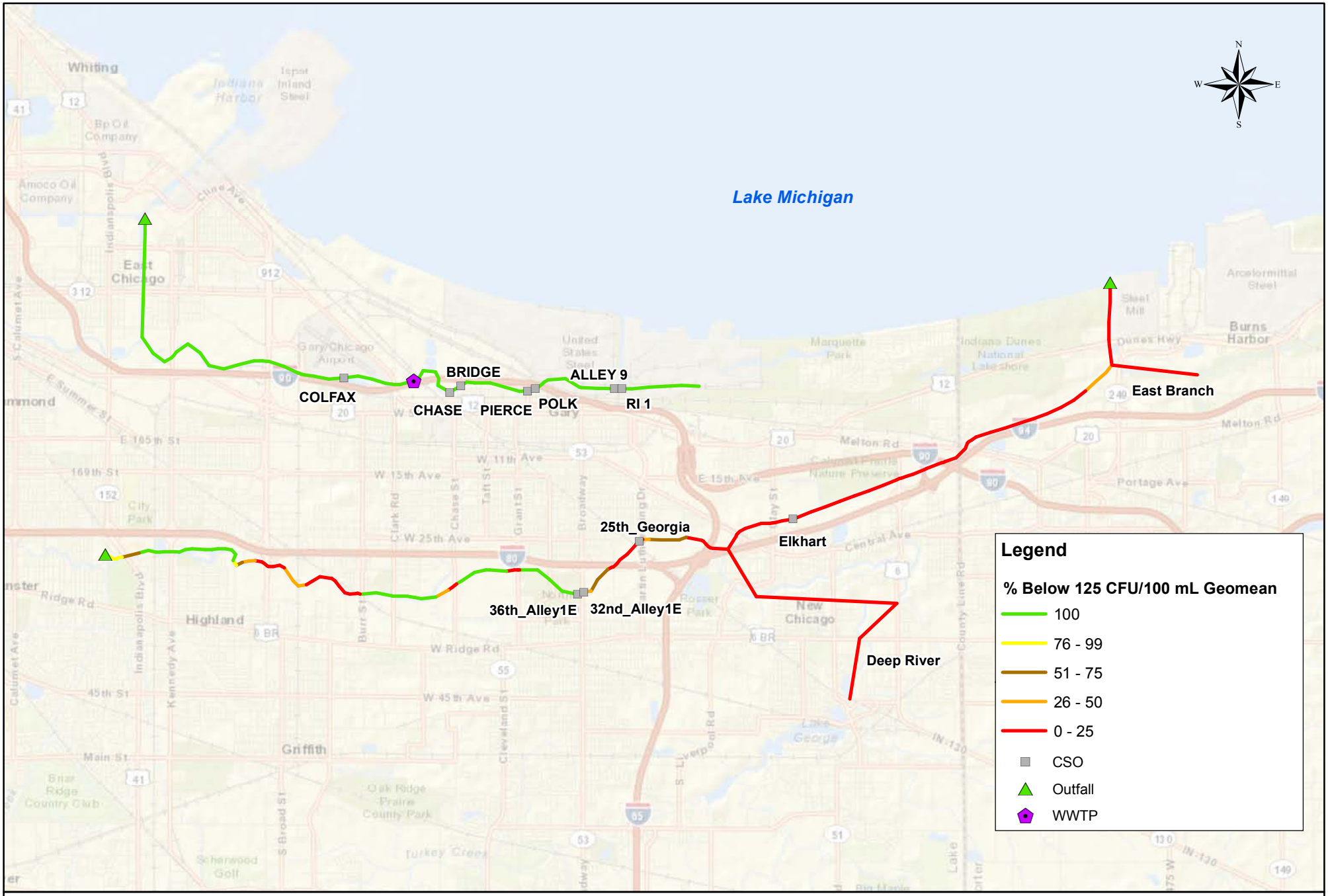


CDM Smith

Figure 6-5
Little Calumet River Wet Weather Sampling: October 30, 2013
Simulated and Observed E.coli Concentrations



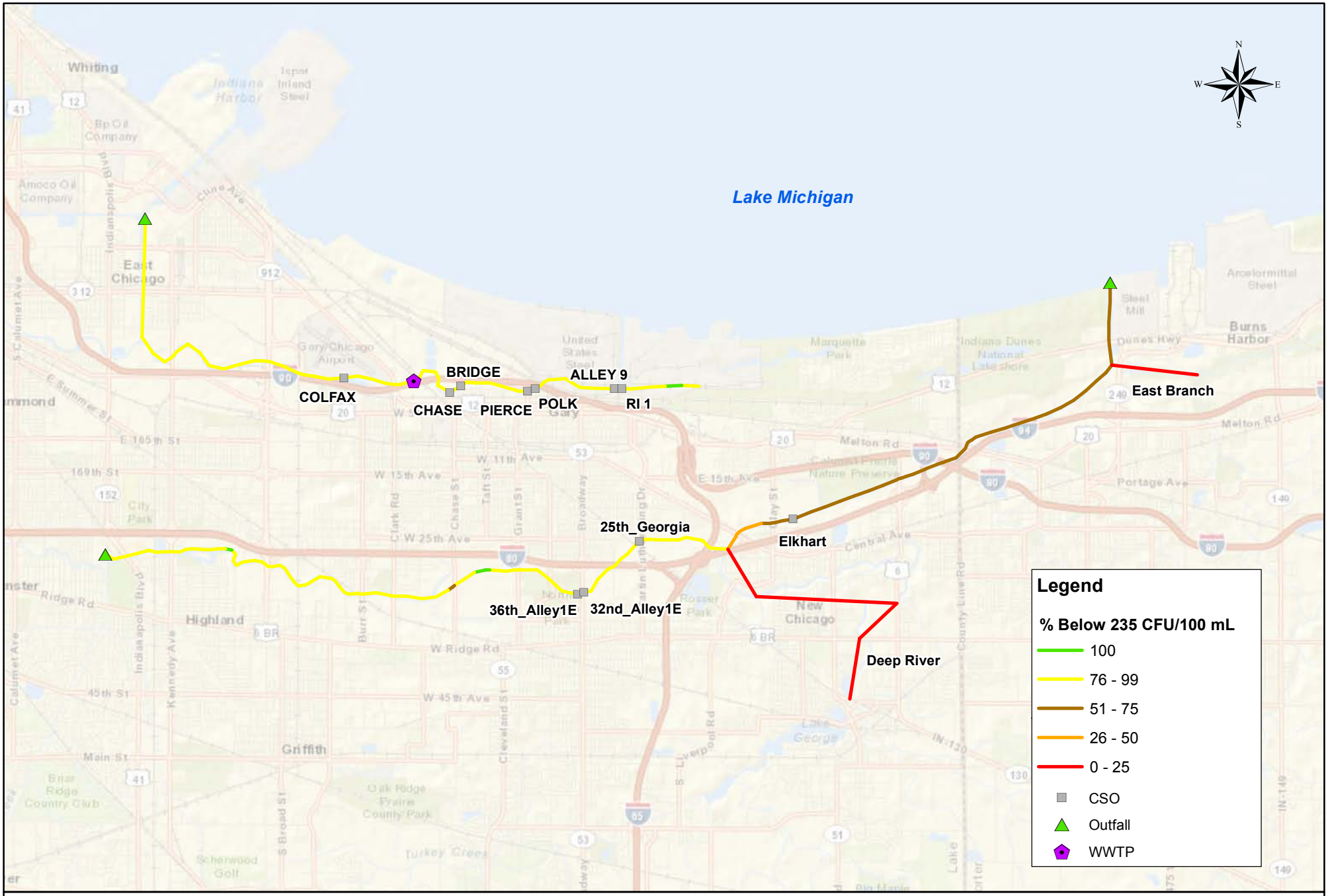
CDM Smith



2 1 0 2 Miles

CDM Smith

Figure 6-6
Grand Calumet River and Little Calumet River
Receiving Water Models - Baseline Conditions (1986)
Percent of Time Below Geomean of 125 CFU /100 mL E. coli (Recreation Season)



2 1 0 2 Miles

CDM Smith

Figure 6-7
Grand Calumet River and Little Calumet River
Receiving Water Models - Baseline Conditions (1986)
Percent of Samples Below 235 CFU/100 mL E. coli (Recreation Season)

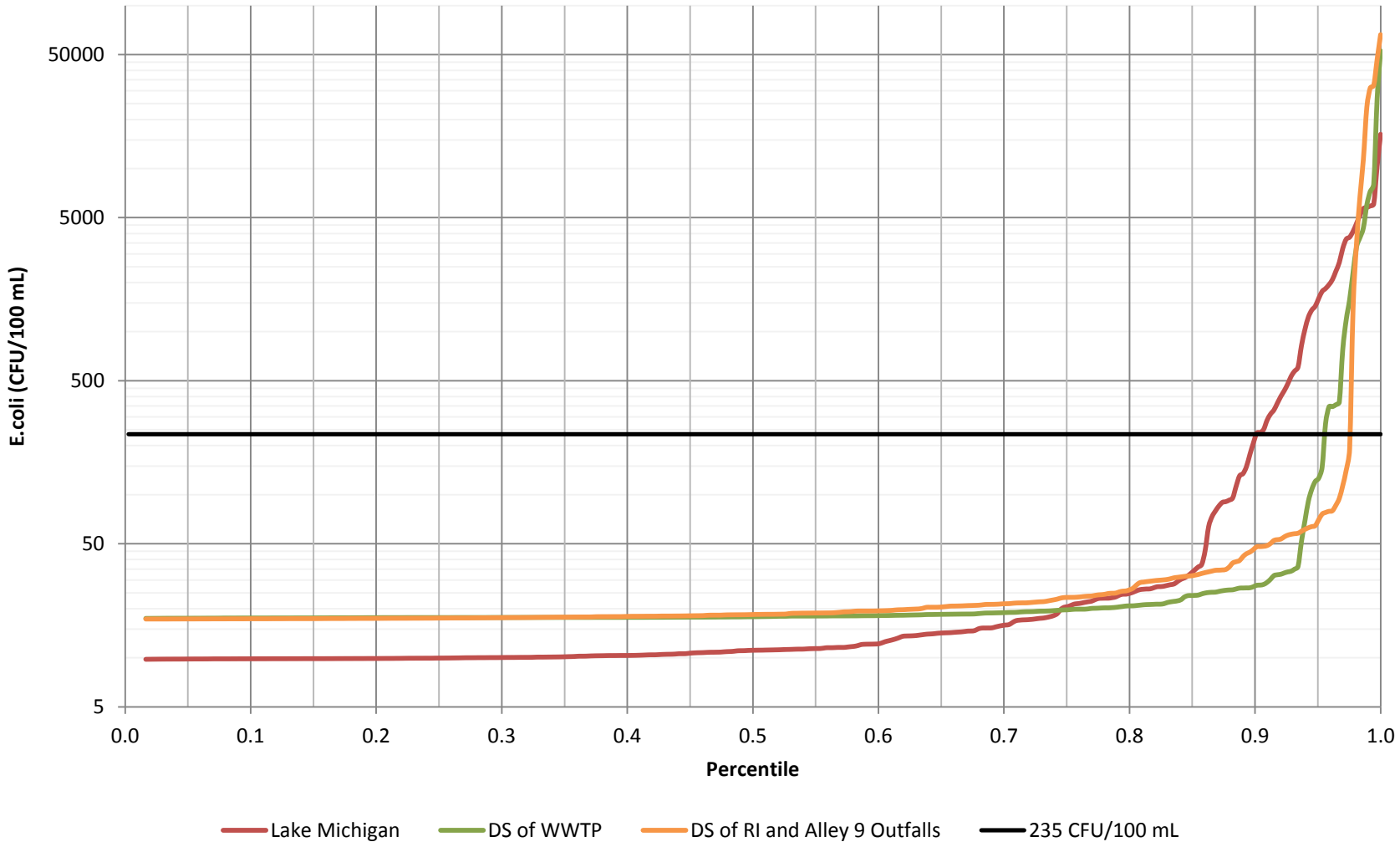
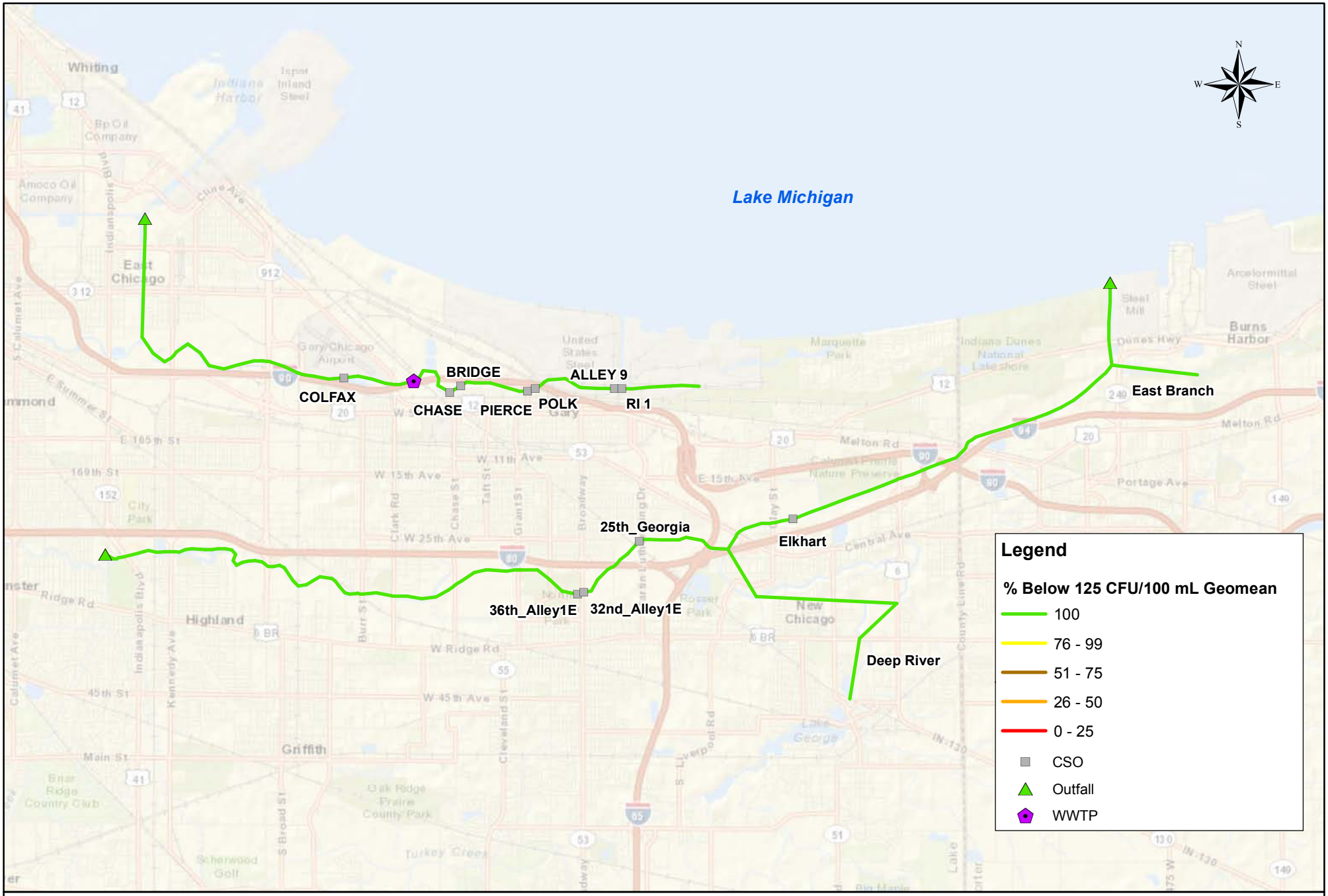


Figure 6-8
Frequency Distribution of the Model-Predicted Bacteria Concentrations (Noon Values)
Baseline Conditions (1986)
Typical Year – Recreation Season
Grand Calumet River

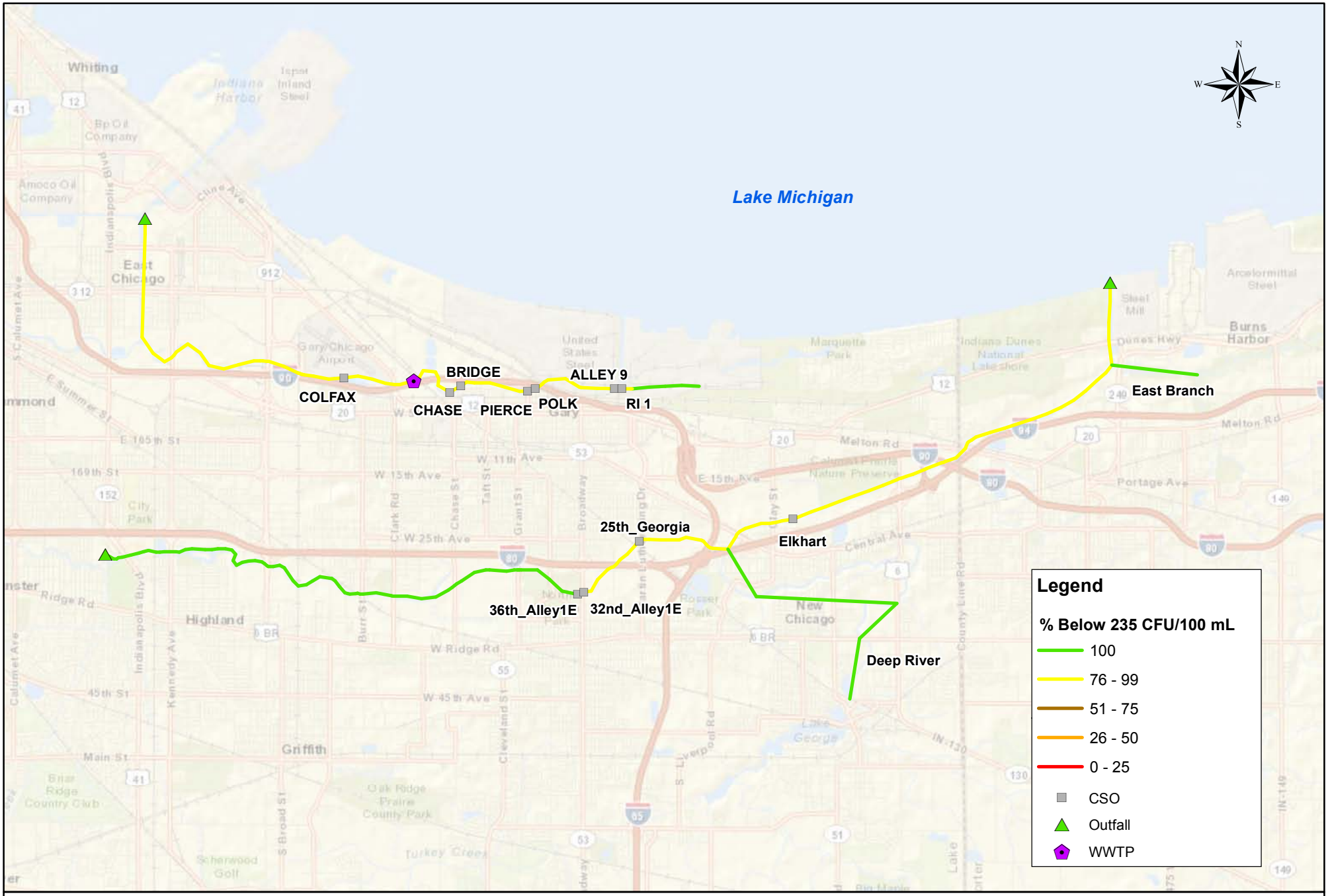
CDM Smith



2 1 0 2 Miles

CDM Smith

Figure 6-9
Grand Calumet River and Little Calumet River
Receiving Water Models - Baseline Conditions (1986) with Improved Non-Point Sources
Percent of Time Below Geomean of 125 CFU/100 mL E. coli (Recreation Season)



2 1 0 2 Miles

CDM Smith

Figure 6-10
Grand Calumet River and Little Calumet River
Receiving Water Models - Baseline Conditions (1986) with Improved Non-Point Sources
Percent of Samples Below 235 CFU/100 mL E. coli (Recreation Season)

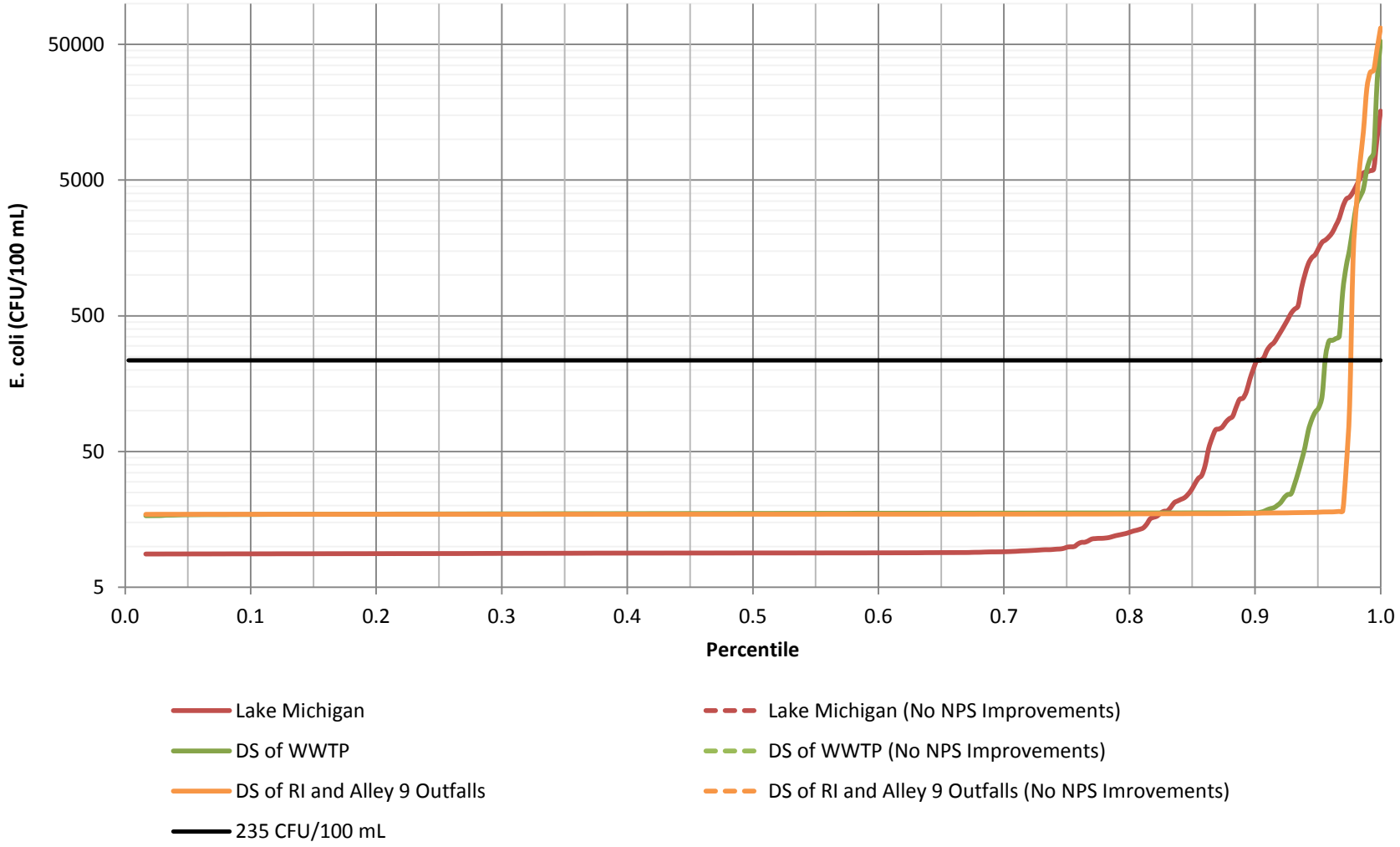


Figure 6-11
Frequency Distribution of the Model-Predicted Bacteria Concentrations (Noon Values)
Baseline Conditions (1986) with Improved Non-Point Sources
Typical Year – Recreation Season
Grand Calumet River

CDM Smith

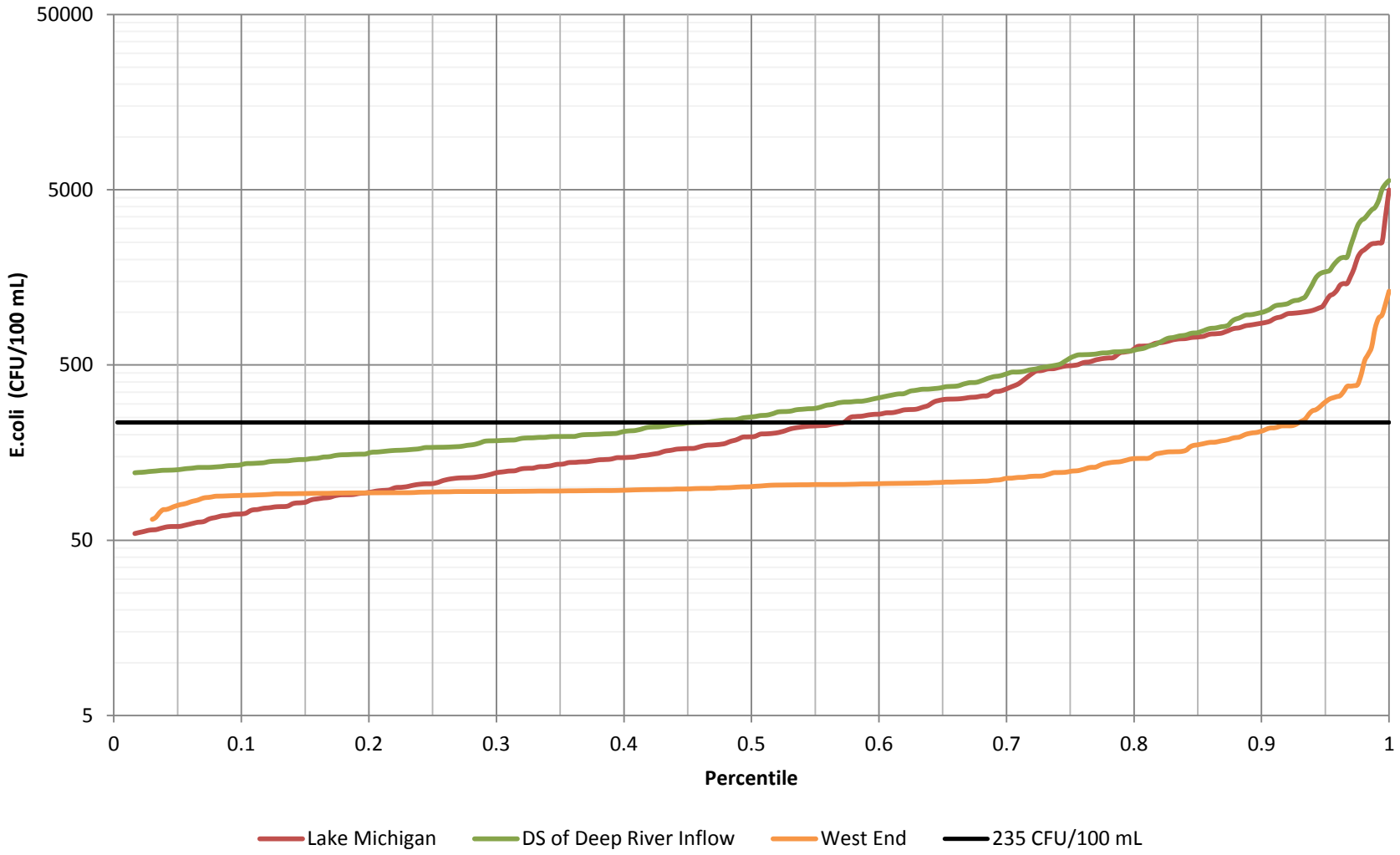


Figure 6-12
Frequency Distribution of the Model-Predicted Bacteria Concentrations (Noon Values)
Baseline Conditions (1986)
Typical Year – Recreation Season
Little Calumet River

CDM Smith

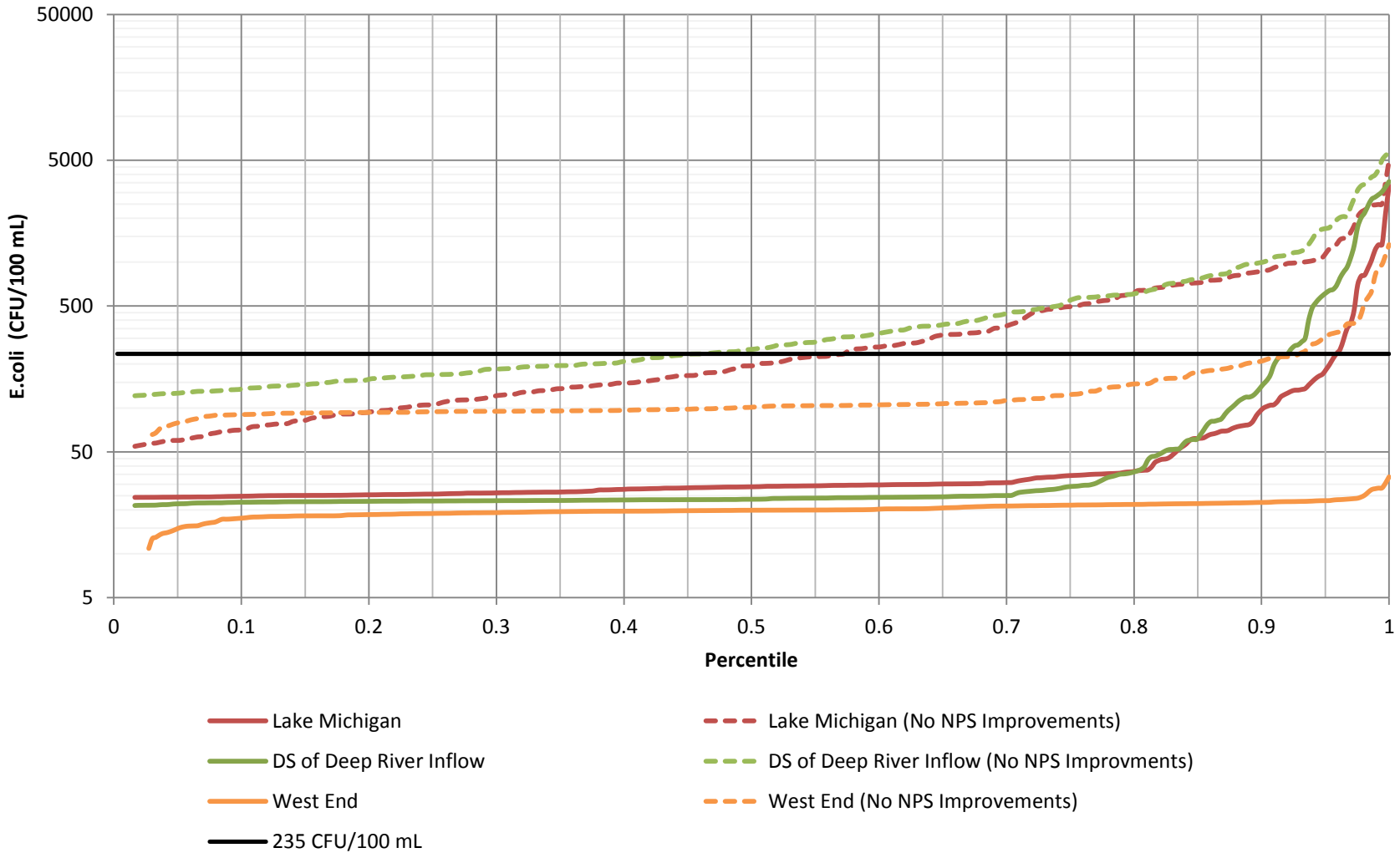


Figure 6-13
Frequency Distribution of the Model-Predicted Bacteria Concentrations (Noon Values)
Baseline Conditions (1986) with Improved Non-Point Sources
Typical Year – Recreation Season
Little Calumet River

CDM Smith