

Root River Monitoring

Milwaukee Metropolitan Sewerage District

September 26, 2012



MMSD Surface Water Quality Program



- Began in 1979
- Documents long term WQ trends (30+ years)
 - Facility planning & operations
 - Flood management & watercourse improvements
 - Stormwater management rules & impacts on WQ
- Over 40 variables analyzed
 - Biological, physical, conventional, metals, nutrients and others.

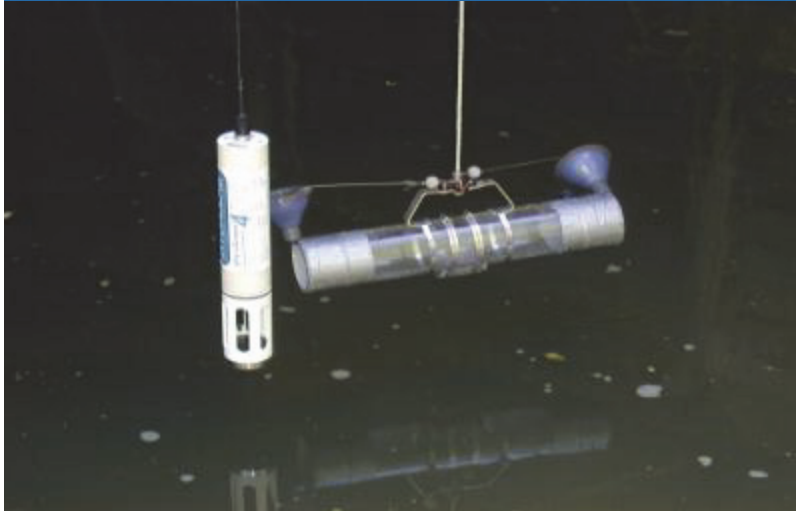
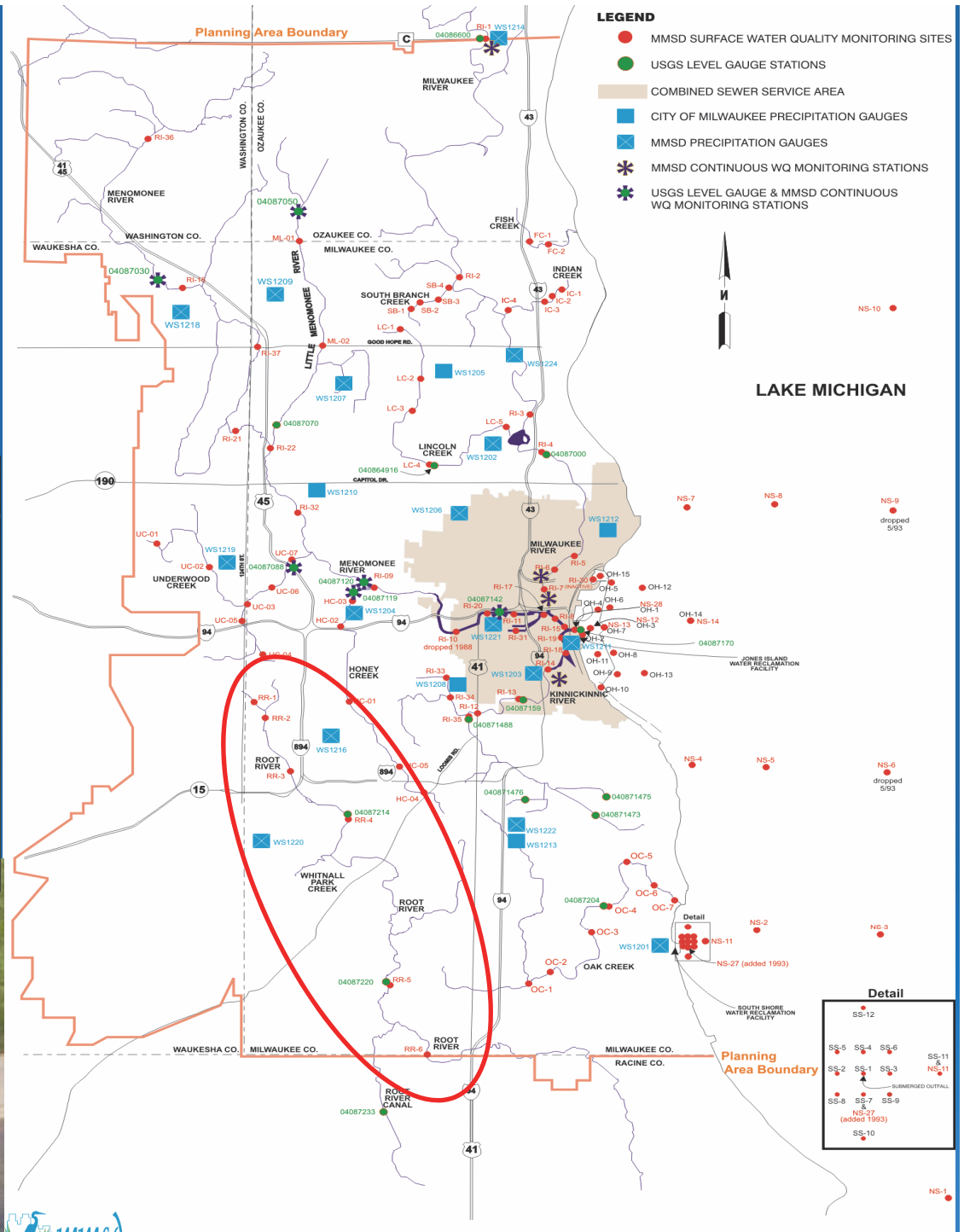
MMSD Surface Water Quality Program

- 3 different surveys on Lake Michigan
- 10 different River/Creek surveys
- Sampled on a biweekly or monthly basis
- Various sample depths (S, M, B)
- Tests vary by survey type and sample depth
- 10 continuous monitoring sites maintained by MMSD/USGS
- Comprehensive network of precipitation gauges



Current MMSD Sampling Locations

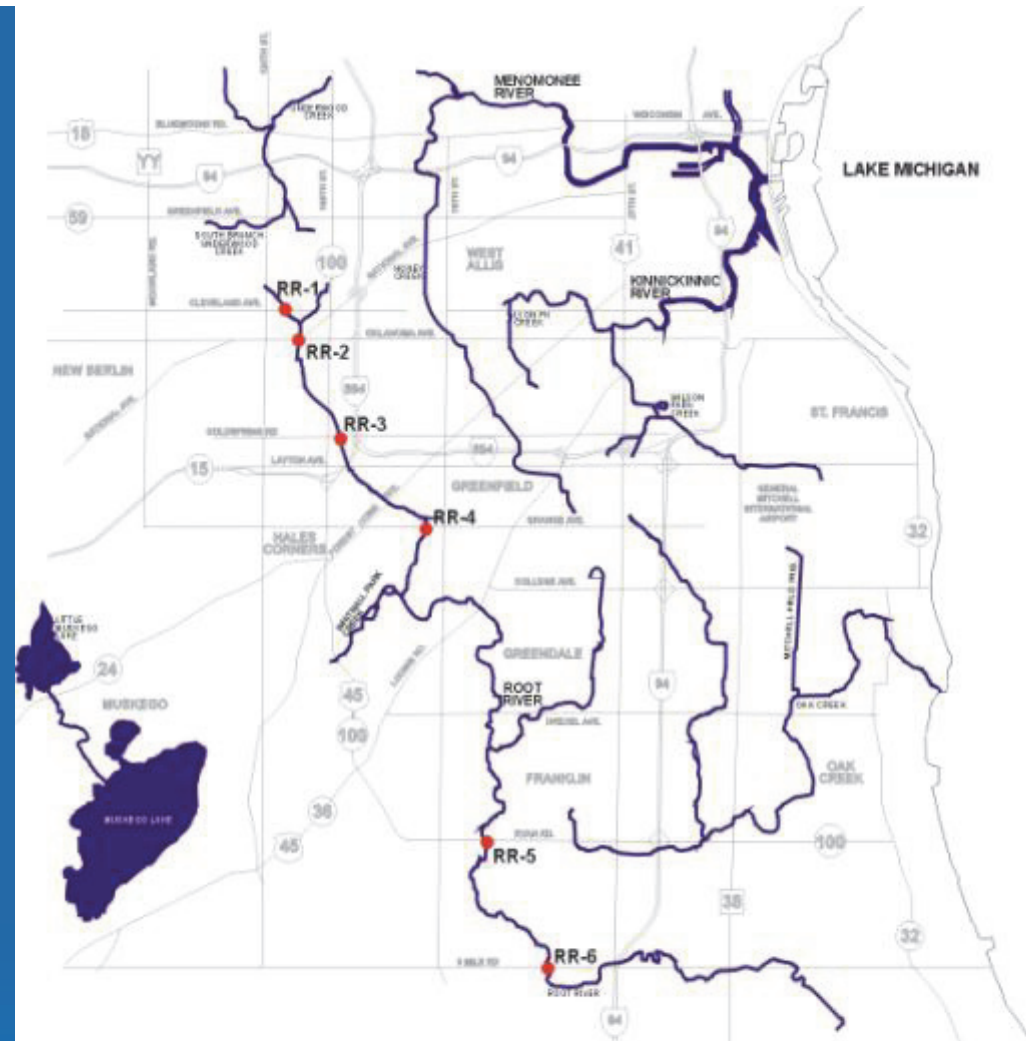
Within MMSD Sewer Service Boundary
(red line delineates)



Root River MMSD Water Quality Monitoring Locations

- Monitoring since 1999
- Six (6) locations
- Once / month
- April - November

RR-01 - Cleveland Ave, east of 124th St
 RR-02 - National Ave & Oklahoma Ave, ~116th St
 RR-03 - Coldspring Rd, east of 108th St
 RR-04 - Grange Ave, west of 76th St
 RR-05 - Ryan Rd, west of 60th St
 RR-06 - County Line Rd (8 Mile Road), ~ 47th St



LEGEND

● WATER QUALITY SAMPLING LOCATIONS



FIGURE 7
ROOT RIVER (RR) SURVEY
WATER QUALITY SAMPLING LOCATIONS

1/18/02

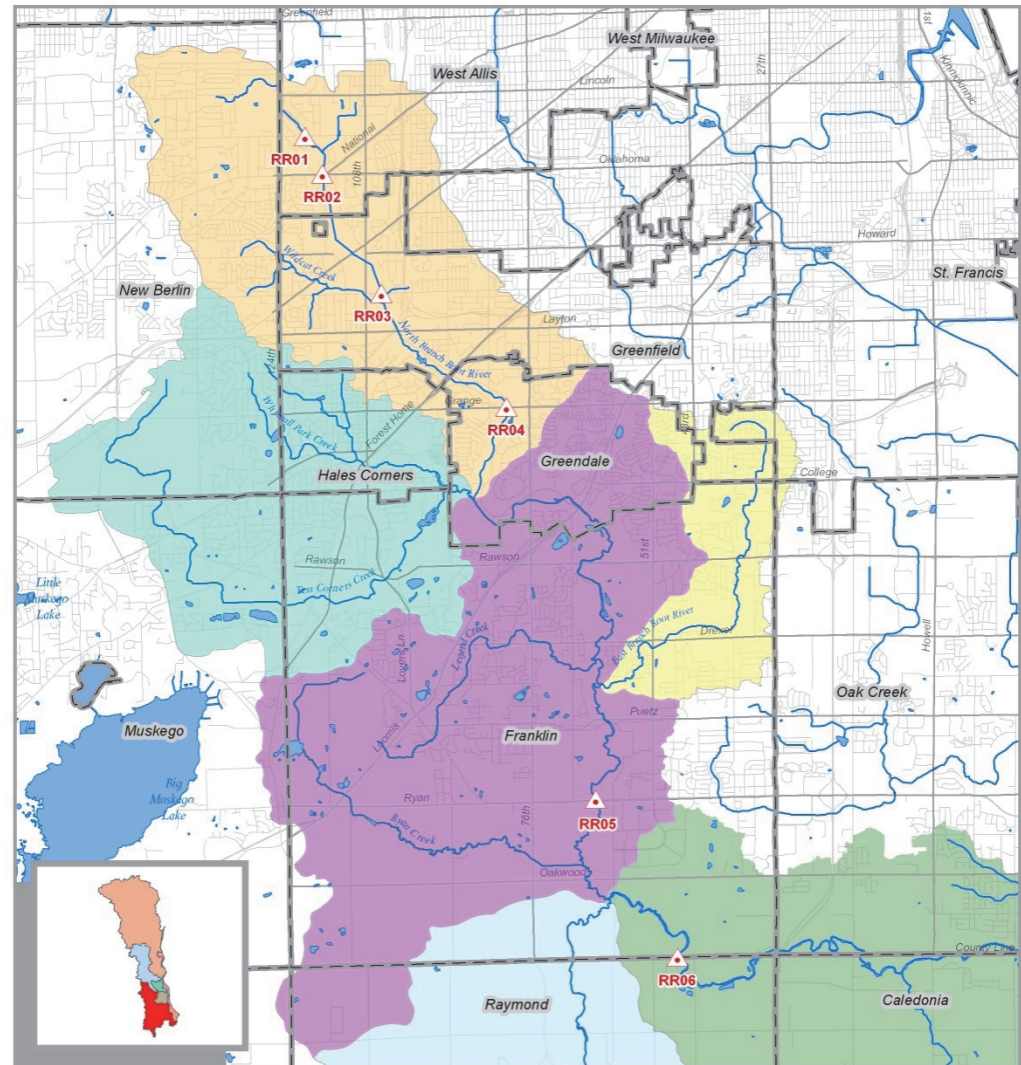
02-034 p.08

MMSD Water Quality Monitoring Location by subwatershed

Monitoring locations

- Upper Root River - Four (4) locations
- Middle Root River - One (1) locations
- Lower Root River - One (1) locations

WATER QUALITY MONITORING SITES

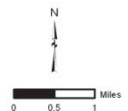


-ROOT RIVER SUBWATERSHEDS-



Data as of 9/2012

SUBWATERSHED		LEGEND	
[Yellow Box]	EAST BRANCH ROOT RIVER	[Purple Box]	MIDDLE ROOT RIVER
[Green Box]	LOWER ROOT RIVER	[Light Blue Box]	ROOT RIVER CANAL
[Orange Box]	UPPER ROOT RIVER	[Teal Box]	WHITNALL PARK CREEK
		[Red Triangle]	MONITORING SITE
		[Black Line]	MUNICIPALITY BOUNDARY



Root River Water Quality Monitoring Variables

- Number of sites
- Number of surveys/year
- Number of samples / site/ year

2012 Water Quality Monitoring Program	
	Root River
Total Number of sites	6
Total Number of surveys - 2012	9
Dry/Wet Event surveys (as part of total)	2
Water quality tests	Sample per Year
Temperature	54
Dissolved Oxygen	54
pH	54
Specific Conductance	54
Turbidity	54
Secchi	
1% Depth	
Fecal Coliform Bacteria (Surface only)	54
E. coli Bacteria (Surface only)	
Total Kjeldahl Nitrogen	54
Ammonia-Nitrogen	54
Nitrate-Nitrogen (calculated)	54
Nitrate & Nitrite Nitrogen	54
Nitrite-Nitrogen	54
Total Phosphorus	54
Dissolved Phosphorus	54
Dissolved Silica	
Total Organic Carbon	54
Total Inorganic Carbon (calculated)	54
Total Dissolved Organic Carbon	54
Total Carbon	54
Biochemical Oxygen Demand-5 Day	54
Biochemical Oxygen Demand-20 Day	
Total Alkalinity	54
Hardness (Calculated from Ca + Mg)	54
Total Solids	54
Total Suspended Solids	54
Volatile Suspended Solids	54
Chlorides	54
Chlorophyll A	54
Copper	54
Lead	54
Chromium	54
Zinc	54
Cadmium	54
Calcium	54
Magnesium	54
Arsenic	54
Nickel	54
Selenium	54
Silver	54

Watershed and Land Use Information









- ❖ Drainage area: 196 square miles
- ❖ Watershed Population: 172,000 people
- ❖ 38 Percent Urban
- ❖ 62 Percent Rural and Other Open Space
 - 47 Percent Agricultural
 - 15 Percent Outdoor Recreational, Wetland, Woodland and Surface Water

Root River Land Use

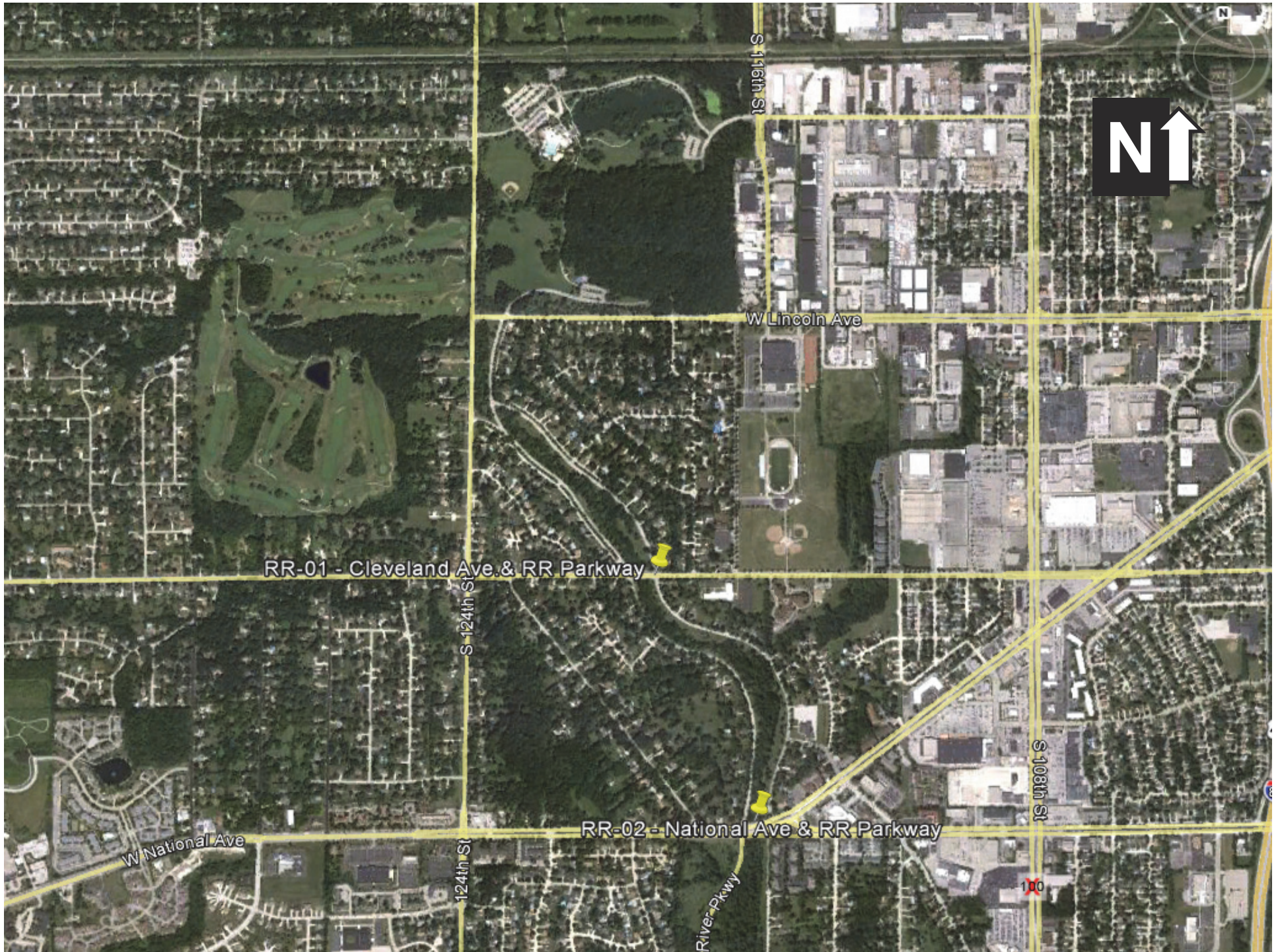
LEGEND

 Root River Watershed

SEWRPC 2000 Land Use

-  Agriculture
-  Low Density Residential
-  High Density Residential
-  Commercial
-  Outdoor Recreation, Wetland, and Woodland
-  Transportation, Communication, and Utilities
-  Manufacturing and Industrial
-  Surface Water





RR-01 - Cleveland Ave. & RR Parkway

RR-02 - National Ave & RR Parkway

S 116th St

S 124th St

S 108th St

W National Ave

W Lincoln Ave

River Pkwy

S 124th St

100



Root River Site 1

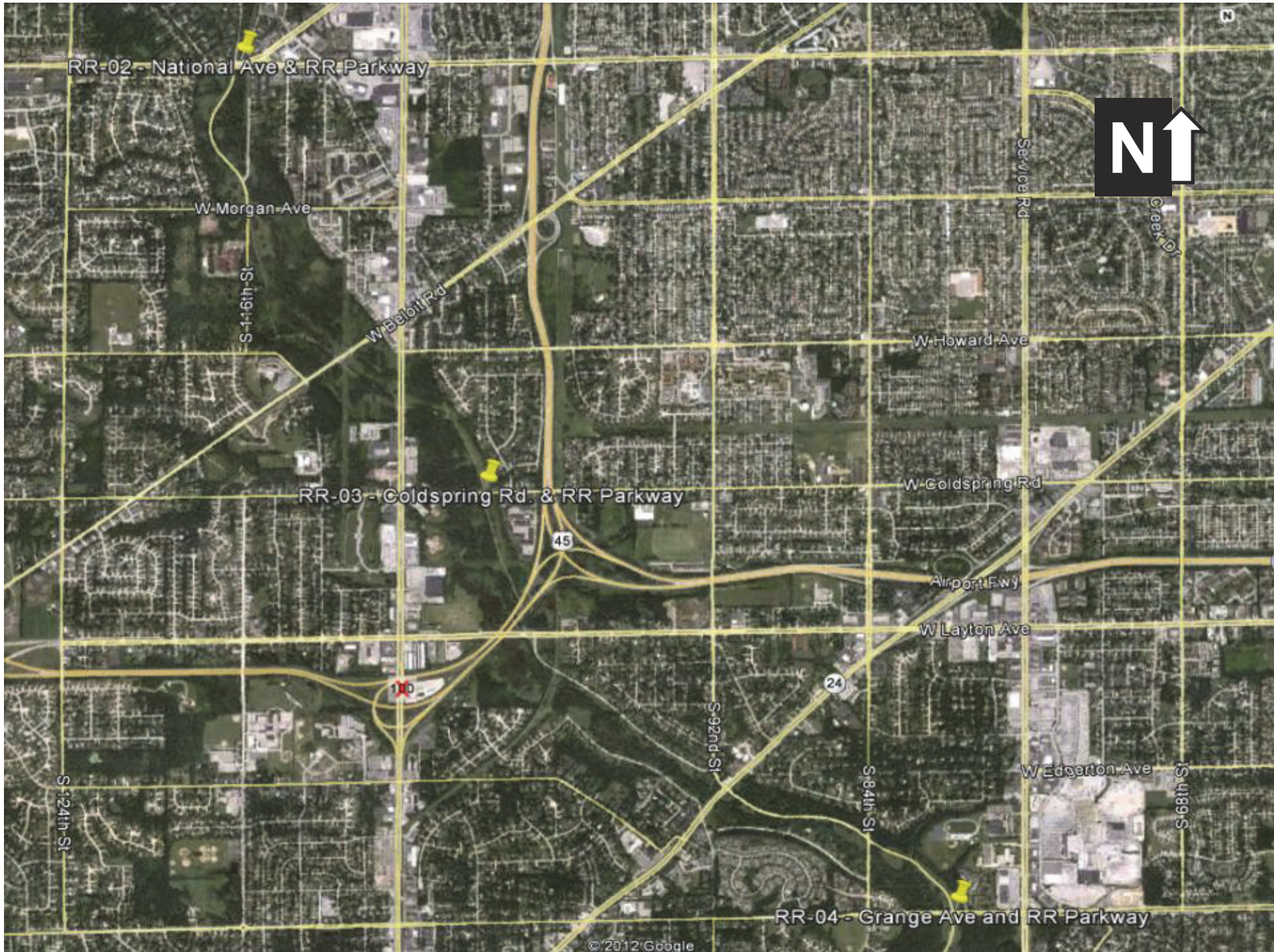
This site is located at Cleveland Ave. and is looking downstream.



Root River Site 2

This site is located at National and Oklahoma Avenues. Above picture is looking upstream while picture at right is looking back at sampling site.







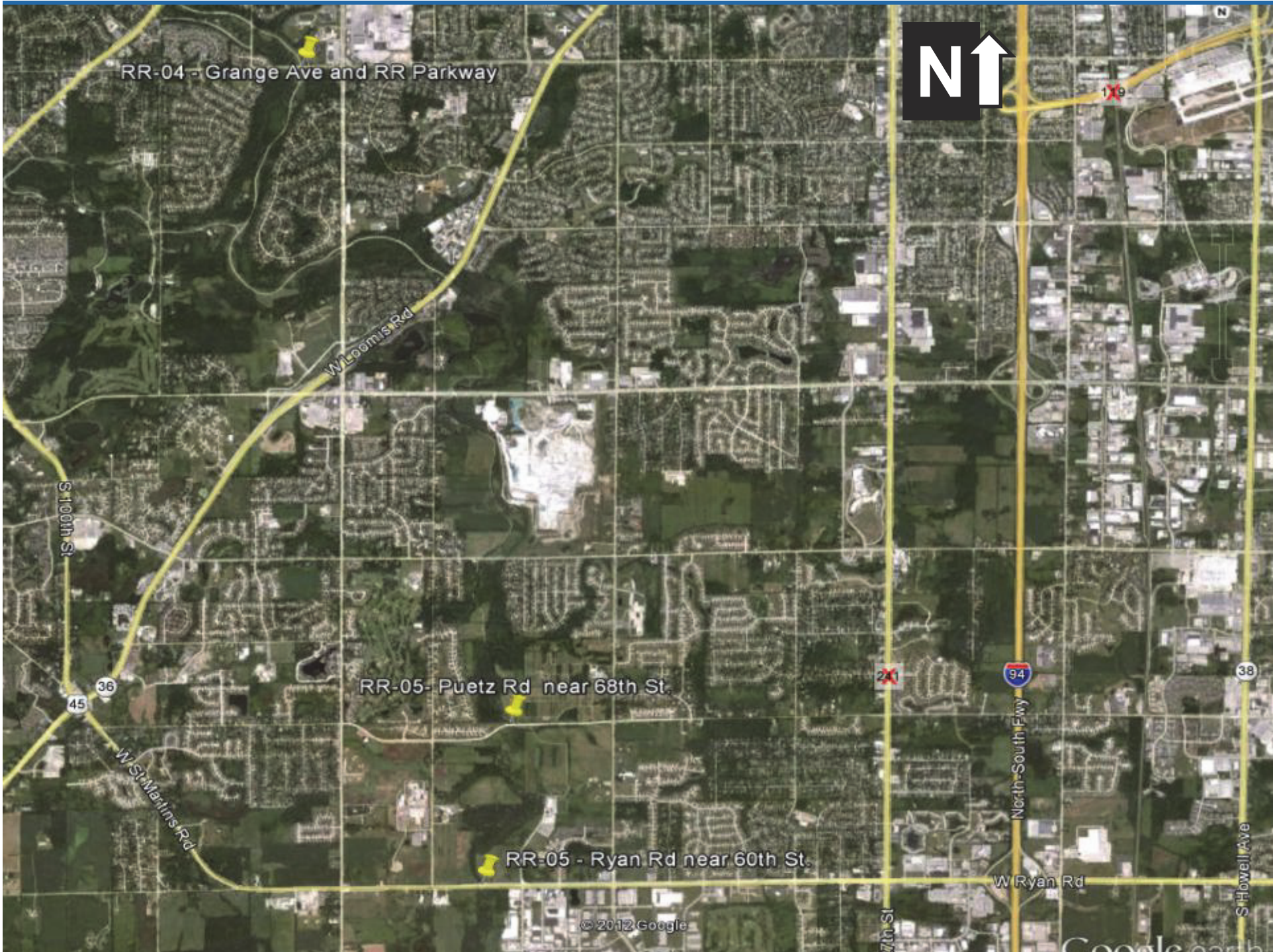
Root River Site 3

This site is located at Coldspring Rd. Picture is taken from downstream looking back at sampling site.



Root River Site 4

This site is located at Grange Ave. The picture on the left is looking upstream while the picture on the right is looking downstream back at the sampling site.



RR-04 - Grange Ave and RR Parkway

W Loomis Rd

S 100th St

RR-05 - Puetz Rd near 68th St.

W St Martins Rd

RR-05 - Ryan Rd near 60th St.

94

North-South Fwy

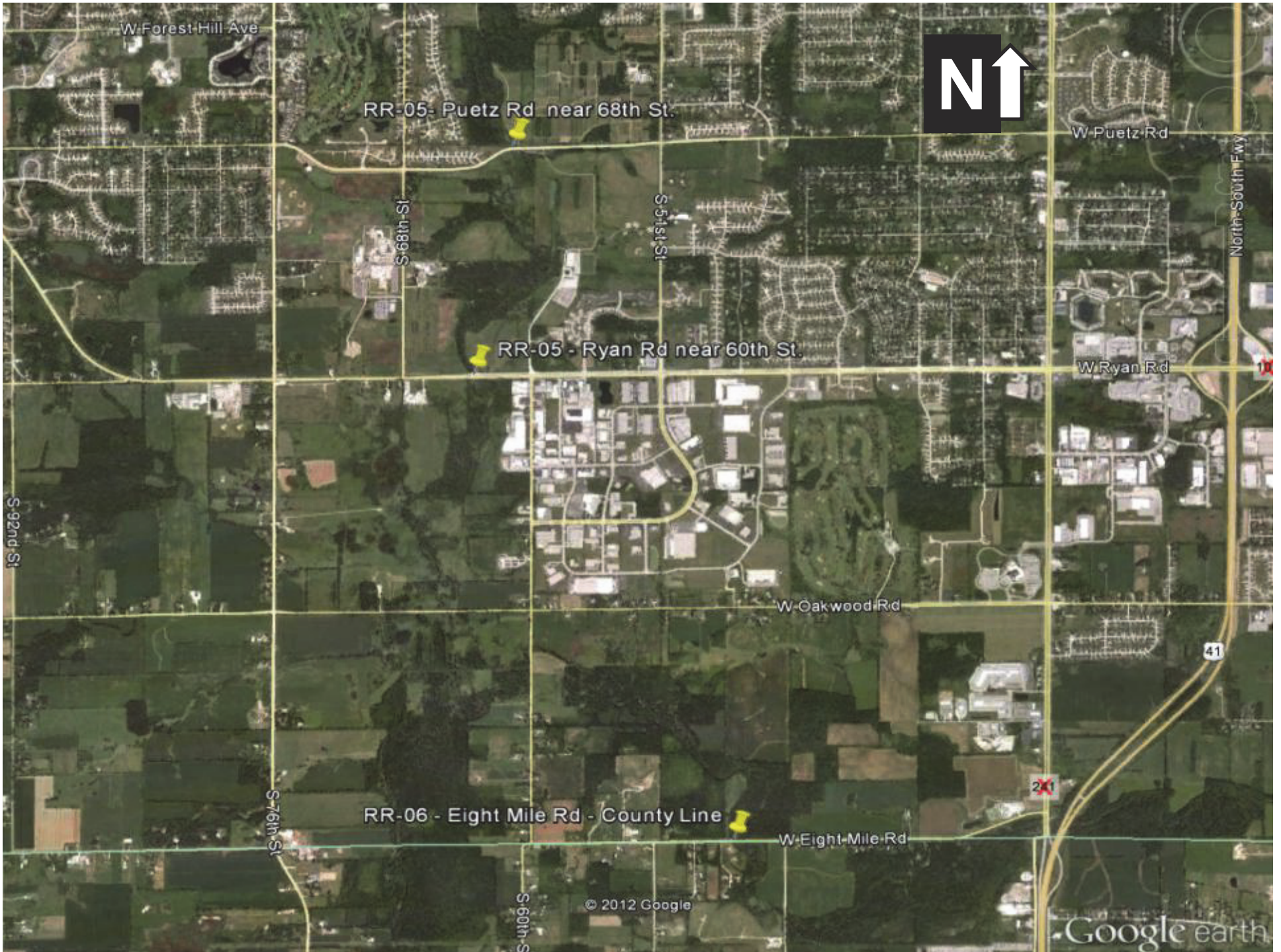
W Ryan Rd

38

S Howell Ave

© 2012 Google





W Forest Hill Ave

RR-05- Puetz Rd near 68th St.



W Puetz Rd

S 68th St

S 51st St

North-South Fwy

RR-05 - Ryan Rd near 60th St.

W Ryan Rd

S 92nd St

W Oakwood Rd

41

S 76th St

RR-06 - Eight Mile Rd - County Line



W Eight Mile Rd

S 60th St

© 2012 Google









Google earth

Root River Land Use

LEGEND

 Root River Watershed

SEWRPC 2000 Land Use

-  Agriculture
-  Low Density Residential
-  High Density Residential
-  Commercial
-  Outdoor Recreation, Wetland, and Woodland
-  Transportation, Communication, and Utilities
-  Manufacturing and Industrial
-  Surface Water





Root River Site 5

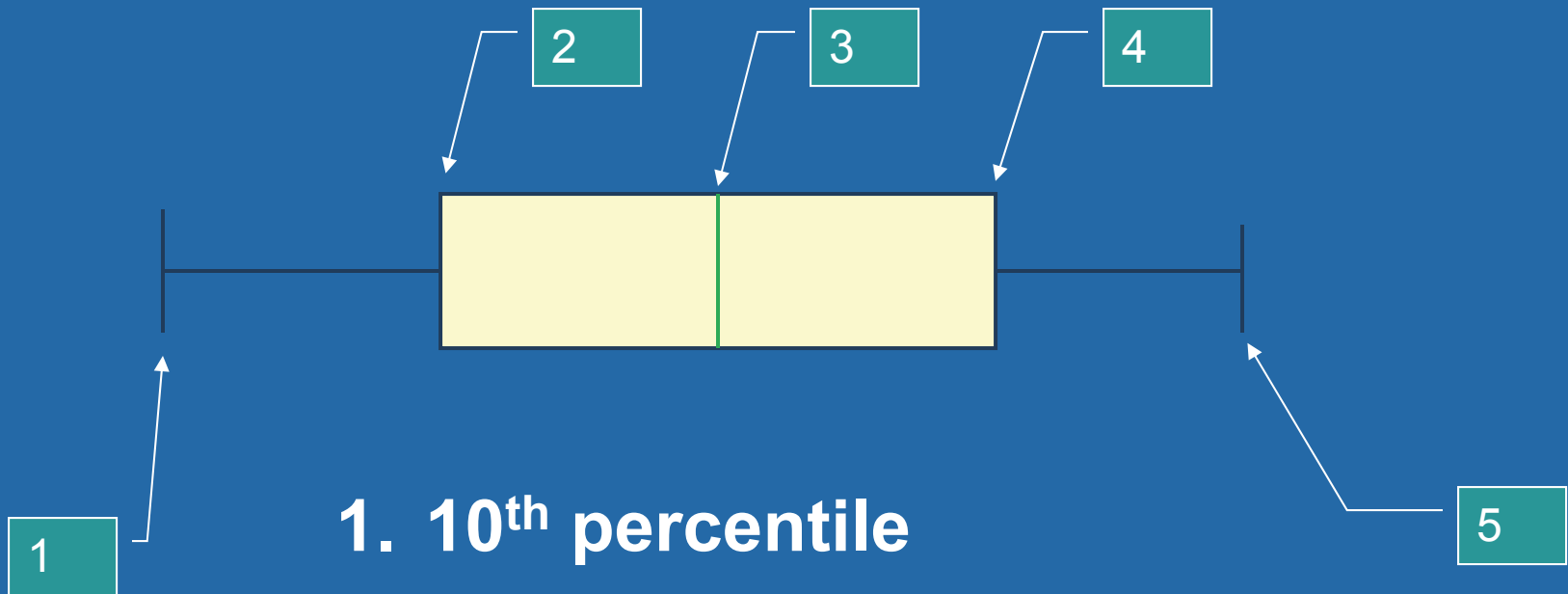
This site is located at Ryan Rd. looking both upstream (left picture) and downstream (right picture).





Root River Site 6

This site is located at County Line Rd. and picture is looking downstream.



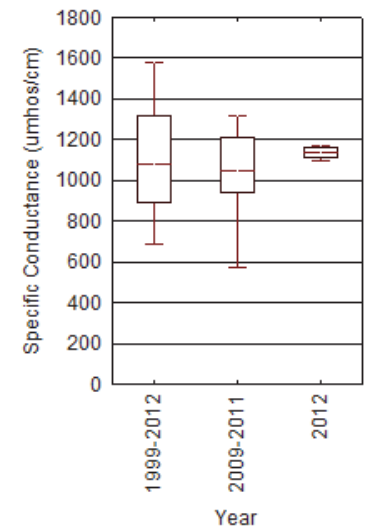
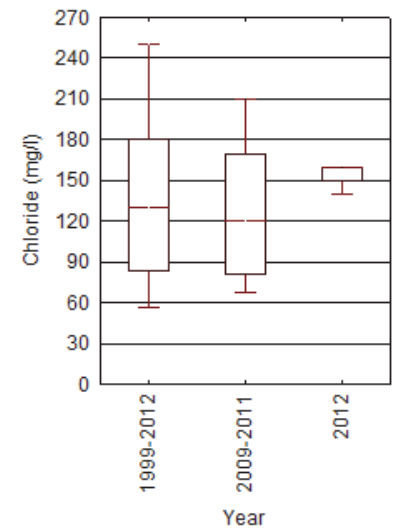
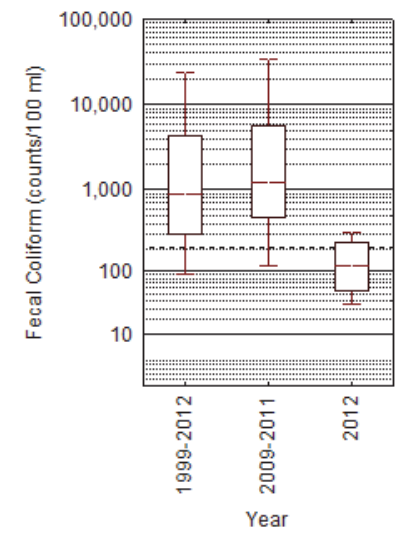
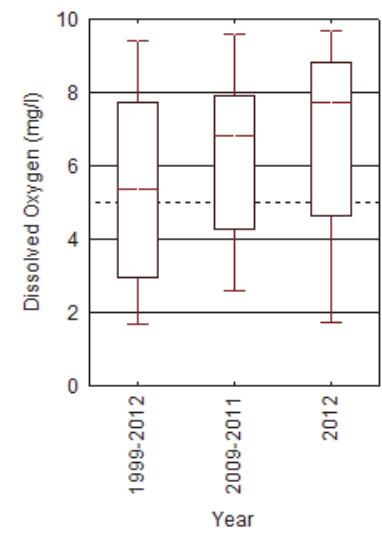
1. 10th percentile
2. 25th percentile
3. 50th percentile or median
4. 75th percentile
5. 90th percentile

Root River at Cleveland Ave Site RR-01

Example of Data



MMSD Water Quality Monitoring Program Data
Root River at Cleveland Ave., Site RR-01



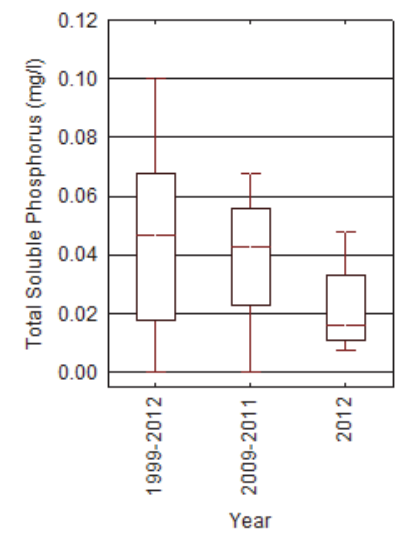
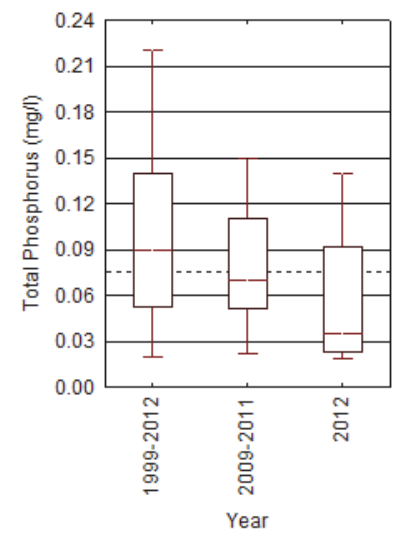
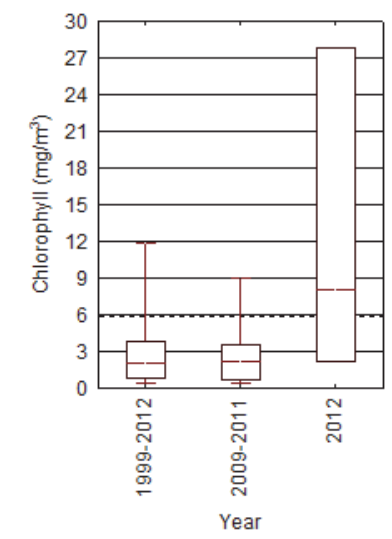
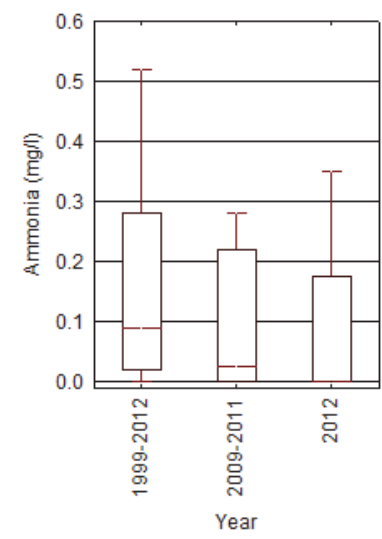
— Median □ 25%-75% ▮ 10%-90%
--- WQ Standard/Criterion

Root River at Cleveland Ave Site RR-01

Example of Data



MMSD Water Quality Monitoring Program Data
Root River at Cleveland Ave., Site RR-01



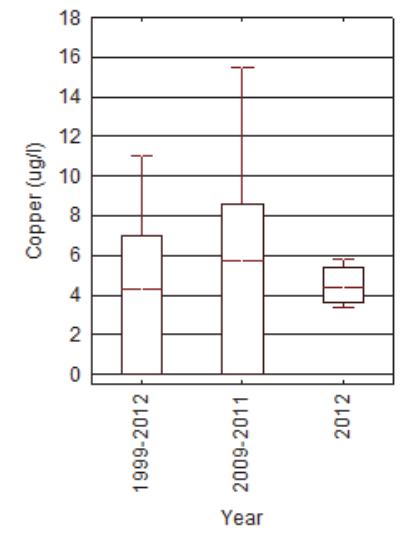
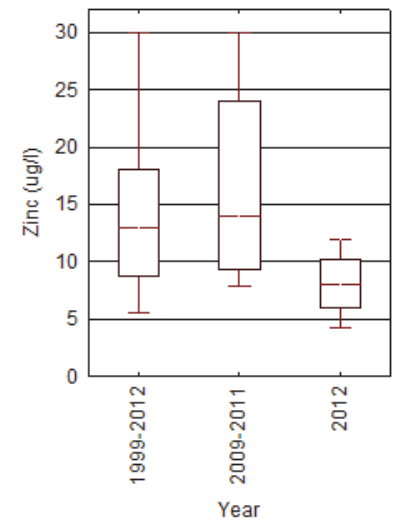
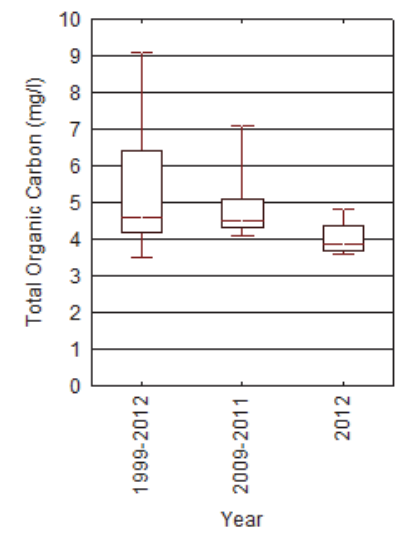
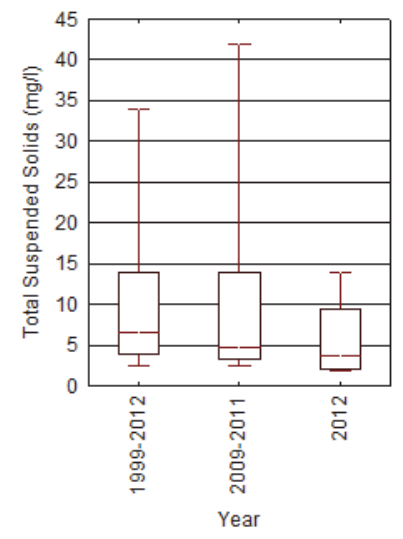
— Median □ 25%-75% ▮ 10%-90%
--- WQ Standard Criterion

Root River at Cleveland Ave Site RR-01

Example of Data



MMSD Water Quality Monitoring Program
Root River at Cleveland Ave., Site RR-01



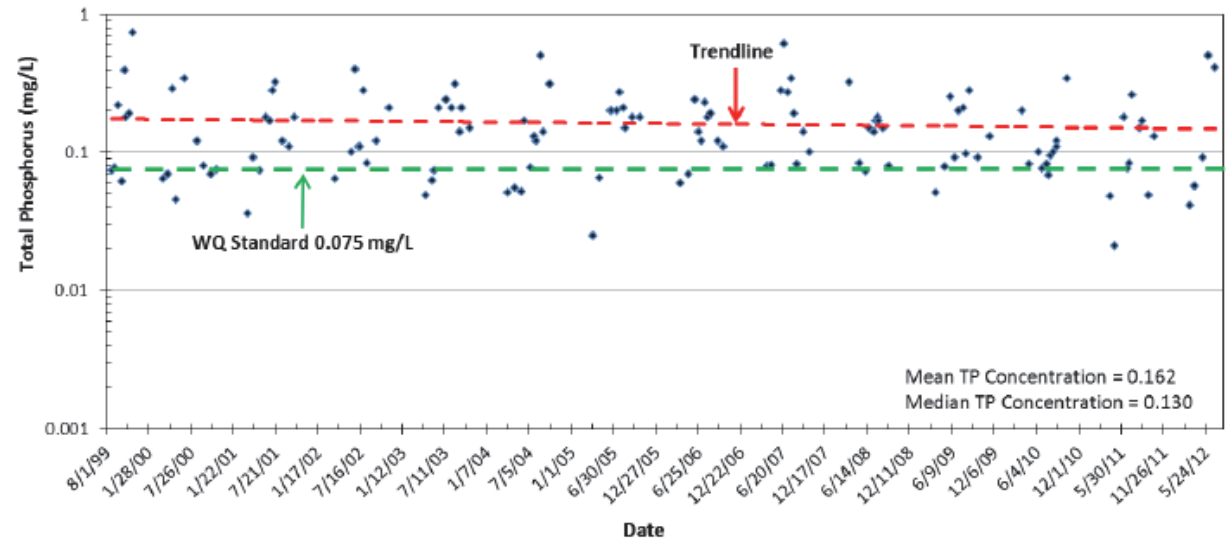
— Median □ 25%-75% ▮ 10%-90%

Root River at National Ave & Oklahoma Ave, ~116th St

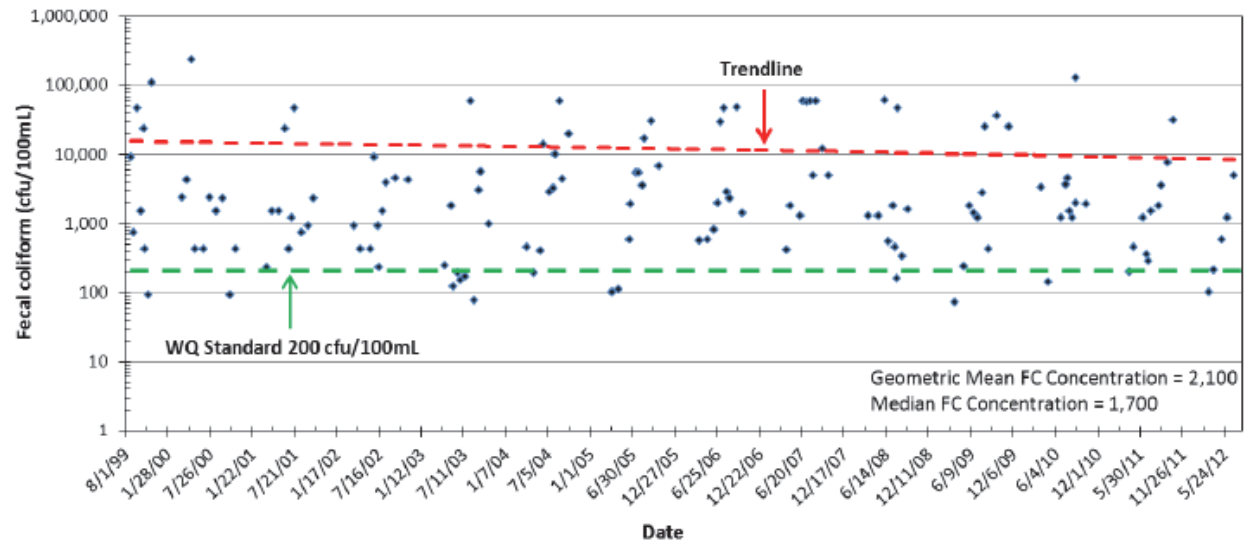
Site RR-02



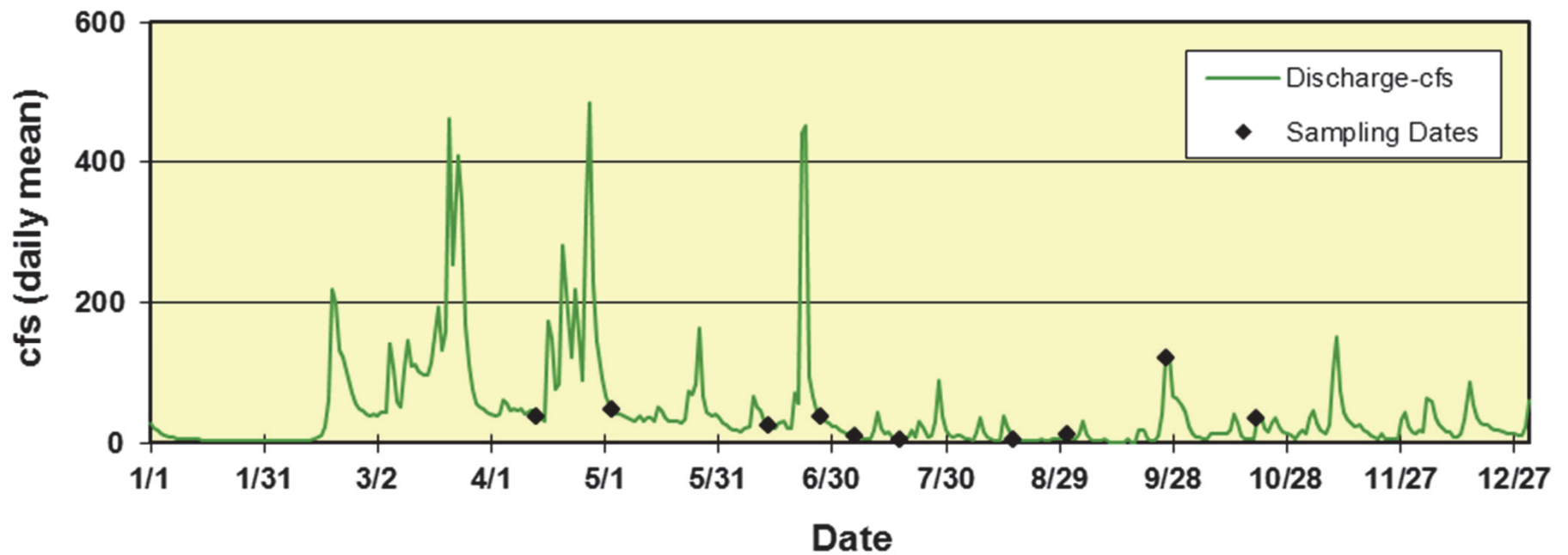
Total Phosphorus (mg/L)
Root River at National Ave (RR-02)
1999-2012 WQ Monitoring Data



Fecal Coliform (cfu/100mL)
Root River at National Ave (RR-02)
1999-2012 WQ Monitoring Data



Root River at Hwy 100 (Ryan Rd) Discharge Data - 2011



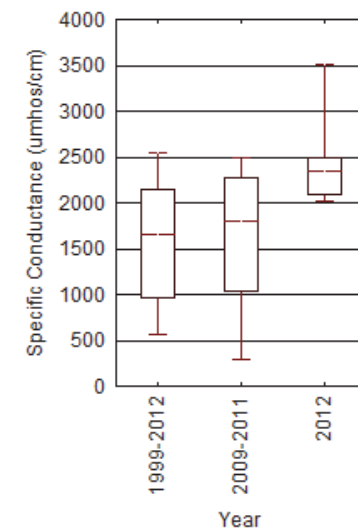
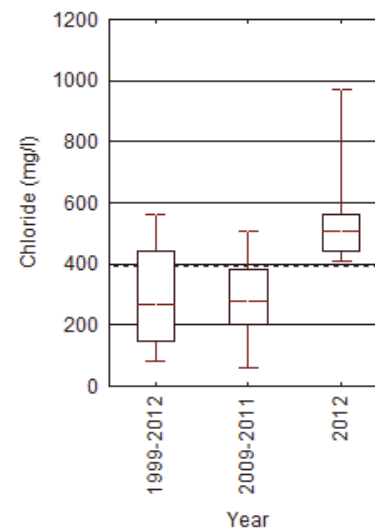
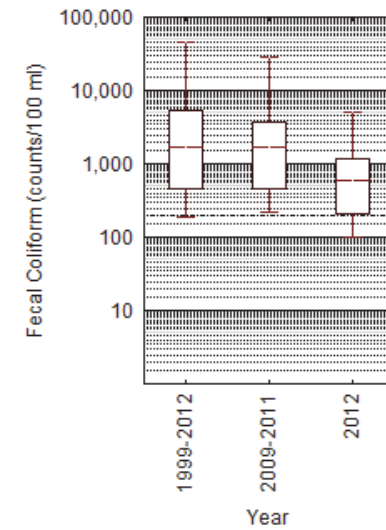
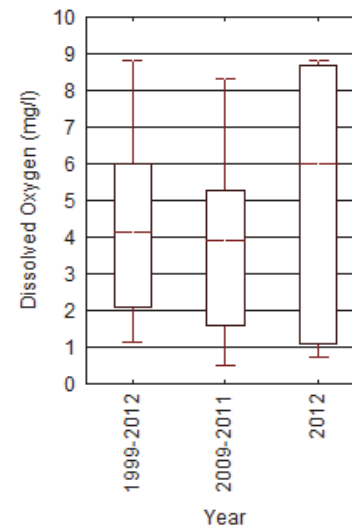
Root River at National Ave & Oklahoma Ave, ~116th St

Site RR-02

Example of Data



MMSD Water Quality Monitoring Program Data
Root River at National and Oklahoma Ave., Site RR-02



— Median □ 25%-75% ▮ 10%-90%
— WQ Standard/Criterion

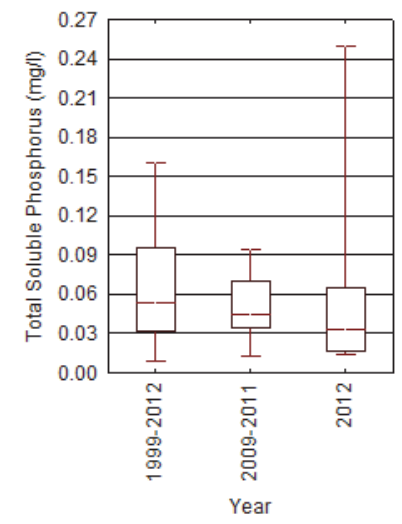
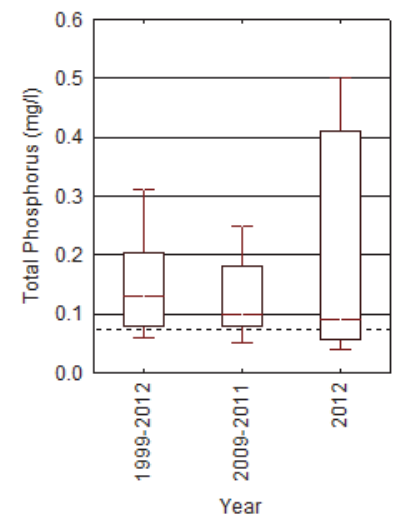
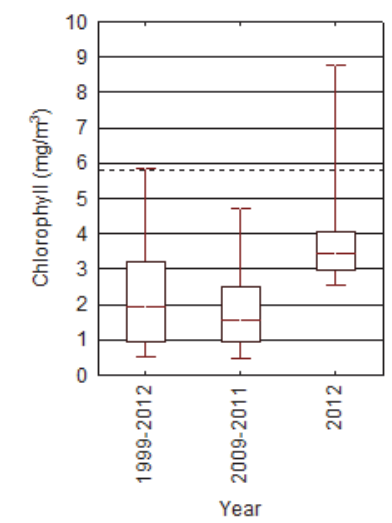
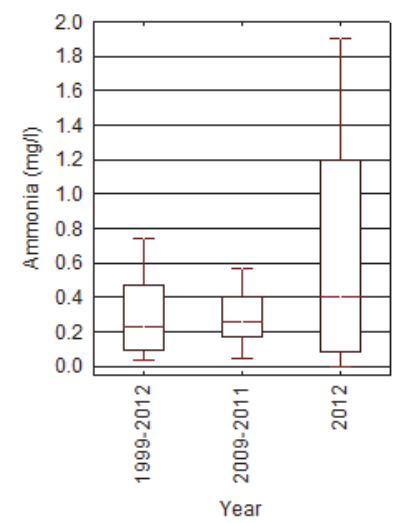
Root River at National Ave & Oklahoma Ave, ~116th St

Site RR-02

Example of Data



MMSD Water Quality Monitoring Program Data
Root River at National and Oklahoma Ave., Site RR-02



— Median □ 25%-75% ▮ 10%-90%
--- WQ Standard/Criterion

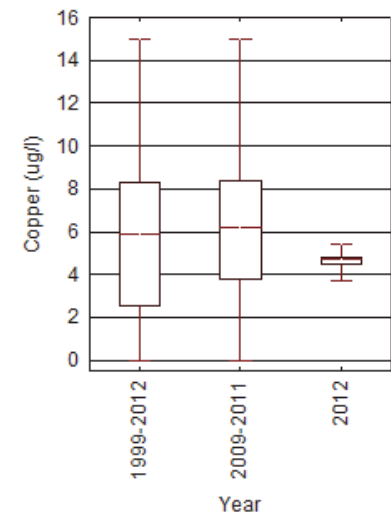
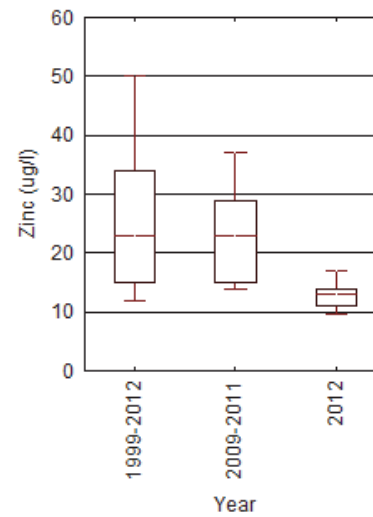
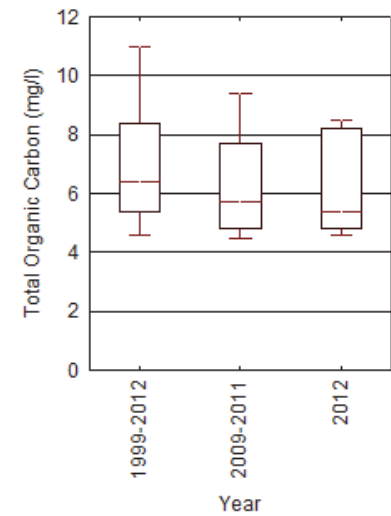
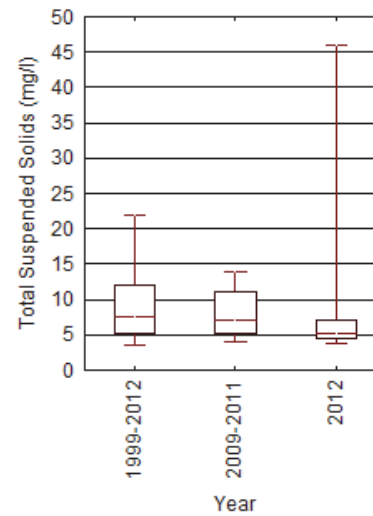
Root River at National Ave & Oklahoma Ave, ~116th St

Site RR-02

Example of Data



MMSD Water Quality Monitoring Program Data
Root River at National and Oklahoma Ave., Site RR-02



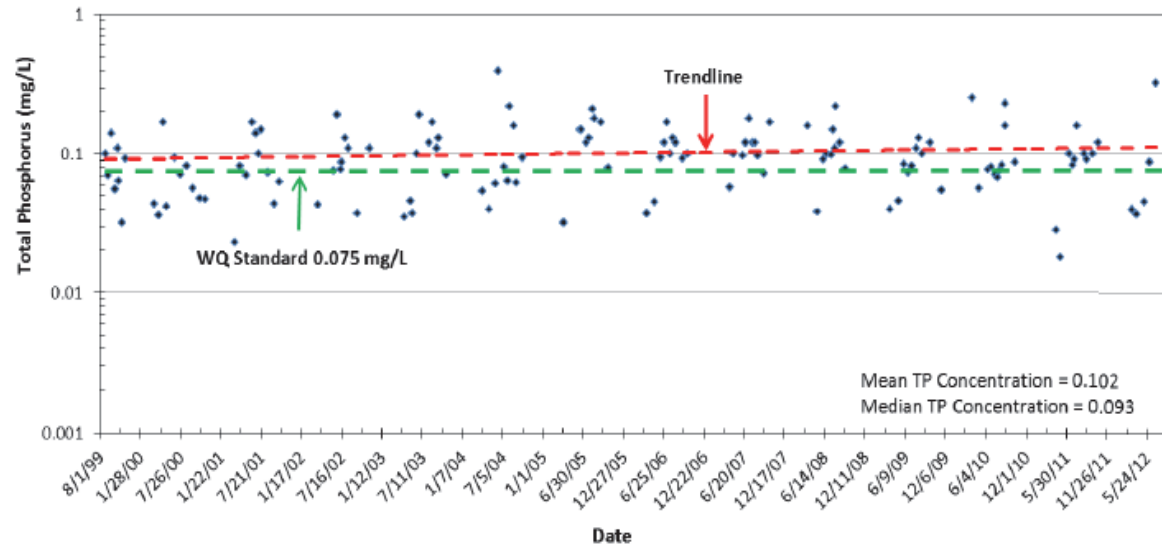
— Median □ 25%-75% ▮ 10%-90%

Root River at Grange Ave, west of 76th St

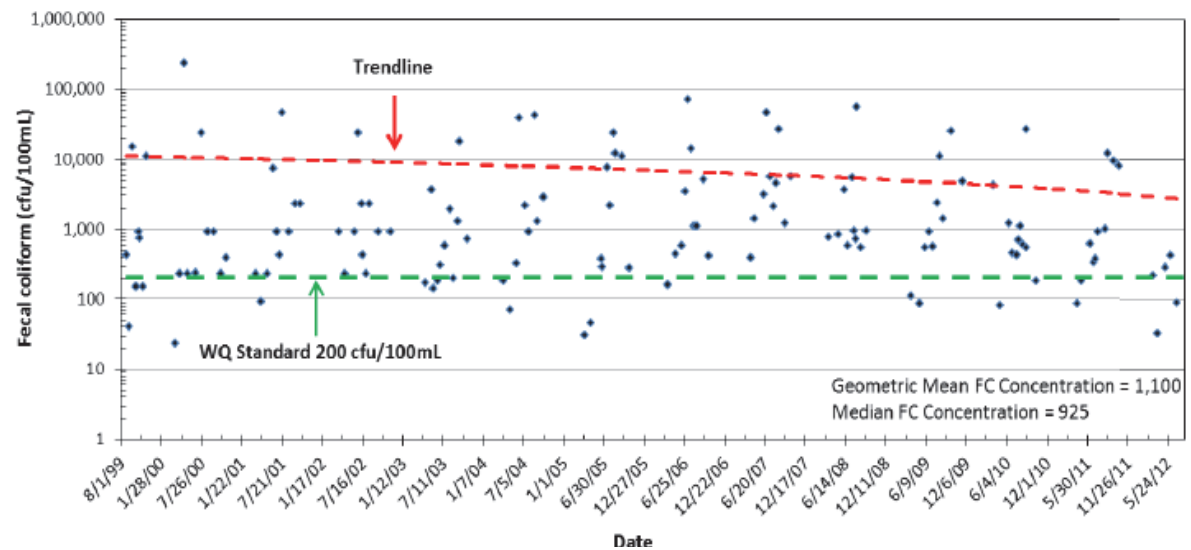
Site RR-04



Total Phosphorus (mg/L)
Root River at Grange Ave (RR-04)
1999-2012 WQ Monitoring Data



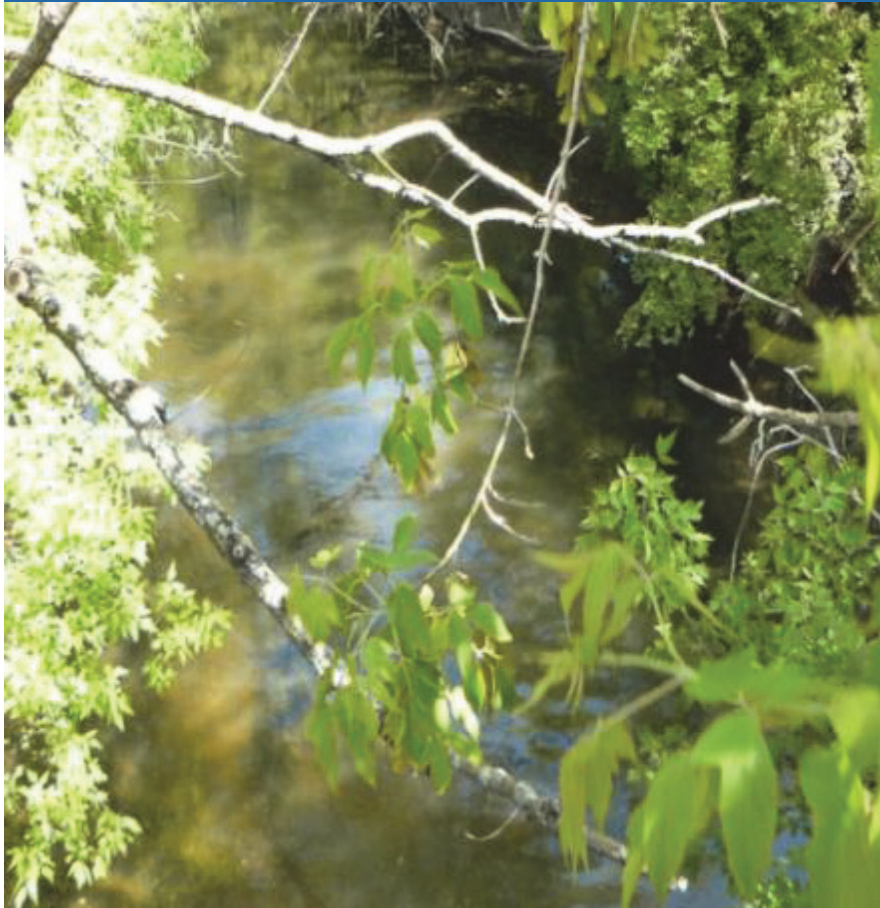
Fecal Coliform (cfu/100mL)
Root River at Grange Ave (RR-04)
1999-2012 WQ Monitoring Data



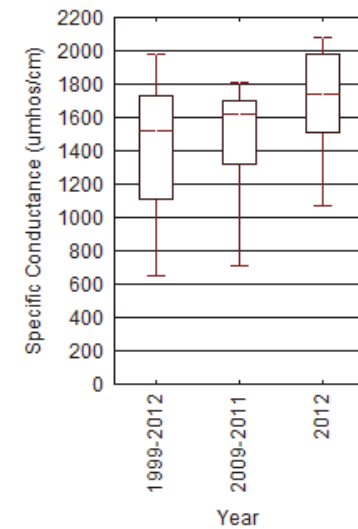
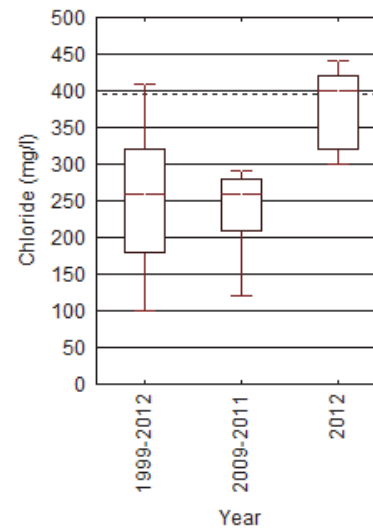
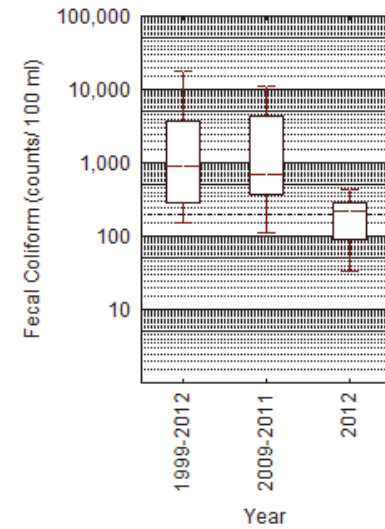
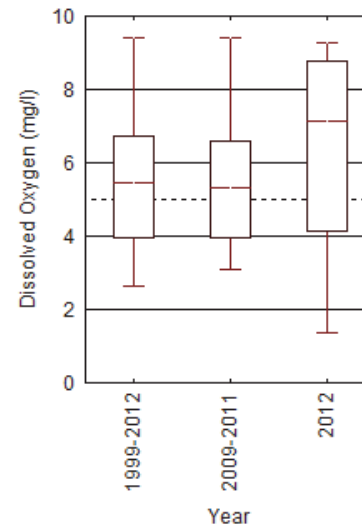
Root River at Grange Ave, west of 76th St

Site RR-04

Example of Data



MMSD Water Quality Monitoring Program Data
Root River at Grange Ave., Site RR-04



— Median □ 25%-75% | 10%-90%
--- WQ Standard/Criterion

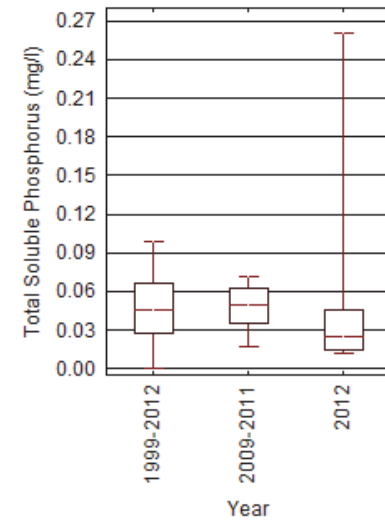
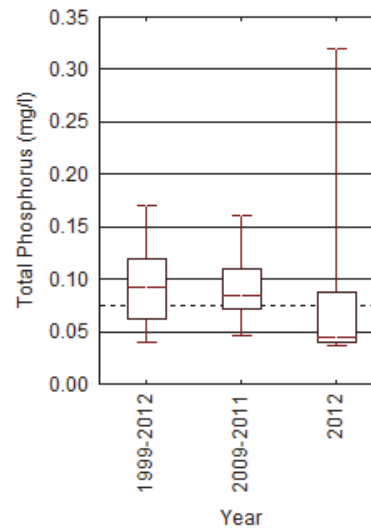
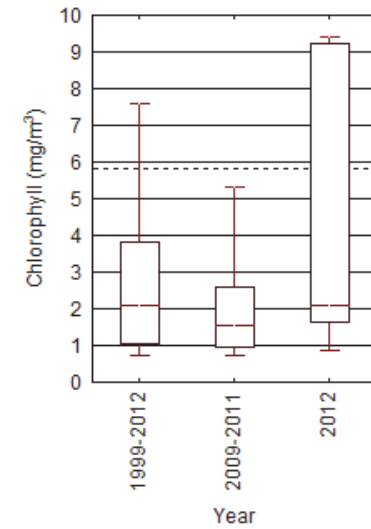
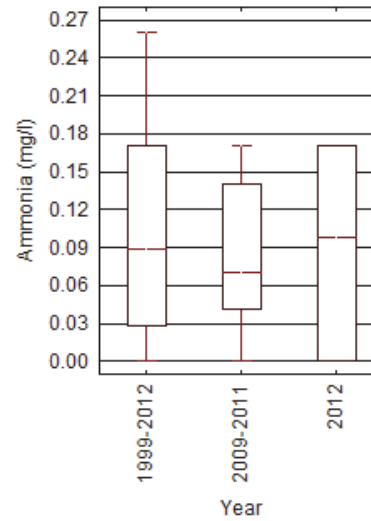
Root River at Grange Ave, west of 76th St

Site RR-04

Example of Data



MMSD Water Quality Monitoring Program Data
Root River at Grange Ave., Site RR-04



— Median □ 25%-75% ▮ 10%-90%
--- WQ Standard/Criterion

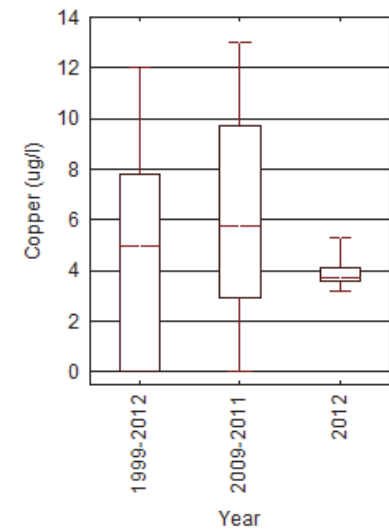
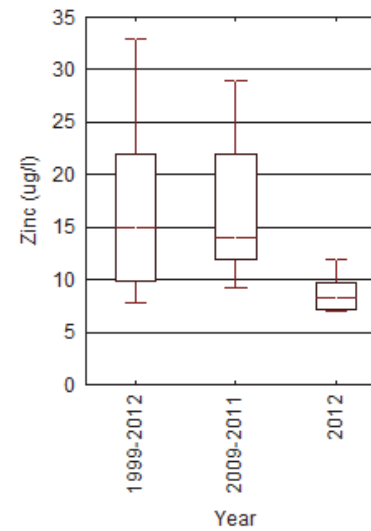
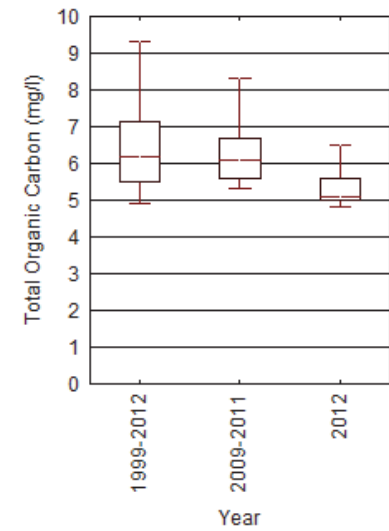
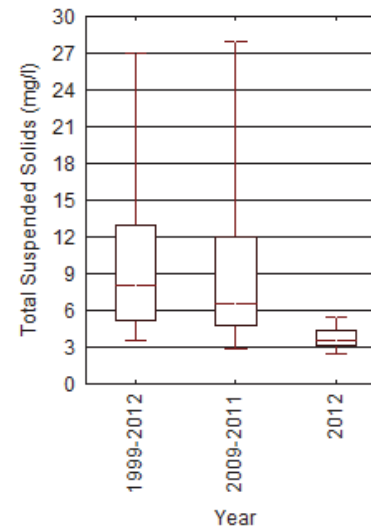
Root River at Grange Ave, west of 76th St

Site RR-04

Example of Data



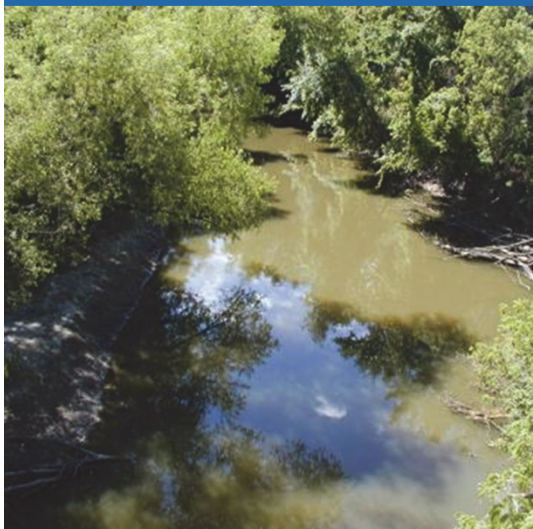
MMSD Water Quality Monitoring Program Data
Root River at Grange Ave., Site RR-04



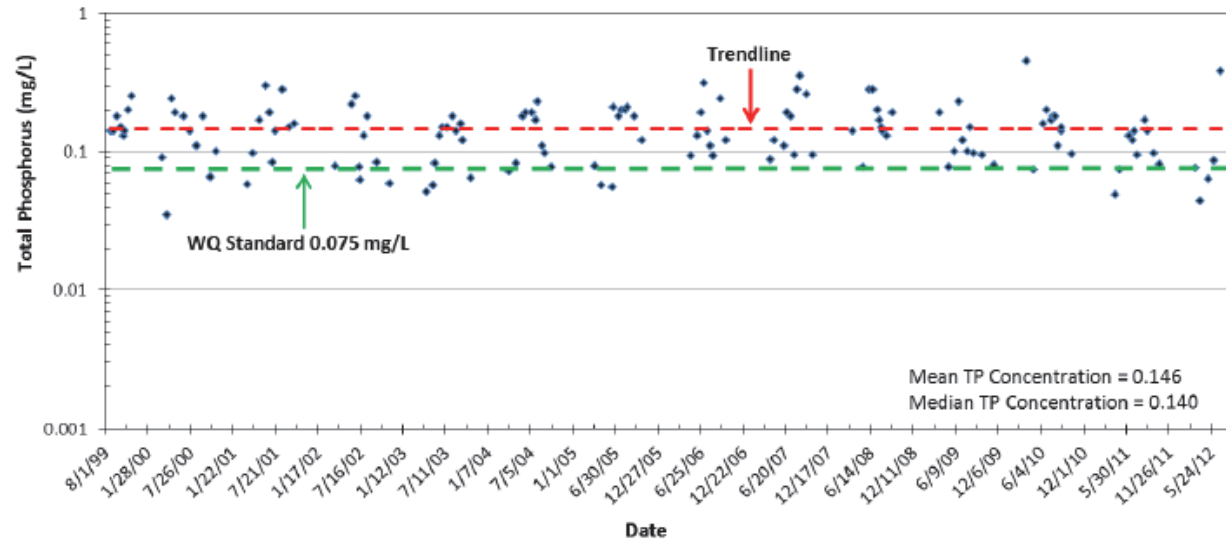
— Median □ 25%-75% ▮ 10%-90%

Root River at County Line Rd.

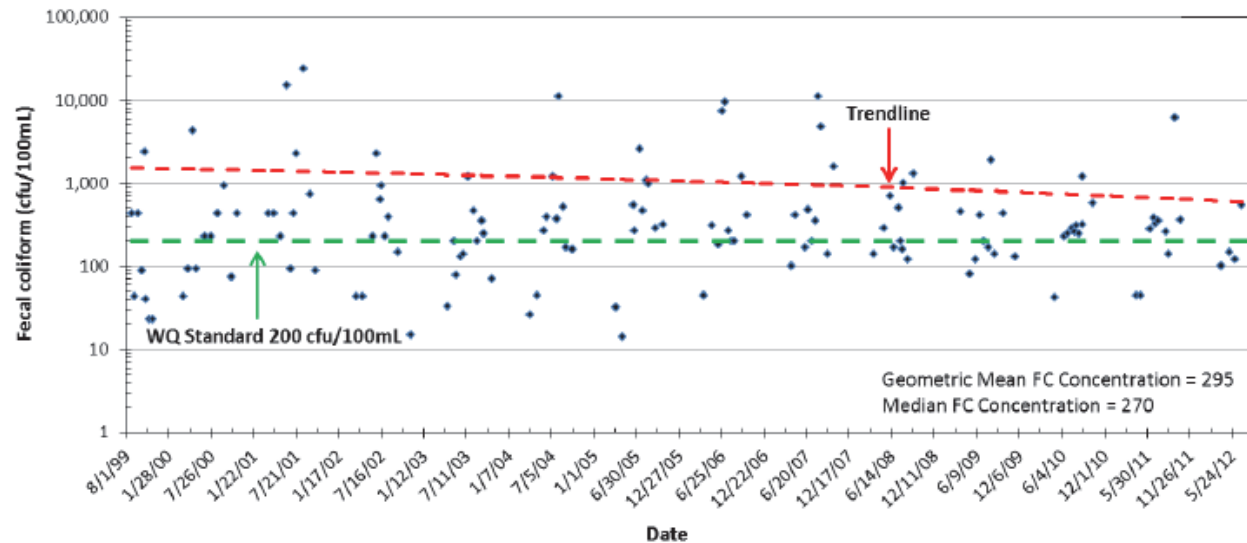
Site RR-06



Total Phosphorus (mg/L)
Root River at County Line Rd (RR-06)
1999-2012 WQ Monitoring Data



Fecal Coliform (cfu/100mL)
Root River at County Line Rd (RR-06)
1999-2012 WQ Monitoring Data

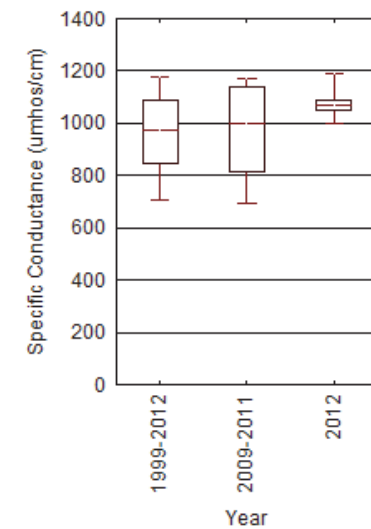
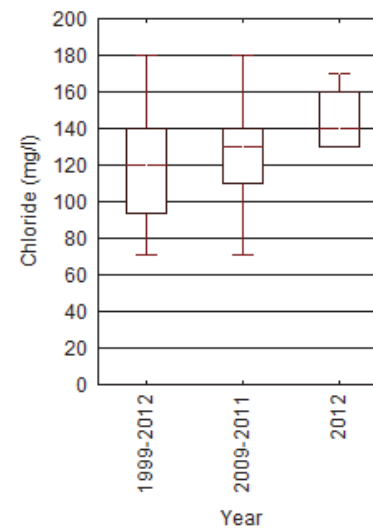
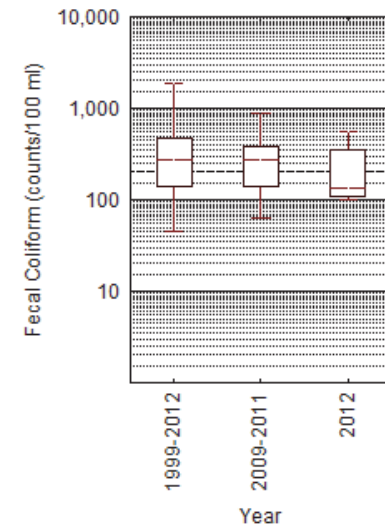
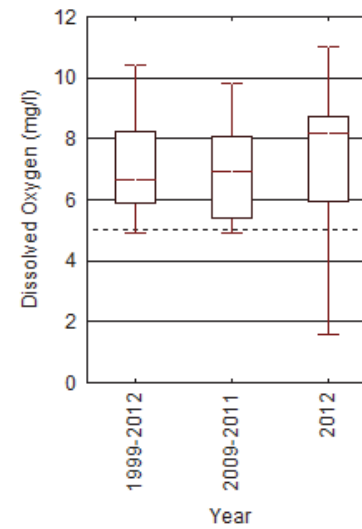


Root River at County Line Rd. Site RR-06

Example of Data



MMSD Water Quality Monitoring Program Data
Root River at County Line Rd., Site RR-06



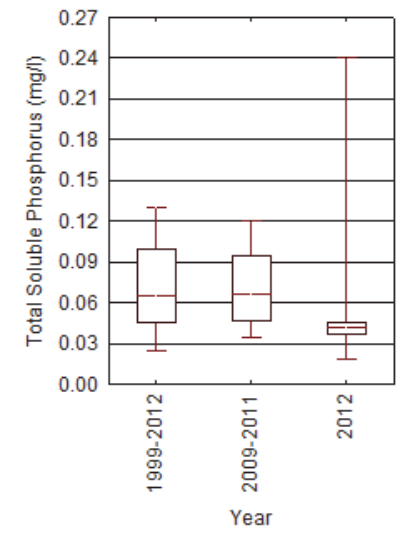
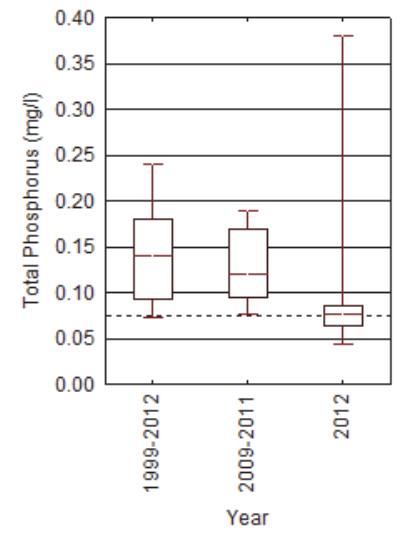
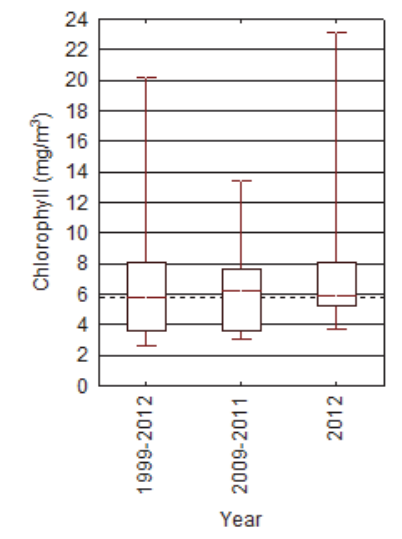
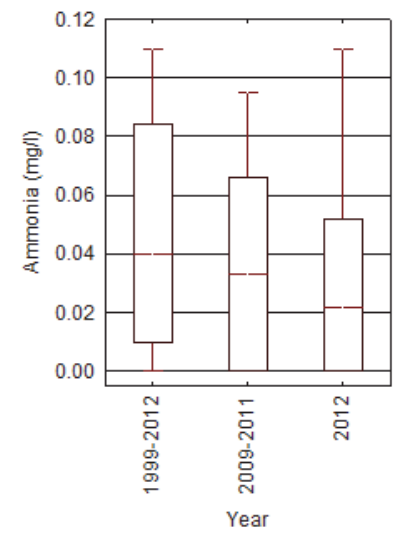
— Median □ 25%-75% ▮ 10%-90%
--- WQ Standard/Criterion

Root River at County Line Rd. Site RR-06

Example of Data



MMSD Water Quality Monitoring Program Data
Root River at County Line Rd., Site RR-06



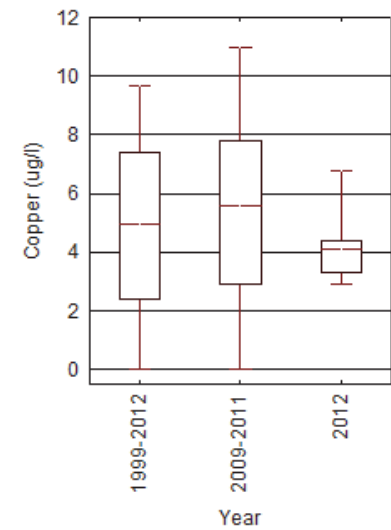
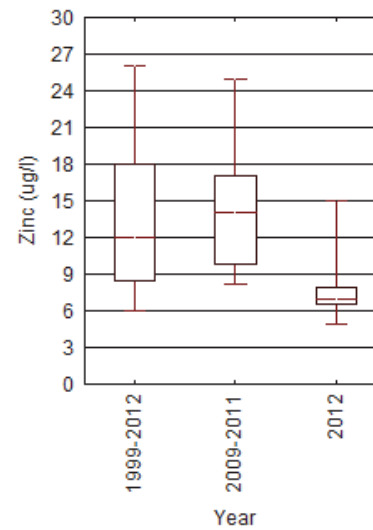
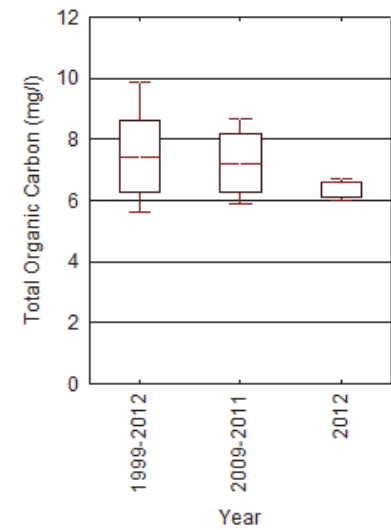
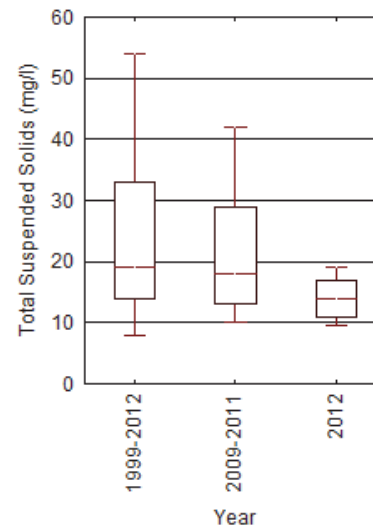
— Median □ 25%-75% | 10%-90%
 --- WQ Standard/Criterion

Root River at County Line Rd. Site RR-06

Example of Data



MMSD Water Quality Monitoring Program Data
Root River at County Line Rd., Site RR-06



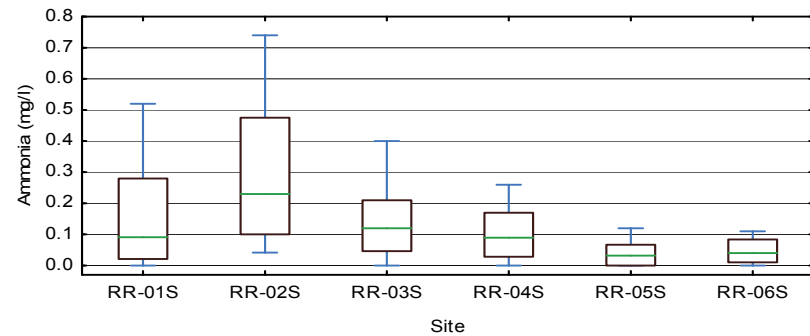
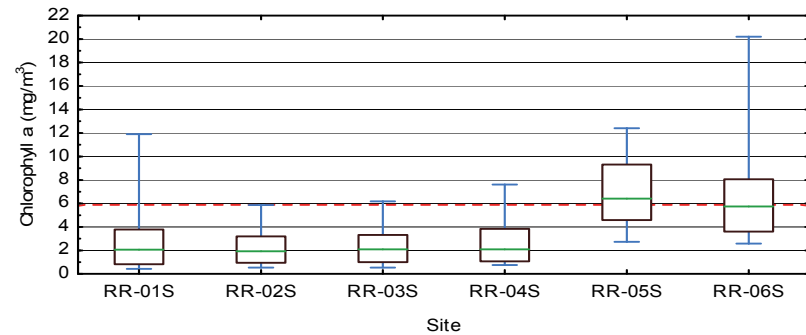
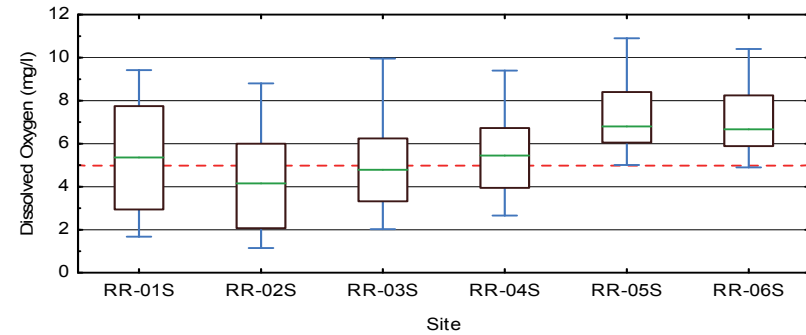
— Median □ 25%-75% ▮ 10%-90%

Root River MMSD WQ Monitoring Data 1999 -2012

Sites arranged from
Upstream to Downstream

WQ Standard or
Recommended Criteria
represented as a dashed red
line

MMSD Water Quality Monitoring Program Data
Root River 1999 - 2012



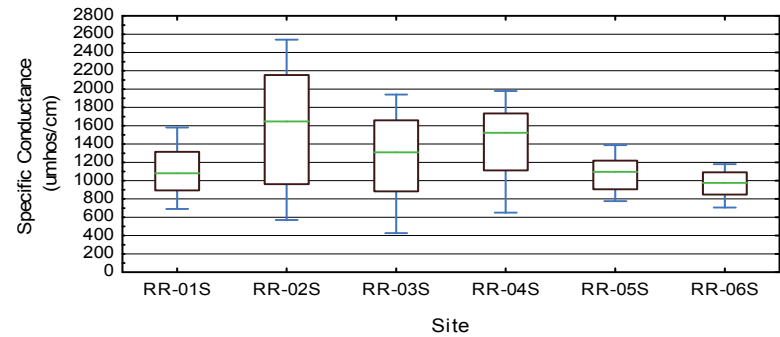
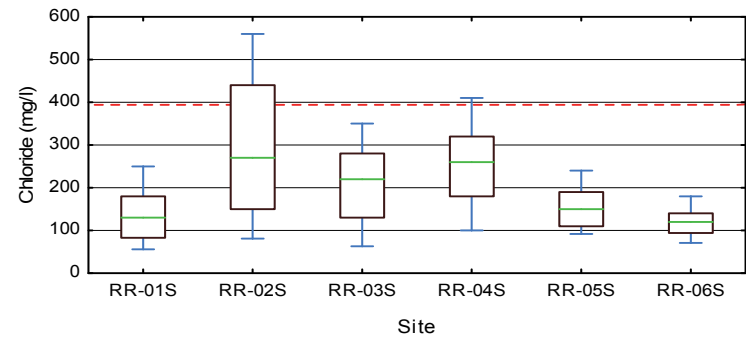
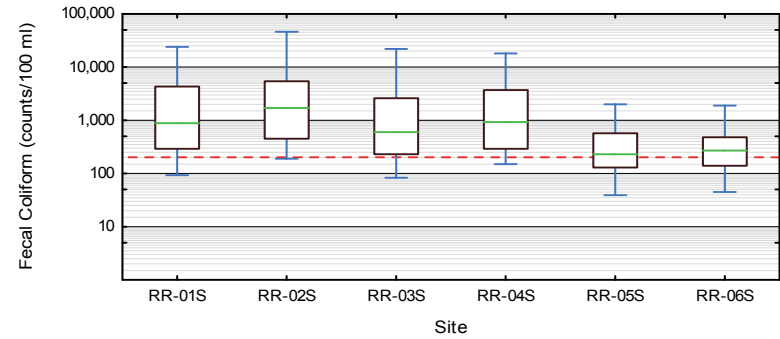
— Median □ 25%-75% | 10%-90%
---- WQ Standard/Criterion

Root River MMSD WQ Monitoring Data 1999 -2012

Sites arranged from
Upstream to Downstream

WQ Standard or
Recommended Criteria
represented as a dashed red
line

MMSD Water Quality Monitoring Program Data
Root River 1999 - 2012



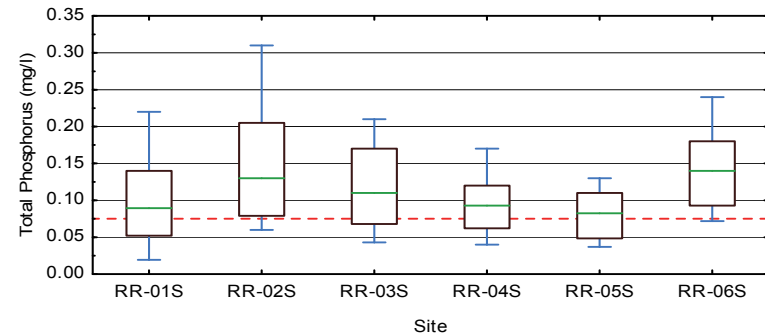
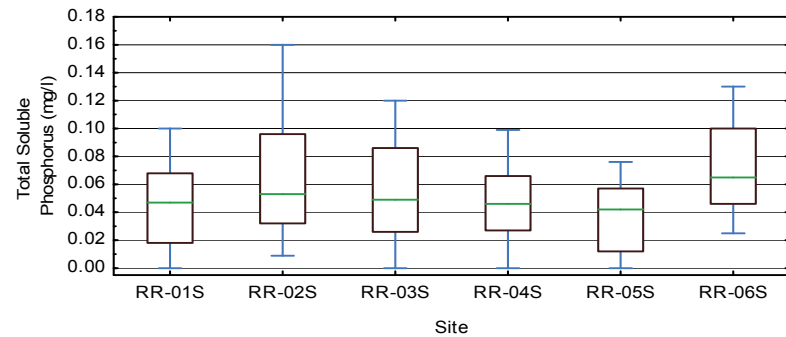
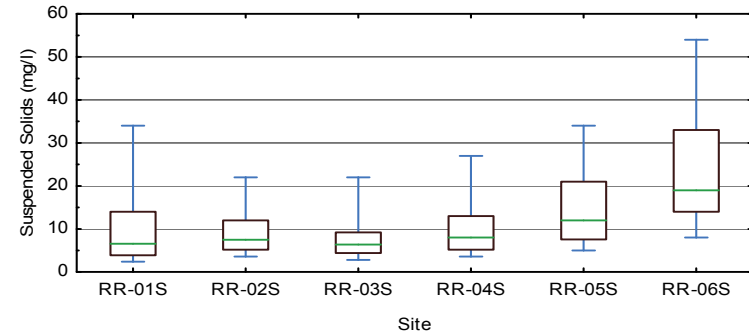
— Median □ 25%-75% | 10%-90%
--- WQ Standard/Criterion

Root River MMSD WQ Monitoring Data 1999 -2012

Sites arranged from
Upstream to Downstream

WQ Standard or
Recommended Criteria
represented as a dashed red
line

MMSD Water Quality Monitoring Program Data
Root River 1999 - 2012



— Median □ 25%-75% | 10%-90%
---- WQ Standard/Criterion



Root River @ Layton Ave – June 8 2008



Root River Parkway @ Layton Ave – June 8 2008



Root River @ Rawson & 68th Street - June 8 2008



**76th and Root River Looking West
6-8-08**