

Water Quality and Sources of Water Pollution in the Root River Watershed 1975-2004

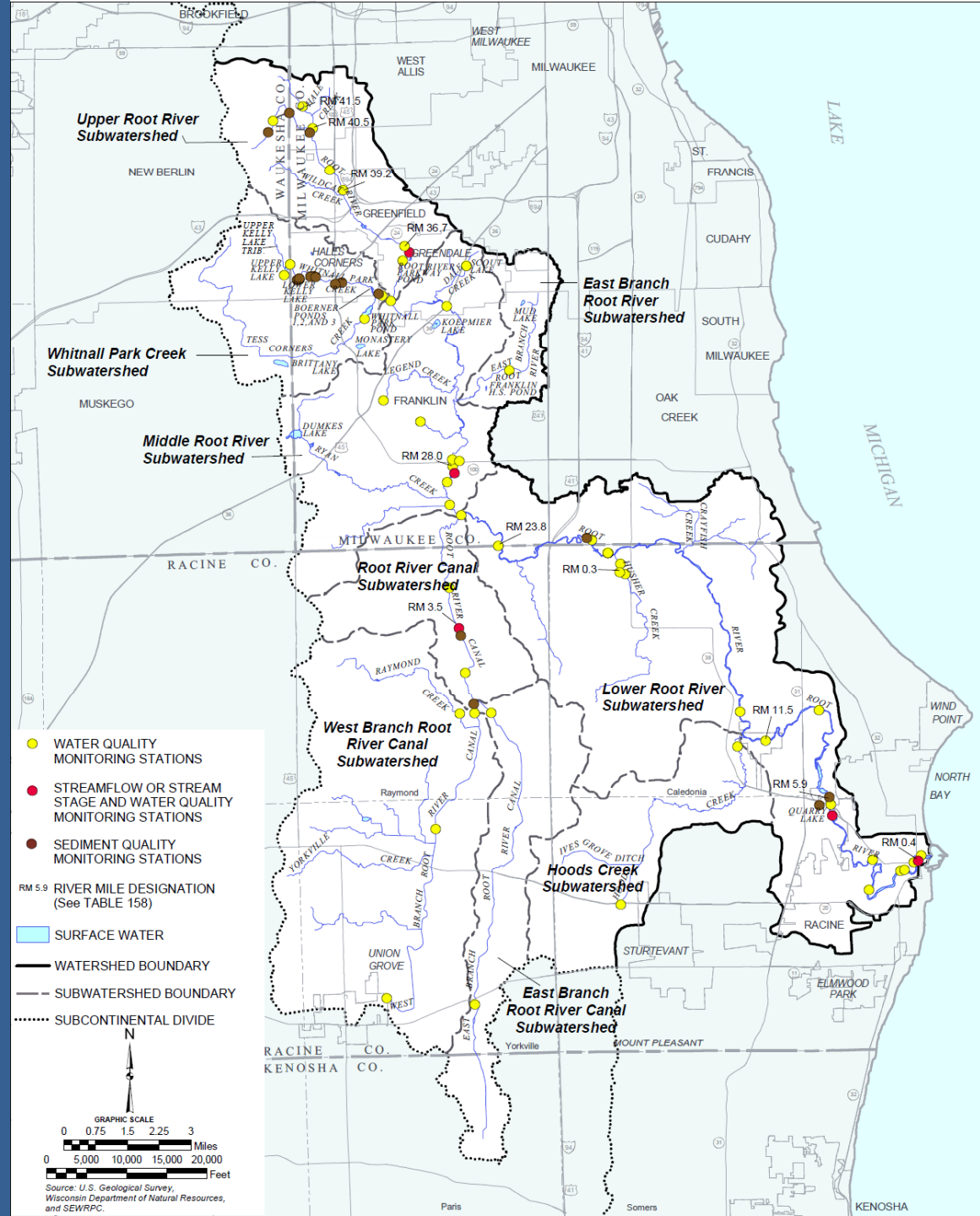
Joseph Boxhorn, Ph.D., Senior Planner



Water Quality



Water Quality Sampling Stations 1975-2004



Data Sources

- Milwaukee Metropolitan Sewerage District
- U. S. Geological Survey
- Wisconsin Department of Natural Resources
- City of Racine Health Department

Constituents Examined

- Bacteria and Biological
 - Fecal coliform bacteria, *E. coli*, Chlorophyll-*a*
- Physical/Chemical
 - Alkalinity, Biochemical oxygen demand (BOD), Chloride, Dissolved Oxygen, Hardness, pH, Specific Conductance, Temperature
- Suspended Material
 - Total suspended solids (TSS), Suspended sediment concentration

Constituents Examined

- Nutrients

- Nitrogen

- Ammonia, Nitrate, Nitrite, Organic nitrogen, Total nitrogen

- Phosphorus

- Dissolved phosphorus, Total phosphorus

- Metals

- Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc

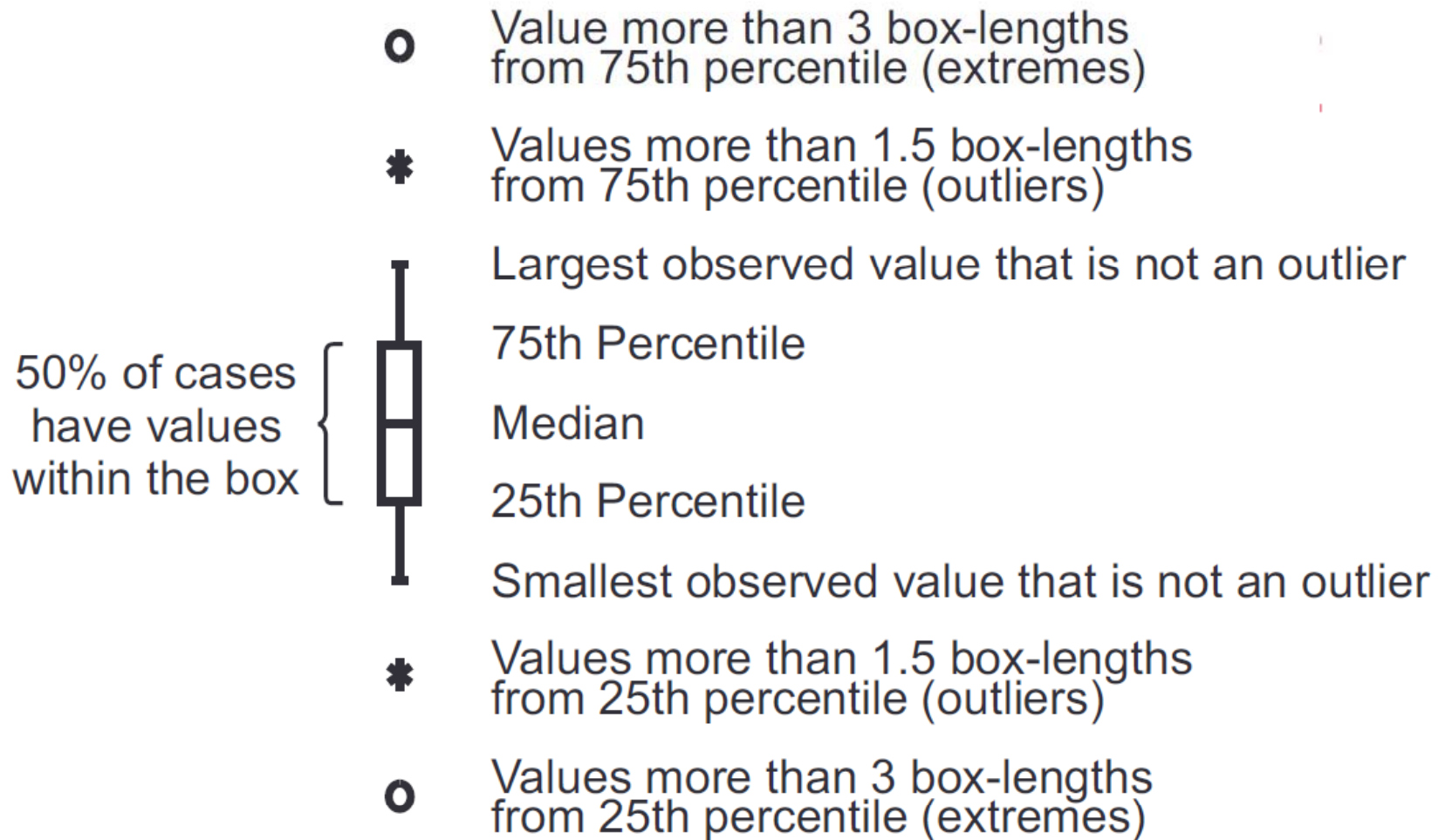
Constituents Examined

- Organic compounds
- Pharmaceuticals and personal care products
- Pesticides
- Polychlorinated biphenyls (PCBs)
- Polycyclic aromatic hydrocarbons (PAHs)

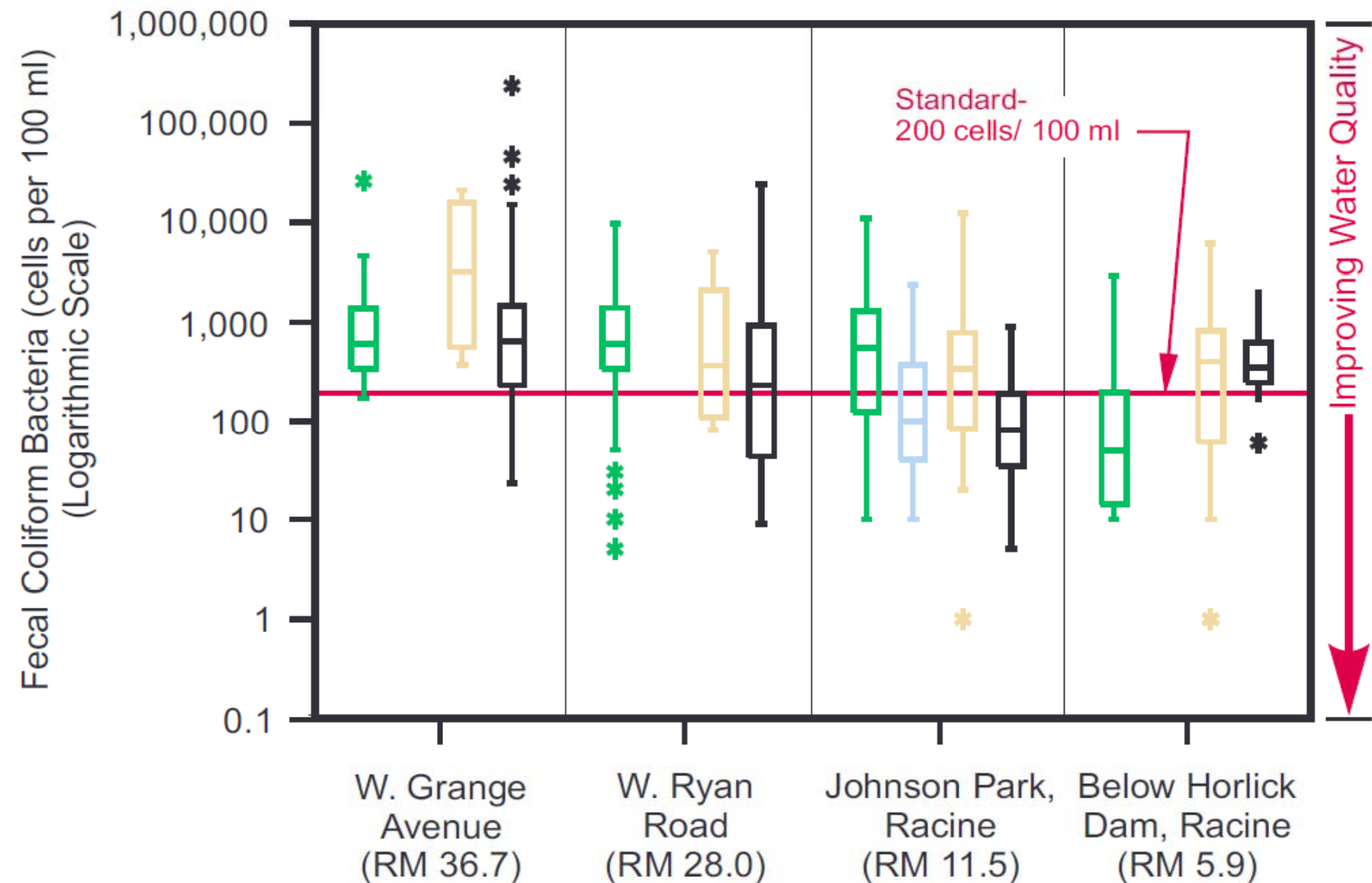
Periods Examined

- 1975-1986
- 1987-1993
- 1994-1997
- 1998-2004

Box Plots

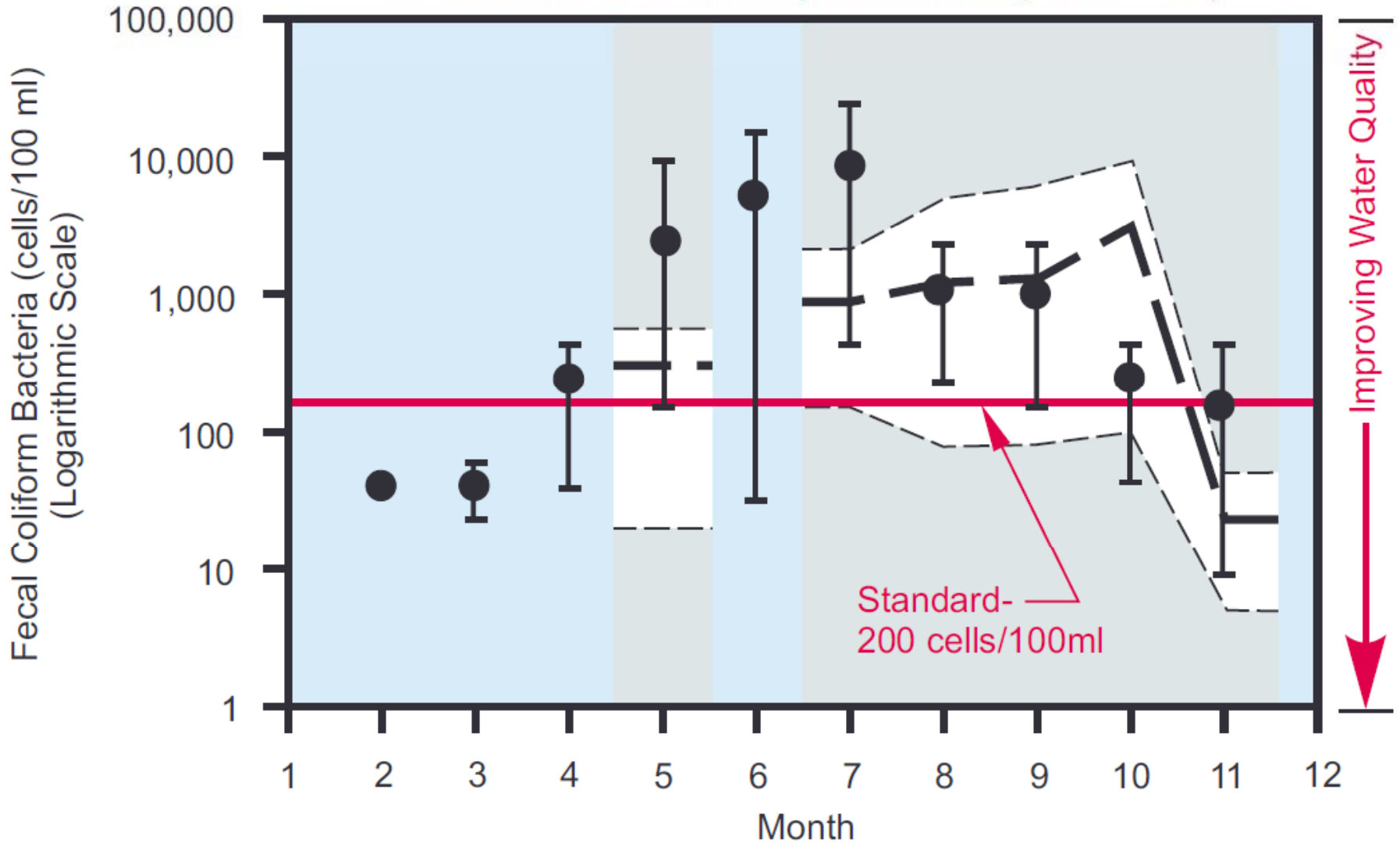


Fecal Coliform Bacteria: 1975-2005

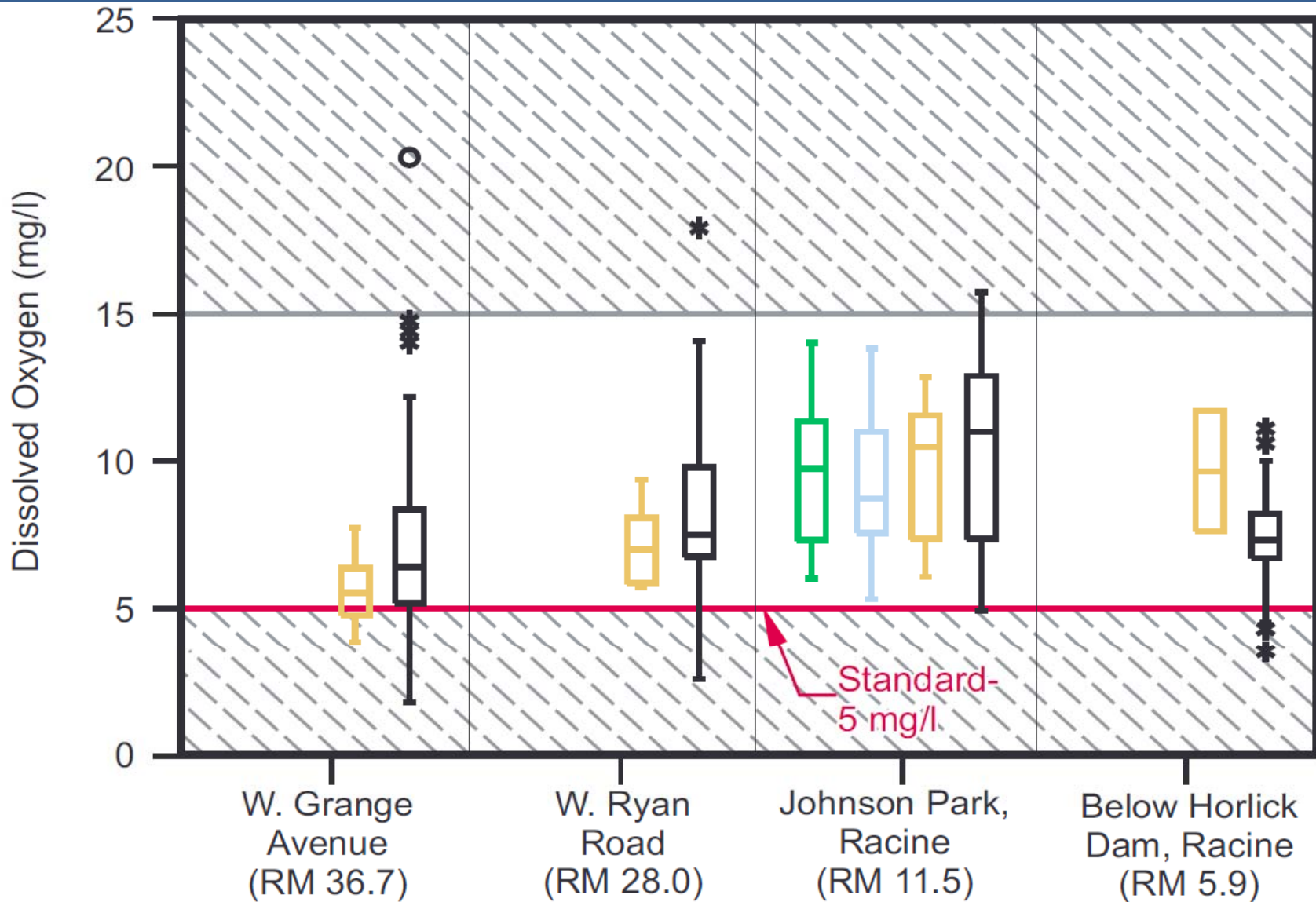


Fecal Coliform Bacteria

Root River at W. Ryan Road (RM 28.0)

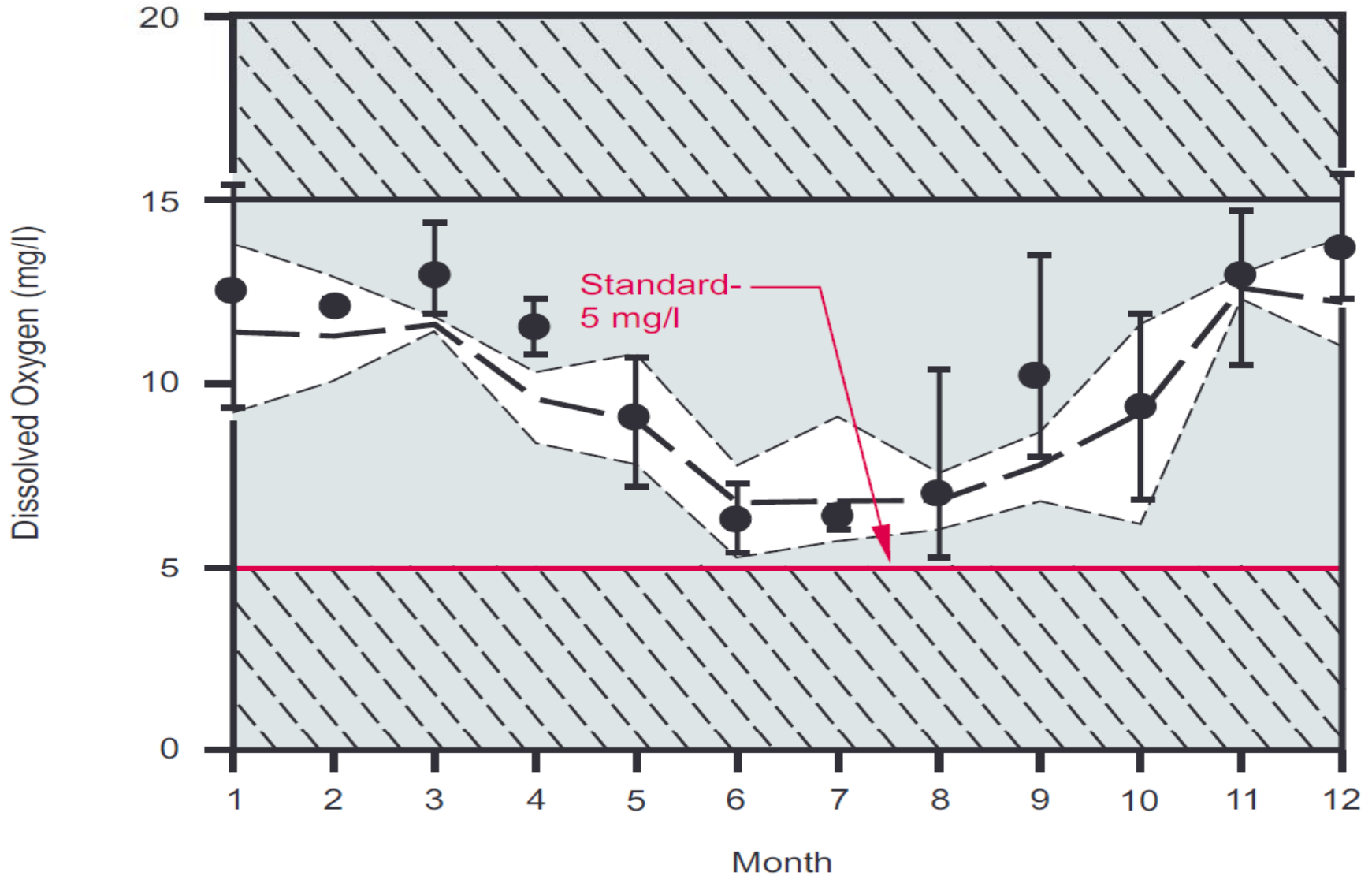


Dissolved Oxygen : 1975-2004

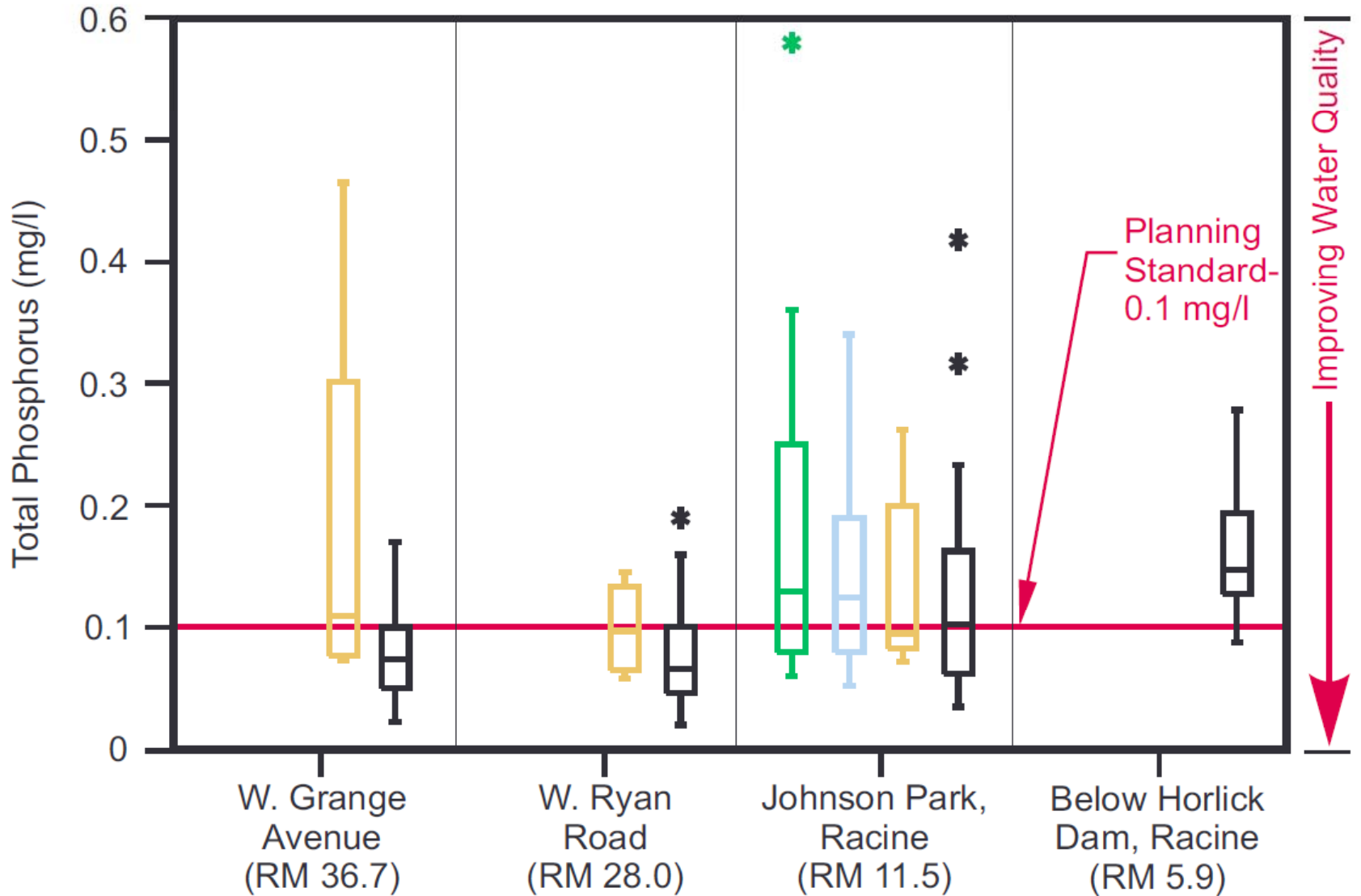


Dissolved Oxygen

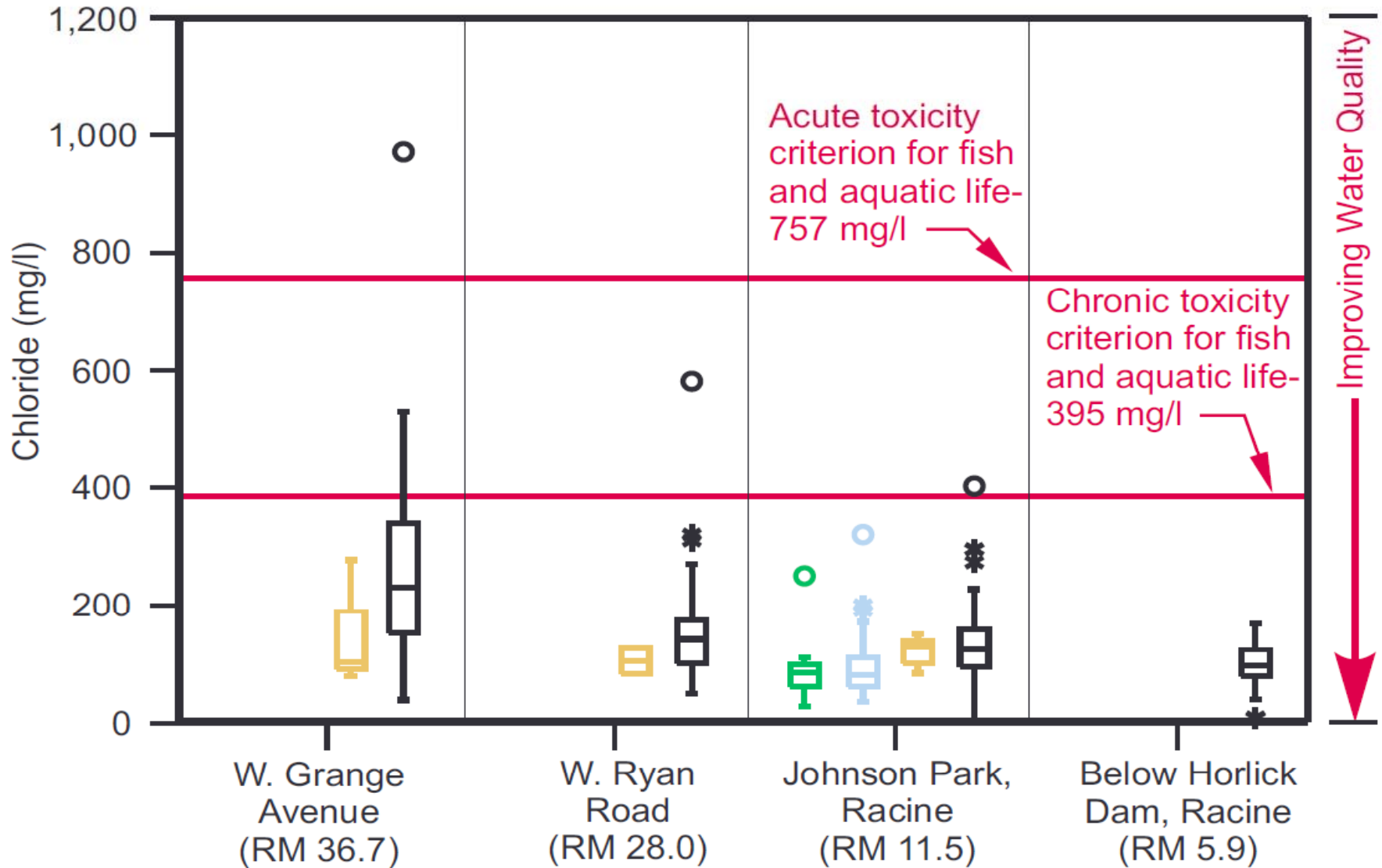
Root River at Johnson Park (RM 11.5)



Total Phosphorus: 1975-2004



Chloride: 1975-2004



Metals

- Decreasing concentrations of Cadmium, Chromium, Copper, and Nickel over time
- Concentrations tend to decrease from upstream to downstream

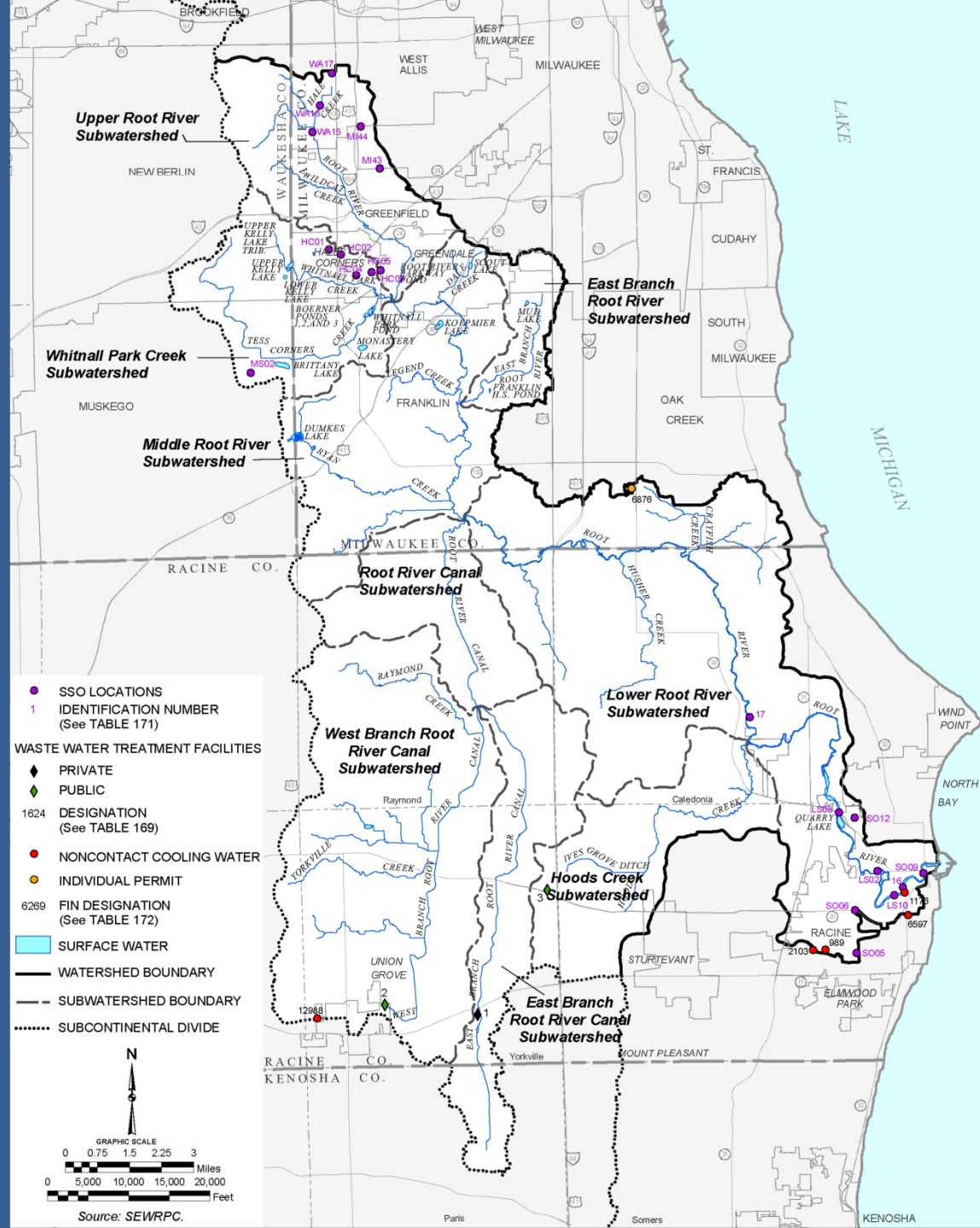


Sources of Water Pollution

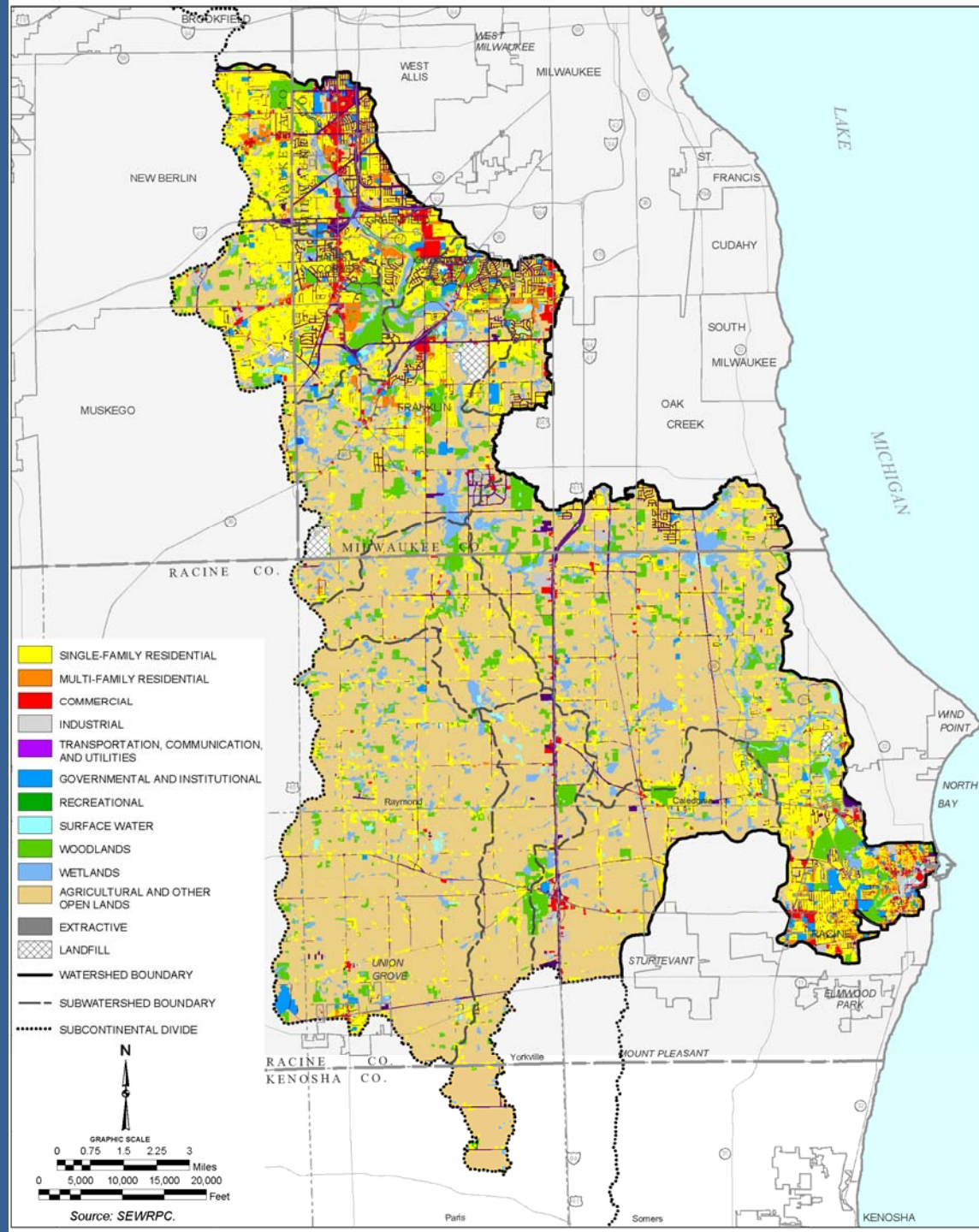


Point Sources

- 3 Sewage treatment plants
- 39 Industrial dischargers
- Sanitary sewer overflows in several locations

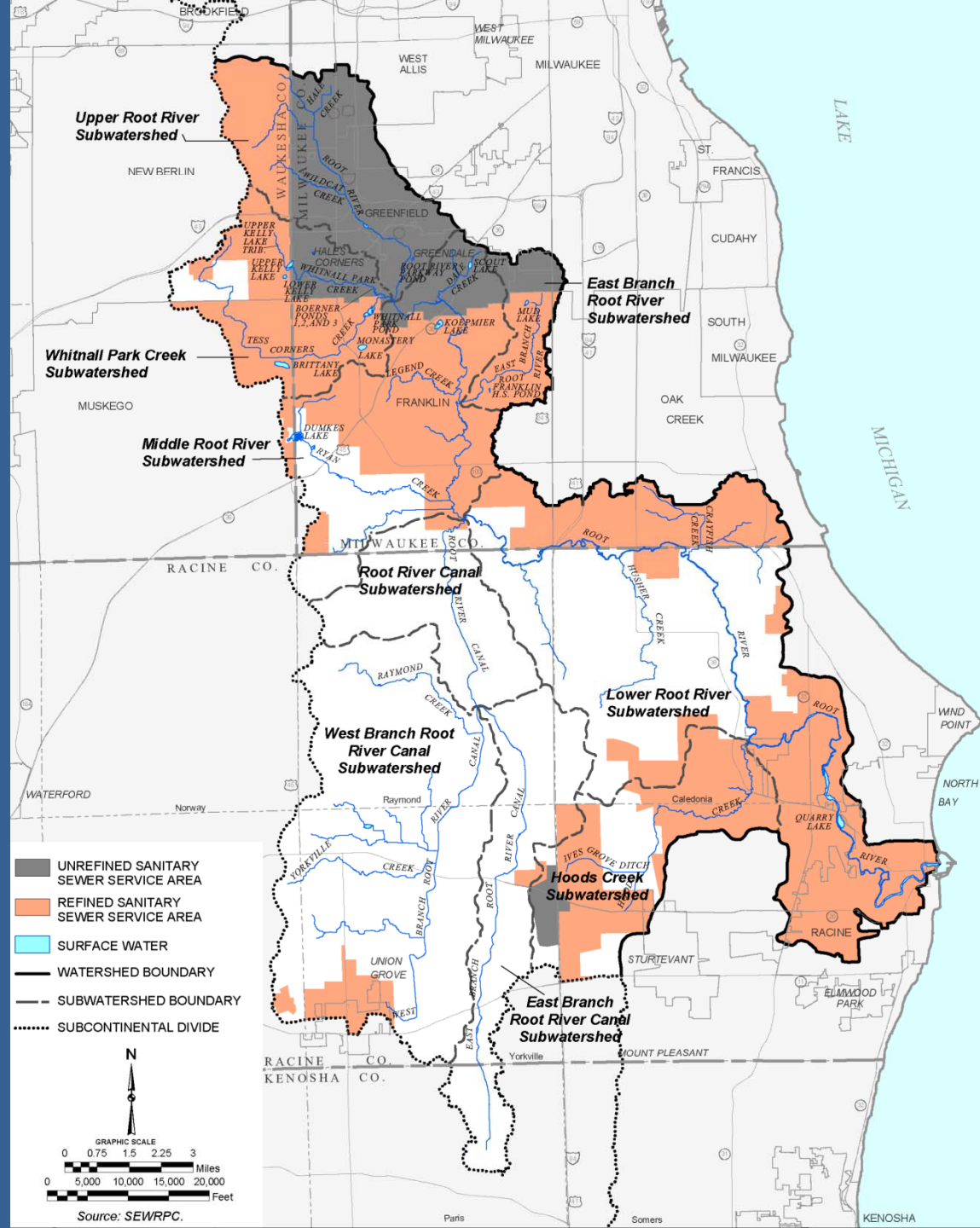


Land Use in the Root River Watershed 2000

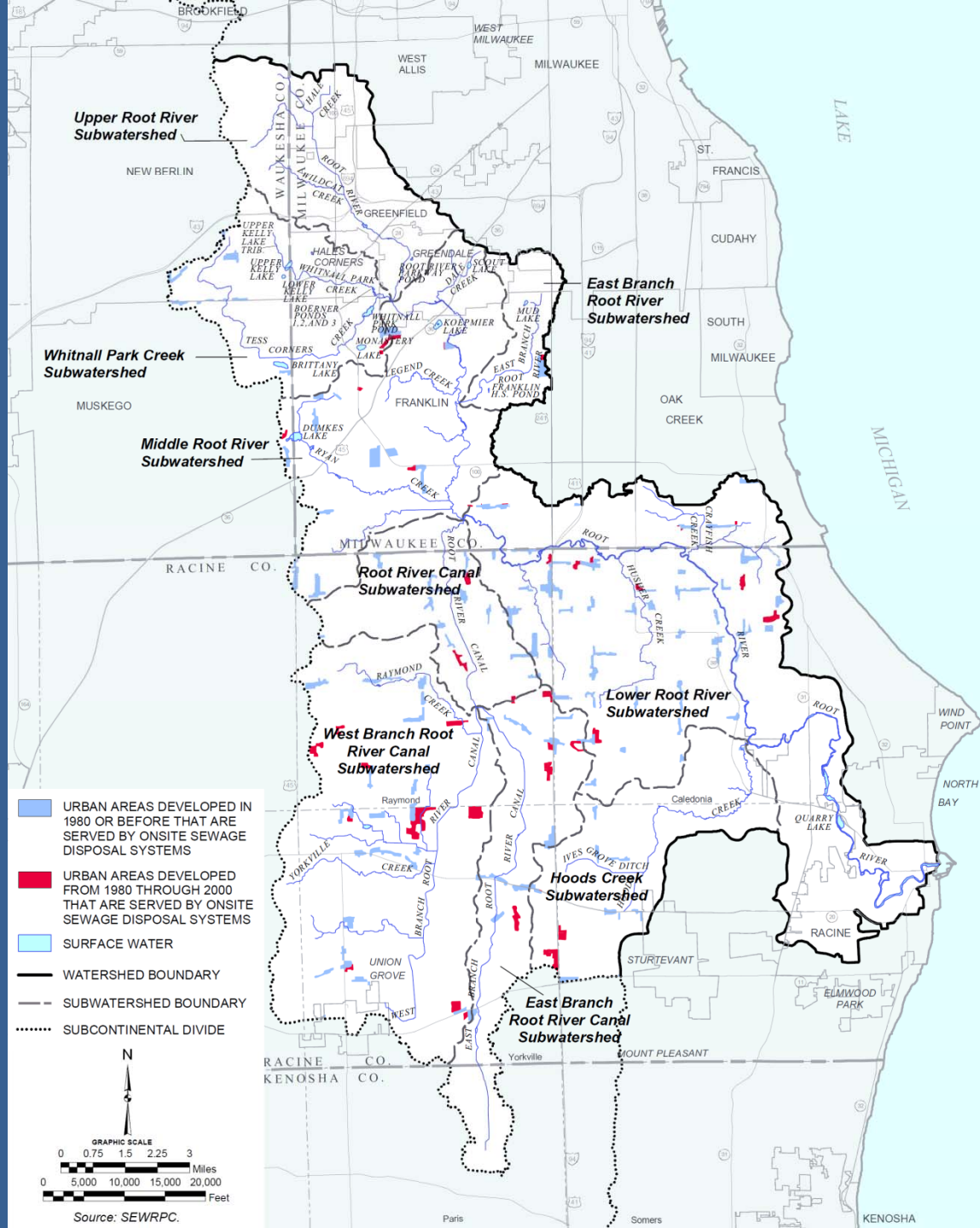


Planned Sewer Service Areas 2005

- 73 square miles
- 37 percent of the watershed



Nonpoint Pollution Sources: Urban Density Areas Served by Onsite Sewage Treatment Systems



Nonpoint Pollution Sources: Other

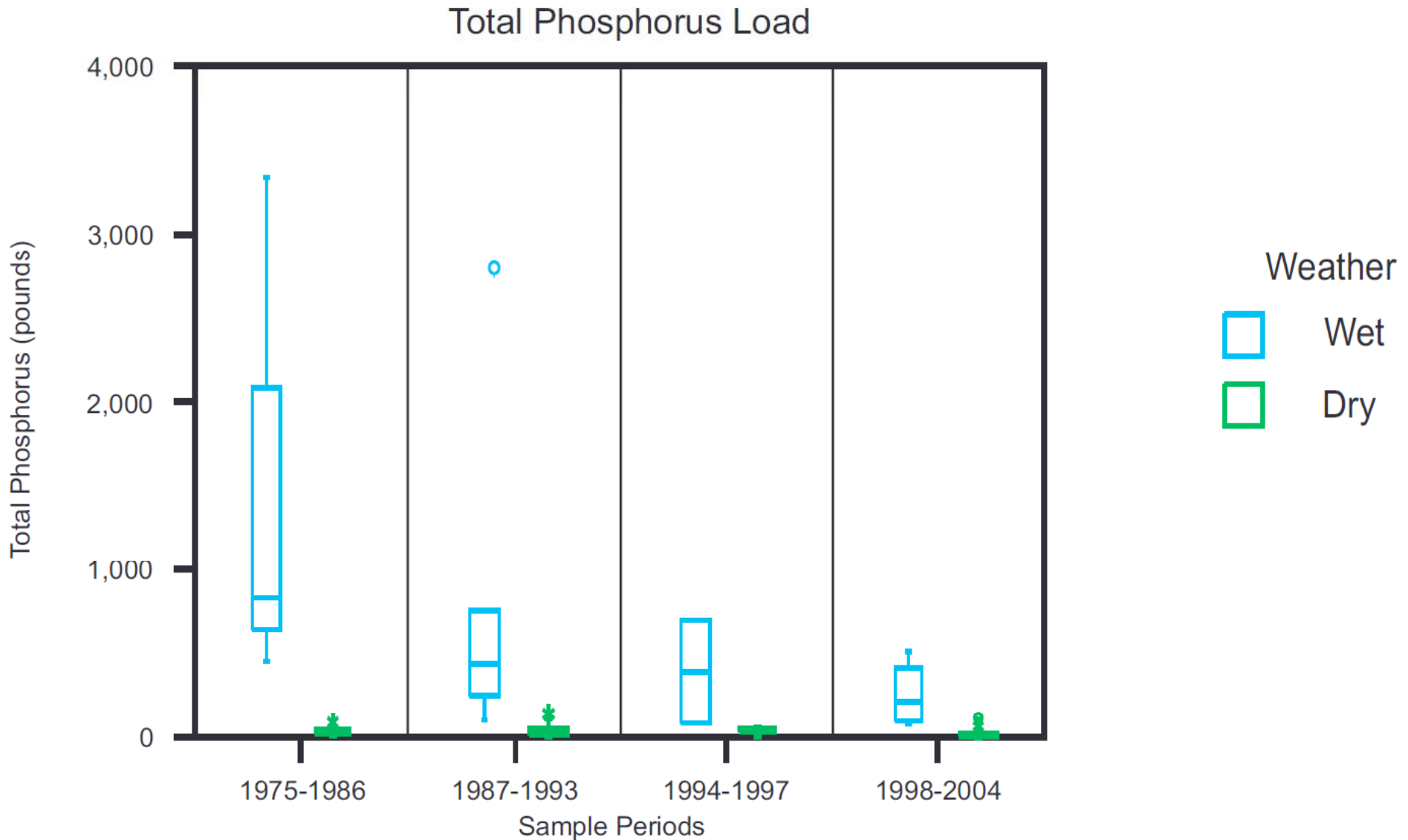
- Landfills
 - Active 1
 - Inactive 13
- Animal Operations
 - Cattle 199
 - Pig 32
 - Sheep 35
 - Chicken 62
 - Duck 1

Average Annual Pollutant Loads

Constituent	Total	Point Source (percent)	Urban Nonpoint Source (percent)	Rural Nonpoint Source (percent)
Total Phosphorus (pounds)	84,060	3.9	31.5	64.6
Total Suspended Solids (pounds)	83,771,430	<0.1	10.7	89.3
Fecal Coliform Bacteria (10^{12} cells)	11,780	0.2	78.2	21.6
Total nitrogen (pounds)	1,143,170	2.4	14.2	83.4
Biochemical Oxygen Demand (pounds)	3,258,620	0.4	22.6	77.0
Copper (pounds)	1,939	2.1	69.5	28.3

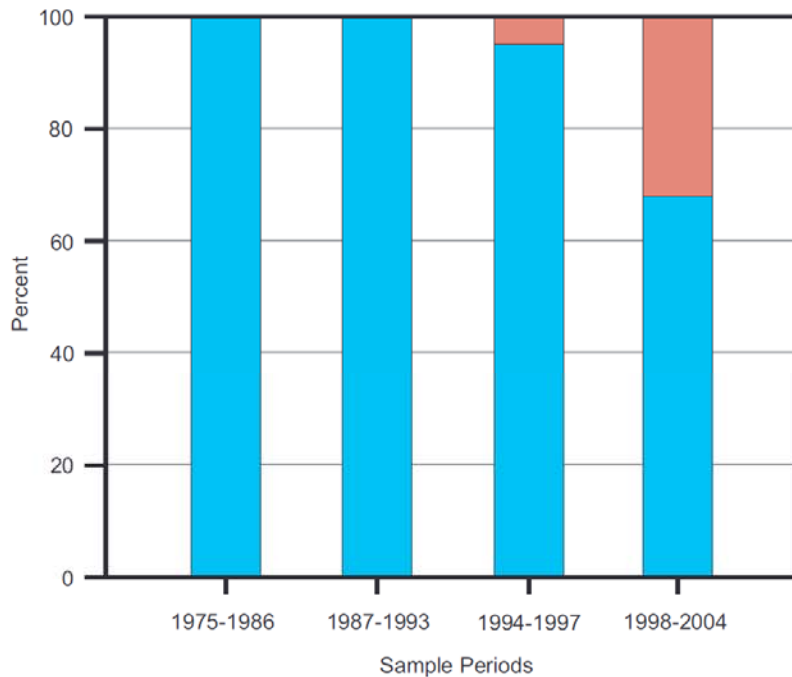
Source: Tetra Tech, Inc.

Daily Average Pollutant Loads in the Root River at Johnson Park

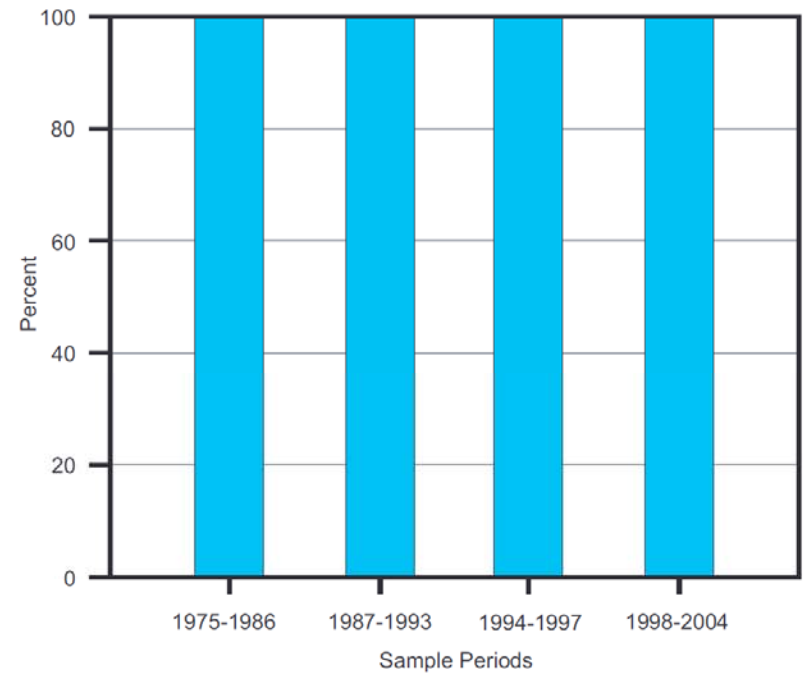




Proportions of Samples Meeting Water Quality Criteria

DISSOLVED OXYGEN



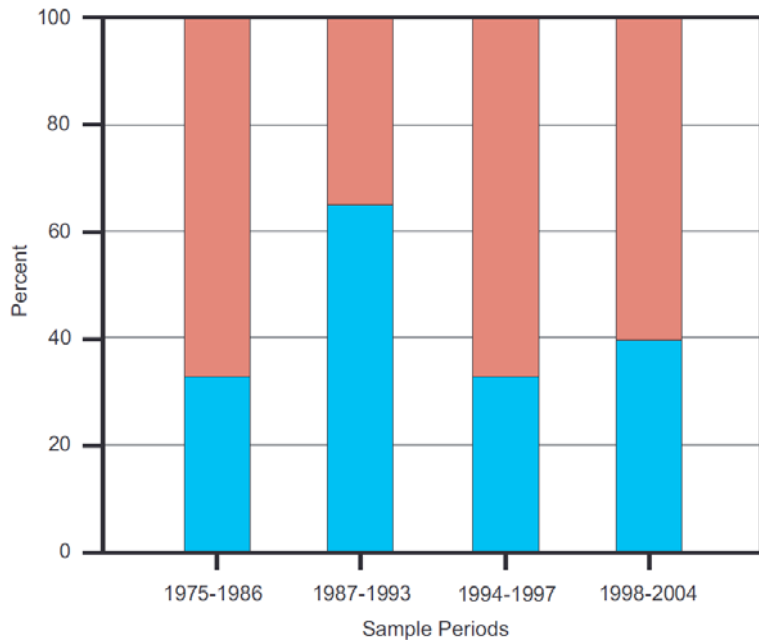
AMMONIA



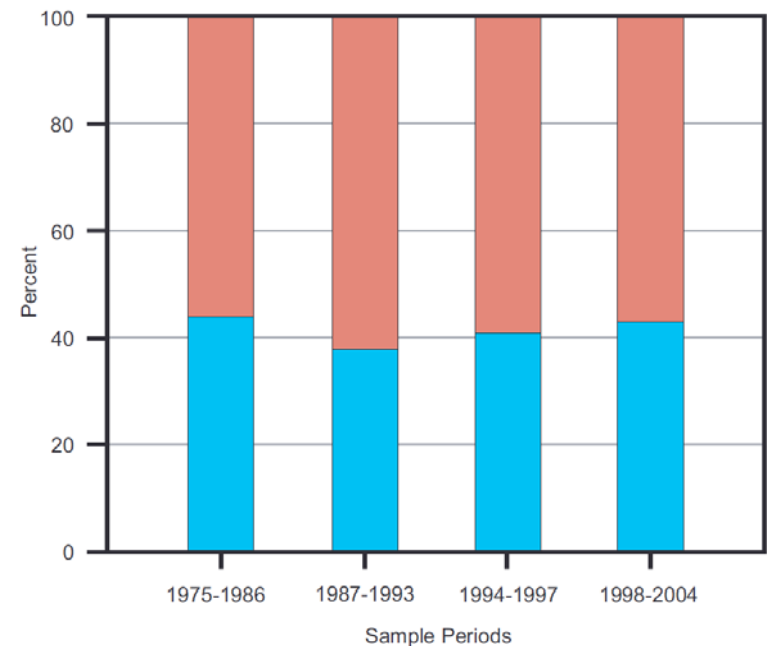
-  Samples Not Meeting Water Quality Standards and Criteria
-  Samples Meeting Water Quality Standards and Criteria



Proportions of Samples Meeting Water Quality Criteria

FECAL COLIFORM BACTERIA

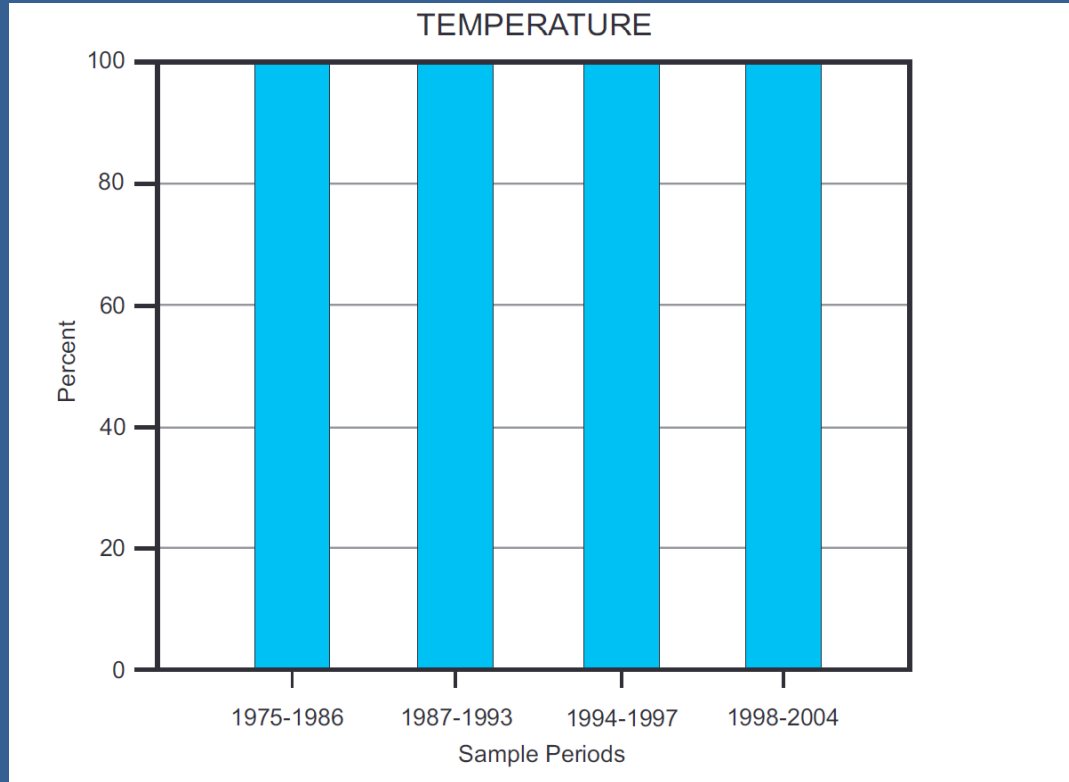




TOTAL PHOSPHORUS



-  Samples Not Meeting Water Quality Standards and Criteria
-  Samples Meeting Water Quality Standards and Criteria

Proportions of Samples Meeting Water Quality Criteria



-  Samples Not Meeting Water Quality Standards and Criteria
-  Samples Meeting Water Quality Standards and Criteria

For more information see:

SEWRPC Technical Report No. 39, *Water Quality Conditions and Sources of Pollution in the Greater Milwaukee Watersheds.*