Milwaukee River Report Card

— 2011 —

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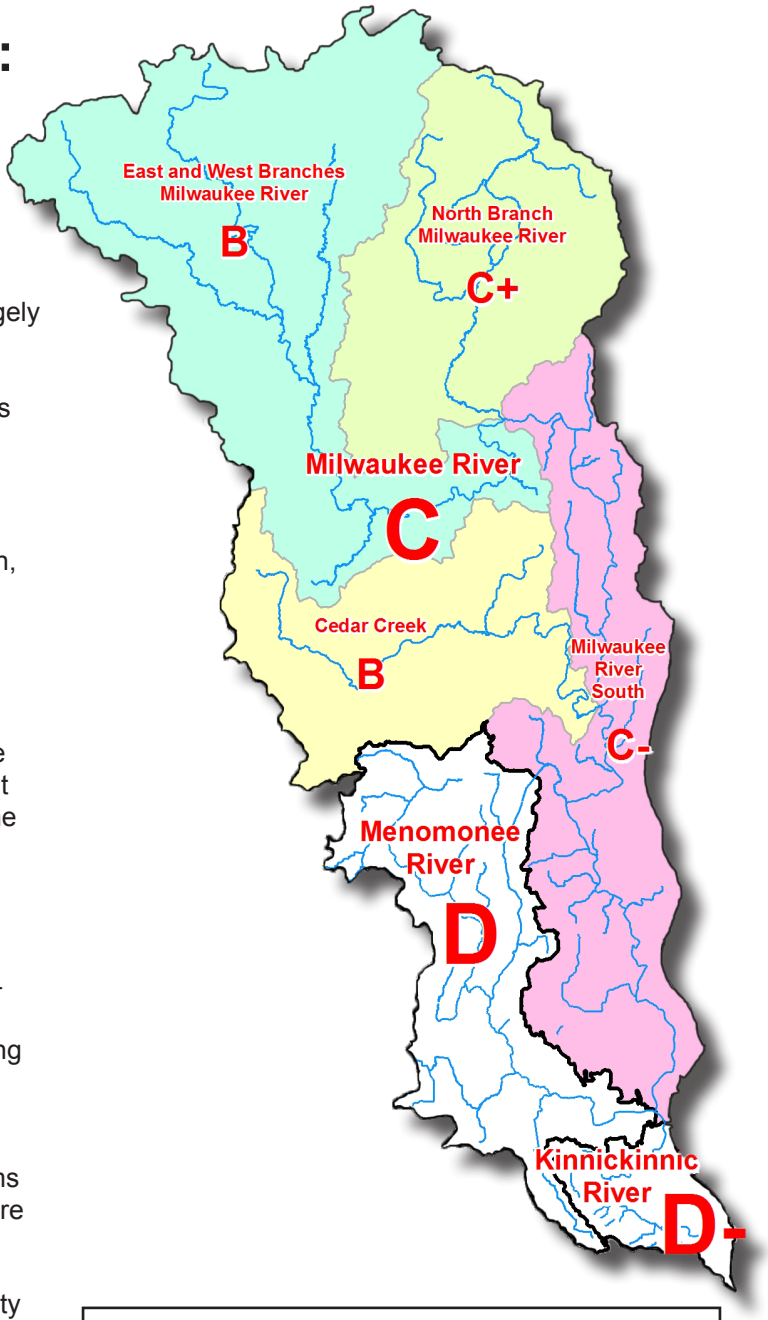
Milwaukee River Basin Grade:

D+

The Milwaukee River Basin, consisting of the Milwaukee, Menomonee, and Kinnickinnic River Watersheds, scored a disappointing overall grade of D+. The more developed and largely urban watersheds of the Kinnickinnic and Menomonee Rivers, which weren't graded in last year's report card, brought down the overall basin grade significantly. Generally, turbidity readings in these two watersheds were very poor; dissolved oxygen and chloride grades were only mediocre; and both received failing grades for phosphorus, conductivity, and indicators of bacteria.

The Milwaukee River Watershed, consisting of the North Branch, East & West Branch, and South Branch Subwatersheds of the Milwaukee River, as well as the Cedar Creek Subwatershed, dropped from a B- in 2010 to a C in 2011. All subwatersheds received A's for pH and water temperature. Dissolved oxygen was a problem in some headwater streams of the North Branch and turbidity remained a problem in the South Branch. Chloride samples in Cedar Creek and the South Branch were decent, but conductivity, phosphorus and bacteria received F's in most of the subwatersheds.



What Do the Grades Mean?

A — All water quality indicators meet desired targets 90-100% of the time. Streams or river segments have "good" water quality, which are capable of supporting fish and other aquatic life.

B — Most water quality indicators meet desired targets roughly 80-89% of the time. Quality of these streams and river segments tends to be good; most areas are capable of supporting fish and other aquatic life.

C — There is a mix of healthy and unhealthy water quality indicators, or indicators are only meeting water quality targets 70-79% of the time. Water quality of these waters tends to be fair, as well as conditions for fish and aquatic life.

D — Few water quality indicators meet desired targets, or only meet water quality targets 60-69% of the time. Water quality and wildlife habitat of these waters tends to be poor.

F — Very few or no water quality indicators meet desired targets. Quality of these streams and river segments is very poor, most often leading to poor conditions for fish and aquatic life.

Report card grades for the Milwaukee, Menomonee and Kinnickinnic Rivers and their tributary streams in 2011.

Grades are largely based on water quality data collected by Milwaukee Riverkeeper volunteer stream monitors at 99 sites throughout the Milwaukee River Basin. The Milwaukee Metropolitan Sewerage District (MMSD) also collected data at 26 sites in the Menomonee River Watershed, 26 sites in the Milwaukee River South Subwatershed, and 5 locations in the Kinnickinnic River Watershed. The Wisconsin Department of Natural Resources (WDNR) monitored 11 sites in the Milwaukee and Kinnickinnic River Watersheds.

More information on water quality grades and targets for watershed health can be found on pages 3-5 and on our website at www.milwaukeeriverkeeper.org.

Introduction

Dear Friend of the River,

Welcome to our second annual Milwaukee River Report Card. This year's report card summarizes the 2011 water quality of the Milwaukee River Basin, which includes the Kinnickinnic and Menomonee River Watersheds, in addition to the Milwaukee River Watershed (consisting of the Cedar Creek, East & West Branch, North Branch and South Branch Subwatersheds). Water quality grades are based on data from our dedicated cadre of Milwaukee Riverkeeper citizen stream monitoring volunteers, as well as data from the Milwaukee Metropolitan Sewerage District (MMSD) and the Wisconsin Department of Natural Resources (WDNR).

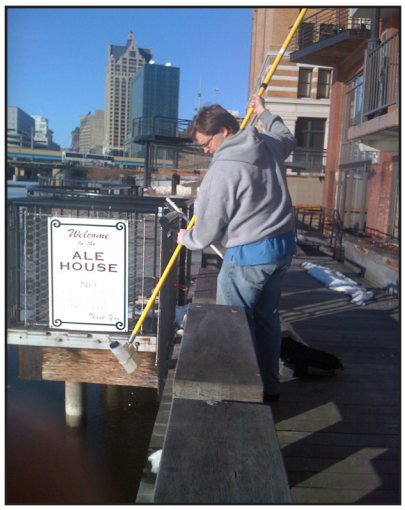
This annual report card also informs you of our progress towards meeting the fishable, swimmable goals for our local watersheds as envisioned under the Clean Water Act. It provides a snapshot of the health of the river at subwatershed, watershed, and basin levels, as measured by basic water quality parameters such as dissolved oxygen, temperature, turbidity, pH, and macroinvertebrates (aquatic organisms). This year's report card also includes data for bacteria, phosphorus, chloride, and conductivity; these contaminants are major impediments to our rivers meeting their fishable and swimmable goals.

Lastly, the report card provides ideas for what you can do to help improve the water quality of our watersheds. If we are serious about achieving clean water and healthy communities, we must change the way we live on the land. By all working together, we can be the solution to the pollution affecting our waterways!

Sincerely,

Cheryl Nenn, Riverkeeper Joe Rath, Water Quality Specialist

P.S. If you are interested in becoming a citizen stream monitor, please contact us!



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How Did We Grade Water Quality Parameters?

To determine water quality grades for the Milwaukee River Basin, a combination of Riverkeeper volunteer stream monitoring data and water quality data from two government agencies, WDNR and MMSD, were analyzed.

Data collected by Riverkeeper volunteers was assessed for several water quality parameters to determine grades for this report, including dissolved oxygen (DO), water temperature, pH, turbidity (or water clarity), and macroinvertebrate life. Our citizen water quality monitors use standard, calibrated monitoring equipment to measure DO, water temperature, and pH on a monthly basis between May and October. Volunteers use transparency tubes to test for turbidity. Most volunteers also deploy continuous water temperature loggers called thermistors, which record hourly water temperature readings throughout the monitoring season. Macroinvertebrate data was used to assess aquatic ecosystem health. A subset of volunteers also collected conductivity data, as well as collected water samples that were sent to the State Lab of Hygiene for chloride and total phosphorus analysis. WDNR water quality data for 11 sites and MMSD data from 57 sites was analyzed to supplement volunteer data.

Below is a description of water quality parameters assessed for the report card, and the targets or goals that water quality data was assessed against to determine health and condition of waterways.

DISSOLVED OXYGEN (DO)

Dissolved oxygen is crucial for aquatic life. Some streams and steam segments in the Milwaukee River Basin have regulatory variances (per State of Wisconsin Administrative Code) allowing DO concentrations as low as 2 mg/L, which is suitable only for the most pollution tolerant fish species. However, we believe all streams and stream segments in the Milwaukee River Basin can reach at least the Warm Water Sport Fishery (WWSF) concentration of 5 mg/L (most streams in the watershed are designated WWSF), and this was the target we used to determine if waterways could support a diverse ecosystem of fish and aquatic life. There are many streams in the basin already meeting or capable of meeting cool or cold water standards for fish and aquatic life.

TEMPERATURE

Water temperature also greatly affects fish and aquatic life. As the majority of streams and stream segments in the Milwaukee River Basin are classified as existing or attainable WWSF streams, we believe the water temperature target should at least remain below the WWSF continuous water temperature maximum standard of 31.7°C. Both instantaneous water temperatures (measured monthly using meters) and continuous water temperatures (measured hourly by thermistors) were analyzed against this standard.

pH LEVEL

pH is a measure of acidity, or the amount of hydrogen (H+) ions in the water. pH ranges from 0 to 14 (0 being most acidic, 14 being most basic) with a value of 7 representing a “neutral” solution. Milwaukee River Basin streams generally run on the basic side of neutral, with values typically between 7 or 8 on the pH scale. It is generally accepted that a pH range of 6-9 can support a healthy aquatic ecosystem.

TURBIDITY

Turbidity, or water clarity, affects both the light and energy inputs available to aquatic ecosystems. Our volunteers measure turbidity using transparency tubes; clear, plastic tubes, which are filled and/or emptied of stream water until they barely reveal the black and white pattern on the bottom of the tube (similar to a lake secchi disc). A height of at least 54.7 cm of stream water in a 120 cm transparency tube indicates a healthy water turbidity acceptable for aquatic life, and this was used as the target for stream health.

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PHOSPHORUS

Phosphorus is an essential nutrient for plants, animals, and aquatic life. Phosphorus is typically low to absent in natural freshwater systems. Human activities have led to large inputs of phosphorus into our rivers and lakes. These activities include fertilization of lawns and fields; sewage treatment discharge; and the addition of phosphorus into our water supply as an anti-corrosion inhibitor for old, lead pipes. Phosphorus entering our waterways causes growth of nuisance algae as well as a cascade of water quality problems (see phosphorus article on pg. 12). Riverkeeper advanced volunteers (or Level II) take monthly water samples that are shipped to the State Lab of Hygiene for total phosphorus analysis. These sample results are assessed against Wisconsin phosphorus standards, which are generally 0.075 mg/L for smaller streams and 0.1 mg/L for larger rivers and the Milwaukee Estuary. Riverkeeper beginner volunteers (Level I) use chemical titration kits (CHEMets kits) to test for orthophosphate, which is a common molecular form of phosphorus. The kits use acids that react with orthophosphate to turn water samples blue. Volunteers determine the level of orthophosphate by comparing the intensity of blue color to known standards, which get progressively darker in proportion to the orthophosphate present. Orthophosphate levels are assessed against EPA guidance of 0.1 mg/L, the recommended maximum for rivers and streams.

MACROINVERTEBRATES

To assess macroinvertebrates, Milwaukee Riverkeeper volunteers use a simple biotic index developed by a group of Wisconsin scientists and specifically designed for streams in Wisconsin. Index score classifications range from Excellent-Good-Fair-Poor. Our target for sites in the Milwaukee River Basin is a “good” classification. Because macroinvertebrates can’t readily migrate like fish, they provide a good overall indicator of the health of a certain reach of stream, and tend to be classified per their tolerance to a range of oxygen conditions.

CHLORIDE

High chloride concentrations in rivers and streams are toxic to aquatic organisms. Road salt runoff constitutes a large source of chloride. Elevated levels of chloride can disrupt an organism’s ability to maintain a natural internal water balance, which leads to impaired survival, growth, and/or reproduction. The Environmental Protection Agency (EPA) has set an acute chloride standard at 860 mg/L and a chronic chloride standard of 230 mg/L as targets for healthy streams. These levels recognize that high levels of chloride can be acutely or instantly toxic to fish, but that lower levels of chloride over a longer period of time or chronic exposure can be just as toxic (see chloride article on pg. 14 for more information). Chloride data was assessed against these targets to determine grades. Grades for acute and chronic criteria were averaged to determine an overall grade.

CONDUCTIVITY

Conductivity is a measure of the ability of water to pass an electrical current. Conductivity in water is affected by charged particles (ions) which can be both positive (cation) and negative (anion). Anions (negative ions) include chloride, nitrate, sulfate and phosphate, and positive ions (cations) include sodium, magnesium, calcium, iron, and aluminum. Conductivity in streams is naturally affected by geology; for instance bedrock streams tend to have lower conductivity whereas streams passing through clay soils tend to have higher conductivity. Anthropogenic discharges to streams--such as discharge of industrial waste (e.g. heavy metals), sewage, or other “charged” contaminants such as chloride, phosphate, and nitrate--can raise conductivity. A conductivity reading of 150 - 500 umhos/cm provides for a healthy aquatic ecosystem with mixed fisheries, and this threshold was used as the target for determining water quality grades for this parameter.

BACTERIA

High bacteria concentrations impact not only stream health, but also human health. Regulatory agencies such as MMSD and WDNR regularly test for fecal coliform and *E. coli* bacteria. According to State of Wisconsin Recreational Use Standards, fecal coliform levels should never exceed 200 CFU/100 mL (colony forming units/100 milliliter sample) and the EPA established an *E. coli* standard of 235 CFU/100 mL (colony forming units/100 milliliter sample). The percentage of samples meeting these targets was used to determine water quality grades for bacteria.

HUMAN BACTEROIDES

Historically high levels of bacteria along stretches of the Menomonee and Kinnickinnic Rivers in Milwaukee and Wauwatosa led Milwaukee Riverkeeper (along with the Great Lakes Water Institute of the University of Wisconsin - Milwaukee or GLWI) to investigate the possibility that failing sewer infrastructure was the culprit. Sandra McLellan's Lab at GLWI has developed techniques to identify and quantify the presence and concentration of human bacteria in stormwater using a genetic test called qPCR, which can count DNA sequences in a sample that are associated with human sewage. After four years of testing and analysis, we have found large concentrations of human waste entering the Menomonee and Kinnickinnic Rivers as well as Honey Creek and Underwood Creek, major tributaries to the Menomonee. We graded the streams based on the presence of human waste (percentage of samples testing negative for human strains of *Bacteroides*) entering the stream from stormwater outfalls.

NOTE: Grades for each water quality parameter are based on the percentage of time that the data points for the monitoring stations in each subwatershed meet our targets relating to overall aquatic ecosystem health. Grades were assigned on a typical percentage basis (90-100%=A, 80-89%=B, 70-79%=C, 60-69%=D and below 60%=F). Overall grades for each subwatershed were determined based on averaging grades for each individual parameter, and the overall watershed grade was determined by averaging the overall grades for each subwatershed. The overall Milwaukee River Basin grade was determined by averaging overall grades for the three watersheds.

What We Didn't Grade in 2011

It is important to note that citizen volunteers and agencies are currently only monitoring basic water quality parameters, with several pilot citizen monitoring projects initiated for bacteria, phosphorus, and chlorides (e.g. road salt runoff). In addition, MMSD is monitoring extensively for bacteria, conductivity, and some emerging pollutants, but only within their service area.

The Southeastern Wisconsin Regional Planning Commission (SEWRPC) completed the Regional Water Quality Management Plan for Southeastern Wisconsin in 2007, analyzing agency and citizen data for the Milwaukee River Basin from 1975 to 2004. While it found similar results for temperature and dissolved oxygen, SEWRPC found most sites assessed in the Milwaukee River Basin were not meeting regulatory bacteria levels for fecal coliform or planning goals for total phosphorus from 1998-2004. There is also very little data in general for the northern portion of the Milwaukee River Watershed, including the East and West Branches and North Branch of the River. Thus, our report card only shows a part of the picture.

Even streams with otherwise "good" water quality indicators could still fail to meet the Clean Water Act's "fishable, swimmable" goals if high levels of toxic substances are present in water, sediment, or tissue of aquatic organisms. For example, concentrations of PCBs (a toxic industrial pollutant) in tissue from all aquatic organisms sampled downstream of Pioneer Road on the Milwaukee River were above the threshold used by WDNR for determining fish consumption advisories. Upstream of Pioneer Road, this threshold was exceeded 20% of the time. PCBs are very high in portions of Cedar Creek downstream from Cedarburg (this area is a designated Federal Superfund Site), as well as in Milwaukee River sediments upstream from Estabrook Dam (currently being cleaned up by WDNR).

There is also good news for the Menomonee and Kinnickinnic Rivers. After 37 years, the majority of petroleum based contaminants have been removed from the Little Menomonee River at the Kerr McGee/Moss American Superfund site. PCB contaminated sediments have also been removed from the lower Kinnickinnic River, and contaminated sediments and upland soils are also being removed from the Burnham Canal in the lower Menomonee River.

Despite some good progress, concentrations of petroleum products, pharmaceutical and personal care products, industrial solvents, flame retardants, insect repellents, and other toxins have been detected at many Milwaukee River Basin sites. Most of these substances are not currently regulated, and many do not have safety criteria associated with them. Thus, it is important to note that there are other issues of concern that are not factored into our grading system, and which should be considered when assessing overall river health.

How Healthy is the Milwaukee River & its Tributaries?

Overall, the Milwaukee River water quality in 2011 was fair, and received an overall grade of C (down from a B- in 2010).

A comparison of the subwatersheds shows that most met water quality goals for warm water sport fisheries as far as temperature and oxygen levels; however, problems exist with low dissolved oxygen levels in the smaller headwater streams of the North Branch, and there were turbidity problems in both the North Branch and South Branch of the Milwaukee River (see the map and explanation of water quality parameters for more details). Riverkeeper volunteer data shows that sites sampled for chloride in the Milwaukee River Watershed met advisory guidelines designed to be protective for fish. However, both Riverkeeper and MMSD conductivity data, which measure a broader swath of pollutants including chloride and heavy metals, showed that only 7.3% of all samples met an EPA advisory threshold for aquatic life and received an F grade. Riverkeeper data showed serious problems with phosphorus, and watershed data also received F grades for both bacteria and macroinvertebrates.

When averaging grades for all water quality parameters, the North Branch Subwatershed received an overall C+ grade and the Milwaukee River South Subwatershed received an overall C- grade. Cedar Creek and the East West Branch of the Milwaukee River both received a B grade.

Of the 39 sites monitored monthly by Riverkeeper volunteers, 26 sites assessed by MMSD, and 8 sites assessed at least once by WDNR, all the sites met instantaneous and continuous water temperature goals for warm water sport fisheries of less than 31.7 degrees C (continuous or hourly water quality data is available for 30 of 39 sites monitored by Riverkeeper). Interestingly, almost all of the sites in the Milwaukee River Watershed also met water temperature goals for cool water streams (less than 28 degrees C) and cold water streams (less than 25 degrees C), with the exception of several sites located in Cedar Creek, Ulao Creek, Batavia Creek, and the Milwaukee River South Subwatersheds. This means many of these streams could support colder water fisheries and receive state designations or upgraded regulatory classifications that could give them more protection and help us better meet our “fishable” goals.

Most sites met water quality targets for dissolved oxygen 100% of the time; however, a few sites experienced seasonal low oxygen levels (e.g. sites on Mink Creek, Melius Creek, Batavia Creek, Ulao Creek) most likely due to low water levels in summer.

Moreover, most sites in the upper portions of the Milwaukee River Watershed met turbidity thresholds, except the North Branch of the Milwaukee River at Riverside Drive. Almost all stream sites within the Milwaukee River South Subwatershed failed to meet turbidity or clarity targets throughout the season, resulting in a D grade for that subwatershed. Several sites on the main stem of the Milwaukee River had very bad turbidity during summer months, as well as several sites on Mole, Trinity, Cedar, and Ulao Creeks. High turbidity can stress fish and smother eggs, and when water turbidity is high over a long period of time, death of fish and aquatic life can result.

The health of the river as measured by macroinvertebrates or biotic life measures fair to poor for 14 of the 24 surveys conducted by Riverkeeper volunteers (at 20 sites). Only 42% of surveys conducted showed good or excellent macroinvertebrate communities. Macroinvertebrates are a good biological measure of overall stream health. All monitored sites in the Milwaukee River Watershed showed stable pH levels - generally lying on the slightly basic side of the spectrum.

MMSD measured bacteria data at 26 sites in the Milwaukee River South Subwatershed for 2011. Overall, the sites failed to meet the fecal coliform standard for recreational use 51% of the time and the *E. coli* standard 57% of the time, resulting in an overall F grade. Presence of bacteria in the river indicates a likely presence of viruses or pathogens that could make people sick, and is an obstacle to meeting our “swimmable” goals.

Riverkeeper volunteers measured 6 sites for chloride in the Milwaukee River Watershed. Water samples were collected and sent to the State Lab of Hygiene for analysis. The sites met EPA’s recommended “acute” standards for chloride 95% of the time and met “chronic standards” 88% of the time, receiving an overall A grade. Chloride levels stem largely from road salt and water softeners, and can be toxic or fatal for fish and aquatic life.

Conductivity was tested at 6 sites by Riverkeeper, at 10 sites by WDNR, and at 26 sites by MMSD. Conductivity data measures a broader swath of pollutants including chloride, heavy metals, and other pollutants usually indicative of urban runoff (for more info see article on chloride/conductivity). Overall, conductivity data showed very poor water quality in the Milwaukee River Watershed, receiving an F grade. Only 7.3% of an impressive 491 samples met EPA’s advisory threshold for aquatic life.

Riverkeeper volunteers tested for total phosphorus monthly at 17 sites within the Milwaukee River Watershed, with WDNR testing an additional 8 sites at least once. Only 47.5% of samples met new state standards for

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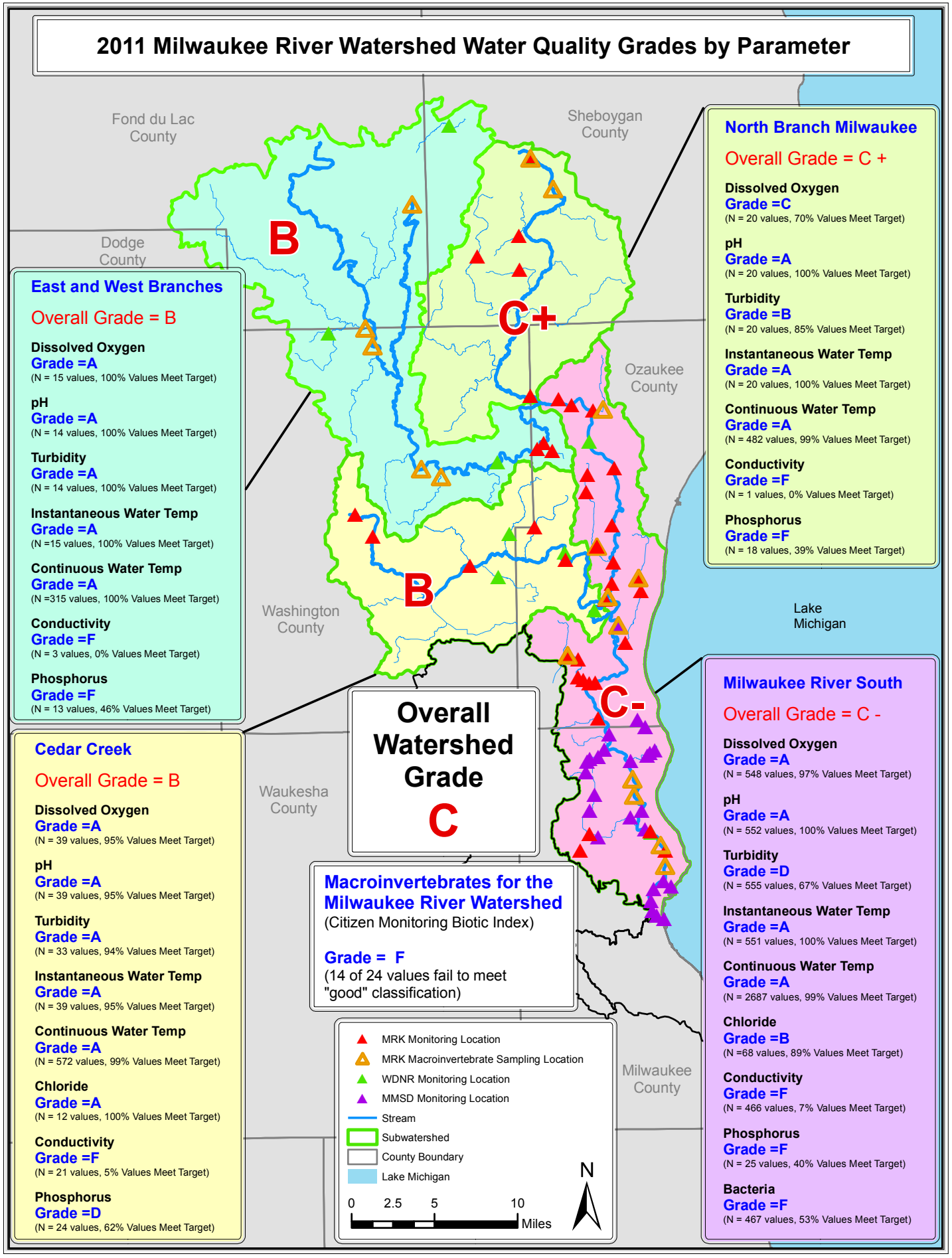
2011 Milwaukee River Watershed Water Quality Grades by Parameter



East and West Branches

Overall Grade = B

Dissolved Oxygen
Grade =A
(N = 15 values, 100% Values Meet Target)

pH
Grade =A
(N = 14 values, 100% Values Meet Target)

Turbidity
Grade =A
(N = 14 values, 100% Values Meet Target)

Instantaneous Water Temp
Grade =A
(N =15 values, 100% Values Meet Target)

Continuous Water Temp
Grade =A
(N =315 values, 100% Values Meet Target)

Conductivity
Grade =F
(N = 3 values, 0% Values Meet Target)

Phosphorus
Grade =F
(N = 13 values, 46% Values Meet Target)

North Branch Milwaukee

Overall Grade = C +

Dissolved Oxygen
Grade =C
(N = 20 values, 70% Values Meet Target)

pH
Grade =A
(N = 20 values, 100% Values Meet Target)

Turbidity
Grade =B
(N = 20 values, 85% Values Meet Target)

Instantaneous Water Temp
Grade =A
(N = 20 values, 100% Values Meet Target)

Continuous Water Temp
Grade =A
(N = 482 values, 99% Values Meet Target)

Conductivity
Grade =F
(N = 1 values, 0% Values Meet Target)

Phosphorus
Grade =F
(N = 18 values, 39% Values Meet Target)

Cedar Creek

Overall Grade = B

Dissolved Oxygen
Grade =A
(N = 39 values, 95% Values Meet Target)

pH
Grade =A
(N = 39 values, 95% Values Meet Target)

Turbidity
Grade =A
(N = 33 values, 94% Values Meet Target)

Instantaneous Water Temp
Grade =A
(N = 39 values, 95% Values Meet Target)

Continuous Water Temp
Grade =A
(N = 572 values, 99% Values Meet Target)

Chloride
Grade =A
(N = 12 values, 100% Values Meet Target)

Conductivity
Grade =F
(N = 21 values, 5% Values Meet Target)

Phosphorus
Grade =D
(N = 24 values, 62% Values Meet Target)

Milwaukee River South

Overall Grade = C -

Dissolved Oxygen
Grade =A
(N = 548 values, 97% Values Meet Target)

pH
Grade =A
(N = 552 values, 100% Values Meet Target)

Turbidity
Grade =D
(N = 555 values, 67% Values Meet Target)

Instantaneous Water Temp
Grade =A
(N = 551 values, 100% Values Meet Target)

Continuous Water Temp
Grade =A
(N = 2687 values, 99% Values Meet Target)

Chloride
Grade =B
(N =68 values, 89% Values Meet Target)

Conductivity
Grade =F
(N = 466 values, 7% Values Meet Target)

Phosphorus
Grade =F
(N = 25 values, 40% Values Meet Target)

Bacteria
Grade =F
(N = 467 values, 53% Values Meet Target)

Macroinvertebrates for the Milwaukee River Watershed

(Citizen Monitoring Biotic Index)

Grade = F
(14 of 24 values fail to meet "good" classification)

Health of Kinnickinnic & Menomonee Rivers

2011 is the first year Milwaukee Riverkeeper evaluated water quality data in the Kinnickinnic River (KK River) and Menomonee River Watersheds for our annual river report card.

However, these rivers were not ignored. In 2008, Riverkeeper and many other partners began a planning process, coordinated by the Southeastern Wisconsin Watersheds Trust (Sweet Water Trust), to create Watershed Restoration Plans for both of these urban watersheds. These plans identified cost-effective projects and policies to improve water quality in “hot spot” areas with heavy loading of phosphorus, bacteria, and sediment, which were identified by stakeholders as priority pollutants of concern. The Watershed Restoration Plans relied largely on data from the SEWRPC’s Regional Water Quality Management Plan, which collated and analyzed data from 1975 to present. Our citizen monitoring data was added to data from WDNR, MMSD, and other entities to inform creation of these plans and their subsequent Implementation Plans.

The Kinnickinnic and Menomonee River Watersheds are very similar, both containing high levels of urban development. The Kinnickinnic River Watershed is nearly 93% urban or developed with impervious surfaces. Also, large percentages of the Kinnickinnic River and its tributaries, such as Wilson Park Creek and Holmes Avenue Creek, have been modified with concrete-lined channels.

The Menomonee River Watershed is nearly 64% urban, and several of its major tributaries, such as Honey and Underwood Creeks, contain large stretches of concrete channel. The main stem of the Menomonee River does stretch northward into more rural areas and 22% of the watershed is still used for agriculture. While the Menomonee River contains a fairly generous riparian buffer

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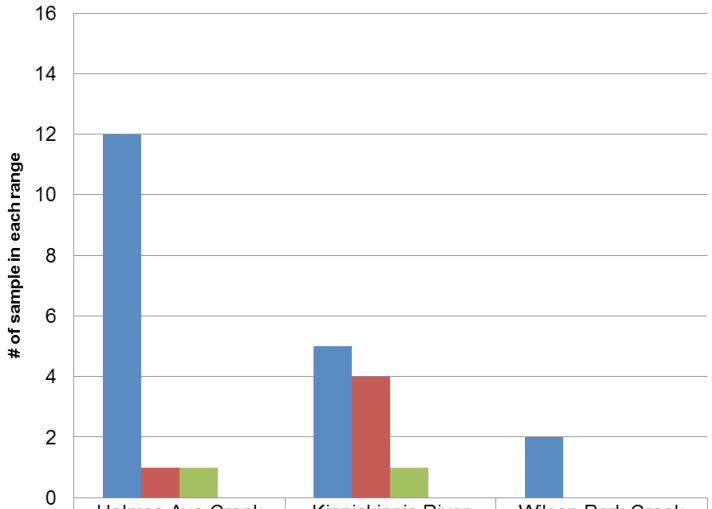
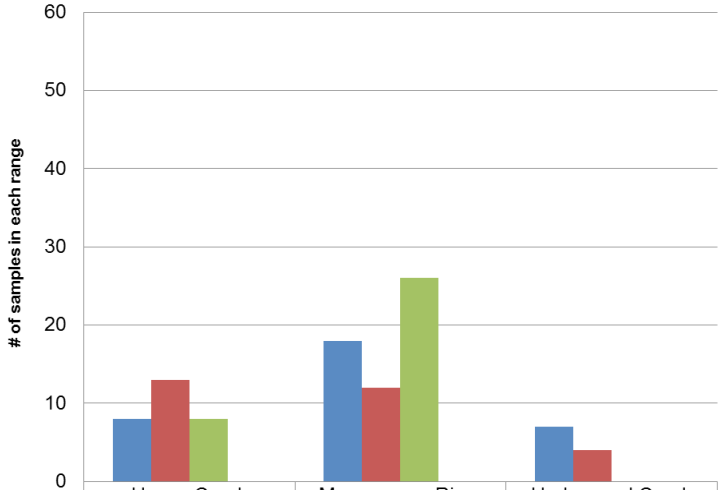
Kinnickinnic River Watershed
Human Bacteroides Sample Results



Bacteria Counts (Copy Number / 100 mL	Holmes Ave Creek	Kinnickinnic River	Wilson Park Creek
Low (CN < 1,000)	12	5	2
Medium (CN 1,000 - 10,000)	1	4	0
High (CN > 10,000)	1	1	0
Total # Samples	14	10	2

Menomonee River Watershed
Human Bacteroides Sample Results



Bacteria Counts (Copy Number / 100 mL	Honey Creek	Menomonee River	Underwood Creek
Low (CN < 1,000)	8	18	7
Medium (CN 1,000 - 10,000)	13	12	4
High (CN > 10,000)	8	26	0
Total # Samples	29	56	11

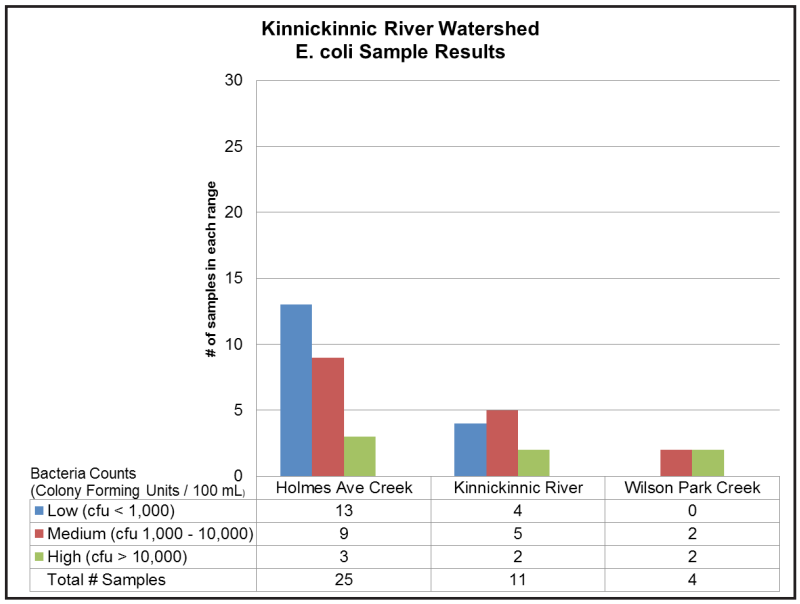
Milwaukee Riverkeeper is especially concerned with the contamination of stormwater by sanitary sewage through leaking private laterals, leaking storm sewer pipes, and illegal sanitary sewer connections to the stormwater system. These two charts show the extent and levels of human sewage contamination entering the Kinnickinnic and Menomonee River Watersheds through stormwater outfalls in our sampling area.


2011 Menomonee and KK River Watersheds Water Quality Grades
Washington County
Ozaukee County
Waukesha County
Milwaukee County
Lake Michigan
Menomonee River Watershed
KK River Watershed
D
D-
Goldendale Creek
Willow Creek
Menomonee River
Little Menomonee Creek
Dretzka Park Creek
Underwood Creek
Honey Creek
Kinnickinnic River
Wilson Park Creek
Menomonee River
Overall Grade = D
Dissolved Oxygen
Grade =B
(N = 445 values, 86% Values Meet Target)
pH
Grade =A
(N = 450 values, 100% Values Meet Target)
Turbidity
Grade =D
(N = 447 values, 68% Values Meet Target)
Instantaneous Water Temp
Grade =A
(N = 449 values, 100% Values Meet Target)
Continuous Water Temp
Grade =A
(N = 1756 values, 99% Values Meet Target)
Chloride
Grade =C
(N = 34 values, 79% Values Meet Target)
Conductivity
Grade =F
(N = 431 values, 5% Values Meet Target)
Phosphorus
Grade =F
(N = 19 values, 42% Values Meet Target)
Bacteria
Grade =F
(N = 718 values, 40% Values Meet Target)
Kinnickinnic River
Overall Grade = D -
Dissolved Oxygen
Grade =C
(N = 180 values, 77% Values Meet Target)
pH
Grade =A
(N = 177 values, 100% Values Meet Target)
Turbidity
Grade =F
(N = 179 values, 51% Values Meet Target)
Instantaneous Water Temp
Grade =A
(N = 180 values, 100% Values Meet Target)
Continuous Water Temp
Grade =A
(N = 119 values, 100% Values Meet Target)
Chloride
Grade =F
(N = 14 values, 36% Values Meet Target)
Conductivity
Grade =F
(N = 174 values, 13% Values Meet Target)
Phosphorus
Grade =C
(N = 9 values, 78% Values Meet Target)
Bacteria
Grade =F
(N = 192 values, 35% Values Meet Target)
MRK Monitoring Location
MRK Macroinvertebrate Sampling Location
WDNR Monitoring Location
MMSD Monitoring Location
Stream
Subwatershed
County Boundary
Lake Michigan
0 1 2 4
Miles
N
Menomonee River Watershed Macroinvertebrates
(Citizen Monitoring Biotic Index)
Grade = C
(3 of 7 values fail to meet "good" classification)
KK River Watershed Macroinvertebrates
(Citizen Monitoring Biotic Index)
Grade = F
(8 of 8 values fail to meet "good" classification)

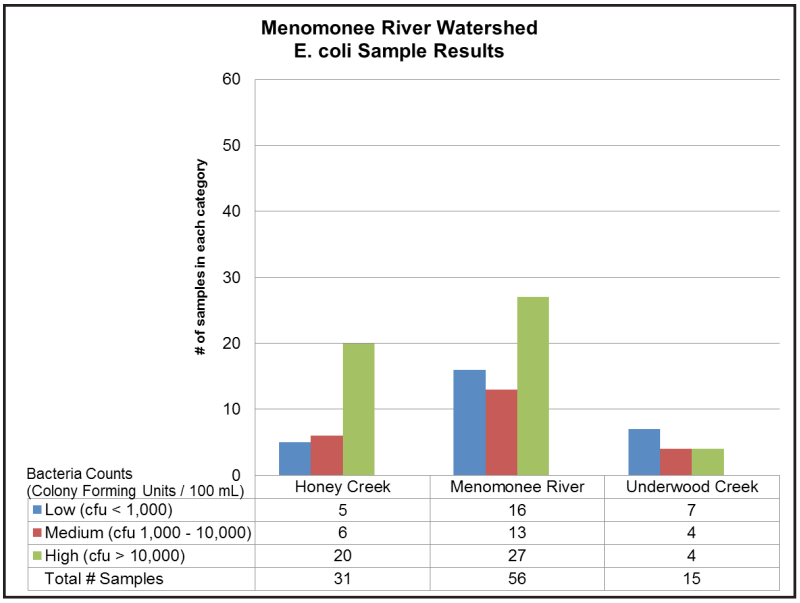
Spotlight: Bacteria and Human Bacteroides

Do You Like to Swim, Paddle, or Drink Water? If Yes, Bacteria Levels Matter!

In the mid 1980s the EPA listed the Milwaukee River Estuary (consisting of nearshore Lake Michigan and downstream portions of the Milwaukee, Menomonee and Kinnickinnic Rivers) as a Federal Area of Concern (AOC), due to its failure to meet water quality and wildlife goals. In addition to contaminated sediments and lack of wildlife habitat, the EPA stated that the estuary was impaired by bacteria and sewer overflows which regularly caused beach closings and recreational hazards.



Bacteria Counts (Colony Forming Units / 100 mL)	Holmes Ave Creek	Kinnickinnic River	Wilson Park Creek
Low (cfu < 1,000)	13	4	0
Medium (cfu 1,000 - 10,000)	9	5	2
High (cfu > 10,000)	3	2	2
Total # Samples	25	11	4



Bacteria Counts (Colony Forming Units / 100 mL)	Honey Creek	Menomonee River	Underwood Creek
Low (cfu < 1,000)	5	16	7
Medium (cfu 1,000 - 10,000)	6	13	4
High (cfu > 10,000)	20	27	4
Total # Samples	31	56	15

These charts demonstrate the loading of bacteria into the stream from water samples Riverkeeper took from stormwater outfalls. For reference, the in-stream recreational standard for E. coli is 235 colony forming units per 100 mL of sample (cfu / 100 mL).

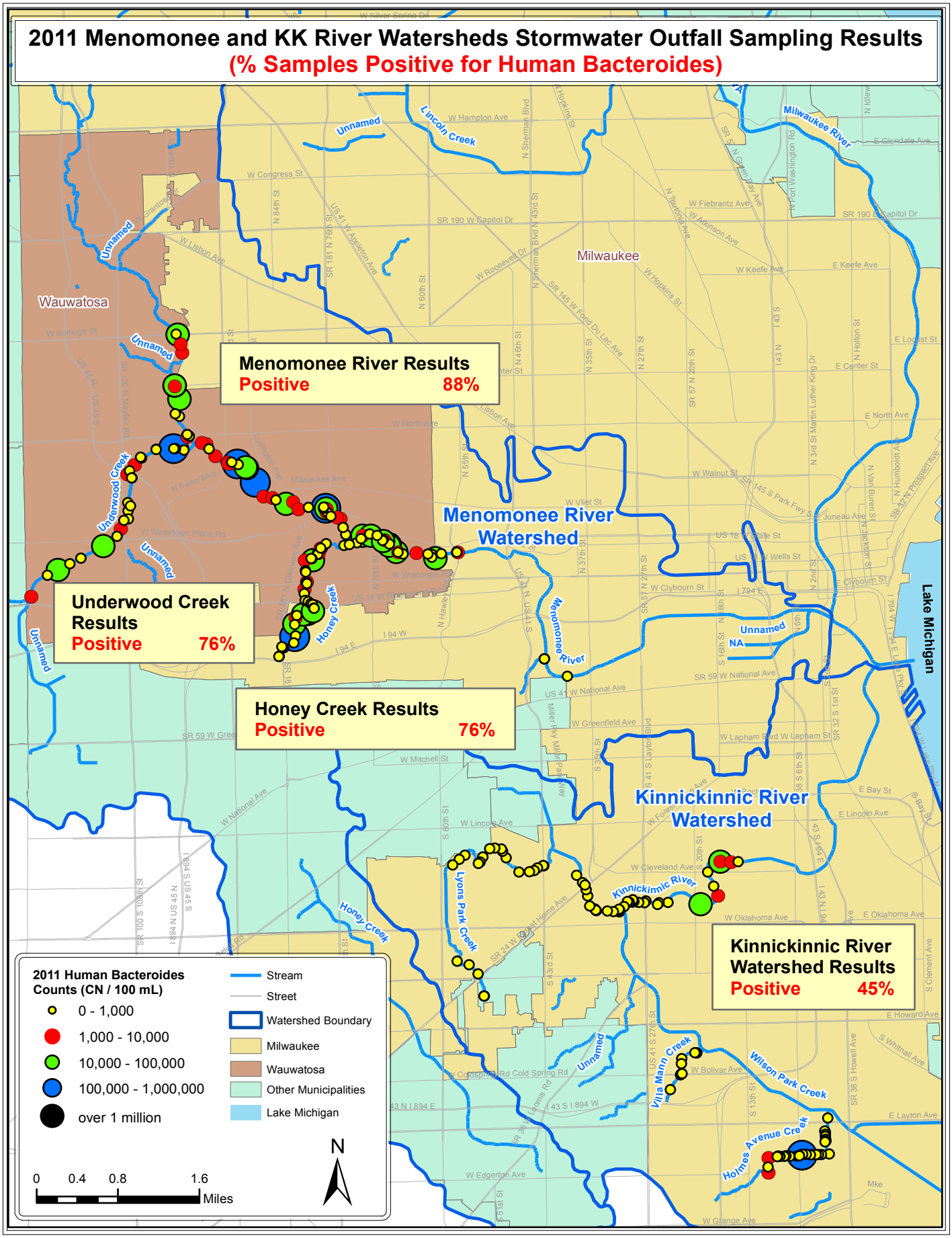
Despite substantial improvement in sewage treatment, water quality standards for recreation (including even "partial" body contact recreation such as canoeing and fishing) are still regularly exceeded, largely due to fecal coliform (the bacteria indicator for recreational use standards) in urban stormwater runoff. SEWRPC found out while compiling data for our regional water quality plan that 60-75% of the fecal coliform found in the lower Menomonee River could not be linked to stormwater runoff from rooftops, parking lots, streets, and other impervious surfaces, especially for the Menomonee River. Bacteria levels for the Kinnickinnic River were off the charts. So where is it coming from?

What's the Cause? Bacteria Find and Fix Project

Preliminary data from 2008-2011 show failing sanitary sewer infrastructure as a major source of bacteria and pathogens in urban stormwater. Broken and leaky stormwater pipes act as conduits for sewage from failing sanitary sewer pipes, dumping human waste into surface waters used for drinking water and recreation. Sanitary waste poses a more direct threat to human health due to extremely high concentrations of viruses, protozoa, and pathogenic bacteria associated with human waste, and it is more likely than urban stormwater runoff to contain pathogens.

In 2008, Riverkeeper began work with Dr. Sandra McClellan of the UWM-Great Lakes Water Institute as well as with MMSD, to identify and quantify the sanitary sewage contamination originating from stormwater within the AOC. Concentrating on hot spots indicated in the Menomonee and Kinnickinnic Rivers, Riverkeeper and its volunteers collect four storm sewer samples from each storm outfall; three during rain events and one from storm sewers that run in dry weather. Dr. McClellan's lab then analyzes these samples for *E. coli* and Enterococci, using high *E. coli*

continued on pg. 17



Graduated symbols show the highest bacteria count for each stormwater outfall tested in 2011.

Spotlight: Phosphorus

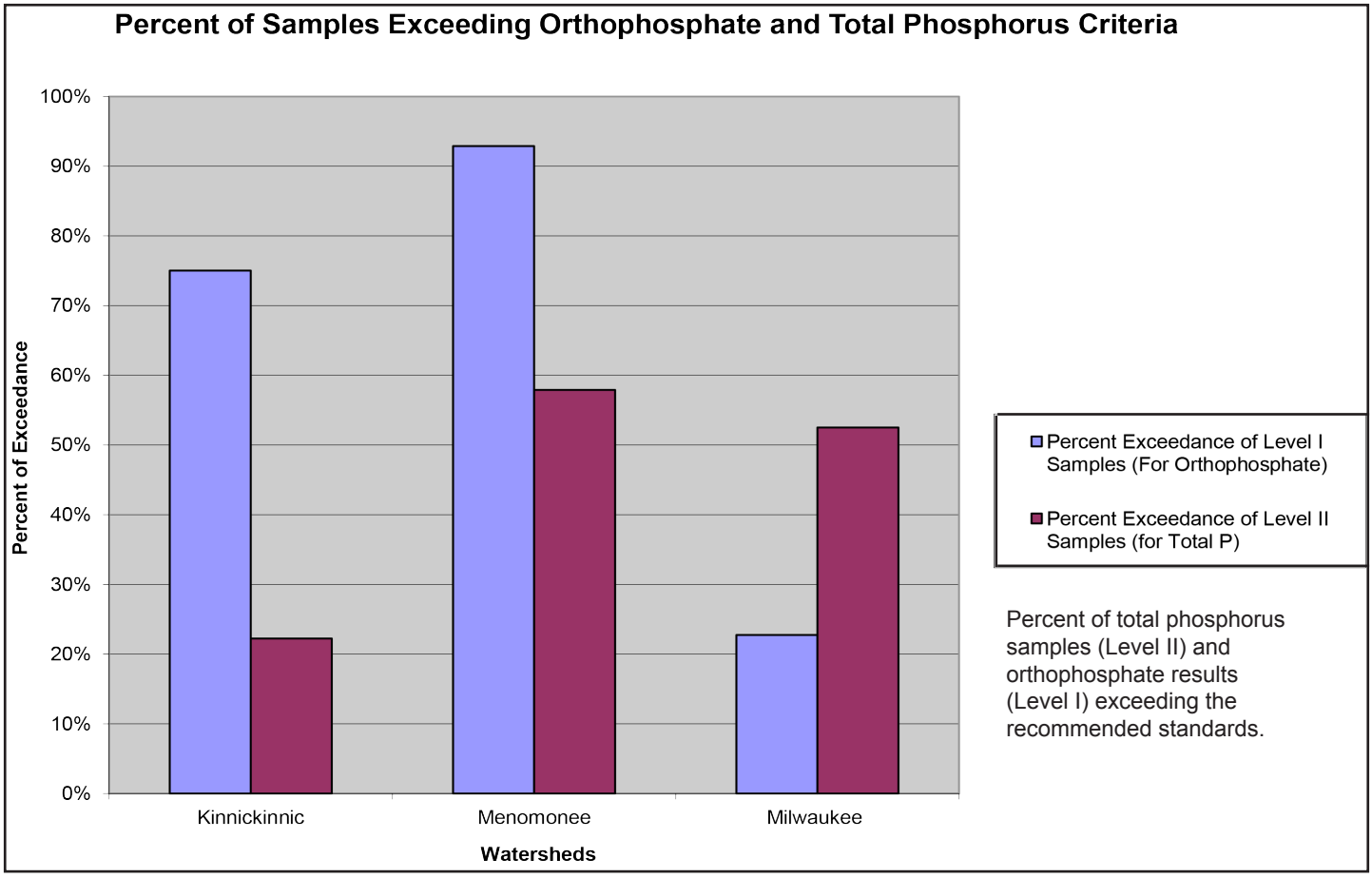
Working to Make Our Cities "Greener" and Our Rivers (and Lake Michigan) Bluer!

Algae blooms are frequent in the Milwaukee River Basin during summer, especially downstream from impoundments and dams and in concrete channelized streams that have warmer, nutrient rich waters. Excessive algae growth is largely caused by phosphorus pollution from urban and rural stormwater runoff, combined sewer overflows, and industrial facilities that use non-contact cooling water (usually public drinking water used to remove heat) that has been treated with phosphates as a corrosion inhibitor for lead pipes. In addition to being unsightly and often smelly, certain forms of algae can sicken humans and pets, cause fish kills (by depleting oxygen during the breakdown process), and force beach closings.

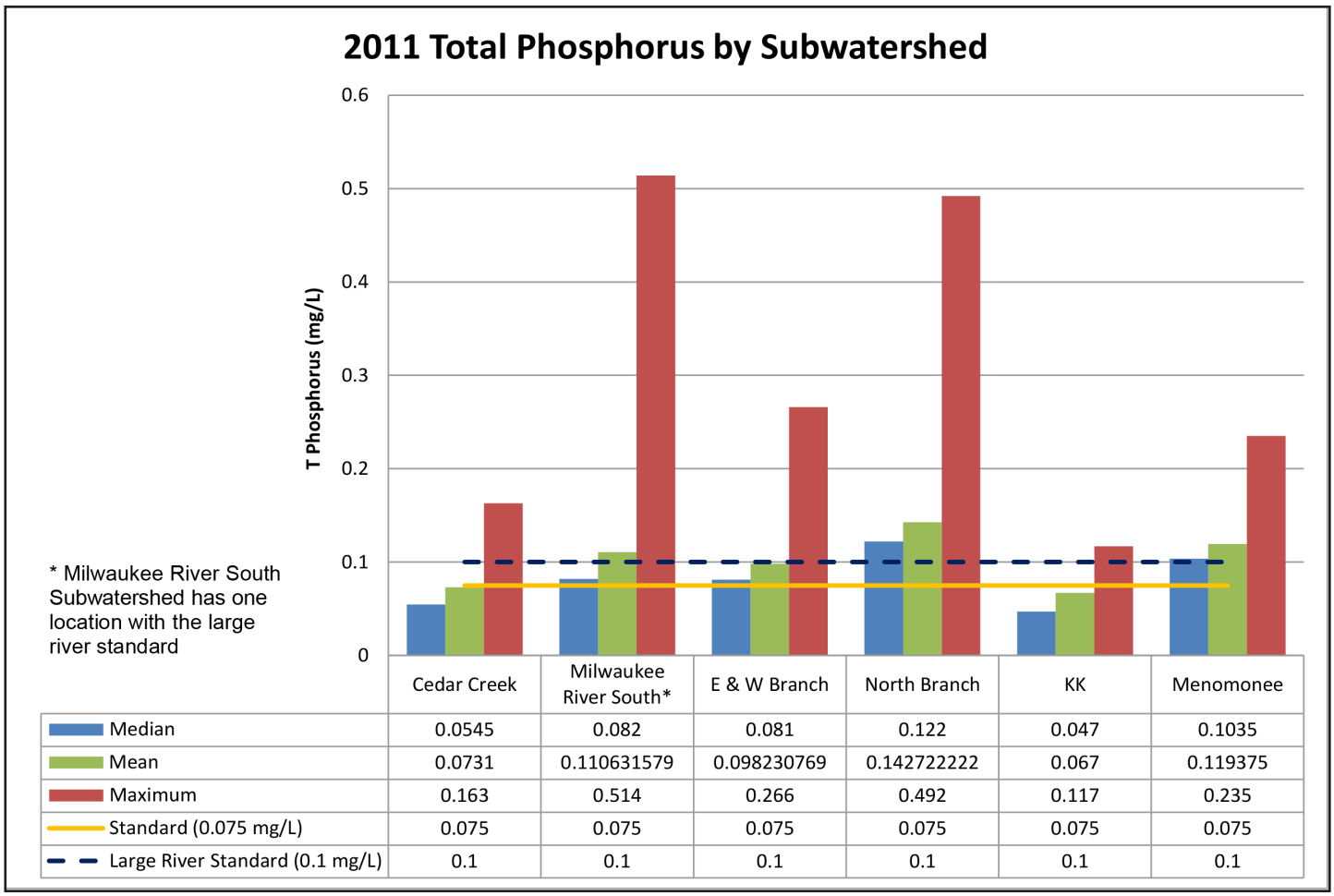
To address this problem, it's important to characterize the sources and levels of phosphorus in our waterways, especially in upstream areas and in smaller tributaries where WDNR and MMSD do not collect data. This is where our volunteer water quality monitors play an invaluable role; they are providing us with a more complete picture of where the phosphorus is coming from, enabling us to devise solutions to reduce this pollution. In addition, our volunteers help to track progress and measure effectiveness of restoration work in targeted areas per local Watershed Restoration Plans that were developed as part of the Southeastern Wisconsin Watersheds Trust effort.

Total Phosphorus Results

Our advanced water quality monitors (Level II volunteers) collected water samples from July through October 2011 at 26 sites throughout the Milwaukee River Basin as part of a pilot project funded by WDNR and coordinated by Riverkeeper with the help of River Alliance of Wisconsin. Riverkeeper received a grant from the Fund for Lake Michigan to continue monitoring through 2012. Water samples were sent to the State Lab of Hygiene for analysis. Significantly, only 7 out of 26 sites assessed for phosphorus met state standards. Several upstream creeks, including Fredonia Creek and Batavia Creek,



Percent of total phosphorus samples (Level II) and orthophosphate results (Level I) exceeding the recommended standards.



	Cedar Creek	Milwaukee River South*	E & W Branch	North Branch	KK	Menomonee
Median	0.0545	0.082	0.081	0.122	0.047	0.1035
Mean	0.0731	0.110631579	0.098230769	0.142722222	0.067	0.119375
Maximum	0.163	0.514	0.266	0.492	0.117	0.235
Standard (0.075 mg/L)	0.075	0.075	0.075	0.075	0.075	0.075
Large River Standard (0.1 mg/L)	0.1	0.1	0.1	0.1	0.1	0.1

Chart shows the median, average and maximum values for total phosphorus samples in each watershed / subwatershed.

had 100% exceedance levels for state standards, which are 0.1 mg/L for lower sections of our 3 main rivers, and 0.075mg/L for upper sections and tributaries. Overall, 43 of 93 or 46% of samples collected by citizen volunteers exceeded state standards.

The WDNR monitored another 10 sites in the Milwaukee River Basin for phosphorus in 2011—11 of 15 samples or 73% exceeded state standards. Summarizing phosphorus data from Riverkeeper volunteers and DNR in 2011, phosphorus standards were exceeded 22% of the time for Kinnickinnic River samples, 58% of the time for Menomonee River samples, and 53% of the time for Milwaukee River samples.

Orthophosphate Results

In addition to the work of our Level II volunteers and WDNR, from May through October 2011, beginner volunteers (or Level I volunteers) used orthophosphate kits to monitor phosphorus. The benefits of the kits are that they are easy to use, provide instantaneous results, and are more cost-effective. The drawback is that our state standards are for "total phosphorus" and not orthophosphate; however, the United States Environmental Protection Agency (EPA) and other agencies recognize that orthophosphate levels of 0.025 mg/L accelerate eutrophication (excessive algae and other aquatic vegetation growth) and recommend maximum levels of 0.1 mg/L for rivers and streams. Our volunteers collected 60 samples at 16 sites, and results showed that of 36 of these 60 samples or 60% of samples exceeded the 0.1 mg/L recommended maximum.

Baseline phosphorus monitoring is crucial to the continuing assessment of phosphorus impacts to our local streams. This data will help us measure the effectiveness of both management and policy efforts aimed at reducing phosphorus, and can also be used by WDNR for recommending rivers for the State's Impaired Waters List. Many of our urban rivers are already listed as impaired or not meeting state standards for phosphorus. For these rivers, a TMDL or Total Maximum Daily Load is currently being developed. The TMDL will create a phosphorus budget for a stream, or a plan to decrease phosphorus loading into impaired sections of streams by reducing phosphorus discharges both from permitted sources (e.g. industrial uses, sewage treatment plants), as well as from urban and rural stormwater runoff.

Chloride and Conductivity Monitoring: Assessing the Impact of Road Salt on Our Streams

Between February and December of 2011, 9 intrepid Milwaukee Riverkeeper volunteers monitored 10 sites throughout the Milwaukee River Basin as they participated in a pilot citizen chloride monitoring project. Milwaukee Riverkeeper served as local coordinator for this Madison and Milwaukee-based project (which also included Oak Creek, Fox River, and Root River sites), initiated by the WDNR and United States Geological Survey (USGS). Water quality experts are increasingly concerned that chloride concentrations in local streams, caused mainly from road salt-laden runoff from parking lots and streets, are creating a toxic environment for aquatic life.

Our hearty volunteers trudged through snow and broke through the thin surface ice covering many streams as they collected chloride samples and took conductivity measurements. Conductivity (or specific conductance) is the measure of the water's ability to conduct an electric current, and varies based on the number of ions or charged particles in the water. Conductivity is often used as an indicator of chloride (although it does not provide information on specific ions present). Volunteers used meters to monitor conductivity on a monthly basis and took 4 baseline water samples; the State Lab of Hygiene in Madison analyzed the samples for chloride concentration. Volunteers also responded to 6 "triggered" events, which were indicated by high conductivity readings from continuous water quality monitoring stations in local streams operated by USGS.

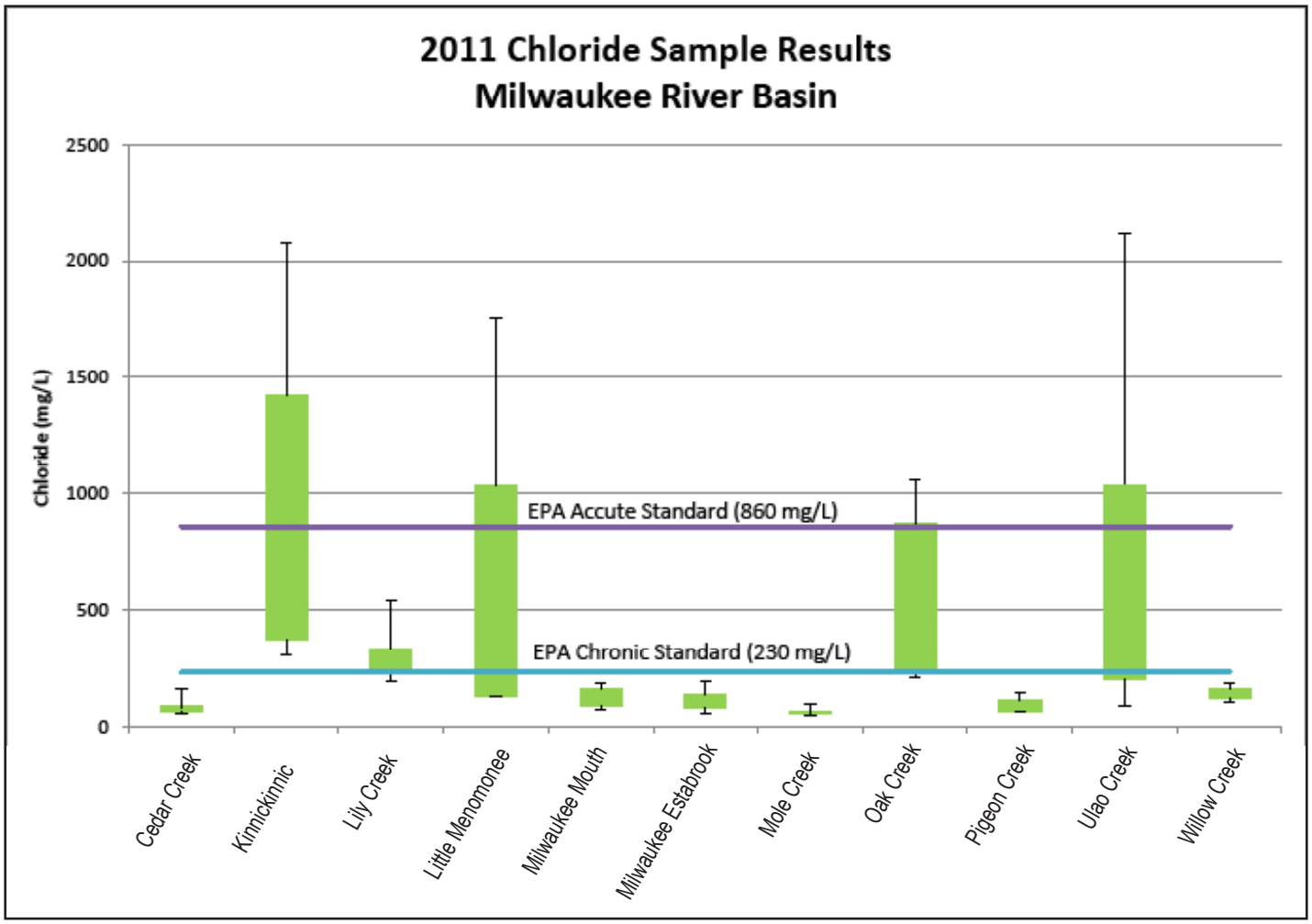
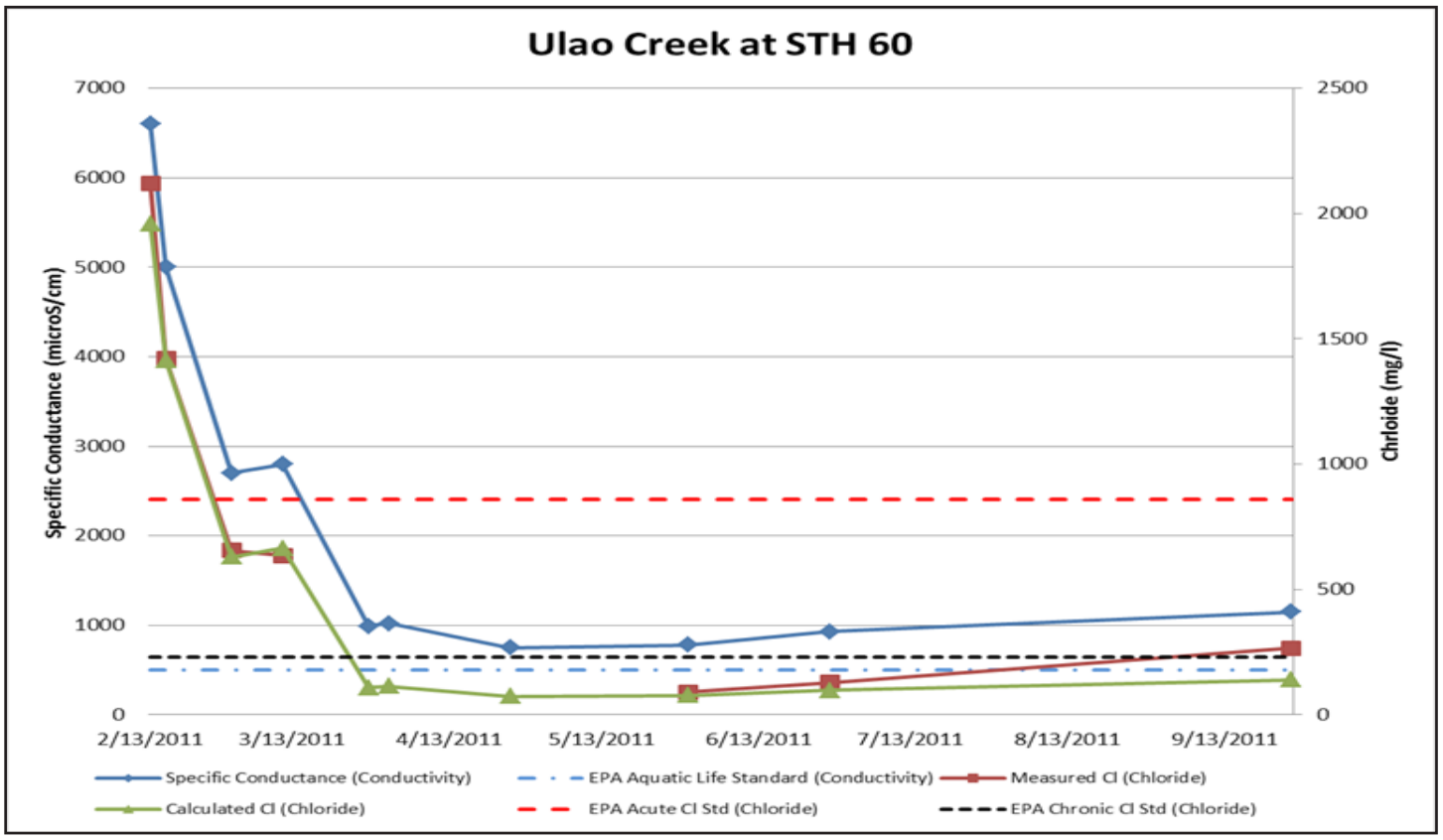


Chart shows high and low extremes (black lines or bars) as well as the median value range (50% of samples fall in this range, shown by green box) for each sampling location.



The Ulao Creek site is in a suburban commercial area near a large interstate interchange. Ulao Creek experiences extremely high levels of chloride during the road salt season (winter), but eventually recedes below acute threshold levels. It still hovers near the chronic level throughout the rest of the year, which could be a concern for fish and aquatic life.

Chloride Results

As we feared, there is great cause for concern. The EPA acute standard states that the one hour average chloride concentration should not exceed 860 mg/L more than once every three years. Volunteers collected 64 total water samples. In Milwaukee the acute standard was met 92.1% of the time, with the standard exceeded 7 times at the Kinnickinnic River (at 11th St.), Little Menomonee River (at HWY 145), and Ulao Creek (at HWY 60), collectively. The EPA chronic standard states that the chloride concentration should not exceed 230 mg/L (based on a four day calculated average) more than once every three years. In Milwaukee, the chronic standard was met only 71.9% of the time, with the standard exceeded 15 times, which includes Lily Creek (at Good Hope Rd) in addition to those already mentioned above. Overall, the Milwaukee River Basin received an overall grade of B for meeting chloride concentration goals; the Milwaukee Watershed received an A, the Menomonee Watershed received a C, and the Kinnickinnic Watershed received an F (although data points were limited).

Conductivity Results

Riverkeeper volunteers took 117 measurements for specific conductance, and WDNR staff took 15 measurements. EPA considers that a conductivity threshold conducive to aquatic life should be in the range of 150-500 umhos/cm or uS/cm. Our volunteer measurements ranged from 460 uS/cm at Little Menomonee River to 6,600 uS/cm at Ulao Creek. Interestingly, the Root River at Puetz Rd measured the lowest conductivity of 18.4 uS/cm and the Root River at Grange Ave hit the highest conductivity of 12,700 uS/cm. Sadly only 2.6% of conductivity measurements taken by Riverkeeper volunteers and WDNR met the EPA threshold.

MMSD also collects extensive conductivity data in its service area in the southern portion of the Milwaukee River Basin. Only 77 of 979 samples or 7.9% of MMSD samples met the EPA threshold. After combining all conductivity data points, only 7.3% of conductivity measurements met the EPA threshold, resulting in an overall F grade for conductivity for the Milwaukee River Basin as well as F grades for all subwatersheds that were measured. It is important to note that all rivers and lakes vary in conductivity naturally based on geology, and water on its own contains positive and negative ions (relative amounts are determined with pH readings). The extremely high conductivity levels found in our rivers are likely due not only to chloride, but also to significant concentrations of other contaminants including phosphate, sulfate, and nitrate (negative ions or anions) as well as calcium, magnesium, copper, mercury, iron, aluminum, and sodium (positive ions or cations). Human activities and historic industrial discharges likely increase conductivity levels in many of our urban areas.

Milwaukee River Grade, continued from pg. 6

phosphorus. The Milwaukee River received an F grade for phosphorus.

In summary, while most of the Milwaukee River Watershed sites monitored are regularly meeting standards for warm water sport fisheries, many of our smaller creeks continue to experience seasonal problems with oxygen during the hot summer months. The watershed also continues to have major problems with turbidity or clarity of the water due to localized impacts from construction activities and stormwater runoff from both agricultural and urbanized areas. In addition, high bacteria levels from both urban and rural stormwater runoff, failing sewer infrastructure, and sanitary sewer overflows during heavy rains continue to be a major problem. While chloride levels were generally good in 2011 (likely due to heavy dilution of road salt, especially in the main stem), extremely poor conductivity levels indicate significant contamination, indicative of urbanizing streams. Milwaukee River sites are only meeting phosphorus standards about half of the time, most likely caused by stormwater runoff from both urban and agricultural areas of the watershed, as well as from phosphorus contributions from several wastewater treatment plants throughout the watershed. A form of phosphorus is also added to the drinking water supplies of several watershed communities to inhibit leaching of lead from old water pipes.

Kinnickinnic and Menomonee Rivers Grades, continued from pg. 8

throughout much of Milwaukee County, a large stretch of the Menomonee flows through developed suburbs and cities, which makes it susceptible to large discharges of stormwater.

As urban development in the watersheds increased and wetlands and other natural areas that absorbed and slowed stormwater were filled and otherwise lost, flash flooding and poor water quality soon resulted. Local streams in both the Kinnickinnic and Menomonee River Watersheds were lined with concrete to move stormwater quickly away from flooding urban areas to Lake Michigan. Water quality became so bad that in 1997 American Rivers designated the Kinnickinnic the 7th most endangered river in the United States (Riverkeeper nominated the Kinnickinnic).

In 2011, MMSD monitored 26 sites in the Menomonee and 10 sites in the Kinnickinnic River Watershed, while Riverkeeper volunteers monitored 3 sites in the Kinnickinnic and 10 sites in the Menomonee River Watershed. Poor water quality results for 2011 are indicative of the urbanization of these two watersheds.

As might be expected in watersheds that are heavily influenced by large volumes of stormwater, the turbidity for both watersheds was subpar; the Kinnickinnic received a failing grade with only half of the samples meeting the threshold for fish stress and the Menomonee didn't fare much better with only 2/3 of the samples meeting this same threshold. In fact, two locations on the Menomonee main stem and one site on Underwood Creek failed to meet the turbidity threshold even once from May through October. While both watersheds received A grades for pH, and instantaneous and continuous water temperature (which was also the case for the Milwaukee River Watershed), the other parameters fared much worse with a mix of B's, C's, D's and F's.

The Menomonee met dissolved oxygen standards 86% of the time receiving a B grade, and the Kinnickinnic met dissolved oxygen standards only 77% of the time, receiving a C grade. Low oxygen levels are of great concern to sustaining viable populations of fish and aquatic life. Both the Kinnickinnic and Menomonee Watersheds scored an F for conductivity, with only 5% of Menomonee and 13% of Kinnickinnic River samples meeting the EPA's proposed threshold for aquatic life. Approximately 79% of Menomonee River samples met chloride standards, and only 36% of Kinnickinnic River samples met standards considered safe for aquatic life; this is largely indicative of road salt runoff in these largely urban watersheds. The Kinnickinnic River received a C grade for phosphorus, with about 78% of samples meeting new state water quality standards, and the Menomonee fared worse with only 42% of samples meeting standards. Phosphorus comes from fertilizers and sewage treatment plants, but is also added to the drinking water supply of Milwaukee as an anti-corrosion inhibitor. Drinking water is used by residents for watering lawns, cleaning cars, etc., and then enters our rivers through storm sewers. There are many industries, especially in the lower Menomonee, that use this phosphorus laden city water to cool their industrial operations, and discharge this "cooling water" into the river. This may account for the poor F grade for the Menomonee.

We are also deeply concerned with bacteria--as measured by *E. coli* as well as human *Bacteroides.* In particular, we are concerned with human bacteria, as it is more likely to contain viruses and pathogens that can make people sick. Both watersheds received an F grade for both *E. coli* and human *Bacteroides*. Samples collected from stormwater outfalls show that 45% of Kinnickinnic River Watershed samples and 88% of Menomonee River Watershed samples tested positive for human *Bacteroides*; all of this contaminated stormwater is flowing unfiltered into our local rivers. See our special section on human *Bacteroides* in this year's report card for more information (pg. 10).

levels to help prioritize human bacteria testing. The lab conducts a special genetic test (called qPCR) to identify the presence and relative abundance of human-specific markers of the "gut" bacteria called *Bacteroides*. This is important because bacteria from the human gut pose a greater human health risk than other sources of fecal contamination. In the past, this lack of information (human vs. nonhuman bacteria) has hampered implementation plans intended to reduce pathogens and remove recreational restrictions.

Our 2011 stormwater outfall sample data for *E. coli* showed that levels for this indicator were very high for the Menomonee River Watershed samples, with 65% of Honey Creek samples, 48% of Menomonee River samples, and 24% of Underwood Creek samples testing in the high range of over 10,000 colony forming units/100 mL (for reference, the in-stream standard is 235 colonies/100 mL). Our 2011 *E. coli* results for the Kinnickinnic River samples were better with most samples collected in the "low-to-medium" range and only 18% of watershed samples in the "high" range.

The 2011 stormwater samples that we tested for human *Bacteroides* showed that only 55% of samples collected for the Kinnickinnic River and 17.6% of samples collected for the Menomonee River tested negative for human sewage. Both watersheds received an F for their *Bacteroides* grades and overall F grades for all bacteria monitoring results, as they fail to meet standards that are protective of human health. We do not have *Bacteroides* data for the Milwaukee River, but that watershed also received an F grade based on the *E. coli* and fecal coliform data collected by MMSD.

Our bacteria monitoring aims to not only identify human bacteria sources that are likely to make people sick, but also to reduce bacteria levels in our rivers and the Milwaukee Estuary by better prioritizing stormwater outfalls to target for additional diagnostic testing (by MMSD and municipalities) and costly repairs.

MMSD In-Stream Bacteria Monitoring

MMSD collects significant in-stream bacteria data in their service area, with over 701 samples analyzed for fecal coliform and 535 samples analyzed for *E. coli* in 2011.

MMSD fecal coliform data shows that only 50.9% of samples from the Milwaukee River South, 51.2% of samples from the Menomonee, and 33.3% of samples from the Kinnickinnic River met the State Recreational Use Standard (200 colony forming units/100 ml). All subwatersheds and the overall Milwaukee River Basin were given a failing grade for fecal coliform.

MMSD's 2011 data for *E. coli* shows that stormwater samples only met the EPA Recreational Use Standard for *E. coli* (235 colonies per 100 ml) approximately 56.5% of the time for the Milwaukee River, 33.2% of the time for the Menomonee River, and 24.6% of the time for the Kinnickinnic River. All watersheds received a F for *E. coli*.

Photo by Milwaukee Riverkeeper Staff

Volunteer Monitor Spotlight

Milwaukee Riverkeeper is grateful to the more than 200 citizens who have actively participated in our volunteer stream monitoring programs since 2006. Three are highlighted below.

Ellen Conley and Jayne Henderson

Ellen Conley and Jayne Henderson are long-time best friends, outdoor enthusiasts, and all-around environmental stewards. Ellen is an art teacher and volunteer naturalist. Jayne coordinates river connection programs between Riveredge Nature Center near Newburg and the Urban Ecology Center in Milwaukee; teaching water quality and river ecology classes, as well as macroinvertebrate identification for students grades 4-12.

Ellen and Jayne have been monitoring Cedar Creek at the outlets of Big Cedar and Little Cedar Lakes in Washington County since 2009, with the monitoring locations having special resonance for Ellen who resides on Big Cedar. They have been a consistent and dedicated monitoring team, sampling on a monthly basis from May through October for the past 4 years. Jayne and Ellen have also recently taken on additional monitoring for phosphorus pollution.

Ellen and Jayne are proud to be a part of Milwaukee Riverkeeper, especially as they share our goals for improving the health of the Milwaukee River. They believe -- as do we -- that their monitoring and educational pursuits will continue to benefit the Watershed. Ellen and Jayne remark that “it is great to see the restoration efforts and the removal of dams - to return the river to its natural state…. also improving is the consciousness of the public about the importance of water issues. There is more work to do, but we are heading in the right direction.”

We would like to thank Ellen and Jayne for their dedication and enthusiasm for improving the Milwaukee River!

Brian LaFave

Brian LaFave found out about Milwaukee Riverkeeper while browsing a website listing volunteer opportunities. Being an avid outdoorsman and environmentalist with a strong interest in clean water and a vocation in water purification, Brian thought stream monitoring would be right up his alley.... and was he right!

Brian has been among our most consistent and dedicated volunteers since 2008. For the past five years he has enjoyed monitoring Mink Creek, Melius Creek and Batavia Creek in Sheboygan County; beautiful little streams in the Milwaukee River Watershed that remind him of his favorite fishing spots. Thanks to Brian’s efforts, we have crucial monitoring information from the North Branch Milwaukee River Subwatershed.

Brian enjoys testing water quality with Milwaukee Riverkeeper and says he would recommend volunteer stream monitoring to anyone interested in clean water and the environment. He has high hopes that the health of the streams in Sheboygan County will continue to improve and someday will allow for the re-introduction of native trout species. Brian states, “if we don’t take water conservation seriously, who will?” We at Milwaukee Riverkeeper could not agree more with Brian.

Thank you Brian!

If you are interested in joining Jayne, Ellen, and Brian as volunteer water quality monitors, please contact Milwaukee Riverkeeper. We hold trainings for Level 1 and Level 2 monitors each spring in late April or early May. For more information, see our website at www.milwaukeeriverkeeper.org, or contact Joe Rath at joe_rath@milwaukeeriverkeeper.org.

What YOU Can Do

Below are some easy things you can do to help restore the health of the Milwaukee River Basin. Thank you for your help and support!

Photo by Eddee Daniel

Reduce erosion and sediment entering the rivers

1) Adopt a River -- keep an eye on a section of river near you. Contact us to learn how.

2) Educate and participate in land stewardship activities such as tree planting and invasive species removal.

3) Report potential sources of pollution from construction sites or stormwater outfalls, eroding areas, and other problems to Milwaukee Riverkeeper at 414-287-0207 or to the WDNR at 1-800-TIP-WDNR.

Photo by Milwaukee Riverkeeper Staff

Reduce nutrients and polluted runoff

1) Prevent stormwater runoff by catching and encouraging slow infiltration of rain into soils with rain gardens, rain barrels, cisterns, and planting of native vegetation.

2) Pick up after pets -- pet waste is a major source of bacteria to our rivers.

3) Use water wisely both inside and outside the home. Minimize use of water during heavy rain storms to reduce stress on local sewers and protect rivers from sewage overflows.

4) Minimize or eliminate use of fertilizers and pesticides on your property.

5) Reduce or eliminate your use of salt on paved

Photo by Milwaukee Riverkeeper Staff

Stay engaged and help inform and educate others

1) Stay up-to-date on current issues affecting water quality and wildlife habitat. Sign up for Riverkeeper News.

2) Vote GREEN and advocate for fishable, swimmable, drinkable rivers and lakes. Contact elected officials and let them know that the health of the rivers and Lake Michigan is important to you.

3) Become involved in river cleanups, volunteer water quality monitoring, and other community events to protect our rivers and the land that drains to them.

Milwaukee River Report Card

— 2011 —

milwaukee RIVERKEEPER®

www.milwaukeeriverkeeper.org

Our Mission

Milwaukee Riverkeeper's mission is to protect water quality and wildlife habitat in the river corridors and to advocate for sound land use in the Milwaukee, Menomonee, and Kinnickinnic River Watersheds.

Milwaukee Riverkeeper serves as an advocate and voice for the Milwaukee, Menomonee, and Kinnickinnic Rivers. Our core programming involves patrolling, monitoring, and advocating on behalf of the rivers. We also coordinate hands-on river restoration projects and organize thousands of volunteers each year in river cleanups.

Milwaukee Riverkeeper is a licensed member of the Waterkeeper Alliance, an international coalition dedicated to clean water and healthy communities.

Our Vision

Milwaukee Riverkeeper envisions a future where all people within the Milwaukee River Basin can enjoy clean drinking water and fishable, swimmable rivers.

Contact Us!

For more information on the Milwaukee River Report Card and other programs of Milwaukee Riverkeeper or to volunteer, please contact us:

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