

Lake Sinissippi Water Quality Results 2002 – 2015

Lake Sinissippi Improvement District
Hustisford, Wisconsin
November 12, 2015

Contents

Water Quality Monitoring Program.....	1
Summary of Water Quality Data	1
Sampling Sites.....	1
How the Data Have Been Used	2
Lake Watershed and Pollutants	2
Concentrated Animal Feeding Operations	3
Public Health Considerations.....	3
Exposure to Illness-Causing Organisms	4
Public Health Considerations in Dodge County	4
References	4
Table 1. Water Quality Data Details.....	5
Table 2. Composite Lake Sample	8
Table 3. Comparison of Fecal Coliform vs. <i>E. coli</i>	8
Table 4. Public Health Monitoring 2005	9
Table 5. Public Health Monitoring 2006	10
Table 6. Public Health Monitoring 2007	11
Table 7. Public Health Monitoring 2008	12
Table 8. Public Health Monitoring 2009	13
Table 9. Public Health Monitoring 2010	14
Table 10. Public Health Monitoring 2011	15
Table 11. Public Health Monitoring 2012	16
Table 12. Public Health Monitoring 2013	17
Table 13. Public Health Monitoring 2014	18
Table 14. Public Health Monitoring 2015	19
Water Quality Analyses – Neider Park Landing	20
Water Quality Analyses – Lake Sinissippi and Rock River	21

Water Quality Monitoring Program

The Lake Sinissippi Improvement District began monitoring water quality in 2002. The program objectives were to develop baseline data of various water quality parameters and to determine the presence and extent of water pollution. Based on early results, the objectives were refined to identify pollution sources within the watershed and to provide data to local and state agencies responsible for improving quality of surface waters.

Initial sampling sites included several lake tributaries within the Towns of Clyman, Hustisford and Oak Grove. Sampling sites at the Rock River north of the lake, agricultural ditches draining to lake tributaries and several public and private lake access sites were added subsequently.

The sampling protocol used for the water quality monitoring program is based on US Environmental Protection Agency Document 841-B-97-003, Volunteer Stream Monitoring: A Methods Manual. The sampling protocol was reviewed by the Wisconsin Department of Natural Resources, Horicon Office. Analytical laboratories used for water quality analyses are Test America, Inc., Watertown, WI, and Wisconsin State Laboratory of Hygiene, Madison, WI.

Test parameters of the protocol include: N-ammonia, N-Kjeldahl, N-organic, total phosphorus (as P), total suspended solids, BOD five day, fecal coliform (membrane filtration) and qualitative *Escherichia coli*. A quantitative test for *E. coli* (MPN: most probable number) was added to the protocol in 2004. Nitrogen and BOD (biochemical oxygen demand) analyses will not be done on a regular basis after 2004.

Summary of Water Quality Data

The water quality monitoring summary includes data for fecal coliform, total phosphorus and total suspended solids, as these are useful parameters to evaluate microbiological contamination, nutrient loading and sediment runoff in waterways. (The data for nitrogen parameters and BOD are not included in the data table, but are available from the Lake District.)

Fecal bacterial indices are used as measures of water contamination by human and other mammalian waste. Recreational waters with fecal coliform levels greater than 200 colony forming units (cfu) per 100 ml are classified as “increased risk of illness” and trigger beach advisories. For the *E. coli* index the risk standard is at a level greater than 235 cfu (or MPN). Surface water in tributaries with high fecal bacterial indices contributes excess microbiological contamination to the lake. The higher the index, the greater the possibility that tributary water contains pathogenic microorganisms that pose a serious human health risk in recreational waters.

Total phosphorus levels greater than 0.1 mg/L (100 ug/L) indicate excessive nutrient loading that contributes to the eutrophic condition of the lake. Excess phosphorus comes from agricultural field runoff, urban runoff, wastewater treatment plants and shoreland runoff. High levels within the lake are also due in part to resuspension of phosphorus-bound sediment throughout the water column.

Values for total suspended solids in excess of 5 mg/L result from excessive field runoff, sediment from urban runoff, construction site erosion and shoreline erosion.

Acceptable levels (target levels) for the three test parameters are given. Data that exceed the acceptable levels are highlighted in bold type.

Sampling Sites

Sampling sites nos. 1 – 7 represent tributary waters west of Lake Sinissippi. These sites include outflow from agricultural ditches that collect runoff from two large dairy farms, from fields used for spreading dairy animal waste and from the Juneau Wastewater Treatment Plant. Sampling site no. 8, Rock River North, was established in 2004 to assess water quality of the largest tributary of the lake. Sampling from the Rock River is done at the Highway S bridge. Sampling sites nos. 9 – 12 are from designated locations on the lake.

On 6/30/2004 a composite sample of lake water taken from three different locations was tested for the presence of four pathogenic organisms: *Cryptosporidium*, *Giardia*, *Salmonella* and 0157 *E. coli*.

How the Data Have Been Used

1. High fecal coliform levels at Rushy Glen and Golf Course Creeks in June and July 2002 resulted from improper spreading of dairy animal manure on fields adjacent to the waterways. The data were reported to Wisconsin Department of Natural Resources (WDNR). These data and additional evidence resulted in a notice of violation of state water regulations (NOV) being issued to the responsible farm by WDNR. The Dodge County Planning and Development Committee also required as a permit condition the establishment of vegetative buffers along agricultural ditches within the subwatershed.
2. High fecal coliform levels at the Eagle Road site in April and May 2003 resulted from sewage bypass by the Juneau Wastewater Treatment Plant. The data were reported to WDNR.
3. High fecal coliform and total phosphorus levels at Shady Lane No. 1 on May 12, 2003, were a result of excessive farm field runoff during a rain event. These data and other evidence were used in a court hearing September 2003. The Lake District challenged the establishment of a farm drainage district at that site by the Dodge County Drainage Board. The court supported the Lake District concerns and denied the drainage board request.
4. Significant runoff occurred during early snowmelt February 29, 2004, at an agricultural field near highways 60/115. The farm field had no vegetative surface residue and no grassed buffers at the edge. The sediment-laden runoff flowed off the field into an agricultural ditch that empties into a tributary of the lake. The Dodge County Land Conservation Department was informed of the problem.
5. High fecal coliform levels at Shady Lane Nos. 1 and 2 in May 2004 were a result of runoff of barnyard waste and feed storage leachate at a large dairy farm. The data were reported to WDNR. NOV and enforcement actions were taken against the responsible farm. The data were also submitted to the county planning and development committee. The Lake District opposed the issuance of a conditional use permit by the county to increase the herd size of the farm. As of December 2004 the permitting process is on hold.
6. Fecal coliform levels in two samples taken in 2004 at Rock River North and Bitternut Island sites were in excess of the limit for recreational waters. These data were reported to the Dodge County Public Health Officer and the health officer for the City of Horicon.

Lake Watershed and Pollutants

Lake Sinissippi's physical location at the bottom of a large watershed is a key factor associated with the problems of improving water quality. During snow melt and heavy rain, runoff from agricultural fields makes its way into the lake with the Rock River water and from several small streams in the land surrounding the lake. Agricultural runoff brings nutrients and silt to the lake,

contributing to the growth of algae, increasing water turbidity and resulting in a gradual filling of the lake bottom.

Pollutants also reach the lake from upstream urban runoff, wastewater treatment plants, failed septic systems, boating spills, runoff from lakefront properties and soil erosion from construction sites. Runoff from lands used for spreading livestock manure and sludge waste from municipal and domestic sewage treatment contributes organic debris and fecal contamination. This runoff is often associated with pathogenic microbiological organisms that can pose a human health risk.

Concentrated Animal Feeding Operations

Large-scale livestock farming can be a significant source of nutrients, bacteria and other pathogenic microorganisms to surface waters. A 1,000-animal unit farm (equivalent to 700 dairy cows) can produce a quantity of sewage equal to that of a 5,000-person city. Storage, processing and field spreading of animal manure from large farms has the potential of causing serious environmental and public health problems.

The Dodge County Comprehensive Plan anticipates that the trend to larger farms will increase. In particular, the plan foresees an increase in the size of dairy herds and in the number of large dairy farms required to obtain state pollutant discharge permits. These trends will continue to pressure land and water resources.

Animal manure runoff from barnyards and spreading fields and livestock feces deposited directly into streams contaminate surface waters with fecal bacteria and protozoa. Many of these microorganisms are pathogenic to humans. For example, the *Cryptosporidium* protozoan is highly prevalent in ruminants and is readily transmitted to humans. Thus, management of livestock contamination of watersheds is an important public health issue (*Environmental Health Perspectives*, July 2004).

Public Health Considerations

The US Public Health Service in the 1960's conducted epidemiological studies of gastrointestinal diseases from water contact activities. The results of these studies led to the adoption of a fecal coliform index for evaluating the microbiological suitability of recreational waters. This index was adopted by the US Department of the Interior in 1968. It provided that the mean of not less than five samples taken over a 30-day period should not exceed 200 cfu per 100-ml sample, nor should more than 10 percent of total samples exceed 400 cfu per sample.

In 1986 the US Environmental Protection Agency published the Ambient Water Quality Criteria for Bacteria. This document gave the EPA's recommended criteria for bacteria in recreational waters for the protection of bathers from gastrointestinal illness. The studies found that use of *E. coli* and enterococci as indicator organisms gave better prediction of acute gastrointestinal illness than use of fecal coliforms. The EPA document was advisory only and Wisconsin (and many other states) continued until very recently to use the fecal coliform index.

Amendments (BEACH Act) to the Clean Water Act in 2000 required the EPA to establish, and states to adopt by April 2004, new quality standards for coastal recreational waters to protect human health. The new standards for Wisconsin include an advisory of "increased risk of illness" at *E. coli* levels greater than 235 cfu per sample and a "serious risk" advisory at *E. coli* levels in excess of 1,000 cfu. The Wisconsin DNR also requires water quality advisories whenever local health officials detect problems and whenever there is a sewer overflow or spill, heavy rainfall or other pollution event believed to impact *E. coli* levels. These standards are currently recommended for inland waters.

Exposure to Illness-Causing Organisms

The main route of exposure to illness-causing microorganisms in recreational waters is through direct contact with polluted water while swimming, bathing and water skiing and through accidental ingestion of contaminated water. In waters containing fecal contamination from human or other mammalian waste, waterborne diseases may result from the following:

1. Bacterial infection (such as cholera, salmonellosis and gastroenteritis)
2. Viral infection (such as infectious hepatitis and gastroenteritis)
3. Protozoan infection (such as cryptosporidiosis, amoebic dysentery and giardiasis)

Other illnesses and conditions affecting the eye, ear, skin and upper respiratory tract can be contracted as well. With these conditions, infection often results when pathogenic microorganisms enter the body through small breaks and tears in the skin or ruptures in the mucous membranes in the ear or nose.

Public Health Considerations in Dodge County

All but one of our neighboring counties (Dane, Fond du Lac, Green Lake, Jefferson, Washington and Waukesha) routinely test public recreational waters for quality. However, Dodge County does not test for water quality nor does the county have an environmental health specialist in the community support division.

The Lake District, therefore, provides water quality data to the county's public health officer to assist the county in meeting its environmental health responsibilities. The county health department is required to report known incidents of environmental contamination to the Wisconsin Department of Health and Family Services. The county is also required to restrict swimming, diving and recreational bathing if a human health hazard exists in an area used for those purposes on public waters and associated land.

In 2005, the Lake District partnered with Dodge County Public Health Unit, Bureau of Environmental Health of Wisconsin DHFS and Wisconsin DNR to conduct public health water quality monitoring of Lake Sinissippi and the Rock River. The data are given in Table 4.

References

Dodge County Planning and Development Department. 2003. Smart Growth/County Comprehensive Plan Elements. October 2003 draft.

Available: www.co.dodge.wi.us/planning/administration/smartgrowth.htm [accessed October 2004]

Patz, J.A. et al. 2004. Unhealthy landscapes: Policy recommendations on land use change and infectious disease emergence. *Environ Health Perspect* 112:1092-1098.

US Environmental Protection Agency. January 1986. Ambient Water Quality Criteria for Bacteria. Publication No. EPA440/5-84-002

Wisconsin Department of Health and Family Services, Division of Public Health. March 2004. Draft Water Quality Monitoring and Recreational Safety Guidelines for Wisconsin's Inland Beaches.

Wisconsin Department of Natural Resources. February 2002. The State of the Rock River Basin. Publication No. WT-668-2002

Wisconsin State Laboratory of Hygiene, Environmental Health Division. 2004. Water Microbiology for State and Federal Agencies. Available: www.slh.wisc.edu/ehd/watermicro/index.php [accessed June 2004]

Table 1. Water Quality Data Details

Sampling Date	Fecal Coliform	Total Phosphorus	Total Suspended Solids
	Acceptable / Target Levels:		
	< 200 cfu	<0.1 mg/L	< 5 mg/L
Site #1: Rushy Glen Creek			
02/01/2002	4	0.27	5
04/08/2002	>300	0.12	10
05/02/2002	>300	<0.1	7
06/04/2002	>30,000	0.18	18
06/11/2002	>3,000	0.5	160
09/03/2002	410	0.69	34
10/31/2002	40	0.12	15
04/01/2003	<10	<0.1	5
04/21/2003	96	<0.1	6
05/05/2003	199	<0.1	<1
05/11/2004	770	0.19	23
06/30/2004	510		
05/10/2005	440	0.17	14
06/21/2005	130	0.99	27
05/16/2006	110	<0.10	19
09/05/2006	50	1.0	26
Site #2: Golf Course Creek			
07/09/2002	>3,000	0.2	17
09/30/2002	1,130	2.2	19
10/31/2002	10	0.18	10
04/01/2003	<10	<0.1	6
04/21/2003	10	<0.1	8
05/05/2003	42	<0.1	3
05/10/2005	120	<0.10	25
05/16/2006	20	<0.10	12

Site #3: Dead Creek Hwy 115			
10/31/2002	<10		
04/01/2003	350	0.2	80
04/21/2003	1,790	0.14	3
05/05/2003	670	0.12	2
05/11/2004	>3,000	0.41	49
06/30/2004	100		
09/08/2004	10	0.32	11
05/10/2005	580	0.33	27
06/21/2005	44	0.52	44
09/13/2005	20	1.1	30
05/16/2006	70	<0.10	13
09/05/2006	1100	0.47	3
05/27/2008	240	0.18	27
06/15/2009		0.16	7.0
07/22/2009		0.28	18.0
08/26/2009		0.34	7.0
Site #4: Eagle Road			
04/01/2003	320	0.17	62
04/21/2003	>3,000	0.45	34
05/05/2003	>3,000	0.31	58
05/11/2004	120	0.22	14
06/30/2004	100		
09/08/2004	250	0.36	6
05/10/2005	240	0.19	3.0
06/21/2005	430	0.98	3.0
09/13/2005	370	0.39	24
05/16/2006	30	<0.10	<1.0
09/05/2006	520	0.78	7
Site #5: Shady Lane No. 1			
05/12/2003	>3,000	7.8	68
05/11/2004	>30,000	14	66
05/18/2004	>300,000	2.7	150

06/30/2004	6,300		
05/16/2006	10	0.95	4
Site #6: Shady Lane No. 2			
05/05/2003	135	0.11	5
05/12/2003	>150	0.26	2
05/18/2004	>3,000	0.42	5
05/16/2006	100	0.86	14
Site #7: Hwy 60/115 Ag Ditch			
02/29/2004			2,000
Site #8: Rock River North			
05/11/2004	40	0.33	61
05/18/2004	350	0.3	68
06/30/2004	30		
09/08/2004	10	0.26	52
05/10/2005	<10	0.33	84
06/21/2005	48	0.45	76
09/13/2005	50	0.54	58
05/16/2006	330	0.17	74
09/05/2006	20	<0.20	44
09/20/2007		0.20	25
05/27/2008	70	0.16	70
06/15/2009		< 0.20	30
07/22/2009		0.21	36
08/26/2009		< 0.20	49
Site #9: Butternut Island			
06/30/2004	80		
09/08/2004	280	0.32	41
05/10/2005	10	0.34	62
Site #10: Spearhead Launch			
04/01/2003	<10	<0.1	30
04/21/2003	20	0.46	140
05/05/2003	<10	0.26	62
06/30/2004	30		
09/08/2004	10	0.28	49
05/10/2005	<10	0.40	90
Site #11: Ski Club Dock Hwy E			
06/30/2004	<10		
09/08/2004	<10	0.33	53
05/10/2005	<10	0.39	94
09/13/2005	20	0.58	54
09/20/2007		0.14	38
06/15/2009		< 0.20	35
07/22/2009		0.18	36
08/26/2009		< 0.20	34
Site #12: Hustisford Dam			
05/11/2004	70	0.26	36
06/30/2004	30		
06/21/2005	280	0.42	68
09/13/2005	130	0.60	52

05/16/2006	10	0.19	61
09/05/2006	90	<0.20	38
05/27/2008	10	0.18	53

Table 2. Composite Lake Sample

Organism	Sample Results
<i>Cryptosporidium</i>	Absent by Count
<i>Giardia</i>	Absent by Count
<i>Salmonella</i>	<0.2 per 100ml
0157 <i>E. coli</i>	Absent per 500 ml

This sample was taken on June 30, 2004.

Table 3. Comparison of Fecal Coliform vs. *E. coli*

Sampling Site	Fecal Coliform	<i>E. coli</i>
	Acceptable / Target Levels:	
	< 200 cpu	< 235 MPN
Rock River North	30	12
Eagle Road	100	120
Shady Lane No. 1	6,300	>2,400
Dead Creek Hwy 115	100	104
Rushy Glen Creek	510	520
Butternut Island	80	105

These samples were taken on June 30, 2004.

Table 4. Public Health Monitoring 2005

The Lake Sinissippi Improvement District established in 2005 a collaborative study of the quality of Lake Sinissippi and the Rock River from the standpoint of public use of recreational waters. The study is conducted jointly with the Dodge County Public Health Unit, the Wisconsin Department of Health and Family Services, and the Wisconsin Department of Natural Resources. Sampling sites include public access points on the lake and river. Water samples are analyzed for *E. coli* bacteria an indicator organism of fecal contamination. Laboratory analysis for determination of *E. coli* is performed by the Wisconsin Laboratory of Hygiene in Madison, Wisconsin, with the financial support of the Wisconsin Department of Natural Resources.

Water Quality Monitoring (Public Health Bacteriological Parameters) of Recreational Waters Measured At Public Access Points of Lake Sinissippi and Rock River in 2005

Sample Site	River Bend Park		Hubbard Boat Launch		Butternut Island		Neider Park Landing		Hustisford Ski Club Dock	
	Sample Date	Fecal coli	<i>E. coli</i>	Fecal coli	<i>E. coli</i>	Fecal coli	<i>E. coli</i>	Fecal coli	<i>E. coli</i>	Fecal coli
05-24-05	<10	14.0	30	17.0	<10	3.1	50	39.0	10	1.0
06-02-05	30	41.0	30	19.9	<10	2.0	10	2.0	10	8.6
06-02-05	--	19.0	--	50.0	--	2.0	--	28.0	--	1.0
06-15-05	10	48.0	110	126.0	10	17.0	700	1414.0	20	7.0
06-23-05	--	29.0	--	61.0	--	19.0	--	60.0	--	6.2
06-29-05	40	32.0	10	2.0	30	19.1	40	40.0	10	8.5
07-07-05	10	12.0	10	1.0	10	15.0	200	370.0	<10	7.4
07-13-05	70	16.0	370	62.0	40	4.0	30	8.0	20	4.0
07-21-05	570	410.0	1900	2000.0	20	29.0	6600	4900.0	170	73.0
07-26-05	530	820.0	70	43.0	50	29.0	1400	690.0	20	12.0
08-04-05	90	41.0	180	160.0	<10	2.0	180	650.0	<10	11.0
08-11-05	<10	26.0	50	33.0	10	11.0	570	550.0	40	37.0
08-18-05	260	290.9	460	290.9	210	204.6	4200	>2419.2	<10	5.1
08-29-05	20	11.0	80	30.0	<10	5.0	40	18.0	<10	1.0
09-01-05	10	26.0	10	11.0	40	48.0	40	36.0	10	4.1
09-07-05	40	25.0	<10	<1.0	<10	7.0	10	4.0	10	3.0

Table 5. Public Health Monitoring 2006

Measured At Public Access Points of Lake Sinissippi and Rock River in 2006

Sample Site	River Bend Park	Hubbard Boat Launch	Butternut Island	Neider Park Landing	Neider Park North	Hustisford Ski Club Dock	Wildcat Road West	Wildcat Road East
Sample Date	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>
05-25-2006	20.0	54.0	2.0	11.0	100.0	1.0	12.0	46.0
06-01-2006	72.0	77.0	15.0	71.0	54.0	2.0	3.0	42.0
06-08-2006	48.0	30.0	18.0	33.0	32.0	10.0	6.0	37.0
06-15-2006	6.3	11.0	19.0	31.0	20.0	15.0	15.0	25.0
06-22-2006	19.0	13.0	17.0	29.0	71.0	5.0	3.0	20.0
06-29-2006	19.0	45.0	83.0	23.0	17.0	6.3	3.1	14.0
07-06-2006	15.0	22.0	3.0	17.0	11.0	3.0	2.0	6.0
07-12-2006	150.0	50.0	11.0	210.0	170.0	230.0	2,000.0	41.0
07-20-2006	1,100.0	35.0	110.0	2,400.0	1,200.0	34.0	16.0	110.0
07-25-2006	49.0	28.0	5.0	866.0	40.0	5.0	57,300.0	15.0
08-01-2006	23.0	34.0	2.0	411.0	72.0	29.0	27.0	41.0
08-07-2006	50.0	35.0	16.0	124.0	151.0	10.0	172.0	8.0
08-15-2006	11.0	4.0	15.0	23.0	34.0	4.0	8.0	8.0
08-22-2006	18.0	6.0	9.0	38.0	22.0	7.0	25.0	18.0
08-28-2006	24.0	43.0	18.0	27.0	200.0	11.0	17.0	13.0
09-05-2006	26.0	4.1	17.0	20.0	39.0	2.0	25.0	11.0

Table 6. Public Health Monitoring 2007

Measured At Public Access Points of Lake Sinissippi and Rock River in 2007

Sample Site	River Bend Park	Hubbard Boat Launch	Butternut Island	Neider Park Landing	Hustisford Ski Club Dock
Sample Date	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>
05-29-2007	16.0	23.0	4.0	22.0	2.0
06-05-2007	39.0	86.0	4.0	110.0	7.0
06-12-2007	9.7	33.0	2.0	8.5	6.3
06-19-2007	46.0	200.0	5.0	650.0	17.0
06-26-2007	20.0	460.0	35.0	26.0	4.0
07-06-2007	49.0	25.0	110.0	290.0	10.0
07-12-2007	56.0	10.0	<1.0	66.0	8.0
07-18-2007	22.0	10.0	14.0	1,100.0	2.0
07-23-2007	44.0	7.0	10.0	35.0	13.0
07-30-2007	24.0	5.0	13.0	2,419.0	<1.0
08-07-2007	140.0	15.0	9.0	2,400.0	15.0
08-13-2007	40.0	25.0	14.0	299.0	6.0
08-21-2007	2,400.0	390.0	42.0	520.0	12.0
08-29-2007	180.0	23.0	25.0	360.0	2.0
09-04-2007	75.0	27.0	12.0	130.0	3.0

Table 7. Public Health Monitoring 2008

Measured At Public Access Points of Lake Sinissippi and Rock River in 2008

Sample Site	River Bend Park	Hustisford Ski Club Dock	Butternut Island	Neider Park Landing
Sample Date	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>
05-27-2008	13.0	7.0	1.0	22.0
06-03-2008	40.0	6.0	11.0	58.0
06-11-2008	387.0	118.0	107.0	238.0
06-18-2008	55.0	12.0	23.0	866.0
06-24-2008	57.0	16.0	152.0	88.0
06-30-2008	110.0	9.0	4.0	53.0
07-14-2008	52.0	5.2	1.0	41.0
07-21-2008	105.0	4.0	1.0	40.0
07-28-2008	40.0	<1.0	4.0	387.0
08-05-2008	88.0	7.0	<1.0	58.0
08-12-2008	60.0	3.0	7.0	11.0
08-18-2008	32.0	2.0	5.0	22.0
09-02-2008	15.0	2.0	12.0	15.0

Note: Samples for July 7, 2008 are not available; they were lost in transit.

Table 8. Public Health Monitoring 2009

Measured At Public Access Points of Lake Sinissippi and Rock River in 2009

Sample Site	River Bend Park	Hustisford Ski Club Dock	Butternut Island	Neider Park Landing
Sample Date	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>
06-15-2009	42.2	2.0	8.6	45.5
07-01-2009	55.0	1.0	29.0	210.0
07-15-2009	62.0	6.0	15.0	9.0
07-29-2009	50.0	4.0	5.0	25.0
08-11-2009	10.8	4.1	2.0	36.4
08-24-2009	28.0	4.0	16.0	11.0
09-08-2009	34.0	3.0	152.0	3.0

Table 9. Public Health Monitoring 2010

Water Quality Monitoring (Public Health Bacteriological Parameters) of Recreational Waters Measured At Public Access Points of Lake Sinissippi and Rock River in 2010

Sample Site	River Bend Park	Hustisford Ski Club Dock	Butternut Island	Neider Park Landing
Sample Date	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>
05-25-2010	37.0	10.0	2.0	88.0
06-08-2010	51.0	48.0	26.0	102.0
06-21-2010	56.0	6.0	25.0	78.0
07-06-2010	44.0	<1.0	7.0	17.0
07-19-201	128.0	13.0	34.0	59.0
08-02-2010	72.0	4.0	20.0	10.0
08-11-2010	8.0	169.0	19.0	16.0
08-30-2010	26.0	3.0	44.0	21.0
09-07-2010	55.0	10.0	135.0	5.0

Table 10. Public Health Monitoring 2011

Water Quality Monitoring (Public Health Bacteriological Parameters) of Recreational Waters Measured At Public Access Points of Lake Sinissippi and Rock River in 2011

Sample Site	River Bend Park	Hustisford Ski Club Dock	Butternut Island	Neider Park Landing
Sample Date	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>
05-31-2011	26.0	17.0	44.0	110.0
06-13-2011	29.0	29.0	2.0	16.0
06-27-2011	29.0	5.0	21.0	28.0
07-11-2011	290.0	70.0	17.0	870.0
07-25-2011	24.0	8.0	4.0	35.0
08-08-2011	23.0	5.0	6.0	16.0
08-22-2011	30.0	2.0	38.0	18.0
09-07-2011	20.0	2.0	39.0	20.0

Table 11. Public Health Monitoring 2012

Water Quality Monitoring (Public Health Bacteriological Parameters) of Recreational Waters Measured At Public Access Points of Lake Sinissippi and Rock River in 2012

Sample Site	River Bend Park	Hustisford Ski Club Dock	Butternut Island	Neider Park Landing
Sample Date	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>
06-07-2012	5.0	4.0	5.0	2.0
06-18-2012	56.0	7.0	68.0	26.0
07-02-2012	8.0	20.0	3.0	21.0
07-16-2012	29.0	3.0	20.0	27.0
08-08-2012	17.0	10.0	15.0	21.0
08-22-2012	21.0	3.0	172.0	54.0
09-04-2012	11.0	1.0	130.0	69.0

Table 12. Public Health Monitoring 2013

Water Quality Monitoring (Public Health Bacteriological Parameters) of Recreational Waters Measured At Public Access Points of Lake Sinissippi and Rock River in 2013

Sample Site	River Bend Park	Hustisford Ski Club Dock	Butternut Island	Neider Park Landing
Sample Date	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>
05-29-2013	517.0	5.0	21.0	17.0
06-18-2013	91.0	5.0	38.0	25.0
06-26-2013	83.0	10.0	5.0	105.0
07-16-2013	44.0	14.0	11.0	40.0
07-30-2013	15.0	5.0	30.0	117.0
08-13-2013	64.0	16.0	27.0	29.0
08-26-2013	53.0	16.0	23.0	20.0
09-03-2013	15.0	1.0	17.0	8.0

Table 13. Public Health Monitoring 2014

Water Quality Monitoring (Public Health Bacteriological Parameters) of Recreational Waters Measured At Public Access Points of Lake Sinissippi and Rock River in 2014

Sample Site	River Bend Park*	Hustisford Ski Club Dock	Butternut Island	Neider Park Landing
Sample Date	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>
05-27-2014	365.0	19.0	3.0	18.0
06-09-2014	579.0	14.0	12.0	4.0
06-24-2014*	272.0	36.0	155.0	387.0
07-07-2014	291.0	6.0	13.0	26.0
07-28-2014	411.0	5.0	12.0	64.0
08-11-2014	866.0	1.0	11.0	38.0
08-25-2014*	65.0	30.0	54.0	2,420.0
09-03-2014	19.0	8.0	52.0	47.0

*A leaking sanitary sewer line was discovered upstream of the park. It was replaced following the 8/11 sampling.

*Rain events - 6/23 (0.98 in), 8/25 (0.28 in)

Laboratory analysis at Wisconsin State Laboratory of Hygiene, Madison, WI 53718 reported data: *E. coli* MPN (Most Probable Number) per 100-ml sample to assess risk of acquiring gastrointestinal illness as a result of using recreational waters. EPA and WDNR recommend posting beach advisories whenever sample results for *E. coli* exceed 235 MPN for a single sample or 126 MPN as a geometric mean of at least 5 samples collected over a 30-day period. Beach closure is recommended whenever the level of *E. coli* exceeds 1,000 MPN.

Table 14. Public Health Monitoring 2015

Water Quality Monitoring (Public Health Bacteriological Parameters) of Recreational Waters Measured At Public Access Points of Lake Sinissippi and Rock River in 2015

Sample Site	River Bend Park*	Hustisford Ski Club Dock	Butternut Island	Neider Park Landing
Sample Date	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>
2015-05-27	69.0	21.0	24.0	122.0
2015-06-08	91.0	6.0	38.0	23.0
2015-06-22*	87.0	14.0	461.0	2420.0
2015-07-06	47.0	5.0	8.0	58.0
2015-07-20	30.0	13.0	16.0	78.0
2015-08-03	70.0	3.0	15.0	131.0
2015-08-18	133.0	15.0	14.0	40.0
2015-09-08*	687.0	19.0	38.0	2420.0

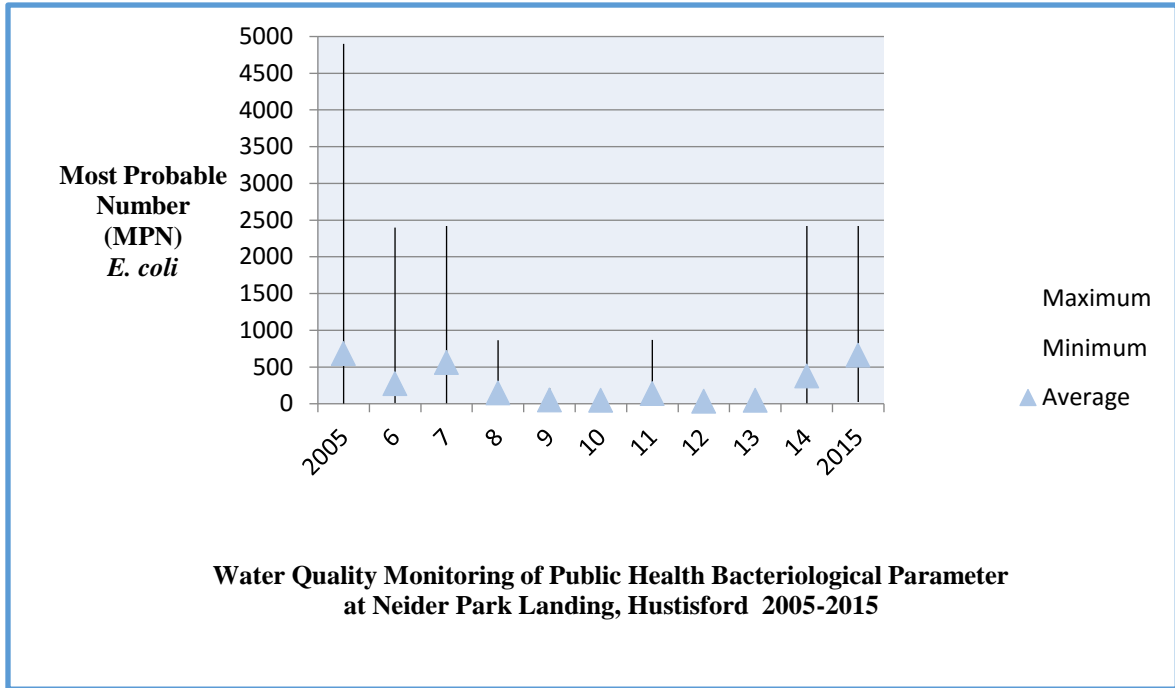
* Rain events - 6/21 (0.5 in), 9/7 (1.5 in)

Source: Lake Sinissippi Improvement District, Hustisford, WI 53034
Laboratory analysis at Wisconsin State Laboratory of Hygiene, Madison, WI 53718

Reported data: *E. coli* MPN (Most Probable Number) per 100 ml sample to assess risk of acquiring gastrointestinal illness as a result of using recreational waters.

EPA and WDNR recommend posting beach advisories whenever sample results for *E. coli* exceed **235** MPN for a single sample or **126** MPN as a geometric mean of at least 5 samples collected over a 30-day period.
Beach closures whenever the level of *E. coli* exceeds **1,000** MPN.

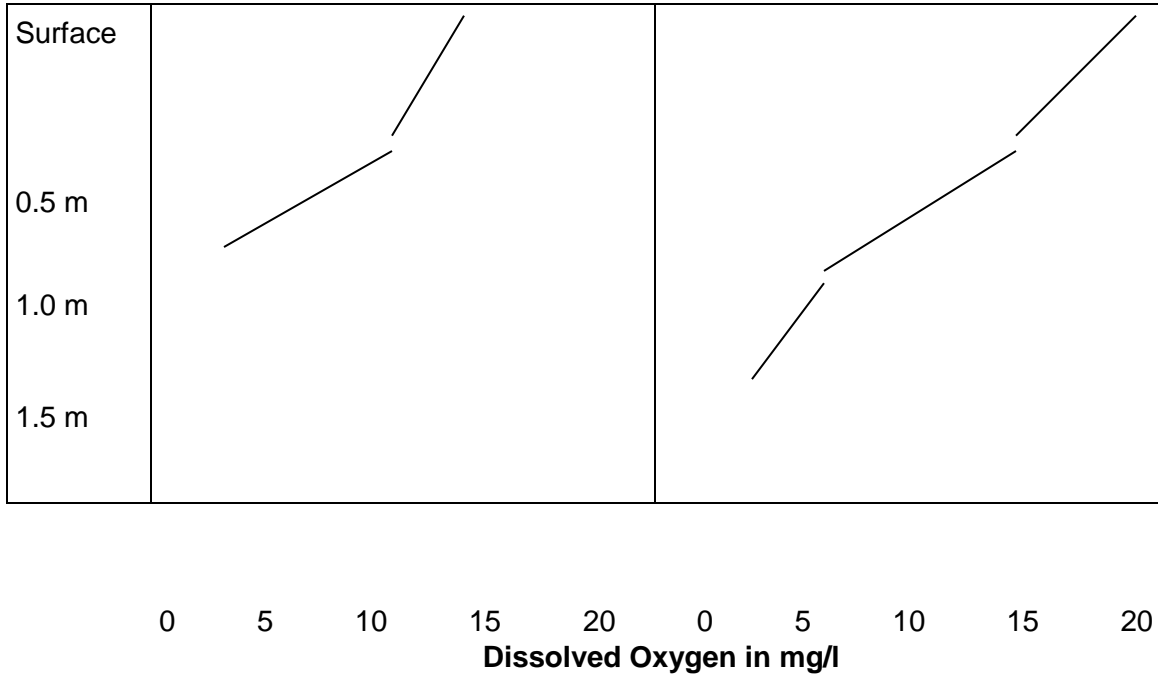
Water Quality Analyses – Neider Park Landing



Water Quality Analyses – Lake Sinissippi and Rock River
Samples taken 1:00 – 3:00 PM, August 13, 2007

Hustisford Ski Club Dock
 Lake Sinissippi
 (water depth 1 m)

River Bend Park Launch
 Rock River
 (water depth 1.5 m)



Ski Club Dock

River Bend Park

Depth	DO mg/l	Temp °C		DO mg/l	Temp °C
Surface	14.2	28		19.4	29
0.5 m	10.2	27.5		14.2	28
1.0 m	2.8	27		6.6	26.5
1.5 m				3.1	26

Parameter		Ski Club Dock		River Bend Park
Ammonia as N	mg/l	0.60		0.28
BOD – 5 Day	mg/l	20		18
Organic Nitrogen	mg/l	4.0		2.8
Phosphorus, Total	mg/l	0.45		0.31
Total Suspended Solids	mg/l	60		44
Total Kjeldahl Nitrogen	mg/l	4.6		3.1
Chlorophyll a	ug/l	259		285

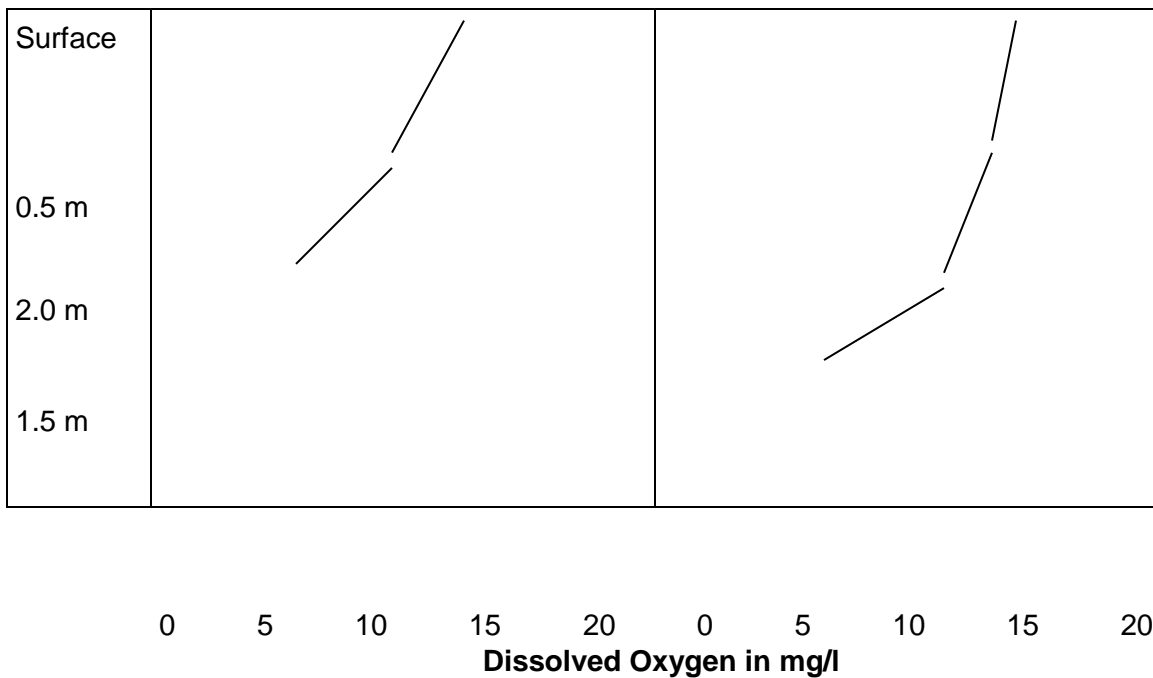
Secchi Disc Depth	m	0.2		0.4
-------------------	---	-----	--	-----

Values of dissolved oxygen and temperature by probe from WDNR-Horicon station. Water depth of samples for chemical analyses 0.2 m. Chlorophyll a determination by Wisconsin State Laboratory of Hygiene. Determination of values of other chemical parameters by TestAmerica, Watertown, WI. Weather was clear and sunny; rain had fallen within 24 hours prior to sampling; air temperature 80 °F (27 °C). Samples taken by Lake Sinissippi Improvement District.

Water Quality Analyses – Lake Sinissippi and Rock River Samples taken 1:00 – 2:00 PM, September 20, 2007

Hustisford Ski Club Dock
Lake Sinissippi
(water depth 1 m)

River Bend Park Launch
Rock River
(water depth 1.5 m)



Ski Club Dock

River Bend Park

Depth	DO mg/l	Temp °C		DO mg/l	Temp °C
Surface	14.0	23.5		14.0	24.0
0.5 m	11.2	21		13.0	23.0
1.0 m	7.0	21		11.0	21.0
1.5 m				7.2	19.5

Parameter		Ski Club Dock		River Bend Park
Ammonia as N	mg/l	0.20		0.23
BOD – 5 Day	mg/l	10		14

Organic Nitrogen	mg/l	1.9		2.5
Phosphorus, Total	mg/l	0.14		0.20
Total Suspended Solids	mg/l	38		25
Total Kjeldahl Nitrogen	mg/l	2.1		2.7
Chlorophyll <i>a</i>	ug/l	102		73.8
Secchi Disc Depth	m	0.3		0.5

Values of dissolved oxygen and temperature by probe from WDNR-Horicon station. Water depth of samples for chemical analyses 0.2 m. Chlorophyll *a* determination by Wisconsin State Laboratory of Hygiene. Determination of values of other chemical parameters by TestAmerica, Watertown, WI. Weather was clear and sunny; no rain had fallen within 24 hours prior to sampling; air temperature 73 °F (23 °C). Samples taken by Lake Sinissippi Improvement District.