WISCONSIN

25th in Beachwater Quality

11% of samples exceeded national standards in 2010

Polluted urban and suburban runoff is a major threat to water quality at the nation's coastal beaches. Runoff from storms and irrigation carries pollution from parking lots, yards, and streets directly to waterways. In some parts of the country, stormwater routinely causes overflows from sewage systems. Innovative solutions known as green infrastructure enable communities to naturally absorb or use runoff before it causes problems. The U.S. Environmental Protection Agency is modernizing its national rules for sources of runoff pollution and should develop strong, green infrastructure-based requirements.

Wisconsin has 193 public beaches along 55 miles of Lake Superior and Lake Michigan coastline. The Wisconsin Department of Natural Resources coordinates Wisconsin's beach monitoring program and administers BEACH Act grants. Unusually heavy rainfall and wet conditions at many coastal beaches in Wisconsin in 2010 may have contributed to elevated bacteria levels compared with previous years.

Racine has demonstrated that contaminated beachwater is correctable and that urban beaches can be clean. In the past decade the city's beachwater quality has been transformed. Beginning in late 2000, a stormwater outfall that was affecting water quality at North Beach and Zoo Beach was reengineered. The improved outfall includes a pretreatment system that removes solid wastes and oils from stormwater and then directs it to a series of infiltration/evaporation basins planted with native wetland species. Under high-flow situations caused by large storms, stormwater bypasses the treatment structures and wetlands, discharging through a bypass outlet into a plunge pool that also contains native vegetation before it is released into Lake Michigan.[1] Because of increased vegetation and less litter, the beaches are themselves more pleasing to the eye as the result of the changes that were made.

In addition to this stormwater treatment system, other strategies for improving water quality at Zoo Beach and North Beach were undertaken, including the development of a series of dune ridges to intercept stormwater from the parking area. The dunes are designed to allow the stormwater to meander and infiltrate as it flows through them. In July 2010 there was flooding due to record rainfall, and the dune ridges retained all of the sheet flow from the parking lot. Together with the constructed wetland, the dunes mitigated the effect of the stormwater discharge, allowing Racine's beaches to remain open when other beaches in the state had pre-emptive closures.[1]

The city of Racine has also been conducting studies of the use of quantitative polymerase chain reaction (qPCR), a molecular method that provides same-day fecal indicator bacteria results, for beachwater analysis since 2005 to see if it would improve the accuracy of beach management decisions. From July 23 to September 7, 2010, the Racine Health Department used qPCR to determine levels of *E. coli* in beachwater and inform their management decisions at North Beach and Zoo Beach. Samples were collected nearly every day during the beach season and were analyzed using both qPCR and Colilert-18, a culture method that provides results the day after samples are taken. When the results from the two methods did not agree or when inhibition of the qPCR method occurred, the previous day's *E. coli* results from the culture-based method were applied. The two methods provided similar beach management decisions based on the 1986 US EPA water quality criteria: The qPCR and Colilert-18 results were either both above the water quality standard or below the water quality standard for 85 out of 87 samples at North Beach and for 66 out of 88 samples at Zoo Beach. Two-thirds of

KEY FINDINGS IN WISCONSIN

Beachwater Contamination

(% of samples exceeding state standards in 2010)

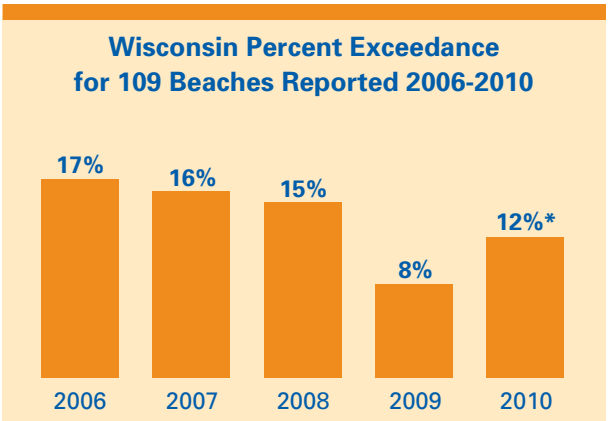
- South Shore Beach in Milwaukee County (59%)
- Wisconsin Point Beach 2 in Douglas County (52%)
- Eichelman Beach in Kenosha County (50%)

Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

- 641 (87%) unknown sources of contamination
- 89 (12%) stormwater
- 5 (1%) other unspecified sources

the discordant samples at Zoo Beach occurred consecutively and may have been due to laboratory error. (Note that the qPCR method results are not included in the state's monitoring data or in NRDC's analysis.)[2] On the basis of this experience, the same-day test method shows promise as a tool that would provide better public health protection and give beachgoers more timely information about beachwater quality than traditional culture methods.



Racine also altered its beach grooming practices to facilitate bacterial die-off in the sand through increased sun exposure and reduction of moisture content, placed additional trash cans with liners so the trash can be emptied on an as-needed basis instead of overflowing and attracting seagulls, enacted a city ordinance and posted signs stating that feeding seagulls was prohibited, and stenciled storm drains with the words "No dumping, drains to lake."[1]

During the summer of 2000, before any of these measures were taken, North Beach was under advisory for 62 days (more than half the time) and Zoo Beach for 39 days. Since then, the number of advisories has dropped dramatically. In the summer of 2010, despite heavy rains, only 1 advisory day was issued at North Beach and 4 were issued at Zoo Beach. The seasonal average *E. coli* count at North Beach decreased from 232 MPN/100 ml between 2000 and 2004 to 66 MPN/100 ml between 2005 and 2010.[1] Most probable number (MPN) is an estimate of the number of viable bacteria in a sample.

These dunes, developed and planted by the city of Racine, help keep contaminated runoff from polluting the beachwater.

Finally, in 2010, the city of Racine continued microbial and chemical source tracking on the Root River, working to pinpoint areas where sanitary sewage is infiltrating stormwater infrastructure.[2]

Door County and its beaches are among the most popular tourist destinations in Wisconsin, and the county recognizes that clean water for recreation is critical to the area's economy. Door County supplements BEACH Act funding with additional resources, allowing many special studies to be conducted, including genetic fingerprinting (helpful in identifying species responsible for fecal indicator bacteria contamination), antibiotic resistance testing on specific strains of *E. coli* (helpful in pinpointing possible types of sources), rain event and stormwater system samples, bird surveys, and spatial distribution surveys of *E. coli* at the beaches. Identifying possible contamination sources is a necessary step in reducing beachwater pollution.[2]

* Why don't the 2010 percent exceedance values in this summary match? Only samples from a common set of beaches monitored each year from 2006–2010 are included in the bar chart. Because some beaches were not monitored in each of those years, the percent exceedance for this subset of beaches (12%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (11%).

Monitoring Results

The 2010 beach season required cuts in program implementation to account for increased program costs. Reductions in the frequency of beach testing were part of the cost-saving measures taken in 2010.[2]

In 2010, Wisconsin reported 193 coastal beaches. Of these, 1 (<1%) was monitored daily, 61 (32%) were monitored more than once a week, 58 (30%) were monitored once a week, and 73 (38%) were not monitored. For this section of the report, NRDC looked at the percent of monitoring samples that exceeded the state's daily maximum bacterial standards (all reported samples were used to calculate the 2010 percent exceedance rates, including duplicate samples and samples taken outside the official beach season, if any). In 2010, 11% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. Twenty of Wisconsin's beaches exceeded the standard at least 20% of the time. The beaches with the highest percent exceedance rates in 2010 were South Shore Beach in Milwaukee County (59%), Wisconsin Point Beach 2 in Douglas County (52%), Eichelman Beach in Kenosha County (50%), Brule River State Forest Beach 3 (41%) and Wisconsin Point Beach 3 (39%) in Douglas County, Hika Park Bay (39%) and Red Arrow Park Beach (38%) in Manitowoc County, South Shore Rocky Beach in Milwaukee County (37%), and Amnicon River Beach (35%) and Brule River State Forest Beach 2 (33%) in Douglas County.

Kenosha County had the highest exceedance rate (29%) in 2010, followed by Douglas (27%), Milwaukee (23%), Manitowoc (20%), Kewaunee (19%), Sheboygan (13%), Iron (12%), Ozaukee (8%), Ashland (8%), Bayfield (7%), Brown (6%), Racine (4%), and Door (2%) counties. Marinette and Oconto counties chose not to participate in Wisconsin's BEACH Act program.[2]

Sampling Practices: Beaches are monitored from Memorial Day weekend through Labor Day weekend; monitoring at most Lake Superior beaches begins in late June. Local health departments conduct the actual water quality monitoring. Samples are taken in knee-deep water, 6–12 inches below the surface.[2] Great Lakes beaches are assigned high, medium, and low priority for monitoring based on the potential impacts from stormwater runoff, beach usage, population density, waterfowl loads, and the proximity of wastewater treatment outfalls and farms.[2]

Additional sampling is required after large rain events or other major pollution events,[1] and beaches are resampled immediately when an advisory or closing is issued. States that monitor more frequently after an exceedance is issued will tend to have higher percent exceedance rates and lower total closing/advisory days than they would if their sampling frequency did not increase after an exceedance was found.

Closings and Advisories

Total closing/advisory days for 532 events lasting six consecutive weeks or less totaled 735 days in 2010, an increase of 83% from 401 days in 2009. Except for 2009, total closing/advisory days in 2010 were less than those reported since 2005. There were 883 closing/advisory days in 2008, 747 days in 2007, 1,101 days in 2006, and 1,018 days in 2005. In addition, there were no extended or permanent events in 2010. Extended events are those in effect more than six weeks but not more than 13 consecutive weeks; permanent events are in effect for more than 13 consecutive weeks. For the 532 events lasting six consecutive weeks or less, 60% (442) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, 19% (141) were preemptive (i.e., ordered without waiting for monitoring results) due to heavy rainfall, 10% (75) were preemptive due to known sewage spills/leaks, 6% (44) were preemptive for other reasons, and 4% (33) were preemptive based on the results of computer modeling.

Standards and Procedures: Wisconsin issues both closings and advisories. A beachwater sample with 236 to 999 cfu/100 ml of *E. coli* results in the issuance of an advisory, and a sample with more than 999 cfu/100 ml of *E. coli* results in a closing. The 30-day five-sample geometric mean of 126 cfu/100 ml *E. coli* for freshwater may also be used to make closing and advisory decisions at high-priority beaches. Resampling to confirm an exceedance is not done before an advisory or closing is issued, and there is no protocol for delaying or forgoing an advisory or closing when a sample exceeds standards. Some counties with longer beaches combine multiple samples along the beach before analyzing for bacteria, and others take an average value of multiple samples analyzed separately; closing and advisory decisions for the entire beach are then based on the composite or average results. For some long beaches, composite sampling is not

encouraged because of the beach's sampling history. Local health departments with jurisdiction over these beaches are encouraged to close entire beaches or beach segments on the basis of individual sample exceedances.[3]

At the discretion of local beach managers, some beaches are closed or placed under advisory after rainfall exceeds a predetermined threshold—for example, one inch of precipitation in a 24-hour period. In other locations preemptive advisories or closures are issued after sewer or stormwater overflows or incidences of reportable illnesses.[1]

Milwaukee uses predictive models in addition to monitoring to determine advisories for a few of its beaches.[4] In 2010, Ozaukee County began using a predictive model (NowCast) at its beaches.[2] This model relies on environmental factors including rainfall, turbidity, and/or wave height to predict *E. coli* levels.

Wisconsin 2010 Monitoring Results and Closing or Advisory Days

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Ashland County					
Bayview Park Beach	2	2/wk	15	0%	0
Big Bay State Park Beach	3	1/wk	15	0%	0
Big Bay Town Park Beach	3	1/wk	15	0%	0
Casper Road Beach	3	1/wk	15	0%	0
Kreher Park Beach	2	2/wk	38	13%	5
La Pointe Memorial Beach	3	1/wk	16	6%	1
Maslowski Beaches	2	2/wk	43	16%	5
Bayfield County					
Bark Bay Beaches	3	1/wk	16	6%	1
Broad Street Beach	3	1/wk	16	6%	1
Herbster Beach	3	1/wk	15	0%	0
Memorial Beach Bayfield	3	1/wk	16	6%	1
Memorial Park Beach Washburn	3	1/wk	16	6%	1
Port Wing Beach East	3	1/wk	17	12%	2
Port Wing Beach West	3	1/wk	16	6%	1
Sioux River Beach North	3	1/wk	15	0%	0
Sioux River Beach South	3	1/wk	17	12%	2
Siskiwit Bay Beach	3	1/wk	15	0%	0
Thompson West End Park Beach	3	1/wk	32	16%	4
Washburn Marina Beach	3	1/wk	17	12%	2
Washburn Walking Trail Beach / BAB Beach	3	1/wk	16	6%	1
Washington Avenue Beach	3	1/wk	16	6%	1
Wikdal Memorial Boat Launch Beach	3	1/wk	16	6%	1
Beaches in Bayfield County that were not monitored and that had no closing or advisory days in 2010:					
Bono Creek Boat Launch Beach	Highway 13 Wayside Beach		Little Sand Bay Beach		River Loop Road Beach
Brown County					
Bayshore Park Beach	3	1/wk	14	0%	0
Communiversity Park Beach	3	1/wk	17	18%	6

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Brown County					
Longtail Beach	3	1/wk	20	0%	0
Beaches in Brown County that were not monitored and that had no closing or advisory days in 2010:					
Bay Beach Joliet Park	Riverside Drive Beach Town of Scott Park Beach	Van Lanen Beach		Volk's Landing Boat Launch Beach	
Door County					
Anclam Park Beach	2	2/wk	33	0%	6
Baileys Harbor Ridges Park Beach	1	4/wk	59	2%	1
Clay Banks Beach 2	3	1/wk	59	7%	3
Egg Harbor Beach	1	4/wk	56	5%	3
Ellison Bay Town Park Beach	1	4/wk	57	2%	1
Ephraim Beach	1	4/wk	60	3%	12
Europe Bay Beach 1	2	2/wk	29	0%	0
Europe Bay Beach 2	2	2/wk	29	0%	0
Europe Bay Beach 3	2	2/wk	29	0%	0
Fish Creek Beach	1	4/wk	60	2%	12
Gislason Beach	3	1/wk	15	0%	0
Haines Park Beach	2	2/wk	30	3%	1
Jackson Harbor Ridges - WI	3	1/wk	2	0%	0
Lakeside Park Beach	2	2/wk	31	0%	6
Lily Bay Boat Launch Beach	3	1/wk	15	0%	0
Murphy Park Beach	1	4/wk	57	0%	0
Newport Bay Beach	1	4/wk	55	0%	0
Nicolet Beach	1	4/wk	57	2%	1
Otumba Park Beach	1	4/wk	61	13%	10
Percy Johnson Memorial Park Beach	3	1/wk	15	0%	0
Portage Park Beach	2	2/wk	29	0%	0
Rock Island State Park Beach	3	1/wk	14	0%	0
Sand Bay Beach 1	2	2/wk	29	3%	1
Sand Dune Beach	3	1/wk	15	0%	0
Sandy Bay Town Park Beach	2	2/wk	29	0%	0
School House Beach	3	1/wk	15	0%	0
Sister Bay Beach	1	4/wk	58	2%	1
Sturgeon Bay Canal Recreation Area Beach	2	2/wk	29	0%	0
Sunset Park Beach Sturgeon Bay	1	4/wk	57	5%	3
Whitefish Bay Boat Launch Beach	3	1/wk	16	0%	0
Whitefish Dunes Beach	1	4/wk	56	0%	0
Beaches in Door County that were not monitored and that had no closing or advisory days in 2010:					
Arrowhead Lane Beach Bittersweet Lane Beach	Braunsdorf Beach Chippewa Drive Beach	Clay Banks Beach 1 Cliff View Drive Beach		County TT Beach Deer Path Lane Beach	

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Douglas County					
Beaches in Door County that were not monitored and that had no closing or advisory days in 2010:					
Garrett Bay Boat Launch Beach Goldenrod Lane Beach Hemlock Lane Beach Isle View Beach	Kickapoo Drive Beach Lakeshore Drive Beach Door Pebble Beach Road Beach 1 Door	Potawatomi State Park Beach 1 Potawatomi State Park Beach 2 Sand Bay Beach 2	Sand Cove Sunset Beach Fish Creek White Pine Lane Beach Winnebago Drive Beach		
Douglas County					
Allouez Bay Beach 3	3	1/wk	16	6%	1
Amnicon River Beach	3	1/wk	20	35%	8
Barker's Island Inner Beach	2	2/wk	38	8%	2
Brule River State Forest Beach 1	3	1/wk	20	25%	5
Brule River State Forest Beach 2	3	1/wk	21	33%	8
Brule River State Forest Beach 3	3	1/wk	22	41%	8
Middle River Beach	3	1/wk	19	26%	5
Wisconsin Point Beach 1	2	2/wk	41	32%	9
Wisconsin Point Beach 2	3	1/wk	29	52%	14
Wisconsin Point Beach 3	3	1/wk	23	39%	8
Wisconsin Point Beach 4	3	1/wk	20	20%	3
Wisconsin Point Beach 5	3	1/wk	16	6%	1
Beaches in Douglas County that were not monitored and that had no closing or advisory days in 2010:					
Allouez Bay Beach 1	Allouez Bay Beach 2	Barker's Island Outer Beach	Conners Point Beaches		
Iron County					
Oronto Bay Beach 1	3	1/wk	18	17%	3
Oronto Bay Beach 2	3	1/wk	17	12%	2
Oronto Bay Beach 3	3	1/wk	17	12%	2
Saxon Harbor Beach East	3	1/wk	16	6%	1
Saxon Harbor Beach West	3	1/wk	17	12%	2
Kenosha County					
Alford Park Beach	3	1/wk	18	17%	3
Eichelman Beach	2	2/wk	38	50%	19
Pennoyer Park Beach	3	1/wk	17	18%	2
Simmons Island Beach	2	2/wk	33	27%	7
Southport Park Beach	3	1/wk	15	7%	1
Beaches in Kenosha County that were not monitored and that had no closing or advisory days in 2010:					
Lakeshore Drive Beach Kenosha	Melissa Beach				
Kewaunee County					
City Of Kewaunee Beach	3	1/wk	59	25%	10
Crescent Beach	2	2/wk	60	13%	6
Beaches in Kewaunee County that were not monitored and that had no closing or advisory days in 2010:					
9th Avenue Wayside Beach	Lighthouse Vista Beach	Red River Park Beaches			

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Manitowoc County					
Fischer Park Beaches	3	1/wk	63	32%	22
Hika Park Bay	3	1/wk	64	39%	24
Memorial Drive Wayside Beach North	2	2/wk	34	12%	2
Memorial Drive Wayside Beach South	2	2/wk	53	8%	4
Neshotah Beach	2	2/wk	60	5%	1
Point Beach State Forest– Concession Stand Beach	2	2/wk	65	14%	6
Point Beach State Forest– Lakeshore Picnic Area Beach	2	2/wk	64	14%	6
Point Beach State Forest– Lighthouse Picnic Area Beach	2	2/wk	65	14%	6
Red Arrow Park Beach Manitowoc	2	2/wk	60	38%	21
Beaches in Manitowoc County that were not monitored and that had no closing or advisory days in 2010:					
Lincoln High School Beach	Silver Creek Beach	YMCA Beach	Red Arrow Marinette 2 Beach		
Maritime Dr Boat Launch Beach	Two Creek Boat Launch Beach	Michaelis Park Beach	Red Arrow Marinette 3 Beach		
Memorial Drive Wayside Beach Middle	University Beach	Peshtigo Harbor Boat Launch Beach	Seagull Bar Wildlife Area Beach		
	Warm Water Beach	Red Arrow Marinette 1 Beach			
Milwaukee County					
Atwater Park Beach	2	2/wk	22	9%	23
Bay View Park Beach	3	1/wk	43	16%	13
Bender Beach	2	2/wk	32	3%	7
Bradford Beach	1	4/wk	55	24%	34
Grant Park Beach	2	2/wk	67	22%	24
Klode Park Beach	2	2/wk	26	4%	6
McKinley Beach	2	3/wk	26	31%	27
South Shore Beach	1	4/wk	54	59%	46
South Shore Rocky Beach	2	2/wk	27	37%	28
Tietjen Beach / Doctor's Park	2	2/wk	25	12%	14
Watercraft Beach	2	2/wk	26	4%	25
Beaches in Milwaukee County that were not monitored and that had no closing or advisory days in 2010:					
Big Bay Park Beach	Sheridan Park Beach				
Oconto County					
Beaches in Oconto County that were not monitored and that had no closing or advisory days in 2010:					
Oconto City Park					
Ozaukee County					
Cedar Beach Rd Beach	1	4/wk	55	13%	19
Concordia University	2	4/wk	25	4%	7
County Road D Boat Launch Beach	1	4/wk	51	14%	11
Harrington State Park Beach North	1	4/wk	52	6%	8
Harrington State Park Beach South	1	4/wk	53	11%	35

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Ozaukee County					
Lion's Den Gorge Nature Preserve	3	1/wk	31	6%	7
Upper Lake Park Beach	1	Daily	102	6%	5
Beaches in Ozaukee County that were not monitored and that had no closing or advisory days in 2010:					
Jay Road Beach	Pebble Road Beach	Sandy Beach Road Beach	Silver Beach Road Beach	Virmond County Park	
Racine County					
North Beach	1	5/wk	344	2%	1
Zoo Beach	1	5/wk	261	6%	4
Beaches in Racine County that were not monitored and that had no closing or advisory days in 2010:					
Michigan Boulevard Beach	Myers Park Beach	Parkway Beach	Shoop Park Beach	Wind Point Lighthouse Beach	
Sheboygan County					
Amsterdam Beach	3	1/wk	15	7%	4
Blue Harbor Beach	1	4/wk	55	16%	11
Deland Park Beach	2	4/wk	57	5%	6
General King Park Beach	2	2/wk	38	5%	5
Kohler Andrae State Park Nature Center Beach	1	4/wk	57	19%	12
Kohler Andrae State Park North Beach	1	4/wk	56	16%	12
Kohler Andrae State Park North Picnic Beach	1	4/wk	56	16%	12
Kohler Andrae State Park South Picnic Beach	1	4/wk	58	16%	11
Beaches in Sheboygan County that were not monitored and that had no closing or advisory days in 2010:					
3rd Street Beach	KK Road Beach	Van Ess Road Beach	Whitcomb Avenue Beach		
Foster Road Beach	Lakeview Park Beach	Vollrath Park Beach	Wilson Lima Beach/ White's Beach		

NOTES

1 Kinzelman, J., City of Racine Health Department. Personal communication. April 2011.

2 Wisconsin Department of Natural Resources. Wisconsin's Great Lakes Beach Monitoring and Notification Program Annual Report, Beach Season 2010. Not dated.

3 Shaunna Chase, Beach Program Coordinator, Wisconsin Department of Natural Resources. Personal communication. May 2008.

4 Susan Phillips, USGS. Personal communication. May 2011.

***Testing the Waters 2011* reflects data as of June 27, 2011.**