



OHIO

29th in Beachwater Quality

21% 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.

Ohio monitors 7.3 miles of shoreline at 62 public and semipublic beaches on Lake Erie. The state's beachwater quality monitoring program is administered by the Ohio Department of Health (ODH).

Rapid methods of quantifying fecal indicator bacteria are being eagerly investigated in Ohio because culture methods, while capable of producing accurate estimates of the concentration of viable bacteria, generally take 24 hours to yield results. Public health would be better protected if swimmers could be warned of high fecal indicator bacteria counts on the day they occur, not the day after. In 2010, the Erie County General Health District (ECHD), one of the ODH beachwater quality monitoring program's partners, continued to work with the U.S. Geological Survey to conduct tests of the quantitative polymerase chain reaction (qPCR) and immunomagnetic separation/adenosine triphosphate (IMS/ATP) rapid analysis methods at several of its beaches. In addition, the Northeast Ohio Regional Sewer District (NEORS), another ODH beachwater monitoring program partner, conducted analysis using the IMS/ATP and qPCR methods at its three beaches.¹ qPCR is a rapid analysis method that detects the presence of specific sequences of genetic material, and it can be used to quantify the concentration of fecal indicator bacteria.

However, unlike traditional culture methods, qPCR cannot distinguish between genetic material from dead bacteria and genetic material from live bacteria. It is generally believed that the concentration of living fecal indicator bacteria is a better predictor of human health impacts than the concentration of living and dead indicator bacteria because the presence of pathogens that can cause illness in humans is more likely to correlate with the concentration of living fecal indicator bacteria. IMS/ATP is a cell surface detection method that uses antibodies and quantifies concentrations for living cells only. In 2011 ECHD will continue to improve IMS/ATP test method protocols. NEORS found little correlation between IMS/ATP results and culture-based results at all three of its sampling locations, and slight but varying degrees of correlation between qPCR results and culture-based results.¹

In 2010, ECHD worked to identify sources of contamination upstream of beaches with high fecal indicator bacteria levels. ECHD is responsible for operation and maintenance inspections of semi-public wastewater treatment systems (1-25,000 gallons per day) in Erie County. Proper operation and maintenance at these facilities lessens their impact on the Lake Erie watershed. ECHD also conducts the BEACH Act monitoring and notification activities at Lake Erie beaches in Erie County. Data from the beach sampling program has been used to declare public health nuisances and identify corrective actions at sewage treatment facilities. The most recent example of this occurred in Bay View, Ohio, where the beachwater quality sampling results led to the pursuit of corrections at a sewage treatment facility that was contaminating the beachwater. Edson Creek is a suspected source of contamination at Vermilion River West Beach, which continued to have a high number of exceedances in 2010, with 34 advisory days. Contamination sources that have been found and

KEY FINDINGS IN OHIO

Beachwater Contamination

(% of samples exceeding state standards in 2010)

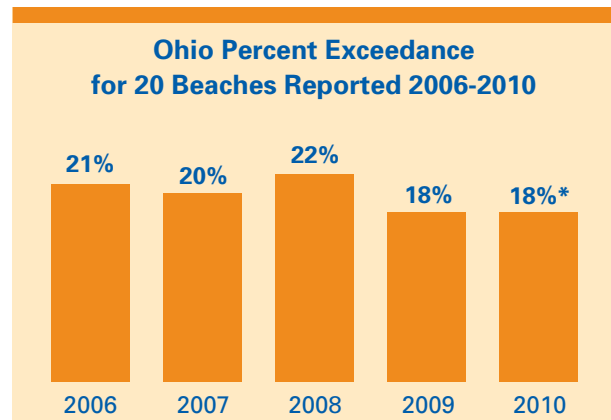
- Edson Creek in Erie County (64%)
- Euclid State Park in Cuyahoga County (44%)
- Noble Beach in Cuyahoga County (43%)

Reported Sources of Beachwater Contamination Statewide (number of closing/advisory days)

- 1,259 (100%) unknown sources of contamination

corrected over the years include bypass of raw sewage from a municipal sewer system, grinder pumps at sewage treatment plants that were not operating correctly, and laundry waste from a residence being discharged directly to surface water.¹

In 2010, NEORSRD conducted monitoring of Euclid Creek to determine the potential for discharge from this creek to contaminate the water at Villa Angela Beach and Euclid Beach. NEORSRD believes that illicit discharges of untreated sewage from homes and combined sewer overflows from sewage treatment plants during rain events are impacting the water quality at Villa Angela and Euclid beaches.¹



Monitoring Results

In 2010, Ohio reported 62 coastal beaches. Of these, 7 (11%) were monitored daily, 37 (60%) more than once a week, and 18 (29%) once a week. 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, 21%* of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. Thirty of Ohio's beaches exceeded the standard at least 20% of the time. The beaches with the highest percent exceedance rates in 2010 were Edson Creek in Erie County (64%), Euclid State Park (44%) and Noble Beach (43%) in Cuyahoga County, Sherod Creek in Erie County (42%), Lakeview Beach in Lorain County (40%), Bay View East (40%) and Crystal Rock (39%) in Erie County, Columbia Park Beach (38%) and Villa Angela State Park (38%) in Cuyahoga County, Vermilion River East (36%) in Erie County, and Royal Acres Beach (36%) in Cuyahoga County. Lorain County had the highest exceedance rate (33%) in 2010, followed by Cuyahoga (27%), Erie (24%), Lake (14%), Ashtabula (13%), Lucas (13%), and Ottawa (5%) counties.

Sampling Practices: The monitoring season varies from location to location, depending on which entity is conducting the monitoring, but generally runs from Memorial Day through Labor Day. ODH conducts water quality sampling at beaches in Lucas, Ottawa, Ashtabula, and Lorain counties as well as at Kelley's Island State Park; the remaining beaches are monitored by local entities. In 2010, sampling was begun the week before Memorial Day for beaches monitored by ODH.

Ohio is a "home rule" state, and the state can only recommend sampling practices, standards, and notification protocols and procedures to local entities that participate in the beachwater quality monitoring program. Guidance recommends that samples be taken 1 foot below the surface in water that is 3 feet deep. For the most part, monitoring is conducted at the area of the beach used most by the public. Beaches are prioritized for monitoring according to visitor use and water quality history, so beaches that are visited most frequently and/or that have a potential for contamination (Tier 1) are sampled the most frequently.

Many of the beaches in the program are already sampled daily or as frequently as laboratory availability will allow. The monitoring frequency of these beaches does not increase after a bacterial exceedance has been found, but if an exceedance is discovered at a beach that is monitored only once a week, resampling may be conducted on the next business day.

NEORSRD analyzed samples at its three beaches (Edgewater, Euclid, and Villa Angela Beaches) in 2010 for enterococcus as well as *E. coli* to determine what, if any, correlations exist between *E. coli* and enterococcus densities. Some correlation was found, but it varied from beach to beach.¹

* 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 (18%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (21%).

ODH is in the process of assessing 102 points of access to nearly 46 miles of publicly accessible shore that are not currently listed as bathing beaches in the state's beachwater monitoring program. These access points (along with the beaches monitored by the state's beachwater quality monitoring program) were identified by the Ohio Department of Natural Resources in a publication issued in 2010. ODH will determine if any of these access points should be considered bathing beaches and included on Ohio's list of beaches and/or monitored. If monitoring at any of these points of access is begun, monitoring at beaches already in the program will be reduced.

Closings and Advisories

Total closing/advisory days for 395 events lasting six consecutive weeks or less increased 24% to 1,259 days in 2010, from 1,012 days in 2009. For prior years, there were 783 days in 2008, 657 days in 2007, 629 days in 2006, and 182 days in 2005. In addition, there was 1 extended event (46 days) and no 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. All closing and advisory days in 2010 were due to monitoring that revealed elevated bacteria levels.

Standards and Procedures: Local jurisdictions have the authority to close beaches and to issue advisories. Ohio uses an *E. coli* single-sample maximum standard of 235 cfu/100 ml for beach advisory decisions. No geometric mean standard is applied when making closing and advisory decisions.

The state recommends that local authorities issue advisories when the bacterial standard is exceeded, and this recommendation was followed in all cases in 2010.

Ohio uses a predictive model called Nowcast at two of its beaches. This model is continually under improvement and can be tailored to provide predictions that are appropriate for a particular beach and even a particular portion of the swimming season at a particular beach. Nowcast relies on environmental factors including rainfall, turbidity, and/or wave height to predict *E. coli* levels. Predictive models are useful because they allow advisories to be issued on the day that bacteria levels are expected to be high. In contrast, when advisories are issued based on *E. coli* counts found using culture methods, they are issued the day after standards are exceeded because it generally takes 24 hours for culture results to be made available. As a result, beachgoers exposed to high bacterial counts may not be warned of their risk. Moreover, the culture results of samples taken the day a beach is placed under advisory often reveal that the water quality was actually acceptable on the day of the advisory.

Between May 24 and July 24, 2010, Huntington Beach was placed on advisory status if Nowcast predicted that the probability of *E. coli* concentrations exceeding 235 cfu/100 ml was 23% or greater. For the remainder of the swim season, the beach was placed on advisory status if Nowcast predicted that the probability of *E. coli* concentrations exceeding 235 cfu/100 ml was 32% or greater.¹ Bacterial monitoring at Huntington Beach has shown that Nowcast-based notifications are more protective than notifications based on bacterial monitoring.² For 2006 to 2010, Nowcast predictions yielded a greater percentage of correct beach management decisions (84.1%) than did the previous day's *E. coli* concentration (75.3%).³ In 2010, the beach was sampled for *E. coli* 81 times, and the model resulted in correct beach advisory decisions for 69 out of 81 days. On 5 of the 81 days, the model predicted an exceedance of standards when there was none, resulting in 5 advisory days being issued unnecessarily. On the remaining 7 out of 81 days, the model predicted acceptable water quality and no advisory was issued, though sampling results (available a day after the samples were taken) revealed that there was an exceedance.¹

Edgewater Beach is also placed on advisory on the basis of Nowcast predictions. For 2008 to 2010, Nowcast predictions yielded a greater percentage of correct beach management decisions (73%) than if they were based on the previous day's *E. coli* concentration (66.6%).³ In 2010, Nowcast was used to make 121 predictions of beachwater quality, and the model resulted in correct beach advisory decisions 97 out of 121 times. For 21 of the 121 predictions, the model predicted an exceedance of standards when there was none, so advisory days were issued unnecessarily. Of the remaining 3 out of 121 predictions, the model predicted acceptable water quality and no advisory was issued, though sampling results (available a day after the samples were taken) revealed that there was an exceedance.¹

Work is under way to expand the number of beaches where predictive modeling is used to issue advisories. In 2010, the beach at Maumee Bay State Park was in the final stages of testing Nowcast, and the model will be used for issuing advisories during the 2011 swim season. During 2010, ECHD collected data for use in developing predictive models at Huron River East, Huron River West, and Vermilion River West beaches.

There are no preemptive rainfall standards at beaches in Ohio, but preemptive rainfall advisories can be issued by beach managers if they feel water quality has been compromised by rain.⁴ Beach managers may also restrict beach access because of sewage or other pollution spills, or for any other threat to public health.

Ohio 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Ashtabula County					
Conneaut Township Park	1	4/wk	57	11%	9
Geneva State Park	1	4/wk	57	4%	5
Lakeshore Park	1	4/wk	57	32%	37
Walnut Beach	1	4/wk	57	7%	10
Cuyahoga County					
Arcadia Beach	2	1/wk	14	29%	29
Bay Park Beach	2	1/wk	14	21%	20
Clarkwood Beach	2	1/wk	14	29%	29
Clifton Beach	2	2/wk	25	28%	29
Columbia Park Beach	2	1/wk	13	38%	40
Edgecliff Beach	2	1/wk	13	23%	20
Edgewater State Park	1	daily	102	13%	12
Euclid State Park	1	daily	102	44%	47
Huntington Beach	1	daily	81	12%	16
Moss Point Beach	2	1/wk	14	21%	22
Noble Beach	2	1/wk	14	43%	42
Parklawn Beach	2	1/wk	14	14%	13
Royal Acres Beach	2	1/wk	14	36%	36
Shoreby Club Beach	2	1/wk	14	7%	7
Shorehaven Beach	2	1/wk	14	14%	14
Sims Beach	2	1/wk	14	29%	28
Utopia Beach	2	1/wk	14	14%	14
Villa Angela State Park	1	daily	104	38%	41
Wagar Beach	2	1/wk	13	31%	27
Erie County					
Battery Park	1	4/wk	51	4%	2
Bay View East	1	4/wk	53	40%	40
Bay View West	1	4/wk	54	17%	15
Cedar Point Chausee	1	4/wk	54	13%	10
Chappel Creek	1	4/wk	55	22%	21

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Erie County					
Cranberry Creek	1	4/wk	55	15%	14
Crystal Rock	1	4/wk	54	39%	40
Darby Creek	1	4/wk	43	26%	25
Edson Creek	1	4/wk	55	64%	27 (46)*
Fichtel Creek	1	4/wk	55	7%	4
Hoffman Ditch	1	4/wk	52	15%	14
Huron River East	1	4/wk	54	11%	12
Huron River West	1	4/wk	55	29%	31
Kiwanis	1	4/wk	53	32%	30
Lion's Park	1	4/wk	53	30%	28
Old Woman Creek East	1	4/wk	53	4%	9
Old Woman Creek West	1	4/wk	55	2%	1
Pickereel Creek	1	4/wk	54	31%	32
Sawmill Creek	1	4/wk	53	32%	30
Sherod Creek	1	4/wk	55	42%	41
Showse Park	1	4/wk	55	15%	14
Sugar Creek	1	4/wk	54	30%	28
Vermilion River East	1	4/wk	55	36%	32
Vermilion River West	1	4/wk	55	33%	34
Whites Landing	1	4/wk	52	19%	22
Lake County					
Fairport Harbor	1	daily	102	11%	11
Headlands State Park (East)	1	daily	102	15%	14
Headlands State Park (West)	1	daily	102	16%	0
Lorain County					
Century Beach	1	4/wk	55	25%	27
Lakeview Beach	1	4/wk	55	40%	47
Lucas County					
Maumee Bay State Park (Erie)	1	4/wk	57	16%	15
Maumee Bay State Park (Inland)	1	4/wk	57	11%	9
Ottawa County					
Camp Perry	1	1/wk	17	18%	9
Catawba Island State Park	1	1/wk	16	6%	2
East Harbor State Park	1	4/wk	57	0%	0
Kelleys Island State Park	1	1/wk	13	0%	0
Lakeside Beach	1	4/wk	57	5%	9
Port Clinton (Deep/Lakeview)	1	4/wk	57	5%	6
South Bass Island State Park	1	1/wk	12	8%	7

*Reported closing or advisory days are for events lasting six consecutive weeks or less. Number of days in parentheses are for events lasting more than six consecutive weeks.

NOTES

- 1 Ohio Department of Health. Year 2010 Bathing Beach Monitoring Program Results. Accessed at <http://www.odh.ohio.gov/odhPrograms/eh/bbeach/beachmon.aspx>. December 2010.
- 2 Ohio Department of Health. Year 2007 Bathing Beach Monitoring Program Results. Not dated.
- 3 Ohio Nowcast FAQs. Accessed at http://www.ohionowcast.info/nowcast_faq.asp. May 22, 2011.
- 4 Barry Rice, Ohio Department of Health. Personal communication. May 2009.

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