

June 2011

Testing the Waters

A Guide to Water Quality at Vacation Beaches

TWENTY-FIRST ANNUAL REPORT

Authors

Mark Dorfman

Kirsten Sinclair Rosselot

Project Design and Development

Jon Devine

Natural Resources Defense Council



About NRDC

The Natural Resources Defense Council is an international nonprofit environmental organization with more than 1.3 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, Chicago, Montana, and Beijing. Visit us at www.nrdc.org.

Acknowledgments

NRDC wishes to acknowledge the support of the Morris & Gwendolyn Cafritz Foundation, the Campbell Foundation, Environment Now, the McKnight Foundation, the David and Lucile Packard Foundation, the Pisces Foundation, Resources Legacy Fund Foundation, the Summit Fund of Washington, and the TOSA Foundation.

NRDC would like to thank Josh Mogerman and Robyn Fischer for researching and reviewing various aspects of the report this year and Carol James for distributing the report nationwide.

Thank you to Alexandra Kenneough for managing the production of the report, to Elise Marton for proofreading the report, to Sue Rossi for designing it, and to Kathryn McGrath, Will Tam, and Auden Shim for creating a dynamic presentation of the report on the NRDC website. We would also like to thank Ynes Cabral and Linda Escalante for their skillful Spanish translations. Many thanks to members of our media team—Courtney Hamilton, Elizabeth Heyd, Valerie Jaffee, Jessica Lass, Josh Mogerman, Jenny Powers, and Kate Slusark—for orchestrating the release of the report to the press. Thanks to David Beckman, Noah Garrison, Henry Henderson, Karen Hobbs, Larry Levine, and Suzanne Struglinski for releasing and blogging about the report for NRDC this year, and to Piper Crowell for arranging releases by chapters of Environment America.

We wish also to thank the U.S. Environmental Protection Agency for sharing data with us again this year, and to the state program coordinators, who provided information for the state chapters along with review of the monitoring and notification data. We recognize that this work is time-consuming and that budgets are tight all around, so we very much appreciate the effort that went into compiling and reviewing these data. Thanks, especially, to all those federal, state, and local officials who work hard every day to keep our beaches clean and to address the sources of beachwater pollution.

NRDC President: Frances Beinecke

NRDC Executive Director: Peter Lehner

NRDC Director of Communications: Phil Gutis

NRDC Deputy Director of Communications: Lisa Goffredi

NRDC Publications Director: Anthony Clark

NRDC Publications Editor: Carlita Salazar

Project Manager: Alexandra Kenneough

Design and Production: Sue Rossi

Table of Contents

Executive Overview	1				
1. Beach Closures, Advisories, and Notices Due to the BP Oil Disaster	10				
2. Swimming in the Great Lakes.....	17				
3. Plan of Action	24				
4. State-by-State Results	32				
<i>How to Understand the State Summaries: Beachwater Quality Monitoring Programs</i>	32				
<i>How to Read the State Summaries</i>	37				
<i>Methodology for NRDC’s Report</i>	40				
Alabama	Florida	Louisiana	Minnesota	North Carolina	South Carolina
Alaska	Georgia	Maine	Mississippi	Ohio	Texas
California	Hawaii	Maryland	New Hampshire	Oregon	Virginia
Connecticut	Illinois	Massachusetts	New Jersey	Pennsylvania	Washington
Delaware	Indiana	Michigan	New York	Rhode Island	Wisconsin
Figures					
Figure EO-1: Reasons Officials Closed Beaches or Issued Advisories in 2010	2				
Figure EO-2: Sources of Pollution That Caused Closings/Advisories, 2000–2010.....	3				
Figure 2-1: Percent of Samples Exceeding <i>E. coli</i> Standard for Great Lakes States Combined, 2006–2010.....	19				
Figure 4-1: Why Don’t 2010 Percent Exceedances Match?	39				
Tables					
Table EO-1: Rank of States by Percentage of Beachwater Samples Received Exceeding the National Standard in 2010	4				
Table EO-2: Repeat Offenders: Beaches With More Than 25 Percent of Samples Received Exceeding the EPA’s Applicable Single-Sample Maximum Bacteria Standards for Designated Beach Areas, Each Year, 2006–2010	6				
Table 1-1: Number of BP Oil Spill Advisory Days in Alabama in 2010.....	11				
Table 1-2: Number of BP Oil Spill Advisory Days in Florida in 2010 and 2011.....	12				
Table 1-3: Number of BP Oil Spill Advisory Days in Louisiana in 2010 and 2011.....	13				
Table 1-4: Number of BP Oil Spill Advisory Days in Mississippi in 2010	14				
Table 1-5: Sources of Information About BP Oil Spill Beach Notices, Advisories, and Closings	15				
Table 2-1: Great Lakes Beaches with Frequent Exceedances of the National Standard	19				
Table 4-1: State Distribution of BEACH Act Funding for Beachwater Quality Monitoring and Notification for 2010 and 2011	32				
Table 4-2: State Coastal Beachwater Quality Standards	34				
Table 4-3: Policy-Recommended Water Depth Where Samples are Collected for Coastal States	35				
Table 4-4: Summary of NRDC’s Data and Program Information Review Process (All Dates 2011).....	41				
Appendices.....	43				
<i>Sources of Beachwater Pollution</i>					
<i>The Impacts of Beach Pollution</i>					
<i>State Highlights</i>					

Executive Overview

NRDC's annual analysis of water quality and public notification data at coastal U.S. beaches found that the number of beach closings and advisories in 2010 soared to its second-highest level in the 21-year history of our report. Beach closings and advisories were issued for 24,091 days in total, a 29% increase from 2009. More than two-thirds of those were issued because bacteria levels exceeded applicable standards. The portion of all monitoring samples that exceeded national health standards was essentially stable; in 2010, 8% of samples exceeded the national standard for designated beach areas, compared with 7% for the four previous years. In addition, fewer beaches were monitored in 2010 than in any year between 2006 and 2009. The 2010 results confirm that our nation's beaches continue to experience significant water pollution that puts swimmers and local economies at risk. Although NRDC continues to push for improvements to beach water quality standards and test methods, the best long-term approach is to adopt solutions to address the sources of beachwater pollution, particularly strategies for reducing contamination carried by stormwater runoff.

POLLUTED BEACHWATER MAKES SWIMMERS SICK AND HURTS COASTAL ECONOMIES

The Environmental Protection Agency (EPA) has estimated that up to 3.5 million people become ill from contact with raw sewage from sanitary sewer overflows alone each year.¹ Many public health experts believe that the number of illnesses caused by untreated sewage could be much higher than is currently recognized because people who get sick from swimming in polluted recreational waters are not always aware of the cause of their illness and don't report it to doctors or local health officials.

Illnesses associated with polluted beachwater include conditions such as stomach flu, skin rashes, pinkeye, respiratory infections, meningitis, and hepatitis. Children are especially vulnerable, perhaps because they tend to submerge their heads more often and are more likely to swallow water when swimming. The Centers for Disease Control and Prevention concluded that the incidence of infections associated with recreational water use has steadily increased over the past several decades;² one study found that swimmers at polluted beaches in the Great Lakes region were at more likely to have gastrointestinal illnesses as non-swimmers;³ and another study found that fecal contamination at Los Angeles and Orange County beaches caused between 627,800 and 1,479,200 annual excess gastrointestinal illnesses.⁴

Our coasts provide more than just local recreation—approximately 85% of all U.S. tourism revenue is received in coastal states. In 2007 the nation's shoreline-adjacent counties contributed \$5.6 trillion toward the nation's gross domestic product and 47 million jobs.⁸ Economists estimate that a typical swimming day is worth approximately \$35.00 to each individual,⁸ so depending on the number of potential visitors to a beach, the "consumer surplus" loss on a day that the beach is closed or under advisory for water quality problems can be quite significant. For example, one study estimated that economic losses as a result of closing a Lake Michigan beach due to pollution could be as high as \$37,030 per day.⁸ Similarly, the Los Angeles/Orange County study discussed above concluded that the public health cost of the excess gastrointestinal illnesses caused by poor water quality was \$21 million to \$51 million each year.⁴

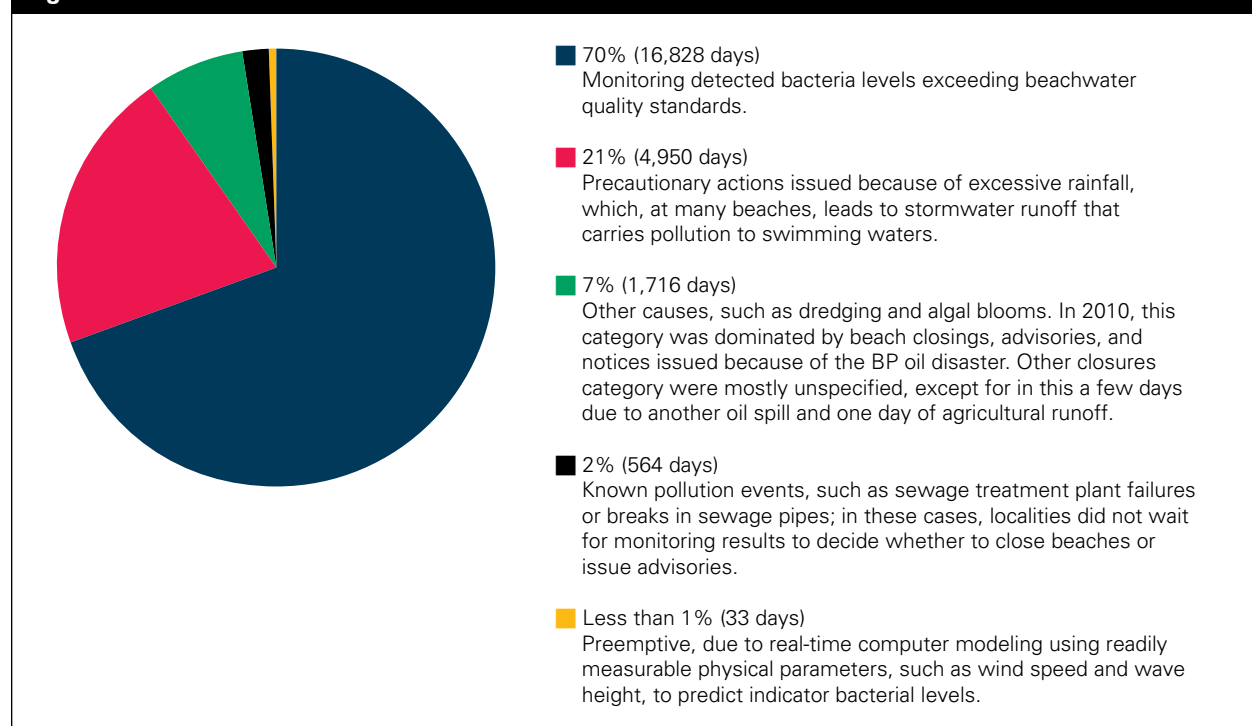
CLOSINGS AND ADVISORIES FOR 2010

In 2010, the number of closing and advisory days at ocean, bay, and Great Lakes beaches reached its second-highest level since NRDC began tracking these events 21 years ago: 24,091 days nationwide. This is an increase of 29% (5,409 days) from the previous year. The major factors contributing to the increase in closing and advisory days in 2010 appears to be a rise in the number of closing and advisory days in Hawaii and California and oil washing up on beaches due to the Gulf of Mexico oil spill. There was a 51% increase in the number of preemptive closing/advisory days (7,223) in 2010 from 2009 (4,773 days) and 2008 (5,341 days). More than 69% of preemptive closing/advisory days were issued because of heavy rainfall and 24% were issued because of other reasons, predominantly because of the Gulf of Mexico oil spill.

In addition, there were 72 closing and advisory events that lasted more than six but not more than 13 consecutive weeks (extended events), and 101 permanent closing and advisory events that lasted more than 13 consecutive weeks (permanent events). Including closing and advisory days that occurred during extended events, the total number of beach closing and advisory days in 2010 comes to 28,789.

Although the number of beaches monitored at least once a week decreased 2% to 2,815 in 2010 from 2,876 in 2009, the continued high level of closings and advisories is an indication that serious water pollution persists at our nation's beaches. The most common reason officials cited for closing beaches or issuing advisories in 2010 was bacteria levels that exceeded beachwater quality standards. However, precautionary issues were also a factor (see Figure EO-1: Reasons Officials Closed Beaches or Issued Advisories in 2010).

Figure EO-1: Reasons Officials Closed Beaches or Issued Advisories in 2010



Pollution Sources That Caused Closings and Advisories in 2010

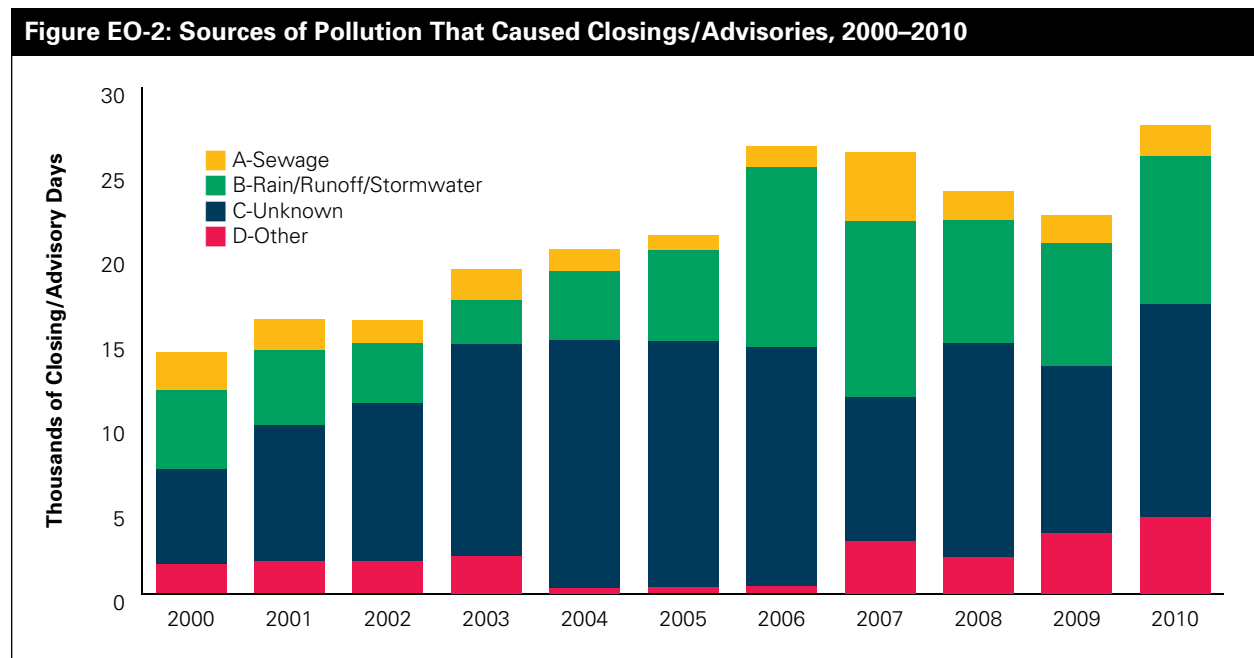
(Totals exceed total closing/advisory days and 100% because more than one contamination source was reported for some events.)

Most beach closings are issued because beachwater monitoring detects unsafe levels of bacteria. These unsafe levels indicate the presence of pathogens—microscopic organisms from human and animal waste that pose a threat to human health. The key reported contributors of these contaminants are (1) stormwater runoff, (2) sewage overflows and inadequately treated sewage, (3) agricultural runoff, and (4) other sources, such as beachgoers themselves, wildlife, septic systems, and boating waste.

Advisories may also be issued as precautionary measures when a pollution event is expected to occur, for instance during rainstorms. (See also Figure EO-2: Sources of Pollution That Caused Closings/Advisories, 2000–2010.)

- 52% (12,596 closing/advisory days) were attributed to unknown sources of pollution.
- 36% (8,712 closing/advisory days) were attributed to polluted runoff and stormwater.
- 19% (4,512 closing/advisory days) were attributed to miscellaneous pollution sources, such as boat discharges. Of those, 1,831 days were attributed to wildlife sources and about a third were due to the Gulf of Mexico oil spill.
- 8% (1,880 closing/advisory days) were attributed to sewage spills and overflows. This pollution source category includes combined sewer overflows, sanitary sewer overflows, breaks or blockages in sewer lines, and faulty septic systems.

There was no contamination source information for 203 closing/advisory days.



Total days shown are greater than annual totals because more than one pollution source may have contributed to each closing/advisory. **Key:** (A) Sewage spills and overflows. (B) Polluted runoff, stormwater, or preemptive due to rain. (C) Unknown. (D) Other reasons (including closings/advisories with no source information provided).

BEACHWATER MONITORING FOR 2010

In 2010, the portion of all monitoring samples exceeding national health standards increased slightly to 8% (7% in 2009, 2008, 2007, and 2006). Louisiana, Ohio, Indiana, and Michigan had the highest percent of samples exceeding the EPA's single-sample maximum standard for designated beach areas (see Table EO-1: Rank of States by Percentage of Beachwater Samples Received Exceeding the National Standard in 2010).⁵

Table EO-1: Rank of States by Percentage of Beachwater Samples Received Exceeding the National Standard in 2010

Rank	Percent Exceedance	State	2010 Total Samples	Beaches With Reported Monitoring Results
1	1%	New Hampshire	1,138	16
2	2%	New Jersey	3,955	219
3	3%	Oregon	946	28
4	3%	Hawaii	4,184	155
5	3%	Delaware	401	22
6	4%	Florida	15,841	305
7	4%	North Carolina	6,917	239
8	5%	Georgia	985	27
9	5%	South Carolina	2,481	23
10	5%	Alaska	299	12
11	5%	Minnesota	377	48
12	5%	Virginia	835	45
13	6%	Pennsylvania	887	12
14	6%	Washington	3,142	56
15	6%	Massachusetts	7,821	586
16	7%	Maryland	895	70
17	8%	Texas	14,169	65
18	8%	Rhode Island	1,855	70
19	9%	New York	9,253	350
20	10%	Mississippi	934	22
21	10%	Alabama	855	25
22	10%	California	26,399	456
23	11%	Maine	1,473	59
24	11%	Connecticut	2,502	65
25	11%	Wisconsin	4,527	117
26	14%	Illinois	4,569	50
27	15%	Michigan	7,392	214
28	16%	Indiana	2,643	31
29	21%	Ohio	2,931	62
30	37%	Louisiana	783	28

Ways in Which NRDC's Report Differs From the EPA's Beach Report

In May, the Environmental Protection Agency released a summary of closing/advisory information (see http://water.epa.gov/type/oceb/beaches/seasons_2010_national.cfm). NRDC's report is much different from the EPA's report.

1. NRDC includes an analysis of monitoring data.
2. NRDC includes area-wide preemptive rainfall advisories, but the EPA generally does not. Though only a few states issue such advisories, Hawaii issued more than 4,000 such days in 2010.
3. NRDC provides state-by-state reporting and analysis of individual beach programs.
4. With respect to closing/advisories, NRDC reports the total number of days and focuses its analysis on events lasting up to six consecutive weeks; events lasting longer are grouped as either extended or permanent events. The EPA reports the number of beaches with closings or advisories and the percent of the total "beach days" that were affected.
5. NRDC analyzes reported contamination sources associated with closings and advisories.
6. NRDC reports closings and advisories beyond monitored beaches. (Excluding Hawaii, there were 718 closing/advisory days at 45 non-monitored beaches in 5 states, plus 19 extended and 3 permanent events. Hawaii adds another 2,802 days.)
7. NRDC compares states and beaches on the basis of water quality.

It is important to note that while a high percent exceedance rate is a clear indication of contaminated coastal recreational waters, it is not necessarily an indication that the state's beachwater quality monitoring program is deficient or fails to protect public health when beachwater quality is poor. For example, four of the five states with the highest exceedance rates always or almost always close a beach or issue an advisory when a sample exceeds the standard; that is, they do not wait for the results of a resample or check other conditions first, as some other states do.

Regionally, the Great Lakes had the highest exceedance rate (15%) in 2010, followed by western states (8%), the Gulf Coast (8%), New England (7%), the Delmarva region (6%), the NY-NJ region (5%), and the Southeast (4%).

For the sixth consecutive year, NRDC determined the number of beaches exceeding the national daily standard more than 25% of the time. In 2010, this list included 171 beaches in 22 states, an increase over 2009, when there were 162 such beaches in 20 states. Thirteen beach areas in 7 states (California, Florida, Illinois, New Jersey, Ohio, Texas, and Wisconsin) made this list in each of the last five years, 2006 through 2010 (see Table EO-2: Repeat Offenders: Beaches With More Than 25 Percent of Samples Received Exceeding the EPA's Applicable Single-Sample Maximum Bacteria Standards for Designated Beach Areas, Each Year, 2006–2010). Chronically high bacteria counts indicate that the beachwater is probably contaminated with human or animal waste.

Table EO-2: Repeat Offenders: Beaches With More Than 25 Percent of Samples Received Exceeding the EPA's Applicable Single-Sample Maximum Bacteria Standards for Designated Beach Areas, Each Year, 2006–2010

State	County	Beach	Tier	Assigned Monitoring Frequency	Potential Pollution Sources (Reported by EPA)
California	Los Angeles	Avalon Beach–Near Busy B Cafe	1	1/wk	Unknown
California	Los Angeles	Avalon Beach–North of GP Pier	1	1/wk	Unknown
California	Los Angeles	Avalon Beach–South of GP Pier	1	1/wk	Unknown
California	Los Angeles	Cabrillo Beach Station	1	Daily	Unknown
California	Orange	Doheny State Beach–North of San Juan Creek	1	3/wk	Unknown
California	Orange	Doheny State Beach–Surf Zone at Outfall	1	3/wk	Unknown
Florida	Taylor	Keaton Beach	1	1/wk	Boats, Runoff, Wildlife, Stormwater, Other, Unknown
Illinois	Lake	North Point Marina North Beach	1	4/wk	Unknown
New Jersey	Ocean	Beachwood Beach West	1	1/wk	Stormwater, Wildlife
Ohio	Cuyahoga	Villa Angela State Park	1	Daily	None Listed
Texas	Nueces	Ropes Park	1	1/wk	Combined Sewer Overflow, Stormwater, Other, Unknown
Wisconsin	Kenosha	Eichelman	2	2/wk	Stormwater, Wildlife
Wisconsin	Milwaukee	South Shore Beach	1	4/wk	Unknown

For the 2010 beach season, the NRDC data set includes monitoring results for 131,389 samples at 3,277 beaches and beach segments (most state and local officials divide longer beaches into manageable monitoring segments). Fewer beaches were monitored last year than in any year between 2006 and 2009; the total was down from 125,551 samples at 3,333 beaches and beach segments in 2009, 132,465 samples at 3,601 beaches and beach segments in 2008, 131,977 samples at 3,516 beaches and beach segments in 2007, and up from 106,417 samples at 3,500 beaches and beach segments in 2006.

Methods Beach Officials Use to Sample, Monitor, and/or Predict Beachwater Quality

Beach officials in all states continue to use traditional methods approved by the EPA that require about 24 hours to quantify bacterial indicator levels in beachwater samples. In July 2010, a pilot project was launched at several beaches in Orange County, California, to demonstrate the use of qPCR, a rapid method of determining bacterial levels that allows beachwater quality warning decisions to be made on the same day a sample is taken. Traditional methods were used to analyze the samples alongside qPCR analysis, but the qPCR results were used to determine whether warnings about beachwater quality would be issued and signs posted at the pilot study beaches. Also during the summer of 2010, the Racine Health Department in Wisconsin used qPCR to determine levels of *E. coli* in beachwater and inform their management decisions at North Beach and Zoo Beach. These pilot studies were the first use of a rapid test method for issuing beachwater quality notifications at coastal beaches in the United States.

Beaches in Puerto Rico and a number of states, including Alabama, California, Florida, Michigan, Ohio, South Carolina, and Rhode Island, have participated in the EPA's National Epidemiological and Environmental Assessment of Recreational (NEEAR) Water Studies. These studies, which were urged on by an agreement that resulted from an NRDC lawsuit against the EPA for failing to fulfill the terms of the BEACH Act, were conducted to gain a better understanding of bacterial indicators, swimming at the beach, and people's health. Beachgoers were interviewed and water samples were collected and analyzed for bacteria using several analysis methods, including rapid testing.

In addition to the NEEAR project, several states have conducted their own studies of rapid test methods. California has invested an estimated \$3 million in rapid test method investigations, and Ohio, Wisconsin, and New Jersey have also conducted or participated in rapid test method research outside of the NEEAR studies.

Beachwater quality generally depends on many complex factors, but for some beaches, predictions of beachwater quality based on a few physical measurements of daily conditions can be calculated fairly accurately. Some states have taken advantage of this and have created computer models that rely on data from physical measurements such as rainfall levels, wind speed and direction, tides, wave heights, and currents. These models rapidly prepare predictions of beachwater quality and allow beaches to be closed or placed under advisory the day that bacterial levels are expected to be high, rather than 24 hours after high levels of bacteria exist. States using computer models to inform closing and advisory decisions for at least some of their beaches in 2010 were California, Illinois, Indiana, New York, Ohio, and Wisconsin.

Because the water quality at many beaches is adversely impacted by contaminated stormwater runoff, another, less sophisticated means of protecting public health is to preemptively close beaches or issue advisories when indicator bacteria levels are expected to be high after rainfall events. Many states report that they have developed standards for issuing preemptive rainfall advisories based on rainfall intensity or some other rain-related factor for at least some of their beaches. California, Connecticut, Delaware, Florida, Hawaii, Maine, Massachusetts, Michigan, New Jersey, New York, Pennsylvania, Rhode Island, South Carolina, and Wisconsin have quantitative rainfall standards at some of their beaches, and New Hampshire is developing them. Seventeen states reported preemptive rainfall closures or advisories at specific beaches in 2010: California, Connecticut, Delaware, Florida, Hawaii, Illinois, Indiana, Massachusetts, Michigan, Minnesota, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Texas, and Wisconsin.

Some states, including California, Minnesota, Mississippi, North Carolina, Rhode Island, and Washington, issue standing advisories warning the public to avoid beachwater contact after heavy rainfall or when storm drains are running. These standing advisories are not reported in the closing and advisory data that the states send to the EPA. In North Carolina, standing rainfall advisories take the form of permanent signs posted on either side of storm drain outfalls stating that swimming between the signs is not recommended when there is water flowing through the drain.

Factors That Confound Interpretation of the Results

Although it is understandable to expect a correlation between year-to-year changes in water quality and the number of closing/advisory days, there are confounding factors that make such correlations unlikely. While year-to-year change in the percent of monitoring samples that exceed health standards is an objective assessment of water quality, year-to-year change in the total number of closing/advisory days is subject to differences in programs and practices. For example, some states or localities:

- ***Take multiple samples at each monitoring station.*** When making closing/advisory decisions, beach officials might use the average value of all samples taken that day. Using this method, the average value may not exceed the standard even though one (or more) of the multiple samples does. In such a case, the beach would not be closed or put under advisory. While this is an acceptable procedure for making closing/advisory determinations, NRDC includes the results of every reported sample when calculating the percent of all samples that exceed the standard in a given year.
- ***Resample a beach after an exceedance before issuing a closing or advisory.*** If the resample does not exceed the standard, the beach is not put under closing or advisory.

- *Preemptively close a beach or issue an advisory without waiting for the results* of beachwater monitoring if they suspect that pollution has affected beachwater quality or if they close a beach or issue an advisory for non-pollution reasons. The reasons for these preemptive actions are highly variable, including heavy rainfall events, known sewage leaks, chemical spills, and high winds and waves.
- *Continue monitoring at beaches that are closed for more than six consecutive weeks* during the reporting year. NRDC does not include extended or permanent beach closings or advisories when comparing closing/advisory days from year to year, but the monitoring data that are collected at these beaches are included in the percent exceedance analysis.
- *Continue monitoring at beaches that have been closed for reasons other than pollution*, such as budget cuts or low attendance. While routine monitoring samples continue to be collected and their results reported to the EPA, the beach closing days may not be reported or may occur during events that are classified as extended or permanent events that are excluded from NRDC's analysis.

Also, year-to-year changes in beach monitoring frequency could impact the total number of closing/advisory days but not the percentage of samples that exceed health standards. For example, increasing routine monitoring from once every two weeks to once a week could decrease the number of closing/advisory days for the same number of events because the duration of many events could go from two weeks to one week.

RECOMMENDATIONS FOR IMPROVING BEACHWATER QUALITY

While concerns about the adequacy of water quality standards and water quality test methods remain, NRDC's biggest concern is addressing the sources of beachwater pollution. Stormwater runoff is the most frequently identified source of beach closings and advisory days, and the EPA estimates that more than 10 trillion gallons of untreated stormwater make their way into our surface waters each year.⁸

Often, the best way of avoiding runoff-related pollution is to reduce the volume of stormwater flowing to the storm drains that carry it to nearby water bodies or, in some cases, to sewage treatment plants. Green infrastructure, which restores or mimics natural conditions, involves techniques that allow rainwater to infiltrate into the soil, reducing the volume of runoff. Green infrastructure includes the use of porous pavement, green roofs, parks, roadside plantings, and rain barrels, to stop rain where it falls, either storing it or letting it filter into the ground naturally. This keeps stormwater runoff from overloading sewage systems and triggering overflows or from carrying pollutants into natural bodies of water.

Not only do these smarter water practices on land not only prevent pollution at the beach—but they also beautify neighborhoods, cool and cleanse the air, reduce asthma and heat-related illnesses, save on heating and cooling energy costs, boost economies, and support millions of American jobs at the same time. Many cities and states have embraced green infrastructure practices.

Decision makers in Congress and the administration should act on national initiatives that would result in cleaner beachwater and improve beach water monitoring and public information:

- The EPA should take a once-in-a-generation opportunity to reform its water pollution regulations for stormwater sources. Strong stormwater retention requirements will help spur widespread implementation of green infrastructure and help keep urban and suburban runoff from reaching beaches.
- Congress should pass legislation called the Green Infrastructure for Clean Water Act. Currently under consideration, it would boost green infrastructure nationwide—meaning cleaner U.S. beaches for the future.
- Congress should restore—and enhance—critical funds for investment in water infrastructure via the Clean Water State Revolving Fund. In the long term, Congress should work toward the creation of a trust or other dedicated source of clean water funding.

- Congress should pass the Sewage Overflow Community Right-to-Know Act when it is introduced. The bill would amend the Clean Water Act by directing owners or operators of sewage treatment plants to improve their spill reporting and by ensuring better coordination between sanitation and public health officials.
- The EPA and state agencies should use their authority under the current law to ensure that communities with combined sewer overflow problems implement strong long-term control plans that achieve critical water quality goals for receiving waters, such as making them safe for swimming.
- The EPA should renew efforts to develop a sanitary sewer overflow rule that reaffirms the prohibition on “blending” partially treated sewage with fully treated sewage, except under extreme circumstances; creates standard requirements for upkeep and repair of aging sewer systems; and includes strong requirements for reporting, recordkeeping, monitoring, and providing public notice when sewage overflows occur.
- The EPA should plug loopholes that allow industrial livestock operations to continue to discharge animal wastes into waterways.
- Congress should reauthorize the BEACH Act and provide sufficient funding for its full implementation and should authorize the use of funds to identify and remedy beach contamination sources.
- The EPA should modernize the health-based standards for beach water quality and continue to work to develop methods for quickly assessing water quality.

NOTES

- 1 U.S. EPA, *Advanced Notice of Proposed Rulemaking, NPDES Permit Requirements for Municipal Sanitary Sewer Collection Systems, Municipal Satellite Collection Systems, and Sanitary Sewer Overflows* (Jan. 4, 2001) (withdrawn Jan. 20, 2011).
- 2 Yoder, J.S., et al., “Surveillance for Waterborne Disease and Outbreaks Associated With Recreational Water Use and Other Aquatic Facility–Associated Health Events—United States, 2005–2006,” Centers for Disease Control and Prevention, September 12, 2008/57(SS09) pp. 1–29, available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5709a1.htm>.
- 3 Wade et al. 2006. *Rapidly Measured Indicators of Recreational Water Quality Are Predictive of Swimming-Associated Gastrointestinal Illness*. Environmental Health Perspectives, v. 114, no. 1, Jan. 2006, 24–28.
- 4 Given, S. et al., “Regional Public Health Cost Estimates of Contaminated Coastal Waters: A Case Study of Gastroenteritis at Southern California Beaches,” 40 *Environ. Sci. Technol.* 4851 (2006).
- 5 For the sixth consecutive year, NRDC used the BEACH Act’s single-sample maximum standards for designated beach areas to compare water quality at U.S. beaches. For marine waters, the standard for enterococcus density is 10⁴ cfu per 100 milliliters; for freshwater, the standard is 235 cfu *E. coli* per 100 milliliters.
- 6 National Ocean Economics Program, Market Data, Coastal Economy Data, Shore Adjacent Coastal Zone Counties, <http://noep.mbari.org/Market/coastal/coastalEcon.asp>.
- 7 Rabinovici, S.J., et al., “Economic and Health Risk Trade-Offs of Swim Closures at a Lake Michigan Beach,” *Environmental Science and Technology*, Vol. 38, No. 10, 2004, p. 2,742.
- 8 EPA, “Report to Congress: Impacts and Control of CSOs and SSOs,” April 26, 2004, EPA 833-R-04-001, p. 4-29, http://cfpub.epa.gov/npdes/cso/policy_report2004.cfm.

Beach Closures, Advisories, and Notices Due to the BP Oil Disaster

The Deepwater Horizon oil rig in the Gulf of Mexico exploded on April 20, 2010, killing 11 workers and sparking the worst oil spill in U.S. history. Over the course of two months, approximately 170 million gallons of oil and 200,000 metric tons of methane gas gushed into Gulf waters, affecting approximately 1,000 miles of shoreline.¹ More than a year later, a sorry legacy of enduring damage, people wronged, and a region scarred remains. As of the end of January, 83 miles of shoreline remained heavily or moderately oiled, and tar balls and weathered oil continue to wash ashore.²

As a result, as highlighted in this supplement to NRDC's annual Testing the Waters beachwater quality report, many beaches in the region have issued oil spill advisories, closures, and notices since April of last year. As of June 15, 2011 there have been a total of 9,474 days of oil-related beach notices, advisories, and closures at Gulf Coast beaches since the spill. Louisiana has been hit the hardest, with 3,420 days as of June 15, 2011, in that state, while there were 2,245 days as of June 15, 2011, in Florida, 2,148 days in Mississippi, and 1,661 days in Alabama. State and local officials took these actions in response to oil on beaches and in coastal waters because exposure to this oil can cause a variety of adverse human health effects, including headaches, dizziness, nausea, vomiting, eye, throat or skin irritation, difficulty breathing, and even increased cancer or neurological risks for long-term exposure.

While most of the advisories, closures, and notices that were issued last year due to the oil spill were lifted by the end of the year, cleanup crews are still at work. And the spill is still interfering with trips to the beach as oil continues to wash ashore at Gulf Coast beaches in Alabama, Louisiana, Florida and Mississippi. As of June 15, 2011, four beach segments in Louisiana that have been closed since the spill have yet to open, and three beaches in Florida have remained under oil spill notice.

Besides being a beloved source of recreation for local residents, tourism at these beaches is an important part of the region's economy. In 2004 alone, ocean tourism and recreation contributed approximately \$15.4 billion to the GDP of the five Gulf states (Florida, Alabama, Mississippi, Louisiana, and Texas),³ so revenue lost from oil spill beach action days could be significant.

Below is a state-by-state look at oil spill notices, advisories, and closures at Gulf Coast beaches from the beginning of the spill through June 15, 2011. Please note that NRDC includes all beaches in its analysis, not just those that are monitored for bacteria. NRDC also includes all advisory, closure, and notice days, not just advisory, closure, and notice days occurring during the regular monitoring season. All days for all lengths of events are included.

The information presented in this supplement was acquired from official government websites, supplemented with phone calls and e-mails with government officials in charge of beach management. For the full list of sources, see Table 1-5: Sources of Information About BP Oil Spill Beach Notices, Advisories, and Closings.

Alabama

Ocean tourism and recreation in Alabama contributed nearly \$355 million to the state GDP in 2004.

The first oil spill-related advisories were issued in Alabama on June 1, 2010, and all advisories were lifted on July 30, 2010. Shoreline Contamination Assessment Teams were working seven days a week on cleanup, and warning signs were still posted at all of Alabama's Gulf Coast beaches into 2011 because of the occasional presence of tar mats and tar balls from the spill. The table below gives oil spill advisory days in 2010. A total of 1,661 advisory days at 30 beaches in Alabama were issued due to the spill in 2010. There have been no oil-related closures since July 2010.

Table 1-1: Number of BP Oil Spill Advisory Days in Alabama in 2010		
County	Beach	Number of BP Oil Spill Advisory Days in 2010
Baldwin	10th Street Access	56
Baldwin	13th Street Access	56
Baldwin	5th Street Access	56
Baldwin	6th Street Access	56
Baldwin	7th Street Access	56
Baldwin	Alabama Point (Gulf of Mexico)	56
Baldwin	Anderson Street	56
Baldwin	Bernard Court	56
Baldwin	Bon Secour National Wildlife Refuge	56
Baldwin	Cotton Bayou	56
Baldwin	Florida Point	56
Baldwin	Fort Morgan National Park	56
Baldwin	Fort Morgan Public Beach	56
Baldwin	Gore Road	56
Baldwin	Gulf Shores Public Beach	56
Baldwin	Gulf State Park–Pavilion	56
Baldwin	Little Lagoon Pass Beach	56
Baldwin	Our Road	56
Baldwin	Pelican Point	53
Baldwin	Ponce De Leon Annex	56
Baldwin	Ponce De Leon Court Lot 35	56
Baldwin	Ponce De Leon Court Lot 50	56
Baldwin	Ponce De Leon Court Lot 51	56
Baldwin	Ponce De Leon Dr Access East	56
Baldwin	Ponce De Leon Dr Public Access	56
Baldwin	Romar Beach	56
Baldwin	South Wilson Blvd	51
Baldwin	Wolf Bay Lodge	51
Mobile	Dauphin Island East End	53
Mobile	Dauphin Island Public Beach	53
Total		1,661

Florida

Ocean tourism and recreation in Florida contributed more than \$10.7 billion to the state GDP in 2004.

The first oil spill-related advisories in Florida were issued on June 8, 2010. Over the July 4, 2010, weekend, Florida ceased issuing health advisories at beaches impacted by the oil spill because they found they were unable to keep up with rapidly changing conditions. Instead, oil impact notices on permanent signs were issued for beaches that had the potential to be impacted by the oil spill. These notices were removed by local health departments when the beach was no longer impacted by the oil spill. Cleanup crews were still at work into 2011 because of the occasional presence of tar mats and tar balls from the spill, and three beaches in Escambia County were still under oil spill notice as of June 15, 2011.

A total of 2,245 advisory and notice days at 30 beaches have been issued due to the spill. This total includes 1,747 days in 2010 and 498 days in 2011, as of June 15.

Table 1-2: Number of BP Oil Spill Advisory and Notice Days in Florida in 2010 and 2011

County	Beach	Number of BP Oil Spill Advisory and Notice Days	
		2010	2011
Escambia	County Park East	47	0
Escambia	County Park West	52	0
Escambia	Fort Pickens	189	166
Escambia	Johnson Beach	187	166
Escambia	Pensacola (Casino) Beach	52	0
Escambia	Perdido Key State Park	194	166
Okaloosa	Beasley State Park	43	0
Okaloosa	Brackin Wayside	43	0
Okaloosa	El Matador	43	0
Okaloosa	Henderson State Park Beach	43	0
Okaloosa	James Lee Park Beach	43	0
Okaloosa	Okaloosa Island Beach Access #1	43	0
Okaloosa	Okaloosa Island Beach Access #2	43	0
Okaloosa	Okaloosa Island Beach Access #3	43	0
Okaloosa	Okaloosa Island Beach Access #4	43	0
Okaloosa	Okaloosa Island Beach Access #5	43	0
Okaloosa	Okaloosa Island Beach Access #6	43	0
Okaloosa	Okaloosa Island Beach Access #7	43	0
Walton	Blue Mountain Beach Access	42	0
Walton	County Park	42	0
Walton	Dune Allen Beach Access	46	0
Walton	Eastern Lake Beach Access	42	0
Walton	Eastern Lake Outfall	42	0
Walton	Grayton Beach Access	42	0
Walton	Holly Street Beach Access	42	0
Walton	Inlet Beach Access (TDC Beach Access)	42	0
Walton	Rosemary Beach	42	0

Table 1-2: Number of BP Oil Spill Advisory and Notice Days in Florida in 2010 and 2011

County	Beach	Number of BP Oil Spill Advisory and Notice Days	
		2010	2011
Walton	Santa Rosa Beach Access	42	0
Walton	South Wall Street Beach	44	0
Walton	Western Lake Outfall	42	0
Total		1,747	498

Louisiana

Ocean tourism and recreation in Louisiana contributed more than \$2.1 billion to the state GDP in 2004.

Louisiana was the first state to be hit by the oil spill, and cleanup crews are still at work. All four segments of Fourchon Beach in Lafourche Parish have been closed since May 7, 2010, and will probably remain closed throughout 2011. The oil spill closures at one section of Grand Isle Beach and all four sections of Grand Isle State Park Beach in Jefferson Parish were not lifted until this year.

A total of 2,232 closing days at 11 beach segments in Louisiana were issued due to the spill in 2010. And as of June 15, 2011, NRDC estimates the total number of closure days in 2011 to be 1,188.

Table 1-3: Number of BP Oil Spill Advisory Days in Louisiana in 2010 and 2011

Parish	Beach	Number of BP Oil Spill Closure Days	
		2010	2011
Jefferson	Grand Isle Beach 1 *	224	15
Jefferson	Grand Isle Beach 2	80	0
Jefferson	Grand Isle Beach 3	80	0
Jefferson	Grand Isle State Park 1	224	140
Jefferson	Grand Isle State Park 2	224	123
Jefferson	Grand Isle State Park 3	224	123
Jefferson	Grand Isle State Park 4	224	123
Lafourche	Fourchon 1	238	166
Lafourche	Fourchon 2	238	166
Lafourche	Fourchon 3	238	166
Lafourche	Fourchon 4	238	166
Total		2,232	1,188

*The date the oil spill closure at this beach segment was lifted has not been confirmed. NRDC was told that it was lifted sometime during January and has applied a date of January 15, 2011.

Mississippi

Ocean tourism and recreation in Mississippi contributed nearly \$210 million to the state GDP in 2004.

The first oil spill-related advisories in Mississippi were issued on June 28, 2010, and all advisories were lifted in early November. Cleanup crews were working along Mississippi's coast into 2011. Mississippi has posted additional signage at all of its beaches educating visitors about what to do if they encounter tar balls and what the health effects of the oil spill may be. The table below gives oil spill advisory days in 2010 (there were no BP oil spill advisory days in Mississippi in 2011). A total of 2,148 advisory days at 17 beaches in Mississippi were issued due to the spill in 2010. There have been no oil-related closures since November 2010.

Table 1-4: Number of BP Oil Spill Advisory Days in Mississippi in 2010		
County	Beach	Number of BP Oil Spill Advisory Days in 2010
Hancock	Buccaneer State Park Beach	120
Hancock	Lakeshore	120
Hancock	Waveland Beach	120
Harrison	Biloxi East Central Beach	128
Harrison	Biloxi West Central Beach	129
Harrison	Courthouse Road Beach	128
Harrison	Edgewater Beach	128
Harrison	Gulfport Central Beach	128
Harrison	Gulfport East Beach	128
Harrison	Gulfport Harbor Beach	128
Harrison	Gulfport West Beach	127
Harrison	Long Beach	127
Harrison	Pass Christian Central Beach	126
Harrison	Pass Christian East Beach	127
Harrison	Pass Christian West Beach	126
Jackson	Gulf Park Estates Beach	129
Jackson	St. Andrews Beach	129
Hancock	Buccaneer State Park Beach	120
Total		2,148

Table 1-5: Sources of Information About BP Oil Spill Beach Notices, Advisories, and Closings

All states
EPA's BEACH Act notification data
In Alabama:
Suzi Rice, Alabama Department of Environmental Management
http://adph.org/news/assets/100601.pdf
http://adph.org/news/assets/100609.pdf
http://adph.org/news/assets/100618.pdf
http://adph.org/news/assets/100730.pdf
http://www.adph.org/news/assets/100504.pdf
http://www.thebeachfacts.com
In Florida:
David Polk, Florida Department of Health
http://www.myfloridaeh.com/061610healthadvisory.pdf
http://www.dep.state.fl.us/deepwaterhorizon/files/healthadvisories/062310_escambia.pdf
In Florida:
http://www.dep.state.fl.us/deepwaterhorizon/files/healthadvisories/062410_okaloosa.pdf
http://www.dep.state.fl.us/deepwaterhorizon/files/healthadvisories/062510_escambia.pdf
http://www.dep.state.fl.us/deepwaterhorizon/files/healthadvisories/062610_escambia.pdf
http://www.dep.state.fl.us/deepwaterhorizon/files/healthadvisories/070110_escambia.pdf
http://www.doh.state.fl.us/chdWalton/PublicHealth/Oil_Impact_Notice_Rescinded8.13.10.pdf
http://www.escambiahealth.com/recent_hot_topics/2010/pdfs/06_18_ha.pdf
http://www.escambiahealth.com/recent_hot_topics/2010/pdfs/06_28_ha_fishing_pier.pdf
http://www.escambiahealth.com/recent_hot_topics/2010/pdfs/06_30_ha_spill.pdf
http://www.healthyokaloosa.com/Deepwater_Horizon/Media/May05/070210_OilImpactNotices.pdf
http://www.healthyokaloosa.com/Media/2010/061710_HealthAdvisoryRESCINDForOil.pdf
http://www.healthyokaloosa.com/Media/2010/081310_OilImpactNotices_Rescinded.pdf
http://www.southwaltonscene.com/blog/2010/06/the-oil-spill-and-south-walton-health-advisory-issued-june-30-2010.html
http://www.southwaltonscene.com/blog/beaches-of-south-walton/page/2/
http://www.visitflorida.com/florida_travel_advisory/#map
http://www.waltonso.org/NewsMedia/release/2010-192-July-2-Update.pdf
http://www.waltonso.org/press_release/2010_192_July_2_Update.pdf
http://www.healthyokaloosa.com/Media/2010/061710_HealthAdvisoryRESCINDForOil.pdf
In Louisiana:
Eric, Port Fourchon Emergency Preparedness
http://www.crt.state.la.us/parks/
http://www.crt.state.la.us/parks/PressReleases/20110429.pdf
http://www.dhh.louisiana.gov/offices/?ID=207
http://www.nola.com/news/gulf-oil-spill/index.ssf/2010/08/2-mile_section_of_grand_isle_b.html
http://www.portfourchon.com/explore.cfm/latestupdates/

Table 1-5: Sources of Information About BP Oil Spill Beach Notices, Advisories, and Closings

Sharon Broussard, Grand Isle State Park
In Mississippi:
Emily Cotton, Mississippi Department of Environmental Quality
http://www.usm.edu/gcrl/msbeach/hanbmon.cgi
http://www.usm.edu/gcrl/msbeach/jacbmon.cgi

NOTES

- 1 Natural Resources Defense Council: “The BP Oil Disaster at One Year—A Straightforward Assessment of What We Know, What We Don’t, and What Questions Need to be Answered” (April 2011), www.nrdc.org/energy/files/bpoildisasteroneyear.pdf.
- 2 NRDC blog at http://switchboard.nrdc.org/blogs/bdeans/the_bp_oil_disaster_a_one-year.html.
- 3 National Ocean Economics Program, “Coastal and Ocean Economic Summaries of the Coastal States 2009,” <http://www.oceaneconomics.org/NationalReport/>.

Swimming in the Great Lakes

The 5,500 miles of coastline along America's Great Lakes have begun to show signs of strain brought on by years of misuse and the gathering onslaught of climate change.¹ Historically, though residents of the region have embraced and loved the Great Lakes, we have not treated the lakes with the care that should be afforded to North America's most valuable freshwater resource. The world's largest freshwater ecosystem (representing one-fifth of the world's fresh surface water) provides drinking water for 30 million people as well as recreation and relief from the region's hot and humid summers. But the beaches of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin are perennial victims of overwhelmed and broken infrastructure that damages water quality. Exacerbating conditions even further are invasive species that have had devastating impacts on the Great Lakes food web.² These issues are not new. In 2010 and 2011, great strides have been made to address the problems that plague our inland seas, but we still find ourselves nibbling at the edges as challenges expand.

Gaps in knowledge about the various pollution sources hinder the creation of a comprehensive plan and public action agenda to improve beach and water quality in the Great Lakes Basin so as to fully protect public health and safety. Lake Erie, once the poster child for improved waters after the implementation of the Clean Water Act, is once again showing signs of utter collapse under a growing deluge of nutrient pollution that threatens to kill the lake, one of the continent's premier fisheries, once again.^{3,4} Today, increased runoff of dissolved phosphorus from farm fields and cities, continued dumping of pollution and hot water from wastewater treatment and power plants, and the invasion of quagga mussels and zebra mussels that concentrate nutrients in nearshore areas and at the lake bottom have conspired to cause thick carpets of toxic blue-green algae to cover portions of Lake Erie every summer.^{5,6,7,8}

While we do not know all the sources of contamination at Great Lakes beaches, we do know that aging and failing infrastructure throughout the region is probably the most prevalent factor. Gary, Indiana, for example, has discharged 6.8 billion gallons of raw and partially treated sewage into waterways flowing directly into Lake Michigan in the past three years, according to press accounts.⁹ This vexing issue is not a unique situation in the region and will require significant investment to fix.

The Chicago Climate Action Plan is instructive in setting forth what the region will be facing in the coming years and the actions necessary to prepare for it.¹⁰ For the report, researchers from the University of Illinois and Texas Tech University downscaled national climatic models to understand how changing climate patterns would affect Chicago. They concluded that the amount of annual precipitation would remain roughly the same but that storms would be shorter and more intense. Stormwater picks up contaminants—including fecal matter from all manner of sources—as it runs off hard surfaces. In areas with combined sewer systems, runoff is routed to sewage treatment plants, a practice intended to remove pollutants from stormwater before it is discharged. However, violent storms can outpace treatment plant capacity, resulting in the discharge of raw or partially treated sewage into rivers and lakes in what is called a CSO (combined sewer overflow). In Chicago, NRDC research has shown this to occur with as little as 1.5 inches of rain.¹¹ This limitation is not uncommon for the region—and that is bad for the Great Lakes, where much of that pollution can end up. A 2006 study estimated that 20 cities dump almost 25 billion gallons of untreated sewage into the Great Lakes each year through CSOs; this points to one obvious place to focus resources in order to reduce a significant pollution source impacting beach and water quality. The federal Clean Water Act not only requires communities to eliminate such sources but also provides federal funding to do so through the State Revolving Fund (SRF) program. Unfortunately, those federal dollars are highly competitive and will not adequately address the problem. The U.S. EPA estimates the eight states in the Great Lakes Basin will need to spend more than \$30 billion on drinking water and wastewater infrastructure upgrades, while the SRF is facing significant budget reductions. Funding gaps like this one have increased over time and go a long way toward explaining the grade of D consistently given by the American Society of Civil Engineers in its biannual *Report Card for America's Infrastructure* for both wastewater and drinking water infrastructure.¹²

A revolution in thinking about stormwater is slowly advancing in the nation and the Great Lakes region. Traditionally we have thought of stormwater as undesirable, something that had to be captured in sewer systems before being piped and pumped to wastewater treatment plants. Traditional, “gray” infrastructure—hard surfaces like rooftops, parking lots, and roads—causes stormwater to run into our limited sewer systems. Green infrastructure, on the other hand, embraces stormwater as a resource and uses natural systems to capture, hold, and even clean rainwater, limiting the negative impacts of storms. Vegetated green roofs and greenways use ecological principles and functions to promote environmentally and economically beneficial outcomes such as energy efficiency, clean water, and conservation. Specifically, the use of vegetation and restored open space helps reduce energy demand, break up heat islands, prevent water pollution and flooding from storm events, restore hydrological functions, and conserve and recharge water resources to better meet the challenges of droughts. It also prevents contaminated stormwater from fouling beaches. Green infrastructure offers a way to help relieve the burden on traditional infrastructure in an inexpensive and aesthetically pleasing way that also helps make our built infrastructure more resilient.

In Cleveland, regional water regulators recently inked a consent decree that will address the tangled mess of northwestern Ohio’s combined sewers, leaning heavily on green infrastructure tools to relieve the burden on the sewer system. The Milwaukee Metropolitan Sewerage District is attempting to eliminate its CSOs and sees green infrastructure as a critical part of the process. It has already taken significant action in buying and preserving land upstream to prevent stormwater runoff from even reaching Milwaukee, investing in green roofs and rain barrels, and educating residents. The City of Chicago has made significant investments in green infrastructure as well, taking the lead on green roofs and rolling out permeable paved alleyways. However, the regional wastewater utility, the Metropolitan Water Reclamation District, has fought this approach, instead relying on a 1972 plan to build a series of tunnels and reservoirs to protect the region from flooding and overflows. NRDC and its partners recently filed suit to force the district to clean up its infrastructure, and there are signs of a shift. For instance, the district’s board recently voted to begin disinfection of effluent discharged into the Chicago River. This is hugely important, since the river discharges billions of gallons of water into Lake Michigan during heavy storms when sluice gates and locks are opened to relieve pressure on the overburdened water system.

All of that pollution takes a toll on swimmers and recreators, and the issue has not gone unnoticed. In the past decade, increased attention to the health of swimmers in the region, along with the BEACH Act of 2000, has brought significant data to light on beach contamination. In 2010, 579 Great Lakes beaches were monitored on at least a weekly basis. But inconsistencies in data-gathering practices and timing continue to make beach warning data less than ideal for protecting public health. Some beaches are monitored daily, while others are monitored weekly or less frequently. In part, these inconsistencies appear to be the result of inadequate funding and staffing. Like monitoring, public notification of beach quality and safety is critical to protecting public health. Here too, practices in the Great Lakes region are inconsistent both within and across states. States differ not only in the information they use to make beach closing and advisory decisions, but also in how they convey this information to the public. While some states issue both advisories and closings, others issue only closings or only advisories.

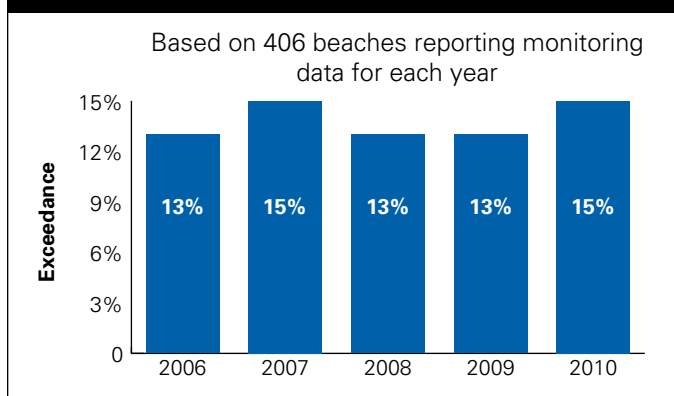
Beach officials in Great Lakes states are required to use traditional culture-based test methods to quantify bacterial indicator levels in beach water samples. These tests take about 24 hours, so when standards are exceeded and warnings issued, officials are essentially telling people a day late that they should not have used particular beaches. For some beaches, water quality can be fairly accurately assessed on the basis of physical measurements such as rainfall levels, wind speed and direction, tides, wave heights, and currents. These models allow beaches to be closed or placed under advisory the day that bacterial levels are expected to be high, rather than 24 hours later when sample results are available. Studies suggest that closings and advisories based on this predictive approach better protect public health than do those based on day-old monitoring results.¹³ Several Great Lakes states have created beach water quality computer models that rely on data from physical measurements. States using computer models to inform closing and advisory decisions for at least some of their Great Lakes beaches in 2010 included Illinois, Indiana, New York, Ohio, and Wisconsin. The only other state that uses a predictive model for closing and advisory decisions at some of its beaches is California. These models need to be tailored to the unique conditions at each beach and thus require significant research and development time.

Many of the Great Lakes states have also participated in pilot projects to research rapid test methods for quantifying indicator bacteria levels and the link between these levels and illness rates in swimmers. Michigan and Ohio participated in the EPA’s National Epidemiological and Environmental Assessment of Recreational (NEEAR) Water Studies, which the EPA conducted as part of its requirement to develop more protective health standards for recreational beachwater.

Beachgoers were interviewed and water samples collected and analyzed for bacteria using several methods including rapid tests. Ohio and Wisconsin have conducted studies of rapid test methods in addition to the NEEAR studies.

NEEAR studies were conducted in 2003 at two Great Lakes beaches. At Indiana Dunes National Lakeshore on Lake Michigan in Indiana, it was found that those who had any contact with beach water were twice as likely (10%) to have gastrointestinal illness as those who had no contact (5%). The risk of gastrointestinal illness was as high as 14% at a beach located on Lake Erie near Cleveland. The presence of the indicator organism enterococcus was associated with the increased risk. The study concluded that rapid measurement of enterococcus could predict gastrointestinal illness occurring as a result of swimming in fecally contaminated freshwater and that samples collected each morning could allow beach managers to assess the microbiological safety of the beach before most beachgoers were exposed.¹⁴

Figure 2-1: Percent of Samples Exceeding *E. coli* Standard for Great Lakes States Combined, 2006–2010



Bacteria in Great Lakes Beachwater

NRDC conducted a comparative analysis of water quality at beaches along the U.S. Great Lakes shoreline using publicly available monitoring data from all eight Great Lakes states. Fifteen percent of all beachwater samples collected in 2010 exceeded the BEACH Act's single-sample maximum *E. coli* standard for designated freshwater beaches (235 cfu/100 ml). Levels above the standard indicate the presence of human or animal waste in the water that could make swimmers sick. Over the five-year period during which NRDC has conducted this analysis of Great Lakes beaches, 13% to 15% of samples at the 406 beaches that reported monitoring data for each year had levels of *E. coli*

contamination exceeding the standard, a figure well above the national average (see Figure 2-1: Percent of Samples Exceeding *E. coli* Standard for Great Lakes States Combined, 2006–2010).

Table 2-1: Great Lakes Beaches with Frequent Exceedances of the National Standard

State	County	Beach	Tier	Monitoring Frequency	Total Samples	Exceedance Rate
MI	Muskegon	Meinert County Park	1	1/wk	21	81%
MI	Marquette	Marquette South Beach	1	3/wk	33	76%
IN	Lake	Jeorse Park Beach I	2	5/wk	75	75%
MI	Macomb	St. Clair Shores Blossom Heath Beach	1	2/wk	129	67%
IN	Lake	Jeorse Park Beach II	2	5/wk	75	67%
NY	Niagara	Krull Park	2	1/wk	25	64%
OH	Erie	Edson Creek	1	4/wk	55	64%
IL	Cook	Winnetka Elder Park Beach	1	daily	72	61%
WI	Milwaukee	South Shore Beach	1	4/wk	54	59%
MI	Alpena	Blair Street Park	1	1/wk	16	56%
NY	Wayne	Pultneyville Mariners Beach	3	1/wk	18	56%
WI	Douglas	Wisconsin Point Beach 2	3	1/wk	29	52%

Great Lakes Beach Closings/Advisories and Pollution Sources

- During 2010, U.S. Great Lakes beaches had 3,766 days of closings and advisories and 6 extended (361 days total) and 1 permanent (110 days total) closings and advisories. 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. Including extended days, the total comes to 4,137 beach closing and advisory days.
- The number of beach closing and advisory days increased 14% from 3,300 in 2009.
- The continued high level of closings/advisories is an indication that serious water pollution persists at our nation's Great Lakes beaches. Eighty-four percent of the 2010 beach closing and advisory days (3,176 days, 165 more than in 2009) were issued because of bacteria levels that exceeded health and safety standards.

Besides high bacteria levels, other reasons for beach closings and advisories in 2010 included the following:

- 7% (276 days) were precautionary due to stormwater runoff, a known source of pollution in some swimming waters.
- 4% (135 days) were issued in response to known pollution events, such as sewage treatment plant failure or breaks in sewage pipes.
- 3% (106 days) were due to other, unspecified causes.
- 1% (33 days) were preemptive due to real-time computer modeling that uses readily measurable physical parameters such as wind speed and wave height to predict indicator bacterial levels.

Major pollution sources listed as responsible for 2010 beach closings and advisories included the following:

- Unknown sources of pollution caused 3,143 closing/advisory days (83% of this year's total), compared with 2,444 days in 2009, 3,015 days in 2008, and 1,994 days in 2007.
- Polluted runoff and stormwater caused or contributed to 351 closing/advisory days (9% of this year's total), compared with 588 days in 2009, 550 days in 2008, and 914 days in 2007.
- Sewage spills and overflows caused or contributed to 64 closing/advisory days (2% of this year's total), compared with 122 days in 2009, 16 days in 2008, and 44 days in 2007.
- Elevated bacteria levels from miscellaneous sources (wildlife, boat discharges, etc.) accounted for 208 closing/advisory days (6% of this year's total), compared with 156 days in 2009, 134 days in 2008, and 91 days in 2007.

Bacterial Standards

Seven of the eight Great Lakes states use the BEACH Act single-sample standard to inform beach closing/advisory decisions. This standard is 235 cfu/100 ml of *E. coli*. Michigan's single-sample standard is 300 cfu/100 ml of *E. coli*.

Two of the Great Lakes states use a geometric-mean standard based on at least five samples over a 30-day period to inform beach closing/advisory decisions. Minnesota applies the BEACH Act geometric-mean standard of 126 cfu/100 ml, and Michigan applies a geometric-mean standard of 130 cfu/100 ml. Illinois, Indiana, Ohio, Pennsylvania, and Wisconsin do not apply the geometric-mean standard when making closing and advisory decisions. In New York, local beach authorities decide whether to apply the geometric mean when making closing and advisory decisions.

Threats to the Health of Great Lakes Swimmers and the Ecosystem

Pathogens in beachwater contaminated with sewage and fecal matter can cause a wide range of diseases that threaten human health, including gastroenteritis, dysentery, hepatitis, respiratory illness, and ear, nose, and throat problems. The consequences of these swimming-associated illnesses can be greater for children, elderly people, pregnant women, cancer patients, and others with weakened immune systems. And these pathogens may be persisting longer in the Great Lakes region due to conditions being established by large populations of invasive species.¹⁵

There is growing evidence that broad changes in the freshwater environment of the Great Lakes brought about by invasive species are promoting conditions that nurture bacteria, including *E. coli*.¹⁶ Healthy lakes are often murky, but feeding by quagga mussels has eliminated as much as 20% of Lake Erie's phytoplankton in less than 15 years.¹⁷ The elimination of those and other microorganisms has literally cleared the waters. Although that sounds good, it has allowed sunlight to penetrate to the bottom of the lakes, encouraging aquatic plant growth on formerly barren lake beds. In Lake Michigan, that is increasingly coming in the form of cladophora, a green algae that accumulates near shorelines. A link between cladophora mats and exceedances of recreational water quality criteria has been suggested, and studies show increased *E. coli* concentrations under and near these mats.^{18,19} A growing number of beaches have been impacted by algae mucking, when the mats disengage from the lake bottom and wash up on shore in foul-smelling mounds.

Recent studies have shown continued rapid growth in the quagga mussel population in the Great Lakes; it is estimated that they now number nearly a quadrillion.^{20,21,22} As dire as the situation looks, it could be made worse if another infamous invader, Asian carp, gains access to the Great Lakes from waterways in and around Chicago. Like the mussels, silver and bighead carp are tireless filter feeders that would continue the process of clarifying lake water, hastening an ecosystem collapse. Recent studies suggest that the carp may also be able to take advantage of cladaophora, establishing themselves in Lake Michigan before colonizing the other lakes.²³

On the positive side, the well-publicized advance of Asian carp has helped to make the public more aware of invasive species threats to the region. Significant resources and energy are being directed to address the sources of invasive species, though NRDC and other Great Lakes advocates remain concerned that the battle against Asian carp is moving too slowly to head off their advance. Still, there is good news on this front too. NRDC helped to broker a legal settlement that will require the EPA to set new national limits on invasive species in ship ballast that should help to eliminate one of the biggest sources of invasive species: water dumped from freighters moving between the lakes and coming from ocean ports.²⁴ The settlement should prompt the EPA to treat this "living pollution" as aggressively as it would an oil spill or toxic release and set protective limits on biological discharges to help prevent future species invasions.

The Aquatic Nuisance Species (ANS) Task Force estimates that the 15 most recent introductions of these invaders could cost the United States \$134 billion by 2050.²⁵ The cost of damages caused by zebra mussels alone to the Great Lakes regional economy could be as much as \$4.9 billion per year.²⁶ Far more costly are the potential threats to the Great Lakes themselves.

Economic Effects

The Great Lakes are a massive tourism engine for the region. For example, Lake Erie is said to generate \$9 billion in tourism revenue annually and support jobs for nearly 150,000 workers in Ohio alone.^{27,28}

Beaches are the top vacation destination in the country. And coastal tourism, dependent in part on clean waters, generates substantial revenues for state and local governments. Studies on the impact of beach closures vary greatly. One study estimated that economic losses resulting from the closure of a Lake Michigan beach due to pollution could be as high as \$37,000 per day. The study also anticipated additional economic losses from polluted waters due to swimming-related illnesses and from beachgoers' lost use of the beach.²⁹ Another study, by researchers at the University of Chicago, estimated that swim bans at Chicago beaches cost the local economy more than \$2 million a year.³⁰ Yet another posited that the closure of all Lake Michigan beaches would result in a loss of nearly \$1 billion.³¹

Boating is a significant source of economic revenue for the Great Lakes. Nearly one-third of the nation's boats are registered in the Great Lakes region. In 2003, boating on the lakes generated direct revenue of \$16 billion and supported 107,000 jobs. Indirect revenue from boating-related industries such as manufacturing, marinas, charter operations, restaurants, lodging, and other businesses located near docking facilities increased the total number of jobs to 244,000 and

revenue to \$19 billion.³² Beach-related products, such as swimsuits, sunscreen, beach chairs, towels, boogie boards, and surfboards, generate hundreds of millions, if not billions, of dollars each year in sales. Sunscreens alone earn manufacturers revenues of about \$640 million a year.³³

Recommendations for Great Lakes Communities

- The EPA's recent municipal guidance emphasizing the value of using green infrastructure tools to augment and replace gray infrastructure should be heeded by governments throughout the Great Lakes basin.
- The EPA and the states must develop numeric nutrient standards for bodies of water, like Lake Erie, that are overwhelmed by nitrogen and phosphorus pollution that causes low-oxygen "dead zones" and toxic algal blooms. Creating these standards establishes an important baseline against which reductions in nutrient pollution from farm fertilizer runoff, urban stormwater, and wastewater dumping can be measured.
- The imminent invasion of Asian carp requires swift and coordinated action from an array of engaged authorities. NRDC has long advocated for a physical separation of the Great Lakes Basin and Mississippi River system in the Chicago-area waterways that connect the two great ecosystems. While further study may be necessary, the current decade-plus timeline set by the Army Corps of Engineers is inadequate to rebuff the invasion. Additionally, tools currently in use are focused on the carp and will not help prevent the next major species invasion. The influx in resources to address the carp invasion must also address the long-term threat of invasive species queued up to move between ecosystems on both sides of the Corps's current ineffective electric barrier. A more effective solution needs to be fast-tracked to end this vector for invasive species movement once and for all. The Stop Asian Carp Act of 2011, introduced by Sen. Debbie Stabenow and Rep. Dave Camp and sponsored by Sen. Dick Durbin, will help to jump-start the development of real long-term solutions.
- Full funding of Great Lakes restoration and collaboration initiatives will allow the EPA to continue to support research and habitat restoration in the region to help stem the impacts of invasive species. The Great Lakes Restoration Initiative funds programs that support beach monitoring, CSO improvements, and green infrastructure.
- Residents throughout the Great Lakes region have a critical role to play: adding water efficiency and green infrastructure features to their homes and workplaces. Installing rain gardens and rain barrels captures water where it falls, reducing the amount of flow to sewer systems. Planting trees and native plants, participating in beach cleanups, and practicing simple water conservation techniques—such as turning off the water while brushing one's teeth—all have significant impacts on the local water footprint and help avoid polluting our lakes and beaches.
- The EPA is expected to update the requirements that apply to long-term runoff from developed sites by proposing a rule in September 2011. The EPA should take full advantage of this once-in-a-generation opportunity by adopting new objective performance requirements to control runoff volume from new and redeveloped sites, which will create strong incentives for the deployment of green infrastructure approaches. The EPA should also require retrofits in already existing public and private developed areas and as part of infrastructure reconstruction projects. Likewise, the agency needs to ensure that significant runoff sources are covered.

NOTES

- 1 "Global Climate Change Impacts in the United States: Midwest Regional Climate Change Impacts," eds. Karl, T.R., Melillo, J.M., and Peterson, T.C., Cambridge University Press, 2009, <http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf>.
- 2 Fields, S., "Great Lakes Resource at Risk," *Environmental Health Perspectives* Volume 113, Number 3, March 2005.
- 3 Experimental Lakes Area. "Eutrophication (Nutrient Pollution)." <http://www.experimentallakesarea.ca/images/Eutrophication.pdf>
- 4 U.S Environmental Protection Agency, "Detroit River-Western Lake Erie Basin Indicator Project—INDICATOR: Plankton Communities in Western Lake Erie," August 2009, http://www.epa.gov/med/grosseile_site/indicators/plankton.html

- 5 U.S. Environmental Protection Agency, "Detroit River-Western Lake Erie Basin Indicator Project," August 2009, http://www.epa.gov/med/grosseile_site/indicators/western-lake-phos.html
- 6 Deardorff, Julie , "Healed once, Lake Erie in relapse Biological forces may be to blame for `dead zones` that are responsible for killing fish and birds" October 2002. http://articles.chicagotribune.com/2002-10-18/news/0210180254_1_dead-zones-great-lakes-national-program-chemical-pollution
- 7 Arnott,, D L; Vanni, M J, "Nitrogen and phosphorus recycling by the zebra mussel (*Dreissena polymorpha*) in the western basin of Lake Erie," *Canadian Journal of Fisheries and Aquatic Sciences*, 1996, 53:646-659, 10.1139/F95-214, April 2011. <http://www.nrcresearchpress.com/doi/abs/10.1139/F95-214>
- 8 University of Wisconsin-Milwaukee, Great Lakes WATER Institute, "*Cladophora* Research and Management in the Great Lakes."December2004. http://seagrant.wisc.edu/home/Portals/0/Files/Water%20Quality/Dec_05_Cladophora_Research_Workshop_Proceedings_2.pdf
- 9 Laasby, Gitte, "Is GSD turning lake into sewer?" *Post Tribune*. 29 January 2011. <http://posttrib.suntimes.com/news/lake/3580708-418/overflows-gary-sewage-treatment-plant.html?print=true>
- 10 City of Chicago, Climate Action Plan, 2008. <http://www.chicagoclimateaction.org/>. Chicago Department of Environment, "Chicago Climate Action Plan: Potential Changes in Precipitation," September 2008. <http://www.chicagoclimateaction.org/pages/precipitation/21.php>
- 11 Cmar, Thom, Henry Henderson, Karen Hobbs, "Re-Envisioning the Chicago River: Adopting Comprehensive Regional Solutions to the Invasive Species Crisis" September 2010. <http://www.nrdc.org/water/Chicagoriver/files/Chicago%20River.pdf>
- 12 American Society of Civil Engineers, "Report Card for America's Infrastructure: Wastewater," 2010. <http://www.infrastructurereportcard.org/factsheet/wastewater>
- 13 Briggs, Shannon, Michigan Department of Environmental Quality, personal communication, June 2009.
- 14 Wade, Timothy J., R. L. Calderon, E. Sams, M. Beach, K. P. Brenner, A. H. Williams, A. P. Dufour, "Rapidly Measured Indicators of Recreational Water Quality Are Predictive of Swimming-Associated Gastrointestinal Illness," *Environmental Health Perspectives* Volume 114, Number 1, January 2006
- 15 USGS Great Lakes Science Center, "Algal (*Cladophora*) Mats Harbor High Concentrations of Indicator Bacteria and Pathogens," 2009.
- 16 Heuvel, A.V., McDermott, C., Pillsbury, R., Sandrin, T., Kinzelman, J., Ferguson, J., Sadowsky, M., Byappanahalli, M., Whitman, R. and Kleinheinz, G.T, "The Green Alga, *Cladophora*, Promotes *Escherichia coli* Growth and Contamination of Recreational Waters in Lake Michigan," *J. Environ. Qual.* Volume 39, 2009.
- 17 Barbiero, R.P., Rockwell, D.C., Warren, G.J. and Tuchman, M.L, "Changes in spring phytoplankton communities and nutrient dynamics in the eastern basin of Lake Erie since the invasion of *Dreissena* spp.," *Can. J. Fish. Aquat. Sci.* Volume 63, 2006.
- 18 USGS Great Lakes Science Center, op.cit.
- 19 Heuvel, et al., op.cit.
- 20 University of Wisconsin-Madison. "Zebra Mussels Hang On While Quagga Mussels Take Over." *ScienceDaily*, 14 June 2009. <http://www.sciencedaily.com/releases/2009/06/090612092733.htm>
- 21 University of Michigan. "Invasive mussels causing massive ecological changes in Great Lake." *ScienceDaily*, 17 April 2011. Web. 27 Jun. 2011. <http://www.sciencedaily.com/releases/2011/04/110413171331.htm>
- 22 Great Lakes Echo, "Lake Michigan 'doughnut' bloom update: See it from space" 23 July 2010. <http://greatlakesecho.org/2010/07/23/lake-michigan-doughnut-bloom-update-see-it-from-space/>
- 23 Dizikes, Cynthia, "Asian carp possibly harder than once thought: Threat to Great Lakes could mount, government officials say" *Chicago Tribune*, 28 April 2011. http://articles.chicagotribune.com/2011-04-28/news/ct-met-asian-carp-20110428_1_open-navigational-locks-locks-in-chicago-waterways-underwater-barrier
- 24 Natural Resources Defense Council, "Invasive Species Settlement: New Ballast Water Permit Should Help Protect American Coasts, Lakes and Rivers," March 2011. <http://www.nrdc.org/media/2011/110308.asp>
- 25 Aquatic Nuisance Species Task Force, "Aquatic Nuisance Species Impacts," 2006, <http://www.anstaskforce.gov/impacts.php>.
- 26 Khalanski, M., "Industrial and Ecological Consequences of the Introduction of New Species in Continental Aquatic Ecosystems: The Zebra Mussel and Other Invasive Species," *Bulletin Français de la Pêche et de la Pisciculture*, Volume 344, 1997.
- 27 The Nature Conservancy, "The Great Lakes: Lake Erie," 2010, <http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/ohio/placesweprotect/lake-erie.xml>
- 28 Ohio Department of Natural Resources, "Governor Promotes Lake Erie Tourism and Sport Fishing at Annual 'Fish Ohio Day,'" 7 Jul 2008, http://ohiodnr.com/home_page/NewsReleases/tabid/18276/EntryId/589/Governor-Promotes-Lake-Erie-Tourism-and-Sport-Fishing-at-Annual-Fish-Ohio-Day.aspx
- 29 Sharyl, J. M., Rabinovici, Richard L. Bernknopf, Anne M. Wein, Don L. Coursey, and Richrd L. Whitman, "Economic and Health Risk Trade-Offs of Swim Closures at a Lake Michigan Beach," *Environmental Science and Technology* Volume 38, Number 10, 2004.
- 30 Sabina L. Shaikh, "Value of Chicago Beaches," University of Chicago, February 20, 2006. Hartmann et al., Report to the City of Chicago on Conflicts with Ring-billed Gulls and the 2009 Integrated Ring-Billed Gull Damage Management Project, p. 4, March 25, 2010, available at http://www.chicagoparkdistrict.com/docs/8e4762a1-a0fe-401c-8d6e-a68214d2dbb7_document.pdf.
- 31 Song, F., Lupi, F., and Kaplowitz, M., "Valuing Great Lakes Beaches," May 2010, <http://ageconsearch.umn.edu/bitstream/61791/2/BeachPaper-Submit-10May5.pdf>
- 32 Great Lakes Commission, "Great Lakes Recreational Boating's Economic Punch," July 2007.
- 33 "New-Wave Sunscreens," *Chemical & Engineering News*, Volume 83, Number 15, American Chemical Society, Washington, D.C., April 11, 2005, pp. 18–22, <http://pubs.acs.org/cen/coverstory/83/print/8315sunscreens.html>.

Plan of Action: How to Clean Up America's Beaches

To improve beach water quality nationwide, our leaders need to adopt policies that clean up the sources of beach pollution. As discussed below, there are a number of current initiatives that could help deliver cleaner beach water, if decision-makers in Congress and the administration act on them. In addition, these same leaders should work to improve beach water monitoring and public information.

Clean Up Urban and Suburban Runoff

In those communities where urban and suburban runoff is moved off roads, buildings, and other impervious surfaces by storm sewers that connect directly to waterways, rainwater picks up bacteria in pet and wildlife waste and garbage. In 2010, polluted runoff and stormwater caused or contributed to 8,712 closing/advisory days at coastal and Great Lakes beaches, making it the largest known source of contamination problems.

Often, the best way of avoiding runoff-related pollution is to reduce the volume of stormwater flowing to the sewer systems that carry it to nearby water bodies. This can be done effectively using solutions that act to restore natural hydrologic conditions by increasing the amount of permeable, usually vegetated areas that minimize the volume of stormwater discharges. These techniques are collectively known as green infrastructure.

Green infrastructure technologies retain and filter rainwater where it falls and let it soak back into the ground, rather than dumping it into waterways. These approaches reduce pollutant flows and minimize the need for often more expensive traditional treatment by utilizing strategically placed rain gardens in yards, tree boxes along city sidewalks, green roofs that use absorbent vegetation on top of buildings, and permeable pavement. Green infrastructure also involves capturing and storing stormwater in rain barrels or cisterns and reusing it, most often for irrigation or other nonpotable uses. Many green infrastructure strategies have the added benefits of augmenting the water supply, providing wildlife habitat, minimizing greenhouse gas generation, and being aesthetically pleasing.

Leaders in Congress and in state and federal environmental agencies recognize the multiple benefits that green infrastructure provides and the multiple problems that urban and suburban runoff causes, so they have increasingly developed policies that aim to reduce stormwater flows by requiring sources of runoff to retain the stormwater they generate. As a result, there are several opportunities today to greatly improve how the nation handles runoff pollution and, consequently, improve water quality at America's beaches and in waterways around the country.

- *EPA's Reform of Clean Water Regulations for Stormwater Sources:* Existing EPA regulations for sources of runoff pollution have not been implemented in a particularly rigorous way. Historically, permits for stormwater systems have done a poor job of ensuring that discharges from those systems will not contribute to degraded water quality conditions. In particular, these systems frequently have not been required to implement programs to achieve a baseline level of stormwater reduction at new or redeveloped sites through retention or other means and rarely must ensure that already developed sites address runoff pollution by retrofitting properties. Moreover, current requirements do not often apply outside of urbanized areas (for example, to huge parking lots that discharge directly to local streams) or to transportation projects.

Fortunately, the EPA has initiated an effort to improve these regulations. NRDC and the Waterkeeper Alliance successfully sued the agency several years ago for not updating its standards for pollution from construction and development activities. In response, the agency issued new standards for discharges during site construction and committed to update the requirements that apply to long-term runoff from developed sites by proposing a rule this September and finalizing it next November.¹

The EPA should take full advantage of this once-in-a-generation opportunity to reform the minimum requirements applicable to urban and suburban runoff sources. To do so, the EPA's new rules must adopt new objective performance requirements for control of runoff volume from new and redeveloped sites, which will create strong incentives for the deployment of green infrastructure approaches. The EPA should also require retrofits in already existing public and private developed areas and as part of infrastructure reconstruction projects. Likewise, the agency needs to ensure that significant runoff sources are covered wherever they are located.

- ***Green Infrastructure for Clean Water Act:*** Despite green infrastructure's recognized benefits and the fact that it can help communities achieve cost savings as compared with other runoff control strategies, there remain a number of barriers to its effective use of green infrastructure in achieving clean water. Accordingly, Representative Donna Edwards (D-MD) and Senators Tom Udall (D-NM) and Sheldon Whitehouse (D-RI) have introduced the Green Infrastructure for Clean Water Act (H.R. 2030 and S. 1115), a bill that would improve the knowledge base about green infrastructure, help implement real-world demonstrations of the techniques, and better integrate green infrastructure into the day-to-day regulatory structure with which communities and developers are already familiar.

The Green Infrastructure for Clean Water Act would accomplish three things. First, it would establish between three and five Centers of Excellence for Green Infrastructure located in various regions across the United States. These centers would be housed in universities or research institutions and would investigate regionally relevant green infrastructure issues, develop manuals and best practices, and provide technical assistance to state and local governments. Second, the Act would provide green infrastructure project grants to state and local governments and to stormwater and wastewater utilities. These grants could be used for planning and developing green infrastructure projects, code revisions, fee structures, or training material, or for implementing, installing, and monitoring green infrastructure projects. Third, the Act would direct the EPA (and its regional offices) to promote and coordinate the use of green infrastructure in permitting programs, research, technical assistance, and funding guidance. Notably, it would direct the EPA to incorporate green infrastructure into requirements under consent decrees and settlement agreements.

- ***Transportation Legislation Regarding Runoff:*** Congress should require new and rehabilitated roadways to meet a performance-based standard to reduce runoff pollution, and it is presently considering legislation that could do just that.

First, Congress periodically passes bills that fund and authorize federal surface transportation projects around the country. The most recent federal transportation bill, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), was signed into law in 2005 and is due to be renewed. This bill provides a major opportunity to address runoff pollution from highways and roads; the new bill should contain provisions requiring all new and rehabilitated federally funded roads to meet a performance-based standard to reduce stormwater runoff pollution. In other words, the bill should require roadway projects to retain a certain amount of the runoff that their impervious surfaces generate. As an example of such a performance standard, Congress previously required certain federal facilities to maintain the "predevelopment hydrology" of a site in conducting specified development projects. That means that the project had to maintain the combination of runoff, infiltration, and evapotranspiration rates and volumes that existed on the site before human-induced land disturbance occurred. This kind of approach could serve as a model for transportation legislation, and Congress should require this standard to be met using green infrastructure whenever feasible.

Second, if Congress delays in passing a comprehensive transportation bill, or if it acts on a bill lacking needed stormwater standards, it should pass stand-alone legislation requiring federally funded roads and highways to control runoff pollution to an objective retention standard. Senator Ben Cardin (D-MD.) has introduced such a bill, the Safe Treatment of Polluted Stormwater Runoff Act (S. 898, also known as the STOPS Runoff Act), which would require

new highways and highway improvement projects to maintain or restore the predevelopment hydrology of the project site to the maximum extent technically feasible.

In addition to these important measures, state water pollution control officials and their counterparts at EPA have significant authority under the current Clean Water Act to demand that sources of runoff pollution—whether they are sewer systems or direct dischargers to the nation’s waterways—have clean water permits that require onsite retention of stormwater and contribute to the achievement of water quality goals for receiving waters.

Eliminate Discharges of Human Sewage

Bacteria can sicken swimmers exposed to water that is contaminated by sewage. Targeting sewage pollution is therefore an important component of a policy strategy for making our beaches cleaner.

Address Combined Sewer Overflows

More than 700 communities nationwide, largely in the Northeast and near the Great Lakes, have “combined” sewer systems, meaning that sewage flushed from homes and businesses is carried by the same pipes that receive runoff from streets and other impervious areas when it rains. These systems were originally constructed many decades (in some cases more than a century) ago and are designed to allow the mix of raw sewage and runoff to overflow into nearby waters when rainfall is so significant that the sewage treatment plant cannot handle the full combined load of stormwater and sewage. Such events are called combined sewer overflows, or CSOs.

Although the EPA’s combined sewer overflow policy has been in place since 1994, about 15 percent of the roughly 772 communities nationwide that are served by combined stormwater and sewage systems do not yet have enforceable long-term plans to control CSOs,² and many more jurisdictions still have years—even decades—before their plans will be completely implemented. EPA and the states need to work with CSO communities to get plans in place in all of these areas to fully address the harm to receiving waters.

Installing holding tanks that allow sewage generated during high-flow events to be treated is one way to prevent sewage overflows. Another way is to upgrade sewage treatment plants so that they can treat higher volumes of flow. However, as with stormwater, one of the most effective—and cost-effective—solutions to CSOs is the use of green infrastructure. The more a community can infiltrate, evaporate, or reuse stormwater before it flows into the combined sewer system, the less it has to detain and treat later.

There is a need to invest nearly \$300 billion over the next 20 years for water and wastewater infrastructure in the United States, of which \$63.6 billion is needed for CSO correction, according to the EPA.³ In the long term, Congress should assist state and local communities in reaching these levels by substantially increasing the federal resources available to meet clean water needs through the creation of a trust fund or other dedicated source of clean water funding. But Congress also needs to act today, by increasing annual funding to the Clean Water State Revolving Fund (CWSRF), which provides critical assistance for projects that repair and rebuild failing water and wastewater infrastructure, and which in recent years has also specifically focused funding on green infrastructure projects. Unfortunately, the CWSRF has been a target for cuts during recent budget debates—funding for the revolving fund was cut dramatically for the current fiscal year, and President Obama has suggested cutting nearly a billion dollars from the CWSRF and its companion program, the Safe Drinking Water SRF.⁴

At a minimum, Congress should restore these critical funds. But there is a strong case that they should be enhanced, not only because there are enormous unmet needs, but also because these investments yield tremendous benefits. In a recent letter, for example, 35 members of the Senate from across the political spectrum hailed the societal payback that comes from these programs:

Investments in water infrastructure provide significant economic benefits to the economy and enjoy a strong return on investment. The U.S. Conference of Mayors notes that each public dollar invested in water infrastructure increases private long-term GDP output by \$6.35. The National Association of Utility Contractors estimates that one billion dollars invested in water infrastructure can create over 26,000 jobs. In addition, the Department of Commerce estimates that each job created in the local water and sewer industry creates 3.68 jobs in the national

economy and each public dollar spent yields \$2.62 dollars in economic output in other industries. As you can see, this is a highly leveraged Federal investment that results in significant job and economic benefits for every dollar spent.⁵

In addition to these policy changes, the EPA and state agencies should use their authority under the current law to ensure that communities implement strong long-term control plans that achieve critical water quality goals for receiving waters, such as making them safe for swimming. CSO control plans increasingly are relying on enforceable commitments to install green infrastructure as a major component of reducing overflows. NRDC strongly encourages this approach. For instance, the Philadelphia Water Department and state environmental officials recently signed an ambitious agreement, that commits the city to deploy, over the next 25 years, the most comprehensive network of green infrastructure found in any U.S. city.⁶

Address Sanitary Sewer Overflows

Sanitary sewer systems carry human and industrial waste from buildings to sewage treatment plants. These sewer systems can discharge untreated sewage when the treatment plants are overwhelmed or malfunction or when sewer lines break, posing a threat to bathing beach safety.

After several false starts over the last 10 years, the EPA is again revisiting its regulations regarding SSOs, in an attempt to clarify certain legal requirements that have been applied unevenly around the country and to add new standard requirements aimed at preventing SSOs and repairing aging sewer systems.

In January 2001, the Bush administration pulled back a proposed rule to address these issues, which had been based on years of work by an advisory committee comprising wastewater utilities, environmental groups, and other interested parties. Instead, in 2003, the agency proposed a policy that would have sanctioned routine blending of partially treated sewage with fully treated sewage, in violation of Clean Water Act requirements. After receiving nearly 100,000 public comments, the EPA withdrew that draft policy and, in 2005, proposed another, stronger one, which had been jointly proposed by NRDC and the nation's largest association of wastewater utilities. But that policy was never finalized.⁷

NRDC supports the EPA's renewed efforts to develop an SSO rule that reaffirms the prohibition on "blending," except under extreme circumstances; creates standard requirements for upkeep and repair of aging sewer systems to prevent or reverse deterioration that leads to SSOs; and includes strong requirements for reporting, recordkeeping, monitoring, and the public's right to know when sewage overflows occur.

With respect to the Great Lakes region, Congress is considering legislation that would clarify that sewage blending is prohibited in much the same way as the EPA policy change would. That bill, called the Great Lakes Water Protection Act (S. 147/ H.R. 425), was introduced by Senators Kirk and Durbin and by Representatives Dold and Lipinski. In addition to the bypass provision, beginning in 2031, the bill would increase the daily penalty for violations of the bypass/blending requirements and would direct the penalties to a Great Lakes Cleanup Fund. The bill would also require that bypass notices submitted to the agency be made available on the Internet. NRDC supports this legislation. The EPA is already doing critical work throughout the Great Lakes region to reduce sewage dumping, and this measure reflects the recognition among members of Congress that more needs to be done to address persistent problems like sewage discharges from outdated infrastructure.

Reduce Agricultural Discharges and Agricultural Runoff

The EPA needs to plug the loopholes that allow industrial livestock operations to continue to discharge animal wastes into waterways. The EPA estimates that confined livestock produce about three times as much waste as people do nationwide; however, these operations lack treatment facilities for livestock waste even remotely comparable to those that treat human sewage. Moreover, many large feedlot operations historically avoided getting Clean Water Act permits, something made easier by lax federal regulation. This state of affairs was recently made worse by a court decision in which the U.S. Court of Appeals for the Fifth Circuit ruled that the federal Clean Water Act does not require these large industrial livestock facilities to obtain pollution control permits unless and until they discharge to protected waters, even when such facilities are designed and operated in a way that will predictably lead to a pollution release.⁸

Although this case is a setback, the EPA still has substantial untapped authority to regulate pollution from the livestock industry. For instance, under a settlement between the EPA and NRDC and other conservation groups, the EPA will propose a rule this October to undertake an important initiative to collect information from the concentrated animal feeding operation (CAFO) industry, an action that will better enable the agency to identify problem facilities and to assess the need for additional pollution controls. The EPA should use this opportunity to gather comprehensive information about the generation, storage, spreading, and off-site use of manure, in order to better track sources of animal waste that can pollute beaches.

In addition, the agency needs to revise its rules to close the loopholes and require all large feedlots to keep animal waste out of waterways. For example, runoff from fields used as manure disposal areas often is treated as exempt from the Clean Water Act, but the EPA can change that regulatory treatment and require facilities with such discharges to reduce their pollutant loadings.

Improve Coordination Between Sanitation and Public Health Officials

When a sewer overflow threatens beachwater quality, there needs to be immediate communication between those responsible for the overflow and those charged with protecting public health. The public has the right to know that an overflow or discharge has occurred and should be informed when it happens, not several days later, after beachwater monitoring results have been analyzed and reported. To close these communication gaps and improve coordination between sanitation and public health officials, leaders in Congress developed the Sewage Overflow Community Right-to-Know Act, a bill that has been considered in prior years and which is likely to be introduced again this Congress. The bill would amend the Federal Water Pollution Control Act, directing owners or operators of sewage treatment plants to: 1) institute an alert system for sanitary sewer overflows, 2) notify the public of such overflows within 24 hours in areas where human health is potentially affected, 3) immediately notify public health authorities and other affected entities of certain kinds of overflows, and 4) provide specified reports to the administrator of the EPA or the state. Improved monitoring, immediate reporting of overflows to public health authorities and to the general public, and prompt response to overflows to minimize human exposure and environmental harm are critical steps that need to be taken to close the communication gaps between those responsible for sewage and stormwater treatment and those charged with protecting public health. NRDC also supports legislation to direct public health officials to inform environmental agencies when they find an exceedance of relevant beachwater quality standards so that its source can be addressed.

Last, as indicated above, the EPA is currently evaluating ways to improve the regulation and control of sanitary sewage pollution. One element of that initiative may be regulatory requirements about reporting overflows to public health officials and others and notifying the public as well. NRDC believes the EPA must develop strong comprehensive regulations to require the reporting of all sewer overflows, improved monitoring for sewer overflows, and public notification of all sewer overflows that could affect public health.

Improve Tools for Identifying and Remedying Poor Beachwater Quality

Enhance the BEACH Act: NRDC supports a bill that Congress has considered in prior years, called the Clean Coastal Environment and Public Health Act, which would reauthorize and increase the federal grants made available to states under the BEACH Act. This funding is crucial and should not only be authorized but should also be fully appropriated to provide states with the full support they need to tackle beachwater contamination and protect the public and the environment. Specifically, the bill would allow funding to be used for identifying sources of beachwater contamination (and might even provide support for remedying pollution sources); it would require the EPA to approve rapid test methods for monitoring beachwater pollution and ensure that states will use them; and it would improve coordination between the public health officials who monitor beachwater and the environmental agencies that regulate the sources of beachwater pollution.

Update Current Standards and Detection Methods

Current beachwater quality criteria are based on studies that were conducted in the 1980s. Much has been learned about detection methods in the last 25 years, and the EPA was mandated by the BEACH Act of 2000 to develop new standards.

The EPA will publish revised beachwater quality criteria by October 2012,⁹ with proposed criteria available in February 2012 and implementation guidance finalized by the end of 2013. In order to prepare the new criteria, the EPA sponsored epidemiological studies (studies that attempted to correlate beachwater quality with the illness rate of actual beachgoers) at a number of beaches, including Great Lakes beaches, a tropical beach, beaches impacted by urban runoff, and beaches impacted by treated sewage. The EPA also conducted research on modern monitoring techniques such as rapid testing methods.¹⁰

While final decisions have yet to be made, the EPA has announced that the new criteria will likely be based on the rate of gastrointestinal illness observed in swimmers, not on the occurrence of other beachwater-related illnesses such as rash, eye infections, earache, or respiratory symptoms. The criteria will represent a similar risk to marine and freshwater swimmers (at present, the criteria provide different levels of protection from illness for marine swimmers and freshwater swimmers). While tools for deriving site-specific criteria at individual beaches will probably be provided, the new criteria are unlikely to include adjustments for nonhuman sources of fecal contamination.

Today, beachwater quality is determined by the concentration of certain bacteria (*E. coli* or enterococcus) is measured. When these bacteria are present at higher concentrations, it indicates the presence of fecal contamination by warm-blooded animals and the potential for pathogens to be present. It is pathogens that cause illness, not the fecal indicator bacteria themselves, but pathogens exist in such small amounts that it is not feasible at the present time to detect unsafe levels directly. EPA's revised criteria likely will be based on fecal indicator bacteria as well.

Current approved methods for determining fecal indicator bacteria counts in beachwater depend on growth of cultures in samples and take about 24 hours to process. Because of this, swimmers cannot know until the next day if the water they swam in was contaminated. Likewise, beaches may be left closed on days when water quality meets standards because the prior day's water quality was poor. There is a great deal of interest in technologies that can provide beachwater quality results in two hours or less so that beach management decisions—whether or not to leave a beach open—can be made the same day that the water quality is measured. Some of these methods rely on detection of genetic material in fecal indicator bacteria cells; others depend on recognition of cell surfaces or whole cells. Methods that detect the presence of targeted enzymes are also being developed.

An example of a genetic method is quantitative polymerase chain reaction, or qPCR. This is a laboratory technique that can be used to quantify the presence of a targeted genetic sequence, and it has received the most attention in rapid test method studies. In the case of beachwater quality monitoring, the targeted genetic sequence would be a sequence from the fecal indicator bacteria named in water quality criteria.

One of the challenges in using qPCR to monitor for beachwater quality is that this method detects dead indicator bacteria as well as all live indicator bacteria, including unviable live indicator bacteria. Traditional culture methods detect only viable cells—only the live cells that reproduce get counted. Dead indicator bacteria do not predict the presence of pathogens as meaningfully as live indicator bacteria because pathogens in sewage are commonly killed along with indicator bacteria during treatment. At beaches where disinfected wastewater is present, qPCR can produce higher indicator bacteria counts than the current culture methods.

Another challenge in using qPCR is inhibition. Beachwater samples are not sterile and pure except for the indicator bacteria they contain. Many conditions that can be found in beachwater samples cause inhibition of qPCR reactions, which results in underestimated bacterial counts.

An example of a cell surface detection technology is immunomagnetic separation/adenosine triphosphate (IMS/ATP). IMS/ATP relies on antibodies that bind to targeted cell surfaces and provides concentrations for living cells only, because dead cells do not have intact surfaces for the antibodies to attach to. In addition to this advantage, IMS/ATP equipment may be less costly and more portable than the equipment needed for qPCR. A disadvantage of IMS/ATP is that antibodies for detecting strains of bacteria found in beachwater are not commercially available. Another disadvantage is that not all living cells are able to replicate, so IMS/ATP measures something that is somewhat different from what culture methods measure. Also, during analysis, antibodies may bind to non-target bacteria in some cases.

10 Simple Things Individuals Can Do

Everyone can help reduce beachwater pollution. For example, we can all take steps to reduce the amount of water sent to sewage treatment plants—which have the potential to overflow—and we can all play a part in reducing polluted runoff. Individuals can also make a difference by becoming educated and expressing their desire for clean, healthy water. Below are 10 simple actions individuals can take to improve our beachwater.

1. Be a good steward at the beach.

If you bring a picnic to the beach, pick up your garbage, and do not feed the birds or other wildlife. Seagulls and other animals are attracted to the garbage and food waste that people often leave behind on the beach, and feeding them will only encourage their permanent presence there. Waste from wildlife is one of the three largest known sources of bacterial pollution and can lead to beach closures. Ask your local beach management agency to invest in secure garbage cans with tight-fitting lids. Make sure children who are not yet toilet trained are dressed in a swim diaper and rubber pants or a similar tight-fitting outer garment. An extra layer of protection in addition to a swim diaper is necessary to help prevent bacteria from entering the water.

2. Clean up after your pet.

Don't leave pet waste on the ground. It could contain harmful bacteria and excess nutrients that can wash into storm drains and eventually pollute local waters. Flush it, bag it, or look for signs in public parks that direct pet owners to appropriate waste receptacles.

3. Conserve water.

Extra water use strains sewage system capacity. Here are some ways you can reduce the amount of water you use at home:

- Scrape—don't rinse—dirty dishes before loading them into the dishwasher.
- Do not let water run unnecessarily when brushing your teeth or shaving.
- Install a water-saving toilet to conserve thousands of gallons annually.
- Install faucet aerators and a water-efficient showerhead to cut the amount of water you use and to save energy by reducing hot water use.

4. Direct runoff to the soil, not the street.

Help keep stormwater from running off your property and into local waterways and the sewer system. Direct rain gutters and downspouts on your home to soil, grass, or gravel areas rather than blacktop, cement, or other hard surfaces. Learn about creating a rain garden or using rain barrels. Sweep your driveway and sidewalks instead of hosing them down.

5. Don't pour it down the drain.

When you dump paint, oil, harsh cleansers, and other hazardous products down the drain, they can find their way into nearby bodies of water. Contact your local sanitation, public works, or environmental health department to find out about hazardous waste collection days and sites. Don't wash your car in the driveway or street; instead, do it at a car wash, where contaminated rinse water may be treated before being discharged to the sewage system.

6. Maintain your septic system.

Have your septic tank cleaned out every three to five years. Such maintenance prolongs the life of your system and can help prevent groundwater and beachwater contamination.

10 Simple Things Individuals Can Do

7. Practice proper lawn and garden care.

Use natural fertilizers such as compost on your garden, and minimize the use of chemical fertilizers, pesticides, and herbicides. To reduce the amount of polluted runoff, landscape with natural vegetation rather than lawns, which require fertilizers and herbicides. Do not allow water used to irrigate your landscaping to hit paved surfaces and run off.

8. Practice proper marine and recreational boating waste disposal.

Dispose of your boat sewage at onshore sanitary facilities. Don't dump waste or trash overboard. Boating wastes discharged into coastal waters can be a significant cause of high pathogen concentrations.

9. Support local, state, and federal legislation that promotes the cleanup of pollution sources.

Write to your representatives and senators and let them know you support strong beach legislation and clean water protections. Tell your government representatives to move forward quickly to address sewage overflows and stormwater. Make sure you tell officials that you are willing to pay for programs to monitor beaches and reduce runoff pollution.

10. Learn about the water quality at local beaches and choose your beach carefully.

Go to NRDC's vacation beaches website (www.nrdc.org/water/oceans/ttw/titinx.asp), the EPA's Beach Advisory and Closing Online Notification website (http://iaspub.epa.gov/waters10/beacon_national_page.main), or your local beach manager (usually the local public health authority), all of which have data on beach monitoring and notification policies and on closings and advisories. Also, to show your concern, ask the local beach manager the following questions: What are the sources of pollution affecting the waters where I swim? What sort of water quality monitoring is performed at these beaches? Are beaches always closed when monitoring shows that the bacterial standard is exceeded? What is the current status of these waters (are they closed or open?), and what warning signs can I look for? Whenever possible, swim at the beaches that your research shows have the cleanest waters or are carefully monitored with strict closure or advisory procedures in effect. Stay away from beaches with visible discharge pipes, and avoid swimming at urban beaches after a heavy rainfall.

NOTES

- 1 See generally U.S. EPA, Proposed National Rulemaking to Strengthen the Stormwater Program, <http://cfpub.epa.gov/npdes/stormwater/rulemaking.cfm>.
- 2 U.S. EPA, National Water Program Best Practices and End of Year Performance Report: Fiscal Year 2010, Subobjective: Safe Swimming, at 53, http://water.epa.gov/aboutow/goals_objectives/waterplan/upload/FY2010_swimming.pdf.
- 3 U.S. EPA, Clean Watershed Needs Survey: 2008 Report to Congress, at v & vii, <http://water.epa.gov/scitech/datait/databases/cwns/upload/cwns2008rtc.pdf>.
- 4 See Pub. L. 112-10, 112th Cong., 1st Sess., § 1738 (April 15, 2011); Budget for Fiscal Year 2012: Environmental Protection Agency, <http://www.whitehouse.gov/sites/default/files/omb/budget/fy2012/assets/environmental.pdf>.
- 5 Letter from Senator Barbara Boxer, et al., to Senator Daniel Inouye et al. (May 26, 2011), http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=f51ee9df-75a9-4767-ba24-c0f7f40fdde7.
- 6 See Larry Levine, Natural Resources Defense Council, "Philadelphia Gains Approval of Landmark Green Infrastructure Plan, a Model for Smart Water Practices Nationwide," http://switchboard.nrdc.org/blogs/llevine/philadelphia_gains_state_appro.html.
- 7 See generally 75 Fed. Reg. 30,395 (June 1, 2010).
- 8 *Natl. Pork Producers Council v. U.S. EPA*, 635 F.3d 738 (5th Cir. 2011).
- 9 U.S. EPA, National Summary: 2010 Swimming Season Update, http://water.epa.gov/type/oceb/beaches/seasons_2010_national.cfm.
- 10 U.S. EPA, Recreational: Water Quality Criteria, <http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/index.cfm>.

State-by-State Results

HOW TO UNDERSTAND THE STATE SUMMARIES: BEACHWATER QUALITY MONITORING PROGRAMS

Program Elements

The BEACH Act authorizes the EPA to award grants to states for implementing programs to monitor coastal recreational waters adjacent to beaches used by the public for compliance with the standards for pathogen indicators. Grant funds are also used to notify the public promptly of any exceedances through posting or equivalent means. The allocations for Fiscal Years 2010 and 2011 are included in Table 5-1: State Distribution of BEACH Act Funding for Beachwater Quality Monitoring and Notification for 2010 and 2011. Many states and localities supplement their BEACH Act funding so that they can achieve the objectives of their beachwater monitoring programs.

Many states and localities supplement their BEACH Act funding so that they can achieve the objectives of their beachwater monitoring programs.

Table 4-1: State Distribution of Beach Act Funding for Beachwater Quality Monitoring and Notification for 2010 and 2011

State or Territory	Fiscal Year 2010 Allocation	Fiscal Year 2011 Allocation
Alabama	\$264,000	\$268,000
Alaska	\$86,000	\$154,000
American Samoa	\$303,000	\$306,000
California	\$520,000	\$524,000
Connecticut	\$225,000	\$228,000
Delaware	\$212,000	\$216,000
Florida	\$531,000	\$539,000
Georgia	\$288,000	\$293,000
Guam	\$304,000	\$307,000
Hawaii	\$326,000	\$331,000
Illinois	\$245,000	\$249,000
Indiana	\$207,000	\$209,000
Louisiana	\$323,000	\$325,000
Maine	\$256,000	\$260,000
Maryland	\$271,000	\$276,000
Massachusetts	\$257,000	\$263,000
Michigan	\$281,000	\$288,000
Minnesota	\$206,000	\$209,000

State or Territory	2010 Allocation	2011 Allocation
Mississippi	\$259,000	\$262,000
New Hampshire	\$206,000	\$209,000
New Jersey	\$280,000	\$285,000
New York	\$351,000	\$357,000
North Carolina	\$305,000	\$311,000
Northern Marianas	\$304,000	\$306,000
Ohio	\$225,000	\$228,000
Oregon	\$230,000	\$234,000
Pennsylvania	\$224,000	\$227,000
Puerto Rico	\$330,000	\$123,000
Rhode Island	\$215,000	\$220,000
South Carolina	\$299,000	\$305,000
Texas	\$386,000	\$392,000
U.S. Virgin Islands	\$304,000	\$306,000
Virginia	\$278,000	\$282,000
Washington	\$272,000	\$277,000
Wisconsin	\$227,000	\$231,000
Total	\$9,800,000	\$9,800,000

Source: EPA Grants Available to Implement Beach Monitoring and Public Notification Programs in 2011, EPA 820-F-10-011, December 2010

Water Quality Standards

The EPA's current beachwater quality standards include a geometric mean indicator density for at least five samples taken at evenly spaced intervals over 30 days, and a single-sample maximum allowable indicator density.¹ Some state and local agencies apply both the geometric mean and the single-sample standards and issue beach closings or advisories if either standard is exceeded; others apply the geometric mean standard or the single-sample standard but not both. Some states apply the single-sample maximum allowable indicator density standard for designated beach areas, some states apply less stringent standards, and some apply designated beach area standards to some of their beaches and less stringent standards to others. Also, there are states that apply additional water quality standards that are not associated with the EPA's standards when they make their closing and advisory decisions. Table 5-2 summarizes the states' use of water quality standards (more details about state standards are given in the individual state summaries).

Table 4-2: State Coastal Beachwater Quality Standards

State	Standards applied:			
	EPA's 30-day geometric mean standard for at least five evenly spaced samples taken over a 30-day period (<i>E. coli</i> density of 126 per 100 mL for freshwater, enterococcus density of 35 per 100 mL for marine water)	EPA's "designated beach area" single sample maximum standard (<i>E. coli</i> density of 235 per 100 mL for freshwater; enterococcus density of 104 per 100 mL for marine water)	Less stringent single sample maximum standard than the EPA's "designated beach area" single sample maximum standard	Additional indicator organism water quality standard(s)
Alabama		•		
Alaska	•		•	•
California	•	•		•
Connecticut ^a	•	•		
Delaware ^b	•	•		
Florida	•	•		•
Georgia	•	•		
Hawaii ^c	•	•		•
Illinois		•		
Indiana		•		
Louisiana	•	•		•
Maine		•		
Maryland ^d	•	•	•	
Massachusetts	•	•		
Michigan ^e	•		•	
Minnesota	•	•		
Mississippi		•		
New Hampshire ^f		•		
New Jersey		•		
New York ^g	•	•		
North Carolina ^h	•	•	•	
Ohio		•		
Oregon			•	
Pennsylvania	•	•		
Rhode Island		•		
South Carolina		•		
Texas		•		
Virginia		•		
Washington ⁱ	•	•		
Wisconsin ^j	•	•		

Source: See individual state summaries

- a Localities in Connecticut determine how they will apply water quality standards; the state guidelines encourage localities to apply the single-sample maximum standard for designated beach areas and encourage localities to consider the 30-day geometric mean standard when making beach closing and advisory decisions.
- b DNA analyses to track the source of bacteria at Slaughter Beach and Prime Hook Beach have shown that non-human sources contribute to indicator bacteria counts at these beaches. Monitoring results at these beaches are adjusted downwards to account for non-human sources at these beaches before the water quality standard is applied.
- c Hawaii applies the geometric mean standard at beaches that are monitored at least five times a month and the single sample maximum standard at other beaches. Hawaii also uses quantitative information about the presence of *Clostridium perfringens* (a tracer for human sewage) when making beach warning decisions.
- d Maryland uses the designated beach area single-sample maximum standard at its Tier 1 and Tier 2 beaches and a less stringent single-sample maximum standard at its Tier 3 beaches.
- e Michigan's geometric mean standard is 130 cfu/100 ml for at least five representatively spaced sampling events over 30 days. Michigan applies a daily maximum standard based on the geometric mean of three simultaneous samples, not a single-sample maximum standard.
- f In New Hampshire, at beaches that are sampled in three locations, when either two or more samples collected at a beach exceed the standard or when one sample exceeds 174 counts/100 ml a beach advisory is issued.
- g For freshwater beaches, New York uses an *E. coli* single-sample maximum of 235 cfu/100 ml or 61 cfu/100 ml for enterococcus (this is the designated beach area standard for enterococcus in freshwater). Whether or not geometric mean standards are applied when making closing and advisory decisions depends on the local beach authority.
- h North Carolina's water quality standards at its Tier 1 beaches are a single-sample maximum of 104 mpn/100 ml water and a running monthly geometric mean of 35 mpn/100 ml. At Tier 2 beaches, the standard is a single-sample maximum of 276 mpn/100 ml, and at Tier 3 beaches, the standard is a single-sample maximum of 500 mpn/100 ml. During April and October, the standard for Tier 1 beaches is generally the same as the standard for Tier 2 beaches.
- i The geometric mean standard of 35 cfu/100 ml is taken into consideration when determining permanent advisories in Washington.
- j In Wisconsin, the geometric mean water quality standard for fresh water may be used to make closing and advisory decisions at high priority beaches.

Monitoring

There is a considerable amount of variability among state beachwater monitoring protocols. Some states perform additional monitoring after exceedances and when they expect beachwater to be contaminated. Others adhere to a schedule that doesn't vary with circumstances. Some states take multiple samples that are composited before analysis, or analyze multiple samples and average the results before applying them to the water quality standard.

States also vary as to how often they sample. Some states monitor their high-priority beaches almost daily, while other states monitor their high-priority beaches once or twice a week. Moreover, sampling techniques differ by state. The EPA recommends that samples be collected 12 inches below the surface in water that is three feet deep, but states report collecting samples at varying depths. Some states are particular about collecting samples at a particular time of day or tidal stage. Samplers in some states wade into the surf and hold the collection container in their hand to collect the sample, others use a telescoping golf ball retriever so samples are collected far from the sampler's body.

Sampling practices can have a major impact on whether or not an advisory or closing is issued. A study conducted at Hobie Beach in Florida found that samples taken at times of high solar radiation were less likely to exceed standards than samples taken when solar radiation was low.² Solar radiation varies with the time of year, the time of day, and the clarity of the atmosphere; it is greatest at high noon near the summer solstice on a clear day. The same study found that enterococcus levels were higher in samples that were collected in knee-deep water than in samples taken in waist-deep water. Table 5-3: Policy-Recommended Water Depth Where Samples are Collected for Coastal States shows the depth of water samples are collected in by state.

State	Ankle-Deep Water	Knee-Deep Water	Waist-Deep Water	Deeper than Waist-Deep
Alabama		•		
Alaska ^a			•	
California	•			
Connecticut ^b			•	
Delaware		•		
Florida ^a			•	

Table 4-3: Policy-Recommended Water Depth Where Samples are Collected for Coastal States

State	Ankle-Deep Water	Knee-Deep Water	Waist-Deep Water	Deeper than Waist-Deep
Georgia ^a			•	
Hawaii ^e		•	•	
Illinois ^e		•	•	
Indiana		•		
Louisiana ^a			•	
Maine ^f		•		
Maryland		•		
Massachusetts ^a			•	
Michigan ^g			•	•
Minnesota		•		
Mississippi ^h		•		
New Hampshire		•		
New Jersey ⁱ		•	•	•
New York ^a			•	
North Carolina		•	•	
Ohio ^a			•	
Oregon ⁱ	•	•		
Pennsylvania ^j		•	•	
Rhode Island ^a			•	
South Carolina ^k		•	•	
Texas ^l		•		
Virginia ^f		•		
Washington		•		
Wisconsin		•		

a Samples are collected in water that is three feet deep.

b Samples are collected in water that is 3-4 feet deep.

c Samples are taken in water that is knee to waist deep.

d Samples are taken in water that is 2-3 feet deep.

e Samples are taken in water that is 3-6 feet deep.

f Samples are taken in water that is 0.5 m deep.

g Samples are taken in water that is between knee and chest deep.

h Samples in the ocean surf are taken in knee-deep water, samples collected from boats are taken in water that is three feet deep, samples taken from piers are taken at the location of the most used area.

i Samples are taken in water that is ankle to knee deep.

j Samples are taken in water that is 30 inches deep.

k Samples are taken in water that is 20-40 inches deep.

l Samples can be collected at the location of greatest swimmer activity instead of in water that is two feet deep under certain conditions.

Public Notification Practices

Along with different standards for triggering an advisory or closure, states vary as to whether or not they issue a public health advisory or close a beach or both when sampling has found bacteria levels that exceed the standards. Some states wait until there have been two consecutive standard violations before an advisory is issued, and some take other factors into account when an exceedance occurs before deciding to issue a closing or advisory.

Methods for notifying the public of health advisories and beach closures are variable among states as well, and for some beaches it may be difficult for beachgoers to get complete information about any notifications. States make use of a variety of notification methods, including the Internet, toll-free phone lines, signs posted at beaches, electronic notifications, newspaper notices, and television and radio coverage in conjunction with the weather report. At a minimum, public notification for beach closings and advisories should include a sign or flag at the beach and an easily located website.

HOW TO READ THE STATE SUMMARIES

The following pages contain the summaries of state beachwater quality standards, monitoring and closing/advisory practices, and NRDC's 2010 monitoring results and closings and advisories, listed alphabetically by state. *It is impossible to make direct comparisons between states or to assess trends over time on the basis of advisory and closure data.* Standards, monitoring, and closing/advisory practices vary from state to state, making it difficult to know, for example, whether a state with many closings has vigilant health officials or has more coastal pollution. High numbers of closings and advisories, while indicating pollution problems, may also indicate that the state or county is making a good effort to protect the public health by vigilantly monitoring its waters, informing the public when they are polluted and taking a precautionary approach to closings and advisories. States with comprehensive programs and closure practices should be commended for their efforts.

A meaningful way of comparing beachwater quality between states or tracking it over time is to compare the percent of monitoring samples taken at each beach that exceed the single-sample maximum standards for designated beach areas. NRDC has provided these values for beaches in all 30 coastal and Great Lakes states.

Many states have dedicated and talented individuals that work hard to improve their beachwater quality and to protect public health when beachwater quality is poor. States that do more than monitor their beachwater and issue closings and advisories should be recognized for their extra efforts.

The state summaries are organized into sections as described below.

Rank in the Nation

Each state's national ranking in percent exceedances is based on the percentage of samples reported to exceed the EPA's applicable single-sample maximum for designated beach areas. For marine water, this standard is an enterococcus density of 104 per 100 ml (based on an acceptable rate of 19 cases of gastroenteritis per thousand swimmers), and for freshwater it is an E. coli density of 235 per 100 ml (based on an acceptable rate of 8 cases of gastroenteritis per thousand swimmers). Rankings go from 1st for the state with the lowest percent exceedances to 30th for the state with the highest percent exceedances.

Key Findings

Beachwater Contamination: The list of contaminated beaches in the state excludes beaches with less than 12 monitoring samples reported during the year.

Reported Sources of Beachwater Contamination Statewide: The EPA asks states to report a cause and a source for each closing and advisory event.

Monitoring Results

This section describes the number of beaches monitored in the state and what their reported monitoring frequency is. The percent of samples that exceeded state standards is given. For this section, NRDC calculated percent exceedance by taking the number of samples exceeding the state's daily maximum standards and dividing that number by the total number of

samples collected during the calendar year (replicate samples on the same day are each counted as an individual sample). These exceedance determinations are used for tracking water quality over time; NRDC does not compare these calculations with specific beach closings or advisories. The list of beaches with exceedances in the state excludes beaches with less than 12 monitoring samples reported during the year.

This section also shows the trends in beachwater quality from 2006 to 2010. When making year-to-year comparisons, NRDC only includes beaches that were sampled all five years. Thus, each state summary has three 2010 percent exceedance rates that might not agree: one that was calculated based on national single-sample maximum water quality standards for designated beach areas, one that was calculated based on the state's single-sample maximum standard, and one that was calculated based on the state's single-sample maximum standard for the set of beaches that appear in all five years from 2006 to 2010.

Sampling Practices: In this section, the state's beach monitoring season is given along with the level of control that the state's program has over local beach monitoring and notification practices. Sampling protocols and factors the states use to determine which beaches to monitor and how frequently to monitor them are also described. This section tells if a state chooses to sample when and where the water quality is suspect, or if monitoring is conducted more frequently after a closing or advisory is issued.

High numbers of closings and advisories may indicate that the state or county is making a good effort to protect public health by vigilantly monitoring its waters and closing beaches when they are polluted.

Closings and Advisories

Number of closings and advisories: The total number of beach closing and advisory days for each beach is included in the monitoring results table mentioned above. In an effort to be consistent in tabulating closings and advisories, NRDC used the following guidelines:

- Closings or advisories issued for an individual beach for one day are counted as one closing/advisory day.
- Extended closings/advisories are those lasting more than 6 but not more than 13 consecutive weeks.
- Permanent closings/advisories include those lasting longer than 13 consecutive weeks.
- If a reported advisory at a specific beach overlapped with a general rain advisory that applied to all beaches within the same jurisdiction, the overlapping days were subtracted from the advisory for that specific beach to avoid double counting. However, if a specific beach was closed during a general rain advisory, NRDC did not modify the reported duration.
- Reported closing/advisory days include only events lasting six consecutive weeks or less. Closing and advisory days for events lasting more than six weeks are reported separately.
- In the case of standing advisories that depend on local conditions, NRDC is typically unable to calculate the number of days attributable to such events, so they are only included to the extent that states report them to the EPA.

Standards and Procedures: This section describes the state standards. Information about any use of predictive models and preemptive standards for issuing beach closings and advisories is included, as well as what factors are involved when a state decides issue a closing or advisory.

Figure 4-1: Why Don't 2010 Percent Exceedances Match?

Beachwater monitoring samples are compared to EPA's single-sample maximum standard for designated beach areas. Some states apply additional standards and some apply standards that are not as strict.

Beachwater monitoring samples are compared to the state's single-sample maximum standards.



FLORIDA
6th in Beachwater Quality
4% 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.

Monitoring Results

In 2010, Florida reported 637 coastal beaches, 308 (48%) of which were monitored once a week, 328 (51%) were not monitored, and one (<1%) had no monitoring frequency data. 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, 4% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Bayou Chico (62%) in Escambia County, Hagen's Cove (47%) in Taylor County, Garniers (42%) in Okaloosa County, Bayview Park (38%) and Navy Point (Bayou Grande) (38%) in Escambia County, Higgs Beach (37%) in Monroe County, Keaton Beach (32%) in Taylor County, Fort Island Gulf Beach (31%) in Citrus County, Coco Plum Beach (27%) in Monroe County, Crandon Park-Key Biscayne (26%) in Miami-Dade County, Oelsner Park Beach (24%) in Pasco County, Minnesota Street (23%) in Broward County, Monument Beach (22%) in Gulf County, Shired Island (22%) in Dixie County, and Dekle Beach (21%) in Taylor County.

Sampling Practices: Monitoring occurs year-round; peak season is from April to mid-September. The beachwater quality monitoring program is administered by the Florida Department of Health, which determines sampling practices, locations, standards, and notification protocols and practices throughout the state.² Samples are collected 18 inches below the surface in water that is approximately 36 inches deep, usually in the morning. Beaches are prioritized for monitoring on a county-by-county basis. Criteria for monitoring are population served, pollution potential, and rainfall. While this ensures that the most critical beaches in each county

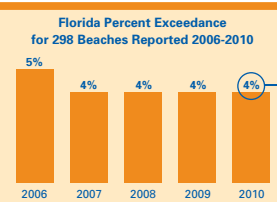
KEY FINDINGS IN FLORIDA

Beachwater Contamination

- (% of samples exceeding state standards in 2010)
- Bayou Chico in Escambia County (62%)
 - Hagen's Cove in Taylor County (47%)
 - Garniers in Okaloosa County (42%)

Reported Sources of Beachwater Contamination

- Statewide (number of closing/advisory days); excludes BP oil disaster
- 1,493 (73%) wildlife
 - 1,448 (71%) stormwater runoff
 - 1,252 (61%) sewage spills/leaks
 - 827 (27%) other sources of contamination
 - 418 (40%) unknown sources of contamination
- Totals exceed total days and 100% because more than one contamination source was reported for most events.



Only samples from a common set of beaches monitored each year from 2006-2009 are included and compared to the state's standards. If a beach was not monitored in all four years, its samples are not included in the comparison.

FL.1 Natural Resources Defense Council Testing the Waters 2011

METHODOLOGY FOR NRDC'S REPORT: SOURCES OF INFORMATION

NRDC relies on the EPA's electronic reporting system for information collected under the federal BEACH Act. Information from the electronic reporting system has been supplemented by NRDC surveys of state and local officials. Beach monitoring coordinators in nearly every state cooperated with NRDC with a great deal of patience and grace and provided interesting and meaningful information for this report. NRDC is thankful for their time and their openness.

Unfortunately, the EPA's electronic data submission system continues to experience technical problems, resulting in delays in data availability and incomplete or inaccurate data. Therefore, NRDC requested 2010 beach season monitoring and closing/ advisory data directly from the states. When states provided these data, NRDC used them; otherwise, we used monitoring data downloaded from the EPA's STORET website and closing/advisory data sent to us by the EPA.

NRDC first began contacting states in January, asking them when and if their annual report would be available and if they could provide NRDC with their monitoring and/or notification data directly. NRDC sent each state a draft of their summary for review, verification, and comment. This draft contained NRDC's analysis of the notification and monitoring data as well as the narrative material for each state. In some cases a summary of monitoring data was sent separately, in addition to the preparation of the draft state summary.

A summary of contacts made with states to verify program information and monitoring and notification data is given in the table below. These dates do not include original contacts with states, state responses to program surveys, or contacts regarding NRDC's questions outside of the state summary and data review process. Note that in some cases it was difficult to determine which column to put the date for a state response, for example when a state responded to an e-mail about the monitoring data with program information or notification data corrections. In several cases, NRDC stated in their communications with states that if they did not receive responses, NRDC would assume that they were in agreement with the item under review.

Many beach managers demonstrated a great deal of patience and care in providing responses to NRDC and we thank them for making the report as complete and accurate as possible.

Table 4-4: Summary of NRDC's data and program information review process (all dates 2011)

State	Monitoring Data Source	Notification Data Source	Monitoring Data Summary Sent to State for Review	State Response to Monitoring Data Summary Received	Draft Summary with Notification and Monitoring Data Analysis, Beach by Beach Data, and Program Description Sent to State for Review	State Response to Summary
Alabama	STORET 3/6	EPA 4/8	5/23	a	4/28	4/29
Alaska	STORET 3/31	EPA 4/18	5/11, 5/22	5/23	5/14	5/25
California	STORET 3/31 state 4/6	state 4/6	5/10, 5/22 ^b	5/23, 6/8	5/6, 6/2	5/12, 5/13
Connecticut	state 2/10 and NPS	state 2/10 EPA 3/30		c	4/28	4/29
Delaware	state 5/28	EPA 4/18	d		5/30	5/30
Florida	STORET 3/31 ^c	EPA 3/30	5/10, 5/22	5/25	5/13, 6/2	
Georgia	state 2/10	EPA 4/14	5/11, 5/22		5/3, 5/11, 6/2	
Hawaii	state 2/10	EPA 4/14	5/10, 5/22		5/16	5/17, 5/24
Illinois	state 3/31	state 3/31 EPA 4/14	5/22		5/18, 6/2	
Indiana	state 2/10 NPS downloaded 4/21	EPA 3/30	5/10	5/18	5/17, 6/7	5/18
Louisiana	state 2/10	EPA 4/7	5/10	5/11, 5/15	5/14	5/16
Maine	state 4/12 STORET on 3/31	state 4/12			5/6, 5/13	5/19 ^f
Maryland	state 4/3 and STORET 3/31	EPA 3/30	5/22	5/31	5/1, 5/11, 6/3	6/3
Massachusetts	state 2/10	EPA 4/21	5/10	5/12	5/18	5/23
Michigan	state 2/10 download from website 5/30	EPA 4/14	5/10, 5/22	5/23	5/19, 5/20, 6/2	5/19, 6/2
Minnesota	state 3/31 Portage 3/25	state 4/5 EPA 4/5			5/5, 5/11	5/11, 5/11, 6/2
Mississippi	STORET 3/31	EPA 4/5			5/3	5/13
New Hampshire	state 3/2	state 3/2 EPA 3/30	5/10	5/11	5/20, 6/3	6/3, 6/7
New Jersey	STORET 3/6	state 3/1 EPA 4/14	5/7, 5/11, 5/22, 5/24	5/9, 5/24, 5/31	5/20	5/24
New York	STORET 3/31	EPA 3/30	5/10	5/13, 5/17	5/20	5/23, 5/23
North Carolina	STORET 3/6	EPA 3/30			5/1	5/4, 5/5, 5/6, 5/9
Ohio	STORET 3/6	EPA 3/30	5/10, 5/22	5/23	5/22	5/23
Oregon	STORET 3/6	EPA 4/8	5/23	5/23	5/2, 5/11	5/11

Table 4-4: Summary of NRDC's data and program information review process (all dates 2011)

State	Monitoring Data Source	Notification Data Source	Monitoring Data Summary Sent to State for Review	State Response to Monitoring Data Summary Received	Draft Summary with Notification and Monitoring Data Analysis, Beach by Beach Data, and Program Description Sent to State for Review	State Response to Summary
Pennsylvania	STORET 3/31	EPA 3/30	5/10	5/11	5/22	5/27
Rhode Island	STORET 3/31	EPA 4/21	5/10	5/11	5/30	6/2, 6/3
South Carolina	state 3/1	EPA 3/30	5/10, 5/22	5/16	5/25	5/25
Texas	state 3/31	state 3/31 EPA 3/31	5/10	5/11	5/23	5/23
Virginia	state website no Bch ID 3/10	state website 3/10 EPA 3/31	5/11, 5/22		5/25	5/25 ^a
Washington	state 2/24	state 2/24 EPA 4/5	5/10	5/11	5/1	5/10
Wisconsin	state 2/10	state 2/10 EPA 4/7			5/4, 5/11	5/6, 5/13

a Alabama had already responded to their draft state summary when they got their monitoring data summary for review.

b California and Orange County were alerted on 6/27 that many months of data were missing from NRDC's data set.

c Connecticut explicitly verified NRDC's monitoring and notification data for the beaches the state collects monitoring and notification data for in their review of the draft state summary.

d EPA and Delaware were alerted on 4/21, 5/1, 5/11, and 5/22 that Delaware's monitoring data set was incomplete. Delaware resolved this issue on 5/23. This state was not sent a monitoring data summary as all data issues were resolved during this process.

e Florida sent monitoring data on May 25th, however, by that time, NRDC had already analyzed Florida's 2010 monitoring data available through EPA's STORET website.

f Maine requested a second round of review on 6/10 but time did not permit NRDC to do so.

g The Virginia program will not review materials sent to them by NRDC as they do not validate external data or its presentation.

NOTES

1 United States Environmental Protection Agency. Ambient Water Quality Criteria for Bacteria—1986. EPA440/5-84-002. January 1986.

2 Vogel, LJ, AA Enns, AM Abdelzaher, HM Solo-Gabriele. Spatial and Temporal Variation in Indicator Microbe Sampling and its Effects on Beach Management Decisions. Poster at Beach Conference. Miami, FL. March 2011.



ALABAMA

21st in Beachwater Quality

10% 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.

Alabama has 97 coastal beaches stretching along 50 miles of Gulf of Mexico coast and 70 miles of bay and island shoreline. The Alabama Department of Environmental Management (ADEM) administers the state's beachwater quality monitoring program.

During 2010, Alabama's beaches were impacted by the BP oil disaster. A total of 1,661 advisory days at 30 beaches were issued due to the spill. Shoreline Contamination Assessment Teams were working seven days a week on cleanup and warning signs were still posted at all of Alabama's Gulf Coast beaches into 2011 because of the occasional presence of tar mats and tar balls from the spill.² NRDC includes oil spill advisory days at all beaches in its oil spill totals, including advisory days at beaches that were not monitored for bacteria in 2010. Ten of the beaches with oil spill advisories were monitored for bacteria in 2010.

Monitoring Results

In 2010 Alabama reported 97 coastal beaches. Of these, 8 (8%) were monitored more than once a week, 12 (12%) once a week, and 5 (5%) every two weeks. 72 (74%) 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). In 2010, 10% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Mary Ann Nelson Beach (35%) and Pirate's Cove (22%) in Baldwin County; Dog River, Alba Club in Mobile County (21%), and Spanish Cove in Baldwin County (20%).

Sampling Practices: Monitoring is conducted throughout the year, with more frequent monitoring from May to September.

ADEM, along with the Alabama Department of Public Health and US EPA, determines sampling practices, locations, standards, and notification protocols and practices throughout the state. Samples are usually collected in knee-deep water, 6 to 12 inches below the surface. Beach tier and monitoring frequency are determined using a quantitative ranking scheme that weighs three factors: the amount of use, a measure of risk, and the presence of important factors such as high use by the elderly or the very young.¹

Once an exceedance is reported, samples are collected daily until the standard is met.² States that monitor more frequently after an exceedance is found will tend to have higher percent exceedance rates and lower total advisory days than they would if their sampling schedule was not altered after an exceedance was found.

KEY FINDINGS IN ALABAMA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

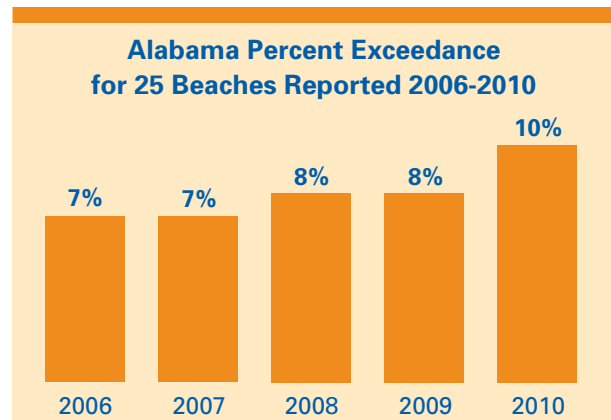
- Mary Ann Nelson Beach in Baldwin County (35%)
- Pirate's Cove in Baldwin County (22%)
- Dog River, Alba Club in Mobile County (21%)
- Spanish Cove in Baldwin County (20%)

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

- 36 (100%) unknown sources of contamination

Advisories

Because of the BP oil disaster, total advisory days for 28 events lasting six consecutive weeks or less increased more than 5-fold to 195 days in 2010 from 34 in 2009. For prior years, there were 14 advisory days in 2008, 30 days in 2007, 44 days in 2006, and 27 days in 2005. Not counting beach advisories due to the BP oil disaster, the number of advisory days in 2010 would have been 36, essentially the same as in 2009. There were 19 extended (1,502 days) and no permanent events in 2010. All extended advisories were due to the oil spill. 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 28 events lasting six consecutive weeks or less, 18% (36) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, and 82% (159) were preemptive (i.e., without waiting for monitoring results) due to the BP oil disaster.



Standards and Procedures: Alabama does not order beach closings; the state's policy is to issue advisories only.² An enterococcus single-sample maximum of 104 cfu/100ml is the standard used to issue beach advisories in Alabama.

Beaches are given green status when sampling results meet the standard. When sample results exceed the standard, the status changes to yellow. Yellow status indicates that there may be an increased risk of illness associated with swimming in such water, and that the beach is being immediately retested. When a sample exceeds the standard, there are no overriding factors that can be taken into account before an advisory is issued. If a resample, taken the next day, also exceeds the standard, a public health advisory (red status) is issued. Red status indicates that resampling has revealed enterococcus levels greater than the threshold.²

There are no standards that mandate preemptive advisories in response to rainfall or sewage spills, but full-scale advisories for all sites have been issued by the county and state health departments after hurricanes and during the 2010 BP oil disaster.³

Alabama 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Baldwin County					
10th Street Access	no tier	None	0	NA	0 (56)*
13th Street Access	no tier	None	0	NA	0 (56)*
5th Street Access	no tier	None	0	NA	0 (56)*
6th Street Access	no tier	None	0	NA	0 (56)*
7th Street Access	no tier	None	0	NA	0 (56)*
Alabama Point (Gulf of Mexico)	2	1/wk	21	0%	0 (56)*
Anderson Street	no tier	None	0	NA	0 (56)*
Bear Point Civic Association	3	2/mo	19	5%	0
Bernard Court	no tier	None	0	NA	0 (56)*
Bon Secour National Wildlife Refuge	3	2/mo	14	0%	0 (56)*
Camp Beckwith	1	2/wk	64	9%	5
Camp Dixie	1	2/wk	52	2%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Baldwin County					
Cotton Bayou	1	2/wk	36	0%	0 (56)*
Escambia Avenue	3	2/mo	19	0%	0
Fairhope Public Beach	1	2/wk	64	16%	6
Florida Point	1	2/wk	36	0%	0 (56)*
Fort Morgan National Park	no tier	None	0	NA	0 (56)*
Fort Morgan Public Beach	3	2/mo	14	0%	0 (56)*
Gore Road	no tier	None	0	NA	0 (56)*
Gulf Shores Public Beach	1	2/wk	36	0%	0 (56)*
Gulf State Park–Pavilion	1	2/wk	36	0%	0 (56)*
Kee Avenue	2	1/wk	44	9%	1
Little Lagoon Pass Beach	2	1/wk	21	0%	0 (56)*
Mary Ann Nelson Beach	3	2/mo	23	35%	5
May Day Park	2	1/wk	5	20%	0
Orange Beach Waterfront Park	2	1/wk	36	11%	0
Orange Street Pier/Beach	2	1/wk	38	16%	1
Our Road	no tier	None	0	NA	0 (56)*
Pellican Pt.	no tier	None	0	NA	53
Pirate’s Cove	1	2/wk	68	22%	4
Ponce De Leon Annex	no tier	None	0	NA	0 (56)*
Ponce De Leon Court Lot 35	no tier	None	0	NA	0 (56)*
Ponce De Leon Court Lot 50	no tier	None	0	NA	0 (56)*
Ponce De Leon Court Lot 51	no tier	None	0	NA	0 (56)*
Ponce De Leon Dr Access East	no tier	None	0	NA	0 (56)*
Ponce De Leon Dr Public Access	no tier	None	0	NA	0 (56)*
Romar Beach	no tier	None	0	NA	0 (56)*
South Wilson Blvd	no tier	None	0	NA	0 (51)*
Spanish Cove	2	1/wk	51	20%	2
Volanta Avenue	2	1/wk	40	15%	2
Wolf Bay Lodge	no tier	None	0	NA	0 (51)*
Beaches in Baldwin County that were not monitored and that had no closing or advisory days in 2010:					
Alabama Point (Perdido Pass)	Buchanan Street Access	Holly Ave.	Morgantown Park		
Barklay Ave.	Cabana Beach Association	Josaphine Park	Mullet Dr.		
Battles Rd	Camp Baldwin	Koa Campground	Murphy Lane		
Bay Ave.	Cedar St.	Lafite Road	N. Mobile St/Perdido Ave.		
Bay Front Park (Daphne)	Cedar St. E	Laine Court Park	Navy Cove		
Bay Side Drive	Choctaw Road North	Live Oak	North Road		
Bayou Drive	Cypress Ave.	Marjon Lane	Oak St. #91		
Belrose Ave. Daphne	Fish Trap Access	Mcdonald Ave.	Palmetto Ave.		
Boggy Point	Gulf Coast Remainder	Mobile Ave.	Pensacola Ave.		
Boykin Street Access	Haupt Road	Montgomery Ave.	Perdido Bay Rec. Beach		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Baldwin County					
Beaches in Baldwin County that were not monitored and that had no closing or advisory days in 2010:					
Pinewood Ave.	Sea Cliff Dr.	Landing	Wydell St.		
Randolf Rd.	Seabright Ave.	Sunset Dr.	Yupon Ave.		
Rester St.	Sibley St/Steadmans	Village Pt. Foundation	Zundall Lane		
Mobile County					
Bay Front Park	no tier	None	0	NA	0
Dauphin Island East End	2	1/wk	22	9%	53
Dauphin Island Public Beach	2	1/wk	20	0%	53
Dog River, Alba Club	2	1/wk	39	21%	7
Fowl River at Highway 193	2	1/wk	37	8%	3

*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 Baldwin County Health Department, Risk Based Beach Evaluation and Ranking, not dated.
- 2 Alabama Dept. of Env. Mgt./Alabama Dept. Public Health. Coastal Alabama Beach Monitoring Program. <http://adem.alabama.gov/programs/coastal/beachMonitoring.cnt>. Accessed in June 2011.
- 3 Suzi Rice, Senior Environmental Scientist, Alabama Department of Environmental Management, personal communication, February 2011.

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



ALASKA

10th in Beachwater Quality

5% 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.

Alaska has nearly 34,000 miles of coastal shoreline. While low water temperatures discourage swimming, recreational shoreline activities do occur, and more than 200 recreational beaches have been identified. The Alaska Department of Environmental Conservation administers the state's beachwater quality program.

KEY FINDINGS IN ALASKA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- South Kenai Beach (14%)
- Bishop's Beach (5%)
- North Kenai Beach (3%)

Monitoring Results

In 2010, Alaska reported 23 coastal beaches, 4 (17%) of which were monitored more than once a week, 6 (26%) of which were monitored once a week, 1 (4%) was monitored less than once a month, and 12 (52%) 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, 3%* of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were South Kenai Beach (14%), Bishop's Beach (5%), and North Kenai Beach (3%).

Sampling Practices: Agencies that choose to participate in the program are encouraged to sample for eight weeks during the summer season.

Sampling practices are uniform throughout the state. Samples are collected 12 inches below the surface in water that is 3 feet deep, at high tide if possible. When selecting beaches to be monitored, factors such as proximity to an established road system and distance from a laboratory are considered,¹ along with the types of recreational activities that occur, the level of use, and the types of nearby pollution sources.²

No advisories have been issued in Alaska due to exceedances of a bacterial standard, but if a beach were to be placed under advisory, monitoring would occur daily until standards were met.³

Advisories

There were no advisories in 2010.

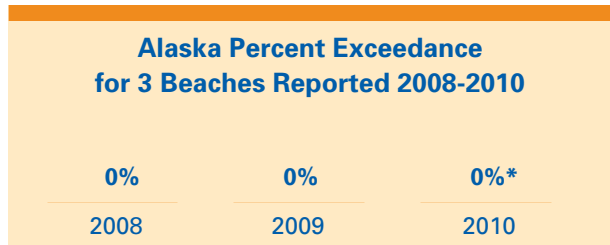
Standards and Procedures: Alaska's program recommends advisories (rather than closings) based on water quality. Water quality standards for the monitoring program include Alaska's fecal coliform standard (in a 30-day period, the geometric mean of five samples may not exceed 100 cfu/100 ml, and not more than one sample may exceed 200 cfu/100 ml) and an enterococcus standard (single-sample maximum of 276 cfu/100 ml; 30-day, five-sample geometric mean of 35 cfu/100 ml). The enterococcus standards match the EPA criteria for full-body-contact recreation in lightly used marine waters. Alaska does not have an *E. coli* standard, but the results from field-based analysis methods for quantifying *E. coli*

can be used as a stand-in for analysis methods for quantifying fecal coliform in remote locations. If this were to occur, the fecal coliform standard would be applied to *E. coli* results.

While the state encourages participating municipalities to issue an advisory when a sample exceeds the standards, the authority for issuing advisories is delegated to the local governments that choose to participate in the program. A

bacterial exceedance is one of many factors that can be used to determine whether to issue a beach advisory.³

Alaska has no preemptive standards for issuing beach closings or advisories due to rainfall or known sewage spills.³



* Why don't the 2010 percent exceedance values in this summary match? The value at the top of the first page (5%) reflects the proportion of samples exceeding the national single-sample maximum standard for designated beach areas. The value in the "Monitoring Results" section (3%) reflects the proportion of samples exceeding the state standard, which in Alaska's case is less stringent than the designated beach area standard. Some samples exceeded the national standard but not the state standard. Also, only samples from a common set of beaches monitored each year from 2008–2010 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 (0%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (3%).

Alaska 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
No County Data Available					
Anchor Point to Happy Valley Creek	no data	none	20	0%	0
City Park	no data	none	0	NA	0
Harris and Aurora Harbors	no data	none	0	NA	0
Letnikof Cove	no data	none	0	NA	0
Lutak Inlet	no data	none	0	NA	0
Naknek River	no data	none	0	NA	0
North Kenai Beach	no data	none	39	3%	0
Petroglyph Beach	no data	none	0	NA	0
Portage Cove	no data	none	0	NA	0
Sandy Beach Park	no data	1/wk	0	NA	0
West Beach	no data	none	0	NA	0
Whisky Bill Beach	no data	none	20	0%	0
Bristol Bay County					
Kanakanak Beach	1	1/wk	3	0%	0
King Salmon Beach (North Naknek)	1	4/yr	0	NA	0
Scandinavian Beach	no data	none	3	0%	0
Snag Point	no data	1/wk	3	0%	0
Juneau County					
Sandy Beach 5, Douglas	3	1/wk	0	NA	0
Kenai Peninsula County					
Bishop's Beach	no data	2/wk	22	5%	0
Homer Spit	no data	1/wk	52	0%	0
Homer Spit-Land's End	no data	1/wk	52	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Kenai Peninsula County					
North Kasilof Beach	no data	2/wk	24	0%	0
South Kenai Beach	no data	2/wk	35	14%	0
Warren Ames Bridge	no data	2/wk	26	0%	0

NOTES

- 1 Alaska Department of Environmental Conservation. Annual Performance Report for the Alaska Department of Environmental Conservation BEACH Monitoring Program (Agreement #CU97023701) Activity Period FFY 2007: October 1, 2006–September 30, 2007. Not dated.
- 2 Alaska Department of Environmental Conservation, Beach Water Quality Monitoring and Pathogen Detection 2007 Quality Assurance Program Plan, prepared by Shannon & Wilson, Inc., April 2007.
- 3 Erin Strang, Alaska Department of Environmental Conservation. Personal communication. February 2009.

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



CALIFORNIA † See Additional Information About California's Beach Data Management

22nd in Beachwater Quality

10% 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.

California has more than 500 miles of coastal beaches, spread among over 400 beaches along the Pacific Ocean and San Francisco Bay coastline. The California Department of Health Services administers the BEACH Act grant.

Current approved methods for determining fecal indicator bacteria counts in beachwater depend on growth of cultures in samples and take at least 24 hours to process. Because of this, swimmers do not know until the next day if the water they swam in was contaminated. Likewise, beaches may be left closed even after water quality meets standards. There is a great deal of interest in technologies that can provide same-day beachwater quality results. During the 2010 beach season, researchers funded by the California State Water Board and the American Recovery and Reinvestment Act tested a rapid method called quantitative polymerase chain reaction, or qPCR, at nine sampling locations in Orange County five days a week. The method used was specific for enterococcus bacteria. The test locations were at Huntington State Beach, Newport Beach, and Doheny State Beach. During this pilot study, public health decisions were made based on both standard and rapid method results. While the project demonstrated the practicality of issuing beach notifications using qPCR, the qPCR method resulted in higher bacterial counts than traditional culture methods and more postings were issued than would have been issued if only traditional culture methods had informed the notification decisions.¹

Researchers at Stanford, University of California at Los Angeles, University of California at Santa Barbara, and the Southern California Coastal Water Research Project are developing a protocol for identifying the sources of fecal indicator bacteria found in beachwater. This project, funded by the California State Water Board with money from the Clean Beach Initiative, a program that focuses on water quality and swimmer safety projects at popular coastal beaches, will provide guidance for choosing appropriate technologies and sampling strategies for source identification studies. Researchers will select a subset of source identification techniques from among dozens of possibilities to test in detail at twenty to thirty California beaches. At these beaches, samples will be taken in rivers, creeks, and storm drains above the point of tidal influence, at the wave wash zone at the mouth of the outfalls, in sand nearby the outfalls, and in kelp washed up on the beach at the high tide line. The presence of human and other sources of fecal indicator bacteria will be determined. After the initial testing phase concludes, a more thorough source identification study of the watersheds for some of the beaches will be conducted. Plans are to include beaches in California with persistent water quality problems that have not been studied in depth previously, including Surfrider Beach in Malibu, Cowell Beach in Santa Cruz, Arroyo Burro in Santa Barbara, and Doheny Beach in Orange County.²

KEY FINDINGS IN CALIFORNIA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

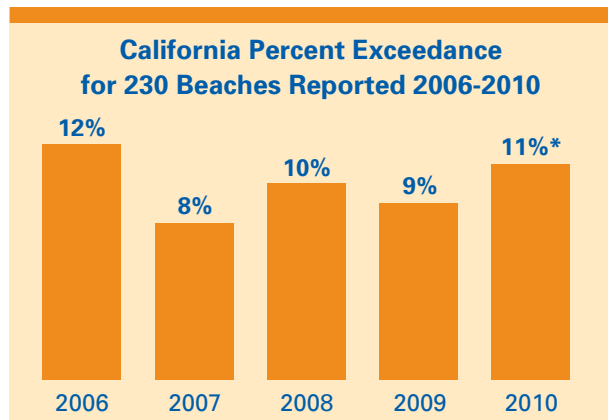
- Avalon Beach north of GP Pier in Los Angeles County (73%)
- Avalon Beach south of GP Pier in Los Angeles County (56%)
- Candlestick Point, Windsurfer Circle in San Francisco County (52%)

Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

- 89% (5125) unknown only
- 4% (237) other unspecified sources
- 3% (163) no information
- 2% (136) sewage spills/leaks
- 2% (95) stormwater

In an effort to reduce the burden associated with beachwater monitoring, several monitoring entities in Orange County have drafted a collaborative, integrated, regional ocean water quality monitoring program proposal for the county.⁴ This proposal would shift most of the monitoring duties in the county to the entities that operate the county's coastal sewage treatment plants and would reduce the number of sampling events in Orange County. Efforts to work collaboratively and eliminate duplication of effort are commendable. But some of the proposed changes will result in less frequent monitoring at beaches that get many visitors and that have a history of exceeding the enterococcus water quality standard, including locations at Doheny State Beach. Frequent monitoring of popular swimming areas where water quality tends to be poor is most protective of public health and there may be cases where frequent monitoring around outfall locations should be preserved.



California's exceedance rate rose substantially from last year to this year. Reasons for this increase may include additional sampling by Los Angeles County at outfalls in order to meet requirements associated with the cleanup of Santa Monica Bay.⁵ California's wet weather season runs from November to April, and most recreational water use occurs during the dry season when water quality is at its best.⁵

Monitoring Results

In 2010, California reported 452 coastal beaches (some of which have multiple segments), 10 (2%) of which were monitored daily, 14 (3%) of which were monitored more than once a week, 282 (62%) of which were monitored once a week, 12 (3%) of which were monitored once a month, 128 (28%) of which were monitored less than once a month, 2 (<1%) of which were not monitored, and there was no monitoring information for 4 (1%) beaches. 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 values, including duplicate samples and samples taken outside the official beach season, if any). As discussed below, California has multiple bacterial standards; accordingly, NRDC considered a sample on a given day at a given beach station to be in exceedance if it exceeded any one of California's bacterial standards. However, even if all bacterial standards were exceeded on a given day at a given station, NRDC counted that as only one exceedance. For example, if a sample exceeded the enterococcus, *E. coli*, and total coliform standards on a given day, NRDC counted that as one exceedance, not three (note that when determining California's national beachwater quality ranking, NRDC analyzed results based on EPA's single-sample maximum standard for designated beach areas of, just as every other coastal state).

In 2010, 11%* of all reported beach monitoring samples exceeded at least one of the state's daily maximum bacterial standards. Seventy-five of California's beaches/beach segments exceeded at least one of the standards at least 20% of the time in 2010. The beaches with the highest percent exceedance rates in 2010 were Avalon Beach north of Green Pleasure Pier (73%) and Avalon Beach south of Green Pleasure Pier (56%) in Los Angeles County, Candlestick Point, Windsurfer Circle (52%) in San Francisco County, Cabrillo Beach (52%) and Avalon Beach Near Busy B Café (51%) in Los Angeles County, Poche County Beach in Orange County (51%), Avalon Beach between Busy B Café and TC (43%) in Los Angeles County, Doheny State Beach north of San Juan Creek in Orange County (42%), and Colorado Lagoon–North (40%) in Los Angeles County.

Contra Costa County had the highest exceedance rate (25%) in 2010 followed by San Francisco (20%), Los Angeles (17%), Santa Barbara (15%), Santa Cruz (15%), Sonoma (13%), San Mateo (12%), Monterey (9%), Orange (9%), Humboldt (7%), Alameda (7%), Ventura (6%), San Diego (6%), San Luis Obispo (5%), Marin (4%), and Mendocino (4%) counties. No beaches in Del Norte County are sampled.

Sampling Practices: Beachwater quality monitoring in California occurs from at least April 1 to October 31, with most beaches in Southern California and in Santa Cruz, San Mateo, and San Francisco Counties monitored year-round.

Individual counties determine sampling locations, while sampling depth and minimum sampling frequency are determined by state law.⁶ Most counties sample at more locations and often more frequently than required by state law.⁵ Samples are taken in ankle-deep water. Monitoring locations in California are selected based on the number of visitors, the location of storm drains, discharge permit requirements to sample at particular places, and legislative requirements (for instance, all beaches along the San Francisco Bay are monitored per legislation). Monitored beaches represent the vast majority of beach day use in California.

Samples are usually collected in the most likely areas of possible contamination. In Los Angeles County, for example, sampling points are located where creeks or storm drains enter the surf zone, which are usually permanently posted as being under advisory. Most other counties may permanently post outfalls and sample 25 yards up or down the coast from the outfall to predict further impacts to beach bathing areas.² Immediate resampling is often conducted after an advisory is issued in order to lift the advisory as soon as possible. When there is a closing, samples must meet standards for two days before the beach can be reopened. States that monitor more frequently after an exceedance is found will tend to have higher percent exceedance rates and lower total closing/advisory days than they would if their sampling schedule did not alter after an exceedance was found.

Closings and Advisories

Total closing/advisory days for 1,062 events lasting six consecutive weeks or less nearly doubled to 5,756 days in 2010 from 2,904 days in 2009. For prior years, there were 4,133 closing/advisory days in 2008, 4,736 days in 2007, 4,644 days in 2006, and 5,199 days in 2005. In addition, there were 14 extended events (811 days total) and 12 permanent events (1,549 days total) 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 1,062 events lasting six consecutive weeks or less, 92% (5,288) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, 2% (95) were preemptive (i.e., without waiting for monitoring results) due to heavy rainfall, 2% (136) were preemptive due to known sewage spills/leaks, and 4% (237) were preemptive due to other unspecified reasons.

Standards and Procedures: Local health agencies are responsible for issuing beachwater quality warnings.⁷ There are four types of beachwater quality warnings issued: postings, closings, rain advisories, and permanent postings. Postings that warn swimmers about the potential for illness are issued when a water sample fails to meet bacterial standards. Rain advisories are pre-emptive warnings that people should avoid swimming in ocean waters during a rain event and for three days after rainfall ceases, and permanent postings are sites where historic data show that the beachwater generally contains elevated bacteria levels.³ Beach closings are generally issued due to sewage spills or other serious health hazards, but local health officials sometimes decide to close a beach when more than one standard is exceeded or when exceedances are far in excess of the standards.² This is rare, however, and closings are generally issued only when it is suspected that sewage is impacting a beach.

California employs a variety of bacterial standards.

- For total coliform, the single-sample standard is 1,000 cfu/100 ml if the ratio of fecal/total coliform bacteria exceeds 0.1. Otherwise, the single-sample standard for total coliform is 10,000 cfu/100 ml. The total coliform standard for the geometric mean of at least five weekly samples collected during a 30-day period is 1000 cfu/100 ml.
- For fecal coliform, the single-sample standard is 400 cfu/100 ml and the standard for the geometric mean of at least five weekly samples collected during a 30-day period is 200 cfu/100 ml. In some jurisdictions, *E. coli* is used as a surrogate for fecal coliform; in this case, the standard is the same as for fecal coliform.
- For enterococcus, the single sample standard is 104 cfu/100 ml and the standard for the geometric mean of at least five weekly samples collected during a 30-day period is 35 cfu/100 ml.

Almost all counties monitor for all three organisms (total coliform, fecal coliform, and enterococcus), and an exceedance of the single-sample standard of any one of these three indicators triggers a posting. Geometric mean standards are sometimes used to keep a beach posted after the single-sample maximum has been exceeded, but are rarely used by themselves to trigger a posting.² Unless adjacent sampling stations exceed water quality standards, notifications are issued for the portion of the beach that extends 50 yards in either direction of the sampling location where an exceedance of water quality standards is found.²

Postings are issued without resampling when a single-sample exceedance occurs. There is no protocol for delaying or foregoing a posting when a single-sample exceedance occurs.

Since 2003, San Diego County has used a predictive model to trigger beach closings at three south county beaches near the outlet of the Tijuana River. These beaches are Imperial Beach, Coronado Beach, and Silver Strand State Beach. The model assesses the need for closures based on real-time information about ocean currents in addition to other parameters. Use of the model allows the San Diego County Department of Environmental Health to make more accurate and timely notifications to protect the health of beachgoers.⁸

In addition to advisories triggered by indicator exceedances, three-day-long preemptive rain advisories are automatically issued for all beaches in five counties (Los Angeles, Monterey, Orange, San Diego, and Santa Cruz counties) when rainfall exceeds predetermined levels, regardless of whether bacterial monitoring samples have been collected and analyzed. For example, Los Angeles County advises swimmers that to stay safe when swimming in the ocean, ocean water should be avoided for 72 hours after a rainstorm.⁹ These general advisories affect all beaches in the county. As a general rule, the Los Angeles County Recreational Waters Program issues a rain advisory when there is 0.1 inch or more of rainfall at the University of Southern California rain gauge, but this varies depending on factors such as how long it has been since the last rainfall, how sporadic the rainfall is, and where it is falling; according to the agency, much of the watershed that feeds storm drain flow is in the hills and mountains, which have different rainfall levels than at the rain gauge. Orange County issues preemptive county-wide rain advisories, warning of elevated bacteria levels in the ocean for a period of at least 72 hours after rain events of 0.2 inches or more. San Diego County issues preemptive rain advisories for a period of up to 72 hours after a rain event of 0.2 inches or more.

Preemptive advisories are also issued for reasons other than rain, such as excessive debris on the beach. Finally, preemptive closings are issued when there is a known sewage spill or when sewage is suspected of impacting a beach. Closings are issued immediately upon notification by the agency responsible for the spill.

* Why don't the 2010 percent exceedance values in this summary match? The value at the top of the first page (10%) reflects the proportion of samples exceeding the national single-sample maximum standard for designated beach areas. California applies additional standards, and the value in the "Monitoring Results" section (11%) reflects the proportion of samples exceeding the state standards. Some samples exceeded the state standards but not the national standard.

† Additional Information About California's Beach Data Management

Given California's extensive coastline, dense coastal population, and many potential sources of beach pollution, the percent exceedance rates and number of closing/advisory days in this state can significantly influence the national picture. For that reason, and for the benefit of an informed beach-going public in California, the state's thorough and accurate management of its large dataset of beach monitoring and closing/advisory information is critical. Beachwater monitoring is conducted by multiple county, municipal, and other local agencies, which then report their results to the state. NRDC collects these data from the state, compiles them for this report, and provides the tabulated data to the state to review their accuracy. Although improvements have been made in the state's data collection and organization methods over the past 21 years, inaccuracies and omissions persist.

For example, as this report went to print, NRDC discovered that approximately seven months of beach monitoring data reportedly submitted to the state by Orange County officials were missing from the state's 2010 monitoring database. NRDC was able to identify anomalies in the reported data because of our familiarity with the relevant beach water monitoring programs, and then contacted county officials for additional information. But it is incumbent on the state to perform this type of quality control check and such action should be part of the state's routine data management practices. Among other things, a lack of complete and accurate information hinders effective direction of pollution reduction actions to protect California beach users.

This report contains corrected data from the 2010 beach season to the extent we were able to identify needed changes before the report's release. However, a number of the results presented here for beaches in Orange County remain based on originally-reported state data. We will continue to update the report online as more data become available, but we urge the state agency responsible for administering the beach monitoring data and the agencies that report it to ensure that the data are diligently reported, their accuracy confirmed, and their storage properly managed. Beginning with the 2011 beach season, the Southern California Coastal Water Research Project (SCCWRP) will assume management of California's beach monitoring data from the California State Water Resources Control Board. The transition to SCCWRP management provides an opportunity to assure that these improvements are made.

California 2010 Monitoring Results and Closing or Advisory Days

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Alameda County					
Alameda Point–North	not tier 1	no data	39	10%	21 (102)*
Alameda Point–South	not tier 1	no data	38	5%	21 (102)*
Crown Beach, 2001 Shoreline Dr.	not tier 1	1/wk	39	8%	50
Crown Beach, Bath House	not tier 1	1/wk	38	3%	50
Crown Beach, Bird Sanctuary	not tier 1	1/wk	40	15%	50
Crown Beach, Sunset Rd.	not tier 1	1/wk	38	5%	50
Crown Beach, Windsurf Corner	not tier 1	1/wk	38	3%	50
Contra Costa County					
Keller Beach, Mid Beach	not tier 1	1/wk	46	28%	53
Keller Beach, North Beach	not tier 1	1/wk	46	28%	53
Keller Beach, South Beach	not tier 1	1/wk	42	17%	53
Del Norte County					
Beaches in Del Norte County that were not monitored and that had no closing or advisory days in 2010:					
Beachfront Park	Enderts Beach	Lake Earl Wildlife Area	Point St. George		
Clifford Kamph Memorial Park	High Bluff Beach	Beaches	South Beach		
Crescent Beach	Kellogg Beach	Pebble Beach	Wilson Creek Beach		
		Pelican Bay State Beach			
Humboldt County					
Clam Beach Co. Park	1	1/wk	42	12%	15
Clam Beach Co. Park, North Mad River Mouth	1	1/wk	37	5%	15
Luffenholtz Beach, Luffenholtz Creek	1	1/wk	36	6%	4
Moonstone Beach	1	1/wk	40	10%	7
Old Home Beach	1	1/wk	30	7%	8
Trinidad State Beach, Mill Creek	1	1/wk	37	3%	3
Beaches in Humboldt County that were not monitored and that had no closing or advisory days in 2010:					
Agate Beach	College Cove	Freshwater Lagoon	Mattole River Beach		
Baker Beach	Crab Co. Park	Gold Bluffs Beach	Redwood Creek Beach		
Big Lagoon	Dead Man's Beach	Hidden Beach	Samoa Dunes Rec. Area		
Black Sands Beach	Dry Lagoon	Little Black Sands Beach	Shelter Cove		
Carruthers Cove Beach	Eel River State Wildlife Area	Little River State Beach	South Spit		
Centerville Beach		Mad River Beach Co. Park	Stone Lagoon		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Los Angeles County					
Alamitos Bay Beach, 2nd St Bridge & Bayshore	1	1/wk	55	33%	8
Alamitos Bay Beach, 56th Place–On Bayside	1	1/wk	58	34%	22
Alamitos Bay Beach, Alamitos–Bay shore float	1	1/wk	56	30%	10
Avalon Beach, bet. BBC and TC	1	1/wk	40	43%	83 (87)*
Avalon Beach, near Busy B Cafe	1	1/wk	41	51%	74
Avalon Beach, near storm drain	1	1/wk	33	24%	28
Avalon Beach, north of GP Pier	1	1/wk	45	73%	63 (49)*
Avalon Beach, south of GP Pier	1	1/wk	41	56%	42 (44)*
Big Rock Beach, Big Rock Beach	1	1/wk	49	12%	35
Cabrillo Beach Station	1	Daily	241	52%	219 (127)*
Colorado Lagoon–Center	1	1/wk	1	0%	0
Colorado Lagoon–North	1	1/wk	60	40%	55
Colorado Lagoon–South	1	1/wk	41	34%	9
Dockweiler State Beach, Ballona Creek	1	1/wk	241	22%	74
Dockweiler State Beach, Culver Blvd	1	1/wk	240	2%	7
Dockweiler State Beach, Hyperion Plant	1	1/wk	49	10%	21
Dockweiler State Beach, Imperial Hwy. storm drain	1	1/wk	240	1%	10
Dockweiler State Beach, World Way	1	1/wk	49	14%	65
El Segundo Beach	1	1/wk	51	16%	42
Hermosa Beach Pier	1	1/wk	240	2%	28
Hermosa Beach, 26th Street	1	1/wk	49	10%	2
Inner Cabrillo Beach	1	Daily	241	17%	66
Leo Carillo State Beach	1	1/wk	49	6%	21
Long Beach, 10th Place–Beach	1	1/wk	56	25%	15
Long Beach, 55th Place–Beach	1	1/wk	52	21%	4
Long Beach, 5th Place–Beach	1	1/wk	55	24%	12
Long Beach, 72nd Place–Beach	1	1/wk	48	19%	2
Long Beach, Coronado Ave–Beach	1	1/wk	57	28%	13
Long Beach, Granada Ave–Beach	1	1/wk	52	23%	4
Long Beach, Molino Ave–Beach	1	1/wk	57	25%	16
Long Beach, Prospect Ave–Beach	1	1/wk	56	23%	13
Long Beach, West side of Belmont Pier	1	1/wk	56	27%	14
Malibu Beach, Latigo Shore Dr.	1	1/wk	49	4%	28
Malibu Beach, Malibu Colony Dr.	1	1/wk	49	10%	35
Malibu Beach, Malibu Pier	1	1/wk	54	20%	75
Malibu Beach, Nicholas Beach	1	1/wk	50	4%	0
Malibu Beach, Paradise Cove	1	1/wk	56	23%	107

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Los Angeles County					
Malibu Beach, Westward Beach	1	1/wk	51	8%	9
Manhattan Beach Pier	1	1/wk	240	1%	12
Manhattan Beach, 27th Street extended	1	1/wk	52	21%	53
Manhattan Beach, 40th Street extended	1	1/wk	240	1%	11
Marina Del Rey Beach	1	1/wk	241	20%	68
Mothers' Beach	1	1/wk	56	32%	17
Outer Cabrillo Beach	1	1/wk	5	20%	0
Palos Verdes Beach, Abalone Cove	1	1/wk	5	20%	0
Palos Verdes Beach, Long Point	1	1/wk	6	0%	0
Palos Verdes Beach, near Busy B Cafe	1	1/wk	240	1%	12
Portuguese Bend	1	Daily	5	20%	0
Puerco Beach	1	1/wk	50	12%	35
Redondo Beach, Avenue I extended	1	1/wk	240	3%	21
Redondo Beach, Herondo Street	1	1/wk	52	25%	78
Redondo Beach, Redondo Pier	1	1/wk	241	27%	108
Redondo Beach, Topaz Street	1	1/wk	52	13%	11
Royal Palms Beach, White Point	1	1/wk	5	0%	2
Santa Monica State Beach, Ashland storm drain	1	1/wk	241	10%	29
Santa Monica State Beach, Montana Ave.	1	1/wk	50	14%	51
Santa Monica State Beach, Pico Kenter storm drain	1	1/wk	241	19%	60
Santa Monica State Beach, Santa Monica Canyon	1	1/wk	241	23%	51
Santa Monica State Beach, Santa Monica Pier	1	1/wk	241	23%	84
Santa Monica State Beach, Strand Street	1	1/wk	48	10%	21
Santa Monica State Beach, Wilshire Blvd.	1	1/wk	49	12%	48
Surfrider Beach	1	1/wk	240	36%	159 (127)*
Topanga State Beach	1	1/wk	241	39%	113 (335)*
Trancas Beach	1	1/wk	49	14%	21
Venice City Beach, Brooks Ave.	1	1/wk	49	16%	28
Venice City Beach, Topsail Street	1	1/wk	51	14%	32
Venice City Beach, Venice Pier	1	1/wk	49	10%	28
Venice City Beach, Windward storm drain	1	1/wk	240	3%	22
Will Rogers State Beach, 17200 Pacific Coast Hwy	1	1/wk	50	12%	48
Will Rogers State Beach, Bel Air Bay Club	1	1/wk	56	25%	86
Will Rogers State Beach, Pulga storm drain	1	1/wk	240	2%	2

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Los Angeles County					
Will Rogers State Beach, Temescal Canyon storm drain	1	1/wk	53	23%	118
Beaches in Los Angeles County that were not monitored and that had no closing or advisory days in 2010:					
Armarillo Beach	El Pescador State Beach	Multiple Beaches	Royal Palms Beach		
Basin H	Escondido Beach	Nicholas Canyon County Beach	South Topanga State Beach		
Bluff Cove	La Costa Beach	No Name	South Will Rogers State Beach		
Broad Beach	La Piedra State Beach	Point Dume County Beach	Torrance Beach		
Carbon Beach	Las Flores Beach	Point Fermin Park	Zuma Beach		
Coral Beach	Las Tunas County Beach	Robert Meyer Memorial State Beach	Zuma Beach–Westward Beach		
Dan Blocker County Beach	Malibu Lagoon State Beach				
El Matador State Beach	Malibu Point				
Marin County					
Bolinas Beach	1	1/wk	29	3%	7
China Camp	1	1/wk	30	10%	21
Dillon Beach	1	1/wk	30	0%	0
Drake's Beach	1	1/wk	30	0%	0
Drake's Beach, Drakes Estero	1	1/wk	18	6%	7
Fort Baker, Horseshoe Cove–Northeast	1	1/wk	29	0%	0
Fort Baker, Horseshoe Cove–Northwest	1	1/wk	29	0%	0
Fort Baker, Horseshoe Cove–Southwest	1	1/wk	29	3%	7
Heart's Desire	1	1/wk	30	3%	7
Lawson's Landing	1	1/wk	30	7%	21
Limantour Beach	1	1/wk	30	0%	0
Miller Point	1	1/wk	30	0%	0
Millerton Point	1	1/wk	30	27%	42
Muir Beach–Central	1	1/wk	30	0%	0
Muir Beach–North	1	1/wk	30	7%	14
Muir Beach–South	1	1/wk	30	0%	0
Rodeo Beach–Central	1	1/wk	29	0%	0
Rodeo Beach–North	1	1/wk	29	0%	0
Rodeo Beach–South	1	1/wk	29	0%	0
Schoonmaker Beach	1	1/wk	30	0%	0
Shell Beach	1	1/wk	30	10%	21
Stinson Beach–Central	1	1/wk	30	0%	0
Stinson Beach–North	1	1/wk	30	3%	7
Stinson Beach South	1	1/wk	30	0%	0
Beaches in Marin County that were not monitored and that had no closing or advisory days in 2010:					
Chicken Ranch Beach at Creek	Fort Baker, Horseshoe Cove–Southwest	McClures Beach	Rodeo Beach–North		
Fort Baker, Horseshoe Cove–Northwest	Golden Hinde	McNears Beach	Rodeo Beach–South		
	Kehoe Beach	Muir Beach–North	Stinson Beach–North		
	Marshall Beach	Muir Beach–South	Stinson Beach–South		
		Paradise Cove			

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Mendocino County					
Big River-Mendocino Bay Headlands SP	1	1/wk	29	0%	0
Caspar Headlands SB	1	1/wk	17	0%	0
Hare Creek	1	1/wk	14	14%	0
MacKerricher State Park	1	1/wk	26	0%	0
MacKerricher State Park, Virgin Creek Beach	1	1/wk	26	12%	0
Pudding Creek Beach, Pudding Creek	1	1/wk	28	4%	0
Pudding Creek Beach, Pudding Lagoon	1	1/wk	1	0%	0
Van Damme SP	1	1/wk	29	0%	0
Beaches in Mendocino County that were not monitored and that had no closing or advisory days in 2010:					
Albion River	Greenwood SB	Manchester SB	Schooner Gulch		
Anchor Bay	Gualala River	Navarro River Redwood SP	Ten Mile River		
Arena Cove	Irish Beach	Noyo River	Westport/Union Landing		
Chadbourne Gulch	Jug Handle State Reserve	Russian Gulch SP			
Monterey County					
Asilomar State Beach, Sunset Dr. at Arena	1	1/wk	34	0%	0
Carmel Beach at Ocean Ave	1	1/wk	35	6%	0
Lover's Point	1	1/wk	40	15%	0 (45)*
Marina State Beach	1	4/yr	1	0%	0
Monterey Beach Hotel	1	1/wk	37	5%	0
Monterey State Beach, Del Monte Beach	1	1/wk	41	20%	0
San Carlos Beach	1	1/wk	36	6%	0 (79)*
Spanish Bay	1	1/wk	34	0%	0
Stillwater Cove	1	1/wk	38	16%	0 (108)*
Zmudowski State Beach	1	4/yr	0	NA	3
Beaches in Monterey County that were not monitored and that had no closing or advisory days in 2010:					
Andrew Molera State Beach	Heritage Harbor	Maccabee Beach	State Beach		
Fort Ord Dunes State Beach	John Little State Beach	Monastery Beach	Point Sur SHP		
Garrapata State Beach	Julia Pfeiffer Burns State Beach	Moss Landing State Beach	Salinas River State Beach		
	Limekiln	Pacific Grove City Beaches	Seal Rock, Pebble Beach		
		Point Lobos State Reserve	Seaside Beach		
Orange County					
Aliso County Beach, Aliso Beach	not tier 1	no data	30	13%	0
Aliso County Beach, Aliso Beach–South	not tier 1	no data	30	7%	0
Aliso County Beach, Camel Point	not tier 1	no data	30	3%	0
Aliso County Beach, Crystal Cove Ramp	not tier 1	no data	74	7%	0
Aliso County Beach, Table Rock	not tier 1	no data	30	7%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Orange County					
Aliso County Beach, Treasure Island Ramp	not tier 1	no data	30	3%	0
Aliso County Beach, Treasure Island Stairs	not tier 1	no data	30	3%	0
Bolsa Chica State Beach, Bolsa Chica Beach	1	Daily	74	4%	3
Bolsa Chica State Beach, Bolsa Chica Reserve	1	Daily	74	8%	3
Capistrano Bay District, 10000' South Outfall	1	2/wk	27	15%	43
Capistrano Bay District, 7500' South Outfall	1	2/wk	25	16%	43
Capistrano Beach, 5000' South Outfall	1	2/wk	26	15%	19
Crystal Cove State Park, Crystal Cove	1	Daily	9	0%	3
Dana Point Harbor, Buoy Line/Baby Beach	1	1/wk	8	0%	77
Dana Point Harbor, East End/Baby Beach	1	1/wk	14	21%	77
Dana Point Harbor, Fuel Dock	1	1/wk	9	0%	77
Dana Point Harbor, Guest Dock	1	1/wk	9	0%	77
Dana Point Harbor, Harbor Entrance	1	1/wk	25	0%	77
Dana Point Harbor, Harbor Patrol Dock	1	1/wk	15	20%	77
Dana Point Harbor, MDP18	1	1/wk	9	0%	77
Dana Point Harbor, Pier	1	1/wk	9	0%	77
Dana Point Harbor, Pilgrim	1	1/wk	9	0%	77
Dana Point Harbor, Swim Area/Baby Beach	1	1/wk	13	15%	77
Dana Point Harbor, West End/Baby Beach	1	1/wk	11	9%	77
Dana Point Harbor, Youth Dock	1	1/wk	9	0%	77
Dana Point, Ocean Institute Beach	1	4/yr	25	4%	0
Doheny State Beach, 1000' South Outfall	1	3/wk	26	38%	252 (57)*
Doheny State Beach, 2000' South Outfall	1	3/wk	31	35%	252 (57)*
Doheny State Beach, 3000' South Outfall	1	3/wk	25	24%	252 (57)*
Doheny State Beach, 4000' South Outfall	1	3/wk	25	12%	252 (57)*
Doheny State Beach, North Beach	1	3/wk	1	0%	252 (57)*
Doheny State Beach, North of San Juan Creek	1	3/wk	26	42%	252 (57)*
Doheny State Beach, Surfzone at Outfall	1	3/wk	27	48%	252
Huntington City Beach, 17th Street	1	Daily	74	7%	28
Huntington City Beach, Beach Hut	1	Daily	74	8%	28
Huntington City Beach, Bluffs	1	Daily	74	9%	28
Huntington City Beach, Jack's Snack Bar	1	Daily	74	8%	28
Huntington Harbour, 11th Street Beach	1	1/wk	10	20%	6

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Orange County					
Huntington Harbour, Admiralty Drive	1	1/wk	9	11%	6
Huntington Harbour, Anaheim Bay	1	1/wk	9	11%	6
Huntington Harbour, Anderson Street	1	1/wk	9	11%	6
Huntington Harbour, Clubhouse	1	1/wk	9	11%	6
Huntington Harbour, Coral Cay	1	1/wk	10	20%	6
Huntington Harbour, Davenport Beach	1	1/wk	9	11%	6
Huntington Harbour, Harbour Channel	1	1/wk	9	11%	6
Huntington Harbour, Humboldt Beach	1	1/wk	9	11%	6
Huntington Harbour, Mothers Beach	1	1/wk	9	22%	6
Huntington Harbour, Sea Gate	1	1/wk	9	11%	6
Huntington Harbour, Sunset Aquatic Park	1	1/wk	9	11%	6
Huntington Harbour, Trinidad Lane	1	1/wk	9	11%	6
Huntington State Beach, 50' N of Santa Ana River	1	Daily	74	4%	35
Huntington State Beach, Brookhurst Street	1	Daily	75	3%	35
Huntington State Beach, Magnolia Street	1	Daily	74	1%	35
Huntington State Beach, Santa Ana River –North	1	Daily	74	1%	35
Huntington State Beach, SCE Plant	1	Daily	74	9%	35
Laguna Beach, Blue Lagoon	1	2/wk	30	7%	22
Laguna Beach, Bluebird Canyon	1	2/wk	31	13%	22
Laguna Beach, Crescent Bay	1	2/wk	9	0%	22
Laguna Beach, Laguna Hotel	1	2/wk	31	19%	22
Laguna Beach, Laguna Lido Apartment	1	2/wk	30	3%	22
Laguna Beach, Victoria Beach	1	2/wk	30	7%	22
Monarch Beach–North	1	Daily	2	0%	7
Newport Bay, 10th Street	1	1/wk	16	0%	124
Newport Bay, 15th Street	1	1/wk	16	6%	124
Newport Bay, 19th Street	1	1/wk	16	6%	124
Newport Bay, 33rd Street	1	1/wk	17	29%	124
Newport Bay, 43rd Street	1	1/wk	16	6%	124
Newport Bay, Abalone Avenue	1	1/wk	16	0%	124
Newport Bay, Alvarado/Bay Island	1	1/wk	16	0%	124
Newport Bay, Bayshore Beach	1	1/wk	16	6%	124
Newport Bay, Bayside Drive Beach	1	1/wk	16	6%	124
Newport Bay, De Anza	1	1/wk	16	0%	124
Newport Bay, Garnet Avenue	1	1/wk	16	0%	124
Newport Bay, Grand Canal	1	1/wk	16	6%	124
Newport Bay, Lido Yacht Club	1	1/wk	16	19%	124
Newport Bay, N Street Beach	1	1/wk	16	0%	124

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Orange County					
Newport Bay, Newport Blvd Bridge	1	1/wk	16	25%	124
Newport Bay, Newport Dunes East	1	1/wk	17	24%	124
Newport Bay, Newport Dunes Middle	1	1/wk	16	25%	124
Newport Bay, Newport Dunes North	1	1/wk	17	29%	124
Newport Bay, Newport Dunes West	1	1/wk	16	25%	124
Newport Bay, Northstar Beach	1	1/wk	16	25%	124
Newport Bay, Onyx Avenue	1	1/wk	16	6%	124
Newport Bay, Park Avenue	1	1/wk	16	0%	124
Newport Bay, Promontory Point	1	1/wk	16	6%	124
Newport Bay, Rhine Channel	1	1/wk	16	13%	124
Newport Bay, Rocky Point	1	1/wk	16	0%	124
Newport Bay, Ruby Avenue	1	1/wk	16	6%	124
Newport Bay, Sapphire Avenue	1	1/wk	16	0%	124
Newport Bay, Ski Zone	1	1/wk	2	50%	124
Newport Bay, Vaughs Launch	1	1/wk	8	38%	124
Newport Bay, Via Genoa	1	1/wk	16	6%	124
Newport Beach, 15th/16th Street	1	Daily	74	3%	28
Newport Beach, 38th Street (9S)	1	Daily	74	1%	28
Newport Beach, 38th Street (BNB10)	1	Daily	16	13%	28
Newport Beach, 52nd/53rd Street	1	Daily	74	3%	28
Newport Beach, Balboa Pier	1	Daily	74	5%	28
Newport Beach, Corona Del Mar	1	Daily	74	1%	28
Newport Beach, Grant Street	1	Daily	9	11%	28
Newport Beach, Lancaster/62nd	1	Daily	9	11%	28
Newport Beach, Orange Street	1	Daily	74	1%	28
Newport Beach, Santa Ana River–South	1	Daily	74	4%	28
Newport Beach, The Wedge	1	Daily	74	0%	28
Poche County Beach, Poche Beach	1	2/wk	26	54%	81 (130)*
Salt Creek County Beach Park, Dana Strands–Selva Ramp	not tier 1	3/wk	30	3%	0
Salt Creek County Beach Park, Salt Creek Beach	not tier 1	3/wk	30	7%	0
San Clemente City Beach, 20000' South Outfall	1	2/wk	26	23%	2
San Clemente City Beach, 450' North of Pier	1	2/wk	25	4%	2
San Clemente State Beach, Avenida Calafia	1	2/wk	25	0%	0
San Clemente State Beach, Las Palmeras	1	2/wk	25	0%	0
Seal Beach Surfside, 100 Yds S of Pier	1	1/wk	17	6%	26
Seal Beach Surfside, 14th Street	1	1/wk	17	12%	26
Seal Beach Surfside, 1st Street	1	1/wk	18	28%	26

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Orange County					
Seal Beach Surfside, 8th Street	1	1/wk	17	12%	26
Seal Beach Surfside, Sea Way	1	1/wk	16	0%	26
South Laguna, Thousand Steps Beach	1	2/wk	30	3%	9
South Laguna, Three Arch Bay	1	2/wk	31	6%	9
South Laguna, Treasure Island Pier	1	2/wk	31	6%	9
Sunset Beach, Broadway	1	1/wk	16	0%	0
Beaches in Orange County that were not monitored and that had no closing or advisory days in 2010:					
Aliso Creek		Emerald Bay (drain)	Newport Beach (Santa Ana River)	Riviera Beach	
San Diego County					
Baja California, Mexico	1	1/wk	24	25%	0
Bayside Park	no data	no data	28	11%	0
Bird Rock (NR)	1	4/yr	2	0%	6
Border Field State Park	1	1/wk	108	23%	65 (158)*
Buccaneer Beach	1	4/yr	60	3%	2
Cardiff State Beach	1	1/wk	202	0%	15
Carlsbad City Beach	1	1/wk	20	0%	3
Carlsbad State Beach	1	1/wk	57	0%	9
Coronado Cays (NR)	1	4/yr	115	0%	0
Coronado City beaches	1	3/wk	97	1%	4
Coronado, Central beach	1	2/wk	58	0%	0
Dog Beach, O.B.	1	4/yr	77	8%	26
Fletcher Cove	1	4/yr	45	2%	0
Harbor Beach	1	4/yr	79	13%	28
Imperial Beach municipal beach, other	1	1/wk	90	16%	2
Imperial Beach pier area	1	1/wk	38	5%	0
La Jolla Cove	1	1/wk	29	0%	0
La Jolla Shores Beach	1	1/wk	28	7%	0
Mission Bay	1	4/yr	1	100%	0
Mission Bay, Bahia Point	1	1/wk	27	7%	5
Mission Bay, Campland On The Bay	1	1/wk	34	15%	16
Mission Bay, Crown Point Shores	1	1/wk	54	4%	2
Mission Bay, De Anza Cove	1	1/wk	29	14%	10
Mission Bay, Fanuel Park	1	1/wk	27	4%	12
Mission Bay, Leisure Lagoon	1	1/wk	53	0%	0
Mission Bay, Mariners Basin	1	1/wk	29	10%	5
Mission Bay, Vacation Isle	1	1/wk	60	10%	18
Mission Bay, Visitor's Center	1	1/wk	30	20%	20
Mission Beach	1	1/wk	50	2%	0
Moonlight Beach	1	2/wk	70	6%	6

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
San Diego County					
North Imperial Beach	1	4/yr	52	12%	0
Ocean Beach	1	1/wk	182	2%	2
Oceanside municipal beach, other	1	1/wk	135	5%	0
Oceanside Pier area	1	1/wk	45	4%	10
Powerhouse Park 15th Street	1	4/yr	34	0%	0
San Diego Bay	1	4/yr	26	0%	0
San Diego Bay Coronado Cays	1	4/yr	28	14%	0
San Diego Bay Glorietta Bay	1	1/wk	26	0%	0
San Diego Bay Shelter Is	1	1/wk	0	NA	14
San Dieguito River Beach	1	2/wk	67	4%	11
San Elijo State Beach	1	1/wk	90	1%	0
San Onofre State Beach	1	1/wk	1	100%	0
Seascape Beach Park	1	1/wk	23	0%	0
Shoreline Park	0	2/wk	29	14%	0
Silver Strand State Beach	1	1/wk	47	4%	52
South Carlsbad State Beach	1	1/wk	269	3%	11
South Casa Beach S.D.	1	4/yr	24	8%	0
Spanish Landing Park	1	1/wk	28	7%	0
Sunset Cliffs Park	1	1/wk	49	2%	0
Swami's Park	1	1/wk	25	0%	0
Tecolote Shores	1	1/wk	57	4%	2
Tide Beach Park	1	4/yr	45	2%	0
Tijuana River	1	1/wk	1	100%	80
Tijuana Slough National Wildlife Refuge	1	1/wk	122	20%	0
Torrey Pines State Beach	1	1/wk	69	4%	14
Tourmaline Surfing Park	1	1/wk	60	2%	0
USMC Camp Pendleton	1	1/wk	6	0%	11
Whispering Sands Nicholson Pt.	1	4/yr	42	5%	0
WindanSea Beach	1	1/wk	29	0%	0
Beaches in San Diego County that were not monitored and that had no closing or advisory days in 2010:					
Agua Hedionda Lagoon	Marine Street Beach	Mission Bay,	Pacific Beach		
Carlsbad municipal beach	Mission Bay,	San Juan Cove	San Diego Bay Chula Vista		
Del Mar City Beach	North Pacific Passage	Mission Bay,	Shell Beach		
La Jolla Community Beach	Mission Bay, Quivera Basin	Santa Barbara Cove	Solana Beach City Beaches		
Leucadia	Mission Bay, Riviera Shores	Mission Bay,	Torrey Pines City Beach		
	Mission Bay, Sail Bay	Ventura Cove	Tourmaline Surfing Park		
		Oceanside Harbor			
San Francisco County					
Aquatic Park, Aquatic Park, Mid-beach	1	1/wk	63	14%	5
Aquatic Park, Hyde Street Pier	1	1/wk	56	5%	5
Baker Beach, Baker Beach, Lobos Creek at Lower Parking Lot	1	1/wk	84	32%	77

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
San Francisco County					
Baker Beach, Baker Beach, Opposite Seacliff 2 Pumping Station	1	1/wk	60	7%	77
Baker Beach, Baker Beach, Upper Parking Lot	1	1/wk	84	6%	77
Candlestick Point, Jack Rabbit Beach	1	1/wk	56	7%	29
Candlestick Point, Sunnydale Cove	1	1/wk	76	32%	29
Candlestick Point, Windsurfer Circle	1	1/wk	100	52%	29
China Beach	1	1/wk	59	8%	7
Crissy Field, Crissy Field West	1	1/wk	65	18%	22
Crissy Field, New Beach	1	1/wk	68	22%	22
Fort Funston	1	1/wk	6	17%	8
Ocean Beach, at Balboa St.	1	1/wk	59	8%	19
Ocean Beach, at Lincoln Ave.	1	1/wk	64	16%	19
Ocean Beach, at Pacheco St.	1	1/wk	7	29%	19
Ocean Beach, at Sloat Blvd.	1	1/wk	62	11%	19
Ocean Beach, at Vicente St.	1	1/wk	10	60%	19
San Luis Obispo County					
Avila Beach, AB8	1	1/wk	50	6%	2
Avila Beach, AB9	1	1/wk	58	17%	2
Cayucos Beach, CAY13	1	1/wk	47	0%	1
Cayucos Beach, CAY14	1	1/wk	47	2%	1
Cayucos Beach, CAY15	1	1/wk	47	2%	1
Montana De Oro, HAZ10	not tier 1	1/wk	47	0%	0
Morro Bay City Beach, MB11	1	1/wk	47	0%	0
Morro Bay City Beach, MB12	1	1/wk	48	2%	0
Morro Bay City Beach, MB13	1	1/wk	48	2%	0
Morro Strand State Beach, MB14	1	1/wk	49	4%	1
Oceano Dunes State Rec Area, OCB10	1	4/yr	1	0%	0
Olde Port Beach, OLDE12	1	1/wk	54	13%	2
Pismo State Beach, Oceano, OCB11	1	1/wk	45	0%	1
Pismo State Beach, Oceano, OCB12	1	1/wk	48	2%	1
Pismo State Beach, Oceano, OCB13	1	1/wk	47	0%	1
Pismo State Beach, PB3	1	1/wk	50	6%	8
Pismo State Beach, PB4	1	1/wk	59	20%	8
Pismo State Beach, PB5	1	1/wk	49	4%	8
San Simeon Beach, PICO23	1	1/wk	47	0%	4
San Simeon Beach, SEW7	1	1/wk	49	8%	4
Beaches in San Luis Obispo County that were not monitored and that had no closing or advisory days in 2010:					
Hearst Memorial State Beach	Moonstone Beach	S Morro Strand State Beach	Shell Beach		
Leffingwell Beach	N Morro Strand State Beach	Sewers	Spyglass Park		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
San Mateo County					
Aquatic Park	1	1/wk	45	33%	58 (50)*
Bean Hollow State Beach	1	1/wk	29	3%	28
Coyote Point County Park	1	1/wk	44	9%	63
Dunes State Beach	1	1/wk	45	4%	13
Fitzgerald Marine (Moss Beach)	1	1/wk	43	19%	55
Francis State Beach	1	1/wk	44	2%	13
Gazos Creek Access	1	1/wk	30	0%	0
Kiteboard Beach	not tier 1	no data	28	29%	57
Lakeshore Park Rec Center	1	4/yr	46	37%	93
Montara State Beach	1	1/wk	45	2%	7
Oyster Point Marina	not tier 1	1/wk	38	24%	96
Pacifica State Beach, Linda Mar Beach #5	1	1/wk	47	13%	35
Pescadero State Beach	1	1/wk	30	10%	27
Pillar Point #7	1	1/wk	48	35%	145 (51)*
Pillar Point #8	1	1/wk	48	23%	145 (51)*
Pomponio State Beach	1	1/wk	30	0%	0
Rockaway Beach	1	1/wk	46	4%	16
Roosevelt State Beach	1	1/wk	45	7%	20
San Gregorio State Beach	1	1/wk	18	6%	7
Sharp Park Beach #3	1	1/wk	33	0%	0
Sharp Park Beach #6	1	1/wk	32	0%	0
Surfers Beach	1	1/wk	47	2%	8
Venice State Beach	1	1/wk	45	7%	27
Beaches in San Mateo County that were not monitored and that had no closing or advisory days in 2010:					
Ano Nuevo State Refuge	Martin's Beach	Pigeon Point Beach	Sand Beach		
Capistrano Blvd. Beach	Maverick's Beach	Pillar Point 2	Thornton State Beach		
El Grandada	Miramar Beach	Pillar Point Harbor	Tunitas Beach		
Elmar Beach	Mori Point	Poplar Beach	Vallejo Beach		
Gray Whale State Beach	Naples Beach	Redondo Beach			
Manor Beach	Pebble Beach	Ross's Cove			
Santa Barbara County					
Arroyo Burro	1	1/wk	41	39%	53 (58)*
Butterfly Beach	1	1/wk	35	14%	17
Carpinteria State	1	1/wk	34	9%	4
East Beach- Mission Creek	1	1/wk	35	20%	33
East Beach Sycamore Creek	1	1/wk	33	9%	33
El Capitan State Beach	1	1/wk	35	14%	9
Gaviota State Beach	1	1/wk	33	9%	5
Goleta Beach	1	1/wk	37	27%	32 (58)*

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Santa Barbara County					
Guadalupe Dunes Beach	1	1/wk	28	4%	7
Hammonds	1	1/wk	36	17%	17
Hope Ranch Beach	1	1/wk	34	9%	13
Jalama Beach	1	1/wk	30	10%	7 (63)*
Leadbetter	1	1/wk	37	19%	15 (65)*
Refugio State Beach	1	1/wk	34	15%	14
Sands at Coal Oil Point	1	1/wk	34	12%	8
Summerland Beach	1	1/wk	34	12%	9
Beaches in Santa Barbara County that were not monitored and that had no closing or advisory days in 2010:					
1,000 Steps	Depressions	Loon Point	Rincon Beach		
Arroyo Quemado	Devereaux	Mesa Lane	Santa Claus Lane		
Campus Pt.	Ellwood	Miramar	Surf Beach		
Carpinteria City	Haskell's	Ocean Beach	West Beach		
Coal Oil Point	Isla Vista Beach	Padaro Lane			
Santa Cruz County					
Aptos Creek Mouth	1	1/wk	25	16%	0
Capitola Beach east of Jetty	1	1/wk	23	22%	21
Capitola Beach west of Jetty	1	1/wk	23	30%	21
Corcoran Lagoon Beach	1	1/mo	4	0%	0
Cowell Beach West of the Wharf	1	1/wk	26	12%	0 (150)*
Cowell's Beach at the Stairs	1	1/wk	19	0%	0 (150)*
Hidden Beach	1	1/mo	7	14%	0
Lighthouse Beach	1	1/mo	4	0%	0
Main Beach at Boardwalk	1	1/wk	24	4%	11
Main Beach at San Lorenzo River	1	1/wk	23	13%	11
Manresa Beach	1	1/mo	7	29%	10
Mitchell's Cove Beach	1	1/mo	4	25%	0
Moran Lake, County Beach	1	1/mo	4	0%	0
Natural Bridges Beach	1	1/wk	22	9%	0
New Brighton Beach	1	1/wk	22	14%	9
Pajaro Dunes Beach	1	1/wk	6	17%	0
Pleasure Point Beach	1	1/mo	5	20%	0
San Vicente Beach	1	1/mo	3	0%	0
Scott Creek Beach	1	1/mo	4	25%	0
Seabright Beach	1	1/wk	23	22%	0
Seacliff Beach	1	1/wk	25	16%	0
Sunny Cove Beach	1	1/mo	4	0%	8
Sunset Beach	1	1/mo	7	0%	0
Twin Lakes Beach	1	1/wk	23	26%	0
Waddell Creek Beach	1	1/mo	4	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Santa Cruz County					
Beaches in Santa Cruz County that were not monitored and that had no closing or advisory days in 2010:					
Beercan Beach		Hooper's Beach	Schwan Lake	Trestle Beach	
		Neary Lagoon mouth	Seascape Beach		
Sonoma County					
Black Point	1	1/wk	7	0%	0 (191)*
Campbell Cove State Beach	1	1/wk	7	29%	0
Doran Park County Regional Park	1	1/wk	7	0%	0
Goat Rock State Beach	1	1/wk	6	0%	0
Gualala Regional Park Beach	1	1/wk	7	0%	0
Salmon Creek State Beach	1	1/wk	7	43%	29
Still Water Cove Regional Park	1	1/wk	7	14%	0 (191)*
Beaches in Sonoma County that were not monitored and that had no closing or advisory days in 2010:					
Still Water Cove Regional Park Beach					
Ventura County					
County Line Beach	1	1/wk	25	0%	0
Deer Creek Beach	1	1/wk	1	0%	0
Emma Wood State Beach	1	1/wk	48	2%	0
Faria County Park	1	1/wk	51	4%	0
Hobie Beach	1	1/wk	46	4%	1
Hobson County Park	1	1/wk	26	0%	0
Hollywood Bch-La Crescen.	1	1/wk	26	0%	14
Hollywood Bch-Los Robles	1	1/wk	51	10%	14
Kiddie Beach	1	1/wk	52	13%	15
La Conchita Beach	1	1/wk	1	0%	0
Mandos Cove Beach	1	1/wk	26	0%	0
Marina Park Beach	1	1/wk	29	10%	3
Mussel Shoals Beach	1	1/wk	26	0%	0
Oil Piers Beach	1	1/wk	52	4%	1
Ormond Bch-Indust. Drain	1	1/wk	45	13%	13
Ormond Beach-J St.	1	1/wk	53	13%	13
Ormond Beach-Arnold Rd.	1	1/wk	42	10%	13
Oxnard Bch Pk-Falkirk Ave	1	1/wk	26	0%	0
Oxnard Bch Pk-Starfish Dr	1	1/wk	26	0%	0
Oxnard Bch-5th St.	1	1/wk	26	4%	0
Oxnard Bch-Outrigger Way	1	1/wk	26	0%	0
Peninsula Bch/Harbor Cove	1	1/wk	29	14%	3
Point Mugu Beach	1	1/wk	27	4%	0
Port Hueneme Beach Pk.	1	1/wk	52	8%	5
Promenade Pk-Calif. St.	1	1/wk	27	4%	1
Promenade Pk-Figueroa St.	1	1/wk	51	6%	1

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Ventura County					
Promenade Pk–Redwood Apts	1	1/wk	26	4%	1
Rincon Beach–Creek Mouth	1	1/wk	52	8%	1
Rincon Beach–Flagpole	1	1/wk	26	8%	1
San Buenaventura State Beach, Dover Lane	1	1/wk	28	7%	19
San Buenaventura State Beach, Kalorama St.	1	1/wk	27	7%	19
San Buenaventura State Beach, San Jon Rd.	1	1/wk	52	13%	19
San Buenaventura State Beach, Weymouth Ln.	1	1/wk	27	4%	19
Silverstrand Bch–S. Paula	1	1/wk	50	6%	0
Silverstrand Bch–San Nic.	1	1/wk	51	4%	0
Silverstrand Bch–Sawtelle	1	1/wk	51	4%	0
Solimar Beach	1	1/wk	51	8%	6
Staircase Beach	1	1/wk	26	0%	0
Surfer's Knoll Beach	1	1/wk	51	6%	0
Surfer's Point at Seaside	1	1/wk	51	10%	0
Sycamore Cove Beach	1	1/wk	26	0%	0
Thornhill Broome Beach	1	1/wk	26	0%	0
Beaches in Ventura County that were not monitored and that had no closing or advisory days in 2010:					
McGrath State Beach	Rincon Parkway North	South Jetty Beach	Ventura River		
Rincon Creek	Seaside Wilderness Park Beach	Surfers Point at Seaside			

*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 Larry Honeybourne, Orange County Health Care Agency. EPA Beach Conference. Miami, FL. March 2011.
- 2 Alexandria Boehm, Stanford University. Personal communication. April 2011.
- 3 California Regional Water Quality Control Board Santa Ana Region. Time Schedule Order No. R8-2004-0067 for Orange County Sanitation District. September 17, 2004.
- 4 County of Orange Health Care Agency. A Collaborative, Integrated, Regional Ocean Water Quality Monitoring Program for Orange County. May 13, 2010.
- 5 Michael Gjerde, California State Water Resources Control Board, personal communication, May 2011.
- 6 Michael Gjerde, California State Water Resources Control Board, personal communication, April 2011.
- 7 California State Water Resources Control Board. Beach Water Quality Information, accessed at www.swrcb.ca.gov/water_issues/programs/beaches/beach_water_quality. February 2011.
- 8 San Diego County Department of Environmental Health. San Diego County 2004 Beach Closure & Advisory Report. May 2008.
- 9 Los Angeles County Department of Public Health, Beach Advisories, available at http://publichealth.lacounty.gov/phcommon/public/eh/water_quality/beach_grades.cfm.

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



CONNECTICUT

24th 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.

Connecticut has 66 public beaches stretching along 18 miles of Long Island Sound coastline. The Connecticut Department of Public Health (CT DPH) administers the state's Beach Act grant.

Connecticut's coastal beachwater had an unusual number of water quality exceedances in 2010. Statewide, the number of exceedances was at least double that of recent years. Of the state's elevated fecal indicator bacteria counts, one third were reported between August 23 and August 26. Contaminated runoff may be at least partly to blame, as two inches of rain fell in many locations on August 22.

After reviewing historical data on bacterial densities, Ledge Light Health District permanently removed Kiddie's Beach from service in early 2011 and posted it with no swimming signs. This beach will be out of service for the 2011 swimming season and until further notice.¹

Monitoring Results

In 2010, Connecticut tracked 66 marine beaches for the US EPA under its BEACH Act grant. Due to reduced municipal funding, only 65 beaches were reported as being monitored weekly. (Clark Avenue Beach in New Haven County is monitored twice 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, 11%* of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards.

The beaches with the highest percent exceedance rates in 2010 were Kiddie's Beach (54%) and Green Harbor Beach (45%) in New London County, Branford Point Beach in New Haven County (28%), Shady Beach (24%) and Long Beach (Marnick's) (24%) in Fairfield County, Anchor Beach (Merwin Point) #1 in New Haven County (22%), Long Beach (Proper) in Fairfield County (22%), Town Beach (Clinton) in Middlesex County (21%), and Pent Road Beach in New Haven County (20%).

New London County had the highest exceedance rate (15%) in 2010 followed by Fairfield (11%), New Haven (10%), and Middlesex (10%) counties.

KEY FINDINGS IN CONNECTICUT

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Kiddie's Beach in New London County (54%)
- Green Harbor Beach in New London County (45%)

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

- 94 (66%) stormwater runoff
- 26 (18%) unknown sources of contamination
- 10 (7%) sewage spills/leaks
- 5 (3%) wildlife
- 8 (6%) other, unspecified sources of contamination

Sampling Practices: Connecticut’s monitoring season stretches from Memorial Day to Labor Day.

Monitoring practices at coastal beaches are the responsibility of local health authorities (for municipal beaches) and the Connecticut Department of Environmental Protection (CT DEP) (for state park beaches), who follow state guidelines that samples be taken in water that is 3-4 feet deep, 12-18 inches below the surface. Beaches are assigned to tiers at the end of every bathing season. These tier assignments are not related to extent of beach use or potential for beachwater contamination, but are instead assigned on the basis of the sampling frequency reported by local health departments and the CT DEP for their respective beaches and the number of beach closing events for those beaches.² Beaches that were sampled weekly and had no more than one closure event during the previous swim season are assigned Tier 1 status, beaches that were sampled weekly and had two or three closure events during the previous swim season are assigned Tier 2 status, and beaches that were not sampled weekly or that had more than three closure events during the previous swim season are assigned Tier 3 status.² Sampling frequency and the number of monitoring station locations at a beach are not assigned based on beach tier.²

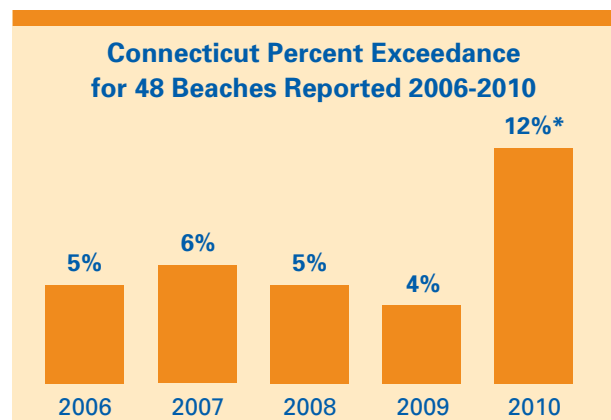
State guidelines suggest additional sampling when there are higher bather loads, at culverts and drainage pipes after rain events, after sewage spills or other pollution events, if waterfowl are congregating, or if sanitary survey information indicates potential for non-point contamination after a rain event.² Resamples are recommended by the state when a sample exceeds standards.³ At the four state park marine beaches monitored by the CT DEP, resampling is done every day once a beach is closed.⁴ States that monitor more frequently after an exceedance is found or after heavy rain will tend to have higher percent exceedance rates and lower total closing/advisory days than they would if their sampling schedule was not altered after an exceedance was found or after heavy rainfall occurred.

Closings and Advisories

Total closing/advisory days for 67 events lasting six consecutive weeks or less increased 32% to 143 days in 2010 from 108 days in 2009, 135 days in 2008, 108 days in 2007, 224 days in 2006, and 200 days in 2005. In addition, there were no extended events and 1 permanent event (365 days) 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 67 events lasting six consecutive weeks or less, 65% (93) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, and 35% (50) were preemptive (i.e., without waiting for monitoring results) due to heavy rainfall.

Reported sources of beachwater contamination: 66% (94) of closing/advisory days were from stormwater runoff, 18% (26) were from unknown sources of contamination, 7% (10) were from sewage spills/leaks, 3% (5) were from wildlife, and 6% (8) were from other, unspecified sources of contamination.



Standards and Procedures: Local jurisdictions determine how they will apply water quality standards. State guidelines encourage local health departments and the CT DEP to apply the EPA’s single-sample maximum standard for marine and estuarine designated beach areas when considering whether to close a beach or issue an advisory. This standard is 104 cfu/100 ml enterococcus. The state guidelines also encourage local health departments and the CT DEP to consider the geometric mean of the last five samples collected in a 30-day period. If this geometric mean is greater than 35 cfu/100 ml, then the state’s guideline is to consider closing the beach. CT DPH encourages beach managers to take into consideration the range or spread of the sample values that generate geometric mean results greater than 35 cfu/100 ml.[†] Some local health departments use either the single-sample maximum or the geometric mean to trigger closing and advisory decisions, while for other local health departments and the CT DEP, the single-sample maximum triggers advisory and closing decisions, and exceedance of the geometric mean standard may trigger consideration of closings and advisories.

When routine samples exceed the state standards, the state recommends that a resample be taken and a sanitary survey be conducted to determine if raw or partially treated sewage is contributing to the elevated bacterial concentrations. If the survey reveals discharges of raw or partially treated sewage, then the state recommends that the bathing area be closed. If sample results exceed the standards and a sanitary survey reveals no evidence of sewage contamination, the state recommends that the bathing area be examined on an individual basis with consultation from CT DPH before any decision about closure is made. A beach whose samples exceed the standards may remain open if a sanitary survey reveals no sign of a sewage spill.² Local authorities may adopt standards more protective of public health than the state standards and may issue advisories in addition to closures. Most municipalities resample before issuing an advisory and most municipalities also conduct a sanitary survey to determine if sewage is contributing to the elevated bacterial concentrations. Some municipalities collect multiple samples at each monitoring event and in most cases, if more than one sample exceeds the standard, they will close the beach without resample.⁴

Local jurisdictions are also responsible for determining their own preemptive closing and advisory practices. State guidance allows preemptive beach closings based on rainfall data² and many municipalities have adopted a preemptive rainfall threshold for selected beaches. When preemptive rainfall thresholds are reached at these beaches, they are automatically closed until test results indicate that there is no bacterial violation.⁴ State guidance says that preemptive closures may be recommended by local jurisdictions if there is a known waste contamination event such as a sewage bypass, mechanical failure at a sewage treatment plant, or a sewer line break.² If a beach is “impacted by a mass of floating debris,” the beach can be closed for safety reasons.² In addition, local health departments may post an advisory or closure that responds to local conditions and to protect public health. Local health departments may also post an advisory at a beach or close it if there is a harmful algal bloom.⁴ In late 2009, the state issued a framework document that includes recommendations about managing beach hazards for local health departments.²

Shoreline municipalities are sensitive to reports of swimmer’s itch. Swimmer’s itch, also called cercarial dermatitis, appears as a skin rash caused by an allergic reaction to certain parasites that infect some birds and mammals. These microscopic parasites are released from infected snails into fresh and salt water (such as lakes, ponds, and oceans). While the parasite’s preferred host is the specific bird or mammal, if the parasite comes into contact with a swimmer, it burrows into the skin, causing an allergic reaction and rash. Swimmer’s itch is found throughout the world and is more frequent during summer months. Connecticut beaches can be placed under advisory when swimmer’s itch is reported.⁴

† Connecticut’s understanding is that the national geometric mean standard is based on epidemiology studies showing that an exceedance of a geometric mean of 35 cfu/100 ml with a log standard deviation less than 0.7 may result in unacceptable illness rates.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 % exceedance for this subset of beaches (12%) did not have the same value as the % exceedance for all of the beaches monitored in 2010 (11%).

Connecticut 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Fairfield County					
Bell Island Beach	1	1/wk	31	6%	2
Burying Hill Beach	1	1/wk	12	8%	2
Byram Beach	3	1/wk	57	18%	7
Calf Pasture Beach	2	1/wk	59	12%	4
Compo Beach	1	1/wk	50	12%	2
Cummings Beach	2	1/wk	45	2%	7
East (Cove Island) Beach	2	1/wk	45	4%	7
Great Captain’s Island Beach	1	1/wk	30	10%	1

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Fairfield County					
Greenwich Point Beach	1	1/wk	48	4%	1
Hickory Bluff Beach	1	1/wk	15	0%	2
Island Beach	2	1/wk	32	13%	2
Jennings Beach	1	1/wk	34	9%	2
Long Beach (Marnick's)	2	1/wk	17	24%	11
Long Beach (Proper)	2	1/wk	32	22%	12
Marvin Beach	1	1/wk	18	11%	2
Pear Tree Point Beach	1	1/wk	98	13%	1
Penfield Beach	1	1/wk	33	9%	2
Quigley Beach	2	1/wk	15	7%	7
Rowayton Beach	1	1/wk	15	0%	2
Sasco Beach	1	1/wk	34	9%	2
Seaside Park Beach	1	1/wk	75	7%	0
Shady Beach	2	1/wk	84	24%	4
Sherwood Island State Park Beach	1	1/wk	51	8%	2
Short Beach	2	1/wk	48	19%	9
South Pine Creek Beach	1	1/wk	16	6%	2
Southport Beach	1	1/wk	34	12%	2
Weed Beach	1	1/wk	61	15%	1
West Beach	2	1/wk	45	4%	7
Middlesex County					
Harvey's Beach	1	1/wk	14	7%	2
Middle Beach/Stannard Beach	1	1/wk	12	17%	0
Town Beach (Clinton)	2	1/wk	14	21%	5
Town Beach (Old Saybrook)	1	1/wk	16	6%	1
Westbrook Town Beach/West Beach	1	1/wk	34	6%	0
New Haven County					
Anchor Beach (Merwin Point) #1	1	1/wk	18	22%	0
Anchor Beach (Merwin Point) #2	1	1/wk	15	7%	0
Branford Point Beach	1	1/wk	25	28%	2
Clark Avenue Beach	1	2/wk	23	17%	2
East Haven Town Beach	1	1/wk	38	13%	3
East Wharf Beach	1	1/wk	15	7%	0
Gulf Beach	1	1/wk	14	7%	0
Hammonasset Beach State Park Beach	1	1/wk	86	3%	0
Jacobs Beach (Town Beach)	1	1/wk	51	8%	0
Lighthouse Point Beach	1	1/wk	12	0%	0
Pent Road Beach	1	1/wk	15	20%	0
Silver Sands State Park Beach	1	1/wk	76	12%	2
Stony Creek Beach	1	1/wk	14	7%	2

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
New Haven County					
Surf Club Beach	1	1/wk	30	10%	0
Walnut Beach	1	1/wk	33	12%	0
West Haven East Beach	1	1/wk	284	9%	2
West Haven West Beach	1	1/wk	138	12%	2
West Wharf Beach	1	1/wk	15	13%	0
Woodmont Beach	1	1/wk	15	7%	0
New London County					
Dubois Beach	3	None	0	NA	0
Eastern Point Beach	1	1/wk	29	10%	0
Esker Point Beach	1	1/wk	15	7%	0
Green Harbor Beach	1	1/wk	42	45%	3
Hole-in-the-Wall Beach	1	1/wk	16	13%	0
Kiddie's Beach	1	1/wk	13	54%	0 (365)*
McCook Point Beach	1	1/wk	15	7%	0
Noank Dock	1	1/wk	15	7%	0
Ocean Beach Park	1	1/wk	50	14%	0
Pleasure Beach	1	1/wk	14	0%	0
Rocky Neck State Park Beach	3	1/wk	76	11%	12
Soundview Beach	1	1/wk	13	0%	0
Waterford Town Beach	1	1/wk	50	8%	0
White Sands Beach	1	1/wk	13	0%	0

*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 Jon Dinneen, Connecticut Department of Public Health. Personal communication. April 2011.
- 2 Connecticut Department of Public Health. Connecticut's 2010 Annual Report for the US EPA Beach Grant with Summary Data for 2003-2010. Jan 10, 2011.
- 3 Connecticut Department of Public Health and Connecticut Department of Environmental Protection. Quality Assurance Project Plan for the Beach Monitoring and Notification Program for Connecticut Coastal Beaches. October 2009.
- 4 Jon Dinneen, Connecticut Department of Public Health. Personal communication. February 2011.

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



DELAWARE

5th in Beachwater Quality

3% 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.

Delaware has about 25 miles of Delaware Bay coastline, 26 miles of Atlantic Ocean coastline, and 115 miles of inland bay shoreline. The state's marine beachwater monitoring program is administered by the Delaware Department of Natural Resources and Environmental Control (DNREC).

Construction of additional sewage treatment capacity in Delaware's inland bay watersheds and the subsequent elimination of tens of thousands of septic tanks and other sources of sewage contamination are expected to result in water quality improvement in the inland bays. Bacteria levels should continue to fall with the implementation of stormwater runoff measures outlined in the Inland Bays Pollution Control Strategy, which emphasizes green infrastructure techniques that allow runoff to percolate into the soil instead of channeling it to surface waters. The pollution control strategy was created to meet watershed cleanup requirements for nitrogen and phosphorus, but many of the provisions will reduce bacterial discharges in runoff to the inland bays as well. For example, the strategy requires that buffer zones be established around wetlands as well as tidal and nontidal waters in the inland bay watersheds. The strategy also allows the preservation or establishment of natural features like forest stands and encourages the use of rain gardens, natural landscaping, and constructed wetlands for management of stormwater.³

To identify and reduce sources of pollution at Delaware's lifeguarded beaches, the recreational water program has initiated a beach shoreline survey program.¹ As a result of these surveys, park staff and shop owners have been educated about the need to locate garbage receptacles away from storm drains, and residents' complaints about malfunctioning septic systems have been addressed. Delaware's Recreational Water Program has been providing support and funding for research into rapid methods of analysis of marine and inland bay waters for the presence of pathogenic and pathogen-like Epsilonproteobacteria. Pathogenic members of this group include *Helicobacter pylori* and *Campylobacter jejuni*, both of which are associated with human gastric disease and gastroenteritis. The correlation between results of this research and fecal indicator values is being studied. The goal is to be able to quickly identify harmful bacteria and improve the safety of recreational waters.¹ Additional research was funded to investigate the role of bacteria regrowth in near-shore sediments and the way this regrowth contributes to indicator bacterial levels in the water column. The results of this research, which was conducted in a partnership with Maryland, will help to determine actual and potential pollution sources at beaches that have the highest rate of water quality exceedences.²

KEY FINDINGS IN DELAWARE

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Delaware Seashore State Park, Tower Road Bayside in Sussex County (41%)
- Broadkill Beach in Sussex County (18%)
- Slaughter Beach in Sussex County (7%)

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

- 44 (51%) unknown sources of contamination
- 42 (49%) stormwater runoff

Monitoring Results

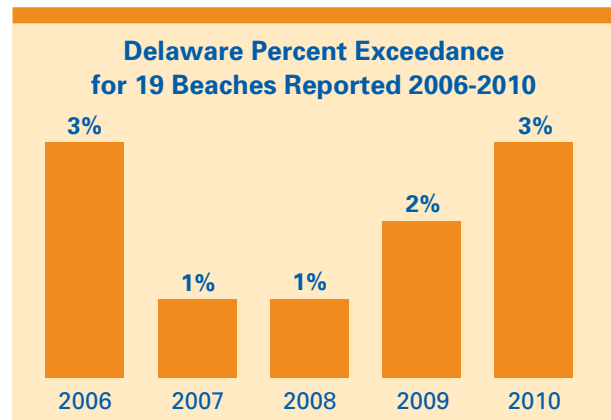
In 2010, Delaware reported 24 coastal beaches, all in Sussex County. Five beaches (21%) were monitored twice a week and 19 (79%) were monitored once a week. For this section of the report, NRDC looked at the percent of monitoring samples that exceeded the state's daily maximum bacterial standards (all 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, 3% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. Five beaches reported samples that exceeded the standard in 2010. The percent exceedances at these beaches were Delaware Seashore State Park, Tower Road Bayside (41%), Broadkill Beach (18%), Slaughter Beach (7%), Prime Hook Beach (6%), and Bethany Beach (3%).

Sampling Practices: In 2010, the monitoring season extended from May 3 to September 27.¹ The state's Floatables and Debris Program has a vessel in the water year-round in all weather to monitor oil spills, harmful algae blooms, sewage treatment discharges, nutrient runoff, and industrial discharges.¹

The DNREC determines sampling practices, locations, standards, and notification protocols and procedures throughout the state.² Samples are taken in knee-deep water.¹ Delaware concentrates its monitoring efforts on high-use beaches where water-contact recreation is the dominant activity. All Atlantic coastal beaches are predominantly swimming beaches that are lifeguarded during the monitored beach season and are classified as Tier 1 beaches. Lowest priority is given to beaches that are boat launches or where users have minimal contact with the water.

Once an advisory or closing is issued, resampling to confirm the exceedance is conducted immediately, and the beach is monitored more frequently until the advisory can be lifted.⁴ States that monitor more frequently after an exceedance is found 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.

The DNREC samples water and/or shellfish for toxins and harmful algal bloom species (*Karenia brevis* and *K. papilionacea*) and issues harmful algal bloom swimming advisories at freshwater beaches.²



Closings and Advisories

Because of concerns about water quality, there is a permanent caution regarding swimming in Rehoboth Bay, Indian River Bay, and Little Assawoman Bay. This permanent advisory includes Tower Road Bayside in Rehoboth Bay and Holts Landing Beach in Indian River Bay. Contaminants in these bays come from many sources in the watershed, including failing septic systems, farm and lawn fertilizers, and runoff from poultry operations. In addition, the sewage treatment plants in Lewes and Rehoboth discharge treated effluent into the Lewes and Rehoboth Canal, which feeds into the bays. Poor flushing of the shallow waters in these bays allows pollutants to linger; it takes more than two months for water to move out of the inland bays.² Signs are posted at popular access points around Rehoboth Bay, Indian River Bay, and Little Assawoman Bay to warn the public of the risks associated with swimming in these bodies of water, particularly after a heavy rain.¹

Total closing/advisory days for 21 events lasting six consecutive weeks or less decreased 9% to 86 days in 2010, from 94 days in 2009. For prior years, there were 11 days in 2008, 10 days in 2007, 0 days in 2006, and 0 days in 2005. In addition, there were no extended or permanent events in 2010; there was 1 permanent event (680 days) in 2009. 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 21 events lasting six consecutive weeks or less, 67% (58) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, and 33% (28) were preemptive (i.e., ordered without waiting for monitoring results) due to heavy rainfall.

Standards and Procedures: Delaware standards for marine beachwater quality are an enterococcus single-sample maximum of 104 cfu/100 ml and a geometric mean of 35 cfu/100 ml. DNA analyses to track the source of bacteria at Slaughter Beach and Prime Hook Beach have shown that nonhuman sources contribute to indicator bacteria counts at these beaches. Monitoring results at these beaches are adjusted downward to account for nonhuman sources at these beaches before the water quality standard is applied. (Monitoring data are reported before this adjustment is made.) For Slaughter Beach, the correction factor is 0.49 multiplied by the raw count. This was calculated on the basis of a microbial source tracking study at this beach that found that 77% of fecal bacteria came from wildlife sources, with a 26% margin of error. At Prime Hook, microbial source tracking found that 70% of fecal bacteria came from wildlife, with a 24% margin of error, resulting in a correction factor of 0.54 for this beach.⁵

State policy is to issue advisories when fecal bacteria counts exceed either the single-sample or geometric-mean standard.¹ There are limited overriding factors, such as leaking sampling containers and excessive sediment in samples, which can be taken into account before issuing an advisory when a sample exceeds standards, but these are rare exceptions. Circumstances that would trigger an imminent health threat result in a closing rather than an advisory.

Delaware has a standard for issuing preemptive rainfall advisories. For marine waters, the DNREC has determined that 3.5 inches of rainfall within 24 hours or three inches within 12 hours may trigger a closing.² Preemptive closings are issued in the case of a known sewage spill.²

Delaware 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Sussex County					
Atlantic Beach Near Gordons Pond	1	1/wk	15	0%	0
Bethany Beach	2	2/wk	34	3%	0
Broadkill Beach	2	1/wk	17	18%	18
Cape Henlopen Beach	1	1/wk	32	0%	0
Cape Henlopen State Park–Herring Point	2	2/wk	10	0%	0
Delaware Seashore State Park, Tower Road Bayside	2	1/wk	17	41%	58
Delaware Seashore State Park, Tower Road Ocean Site	1	1/wk	15	0%	0
Delaware/Maryland Line Beach	2	1/wk	30	0%	0
Dewey Beach	1	2/wk	36	0%	0
Fenwick Island–Town	1	1/wk	0	NA	0
Fenwick Island State Park Beach	2	2/wk	21	0%	0
Holts Landing Beach	2	1/wk	3	0%	0
Lewes Beach	no data	1/wk	8	0%	0
Lewes Beach North	1	1/wk	13	0%	0
Lewes Beach South	1	1/wk	14	0%	0
North Indian River Inlet Beach, Delaware Seashore State Park	1	1/wk	15	0%	0
Prime Hook Beach	2	1/wk	17	6%	0
Rehoboth–Delaware Ave	1	1/wk	4	0%	0
Rehoboth–Queen St Beach	1	1/wk	16	0%	0
Rehoboth–Rehoboth Ave Beach	1	2/wk	34	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Sussex County					
Rehoboth–Virginia Ave Beach	1	1/wk	16	0%	0
Slaughter Beach	2	1/wk	15	7%	10
South Bethany Beach	1	1/wk	19	0%	0
South Indian River Inlet Beach	1	1/wk	0	NA	0

NOTES

- 1 Delaware Department of Natural Resources and Environmental Control. 2010 Recreational Water Year-End Report. Not dated.
- 2 Debbie Rouse, Delaware Department of Natural Resources and Environmental Control, personal communication, March 2011.
- 3 Delaware Department of Natural Resources and Environmental Control. Inland Bays Pollution Control Strategy. May 2008.
- 4 Delaware Department of Natural Resources and Environmental Control. 2008 Recreational Water Year-End Report. Not dated.
- 5 Michael Bott, Delaware Department of Natural Resources and Environmental Control, personal communication, July 2009.

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



FLORIDA

6th in Beachwater Quality

4% 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.

With its year-round swim season and more than 1,000 miles of coastal beach, Florida has the most ocean swimmers in the nation.¹ The state has more than 600 public beaches stretching along its Atlantic and Gulf of Mexico coastline.

During 2010, Florida's beaches were impacted by the BP oil disaster. A total of 1,747 oil notice and advisory days at 30 beaches were issued due to the spill in 2010. Oil spill notices were still posted at several beaches in Escambia County as of this writing and cleanup crews were still at work because of the occasional presence of tar mats and tar balls from the spill.² NRDC includes oil spill advisory and notice days at all beaches in its oil spill totals, including advisory and notice days at beaches that were not monitored for bacteria in 2010. Fourteen of the beaches with oil spill notices and advisories were also monitored for bacteria in 2010.

A \$7 million restoration project concluded at Hobie Beach (Dog Beach) in Miami in late 2010. This project was conducted primarily for shoreline stabilization, but some of the changes are expected to have beneficial effects on water quality at this beach as well. In particular, stormwater management improvements were made to the parking lot and maintenance road. Semi-permeable pavers were used to allow some rainfall to infiltrate into the soil instead of running off, and a new drainage system was constructed.³

Monitoring Results

In 2010, Florida reported 637 coastal beaches, 308 (48%) of which were monitored once a week, 328 (51%) were not monitored, and one (<1%) had no monitoring frequency data. 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, 4% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Bayou Chico (62%) in Escambia County, Hagen's Cove (47%) in Taylor County, Garniers (42%) in Okaloosa County, Bayview Park (38%) and Navy Point (Bayou Grande) (38%) in Escambia County, Higgs Beach (37%) in Monroe County, Keaton Beach (32%) in Taylor County, Fort Island Gulf Beach (31%) in Citrus County, Coco Plum Beach (27%) in Monroe County, Crandon Park-Key Biscayne (26%) in Miami-Dade County, Oelsner Park Beach (24%) in Pasco County, Minnesota Street (23%) in Broward County, Monument Beach (22%) in Gulf County, Shired Island (22%) in Dixie County, and Dekle Beach (21%) in Taylor County.

KEY FINDINGS IN FLORIDA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Bayou Chico in Escambia County (62%)
- Hagen's Cove in Taylor County (47%)
- Garniers in Okaloosa County (42%)

Reported Sources of Beachwater Contamination

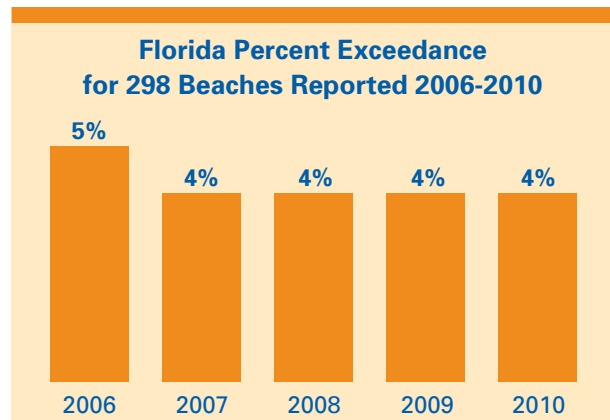
Statewide (number of closing/advisory days);

excludes BP oil disaster

- 1,493 (73%) wildlife
- 1,448 (71%) stormwater runoff
- 1,252 (61%) sewage spills/leaks
- 827 (27%) other sources of contamination
- 418 (40%) unknown sources of contamination

Totals exceed total days and 100% because more than one contamination source was reported for most events.

Taylor County had the highest exceedance rate (33%) in 2010, followed by Citrus (31%), Dixie (22%), Hernando (17%), Escambia (13%), Wakulla (9%), Hillsborough (8%), Okaloosa (8%), Broward (8%), Monroe (7%), Pasco (7%), Gulf (7%), Miami-Dade (6%), Levy (6%), Pinellas (4%), Manatee (4%), Bay (4%), Martin (3%), Palm Beach (3%), Volusia (3%), Sarasota (3%), Brevard (3%), Santa Rosa (2%), Charlotte (2%), Lee (2%), Walton (2%), Franklin (2%), St Lucie (1%), and Indian River (1%) counties. Nassau, St. Johns, Collier, Duval, and Flagler counties had no exceedances.



Sampling Practices: Monitoring occurs year-round; peak season is from April to mid-September.

The beachwater quality monitoring program is administered by the Florida Department of Health, which determines sampling practices, locations, standards, and notification protocols and practices throughout the state.² Samples are collected 18 inches below the surface in water that is approximately 36 inches deep, usually in the morning. Beaches are prioritized for monitoring on a county-by-county basis. Criteria for monitoring are population served, pollution potential, and rainfall. While this ensures that the most critical beaches in each county are monitored, there are a wide variety of beach characteristics in Florida, and beaches chosen for monitoring in one county may not be as important as beaches left unmonitored in another county.

Sampling frequency does not increase after an advisory is issued.

Long-term monitoring of beachwater and ocean sediments has begun off the coast of Florida for oil spill–related chemicals, including some polycyclic aromatic hydrocarbons. These chemicals are notorious for being toxic and persistent in the environment and for accumulating in the food chain.²

Advisories and Notices

Total advisory/notice days for 238 events lasting six consecutive weeks or less increased 39% in 2010 to 3,052 days from 2,201 days in 2009. In 2010, 999 oil spill advisory/notice days for events lasting six consecutive weeks or less were issued; if oil spill days were excluded there would be a 7% decrease in advisory days from 2009 to 2010. In previous years there were 2,067 days in 2008, 3,139 days in 2007, 2,686 days in 2006, and 2,991 days in 2005. In addition, in 2010 there were 11 extended events (613 days total) and 5 permanent events (720 days). 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. Most of the extended and permanent events were due to the oil spill. For the 238 events lasting six consecutive weeks or less, 67% (2,046) of notice/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, <1% (7) were preemptive (i.e. without waiting for monitoring results) due to known sewage spills/leaks, and 33% (999) were preemptive due to the oil spill.

Standards and Procedures: The Department of Health does not have the authority to close Florida beaches; instead, advisories are issued. Florida applies the EPA’s marine designated beach area criteria for enterococcus: a single-sample maximum of 104 cfu/100 ml and a 5-sample, 30-day geometric mean of 35 cfu/100 ml. In addition, Florida applies a fecal coliform single-sample maximum standard of 400 cfu/100 ml. In prior years, Florida distinguished fecal coliform exceedances from enterococcus exceedances by calling enterococcus exceedances “advisories” and fecal coliform exceedances “warnings,” but in 2010, Florida began using the term “advisories” for all bacterial exceedances.

In most coastal counties, officials issue an advisory if any one of the three standards is exceeded. However, if a sample exceeds a standard and the county can conduct a follow-up sample within the same week, the beach may be resampled before an advisory is issued. If the resample confirms an exceedance, an advisory is issued.

Pinellas County has a preemptive rainfall standard for two of its marine beaches, Maximo and North Shore. Maximo Beach's standard is 0.8 inch within a 24-hour period, while North Shore Beach's standard is 1 inch within a 24-hour period.² Monroe County also issues preemptive rainfall advisories, and Martin County has a preemptive standard based on water clarity. Most counties will warn against swimming after a sewage spill until sampling results are satisfactory. After a hurricane or tropical storm comes ashore, precautionary advisories are issued.

Florida 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Bay County					
Beach Drive	1	1/wk	52	12%	41
Beckrich Road (Edgewater Gulf Beach)	1	1/wk	52	4%	14
Bid-A-Wee Beach	1	1/wk	52	0%	0
Carl Gray Park	1	1/wk	52	19%	70
Delwood Beach	1	1/wk	51	0%	0
Dupont Bridge	1	1/wk	52	8%	7
East County Line (Mexico Beach)	1	1/wk	51	4%	15
Laguna Beach	1	1/wk	52	2%	7
Panama City Beach Pier (Edgewater Beach)	1	1/wk	52	2%	7
Seltzer Park (Silver Sands Beach)	1	1/wk	52	0%	0
Spy Glass Drive (Biltmore Beach)	1	1/wk	52	0%	0
Sunset Park	1	1/wk	52	0%	0
West County Line (Carrillon Beach)	1	1/wk	52	0%	0
Beaches in Bay County that were not monitored and that had no closing or advisory days in 2010:					
8th Street, Mexico Beach	Gulf Lagoon Beach	Miramar Heights Beach	Beach		
Bahama Beach	Gulf Resort Beach	Open Sands Beach	Sunnyside Beach		
Bay County Public Beach	Hollywood Beach	Rivera Beach	Suntime Beach		
Belaire Beach	Long Beach	Santa Monica Beach	Tyndall Beach		
El Centro Beach	Lullwater Beach	Shell Island Beach			
Florida Beach	Magnolia Beach	St. Andrews State Park			
Brevard County					
Cocoa Beach Pier	1	1/wk	56	14%	15
Cocoa Beach Minuteman Causeway	1	1/wk	51	0%	0
Indialantic Boardwalk	1	1/wk	51	0%	0
Jetty Park (Cape Canaveral)	1	1/wk	52	2%	0
Paradise Beach	1	1/wk	52	2%	0
Patrick Air Force Base (PAFB) North	1	1/wk	52	2%	0
Pelican Beach Park	1	1/wk	51	0%	0
Sebastian Inlet North	1	1/wk	51	0%	0
Spessard Holland Beach Park (North)	1	1/wk	52	2%	0
Beaches in Brevard County that were not monitored and that had no closing or advisory days in 2010:					
Aquarina Beach	Bonsteel Park	Canaveral National	Canova Beach Park		
Bicentennial Beach Park		Seashore/Playalinda Beach	Cherrie Down Park		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Brevard County					
Beaches in Brevard County that were not monitored and that had no closing or advisory days in 2010:					
Coconut Point Park	Lori Wilson Park	North Area Beach (PAFB)	Robert P. Murkshe Memorial Park		
Fischer Park	Main Entrance Beach (PAFB)	Ocean Park	Seagull Park (PAFB)		
Hightower Beach Park	NCO Club Beach (PAFB)	Officers Club Beach (PAFB)	Shepard Park		
Broward County					
Bahia Mar	1	1/wk	53	4%	0
Birch State Park	1	1/wk	54	4%	0
Commercial Blvd	1	1/wk	53	4%	0
Custer Street	1	1/wk	61	13%	3
Dania Beach	1	1/wk	56	11%	6
Deerfield Beach	1	1/wk	52	0%	0
Deerfield Beach SE 10th Street	1	1/wk	54	4%	0
Hallandale Beach Blvd	1	1/wk	61	18%	3
Harrison Street	1	1/wk	62	16%	8
John Lloyd State Park	1	1/wk	52	2%	0
Minnesota Street	1	1/wk	69	23%	6
NE 16 Street, Pompano	1	1/wk	53	2%	0
Oakland Park Boulevard	1	1/wk	52	0%	0
Pompano Beach	1	1/wk	54	4%	0
Sebastian Street	1	1/wk	53	4%	0
Beaches in Broward County that were not monitored and that had no closing or advisory days in 2010:					
George English Park	Hillsboro Inlet	North Beach Park	Van Buren Street		
		Intercoastal			
Charlotte County					
Boca Grande	1	1/wk	52	0%	0
Englewood Mid Beach	1	1/wk	52	4%	5
Englewood North	1	1/wk	53	2%	0
Englewood South	1	1/wk	52	0%	0
Palm Island North	1	1/wk	52	0%	0
Palm Island South	1	1/wk	52	0%	0
Port Charlotte Beach East	1	1/wk	56	5%	10
Port Charlotte Beach West	1	1/wk	54	6%	0
Beaches in Charlotte County that were not monitored and that had no closing or advisory days in 2010:					
Dotzler Beach	Ponce De Leon Beach	Port Charlotte Beach			
Citrus County					
Fort Island Gulf Beach	1	1/wk	52	31%	84
Collier County					
Barefoot Beach State Reserve	1	1/wk	52	0%	0
Central Avenue	1	1/wk	52	0%	0
Clam Pass	1	1/wk	52	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Collier County					
Denor-Wiggins State Recreation Area	1	1/wk	52	0%	0
Doctor's Pass	1	1/wk	52	0%	0
Hideaway Beach	1	1/wk	52	0%	0
Horizon Way Beach (AKA Parkshore Beach)	1	1/wk	52	0%	0
Lowdermilk Park	1	1/wk	52	0%	0
Naples Pier	1	1/wk	52	0%	0
Pelican Bay Restaurant And Club	1	1/wk	52	0%	0
Residence Beach	1	1/wk	52	0%	0
South Marco Beach (AKA SMB Access)	1	1/wk	52	0%	0
Tigertail Beach	1	1/wk	52	0%	0
Vanderbilt Beach	1	1/wk	52	0%	0
Beaches in Collier County that were not monitored and that had no closing or advisory days in 2010:					
10 Thousand Island	2nd Avenue North Beach	Admiralty & Shores Beach	Pelican Bay Beach North		
10th Avenue South Beach	2nd Avenue South Beach	Broad Avenue Beach	Pelican Bay Beach South		
11th Avenue South Beach	32nd Avenue Beach	Caxambas Park	Port Royal Beach & Club		
13th Avenue South Beach	3rd Avenue North Beach	Clam Pass Park North	Shore Drive Beach		
14th Avenue South Beach	3rd Avenue South Beach	Clam Pass Park South	The Moorings		
15th Avenue South Beach	4th Avenue North Beach	Cutlass Cove Beach & Club	Vedado Way Beach		
16th Avenue South Beach	4th Avenue South Beach	Gordon Pass Beach	Villa Mare Ln Beach		
17th Avenue South Beach	5th Avenue South Beach	Keewaydin Island	Wiggins Pass North		
18th Avenue South Beach	6th Avenue South Beach	Lely Barefoot Beach	Wiggins Pass State Park		
1st Avenue North Beach	7th Avenue South Beach	Naples Beach Club			
1st Avenue South Beach	8th Avenue South Beach	Naples Lake Beach			
Dixie County					
Shired Island	1	1/wk	32	22%	26
Duval County					
15th Street Access	1	1/wk	51	0%	0
19th Street Access	1	1/wk	51	0%	0
30th Avenue Access	1	1/wk	51	0%	0
Atlantic Blvd Access	1	1/wk	51	0%	0
Beach Blvd Access	1	1/wk	51	0%	0
Hanna Park	1	1/wk	51	0%	0
Hopkins Street Access	1	1/wk	51	0%	0
Huguenot Park	1	1/wk	51	0%	0
North Little Talbot Island	1	1/wk	51	0%	0
South Little Talbot Island	1	1/wk	51	0%	0
Escambia County					
Bayou Chico	1	1/wk	52	1	119 (115)*
Bayview Park	1	1/wk	52	0	84 (66)*
Big Lagoon State Park	1	1/wk	53	8%	24

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Escambia County					
County Park East	1	1/wk	52	0%	0 (47)*
County Park West	1	1/wk	51	0%	2 (50)*
Fort Pickens	1	1/wk	0	NA	11 (186)*
Johnson Beach	1	1/wk	51	2%	11 (186)*
Johnson Beach Sound Side	1	1/wk	51	0%	0
Navy Point (Bayou Grande)	1	1/wk	52	38%	145
Pensacola (Casino) Beach	1	1/wk	51	0%	2 (50)*
Perdido Key State Park	1	1/wk	50	0%	10 (186)*
Quietwater Beach (Santa Rosa Sound)	1	1/wk	52	0%	0
Sanders Beach	1	1/wk	53	11%	38
Beaches in Escambia County that were not monitored and that had no closing or advisory days in 2010:					
Fort Mcree Area	Navy Point South	Quietwater Beach	Sabine Yacht and Racket		
	Opal Beach	Picnic Area	Santa Rosa Island		
Flagler County					
Gamble Rogers State Park	1	1/wk	52	0%	0
North Flagler Pier	1	1/wk	52	0%	0
Picknickers (Beverly Beach)	1	1/wk	52	0%	0
South Flagler Pier	1	1/wk	52	0%	0
Varn Park	1	1/wk	52	0%	0
Washington Oaks State Park	1	1/wk	52	0%	0
Beaches in Flagler County that were not monitored and that had no closing or advisory days in 2010:					
Hammock	Marineland	South Beach			
Franklin County					
Alligator Point	1	1/wk	49	0%	0
Carrabelle Beach	1	1/wk	49	10%	27
St. George Island 11th Street East	1	1/wk	98	0%	0
St. George Island Franklin Street	1	1/wk	49	0%	0
St. George Island State Park	1	1/wk	49	0%	0
Beaches in Franklin County that were not monitored and that had no closing or advisory days in 2010:					
Peninsular Point Beach	St. George Island 11th Street West				
Gulf County					
Beacon Hill Beach	1	1/wk	54	4%	0
Cape San Blas	1	None	51	4%	6
Dixie Belle Beach	1	1/wk	53	4%	6
Lookout Beach	1	1/wk	53	2%	0
Monument Beach	1	1/wk	59	22%	16
St. Joe Beach	1	1/wk	54	4%	0
Beaches in Gulf County that were not monitored and that had no closing or advisory days in 2010:					
Highway 98 Beach					

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Hernando County					
Pine Island	1	1/wk	52	17%	14
Hillsborough County					
Bahia Beach	1	1/wk	54	6%	0
Ben T. Davis North	1	1/wk	60	15%	5
Ben T. Davis South	1	1/wk	57	12%	16
Cypress Point North	1	1/wk	54	4%	0
Cypress Point South	1	1/wk	57	9%	4
Davis Island	1	1/wk	57	9%	0
Picnic Island North	1	1/wk	58	10%	0
Picnic Island South	1	1/wk	53	4%	0
Simmons Park	1	1/wk	54	4%	0
Beaches in Hillsborough County that were not monitored and that had no closing or advisory days in 2010:					
Apollo Beach		McDill Air Force Base Beaches			
Indian River County					
Coconut Point Sebastian Inlet	1	1/wk	52	0%	0
Humiston Beach	1	1/wk	52	0%	0
Round Island Beach Park	1	1/wk	52	0%	0
Sexton Plaza	1	1/wk	53	4%	0
South Beach Park	1	1/wk	52	0%	0
Wabasso Beach Park	1	1/wk	52	0%	0
Beaches in Indian River County that were not monitored and that had no closing or advisory days in 2010:					
Amber Sands Beach	Golden Sands Beach Park	Seagrape Beach	Tracking Station Beach Park		
Conn Beach	Jaycee Beach Park	Seahorse Beach	Treasure Shores Beach Park		
Flame Vine Beach	Riomar Beach	Sebastian Inlet South Side	Turtle Trail Beach		
Lee County					
Boca Grande Light House/ Seagrape Beach	1	1/wk	53	4%	5
Bonita Beach Park	1	1/wk	52	0%	0
Bowditch Point Beach	1	1/wk	52	0%	0
Bowman's Beach	1	1/wk	52	0%	0
Cape Coral Yacht Club	1	1/wk	55	9%	15
Little Hickory Beach Park	1	1/wk	52	0%	0
Lovers Key State Park	1	1/wk	52	0%	0
Lynn Hall Memorial Park	1	1/wk	52	0%	0
Sanibel Causeway Beach	1	1/wk	53	2%	0
Sanibel Lighthouse Park Beach	1	1/wk	54	6%	0
South Seas Plantation Captiva- Redfish Pass	1	1/wk	53	2%	0
Tarpon Bay Road Beach	1	1/wk	54	4%	0
Turner Beach/Blind Pass Beach	1	1/wk	52	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Lee County					
Beaches in Lee County that were not monitored and that had no closing or advisory days in 2010:					
Cayo Costa State Park	North Captiva Island	Public Beach Access #23–	Southern Tip Access Fort		
Fulgar St Beach Access– Sanibel	Public Access #34– Ft Myers Beach	Ft Myers Beach	Myers Beach		
Holiday Inn Public Beach– Access Ft Myers Beach	Public Beach Access #17– Ft Myers Beach	Sanibel Beach Access #4	South Seas Captiva		
Levy County					
Cedar Key Beach	1	1/wk	52	6%	21
Beaches in Levy County that were not monitored and that had no closing or advisory days in 2010:					
Yankeetown Beach					
Manatee County					
Bay Front Park North	1	1/wk	53	9%	18
Bay Front Park South	1	1/wk	52	2%	0
Bradenton Beach	1	1/wk	52	2%	0
Coquina Beach North	1	1/wk	52	8%	21
Coquina Beach South	1	1/wk	50	0%	0
Manatee Public Beach North	1	1/wk	52	2%	0
Manatee Public Beach South	1	1/wk	51	0%	0
Palma Sola North	1	1/wk	52	2%	0
Palma Sola South	1	1/wk	55	16%	33
Whitney Beach	1	1/wk	51	0%	0
Beaches in Manatee County that were not monitored and that had no closing or advisory days in 2010:					
City Of Anna Maria Access (Anna Maria Island)	Emerson Point	Longboat Key			
Martin County					
Bathtub Beach	1	1/wk	52	0%	0
Bob Graham Beach	1	1/wk	53	2%	0
Hobe Sound Public Beach	1	1/wk	52	0%	0
Hobe Sound Wildlife Refuge	1	1/wk	52	0%	0
Jensen Beach Causeway East	1	1/wk	52	0%	0
Jensen Public Beach	1	1/wk	54	4%	0
Roosevelt Bridge	1	1/wk	57	18%	2 (53)*
Stuart Beach	1	1/wk	52	0%	0
Stuart Causeway	1	1/wk	53	2%	0
Beaches in Martin County that were not monitored and that had no closing or advisory days in 2010:					
Alex's Beach	Chastain Beach	Jensen Beach Causeway	Tiger Shores Beach		
Bathtub Reef	Fletcher Beach	Saint Lucie Inlet State Park	Virginia Forest		
Blowing Rocks	Glasscock	Sandsprint Park			
Bryan Mawr	House of Refuge	Stokes			
Miami-Dade County					
53rd Street–Miami Beach	1	1/wk	55	5%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Miami-Dade County					
Cape Florida Park	1	1/wk	53	2%	0
Collins Park–21st Street	1	1/wk	57	9%	0
Crandon Park–South	1	1/wk	17	6%	0
Crandon Park–Key Biscayne	1	1/wk	68	26%	15
Golden Beach	1	1/wk	54	4%	0
Haulover Beach	1	1/wk	53	2%	0
Haulover Beach–North	1	1/wk	10	0%	0
Hobie Beach (AKA Dog Beach)	1	1/wk	30	3%	0
Key Biscayne Beach	1	1/wk	54	4%	0
Matheson Hammock	1	1/wk	56	7%	2
North Shore Ocean Terrace	1	1/wk	54	4%	0
Oleta State Park	1	1/wk	53	2%	7
South Beach Park	1	1/wk	54	4%	0
Sunny Isles Beach–Samson Park	1	1/wk	10	0%	0
Sunny Isles Beach–Pier Park	1	1/wk	43	2%	0
Surfside Beach–93rd Street	1	1/wk	54	4%	0
Virginia Beach	1	1/wk	54	4%	0
Beaches in Miami-Dade County that were not monitored and that had no closing or advisory days in 2010:					
Homestead Bay Front Park Windsurfer Beach					
Monroe County					
Anne’s Beach	1	1/wk	52	6%	21
Bahia Honda Bayside	1	1/wk	52	0%	0
Bahia Honda Oceanside	1	1/wk	52	12%	42
Bahia Honda Sandspur	1	1/wk	52	8%	28
Coco Plum Beach	1	1/wk	52	27%	91
Curry Hammock	1	1/wk	52	2%	7
Founder’s Park Beach	1	1/wk	52	2%	0
Ft. Zachary Taylor	1	1/wk	52	0%	0
Harry Harris County Park	1	1/wk	52	0%	0
Higgs Beach	1	1/wk	52	37%	21 (112)*
Islamorada Public Library	1	1/wk	52	0%	0
John Pennekamp State Park Cannon Beach	1	1/wk	52	0%	0
Simonton Beach	1	1/wk	52	2%	7
Smathers Beach	1	1/wk	52	6%	21
Sombrero Beach	1	1/wk	52	4%	14
South Beach	1	1/wk	52	12%	42
Veteran’s Beach	1	1/wk	52	2%	7
Beaches in Monroe County that were not monitored and that had no closing or advisory days in 2010:					
18 Mile Stretch		Atlanta Shores	Banana Bay Resort– Marathon	Buccaneer	

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Monroe County					
Beaches in Monroe County that were not monitored and that had no closing or advisory days in 2010:					
Casa Clara		Fiesta Key Campground	Long Key State Park	Smathers Beach East	
Casa Marina		Hawks Cay Resort	Monroe County Beach	Sunset Park	
Cheeca Lodge Beach		Holiday Inn Beachside	N Roosevelt/Cow Key	The Islander Beach Resort	
Craig Key Roadside		John Pennecamp State Park Far Beach	Reach Resort	The Moorings	
Dog Beach		Kennedy Dr & N Roosevelt	Rest Beach	Valhalla Beach Resort	
Dolphin Research Center		Key West Beach Club	Sea Oats Beach	Westin Beach	
Nassau County					
Amelia Island Plantation (AIP) Beach Club	1	1/wk	49	0%	0
American Beach	1	1/wk	51	0%	0
Fort Clinch Beach	1	1/wk	50	0%	0
Jasmine Street	1	1/wk	51	0%	0
Main Beach	1	1/wk	49	0%	0
Ocean Street	1	1/wk	51	0%	0
Peter's Point	1	1/wk	51	0%	0
Piper Dunes (AIP Beach)	1	1/wk	51	0%	0
Sadler Road	1	1/wk	49	0%	0
Simmons Road	1	1/wk	50	0%	0
South End	1	1/wk	49	4%	0
Beaches in Nassau County that were not monitored and that had no closing or advisory days in 2010:					
Alachua Beach Access		Hutchins Beach Access	N. Casino Beach Access	Scott Road Beach Access	
Allen Beach Access		John Robas Beach Access	New York Beach Access	South End Bridge	
Bill Melton Beach Access		Kissimmee Beach Access	North Beach Park	Summer Beach	
Burney Park Beach Front		Manatee Beach Access	Ozello Beach Access	Suwannee Beach Access	
Fort Clinch Riverside		Mizell Beach Access	S. Casino Beach Access		
Okaloosa County					
Beasley State Park	no data	None	0	NA	43
Brackin Wayside	1	1/wk	52	0%	43
Camp Timpoochee	1	1/wk	52	6%	14
East Pass	1	1/wk	52	4%	13
El Matador	1	None	0	NA	43
Garniers	1	1/wk	52	42%	50 (70)*
Gulf Island National Seashore	1	1/wk	52	8%	27
Henderson State Park Beach	1	1/wk	52	0%	43
James Lee Park Beach	1	1/wk	52	0%	43
Lincoln Park	1	1/wk	52	10%	35
Liza Jackson Park	1	1/wk	52	13%	50
Marlers Park	1	1/wk	52	0%	0
Okaloosa Island Beach Access #1	1	None	0	NA	43
Okaloosa Island Beach Access #2	1	None	0	NA	43

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Okaloosa County					
Okaloosa Island Beach Access #3	1	None	0	NA	43
Okaloosa Island Beach Access #4	1	None	0	NA	43
Okaloosa Island Beach Access #5	1	None	0	NA	43
Okaloosa Island Beach Access #6	1	None	0	NA	43
Okaloosa Island Beach Access #7	1	None	0	NA	43
Poquito Park	1	1/wk	52	2%	8
Rocky Bayou (Fred Gannon State Park)	1	1/wk	52	10%	29
Beaches in Okaloosa County that were not monitored and that had no closing or advisory days in 2010:					
Bay Drive	Hurlburt Campground	Nco Beach	Star Drive		
Beasley State Park	Hurlburt Marina	Norreigo Point	US Army Rec Center		
Bluewater Beach	Joes Bayou	Parrish Point	Valparaiso Blvd		
Cinco Food	Laguana Park	Pocahantas Drive	Walk Edge		
Clement-Taylor	Landing	Postal Point	Weekley Bayou		
Dana Point	Lions Park	Rickey Avenue	White Point		
Eldridge Park	Longwood Park	Rocky Creek Campground			
Florida Park	Maxwell-Gunter	Seashore Beachwalk			
Holiday Isle Aegean	Meigs Park	Seaview			
Palm Beach County					
Boynton Beach Municipal	1	1/wk	52	0%	0
Carlin Park	1	1/wk	52	0%	0
Delray Beach (AKA Sandoway Park)	1	1/wk	52	0%	0
Dubois Park	1	1/wk	59	12%	0
Gulfstream Park	1	1/wk	52	0%	0
Jupiter Beach Park	1	1/wk	52	0%	0
Lake Worth (AKA Kreusler)	1	1/wk	55	5%	0
Lantana Municipal	1	1/wk	52	0%	0
Ocean Inlet Park	1	1/wk	52	0%	0
Palm Beach	1	1/wk	52	0%	0
Phil Foster Park	1	1/wk	64	19%	4
Riviera Beach	1	1/wk	52	0%	0
South Inlet Park	1	1/wk	52	0%	0
Spanish River	1	1/wk	52	0%	0
Beaches in Palm Beach County that were not monitored and that had no closing or advisory days in 2010:					
Coral Cove	Loggerhead Park	Peanut Island	South Beach		
John D. Mcarthur	Ocean Reef Park	Phipps			
Juno Beach Park	Palm Beach Shores	Red Reef Park			
Pasco County					
Anclote River Park Beach	1	1/wk	46	0%	0
Brasher Park Beach	1	1/wk	47	2%	14
Energy And Marine Center	1	1/wk	46	7%	39
Gulf Harbors Beach	1	1/wk	45	4%	14

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Pasco County					
Oelsner Park Beach	1	1/wk	46	24%	35 (49)*
Robert J. Strickland	1	1/wk	46	4%	11
Robert K. Rees Park Beach	1	1/wk	43	7%	21
Pinellas County					
Courtney Campbell Causeway	1	1/wk	57	9%	5
Fort Desoto North Beach	1	1/wk	54	0%	0
Gandy Boulevard	1	1/wk	57	7%	0
Honeymoon Island Beach	1	1/wk	54	2%	0
Indian Rocks Beach	1	1/wk	55	4%	0
Indian Shores Beach	1	1/wk	55	5%	5
Madeira Beach	1	1/wk	53	0%	0
Mobbly Bayou Preserve	1	1/wk	58	9%	0
North Shore Beach	1	1/wk	54	4%	5
Pass-A-Grille Beach	1	1/wk	53	0%	0
Redington Shores–182nd Ave	1	1/wk	56	5%	0
Sand Key	1	1/wk	55	4%	0
Sunset Beach–Tarpon Springs	1	1/wk	58	9%	0
Treasure Island Beach	1	1/wk	54	4%	5
Beaches in Pinellas County that were not monitored and that had no closing or advisory days in 2010:					
Bay Vista Park	Fort Desoto–East Beach	Lassing Park–19th Ave Se	Redington Shores–175th Ave		
Belleair Beach–Morgan Drive	Fort Desoto 1/2 Way B/N Fort & N. Beach	Madeira Beach–129th Ave	Safety Harbor Pier		
Belleair Causeway–Intercoastal	Fred Howard Beach	Maximo Park–East Beach	St Pete Beach–34th Ave (The Don)		
Bermuda Bay Beach	Ft Desoto Park–Pier/Fort	Maximo Park–West Beach	St Pete Beach–46th Ave (Park)		
Clearwater Beach–Carlouel Park	Gulfport–East Beach	North Redington Beach–169th Ave	Sunset Beach (TI)–82nd Ave		
Clearwater Beach–Rockaway	Gulfport–Osgood Beach	North Shore–North Beach	Sunset Beach (TI)–89th Ave		
Clearwater Beach (3rd St)	Gulfport–West Beach	Pass-a-Grille–19th Ave	Treasure Island–103rd Ave		
Crystal Beach	Honeymoon Island Causeway (South)	R.E. Olds Park			
Dunedin Marina Beach	Indian Rocks Beach–Central Ave	Redington Beach–158th Ave			
Santa Rosa County					
Homeport	1	1/wk	52	0%	0
Juana’s Beach	1	1/wk	53	2%	0
Navarre Beach Pier	1	1/wk	52	0%	0
Navarre Beach West	1	1/wk	52	0%	0
Navarre Park	1	1/wk	52	2%	7
Shoreline Park	1	1/wk	56	9%	5
Woodlawn Beach	1	1/wk	53	2%	0
Beaches in Santa Rosa County that were not monitored and that had no closing or advisory days in 2010:					
Floridatown Park	Garcon Point Location 3	Redfish Point			

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Sarasota County					
Blind Pass Beach	1	1/wk	49	0%	0
Brohard Beach	1	1/wk	49	0%	0
Caspersen Public Beach	1	1/wk	48	0%	0
Lido Casino Beach	1	1/wk	51	4%	0
Longboat Key Access	1	1/wk	50	2%	0
Manasota Beach	1	1/wk	49	0%	0
Nokomis Public Beach	1	1/wk	49	2%	0
North Jetty Park Beach	1	1/wk	52	0%	0
North Lido Beach	1	1/wk	49	0%	0
Ringling Causeway	1	1/wk	56	13%	4 (2)*
Service Club Park	1	1/wk	50	2%	0
Siesta Key Public Beach	1	1/wk	52	6%	0
South Lido Beach	1	1/wk	51	4%	0
Turtle Beach	1	1/wk	50	2%	0
Venice Fishing Pier	1	1/wk	50	2%	0
Venice Public Beach	1	1/wk	51	4%	0
Beaches in Sarasota County that were not monitored and that had no closing or advisory days in 2010:					
Avenida Del Mare Access #11	Calle De La Siesta, Access #7	Longboat Access #3	Point O' Rocks		
Avenida Messina Access #2	Calle Del Inverno Access #10	Ocean Blvd Access #5	Quick Point		
Avenida Navarra Access #14	Longboat Access #1	Palmer Point Beach	Shell Road Access #1		
Blackburn Point Park	Longboat Access #2	Plaza De Las Palmas #9	South Jetty Beach		
		Plaza De Las Palmas 1, Access #8	Stickney Point Access #12		
St Johns County					
Anastasia State Park (St. Augustine Beach)	1	1/wk	52	0%	0
Crescent Beach	1	1/wk	52	0%	0
Matanzas Inlet	1	1/wk	52	0%	0
Mickler's Landing	1	1/wk	52	0%	0
Solano (Ponte Vedra Beach)	1	1/wk	52	0%	0
St. Augustine Beach A Street	1	1/wk	53	2%	0
St. Augustine Beach Ocean Trace	1	1/wk	51	0%	0
Vilano Beach	1	1/wk	52	0%	0
St Lucie County					
F Douglass Memorial Park	1	1/wk	51	0%	0
Fort Pierce Inlet/North Jetty Park	1	1/wk	52	2%	0
Pepper Park	1	1/wk	52	2%	0
Walton Rocks Beach	1	1/wk	52	2%	0
Beaches in St Lucie County that were not monitored and that had no closing or advisory days in 2010:					
Avalon Park	Blind Creek	Blind Creek Park	Blue Heron Blvd Access		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
St Lucie County					
Beaches in St Lucie County that were not monitored and that had no closing or advisory days in 2010:					
Coconut Drive Access	Jaycee Park	Normandy Beach	South Jetty Park Beach		
Gulfstream Beach	John Brooks Park	Porpoise Beach	Surfside Park		
Hermans Bay	K Bergalis Memorial Park	South Beach Boardwalk	Waveland Beach		
Inlet State Park at Ocean	Little Jim Bridge	South Causeway at Boat Ramp			
Inlet State Park at River	Middle Cove				
Taylor County					
Dekle Beach	1	1/wk	29	21%	75
Hagen's Cove	1	1/wk	30	47%	14 (70)*
Keaton Beach	1	1/wk	31	32%	77
Beaches in Taylor County that were not monitored and that had no closing or advisory days in 2010:					
Cedar Island	Dark Island				
Volusia County					
27th Street, New Smyrna Beach	1	1/wk	52	0%	0
Bicentennial Park, Ormond Beach	1	1/wk	104	1%	0
Dunlawton, Daytona Beach Shores	1	1/wk	52	8%	14
Flagler Avenue, New Smyrna Beach	1	1/wk	52	0%	0
Florida Shores Blvd	1	1/wk	52	13%	53
Granada, Ormond Beach	1	1/wk	52	0%	0
International Speedway, Daytona Beach	1	1/wk	52	8%	28
Main, Daytona Beach	1	1/wk	52	0%	0
North Jetty, Ponce Inlet	1	1/wk	49	2%	0
Oceanview Way, Ponce Inlet	1	1/wk	51	0%	0
Seabreeze, Daytona Beach	1	1/wk	52	0%	0
Silver Beach, Daytona Beach	1	1/wk	52	13%	49
South Jetty, New Smyrna Beach	1	1/wk	52	0%	0
Torinita, Wilbur By The Sea	1	1/wk	51	0%	0
Villa Way	1	1/wk	52	0%	0
Beaches in Volusia County that were not monitored and that had no closing or advisory days in 2010:					
Beach Street					
Wakulla County					
Mash Island	1	1/wk	48	6%	21
Shell Point Beach	1	1/wk	46	11%	43
Walton County					
Blue Mountain Beach Access	1	1/wk	0	NA	42
Choctaw Beach County Park	1	1/wk	55	7%	0
County Park	1	1/wk	53	2%	42
Dune Allen Beach Access	1	1/wk	52	0%	2 (44)*
Eastern Lake Beach Access	1	1/wk	52	2%	42
Eastern Lake Outfall	1	None	0	NA	42

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Walton County					
Grayton Beach Access	1	1/wk	52	0%	42
Holly Street Beach Access	1	1/wk	52	2%	42
Inlet Beach Access (Tdc Beach Access)	1	1/wk	52	0%	42
Rosemary Beach	no data	None	0	NA	42
Santa Rosa Beach Access	no data	None	0	NA	42
South Wall Street Beach	1	None	0	NA	44
Western Lake Outfall	no data	None	0	NA	42
Wheeler Point	1	1/wk	53	2%	0
Beaches in Walton County that were not monitored and that had no closing or advisory days in 2010:					
Cessna Park (Class II)	Grayton Beach State Recreation Area		Legion Park (Class II)		

*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 NOAA, Current Participation Patterns in Marine Recreation. November 2001.
- 2 David Polk, Florida Department of Health, personal communication.
- 3 Miami Dade County. Rickenbacker Causeway shoreline and roadway protection (memorandum). Not dated.

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



GEORGIA

8th in Beachwater Quality

5% 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.

Georgia has 41 public beaches along 118 miles of Atlantic Coast and barrier islands. The Coastal Resources Division of the Georgia Department of Natural Resources administers Georgia's beach monitoring and notification program.

Oyster reefs, which once covered the Georgia coastline, have been devastated by pollution, overharvesting, and disease. It's difficult to estimate the previous extent of the reefs, but information on commercial harvesting rates offers an idea of how much has been lost. In 1908 Georgia harvested 3.6 million kg of oyster meat; a century later less than 6,000 kg were harvested.¹ Oyster reefs play an important role in the health of estuaries, providing erosion control, water filtration, food production, and spawning and breeding habitat for many fish species, and Georgia is conducting projects to restore the reefs. These efforts are at present focused on existing boat ramps and are motivated largely by the need to reduce coastal erosion and provide bank stability, but they are expected to have beneficial effects on beachwater quality as well. Oyster reef restoration is accomplished by providing hard surfaces in the intertidal zone where oyster spat can attach and mature.

Monitoring Results

In 2010 Georgia reported 41 coastal beaches. Of these, 17 (41%) were monitored once a week, 9 (22%) once a month, and 1 (2%) less than once a month; 14 (34%) 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, 5% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were St. Andrews Picnic Area (Jekyll) (22%) and Jekyll Clam Creek (19%) in Glynn County, and Tybee Island Polk Street in Chatham County (12%).

Glynn County had the highest exceedance rate (6%) in 2010, followed by Chatham County (3%); there were no exceedances in McIntosh County. No beaches in Liberty or Camden counties were monitored.

Sampling Practices: Most of the monitored beaches are sampled year-round. In 2010, beaches that were monitored, but not year-round, were sampled from April through October.

The Coastal Resources Division determines sampling practices, locations, standards, and notification protocols and practices throughout the state. Samples are taken in about 3 feet of water (measured from wavetop) at a depth of 15 to 30 centimeters. Beaches that have large populations nearby, have tourist accommodations, are easily accessible, and have the most amenities are monitored the most frequently.

KEY FINDINGS IN GEORGIA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- St. Andrews Picnic Area (Jekyll) in Glynn County (22%)
- Jekyll Clam Creek in Glynn County (19%)
- Tybee Island Polk Street in Chatham County (12%)

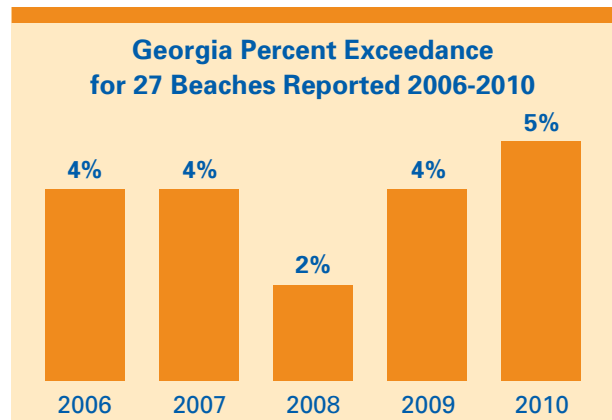
Reported Sources of Beachwater Contamination Statewide (number of closing/advisory days)

- 217 days (100%) unknown sources of contamination

The monitoring frequency for a beach increases when an exceedance occurs. States that monitor more frequently after an exceedance is found will tend to have higher percent exceedance rates and lower closing/advisory days than they would if their sampling frequency did not increase after an exceedance was found.

Advisories

Total advisory days for 32 events lasting six consecutive weeks or less increased 4% in 2010, to 217 from 209 days in 2009. For prior years, there were 72 advisory days in 2008, 181 days in 2007, 203 days in 2006, and 528 days in 2005. In addition, there were 2 extended events (105 days total) and 1 permanent event (365 days) 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 advisory days in 2010 were due to monitoring that revealed elevated bacteria levels.



Standards and Procedures: Georgia’s beachwater monitoring program issues advisories only. Georgia applies the EPA standard for enterococcus of a single-sample maximum of 104 cfu/100 ml and a 30-day five-sample geometric mean of 35 cfu/100 ml.

When either the single-sample or geometric mean standard is exceeded, the Coastal Resources Division notifies the Georgia Department of Health and the local beach management entity. Upon receiving this notification, the local beach management entity issues an advisory. There is no protocol for forgoing an advisory when an exceedance is found, and resampling to confirm an exceedance is not done before an advisory is issued.

The state has concluded that its beachwater quality does not appear to correlate strongly with any measured parameters, including rainfall.² Therefore, Georgia has no preemptive rainfall advisory standards and does not make use of predictive models for issuing beach advisories. However, permanent advisories are issued for beaches that have ongoing water quality issues. For example, Kings Ferry has been under permanent advisory since 2006.¹



An oyster reef in the making after only two growing seasons in Belleville, Georgia.

The Health Department can issue a closing in the case of an immediate threat to public health, such as a sewage spill.

A volunteer network monitors phytoplankton in Georgia’s estuaries, providing information necessary in the event of a harmful algal bloom.

© ELIZABETH CHENEY

Georgia 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Camden County					
Cumberland	3	none	0	NA	0
Little Cumberland	3	none	0	NA	0
Chatham County					
Bradley (Ossabaw)	2	1/mo	7	0%	0
Kings Ferry	2	4/yr	4	75%	0 (364)*
Little Tybee Island	3	none	0	NA	0
Middle Ossabaw	3	none	0	NA	0
Skidaway Narrows	2	1/mo	7	0%	0
South Ossabaw	2	1/mo	7	0%	0
Tybee Island Middle	1	1/wk	51	0%	0
Tybee Island North	1	1/wk	51	0%	0
Tybee Island Polk Street	1	1/wk	58	12%	23
Tybee Island South	1	1/wk	51	0%	0
Tybee Island Strand	1	1/wk	51	0%	0
Wassaw Island	3	none	0	NA	0
Williamson Island	3	none	0	NA	0
Glynn County					
12 Street Goulds Inlet (Ssi)	1	1/wk	53	4%	4
4H Camp (Jekyll)	1	1/wk	52	2%	2
5th Street Crossover (Ssi)	1	1/wk	51	0%	0
Blythe Island Regional Park Sandbar	2	1/mo	8	13%	7
Capt. Wylly (Jekyll) Near Beachview	1	1/wk	52	2%	2
Convention Center (Jekyll)	1	1/wk	51	0%	0
East Beach Old Coast Guard (Ssi)	1	1/wk	52	4%	7
Jekyll Clam Creek	1	1/wk	68	19%	32 (105)*
Jekyll North At Dexter Lane	1	1/wk	52	2%	2
Little Street Simons	3	none	0	NA	0
Massengale (Ssi)	1	1/wk	52	2%	2
Pelican Spit (Off Sea Island)	3	none	0	NA	0
Rainbow Bar (Little Ssi)	3	none	0	NA	0
Reimolds Pasture (Little Ssi)	2	1/mo	8	25%	15
Sea Island North	2	1/mo	7	0%	0
Sea Island South	2	1/mo	7	0%	0
South Dunes (Jekyll)	1	1/wk	51	2%	7
St. Andrews Picnic Area (Jekyll)	1	1/wk	69	22%	114
St. Simons Island Lighthouse	1	1/wk	51	0%	0
Liberty County					
St. Catherines Island	3	none	0	NA	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
McIntosh County					
Blackbeard Island	3	none	0	NA	0
Cabretta (Sapelo)	3	none	0	NA	0
Contentment Bluff Sandbar	2	1/mo	7	0%	0
Dallas Bluff Sandbar	2	1/mo	7	0%	0
Nanny Goat (Sapelo)	3	none	0	NA	0
Wolf Island	3	none	0	NA	0

*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 Power, A., B. Corley, D. Atkinson, R. Walker, D. Harris, J. Manley, T. Johnson. "A Caution Against Interpreting and Quantifying Oyster Habitat Loss From Historical Surveys." *J of Shellfisheries Res.* Dec. 2010.
- 2 Elizabeth Cheney, Beach Water Quality Manager, Georgia Department of Natural Resources, personal communication, April 2011.

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



HAWAII

4th in Beachwater Quality

3% 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.

Hawaii has more than 400 public beaches stretching along nearly 300 miles of Pacific Ocean coastline. Its beachwater monitoring program is administered by the Clean Water Branch of the Hawaii Department of Health (DOH).

Hawaii funded a project that concluded in 2010 in which wastewater plumes off the island of Maui were identified. These wastewater plumes result from municipal wastewater that is being injected into wells.¹ This year, DOH is working with the Kauai chapter of the Surfrider Foundation to investigate the presence of wastewater constituents in the waters of Nawiliwili Bay. In addition to identifying the species responsible for fecal indicator bacteria found in bay waters, sampling will be conducted for two human pharmaceuticals, carbamazepine (an anticonvulsant) and sulfamethoxazole (an antibiotic).² These pharmaceuticals are present in wastewater and are not destroyed during wastewater treatment, which makes them useful indicators for the presence of wastewater effluent.¹

In response to a tsunami warning in late February 2010, the County of Maui shut down power to all low-lying coastal wastewater pumps. If power were not shut down and a tsunami had hit, there would have been extensive damage to pumps, and sewage would have flowed to the ocean. As soon as the all-clear was given, pumps were turned on, but not before four pump stations experienced minor overflows. A 7-day sewage warning was issued for more than 16 miles of beach.³

Mokaaea Island was under warning nearly every day in 2010. This island is located in Ke'ehi Lagoon, where several homes were directly discharging sewage into the ocean.³ All of the homes that are currently occupied now have a dry compost system, and beachwater sampling around the island will verify whether these systems are working properly.² Hawaii does not list the beach on this island as a BEACH Act beach because of accessibility constraints.

KEY FINDINGS IN HAWAII

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Lumaha'i Beach (29%) in Kauai County
- Kalihiwai Bay (27%) in Kauai County
- Waimea Recreation Pier State Park (24%) in Kauai County

Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

- 4,032 (96%) stormwater runoff
- 179 (4%) other unspecified sources

Monitoring Results

In 2010, Hawaii reported 463 coastal beaches, 43 (9%) of which were monitored more than once a week, 13 (3%) once a week, 90 (19%) every other week, 18 (4%) once a month, 4 (<1%) less than once a month; 288 (62%) were not monitored and 7 (2%) had no data for monitoring frequency. 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, 3% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Lumaha'i Beach (29%), Kalihiwai Bay (27%), Waimea Rec. Pier St. Pk. (24%), Hanalei Beach Co. Park (15%), and Kekaha Beach Co. Pk. (12%), all in Kauai County. Kauai County had the highest exceedance rate (8%) in 2010 followed by Maui (2%), the Hawaii (2%), and Honolulu (1%) counties.

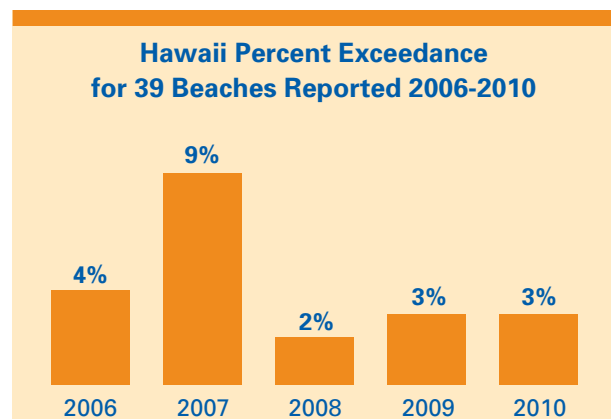
Sampling Practices: The monitoring season in this tropical state is year-round.

Sampling practices, locations, standards, and notification protocols and practices are uniform throughout the state. Samples are taken 1 foot below the surface in water that is knee to waist deep. Hawaii's beach monitoring program prioritizes sampling efforts based on the risk of illness to swimmers and the frequency of use. Tier 1 beaches are Hawaii's important and threatened beaches and (except for Oahu) were monitored three times a week in 2010. Tier 2 beaches are moderate-use beaches and were sampled once or twice a week for 6 months at a time. If a Tier 2 beach shows periodic elevated counts for no obvious reason, it is sampled once or twice a week for another 6 months or is elevated to Tier 1 status. If a beach does not have a high likelihood of contamination and has consistently low fecal indicator counts, then it is assigned Tier 3 status and is sampled at least once every six months. Circumstances such as inaccessibility, sampler illness or vacation, or lab closure may prevent these frequencies from being maintained. For instance, because of reductions in budget and manpower, the beaches on Oahu were not sampled at these frequencies in 2010. Instead, Oahu's Tier 1 beaches were sampled at least once a week, and Tier 2 and 3 beaches were unmonitored.³

If a warning is issued, daily monitoring is performed until bacteria levels no longer exceed action levels, and the beach is reopened.² States that monitor more frequently after an exceedance is found will tend to have higher percent exceedance rates and lower total warning/advisory days than they would if their sampling frequency did not increase after an exceedance was found.

Warnings and Advisories

Total closing/advisory days for 1,028 events lasting six consecutive weeks or less increased 79% to 4,215 days in 2010 from 2,352 days in 2009. For prior years, there were 2,766 days in 2008, 4,134 days in 2007, 6,507 days in 2006, and 2,228 days in 2005. In addition, there was one permanent event (362 days) and no extended 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. Essentially all (96%) of the advisories in 2010 were preemptive due to rain (what Hawaii calls "brown water advisories"). To calculate the number of advisory days, NRDC applied the duration of each rain advisory. Hawaii and the EPA did not report these advisories by beach, but rather by island or area. NRDC applied the duration of each rain advisory to each beach in the designated area.² Four percent (179) of closing/advisory days in 2010 were preemptive (i.e. without waiting for monitoring results) due to known sewage spills/leaks and <1% (4) were preemptive due to other reasons.



Standards and Procedures: Hawaii's Department of Health does not have the authority to close beaches; instead, it posts warnings and issues advisories. In 2009 Hawaii began using a single-sample maximum standard of 104 cfu/100ml (for beaches that are not sampled at least five times a month) and a geometric mean standard of 35 cfu/100ml (for beaches that are sampled at least five times a month).² Hawaii also uses quantitative information about the presence of *Clostridium perfringens* (a tracer for human sewage) when making beach warning decisions.²

At beaches that are monitored at least five times a month, a warning is posted when the enterococcus geometric mean is exceeded and the *Clostridium perfringens* count exceeds its level of action.² When these standards are exceeded, the rule is absolute: There are no overriding factors that can be taken into account before an advisory is issued. For beaches that are monitored less frequently than five times a month, a beach is resampled before posting a warning based on the single-sample maximum standard, unless the cause of the exceedance was noted by the sampler.²

Preemptive rainfall advisories are issued when a flood warning from the National Weather Service indicates that there will be a discharge of a significant quantity of turbid stormwater into coastal areas. When a storm event does not generate a flood warning but creates turbid waters with debris and possibly dead animals in near-shore waters, a preemptive rainfall advisory may be issued. These preemptive rainfall advisories, called brown water advisories, can be issued statewide, island-wide, or for specific areas of one island. If a sewage spill is suspected or if there are indications of human fecal contamination, the beach is posted immediately and a sample is taken.²

Hawaii 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Hawaii County					
2nd Beach (Next to Mahaiula)	2	2/mo	16	0%	0
Anaeho'omalua Bay	1	3/wk	78	1%	0
Analani Pond (Puala'a)	1	3/wk	84	2%	0
Banyan's Surfing Area	3	2/wk	9	11%	0
Coconut Island Park	2	2/mo	39	0%	0
Hakalau Co. Pk.	2	2/mo	8	13%	0
Hapuna Beach St. Rec. Area	2	2/mo	19	0%	0
Hilo Bay (Boat Landing)	no data	no data	0	NA	3
Hilo Bayfront	1	3/wk	103	1%	3
Holoholokai Beach	2	2/mo	15	0%	0
Honaunau Bay	2	2/mo	9	0%	0
Honoli'i Beach Co. Park	1	3/wk	84	4%	0
Ho'okena	2	2/mo	9	0%	0
Ice Pond (single point)	2	2/mo	43	5%	0
James Kealoha Park	1	3/wk	84	1%	0
Ka Lae (South Point)	2	2/mo	1	0%	0
Kahalu'u Beach Co. Pk.	1	3/wk	79	1%	0
Kailua Bay	2	2/mo	98	4%	0
Kalapana Beach (new) (Harry K. Brown Beach Co. Pk.)	2	2/mo	5	0%	0
Kamakaokahonu	1	3/wk	82	6%	0
Kapoho Bay	2	2/mo	44	9%	0
Kapoho Tidepools (Vacationland)	2	2/mo	45	0%	0
Kauna'oa Beach	2	2/mo	15	0%	0
Kawaihae Harbor	2	2/mo	15	0%	0
Keahou Bay (Kona)	2	2/mo	18	0%	0
Kealia Beach	3	None	0	NA	7
Keaukaha Beach Park	2	2/mo	44	2%	0
Kehena	2	2/mo	5	0%	0
Keokea Beach Co. Pk.	3	2/wk	1	0%	0
Kolekole Beach Co. Park	2	2/mo	8	13%	0
Laupahoehoe Beach Co. Park	2	2/mo	8	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Hawaii County					
Lehia Beach Co. Pk.	2	2/mo	10	0%	0
Leleiwi Beach Co. Pk.	1	3/wk	135	2%	0
Manini'owali	2	2/mo	18	0%	0
Mauna Lani (Kalahuihua'a)	3	None	14	0%	0
Miloli'i Beach	2	2/mo	9	0%	0
Ninole	2	2/mo	3	0%	0
Onakahakaha Beach Co. Pk.	1	3/wk	121	2%	0
Pelekane Bay	2	2/mo	13	0%	0
Pine Trees	2	2/mo	16	0%	0
Pohoiki Beach	2	2/mo	19	5%	0
Pololu Valley	3	2/wk	1	0%	0
Puako	1	3/wk	78	1%	0
Punalu'u	2	2/mo	3	0%	0
Radio Bay	2	2/mo	10	0%	0
Spencer Beach Co. Pk.	2	2/mo	16	0%	0
Waipi'o Bay	2	2/mo	1	0%	0
Waiulaula	2	2/mo	11	0%	0
White Sands Beach Co. Pk. (Magic Sands)	2	2/mo	30	0%	0
Whittington Beach Co. Pk.	2	2/mo	3	0%	0
Beaches in Hawaii County that were not monitored and that had no closing or advisory days in 2010:					
Apua	Ka'iliki'i	Keawaiki	Old Kona Airport		
Cape Kumukahi	Ka'upulehu	Kiholo Bay	St. Rec. Area		
Green Sand Beach	Kahuwai Bay	Kuki'o	Onomea		
Halape Shelter	Kalahiki Beach	Lapakahi St. Hist. Park	Pahoehoe Beach Co. Pk.		
Hawaiian Beaches Co. Park	Kalu'e Pt.	MacKenzie State Rec. Area	Paiahaa		
Hawaiian Paradise Co. Pk.	Kaluhika'a Beach	Mahai'ula Bay	Papa'i (King's Landing)		
Heeia	Kamehame Hill	Mahukona Beach Co. Pk.	Pohue Bay		
Honokane Iki	Kamoa Pt.	Makalawena	Pu'u Hou		
Honokane Nui	Kapa'a Beach Co. Pk.	Makole'a Beach	Pu'u honua Pt. (Pu'u o Honaunau)		
Honokea	Kapoho Beach Lots	Manini Point Co. Pk.	Pueo Bay		
Honokohau Beach	Kapu'a Bay	Manuka Bay	Reeds Bay Park		
Honolulu Landing	Kauhako Bay - Hookena	Mau'umae Beach	Road to the Sea		
Honomalino Bay	Kawa Bay	Nanawale Co. Park	Wai'ahukini		
Honopue	Ke'ei	Napo'apo'o Beach Co. Pk.	Waialea Bay		
Isaac Hale Beach Co. Pk.	Kea'au	Ohai'ula Beach	Waimanu Bay		
Ka'alu'alu Bay	Kealakekua Bay	Old Kona Airport (Pawai)	Wawaloli Beach		
Honolulu County					
Ala Moana Beach Co. Park	1	2/wk	127	6%	13
Aukai Beach Co. Park	3	None	0	NA	13
Banzai	3	None	0	NA	13

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Honolulu County					
Barbers Point Beach Co. Pk.	3	None	0	NA	13
Bellows Field Beach Co. Pk.	3	1/mo	0	NA	13
Camp Harold Erdman	2	1/wk	0	NA	13
Chun's Reef	1	2/wk	8	0%	13
Diamond Head	2	None	0	NA	13
Diving area east of Reef Runway	no data	None	0	NA	13
Ehukai Beach Co. Pk.	3	None	0	NA	13
Ewa Beach	3	None	0	NA	13
Ewa Beach Co. Park	2	2/wk	0	NA	13
Ewa Plantation Beach	3	None	0	NA	13
Fort DeRussy Beach	2	None	0	NA	13
Fort DeRussy Beach Park	2	None	0	NA	13
Fort Hase Beach	3	None	0	NA	13
Fort Kamehameha Beach	3	None	0	NA	13
Gray's Beach	2	None	0	NA	13
Hale'iwa Ali'i Beach Co. Pk.	3	None	0	NA	13
Hale'iwa Beach Co. Pk.	3	None	0	NA	13
Halona Blowhole	2	None	0	NA	13
Hanaka'ilio Beach	3	None	0	NA	13
Hanauma Bay	1	2/wk	41	0%	13
Hau'ula Beach Co. Park	2	None	0	NA	13
Hawaiian Electric Beach Park	3	None	0	NA	13
He'eia	2	1/wk	0	NA	13
Hickam Harbor Beach	2	None	0	NA	13
Ihilani Honu	3	None	0	NA	13
Ihilani Kohola	3	None	0	NA	13
Ihilani Naia	3	None	0	NA	13
Ihilani Ulua	3	None	0	NA	13
Iroquois Pt.	3	None	0	NA	13
Ka'a'awa Beach Co. Park	2	None	0	NA	13
Ka'alawai Beach	2	None	0	NA	13
Ka'ena Pt.	3	None	0	NA	13
Kahala	2	1/wk	0	NA	13
Kahala Hilton Beach	2	1/mo	0	NA	13
Kahana Bay	3	None	0	NA	13
Kahanamoku Beach	1	2/wk	66	0%	14
Kahanamoku Lagoon	no data	no data	0	NA	13
Kahe Pt. Beach Co. Pk.	2	None	0	NA	13
Kahuku Golf Course	3	None	0	NA	13
Kaiaka	3	None	0	NA	13

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Honolulu County					
Kaihalulu Beach	3	None	0	NA	13
Kailua Beach	2	None	0	NA	13
Kailua Beach Middle	2	None	0	NA	16
Kailua Beach Pk.	2	3/wk	19	5%	13
Kaiona Beach Co. Park	3	None	0	NA	13
Kaipapa'u Beach	2	None	0	NA	13
Kakaako Waterfront	3	None	0	NA	13
Kalae'o'io Beach Co. Park	3	None	0	NA	13
Kalama Beach	2	1/mo	0	NA	21
Kalaniana'ole Beach	3	None	0	NA	13
Kaloko (Queens) Beach	3	None	0	NA	13
Kaluahole Beach	3	None	0	NA	13
Kaluanui Beach	2	None	0	NA	13
Kananelu Beach	3	None	0	NA	13
Kane'ohe Bay	3	None	0	NA	26
Kapaeloa Beach	2	4/yr	0	NA	13
Kapi'olani Park	2	None	0	NA	13
Kaunala Beach	3	None	0	NA	13
Kaupo Beach Co. Park	3	None	0	NA	13
Kawaiku'i Beach Park	2	1/mo	0	NA	13
Kawailoa Beach	3	None	0	NA	13
Kawela Bay	2	None	0	NA	13
Kea'au Beach Co. Park	3	None	0	NA	13
Kealia Beach	2	1/wk	0	NA	13
Ke'ehi Lagoon	2	None	0	NA	18
Koke'e Beach Park	2	1/wk	0	NA	13
Koko Kai Beach Park	2	1/wk	0	NA	13
Kokololio Beach	2	None	0	NA	13
Kualoa Co. Regional Park	1	1/mo	13	0%	13
Kualoa Sugar Mill Beach	3	None	0	NA	13
Kuhio Beach Park	1	2/wk	54	2%	13
Kuilei Cliffs Beach Park	3	None	0	NA	13
Kuilima Cove	3	None	0	NA	13
Kuli'ou'ou	2	1/wk	0	NA	13
Laenani Beach Co. Park	2	None	0	NA	13
Laie Beach Co. Park	3	None	0	NA	13
Laniakea Beach	2	4/yr	0	NA	13
Lanikai	2	None	0	NA	13
Laniloa Peninsula (Beach)	3	None	0	NA	13
Laukinui Beach	3	None	0	NA	13

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Honolulu County					
Lualualei Beach Co. Park	2	None	0	NA	13
Magic Island Beach	1	2/wk	62	0%	13
Magic Island East	3	None	0	NA	13
Ma'ili Beach Co. Park	3	1/mo	25	0%	13
Maipalaoa Beach	3	None	0	NA	13
Makaha Beach Co. Park	1	1/mo	25	4%	13
Makao Beach	3	None	0	NA	13
Makapu'u Beach Co. Park	1	1/mo	14	0%	13
Makaua Beach Co. Park	3	None	0	NA	13
Makua Beach	3	None	0	NA	13
Malaekahana Bay	1	1/mo	1	0%	13
Manner's Beach	3	None	0	NA	13
Mauna Lahilahi Beach Co. Pk.	3	None	0	NA	13
Maunalua Bay	3	None	0	NA	18
Maunalua Bay Beach Park	2	1/wk	0	NA	13
Mokule'ia Beach	3	None	0	NA	13
Mokule'ia Beach Park	2	4/yr	0	NA	13
Nanaikapono Beach	3	None	0	NA	13
Nanakuli Beach Co. Pk.	1	1/mo	25	0%	13
Nimitz Beach	3	None	0	NA	13
Niu	2	1/wk	0	NA	13
North Beach	3	None	0	NA	13
Ohikilolo Beach(Barking Sands)	3	None	0	NA	13
Oneawa Beach	2	1/mo	0	NA	13
One'ula Beach Co. Park	3	None	0	NA	13
Outrigger Canoe Club Beach	2	None	0	NA	13
Pahipahi'alu Beach	2	None	0	NA	13
Paiko Lagoon	2	1/wk	0	NA	13
Papa'iloa Beach	2	None	0	NA	13
Papaoneone Beach	3	None	0	NA	13
Pearl Harbor-Middle Loch	3	None	0	NA	13
Piliokahe Beach	no data	no data	0	NA	13
Pipeline, The	2	1/wk	0	NA	13
Point Panic Beach Park	3	None	0	NA	13
Poka'i Bay Beach Co. Pk.	1	1/mo	25	0%	13
Pounders Beach	3	None	0	NA	13
Punalu'u Beach Co. Park	2	None	0	NA	13
Pupukea Beach Co. Pk.	3	None	0	NA	13
Pu'uiki	3	None	0	NA	13
Pu'uohulu Beach	3	None	0	NA	13

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Honolulu County					
Queen's Surf Beach Park	1	2/wk	53	0%	13
Royal-Moana Beach	1	2/wk	57	2%	13
Sand Island	1	1/mo	0	NA	13 (362) *
Sandy Beach Co. Park	1	1/mo	37	0%	13
Sans Souci St. Rec. Area	1	2/wk	53	0%	13
Sunset Beach	1	1/mo	13	0%	13
Swanzy Beach Co. Park	3	None	0	NA	13
Tongg's Beach	2	None	0	NA	13
Turtle Bay	3	None	0	NA	13
Ulehawa Beach Co. Park	2	None	0	NA	13
Waiahole Beach Co. Park	2	4/yr	0	NA	13
Wai'ala'e Beach Co. Park	1	2/wk	0	NA	13
Waiale'e	2	None	0	NA	13
Wai'anae Kai Military Reservation Beach	3	None	0	NA	13
Wai'anae Regional Park	3	None	0	NA	13
Waikiki Beach Center	2	None	0	NA	13
Wailupe Beach Park	2	1/mo	0	NA	13
Waimanalo Bay St. Rec. Area	2	1/wk	0	NA	17
Waimanalo Beach	3	1/wk	0	NA	13
Waimanalo Beach Co. Park	1	3/wk	19	0%	13
Waimea Bay Beach Co. Pk.	1	1/mo	13	0%	13
War Memorial Natatorium	3	None	0	NA	13
Wawamalu Beach Park	3	None	0	NA	13
White Plains Beach	1	1/mo	25	0%	13
Yokohama Bay	3	None	0	NA	13
Kauai County					
(Honopuwaikua) Honopu Valley	2	None	0	NA	18
Ahukini Rec. Pier St. Pk.	2	None	0	NA	18
Aliomanu Beach	3	None	0	NA	18
Anahola Beach	3	None	0	NA	18
Anahola Beach Co. Park	3	None	7	0%	18
Anini Beach	2	2/mo	16	6%	18
Anini Beach Park	3	None	0	NA	18
Barking Sands	2	2/mo	0	NA	18
Beach House Beach	2	2/mo	1	0%	18
Black Pot Beach Park	3	None	0	NA	18
Brennecke Beach	3	None	3	0%	18
Donkey Park	3	None	0	NA	18
Gillin's Beach	3	None	0	NA	18
Glass Beach	3	None	2	0%	18

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Kauai County					
Ha'ena Beach Co. Park	2	2/mo	22	0%	18
Hanakapi'ai Beach	2	None	0	NA	18
Hanalei Beach Co. Park	1	3/wk	149	15%	18
Hanama'ulu Beach Co. Park	2	2/mo	5	60%	18
Haula Beach	3	None	0	NA	18
Kahili Beach	3	None	0	NA	18
Kalalau Beach	2	None	0	NA	18
Kalapaki Beach	1	3/wk	77	9%	18
Kalihiwai Bay	2	2/mo	15	27%	18
Kapa'a Beach Co. Park	3	None	16	0%	18
Kaupea Beach (Secret Beach)	3	None	0	NA	18
Kawailoa Beach	3	None	0	NA	18
Kealia	2	2/mo	7	0%	18
Ke'e Beach	2	2/mo	22	0%	18
Kekaha Beach Co. Pk.	3	None	17	12%	18
Kepuhi Beach	3	None	0	NA	18
Kikiaola Beach	3	None	2	0%	22
Kilauea Pt. Nat. Wildlife Ref.	3	None	0	NA	18
Kipu Kai	3	None	0	NA	18
Koloa Landing	3	None	2	0%	18
Kukui'ula Bay	3	None	0	NA	18
Larsens Beach	3	None	0	NA	18
Lawa'i Kai	3	None	0	NA	18
Lucy Wright Beach Co. Park	3	None	2	50%	18
Lumaha'i Beach	3	None	35	29%	18
Lydgate State Park	1	3/wk	77	4%	18
Maha'ulepu Beach	2	None	0	NA	18
Miloli'i	2	None	0	NA	18
Moloa'a Bay	3	None	0	NA	18
Na Pali Coast State Park	3	None	0	NA	18
Ninini Pt.	2	None	0	NA	18
Niumalu Beach Park	3	None	0	NA	18
Nu'alolo	2	None	0	NA	18
Nukoli'i Beach Park	3	None	16	0%	18
Pacific Missile Range Facility	3	None	24	4%	18
Pakala (Makaweli)	3	None	5	0%	18
Palama Beach (Nomilu)	3	None	1	0%	18
Papa'a Bay	3	None	0	NA	18
Pila'a Beach	3	None	0	NA	18
Po'ipu Beach Co. Park	1	3/wk	78	1%	18

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Kauai County					
Polihale State Park	2	2/mo	2	0%	18
Port Allen	3	None	2	0%	18
Prince Kuhio Park	3	None	0	NA	18
Princeville	3	None	0	NA	18
Salt Pond Beach Co. Park	1	3/wk	78	0%	18
Sheraton Beach	3	None	24	4%	18
Shipwreck Beach	2	2/mo	3	0%	18
Spouting Horn Beach Co. Park	3	None	0	NA	18
Tunnels Beach	3	None	0	NA	18
Wahiawa Bay	3	None	1	0%	18
Waiakalua Iki Beach	3	None	0	NA	18
Waiakalua Nui Beach	3	None	0	NA	18
Waikoko Bay	3	None	0	NA	18
Wailua Beach	3	None	6	0%	18
Waimea Rec. Pier St. Pk.	3	None	25	24%	18
Wainiha Bay	3	None	0	NA	18
Wai'ohai Beach	3	None	5	0%	18
Wai'oli Beach Park	2	2/mo	37	3%	18
Waipouli	3	None	2	0%	18
Maui County					
Ahihi-kina'u Natural Area Reserve	3	None	0	NA	6
Alaeloa Beach	3	None	0	NA	6
Awahua Beach	3	None	0	NA	6
Awalua Beach	3	None	0	NA	6
Fagans Beach	3	None	0	NA	6
Father Jules Papa	3	None	0	NA	6
Fleming Beach North	2	2/mo	5	0%	6
H.P. Baldwin Beach Co. Pk.	2	2/mo	4	0%	13
Halawa Beach Park	3	None	0	NA	6
Halena Beach	3	None	0	NA	6
Halepalaoa Beach	3	None	0	NA	6
Hamoia	3	None	0	NA	6
Hana Bay	2	2/mo	0	NA	6
Hanaka'o'o Beach Co. Pk.	1	3/wk	80	5%	6
Hata's	2	2/mo	4	0%	6
Honokeana Bay	3	None	0	NA	6
Honokohau Bay	3	None	0	NA	6
Honokowai Beach Co. Pk.	2	2/mo	5	0%	6
Honolua Bay	2	2/mo	5	20%	6
Honomanu Bay	2	2/mo	0	NA	6

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Maui County					
Honouli Malo'o	3	None	0	NA	6
Honouli Wai	3	None	0	NA	6
Ho'okipa Beach Co. Pk.	2	2/mo	4	0%	6
H-Poko Papa	3	None	0	NA	6
Huakini Bay	2	2/mo	0	NA	6
Hulopo'e Beach Park	3	None	0	NA	6
Iliopi'i Beach	3	None	0	NA	6
Ka'anapali	2	2/mo	28	0%	6
Kahalepohaku Beach	3	None	0	NA	6
Kahalui Harbor	1	3/wk	81	1%	13
Kahana	2	2/mo	10	10%	6
Kahemano Beach	3	None	0	NA	6
Kaihalulu Bay	3	None	0	NA	6
Ka'ili'iili Beach	3	None	0	NA	6
Kakahai'a Beach Park	3	None	0	NA	6
Kalae, South Point	no data	no data	0	NA	6
Kalama Beach Co. Park	2	2/mo	7	14%	13
Kalepolepo Beach	2	2/mo	4	0%	13
Kamaka'ipo Beach	3	None	0	NA	6
Kama'ole Beach 1	1	3/wk	81	0%	13
Kama'ole Beach 2 (Ili'iliholo Beach)	2	2/mo	4	25%	13
Kama'ole Beach 3	1	3/wk	81	1%	13
Kanaha Beach Co. Park	1	3/wk	85	6%	13
Kanaio Beach	3	None	0	NA	6
Kanalukaha Beach	3	None	0	NA	6
Kapalua (Fleming's) Beach	3	None	5	0%	6
Kapoli Beach Co. Park	3	None	0	NA	6
Kapukahehu Beach	3	None	0	NA	6
Kapukuwahine Beach	3	None	0	NA	6
Kaunala Beach	3	None	0	NA	6
Kaunolu Bay	3	None	0	NA	6
Kaupoa Beach	3	None	0	NA	6
Kawa'aloa Bay	3	None	0	NA	6
Kawakiu Bay (Nui)	3	None	0	NA	6
Kea'a Beach	3	None	0	NA	6
Ke'anae	3	None	0	NA	6
Keawakapu Beach	2	2/mo	8	0%	13
Keomuku Beach	3	None	0	NA	6
Keonenui Beach	3	None	0	NA	6
Kepuhi Beach	3	None	0	NA	6

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Maui County					
Kiowea Park (Kamehameha Coconut Grove)	3	None	0	NA	6
Koki Beach Park (VFW)	3	None	0	NA	6
Kolo Wharf	3	None	0	NA	6
Ku'au Bay	2	2/mo	4	25%	13
Kuiaha Bay	3	None	0	NA	6
La Perouse Bay	3	None	0	NA	6
Lahaina Beach	2	2/mo	4	0%	6
Launiupoko St. Wayside	1	3/wk	78	1%	6
Leho'ula Beach	3	None	0	NA	6
Lighthouse Beach	3	None	0	NA	6
Lopa Beach	3	None	0	NA	6
Lower Pa'ia	2	2/mo	4	0%	13
Ma'alaea Beach	1	3/wk	85	2%	13
Mai Poina Oe lau Beach Co. Pk.	2	2/mo	12	0%	13
Maka'ala Pt.	3	None	0	NA	6
Makena Landing Beach	2	2/mo	5	0%	6
Maliko Bay	2	2/mo	4	50%	6
Malu'aka Beach	2	2/mo	5	0%	6
Manele Bay	3	None	0	NA	6
Mantokuji Bay	3	None	0	NA	6
McGregor Pt.	3	None	0	NA	6
Mokapu Beach Park	2	2/mo	4	0%	13
Mokulau	1	3/wk	0	NA	6
Mokule'ia Beach	2	2/mo	5	0%	6
Mo'omomi Beach	3	None	0	NA	6
Murphy Beach Park	3	None	0	NA	6
Naha Beach	3	None	0	NA	6
Nahiku	3	None	0	NA	6
Napili Bay	2	2/mo	5	0%	6
Nu'u Bay	3	None	0	NA	6
Olowalu	2	2/mo	8	0%	6
Oneali'I Beach Park	3	None	0	NA	6
Oneloa Bay Beach	2	2/mo	5	0%	6
Oneloa Beach (Big Beach)	2	2/mo	5	0%	6
Oneuli Beach	2	2/mo	5	0%	6
Palauea Beach Park	2	2/mo	5	0%	6
Papalua	2	2/mo	4	0%	6
Papalua Beach	3	None	0	NA	6
Papohaku Beach	3	None	0	NA	6

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Maui County					
Paukukalo Beach	3	None	0	NA	20
Pelekunu	3	None	0	NA	6
Pepeiaolepo Bay	3	None	0	NA	6
Pohaku Mauiuli Beach	3	None	0	NA	6
Polihua Beach	3	None	0	NA	6
Polo Beach Park	2	2/mo	5	0%	6
Po'olau Beach	3	None	0	NA	6
Po'olenalena Beach	2	2/mo	5	0%	6
Po'olenalena Beach Park	2	None	0	NA	6
Puamana Beach Co. Park	2	2/mo	4	0%	6
Puko'o	3	None	0	NA	6
Punalau	3	None	0	NA	6
Pu'u ola'i (Small Beach)	2	2/mo	5	0%	6
Pu'u Pehe Cove	3	None	0	NA	6
Pu'unoa Beach	2	2/mo	4	0%	6
Sandy Beach	3	None	0	NA	6
Shipwreck Beach	3	None	0	NA	6
Spreckelsville	1	3/wk	85	1%	13
St. Theresa's	2	2/mo	80	5%	6
Ukumehame Beach Co. Pk.	2	2/mo	4	0%	6
Ulua Beach Park	2	2/mo	5	0%	13
Wahikuli State Wayside Park	2	2/mo	4	0%	6
Wai'anapanapa State Park	2	2/mo	0	NA	6
Waiehu Beach Co. Park	2	2/mo	8	0%	13
Waihe'e Beach Co. Park	2	2/mo	4	0%	6
Waikoloa Beach	3	None	0	NA	6
Wailau	3	None	0	NA	6
Wailea Beach Park	1	3/wk	79	0%	13
Waimaha'ihai Beach	3	None	0	NA	13
Waipulani	2	2/mo	4	0%	6

*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 Hunt, C.D., Jr., and Rosa, S.N. "A Multitracer Approach to Detecting Wastewater Plumes From Municipal Injection Wells in Nearshore Marine Waters at Kihei and Lahaina, Maui, Hawaii." U.S. Geological Survey Scientific Investigations Report, 2009-5253. 2009.
- 2 Watson Okubo, Hawaii Department of Health,. Personal communication,. February 2011.
- 3 Hawaii Department of Health. Beaches Environmental Assessment and Coastal Health Act 2010 Notification Report to EPA (draft). Not dated.

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



ILLINOIS

26th in Beachwater Quality

14% 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.

Illinois has 52 public Great Lakes swimming beaches along approximately 60 miles of Lake Michigan shoreline. The Illinois Department of Public Health (IDPH) administers the state’s coastal beach monitoring program.

Using border collies during the beach season to harass gulls every day from dawn to dusk¹ has proved to be an effective means of improving beachwater quality at two gull-impacted beaches in Chicago. The beachwater at 63rd Street Beach (Jackson Park) exceeded standards more than half the time in 2006 and 2007. In 2008, when border collies were used to reduce the number of gulls at the beach, only 6% of water samples exceeded standards. In 2009 there was no gull harassment, and 66% of samples exceeded standards. Gull harassment was reinstated in 2010 and the percent of samples exceeding standards was 22%. Similar success was observed with full-time canine gull harassment at 57th Street Beach in 2008. The water there exceeded standards 20% of the time in 2006, 26% of the time in 2007, 0% of the time in 2008, and 49% of the time in 2009, when dogs were not used. Gull harassment was again in place in 2010 and 13% of samples exceeded standards.

Monitoring Results

In 2010, Illinois reported 61 coastal beaches and beach segments. Of these, 17 (28%) were monitored daily, 33 (54%) more than once a week, and 3 (5%) once a week. Eight (13%) 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, 14%* of all reported beach-monitoring samples exceeded the state’s daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Winnetka Elder Park Beach (61%) and Winnetka Centennial Dog Beach (49%) in Cook County; North Point Marina North Beach in Lake County (49%); Northwestern University Beach (36%), Evanston South Beach (32%), South Shore (30%), Rainbow Beach (24%), and Calumet South Beach (22%) in Cook County; Great Lakes Naval Nunn Beach (22%) in Lake County; Jackson Park Beach (63rd Street Beach) (21%), Montrose Beach (21%), and 31st Street Beach (21%) in Cook County; and Illinois Beach State Park South Beach (20%) in Lake County.

Cook County had the highest percent exceedance rate in 2010 (14%), followed by Lake County (13%).

Sampling Practices: The monitoring season extends from Memorial Day to Labor Day.²

Samples are taken in water that is knee to waist deep. It is up to the managing entity for each beach to issue swim bans and advisories, depending upon EPA guidance and its own policies.²

KEY FINDINGS IN ILLINOIS

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Winnetka Elder Park Beach in Cook County (61%)
- Winnetka Centennial Dog Beach in Cook County (49%)
- North Point Marina North Beach in Lake County (49%)

Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

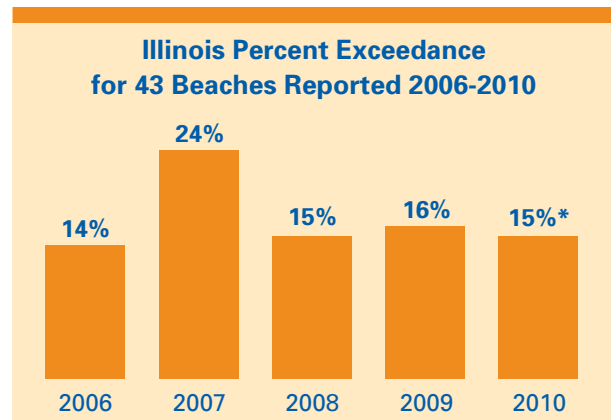
- 337 (66%) unknown sources of contamination
- 107 (21%) agriculture
- 60 (12%) combined sewer overflows
- 4 (1%) stormwater runoff

Most coastal swimming beaches in Illinois are sampled seven days a week, as Illinois believes that daily monitoring is most protective of public health. Areas of shoreline that are not used for swimming because they are rocky or otherwise unsuitable are not monitored.³ Daily monitoring continues when a swim ban or advisory is issued.

Swim Bans and Advisories

Total closing/advisory days for 280 events lasting six consecutive weeks or less decreased 12% to 508 days in 2010, from 576 days in 2009. For prior years, there were 534 days in 2008, 793 days in 2007, 591 days in 2006, and 585 days in 2005. In addition, there was 1 extended event (74 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.

For 280 events lasting six consecutive weeks or less, 88% (448) closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels and 12% (60) were preemptive (i.e., ordered without waiting for monitoring results) due to known sewage spills.



© CHICAGO PARK DISTRICT

Professional gull chasers at work at 63rd Street Beach (Jackson Park) in Chicago. (Chicago Park District)

swim ban. The Chicago Park District posts an advisory at its beaches when sample results are between 235 cfu/100 ml and 1,000 cfu/100 ml, and posts a ban when sample results exceed 1,000 cfu/100ml.⁴

Beach managers may preemptively close beaches or issue swim bans because of rain or other factors.

Several coastal beach managers use predictive models (SwimCast) to make swim ban and advisory decisions. At a minimum, predictions are generally made at 9 a.m. and 1 p.m. and whenever hydrometeorological conditions change. For each beach where the SwimCast system exists, similar but slightly different predictive models are utilized. These

Standards and Procedures: Depending on the managing authority for coastal beaches, an advisory or a swim ban may be issued. The water quality standard in Illinois is an *E. coli* single-sample maximum of 235 cfu/100 ml. The BEACH Act's freshwater beach *E. coli* standard for the geometric mean of five samples taken over a 30-day period of 126 cfu/100 ml is not applied when making swim ban and advisory decisions.

If a sample exceeds the single-sample standard, action is taken in all jurisdictions.³ The Wilmette Health Department and the Winnetka Park District, both in Cook County, take two samples a day. If one sample exceeds the standard, they resample before issuing a swim ban, but if both exceed they issue a

* 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 (15%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (14%).

models predict beachwater conditions on a real-time basis, in contrast to standard culture methods for quantifying bacteria. When culture methods are used as the basis for issuing closings and advisories, health warnings are not issued until at least 24 hours after samples are taken due to the time required to process and read samples. In a sense, using culture methods to issue beach closings and advisories is akin to using the previous day's bacteria density to predict today's. Studies have shown that SwimCast provides a more accurate assessment of current beachwater quality than yesterday's bacterial density.³

SwimCast models produce a 99% confidence interval, a range of bacterial concentrations within which the actual concentration is expected—with 99% confidence—to lie. For beach managers in Lake County that use the SwimCast predictive model, the determination of swim bans and risk advisories is the same at all locations: 1) When the lower bound of the 99% confidence interval prediction is above 235 cfu/100 ml, a swim ban occurs and the beach is posted with a red flag. This is the highest-risk condition. 2) When the average prediction and upper bound of the 99% confidence interval prediction are above 235 cfu/100 ml but the lower bound is below 235 cfu/100 ml, this is considered to be a moderate- to high-risk condition, and an advisory is posted at the beach. 3) When the upper bound of the 99% confidence interval prediction is above 235 cfu/100 ml but the average prediction and the lower bound are below 235 cfu/100 ml, a moderate-risk condition is posted at the beach. 4) When the upper bound of the 99% confidence interval prediction is below 235 cfu/100 ml, this is considered to be a low-risk condition, and a green flag is posted.

Illinois 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Cook County					
12th Street	1	5/wk	71	13%	12
31st Street	1	5/wk	72	21%	18
57th Street	1	5/wk	71	13%	14
Albion	1	5/wk	69	7%	10
Calumet South	1	5/wk	72	22%	22
Chase Ave Park and Beach	3	none	0	NA	0
Evanston Church Dog Beach	3	2 daily	155	6%	0
Evanston Clark	1	2 daily	157	12%	4
Evanston Greenwood	1	2 daily	157	10%	3
Evanston Lee	1	2 daily	155	14%	12
Evanston Lighthouse	1	2 daily	155	10%	1
Evanston South	1	2 daily	155	32%	22
Foster Avenue	1	5/wk	70	10%	13
Glencoe Park	1	daily	119	8%	0
Howard Street Park	1	5/wk	70	9%	10
Jackson Park (63rd Street)	1	5/wk	70	21%	23
Jarvis Avenue Park	1	5/wk	70	10%	10
Juneway Terrace Park	1	5/wk	69	4%	6
Kathy Osterman	1	5/wk	70	19%	17
Kenilworth	1	daily	94	7%	7
Loyola	1	5/wk	71	7%	8
Montrose	1	5/wk	70	21%	21

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Cook County					
North Avenue	1	5/wk	71	3%	5
North Shore Avenue	1	5/wk	0	NA	0
Northwestern University	1	daily	44	36%	9
Oak Street	1	5/wk	72	11%	14
Oakwood	1	5/wk	72	3%	5
Ohio Street	1	5/wk	69	7%	8
Pratt Boulevard Beach and Park	1	5/wk	0	NA	0
Rainbow	1	5/wk	71	24%	24
Rogers Avenue Park	1	5/wk	69	4%	6
Sherwin Avenue Park And Beach	3	none	0	NA	0
South Shore	1	5/wk	73	30%	27
Thorndale	1	5/wk	0	NA	0
Wilmette Gillson Park	1	daily	400	10%	7
Wilmette Gillson Park Dog Beach	1	1/wk	14	7%	2
Wilmette Langdon	1	daily	96	4%	3
Winnetka Centennial Dog Beach	2	daily	72	49%	34
Winnetka Elder Park	1	daily	72	61%	42
Winnetka Lloyd Park	1	daily	71	11%	8
Winnetka Maple Park	1	daily	72	7%	5
Winnetka Tower	1	daily	71	11%	8
Lake County					
Fort Sheridan North	3	none	0	NA	0
Fort Sheridan South	3	none	0	NA	0
Great Lakes Naval Nunn	1	4/wk	60	22%	0
Highland Park Avenue Boating Beach	1	4/wk	53	9%	11
Highland Park Moraine Park Dog Beach	2	1/wk	14	7%	7
Highland Park Rosewood	1	daily	159	4%	0
Illinois State Park Camp Logan	3	none	0	NA	0
Illinois State Park North	1	4/wk	102	8%	5
Illinois Beach State Park Sailing Beach	3	none	0	NA	0
Illinois State Park South	1	4/wk	107	20%	15
Illinois State Park Resort	1	4/wk	106	18%	14
Lake Bluff Dog Beach	2	1/wk	14	7%	7
Lake Bluff Sunrise Beach	1	4/wk	53	8%	7
Lake Forest Forest Park	1	4/wk	160	3%	0
North Chicago Foss Park	3	none	0	NA	0
North Point Marina North	1	4/wk	108	49%	2 (74)*
Waukegan North	1	4/wk	8	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Lake County					
Waukegan South	1	4/wk	154	6%	0
Zion Hosah Park	1	none	0	NA	0

*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 Hartmann, J.W., S.F. Beckerman, T.W. Seamans, R.M. Engeman, and S. Abu-Absi. Report to the City of Chicago on Conflicts With Ring-Billed Gulls and the 2009 Integrated Ring-Billed Gull Damage Management Project. March 25, 2010.
- 2 United States Environmental Protection Agency, Implementing the BEACH Act of 2000 (Report to Congress). October 2006.
- 3 Justin DeWitt, Illinois Department of Health. Personal communication. May 2011.
- 4 Cathy Breitenbach, Chicago Park District. Personal communication. June 2010.

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



INDIANA

28th in Beachwater Quality

16% 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.

Indiana has 30 Great Lakes beaches stretching along 64 miles of Lake Michigan shoreline in three counties. The Indiana Department of Environmental Management (IDEM) administers the state's beach monitoring and notification program.

Monitoring Results

In 2010, Indiana reported *E. coli* monitoring data and notification information for 31 Great Lakes beaches. The sampling frequency for the 28 reported beaches were: 7 beaches (23%) were monitored daily, 17 beaches (55%) more than once a week, and the 7 National Lakeshore beach sites (23%) were monitored 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, 16%* of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Jeorse Park Beach I (75%) and Jeorse Park Beach II (67%) in Lake County, Mount Baldy at Indiana Dunes National Lakeshore in La Porte County (32%), Buffington Harbor Beach in Lake County (28%), Lakeview Beach at Indiana Dunes National Lakeshore (26%) and Indiana Dunes State Park East Beach (21%) in Porter County, and Hammond Marina East Beach (21%) and Whihala Beach West (20%) in Lake County.

Lake County had the highest exceedance rate (21%) in 2010 followed by Porter (13%) and La Porte (11%) counties.

Sampling Practices: Generally, the monitoring season is from late May through the first week of September, but at some beaches sampling may begin and end a week earlier or later.

Sampling practices, locations, standards, and notification protocols are set by the state or in consultation with the state. Specific monitoring locations are used each year to ensure consistency and representative nature of data. Samples are taken in knee-deep water.

Monitoring frequencies are based on a prioritized ranking of beaches, with higher-priority beaches receiving more frequent sampling. The rankings are based on many variables, which include (but are not limited to) bather use, the proximity to known point and non-point sources, and likely effects from heavy rainfall events.¹ Seven Indiana Dunes National Lakeshore beach sites (Kemil, Lake View, Mount Baldy, Dunbar, West, Central, and Porter) are monitored and voluntarily post monitoring and notification data to the Indiana BeachGuard Web site, even though they are not eligible for BEACH Act funding.¹

KEY FINDINGS IN INDIANA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Jeorse Park Beach I in Lake County (75%)
- Jeorse Park Beach II in Lake County (67%)
- Mount Baldy at Indiana Dunes National Lakeshore in La Porte County (32%)

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

- 358 (88%) unknown sources of contamination
- 40 (10%) no information
- 8 (2%) stormwater runoff

Some beaches are routinely sampled seven days a week, and their monitoring schedules do not change when they are closed or under advisory. At some of the beaches that are not sampled seven days a week, additional samples may be collected during a closing or advisory; at other beaches, the monitoring frequency is not changed.

Closings and Advisories

Total closing/advisory days for 217 events lasting six consecutive weeks or less increased 45% to 406 days in 2010 from 387 days in 2009. For previous years, there were 333 days in 2008, 213 days in 2007, 111 days in 2006, and 131 days in 2005. There was one extended event (53 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.

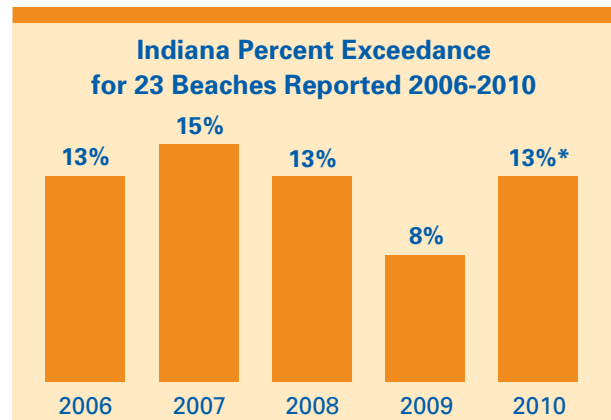
For the 217 events lasting six consecutive weeks or less, 89% (360) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, 1% (6) were preemptive (i.e. without waiting for monitoring results) due to heavy rainfall, and there was no information for 10% (40).

Standards and Procedures: Both closings and advisories are issued in Indiana. The state has an *E. coli* single-sample maximum standard of 235 cfu/100 ml. The BEACH Act's freshwater beach *E. coli* standard for the geometric mean of five samples taken over a 30-day period of 126 cfu/100 ml is not applied when making closing and advisory decisions.

Beach managers issue an advisory or closing if monitoring results indicate the presence of *E. coli* in concentrations greater than 235 cfu/100ml.¹ There is no protocol for forgoing a closing or advisory when a single-sample exceedance occurs, and resampling to confirm an exceedance is not done before a closing or advisory is issued.

BEACH Act grants have been used to partially fund the development of models that predict beachwater quality. These models make predictions based on current conditions, turbidity, chlorophyll content, and color. A model called Project SAFE was used in 2010 for Ogden Dunes, Wells Street, Marquette, and Lake Street beaches.² Each weekday morning, beach managers were given the model's predicted likelihood that the *E. coli* count would exceed safe limits. On that basis, the beach manager chose whether to issue an advisory or closing. Physical bacterial monitoring continued at these beaches to complement the predictive modeling information.

Beach managers have the discretion to preemptively issue advisories or closings if conditions that may result in elevated *E. coli* levels exist, such as heavy rainfall or combined sewer overflow events.¹ La Porte County issues an advisory if excessive debris, such as oil globules, or algae are found in the lake or on the beach. Beach managers can also close a beach for weather and current conditions, such as a rip current.



* 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 (13%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (16%).

Indiana 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
La Porte County					
Duneland Beach Stop 31	3	3/wk	40	13%	11
Duneland Beach Stop 34	3	3/wk	39	8%	6
Indiana Dunes National Lakeshore–Central Avenue Beach	2	1/wk	17	18%	3
Indiana Dunes National Lakeshore–Dunbar Beach	3	1/wk	16	13%	2
La Porte County					
Indiana Dunes National Lakeshore–Mount Baldy	1	1/wk	19	32%	6
Indiana Dunes National Lakeshore–State Park Road/Kemil Avenue Beach	2	1/wk	16	13%	3
Long Beach Stop 20	3	3/wk	39	3%	2
Long Beach Stop 24	3	3/wk	40	3%	1
Michiana Shores Stop 37	3	3/wk	37	3%	3
Sheridan Beach Stop 2	1	3/wk	144	5%	7
Sheridan Beach Stop 7	3	3/wk	48	4%	2
Washington Park Beach	1	daily	321	16%	32
Lake County					
Buffington Harbor Beach	2	5/wk	75	28%	26
Hammond Marina East Beach	2	Daily	98	21%	21
Hammond Marina West Beach	2	Daily	98	10%	10
Jeorse Park Beach I	2	5/wk	75	75%	78
Jeorse Park Beach II	2	5/wk	75	67%	21 (53)*
Lake Street Beach	2	5/wk	160	11%	18
Marquette Park Beach	2	5/wk	320	11%	24
Wells Street Beach	2	5/wk	80	5%	4
Whihala Beach East	1	Daily	104	12%	12
Whihala Beach West	1	Daily	104	20%	21
Porter County					
Broadway Beach	2	5/wk	75	11%	8
Drexwood Beach	2	5/wk	75	7%	5
Indiana Dunes National Lakeshore–Porter Beach	2	1/wk	15	7%	1
Indiana Dunes State Park East Beach	1	Daily	106	21%	19
Indiana Dunes State Park West Beach	1	Daily	106	19%	20
Ogden Dunes Beach	3	4/wk	192	9%	28
Shore Avenue Beach	2	5/wk	75	8%	6

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Porter County					
Indiana Dunes National Lakeshore–Lakeview Beach	2	1/wk	19	26%	5
Indiana Dunes National Lakeshore–West Beach	1	1/wk	15	7%	1

*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 Michelle Caldwell, Indiana Department of Environmental Management. Personal communication.

2 USGS. “About Project S.A.F.E.” http://www.gls.usgs.gov/main.php?content=research_projectSAFE_about&title=Project%20S.A.F.E.0&menu=research_initiatives_projectSAFE. Accessed June 2011.

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



LOUISIANA

30th in Beachwater Quality

37% 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.

Most of Louisiana's coastline consists of wetlands. However, there are at least 19 coastal beaches lining nearly 30 miles of the Gulf of Mexico and estuarine shoreline, including the barrier island Grand Isle, as well as some beaches near the Texas border and on the shore of the estuary of Lake Pontchartrain. The state's coastal monitoring program is administered by the Louisiana Department of Health and Hospitals (LDHH).

During 2010, Louisiana's beaches were impacted by the BP oil disaster, which began with the April 20, 2010 explosion on the Deepwater Horizon rig and impacted most of the coastal beaches in the eastern half of the state. Oil flowed from the damaged well for three months, until it was capped on July 15, 2010. A total of 2,232 closing days at 11 beach segments were issued due to the spill in 2010, and many beaches remained closed into 2011 because of oil washing ashore and continued cleanup efforts. NRDC includes all oil spill closure days at all beaches in its oil spill totals, including closure days at beaches that were not monitored weekly for bacteria in 2010 and closure days that occurred outside of the monitoring season.

Also in 2010, beaches in Louisiana continued to experience lingering impacts from hurricanes Katrina and Rita (August and September 2005, respectively) as well as Gustav and Ike (September 2008). Use of Cameron Parish beaches remained below pre-storm levels, although it is slowly recovering as the area is rebuilt. Hackberry Beach in Cameron Parish remained inaccessible.¹

With each water quality sample that is collected, data on water temperature, salinity, tide conditions, weather conditions, and wind direction and speed are also collected. In addition, the total precipitation for the 2 and 3 days prior to sample collection is estimated. No environmental variable was identified that could explain the record high enterococcus densities that were encountered in 2010.¹

KEY FINDINGS IN LOUISIANA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Gulf Breeze (77%) in Cameron Parish
- Constance Beach (70%) in Cameron Parish
- Little Florida (67%) in Cameron Parish

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

- 91 (100%) unknown sources

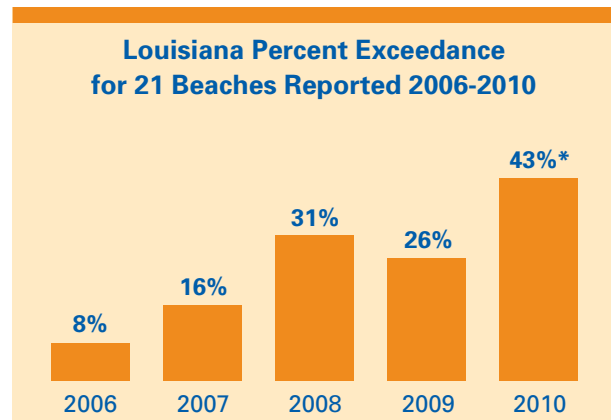
Monitoring Results

In 2010, Louisiana reported 29 coastal beaches. Of these, 27 (93%) were monitored once a week and 1 (3%) was monitored once a month. One beach (3%) was not monitored due to access constraints resulting from previous hurricanes. For this section of the report, NRDC looked at the percent of monitoring samples that exceeded the state's daily maximum bacterial standards. In 2010, 37%* of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Gulf Breeze (77%), Constance Beach (70%), Little Florida (67%), Holly Beach 5 (63%), Rutherford Beach (63%), Holly Beach 4 (60%), and Long Beach (60%), all in Cameron Parish; Cypremort Point State Park (60%) in St. Mary Parish; Holly Beach 1, 2,

3, and 6 (57%) and Martin Beach (50%) in Cameron Parish, and Fontainebleau State Park (43%) in St. Tammany Parish. Cameron Parish had the highest exceedance rate (61%) in 2010, followed by St. Mary (60%), St. Tammany (43%), Orleans (21%), Calcasieu (20%), Lafourche (9%), and Jefferson (8%) parishes.

In addition to beaches monitored by LDHH under the BEACH Act, the Lake Pontchartrain Basin Foundation, a nonprofit, membership-based citizens' organization, has monitored additional beaches and sites around Lake Pontchartrain since 2000, but NRDC was unable to retrieve those monitoring results from the U.S. EPA, and those beaches are not included in this summary.

Pontchartrain Beach was monitored again in 2010 by LDHH as part of an ongoing reexamination of the swim advisory on that portion of Lake Pontchartrain, and Fontainebleau State Park on Lake Pontchartrain has been regularly monitored by the state since the inception of the program.



Sampling Practices: Monitoring is conducted from the beginning of April through the end of October.

The LDHH determines sampling practices, locations, standards, and notification protocols and practices at Louisiana beaches monitored through the BEACH Act. Samples are collected 12 inches below the surface in water that is approximately 3 feet deep. Levels of beach use and perceptions of water quality determine monitoring priorities. Monitoring frequency does not increase after a beach is placed under advisory unless the contamination source has been identified and corrected, in which case more intensive sampling may be conducted.

Closings and Advisories

Total closing/advisory days for 8 events lasting six consecutive weeks or less decreased 81% to 91 in 2010 from 472 in 2009. For prior years, there were 221 days in 2008, 459 days in 2007, 5 days in 2006, and 406 days in 2005. In addition, there were 3 extended events (218 days total) and 25 permanent events (4,963 days total) 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 for 8 events lasting six consecutive weeks or less in 2010 were due to monitoring that revealed elevated bacteria levels, as were over half of the permanent closing and advisory days. One-hundred sixty of the extended days and 2,072 of the permanent days were due to the Gulf oil spill. A 42-day contamination advisory that was issued during the oil spill closure at Grand Isle Beach 1 is excluded from this analysis.

Standards and Procedures: LDHH issues beach advisories based on water quality, but does not have the authority to issue beach closings under the beach monitoring program. Local governments, however, can issue closings. Water quality standards are not met if any of the following are exceeded: 1) an enterococcus single-sample maximum standard of 104 cfu/100 ml, 2) an enterococcus geometric mean of 35 cfu/100 ml for five samples taken over a 30-day period, or 3) a fecal coliform geometric mean of 200 cfu/100 ml based on a minimum of five samples taken over no more than a 30-day period. Multiple samples are sometimes taken, and when they are, the results are averaged to determine whether standards are being exceeded.¹ An exceedance of any of these three standards can trigger an advisory, but the fecal coliform standard is rarely exceeded.¹

Other than taking a resample to verify exceedances when the results are in doubt, which rarely happens, there is no protocol for forgoing an advisory when an exceedance is found. It is noteworthy that the majority of advisories in

* 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 (43%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (37%).

Louisiana result from exceedance of the enterococcus geometric mean criterion. If Louisiana issued beach advisories based only on the enterococcus single-sample maximum criterion, as many states do, 37% of the observed exceedances during 2010 would not have resulted in an advisory.¹

Preemptive rainfall advisories are not issued. Louisiana's BEACH Program has examined data collected over many years to assess the relationship between indicator organism densities and environmental conditions (including water temperature, salinity, tide conditions, weather conditions, and wind direction and speed) at its beaches. The models that have been developed for each beach explain only a small fraction of the total variability in indicator organism density and cannot be used to issue precautionary advisories.

Louisiana 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Calcasieu County					
North Beach–Lake Charles	1	1/wk	30	13%	20 (58)*
South Beach & Rabbit Island	1	1/wk	30	27%	3 (136)*
Cameron County					
Constance Beach	2	1/wk	30	70%	0 (172)*
Gulf Breeze	2	1/wk	30	77%	0 (179)*
Hackberry Beach	2	none	0	NA	0
Holly Beach 1	1	1/wk	30	57%	0 (166)*
Holly Beach 2	1	1/wk	30	57%	0 (179)*
Holly Beach 3	1	1/wk	30	57%	0 (172)*
Holly Beach 4	1	1/wk	30	60%	0 (179)*
Holly Beach 5	1	1/wk	30	63%	0 (179)*
Holly Beach 6	1	1/wk	30	57%	0 (179)*
Little Florida	2	1/wk	30	67%	0 (172)*
Long Beach	2	1/wk	30	60%	0 (172)*
Martin Beach	2	1/wk	30	50%	0 (172)*
Rutherford Beach	2	1/wk	30	63%	0 (179)*
Jefferson County					
Grand Isle Beach 1	2	1/wk	29	7%	0 (224)*
Grand Isle Beach 2	2	1/wk	29	14%	43 (80)*
Grand Isle Beach 3	2	1/wk	30	3%	8 (80)*
Grand Isle State Park 1	1	1/wk	27	7%	7 (224)*
Grand Isle State Park 2	1	1/wk	27	11%	0 (224)*
Grand Isle State Park 3	1	1/wk	28	7%	0 (224)*
Grand Isle State Park 4	1	1/wk	28	4%	0 (224)*
Lafourche County					
Fourchon 1	1	1/wk	24	13%	0 (238)*
Fourchon 2	1	1/wk	23	9%	0 (238)*
Fourchon 3	1	1/wk	23	9%	0 (238)*
Fourchon 4	3	1/mo	6	0%	0 (238)*

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Orleans County					
Pontchartrain Beach	NA	1/wk	29	21%	0 (365)*
St. Mary County					
Cypremort Point State Park	1	1/wk	30	60%	0 (179)*
St. Tammany County					
Fontainebleau State Park	1	1/wk	30	43%	10 (111)*

*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 Louisiana Department of Health and Hospitals. Louisiana BEACH Grant Report 2010 Swimming Season. March 2011.

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



MAINE

23rd 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.

There are more than 30 miles of public-access beaches stretching along Maine's Atlantic waters, including bays, sounds, and estuaries. The coastal beach water quality monitoring program, Maine Healthy Beaches (MHB), is managed by the Maine Department of Environmental Protection (DEP) and coordinated by the University of Maine Cooperative Extension/Maine Sea Grant.

The MHB program provides sophisticated resources and assistance to towns and state parks experiencing poor beachwater quality. For example, because of elevated levels of enterococcus bacteria at Laite Beach and Camden Yacht Club Recreation Area, supplemental funding was obtained from the US EPA to conduct a boater's education campaign and to do additional monitoring in order to identify pollution sources. As a part of this effort, 106 samples were analyzed for enterococcus and an additional 47 samples were analyzed for optical brighteners (laundry detergent additives that, together with elevated fecal indicator bacteria, indicate the presence of human sewage). This monitoring revealed bacterial contributions from storm drain outfalls in the Megunticook River and Rock Brook, from the Camden Wastewater Treatment Facility, and from the large waterfowl population residing in the Camden inner harbor. As a result of the effort, the town of Camden identified two illicit sewage cross-connections to the storm drainage network. A separate investigation in the Rock Brook watershed, led by DEP staff, identified a broken sewer line.

Boater education activities were aimed at convincing boat owners to empty their sewage holding tanks into Camden's pump-out boat instead of emptying them into the ocean. The campaign included developing and distributing education and outreach materials, giving public presentations, and surveying Camden's mooring and slip permit holders. In 2010, 4,000 gallons more sewage was pumped into the pump-out boat than in 2009, though the values in 2009 may have been unusually low due to poor weather conditions and low boat traffic. An increase of 2,000 gallons was pumped into the pump-out boat in 2010 compared with 2008; because both seasons had similar weather and boat traffic, the additional capture in 2010 reflects well on the campaign.¹

In 2010, MHB continued to support intensified monitoring in the Cape Neddick River watershed in an effort to identify sources of beachwater contamination at Cape Neddick Beach. MHB also assisted the town of York in developing a work plan to find and fix sources of pollution impacting the beach. The plan includes conducting sanitary surveys, enforcing the town's septic tank pump-out ordinance, and providing restroom facilities at the beach.³

Additional monitoring conducted by MHB revealed that Lincolnville Beach's elevated levels of bacterial pollution are likely caused by malfunctioning septic systems, wildlife, and illicit connections to the storm drainage network along U.S. Route 1. This area is historically a tidal wetland; it has unsuitable soils and limited space for septic systems, and one restaurant's septic system is underwater when tides are especially high. Local businesses must limit the number of patrons

KEY FINDINGS IN MAINE

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Goodies Beach in Knox County (45%)
- Laite Beach in Knox County (32%)
- Lincolnville Beach Area in Waldo County (30%)

Reported Sources of Beachwater Contamination

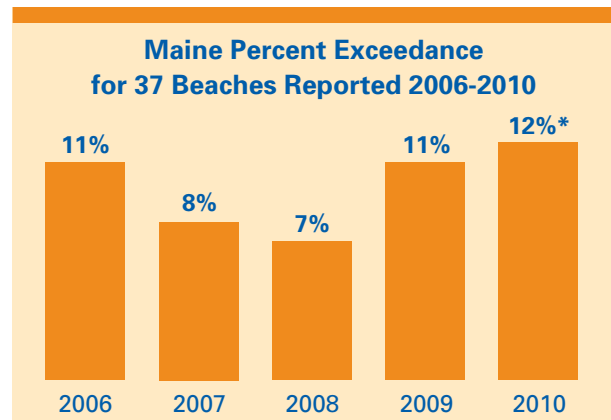
Statewide (number of closing/advisory days)

- 207 (100%) unknown

and hours of operation because of the lack of adequate wastewater disposal options. The town has paid for engineers to plan and design additional wastewater infrastructure that would allow for elimination of septic tanks, but there is currently no money to support construction.³

Special monitoring was conducted in 2010 to help identify sources of contamination at many other beaches in Maine, including the Ducktrap Recreation Area and Higgins Beach, which are under permanent swimming advisories; Goodies Beach, Popham Beach, Old Orchard Beach–Ocean Park, Kinney Shores, Gooches Beach, Ogunquit beaches, Sea Point Beach, and three beaches in southern Maine.³

As of 2010, the beach at the mouth of Ducktrap River is no longer participating in the MHB program as it lacks adequate public parking and access and has low usage. The town has posted it with a permanent swimming advisory and is not promoting it as a swimming area.²



Monitoring Results

In 2010, Maine reported 61 coastal beaches. Of these, 3 (5%) were monitored more than once a week, 54 (89%) were monitored once a week, 2 (3%) were monitored every other week, and 2 (3%) were monitored once a month. 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. The beaches with the highest percent exceedance rates in 2010 were Goodies Beach (45%) and Laite Beach (32%) in Knox County; Lincolnville Beach Area in Waldo County (30%); Short Sands Beach (28%), Little Beach (28%), Riverside (Ogunquit) (24%), Sea Point Beach (24%), and Goose Rocks (21%) in York County; and Lagoon Beach in Sagadahoc County (20%).

Knox County had the highest exceedance rate (33%) in 2010, followed by Waldo (30%), York (10%), Cumberland (8%), Hancock (8%), Sagadahoc (7%), and Lincoln (0%) counties.

Sampling Practices: The monitoring season lasts approximately three months, from Memorial Day through Labor Day. Monitoring is extended to include spring wet-weather monitoring and special studies for targeted areas.²

Monitoring coastal water quality for swimming and other water-contact usage is the responsibility of local jurisdictions, municipalities, or state parks and is not mandated by state law. Samples are taken in 2-3 feet of water. MHB is a voluntary program, and in order to participate, a beach must have a beach management entity that can meet the program's protocols and conditions.

Monitoring sites for each beach are selected at places where people swim, at sources of freshwater inputs to the beach, and near other high-risk features including sewage treatment plant outfalls, and wildlife.³ Once a beach is closed or placed under advisory, MHB recommends that the monitoring frequency increase until the beach is reopened. However, not all localities have the ability to conduct increased monitoring, and as a result the beaches in these towns cannot be reopened until the next routine sample is analyzed.²

For areas experiencing chronic bacterial pollution, additional monitoring sites are added throughout the watershed, and/or wet-weather monitoring is conducted to help determine the sources of pollution.³ Many times, monitoring for special studies conducted by MHB includes analysis of optical brighteners. Optical brighteners are fluorescent white dyes

* 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%).

that are added to laundry soaps, detergents, paper products, and textiles that make materials appear whiter. Because household plumbing systems mix effluent from washing machines and toilets together, optical brighteners are found in human sewage in septic systems and wastewater treatment plants. When concentrations of optical brighteners are greater than 200 µg/L in water with elevated fecal indicator bacteria levels, human sources of fecal contamination are suspected.³

Closings and Advisories

Total closing/advisory days for 71 events lasting six consecutive weeks or less decreased 17%, to 207 days in 2010 from 250 days in 2009. For prior years, there were 170 closing/advisory days in 2008, 176 days in 2007, 134 days in 2006, and 92 days in 2005. In addition, there were no extended and 2 permanent events (730 days) 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: Both closings and advisories are issued in Maine, but closings are rare and occur only when beaches experience chronic high bacteria levels or known safety or public health threats, and in municipalities where closing ordinances are in place.² When determining whether to recommend a beach advisory, MHB applies a single-sample standard for enterococcus of 104 MPN/100 ml.

Results of all monitoring samples are transmitted to the MHB database, and automatic e-mail alerts are issued to beach managers, local officials, and other entities as soon as an exceedance is found. Advisories are not issued solely on the basis of monitoring results. The decision to post a beach is made by the local beach manager (in partnership with MHB staff), who considers factors including bacteria levels, environmental conditions, risk of pollution, and history of high bacteria levels.³ Each decision is made on a case-by-case basis. Depending on the conditions, MHB will recommend an advisory or closing when the standards are exceeded, and the decision to post an advisory or closing for a beach is the responsibility of the town or state park.² The only beach managers who automatically post an advisory or closing after one sample exceeds standards are the state park beach managers for Popham, Ferry (Saco), Kettle Cove, Crescent State Park, Reid-East, Lagoon, and Half Mile beaches. For areas with historically good water quality and a low risk of pollution, an advisory may not be posted until resample results are available. Scarborough Beach is a state park beach but is privately managed, and advisories at this beach may not be issued until resampling confirms an exceedance. Whether to resample before issuing an advisory also depends on the magnitude of the exceedance and knowledge of a pollution event, if any. MHB staff follow up after each exceedance to ensure that state protocols were followed correctly and in a timely manner.²

The program recommends that precautionary rainfall advisories be posted at urban beaches with a history of elevated bacteria levels and stormwater issues. There are a few communities in Maine that, depending on conditions, may post an advisory after a specified amount of rainfall.² Local officials are notified when there is a known sewage spill.

Maine 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Cumberland County					
Crescent Beach State Park	1	1/wk	26	0%	0
East End Beach	1	3/wk	57	12%	11
Ferry Beach (Scarborough)	1	1/wk	17	18%	4
Higgins Beach	1	1/wk	41	0%	0 (365)*
Kettle Cove Beach	1	1/wk	14	7%	2
Pine Point	1	1/wk	15	7%	0
Scarborough Beach	1	1/wk	42	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Cumberland County					
Willard Beach	1	2/wk	88	14%	11
Winslow Park	2	2/mo	8	25%	3
Hancock County					
Hadley Point	1	1/wk	16	13%	0
Hulls Cove	1	1/wk	16	13%	2
Sand Beach	1	1/wk	29	3%	0
Hancock County					
Seal Harbor	0	1/wk	11	0%	0
Town Beach	1	1/wk	32	9%	2
Knox County					
Goodies Beach	1	1/wk	22	45%	25
Laite Beach	1	1/wk	19	32%	10
Sandy Beach	1	1/wk	16	19%	2
Lincoln County					
Pemaquid Beach	2	2/mo	14	0%	0
Sagadahoc County					
Half Mile Beach	2	1/mo	6	0%	0
Lagoon Beach	1	1/wk	15	20%	9
Mile Beach	1	1/wk	26	0%	0
Popham–Center Beach	1	1/wk	10	10%	3
Popham–East Beach	1	1/wk	26	4%	3
Popham–West Beach/Morse River	1	1/wk	33	9%	9
Reid–East Beach	2	1/mo	0	NA	0
Waldo County					
Ducktrap River	1	2/wk	0	NA	0 (365)*
Lincolnville Beach Area	1	1/wk	23	30%	8
York County					
Bay View	1	1/wk	14	0%	0
Cape Neddick Beach	1	1/wk	16	13%	3
Casino Square	1	1/wk	19	16%	1
Colony Beach	1	1/wk	15	13%	7
Crescent Beach (Kittery)	1	1/wk	14	7%	0
Crescent Beach (Wells)	1	1/wk	17	18%	0
Drakes Island Beach	1	1/wk	29	3%	0
Ferry Beach (Saco)	1	1/wk	13	0%	0
Footbridge (Ogunquit)	1	1/wk	15	7%	0
Fort Foster	1	1/wk	44	2%	2
Fortunes Rocks Beach	1	1/wk	14	0%	0
Gil Bouche Park/Biddeford Pool	1	1/wk	14	0%	0
Gooches Beach	1	1/wk	34	18%	9

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
York County					
Goose Rocks	1	1/wk	67	21%	18
Hills Beach	1	1/wk	14	7%	2
Kennebunk Beach	1	1/wk	15	7%	0
Kinney Shores	1	1/wk	14	0%	0
Laudholm Beach	1	1/wk	30	3%	0
Libby Cove Beach	1	1/wk	15	7%	0
Little Beach	1	1/wk	18	28%	12
Long Sands Beach	1	1/wk	100	19%	3
Main (Ogunquit)	1	1/wk	14	0%	0
Middle Beach	1	1/wk	14	0%	0
Middle Beach	1	1/wk	15	7%	0
Moody (Ogunquit)	1	1/wk	16	13%	0
Old Orchard Beach–Central	1	1/wk	56	0%	0
Old Orchard Beach–North End	1	1/wk	28	0%	0
Old Orchard Beach–Ocean Park	1	1/wk	31	6%	1
Riverside (Ogunquit)	1	1/wk	38	24%	18
Sea Point Beach	1	1/wk	17	24%	10
Short Sands Beach	1	1/wk	18	28%	14
Wells Beach	1	1/wk	42	0%	0
Wells Harbor	1	1/wk	15	7%	0
York Harbor Beach	1	1/wk	16	13%	3

*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.

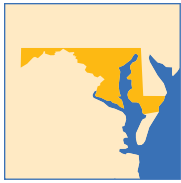
NOTES

1 Maine Healthy Beaches Program. Camden Harbor Water Quality Project. April 2011.

2 Keri Lindberg, University of Maine Cooperative Extension and Sea Grant. Personal communication, May 2011.

3 Maine Healthy Beaches Program. 2010 Report to US EPA. April 2011.

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



MARYLAND

16th in Beachwater Quality

7% 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.

There are 70 coastal beaches in Maryland lining 20 miles of the Atlantic Ocean, Chesapeake Bay, and other bays and sounds. Beachwater quality is monitored in a program administered by the Maryland Department of the Environment (MDE).

Maryland's recent actions to reduce stormwater pollution, including the Stormwater Management Act of 2007, a new general permit to control stormwater discharge during construction, and new municipal stormwater permits now being issued for Maryland's 10 largest counties, are estimated to reduce urban stormwater by 20 to 30 percent when fully implemented.¹

In 2010, Maryland took part in a study to investigate the role of bacterial regrowth in near shore sediments and how this regrowth contributes to indicator bacterial levels in the water column. Results from this study will help to determine actual and potential pollution sources at beaches that have the highest rate of water quality exceedences because it will show whether bacterial regrowth in the sediments is contributing to exceedance of water quality standards.²

Monitoring Results

In 2010, Maryland reported 70 coastal beaches, 30 (43%) of which were monitored once a week, 25 (36%) every other week, and 15 (21%) once a month. Maryland also monitors Assateague Island National Seashore in Virginia. 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, 7% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Tolchester Estates Beach in Kent County (43%), Elk Neck State Park North East River in Cecil County (36%), and YMCA Camp Tockwogh (Youth Camp) (24%), Tolchester Marina and Beach (22%), Echo Hill Camp (Youth Camp) (20%) in Kent County.

Kent County had the highest exceedance rate (25%) in 2010 followed by Cecil (22%), Anne Arundel (7%), Worcester (3%), Calvert (2%), Baltimore (2%), and St Mary's (2%). There were no exceedances at beaches in Queen Anne's and Somerset counties

KEY FINDINGS IN MARYLAND

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Tolchester Estates Beach in Kent County (43%)
- Elk Neck State Park North East River in Cecil County (36%)
- YMCA Camp Tockwogh (Youth Camp) in Kent County (24%)

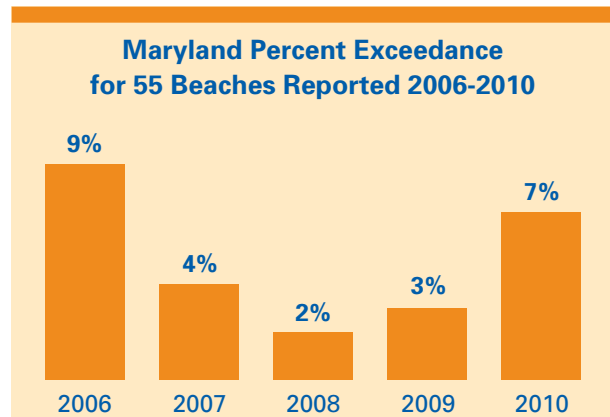
Reported Sources of Beachwater Contamination Statewide (number of closing/advisory days)

- 296 (100%) unknown sources of contamination

Sampling Practices: The monitoring season runs from Memorial Day to Labor Day.

Sampling and notification activities are delegated to local health departments. Current guidance and regulation at this time is consistent across the board and applies to all beaches in Maryland. Samples are taken in knee-deep water, 12 inches below the water's surface. Priority for monitoring Maryland's coastal beaches is based on bather use level, historical water quality, proximity of potential or actual pollution sources, human and animal fecal contamination sources, beach structure, ecological factors, and any other factors that may contribute to beachwater quality.² The highest priority beaches are assigned to Tier 1 and the lowest priority beaches are assigned to Tier 3. Beaches in Maryland are defined in part by use; beaches that are not used are not considered to be beaches and are removed from the beach list.¹

Maryland's beach monitoring program recommends that local health departments resample the following day when a beach is closed or placed under advisory. States that monitor more frequently after an exceedance is found will tend to have higher percent exceedance rates and lower total closing/advisory days than they would if their sampling schedule was not altered after an exceedance was found.



Closings and Advisories

Total closing/advisory days for 28 events lasting six consecutive weeks or less more than doubled to 296 days in 2010. For prior years, there were 133 closing and advisory days in 2009, 61 days in 2008, 243 days in 2007, 317 days in 2006, and 209 days in 2005). In addition, there was one extended advisory (55 days) and no permanent events in 2010. Extended events are those in effect more than six 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: In Maryland, closings are issued for known pollution events or other unsafe conditions and advisories are issued when bacteria standards are exceeded and no known pollution source is present. At its coastal beaches, Maryland applies a 30-day geometric mean standard of 35 cfu/100 ml and a single-sample maximum standard for enterococcus of 10⁴ cfu/100 ml at Tier 1 and Tier 2 beaches and 158 cfu/100 ml at Tier 3 beaches. Three samples are taken per sampling event and the average of the sampling results is used to determine whether the single-sample standard is being met.³ The average of three samples taken per sampling event is used to find five evenly spaced values over a 30-day period that are used to calculate the geometric mean.

If the local health department determines that sampling results indicating an exceedance of the single-sample maximum or geometric mean standard are valid, a notification can be issued without resampling.² If the validity of the sample is in doubt, local health departments may resample before issuing an advisory, but this is not common.

Maryland does not have preemptive rainfall advisory standards, but rainfall information for each beach is provided on the Maryland Healthy Beaches website. The public is always advised to avoid swimming following a significant rain event because potentially harmful bacteria concentrations may rise after heavy rains due to polluted stormwater runoff.²

If a known pollution source exists (e.g., a combined sewer overflow, failing sewer infrastructure, or wastewater treatment discharge), the county must close the beach.⁴ Also, if there is any dangerous contaminant or condition, the local health department or the MDE may order an immediate closing.⁴

Maryland 2010 Monitoring Results and Closing or Advisory Days

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Anne Arundel County					
Annapolis Sailing	1	1/wk	17	6%	0
Arundel on the Bay	2	2/mo	7	0%	0
Atlantic Marina Resort	2	2/mo	9	22%	0
Bay Ridge at Bay Drive	1	1/wk	17	6%	0
Bay Ridge at River Drive	1	1/wk	17	0%	0
Bayside Beach	3	1/mo	11	27%	6
Beverly Beach	2	2/mo	9	11%	0
Cape Anne	3	1/mo	5	20%	0
Cape St. Claire at Persimmon Point	2	2/mo	9	11%	0
Cedarhurst	2	2/mo	8	0%	0
Fairhaven	2	2/mo	8	0%	0
Fort Smallwood at Pond Drive	3	1/mo	7	0%	0
Fort Smallwood Park	3	1/mo	6	0%	0
Franklin Manor	2	2/mo	8	0%	0
Highland Beach	2	2/mo	7	0%	0
Idlewilde on the Bay	3	1/mo	4	0%	0
Mason's Beach	3	1/mo	4	25%	0
Mayo Beach Park	1	1/wk	17	0%	0
Mountain Point at Gibson Island	2	2/mo	7	0%	0
Oyster Harbor	2	2/mo	8	13%	0
Rose Haven	2	2/mo	8	0%	0
Round Bay Main Beach	1	1/wk	17	0%	0
Sandy Point State Park East Beach	1	1/wk	19	5%	0
Sandy Point State Park South Beach	1	1/wk	17	0%	0
Saunders Point	2	2/mo	9	22%	0
Town Point at Arkhaven	3	1/mo	4	0%	0
Turkey Point at Cloud Beach	2	2/mo	7	0%	0
Venice on the Bay	2	2/mo	10	30%	9
Baltimore County					
Gunpowder Falls State Park–Hammerman	2	2/mo	14	7%	24
Hart Miller Island	2	2/mo	10	0%	0
Miami Beach	2	2/mo	13	0%	9
Rocky Point Park	2	2/mo	10	0%	0
Calvert County					
Breezy Point	1	1/wk	13	0%	0
Brownie's Beach	1	1/wk	13	0%	0
Chesapeake Station	2	2/mo	6	0%	0
Driftwood	2	2/mo	9	11%	8

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Calvert County					
Flag Harbor	2	2/mo	7	0%	0
Flag Ponds	2	2/mo	7	0%	0
North Beach	1	1/wk	13	8%	5
Scientists Cliffs	3	1/mo	4	0%	0
Seahorse	2	2/mo	8	0%	0
Windward Keys	2	2/mo	15	0%	0
Cecil County					
Crystal Beach Manor	2	2/mo	10	20%	12
Elk Neck State Park North East River	1	1/wk	14	36%	35
Grove Point Camp	3	1/mo	6	17%	7
Red Point Beach	3	1/mo	5	0%	0
West View Shores	3	1/mo	6	17%	7
Kent County					
Boy Scout Beach (Eliason)	1	1/wk	8	25%	0
Echo Hill Camp (Youth Camp)	1	1/wk	20	20%	49
Ferry Park	1	1/wk	18	17%	19
Tolchester Estates Beach	1	1/wk	21	43%	9 (55)*
Tolchester Marina and Beach	1	1/wk	18	22%	71
YMCA Camp Tockwogh (Youth Camp)	1	1/wk	21	24%	19
Queen Anne's County					
Camp Wright	3	1/mo	10	0%	0
Matapeake	3	1/mo	15	0%	7
Somerset County					
Janes Island	3	1/mo	4	0%	0
Wellington	3	1/mo	5	0%	0
St. Mary's County					
Cedar Cove Community Beach	1	1/wk	16	0%	0
Elm's Beach–Public Beach	1	1/wk	16	6%	0
Point Lookout State Park	1	1/wk	16	0%	0
Worcester County					
Assateague State Park	1	1/wk	15	0%	0
North Beach Site #1 (State Park Boundary)	1	1/wk	15	0%	0
North Beach Site #2 (Ranger Station)	1	1/wk	15	0%	0
Ocean City Beach 1	1	1/wk	29	3%	0
Ocean City Beach 2	1	1/wk	29	3%	0
Ocean City Beach 3	1	1/wk	29	3%	0
Ocean City Beach 4	1	1/wk	29	3%	0
Ocean City Beach 5	1	1/wk	29	3%	0
Ocean City Beach 6	1	1/wk	29	3%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Worcester County					
Oceanside #3	1	1/wk	15	0%	0
Accomack County, VA					
Assateague Island National Seashore (managed by Maryland)	1	1/wk	14	0%	0

*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 Heather Merritt, Maryland Department of the Environment, personal communication, June 2011.
- 2 Heather Merritt, Maryland Department of the Environment, personal communication, March 2011.
- 4 Maryland Department of the Environment. Guidance for County Recreational Water Quality Monitoring and Notification Programs. December 2003.
- 4 Code of Maryland. Subtitle 09 Water Pollution. 26.08.09 Public Bathing Beaches.

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



MASSACHUSETTS

15th in Beachwater Quality

6% 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.

Massachusetts has 525 public and semipublic marine beaches along 204 miles of sandy beach that line Atlantic waters. The monitoring program is administered by the Massachusetts Department of Public Health (MDPH).

In 2010, the Massachusetts Institute of Technology and Woods Hole Oceanographic Institution continued their study to determine the source of bacteria that lead to periodic beach closures on Cape Cod. Samples of sand and water were collected and analysis begun to determine whether pathogens were present and what their source might be.¹

In July 2010, Pleasant Bay off Cape Cod became the state's latest no-discharge zone. No-discharge zones are designated by the U.S. EPA and prohibit both treated and untreated sewage discharges from boats. Within no-discharge zone boundaries, boat operators are required to retain their sewage onboard for disposal at sea (beyond three miles from shore) or onshore at a pump-out facility. The no-discharge zone designation for Pleasant Bay was requested by the Pleasant Bay Resource Management Alliance, comprising the four towns that share the bay: Orleans, Brewster, Chatham, and Harwich.¹

Chatham began building a new wastewater treatment facility in the spring of 2010. Construction of the plant, five pump stations, and sewer mains is expected to take 30 months to complete. This plant, funded in part by American Reinvestment and Recovery Act (ARRA) funds, will ultimately allow about two-thirds of town residents to be connected to municipal wastewater treatment instead of septic tanks.¹

Overall, \$185 million in ARRA money was awarded for water infrastructure in Massachusetts, including roughly \$44 million for Cape Cod wastewater and drinking water projects. Approved projects in the coastal towns of Provincetown, Oak Bluffs, Edgartown, Marion, and Wareham will extend the sewer lines and in some cases upgrade the town's municipal sewage treatment facilities so that homes and businesses currently served by septic tanks can sewer their wastes instead. The result will be less pollution of surface waters because of fewer sanitary sewer overflows and septic system failures. In addition, ARRA funds are helping New Bedford remove grit and sediment from its sewer system. Removal of the sediment should provide additional capacity during wet weather events, mitigate street flooding, and eliminate the potential for dry weather discharges, reducing the volume and frequency of raw and partially treated sewage discharges.¹

A 17-foot-diameter combined-sewer overflow tunnel in South Boston was expected to become operational on June 1, 2011. In addition to holding combined-sewer overflows for later treatment, this tunnel will store stormwater flows

KEY FINDINGS IN MASSACHUSETTS

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Kings at Stacy Brook in Essex County (83%)
- Cockle Cove Creek (parking lot) in Barnstable County (58%)
- Great Pond at Long Point in Dukes County (50%)

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

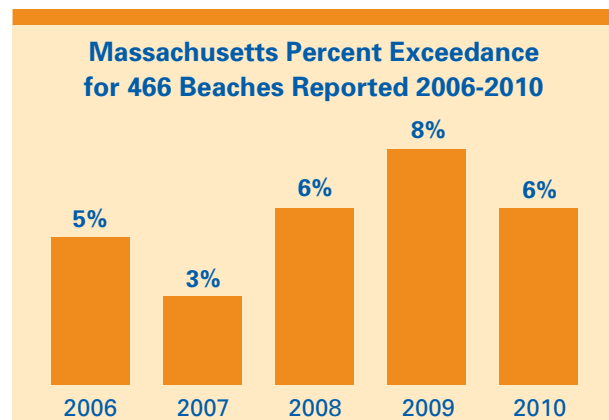
- 1,172 (93%) unknown sources of contamination
- 84 (7%) stormwater runoff

during all but the largest rainstorms and will pump both stormwater and combined-sewer overflow for treatment as capacity allows, thus preventing a large bacterial source from reaching beaches in South Boston.¹

There was heavier-than-normal rainfall in Massachusetts during August 2010. Close to six inches of rain fell in the Boston area, 71% more than the monthly average, and close to five inches of rain fell on Cape Cod, 33% more than the monthly average.¹ This may have contributed to poor water quality at the beaches in these areas during this period.

Monitoring Results

In 2010, Massachusetts reported 614 coastal beaches and beach segments, 12 (2%) of which were monitored daily, 545 (89%) once a week, 7 (1%) every other week, and 50 (8%) once a month. 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, 6% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. Twenty-eight of Massachusetts' beaches exceeded the standard at least 20% of the time. The beaches with the highest percent exceedance rates in 2010 were Kings at Stacy Brook in Essex County (83%), Cockle Cove Creek (parking lot) in Barnstable County (58%), Great Pond at Long Point in Dukes County (50%), Pearse in Bristol County (47%), Shorewood Beach Association in Barnstable County (38%), Pond at Lucy Vincent Beach in Dukes County (35%), Independence Park in Essex County (33%), Parkhurst in Norfolk County (33%), Cockle Cove Creek in Barnstable County (33%), and Sepiessa Point in Dukes County (33%). Norfolk County had the highest exceedance rate (15%) in 2010 followed by Dukes (15%), Essex (8%), Bristol (7%), Nantucket (7%), Suffolk (5%), Plymouth (4%), and Barnstable (4%) counties.



Note that in some counties, such as Nantucket County, most of the beaches have a sampling variance. As noted below, variance is allowed under Massachusetts regulations and allows for less frequent sampling at beaches that have no potential sources of contamination and that went two years without an exceedance.¹ In these counties, the exceedance rate may be higher in part because the cleanest beaches in the county are not sampled as frequently.

Sampling Practices: The monitoring season starts as early as Memorial Day at some beaches and last through Labor Day for most.

MDPH coordinates the efforts of a range of collaborators including local boards of health, the Barnstable County Department of Health and the Environment, and the Department of Conservation and Recreation. MDPH determines sampling practices, locations, standards, and notification protocols and practices throughout the state. Samples are collected in three feet of water, one foot below the surface of the water.¹ State water quality regulations require that all public and semipublic freshwater and marine bathing beaches in Massachusetts be monitored during the bathing season for bacterial contamination.² The sampling frequency for Massachusetts' beaches is based on use and the potential for pollution problems. If a beach has been monitored weekly for the two most recent consecutive years with no exceedance of standards being found, and a sanitary survey conducted by a registered sanitarian reveals no potential sources of pollution at that beach, the beach managing entity may be allowed to sample less frequently.

Beachwater quality samples must be taken at the areas of greatest bather load. However, beach operators are encouraged to sample where outfalls and other sources of contamination are present as well as at areas of greatest bather load.¹ When an exceedance is found, sampling is generally conducted every day until the standards are met and the beach is reopened.¹ Also, beaches that issue rainfall advisories generally sample on the day rainfall occurs or the day after.¹ States that monitor more frequently after an exceedance is found or after rainfall 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 507 events lasting six consecutive weeks or less decreased 15% to 1,256 days in 2010, from 1,478 days in 2009. For previous years, there were 1,102 days in 2008, 567 days in 2007, 1,092 days in 2006, and 680 days in 2005. In addition, there were 5 extended events (297 days total) 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.

For the 507 events lasting six consecutive weeks or less, 80% (1,010) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, 7% (84) were preemptive (i.e., ordered without waiting for monitoring results) due to heavy rainfall, and 13% (162) were preemptive due to other reasons.

Standards and Procedures: Beaches are closed to swimming when either the single-sample maximum or the geometric mean standard is exceeded. Whether beach action days are reported to the EPA as closings or advisories, restrictions and notifications are the same. For marine beaches, the standard is a single-sample enterococcus maximum of 104 cfu/100 ml or a five-sample geometric mean of 35 cfu/100 ml.

In addition to fecal indicator bacteria monitoring, beaches must also be tested for oil, hazardous materials, and heavy metals if there is information indicating possible contamination.²

Preemptive rainfall standards are in use at several beaches on Boston Harbor, and preemptive rainfall closings are issued after any significant rainstorm at a bathing beach where there has been a history of violations of water quality standards. In addition to preemptive rainfall closings and closings due to bacterial exceedances, local boards of health and/or the MDPH can close a beach if they determine that there is a threat to human health for any other reason, such as an oil spill.¹ Beaches can be closed because of a red tide (a bloom of the harmful algal bacterium *Alexandrium*) that decreases visibility in the water to such an extent that the beach operator considers it a rescue safety hazard.¹ Local boards of health can also preemptively close beaches that have consistently elevated bacterial indicator levels.

Massachusetts 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Barnstable County					
29 Commercial Street	2	1/wk	16	19%	3
333 Commercial Street	2	1/wk	15	13%	2
451 Commercial Street	2	1/wk	15	13%	3
593 Commercial Street	2	1/wk	13	0%	0
637 Commercial Street	2	1/wk	13	0%	0
Acapesket Improvement Association	2	1/wk	12	0%	0
Allen Harbor	3	1/wk	12	0%	0
Andrew Harding Lane Beach	2	1/wk	12	0%	1
Atkins Lane	2	1/wk	15	13%	3
Atlantic Avenue MA751175	2	1/wk	15	13%	2
Atlantic Avenue MA914656	3	1/wk	4	0%	0
Ballston	3	1/mo	4	0%	0
Bank Street–Bayview Road	3	1/wk	4	0%	0
Barlows Landing	2	1/wk	4	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Barnstable County					
Bass River–East	2	1/wk	14	0%	0
Bass River–West	2	1/wk	14	0%	0
Baxter Avenue	2	1/wk	15	0%	0
Bay Road	2	1/wk	14	0%	0
Bayview	2	1/wk	13	0%	0
Bayview Street	2	1/wk	14	0%	0
Bikepath Beach (Trunk River) MA909064	2	1/wk	15	7%	1
Bikepath Beach (Trunk River) MA946610	2	1/wk	14	0%	0
Boat Meadow	2	1/wk	14	0%	0
Bone Hill	2	1/wk	0	NA	0
Bowerman Beach Club	no data	1/wk	12	0%	0
Breakwater Landing	2	1/wk	14	0%	0
Brewster Dunes	2	1/wk	12	0%	0
Briarwood Marine and Science	2	1/wk	7	0%	0
Bridge Street	2	1/wk	0	NA	0
Bristol–East	2	1/wk	15	7%	0
Bristol–West	2	1/wk	14	0%	0
Brooks	3	1/wk	4	0%	0
Bucks Creek	2	1/wk	15	13%	3
Burton Baker	3	1/mo	13	0%	0
Cahoon Hollow	3	1/mo	4	0%	0
Callies Beach	3	1/mo	4	0%	0
Campground	2	1/wk	15	7%	0
Cape Cod Sea Camps (Bay)	2	1/wk	12	0%	0
Cataumet Harbor	2	1/wk	15	13%	0
Cedar Point Association	2	1/wk	12	0%	0
Chapin Memorial	2	1/wk	13	0%	0
Chapoquoit	2	1/wk	14	0%	0
Chapoquoit Associates–Front Beach	2	1/wk	12	0%	0
Chapoquoit Associates–Little Beach	2	1/wk	12	0%	0
Chatham Bars Inn	2	1/wk	11	0%	0
Chequesset Yacht and Country Club	2	1/wk	12	0%	0
Clipper Lane	no data	1/wk	14	7%	0
Coast Guard–1	2	1/wk	10	0%	0
Coast Guard–2	2	1/wk	10	0%	0
Coast Guard Town	3	1/mo	4	0%	0
Cockle Cove	2	1/wk	12	0%	0
Cockle Cove Creek	2	1/wk	12	33%	0 (75)*
Cockle Cove Creek (parking lot)	2	1/wk	12	58%	0 (49)*
Cold Storage	2	1/wk	13	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Barnstable County					
Cold Storage/Pond Village	3	1/wk	15	7%	1
Cole Road	2	1/wk	15	7%	1
Colonial Acres	2	1/wk	13	0%	0
Colonial Acres–East	2	1/wk	17	0%	0
Columbus Avenue	2	1/wk	14	0%	0
Cook's Brook	2	1/wk	14	0%	0
Cordwood Road	2	1/wk	0	NA	0
Corn Hill	3	1/mo	4	0%	0
Corporation	2	1/wk	14	0%	0
Cotuit Bay Shores Association	2	1/wk	12	0%	0
Court Street	2	1/wk	16	19%	3
Covell's	2	1/wk	15	0%	0
Craigville	2	1/wk	15	0%	0
Craigville Beach Club	2	1/wk	14	0%	0
Crocker's Neck	2	1/wk	15	7%	1
Crosby Landing	2	1/wk	14	0%	0
Cross Street	2	1/wk	0	NA	0
Crow's Nest (496 Shore Road)	2	1/wk	15	7%	1
Dowses	2	1/wk	15	0%	0
Duck Harbor	3	1/mo	4	0%	0
Dune's Colony (648 Shore Road)	2	1/wk	15	7%	1
Dyer Prince	2	1/wk	14	0%	0
Earle Road	3	1/wk	14	7%	2
East (Town) Beach	2	1/wk	14	7%	1
East Sandwich	2	1/wk	14	7%	1
Electric Avenue	2	1/wk	4	0%	0
Ellis Landing	2	1/wk	14	0%	0
Ellis Landing Park Condominiums	2	1/wk	12	0%	0
Englewood	2	1/wk	13	0%	0
Estey Avenue	2	1/wk	0	NA	0
Falmouth Associates–564 Surf Drive	2	1/wk	12	0%	0
Falmouth Heights–East	2	1/wk	14	0%	0
Falmouth Heights–West	2	1/wk	14	0%	0
Falmouth Yacht Club	2	1/wk	12	0%	0
Fifth Avenue (boat launch)	2	1/wk	0	NA	0
First Encounter–Beach	2	1/wk	14	0%	0
First Encounter–Spit River	2	1/wk	14	0%	0
Fisher	3	1/mo	4	0%	0
Follins Pond MA102069	2	1/wk	14	0%	0
Follins Pond MA589398	2	1/wk	15	13%	3

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Barnstable County					
Forest Street Beach	2	1/wk	12	0%	0
Glendon Road	2	1/wk	13	0%	0
Gray Gables	2	1/wk	14	0%	0
Gray's Beach	2	1/wk	14	0%	0
Great Hollow	3	1/mo	4	0%	0
Grey Neck	3	1/wk	4	0%	0
Haigis	2	1/wk	13	0%	0
Halliday Acres	no data	1/wk	12	0%	0
Harborview	2	1/wk	13	0%	0
Hardings–East	2	1/wk	12	0%	0
Hardings–West	2	1/wk	12	0%	0
Hawthorne	2	1/wk	12	0%	0
Head of the Meadow (National)	2	1/wk	10	0%	0
Head of the Meadow (Town)	3	1/mo	4	0%	0
Herring Cove (National)	2	1/wk	10	0%	0
Hideaway Village Association	2	1/wk	12	0%	0
Howes Street	2	1/wk	13	0%	0
Indian Neck	3	1/mo	4	0%	0
Indian Trail	2	1/wk	0	NA	0
Inman Road	2	1/wk	13	0%	0
Jackknife Harbor	2	1/wk	12	0%	0
Jetty Lane	2	1/wk	6	0%	0
Johnson Street	2	1/wk	16	19%	3
Kalmus Ocean	2	1/wk	15	0%	0
Kalmus Yacht	2	1/wk	14	0%	0
Kellers Corner	3	1/mo	0	NA	0
Kendal Lane	2	1/wk	13	0%	0
Kennedy Memorial	2	1/wk	13	0%	0
Kent's Point	3	1/wk	7	0%	0
Keyes Beach	2	1/wk	15	0%	0
Kingsbury	2	1/wk	14	0%	0
Lighthouse	2	1/wk	12	0%	1
Linnell Landing	3	1/mo	4	0%	0
Little Inn at Pleasant Bay	2	1/wk	14	14%	0
Little Island Beach Preserve	2	1/wk	12	0%	0
Little River Road	2	1/wk	0	NA	0
Longnook	3	1/mo	4	0%	0
Loops	2	1/wk	13	0%	0
Maguires Landing	3	1/mo	4	0%	0
Mants	2	1/wk	14	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Barnstable County					
Marconi–Sampling Point 1	2	1/wk	10	0%	0
Marconi–Sampling Point 3	2	1/wk	0	NA	0
Mashpee Neck Road (Town Landing)	2	1/wk	15	7%	1
Maushop Village	2	1/wk	12	0%	0
Mayflower	2	1/wk	14	0%	0
Mayo	2	1/wk	14	0%	0
Meeting House Pond	3	1/wk	13	0%	0
Megansett	2	1/wk	14	0%	0
Menauhant–East	2	1/wk	14	0%	0
Menauhant–West	2	1/wk	14	0%	0
Merkel Beach (Snow Inn Road)	3	1/wk	4	0%	0
Mill Road	2	1/wk	14	0%	0
Millway	2	1/wk	14	14%	3
Monument	2	1/wk	4	0%	0
Nauset	2	1/mo	14	0%	0
Nauset Light–1	2	1/wk	10	0%	0
Nauset Light–3	2	1/wk	0	NA	0
Neel Road	3	1/wk	4	0%	0
New Seabury Inn	2	1/wk	12	0%	0
New Silver (Silver Beach Improvement Association)	2	1/wk	12	0%	0
Newcomb Hollow	3	1/mo	4	0%	0
Nobska Beach Association	2	1/wk	12	0%	0
Noon’s Landing	2	1/wk	16	13%	2
Ocean Edge–1	2	1/wk	12	0%	0
Old Mill Point Association–Left of Jetty	2	1/wk	12	0%	0
Old Mill Point Association–Right of Jetty	2	1/wk	13	8%	1
Old Silver 1–Central	2	1/wk	14	0%	0
Old Silver 2–North	2	1/wk	15	0%	0
Old Silver 2–South	2	1/wk	13	0%	0
Old Silver Beach Estates Association	2	1/wk	12	0%	0
Omaha Road	3	1/mo	4	0%	0
Oregon	2	1/wk	3	33%	1
Oyster Harbors Club	2	1/wk	12	0%	0
Oyster Place	2	1/wk	0	NA	0
Oyster Pond	2	1/wk	12	0%	0
Paines Creek	2	1/wk	14	0%	0
Pamet Harbor	2	1/wk	15	7%	1
Parkers River East	2	1/wk	14	0%	0
Parkers River West	2	1/wk	13	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Barnstable County					
Patiusset Beach	2	1/wk	13	0%	0
Paw Wah Pond	3	1/wk	4	0%	0
Pilgrim Pine Acres	2	1/wk	9	0%	0
Pinelands Park	2	1/wk	0	NA	0
Pleasant Bay MA584237	2	1/wk	19	26%	5
Pleasant Bay MA815860	3	1/mo	5	20%	1
Pleasant Road	3	1/wk	4	0%	0
Pleasant Street	2	1/wk	13	8%	1
Pocasset Beach Improvement Association	2	1/wk	12	0%	0
Point of Rocks	2	1/wk	4	0%	0
Popponesset	2	1/wk	12	0%	1
Popponesset Beach Association	2	1/wk	0	NA	0
Popponesset Spit	2	1/wk	13	8%	0
Powers Landing	3	1/mo	4	0%	0
Priscilla's Landing	3	1/wk	6	17%	1
Provincetown Inn Rotary	2	1/wk	14	7%	2
Quanset Harbor Club Association	2	1/wk	13	0%	0
Quisset Beach Association	2	1/wk	10	0%	0
Race Point (National)	2	1/wk	10	0%	0
Race Point (National)–Sampling Point 2	2	1/wk	10	0%	0
Race Point (National)–Sampling Point 3	2	1/wk	0	NA	0
Racing Beach Association	2	1/wk	12	0%	0
Raycroft	2	1/wk	13	0%	0
Red River MA471736	2	1/wk	14	7%	1
Red River MA504097	2	1/wk	14	7%	1
Red River–East	3	1/wk	6	33%	5
Ridgevale	2	1/wk	12	0%	0
Robbins Hill	2	1/wk	14	0%	0
Rock Harbor	2	1/wk	17	18%	3
Ropes	2	1/wk	2	0%	0
Ryder	3	1/mo	4	0%	0
Ryder Street	2	1/wk	15	13%	2
Ryder Street MA433361	2	1/wk	15	13%	2
Ryder Street MA639914	2	1/wk	15	13%	2
South Sunken Meadow	2	1/wk	14	0%	0
Saconnesett Hills Association	2	1/wk	12	0%	0
Sagamore	2	1/wk	14	0%	0
Sandy Neck	2	1/wk	13	0%	0
Scatteree Town Landing	2	1/wk	2	0%	0 (74)*

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Barnstable County					
Scraggy Neck Recreation Association	2	1/wk	12	0%	0
Scudder Lane	2	1/wk	0	NA	0
Scusset (DCR–DSPR)	2	1/wk	16	6%	1
Sea Pines	2	1/wk	12	0%	0
Sea Street (Dennisport)	3	1/wk	13	0%	0
Sea Street (East Dennis)	2	1/wk	13	0%	0
Seabreeze	3	1/wk	4	0%	0
Seacoast Shores Associates, Inc.	2	1/wk	12	0%	0
Seagull (Center)	2	1/wk	14	0%	0
Seagull (Left)	2	1/wk	13	0%	0
Seagull (Right)	2	1/wk	14	0%	0
Seaside Park Improvement Association	2	1/wk	12	0%	0
Seaview Avenue Beach	2	1/wk	13	0%	0
Seconsett Island Causeway	2	1/wk	14	0%	0
Shorewood Beach Association	2	1/wk	13	38%	7
Silver Springs Association	2	1/wk	12	0%	0
Sippewissett Highlands Trust	2	1/wk	12	0%	0
Skaket Beach	3	1/wk	9	0%	0
Skaket Beach Condominiums	2	1/wk	13	0%	0
South Cape Beach (DCR–DSPR)	2	1/wk	15	0%	0
South Cape Civic Association	2	1/wk	0	NA	0
South Middle	2	1/wk	13	0%	0
South Village	2	1/wk	13	0%	0
Stoney Beach (MBL)	2	1/wk	14	0%	0
Sullivan (Depot Street)	2	1/wk	13	0%	0
Sunset	2	1/wk	12	0%	0
Sunset Village (379 Shore Road)	2	1/wk	15	7%	1
Surf Drive–1	2	1/wk	14	0%	0
Surf Drive–East	2	1/wk	14	0%	0
Surf Drive–Pool	2	1/wk	14	0%	0
Tahanto Associates, Inc.	2	1/wk	12	0%	0
Thatcher Town Park	2	1/wk	14	0%	0
The Belmont	2	1/wk	12	0%	0
Thumpertown	2	1/wk	15	7%	7
Torrey Beach Community Association	2	1/wk	11	9%	0
Town Cove MA134241	2	1/wk	16	13%	2
Town Cove MA272144	2	1/wk	14	0%	0
Town Landing–Breakwater	2	1/wk	18	22%	17
Town Landing–Snail Road	2	1/wk	14	7%	1
Town Landing Beach Point	2	1/wk	15	7%	1

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Barnstable County					
Town Landing West of Coast Guard	2	1/wk	14	7%	1
Town Neck MA246390	2	1/wk	16	19%	5
Town Neck MA773357	2	1/wk	13	0%	5
Town Neck (Horizons) MA286058	2	1/wk	13	0%	0
Trotting Park	2	1/wk	13	0%	0
Vernon St.	2	1/wk	15	0%	1
Veterans	2	1/wk	15	0%	0
Wah Wah Taysee Road	3	1/wk	4	0%	0
Wequasett Inn Resort	2	1/wk	12	0%	0
West Dennis--Residential	2	1/wk	13	0%	0
West Dennis--Snack Bar	2	1/wk	14	0%	0
West Dennis--West	2	1/wk	14	0%	0
West End Lot	2	1/wk	17	24%	8
White Crest	3	1/mo	4	0%	0
Wianno Avenue	2	1/wk	3	33%	1
Wianno Club (Salt--107 Seaview)	2	1/wk	12	0%	0
Wilbur Park	2	1/wk	13	0%	0
Wild Harbour Estates	2	1/wk	12	0%	0
Windmill	2	1/wk	13	0%	0
Wings Neck Trust Association (North Beach)	2	1/wk	13	8%	1
Wings Neck Trust Association (South Beach)	2	1/wk	12	0%	0
Winston Ave	2	1/wk	18	17%	31
Wood Neck Beach	2	1/wk	14	0%	0
Wood Neck River	2	1/wk	15	7%	1
Zylpha	3	1/wk	4	0%	0
Bristol County					
400 North	2	1/wk	16	6%	5
400 South	2	1/wk	16	6%	5
Anthony's	2	1/wk	12	0%	0
Apponagansett Town Beach	2	1/wk	12	0%	0
Baker's Beach	2	1/wk	3	0%	0
Bayview	2	1/wk	12	0%	0
C & K Club	2	1/wk	12	8%	0
Cedar Cove	2	1/wk	9	11%	13
Cherry & Webb	3	1/mo	3	0%	0
Coles River Club off Harbor Road	2	1/wk	12	0%	0
Davy's Locker	2	1/wk	16	6%	6
Demarest Lloyd (DCR--DSPR)	2	1/wk	15	0%	0
East Beach	3	1/mo	3	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Bristol County					
Elephant Rock	2	1/wk	11	0%	0
Fort Phoenix (DCR–DSPR)	2	1/wk	16	6%	3
Hidden Bay	2	1/wk	12	0%	0
Horseneck (DCR–DSPR)	2	1/wk	15	7%	3
J. Beach	2	1/wk	15	0%	5
Jones Town Beach	2	1/wk	12	0%	0
Kids Beach	2	1/wk	16	6%	5
Leeside	2	1/wk	12	17%	13
Manhattan Avenue	2	1/wk	13	8%	1
Moses Smith Creek	2	1/wk	12	17%	15
Nonquitt	2	1/wk	12	0%	0
Oak Hill Shores	2	1/wk	12	0%	0
O'Tools	2	1/wk	18	17%	8
Pearse	2	1/wk	19	47%	41
Raymond Street	2	1/wk	12	0%	0
Round Hill	3	2/mo	6	0%	0
Salter's Point East	2	1/wk	12	0%	0
Salter's Point South	2	1/wk	12	0%	0
Sandy Beach	2	1/wk	12	8%	6
Seaview	2	1/wk	12	0%	0
Spindle Rock	2	1/wk	11	0%	0
Squid	2	1/wk	16	6%	7
Tabor Park South	2	1/wk	18	17%	6
Tower 1	2	1/wk	18	17%	8
Tower 4	2	1/wk	18	17%	8
Town Beach MA188966	2	1/wk	11	0%	0
Town Beach MA249263	2	1/wk	13	15%	7
West Island Causeway	3	1/mo	3	0%	0
West Island Town Beach	3	1/mo	3	0%	0
Dukes County					
Bend in the Road	3	1/wk	3	0%	0
Chappy Beach Club	2	1/wk	2	0%	0
Chappy Point Beach	3	1/wk	4	0%	0
East Beach (Chappy)	3	1/wk	3	0%	0
Eastville Town Beach–Drawbridge	2	1/wk	8	25%	4
Eastville Town Beach–Harbor	2	1/wk	5	0%	0
Fuller Street	2	1/wk	3	0%	0
Great Pond at Long Point	2	1/wk	18	50%	12
Great Rock Bight	3	1/mo	4	0%	0
Joseph Sylvia State Beach	3	1/wk	3	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Dukes County					
Joseph Sylvia State Beach–Little Bridge	2	1/wk	5	0%	0
Joseph Sylvia State Beach–Sound	2	1/wk	5	0%	0
Katama Point	no data	1/wk	0	NA	12
Lambert’s Cove Beach–North	2	1/wk	14	7%	1
Lambert’s Cove Beach–South	2	1/wk	14	7%	1
Lobsterville	3	1/mo	4	0%	0
Madera Cove	2	1/wk	8	13%	2
Makonkey Roads and Beach Trust	2	1/wk	12	8%	1
Marinelli (Jetty) Beach	2	1/wk	5	0%	0
Menemsha	3	1/wk	4	0%	0
Mink Meadows	2	1/wk	11	18%	2
Moshup Beach	3	1/mo	4	0%	0
Norton Point Beach	2	1/wk	3	0%	0
Ocean at Chilmark Pond Preserve	2	1/wk	5	0%	0
Ocean at Edgartown Great Pond	3	1/wk	4	0%	0
Ocean at Long Point–East	2	1/wk	15	20%	2
Ocean at Long Point–West	2	1/wk	0	NA	0
Ocean at Lucy Vincent Beach	3	1/wk	13	23%	3
Ocean at Squibnocket Beach	2	1/wk	15	7%	0
Owen Little Way	2	1/wk	17	24%	5
Owen Park	2	1/wk	4	0%	0
Pay Beach	2	1/wk	8	13%	2
Pay Beach–Inkwell	2	1/wk	9	22%	4
Pecoy Point Preserve Beach	2	1/wk	15	27%	15
Philbin Beach	2	1/wk	14	0%	0
Pond at Lucy Vincent Beach	2	1/wk	17	35%	0 (50)*
Ramble Trail Preserve Beach	2	1/wk	16	31%	21
Red Beach	3	1/mo	4	0%	0
Sepiessa Point	3	1/wk	12	33%	6
Seven Gates Beach MA689705	2	1/wk	12	8%	2
Seven Gates Beach MA856169	2	1/wk	12	8%	1
Sound at Wilfred’s Pond Reserve	2	1/wk	4	0%	0
South Beach State Park	3	1/wk	3	0%	0
South Beach State Park–Middle	3	1/wk	3	0%	0
South Beach State Park–West	3	1/wk	3	0%	0
Tashmoo Beach	2	1/wk	4	0%	0
Tashmoo Cut	3	1/wk	15	13%	2
Tisbury Great Pond	2	1/wk	0	NA	2
Vineyard Harbor Motel	2	1/wk	16	19%	3
Wasque Swim Beach	2	1/wk	3	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Essex County					
Back	3	1/mo	5	0%	0
Black	2	1/wk	16	13%	10
Black Rock	2	1/wk	12	8%	7
Brackenbury	2	1/wk	15	20%	4
Canoe	2	1/wk	13	8%	2
Cape Hedge	3	1/mo	5	0%	0
Children's Island-Back	2	1/wk	9	0%	8
Children's Island-Dock	2	1/wk	9	0%	8
Children's Island-Wally	2	1/wk	9	0%	8
Clammer's Beach	2	1/wk	4	0%	0
Clark	2	1/wk	15	0%	0
Collins Cove	2	1/wk	13	8%	1
Crane	3	1/mo	5	0%	0
Cressy's	3	1/mo	4	0%	1
Crocker Park	2	1/wk	13	8%	2
Dane Street MA424085	2	1/wk	16	25%	2
Dane Street MA407948	2	1/wk	0	NA	3
Dead Horse	2	1/wk	12	0%	0
Devereux	2	1/wk	12	0%	0
Eisman's	2	1/wk	13	8%	2
Fisherman's	2	1/wk	15	20%	5
Forest River Point	2	1/wk	12	0%	0
Front Beach MA129354	3	1/wk	4	0%	0
Front Beach MA471378	2	1/wk	5	0%	0
Gas House	2	1/wk	15	13%	4
Goat Hill	2	1/wk	12	0%	0
Good Harbor	2	1/wk	17	6%	1
Good Harbor Creek	2	1/wk	17	6%	1
Grace Oliver	2	1/wk	15	13%	4
Half Moon	3	1/mo	4	0%	1
Independence Park	2	1/wk	18	33%	7
Juniper Point	2	1/wk	13	8%	1
Kings	2	1/wk	14	14%	3
Kings (DCR-DUPR)	2	1/wk	18	11%	17
Kings at Kimball	2	1/wk	18	6%	17
Kings at Stacy Brook	2	1/wk	18	83%	17
Little Neck	2	1/wk	15	0%	0
Long-Gloucester	3	1/mo	5	0%	0
Long-North	3	1/mo	5	0%	0
Lynch Park	2	1/wk	14	14%	2

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Essex County					
Mackey	2	1/wk	3	0%	0
Magnolia	2	1/wk	16	6%	2
Magnolia–Right of Bath & Tennis	2	1/wk	15	0%	2
Mingo	2	1/wk	14	14%	3
Nahant Beach–South	2	1/wk	15	0%	0
Nahant Beach (DCR - DUPR) MA203203	2	1/wk	15	0%	0
Nahant Beach (DCR - DUPR) MA211183	2	1/wk	15	0%	0
Nahant Beach (DCR - DUPR) MA272297	2	1/wk	15	0%	0
Niles	3	1/mo	4	0%	1
Obear Park	2	1/wk	12	0%	0
Ocean Avenue	2	1/wk	14	21%	8
Old Garden	2	1/wk	5	0%	0
Osgood	2	1/wk	8	0%	0
Pavillion	3	1/wk	5	0%	0
Pavillion Beach	3	1/mo	4	0%	1
Pebble	3	1/mo	5	0%	0
Phillips	3	2/mo	7	14%	2
Pioneer	2	1/wk	13	8%	1
Plum Cove	2	1/wk	13	8%	1
Plum Island	3	1/mo	4	0%	0
Plum Island–End of Island 1	3	2/mo	8	0%	0
Plum Island–End of Island 2	3	2/mo	8	0%	0
Plum Island at 55th Street	3	2/mo	15	0%	0
Plum Island at Point	3	2/mo	8	0%	0
Preston	2	1/wk	13	8%	2
Rice MA235405	2	1/wk	14	14%	0
Rice MA530831	2	1/wk	0	NA	1
Salisbury–North Beach	2	1/wk	15	0%	0
Salisbury (DCR–DSPR)	2	1/wk	15	0%	0
Sandy Beach	2	1/wk	17	18%	0
Sandy Point	2	1/wk	12	0%	0
Short	2	1/wk	12	0%	0
Singing–1	2	1/wk	15	0%	0
Singing–Right of Parking	2	1/wk	15	0%	0
Steep Hill	2	1/wk	14	0%	0
Steps	2	1/wk	12	0%	0
Stramski	2	1/wk	15	27%	10
Sunset Road	2	1/wk	14	14%	4
Tuck’s Point	2	1/wk	15	0%	0
Tudor	2	1/wk	15	20%	5

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Essex County					
Village Street	2	1/wk	15	13%	4
West	2	1/wk	12	0%	0
West Manchester	2	1/wk	16	13%	8
Whales	2	1/wk	13	8%	2
White	2	1/wk	16	6%	2
Willow Avenue	2	1/wk	14	29%	21
Willows Pier	2	1/wk	12	0%	0
Wingaersheek	2	1/wk	17	6%	1
Winter Island (Waikiki)	2	1/wk	12	0%	0
Woodbury	2	1/wk	12	0%	0
Nantucket County					
40th Pole 1	2	1/wk	13	8%	2
Children's	2	1/wk	14	14%	3
Cisco	3	1/mo	3	0%	0
Cliffside	3	1/mo	3	0%	0
Dionis	2	1/wk	13	8%	2
Jetties	2	1/wk	13	8%	2
Madaket	3	1/mo	3	0%	0
Miacomet	3	1/mo	3	0%	17
Sconset 1	2	1/wk	3	0%	0
Sewerbeds	3	1/mo	3	0%	0
Surfside 1	3	1/mo	3	0%	0
Surfside 2	3	1/mo	3	0%	0
Warren's Landing	3	1/mo	13	0%	0
Washing Pond	2	1/wk	13	8%	2
Washington Street	2	1/wk	14	14%	3
Wauwinet Bayside	2	1/wk	10	10%	2
Wauwinet Oceanside	2	1/wk	10	10%	2
Norfolk County					
Avalon	2	1/wk	14	14%	6
Bassing's (Sailing Club)	2	1/wk	13	15%	21
Black Rock	2	1/wk	13	8%	1
Broady (Baker)	2	1/wk	15	20%	19
Chikatawbot	2	1/wk	13	8%	4
Delano Avenue	2	1/wk	14	14%	6
Edgewater	2	1/wk	14	14%	6
George E. Lane	2	1/wk	12	8%	1
Germantown Fire Station	2	1/wk	13	8%	2
Heron	2	1/wk	14	14%	11
Merrymount	2	1/wk	13	8%	4

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Norfolk County					
Mound	2	1/wk	14	14%	5
Nickerson	2	1/wk	14	14%	6
Orchard Street	2	1/wk	14	7%	4
Parkhurst	2	1/wk	15	33%	19
Rhoda	2	1/wk	15	13%	21
Sandy	2	1/wk	15	20%	7
Sandy Cove	2	1/wk	13	8%	2
Smith Beach	2	1/wk	12	8%	5
Wessagusett (Old Wessagusett)	3	2/mo	6	0%	0
Wollaston (DCR - DUPR) MA203090	1	Daily	83	19%	37
Wollaston (DCR - DUPR) MA562850	1	Daily	83	10%	30
Wollaston (DCR - DUPR) MA715607	1	Daily	84	15%	45
Wollaston (DCR - DUPR) MA957964	1	Daily	84	21%	45
Yacht Club	2	1/wk	13	8%	1
Plymouth County					
A Street Bay Side	2	1/wk	13	8%	2
A Street Ocean	2	1/wk	12	0%	0
Antasawomak-1	2	1/wk	10	10%	7
Antasawomak-2	2	1/wk	10	0%	0
Aucoot	2	1/wk	12	8%	1
Belair	2	1/wk	11	0%	0
Beverly Yacht	2	1/wk	12	0%	0
Brant Beach	2	1/wk	9	0%	0
Brant Rock	2	1/wk	12	0%	0
Briarwood	2	1/wk	16	0%	0
Center Hill Road	2	1/wk	0	NA	0
Converse Point	2	1/wk	12	0%	0
Crescent	2	1/wk	10	0%	0
Darcy's	2	1/wk	12	0%	0
Dexter Lane	2	1/wk	12	0%	0
Duxbury Beach at Bath House	2	1/wk	14	0%	0
East Boulevard	3	1/wk	11	18%	15
Edgewater	2	1/wk	12	0%	0
Egypt	2	1/wk	11	0%	0
Fieldston MA874495	2	1/wk	14	14%	4
Fieldston MA992826	2	1/wk	14	14%	4
Forbes	2	1/wk	17	24%	23
Gray's	2	1/wk	16	6%	1
Green Harbor	2	1/wk	13	8%	5
Gunrock	2	1/wk	12	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Plymouth County					
Hamilton Beach	2	1/wk	16	0%	0
Harbor 1	2	1/wk	10	10%	0
Harbor 2	2	1/wk	12	17%	4
Hollywoods-1	2	1/wk	10	10%	0
Hollywoods-2	2	1/wk	0	NA	1
Humarock	2	1/wk	11	0%	0
Indian Mound Beach	2	1/wk	17	12%	8
Island Wharf	2	1/wk	12	0%	0
James Avenue	2	1/wk	15	7%	15
Kenburma	2	1/wk	7	0%	0
Kimball	2	1/wk	12	8%	1
Land Trust Reservation	2	1/wk	11	0%	0
Landing Road	2	1/wk	16	13%	4
Leisure Shores	2	1/wk	0	NA	0 (49)*
Little Harbor	2	1/wk	16	0%	0
Mattapoisett Shores Association	2	1/wk	11	9%	1
Minot	2	1/wk	11	0%	0
Nantasket (DCR-DUPR) MA104582	2	1/wk	15	0%	0
Nantasket (DCR-DUPR) MA135071	2	1/wk	15	7%	0
Nantasket at Park Street	2	1/wk	15	0%	0
Nantasket at Water Street	2	1/wk	15	0%	0
Ned's Point	2	1/mo	22	0%	0
Nelson Street	2	1/wk	0	NA	0
Newport	2	1/wk	12	0%	0
North	2	1/wk	11	0%	0
North Boulevard	2	1/wk	18	17%	8
Oakdale Avenue	2	1/wk	12	8%	13
Onset	2	1/wk	16	0%	0
Otis	2	1/wk	0	NA	0
Parkwood	2	1/wk	16	0%	0
Peases Point	2	1/wk	10	0%	0
Peggotty	2	1/wk	13	15%	6
Pinehurst	2	1/wk	17	6%	1
Piney Point	2	1/wk	12	0%	0
Planting Island	2	1/wk	12	0%	0
Plymouth MA552169	2	1/wk	12	8%	2
Plymouth MA786288	2	1/wk	12	0%	0
Plymouth MA819257	2	1/wk	13	8%	2
Point Connett	2	1/wk	10	10%	1
Point Independence	2	1/wk	16	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Plymouth County					
Residents Beach (Duxbury Beach)	2	1/wk	14	0%	0
Rexhame	2	1/wk	15	0%	0
Riverside Avenue	3	1/wk	8	0%	0
Rocky Nook	2	1/wk	17	12%	1
Sand Hills	2	1/wk	11	0%	0
Scituate Lighthouse	2	1/wk	11	0%	0
Seal Cove	2	1/wk	14	14%	10
Shell Point	3	1/wk	9	0%	0
Shipyards Lane	2	1/wk	15	7%	2
Silver Shell	2	1/wk	12	0%	0
Silver Shell-South Jetty	2	1/wk	12	0%	0
Standish Shores	2	1/wk	0	NA	0
Swift's	2	1/wk	16	0%	0
Swift's Neck	2	1/wk	16	0%	0
Tabor Academy	2	1/wk	12	0%	0
Tabor Academy-1	2	1/wk	12	0%	0
Town Beach MA201719	2	1/wk	11	9%	1
Town Beach MA476242	2	1/wk	11	0%	0
Wampatuck	2	1/wk	12	8%	1
West End	2	1/wk	14	0%	0
White Horse MA523462	2	1/wk	12	8%	7
White Horse MA576579	2	1/wk	13	8%	2
XYZ	2	1/wk	12	0%	0
Yacht Club	2	1/wk	10	0%	0
Suffolk County					
Carson Beach at Bath House (DCR - DUPR) MA334293	1	Daily	84	11%	23
Carson Beach (DCR - DUPR) MA641647	1	Daily	84	8%	23
City Point Beach (DCR)	1	Daily	82	4%	10
Constitution (DCR - DUPR) MA187787	1	Daily	82	2%	6
Constitution (DCR - DUPR) MA738501	1	Daily	82	1%	6
Constitution (DCR - DUPR) MA780232	1	Daily	82	6%	6
Donovans	2	1/wk	33	12%	0
Grandview	2	1/wk	26	0%	0
Halford	2	1/wk	31	6%	0
Lovell's Island (DCR-DUPR)	2	1/wk	11	0%	0
M Street Beach at M Street (DCR-DUPR)	1	daily	83	0%	8
Malibu (DCR-DUPR)	2	1/wk	18	11%	4
Pico	2	1/wk	31	0%	0
Pleasure Bay at Broadway (DCR-DUPR)	2	1/wk	15	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Suffolk County					
Revere Beach (DCR) MA186671	2	1/wk	15	0%	0
Revere Beach (DCR) MA198444	2	1/wk	15	0%	0
Revere Beach (DCR) MA227000	2	1/wk	15	0%	0
Revere Beach (DCR) MA809018	2	1/wk	15	7%	0
Savin Hill (DCR-DUPR)	2	1/wk	16	0%	2
Short (DCR-DUPR)	2	1/wk	15	0%	0
Spectacle Island	2	1/wk	11	0%	0
Tenean (DCR-DUPR)	1	daily	83	16%	26
Winthrop (DCR-DUPR)	2	1/wk	12	0%	0
Yerrill	2	1/wk	31	0%	0

*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 Chris Huskey, Massachusetts Department of Public Health. Personal communication. April, 2011.

2 Massachusetts Department of Public Health. Marine and Freshwater Beach Testing in Massachusetts Annual Report: 2009 Season. October 2010.

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



MICHIGAN

27th in Beachwater Quality

15% 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.

Michigan has more than 600 public beaches stretching along more than 600 miles of Great Lakes coastline. The Michigan Department of Natural Resources and Environment (DNRE) administers the state's BEACH Act grant.

Monitoring Results

In 2010, Michigan reported 632 coastal beaches (including 35 National Park Service beaches), 11 (2%) of which were monitored more than once a week, 199 (31%) once a week, 400 (63%) were not monitored, and there was no monitoring frequency information for 22 (3%) beaches. For this section of the report, NRDC looked at the percent of individual monitoring samples that exceeded the state's daily bacterial standard unless individual samples were not reported (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). As discussed below, Michigan does not have a single-sample maximum standard, they apply their daily standard after calculating the geometric mean of at least three simultaneous samples. In 2010, 7% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standard. The beaches with the highest percent exceedance rates in 2010 were Brimley State Park in Chippewa County (49%), St. Clair Shores Blossom Heath Beach in Macomb County (40%), Warren Dunes Beach in Berrien County (30%), Sherman Park in Chippewa County (29%), Singing Bridge Beach in Arenac County (27%), Pier Park in Wayne County (26%), Meinert County Park in Muskegon County (24%), East Tawas City Park in Iosco County (22%), and St. Clair Shores Memorial Park Beach in Macomb County (20%).

Chippewa County had the highest exceedance rate (47%) in 2010, followed by Marquette (44%), Macomb (19%), Wayne (18%), Van Buren (9%), Berrien (8%), St. Clair (8%), Iosco (8%), Arenac (8%), Alpena (7%), Muskegon (7%), Schoolcraft (7%), Grand Traverse (5%), Ottawa (5%), Alcona (5%), Monroe (4%), Allegan (4%), Menominee (4%), Huron (3%), Cheboygan (2%), Bay (2%), Benzie (2%), Oceana (2%), Sanilac (2%), Leelanau (2%), and Charlevoix (1%) counties. There were no exceedances in 2010 in Antrim, Baraga, Delta, Emmet, Houghton, Keweenaw, Mackinac, Manistee, Mason, Ontonagon, and Presque Isle counties. Beaches in Alger, Gogebic, Luce, and Montmorency counties are not monitored.

Sampling Practices: The monitoring season runs from April to October.

Sampling practices, locations, standards, and notification protocols and practices are uniform throughout the state.¹ Samples are taken 1 foot below the surface in water that is 3 to 6 feet deep. Beaches are selected for monitoring based on location and frequency of use, history of bacterial contamination, and proximity to a known bacterial contamination source.²

KEY FINDINGS IN MICHIGAN

Beachwater Contamination

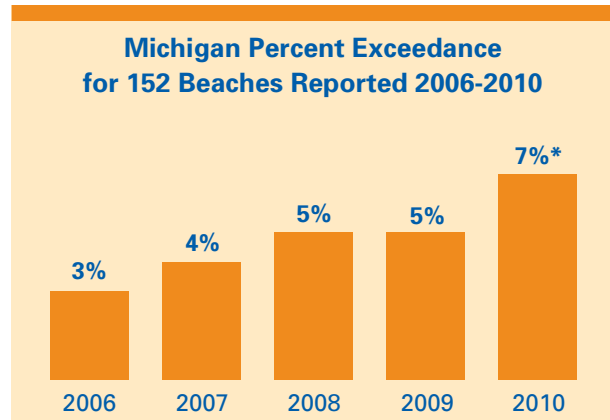
(% of samples exceeding state standards in 2010)

- Brimley State Park in Chippewa County (49%)
- St. Clair Shores Blossom Heath Beach in Macomb County (40%)
- Warren Dunes Beach in Berrien County (30%)

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

- 315 (87%) unknown sources of contamination
- 27 (7%) stormwater runoff
- 14 (4%) other sources of contamination
- 4 (1%) sewage spills/leaks
- 3 (1%) wildlife

Depending on the local health department, the monitoring frequency of a beach that has been closed or placed under advisory can be increased. In most cases, resampling is conducted the day a beach is closed or placed under advisory. States that monitor more frequently after an advisory 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 change after an advisory or closing was issued.



Closings and Advisories

Total closing/advisory days for 102 events lasting six consecutive weeks or less increased 6% to 363 days in 2010, from 342 days in 2009. For previous years, there were 265 days in 2008, 198 days in 2007, 124 days in 2006, and 234 days in 2005. In addition, there were 3 extended events (188 days total) and 1 permanent event (110 days) 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 102 events lasting six consecutive weeks or less, 81% (295) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, 8% (28) were preemptive (i.e., ordered without waiting for monitoring results) due to heavy rainfall, and 11% (40) were preemptive due to unspecified reasons.

Standards and Procedures: Both advisories and closings are issued. The standards in use in Michigan are a 30-day geometric mean of *E. coli* of 130 cfu/100 ml for at least five representatively spaced sampling events over 30 days and a daily maximum for one sampling event of 300 cfu/100 ml.² At each sampling event, three or more samples are taken and the geometric mean of the sampling results is used when comparing to the daily standard.² Resamples to confirm an exceedance are sometimes conducted at Michigan's Great Lakes beaches before an advisory or closing is issued.

Some health departments issue preemptive rainfall advisories, with standards based on rainfall amount.¹ Beach advisories and closures may be issued for riptides, spills, harmful algal blooms, and other potential threats to public health.²

* Why don't the 2010 percent exceedance values in this summary match? The value in the heading of this section (15%) reflects the proportion of samples exceeding the national single-sample maximum standard for designated beach areas. The value in the "Monitoring Results" section (7%) reflects the proportion of samples exceeding the state standard, which in Michigan's case is less stringent than the national standard. Some samples exceeded the national standard but not the state standard.

Michigan 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Alcona County					
Harrisville State Park	1	1/wk	21	5%	0
Beaches in Alcona County that were not monitored and that had no closing or advisory days in 2010:					
Black River Public Access	Greenbush Township	Negwegon State Park	Trask Lake Road Beach		
	Harrisville Public Access	Sturgeon Point State Park			
Alger County					
Beaches in Alger County that were not monitored and that had no closing or advisory days in 2010:					
Au Train Beach	Christmas Beach	Grand Marais Township	Grand Portal Point-Public Shoreline		
Bay Furnace Recreation Area Beach	Grand Marais Harbor Beach	Beach			

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Alger County					
Beaches in Alger County that were not monitored and that had no closing or advisory days in 2010:					
Munising Beach	Pictured Rocks National Lakeshore-Chapel Beach	Pictured Rocks National Lakeshore-Minners Beach	Beach	Public Shoreline Beach-Grand Sable Dunes	
Pictured Rocks National Lakeshore-Chapel Beach	Pictured Rocks National Lakeshore-Mosquito Beach	Pictured Rocks National Lakeshore-Hurricane Campground Beach	Public Shoreline Beach-Au Train Bay	Rathfoot Park Beach	
Pictured Rocks National Lakeshore-Hurricane Campground Beach	Pictured Rocks National Lakeshore-Sand Point	Pictured Rocks National Lakeshore-Twelve Mile	Public Shoreline Beach-Au Train to Five Mile Pts	Roadside Park	
	Pictured Rocks National Lakeshore-Twelve Mile		Public Shoreline Beach-East County Border area	Sand Point to Miners Castle Point-Public Shoreline	
				Sullivans Landing	
Allegan County					
Douglas Beach	1	1/wk	45	4%	0
Oval Beach	1	1/wk	45	0%	0
Pier Cove Beach	1	1/wk	45	4%	6
West Side County Park Beach	1	1/wk	45	7%	5
Beaches in Allegan County that were not monitored and that had no closing or advisory days in 2010:					
Castle Park	Saugatuck Dunes State Park Shoreline Beach				
Alpena County					
Blair Street Park	1	1/wk	16	19%	3
Michekewis Beach	1	1/wk	12	0%	0
Ossineke Beach	1	1/wk	12	0%	0
Starlite Beach	1	1/wk	15	13%	2
Thompson Park	1	1/wk	12	0%	0
Beaches in Alpena County that were not monitored and that had no closing or advisory days in 2010:					
Bay View Park	Negwegon State Park-Ossineke South Point	Ossineke State Park	Rock Port Beach		
Elcajon Bay	Ossineke Campground	Partridge Point	Whitefish Bay		
Issineke Hardwood Point					
Antrim County					
Antrim County Day Park South	1	1/wk	10	0%	0
Banks Township. Park	1	1/wk	11	0%	0
Barnes Park	1	1/wk	9	0%	0
Elk Rapids	1	1/wk	10	0%	0
Veterans Memorial Park	1	1/wk	10	0%	0
Beaches in Antrim County that were not monitored and that had no closing or advisory days in 2010:					
Antrim County Day Park North	Erickson Road	Nature Preserve	Petobego Pond Area		
Antrim Creek Natural Area	Lore Road End Beach	North Bay Shore (Conservancy)	Road Crossing near Winters Road		
Elk Rapids Park	Michigan Trail	O'Dell Road			
Arenac County					
Arenac County Park	1	1/wk	96	0%	0
Bessinger Road Beach	1	1/wk	33	0%	0
Dyer Road Beach	1	1/wk	33	9%	8
Foster Road Beach	1	1/wk	33	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Arenac County					
Hammel Beach Road Access	1	1/wk	33	0%	0
Singing Bridge Beach	1	1/wk	90	27%	33
Twining Road Beach	1	1/wk	33	0%	0
Whites Beach	1	1/wk	42	7%	2
Beaches in Arenac County that were not monitored and that had no closing or advisory days in 2010:					
Au Sable State Forest– Greens Point	Augres Township Park Beach	City of Augres Public Access	Pump Station Terrace Road		
	Booth Road Beach	Gordon Road Beach			
Baraga County					
L'Anse Waterfront Park	1	1/wk	2	0%	0
Beaches in Baraga County that were not monitored and that had no closing or advisory days in 2010:					
Arvon Township Park	L'Anse Township Park	Public Shoreline Beach– Northwest Abbaye Peninsula	Public Shoreline Beach– Sand Point		
Baraga State Park	Mouth of the Huron River				
First Sand Beach	Public Shoreline Beach– Cooper Country Huron Bay	Public Shoreline Beach– Point Abbaye	Public Shoreline Beach–SE End of Huron Bay		
Keweenaw Bay Village Public Roadside Park			Second Sands Beach		
Bay County					
Bay City State Recreation Area	1	1/wk	189	2%	1
Brissette Beach Township Park	1	1/wk	42	0%	0
Pinconning Park	1	1/wk	42	2%	0
South Linwood Beach Township Park	1	1/wk	45	9%	2
Wenona Beach	1	1/wk	42	0%	0
Beaches in Bay County that were not monitored and that had no closing or advisory days in 2010:					
Nayanquing Point Wildlife Area	North Linwood Beach	North Pinconning Beach	South Pinconning Beach		
Benzie County					
Frankfort: Anchor Road Beach	1	1/wk	45	2%	0
Beaches in Benzie County that were not monitored and that had no closing or advisory days in 2010:					
Alberta Village Beach & Bluffs	County Road # 669 Esch Road/Otter Creek	Platte River Point Point Betsie Lighthouse Beach	Zettenberg Preserve		
Berrien County					
Cherry Beach	1	1/wk	48	15%	3
Grand Beach	1	1/wk	52	10%	3
Hagar Township Park	1	1/wk	42	0%	0
Jean Klock Park	1	1/wk	42	5%	2
Lincoln Township Park	1	1/wk	39	0%	0
Lions Park	1	1/wk	36	0%	0
Michiana Village	1	1/wk	45	7%	2
New Buffalo City	1	1/wk	57	12%	2
Rocky Gap	1	1/wk	39	0%	0
Silver Beach	1	1/wk	39	3%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Berrien County					
Tiscornia Park	1	1/wk	42	2%	0
Warren Dunes Beach	1	1/wk	57	30%	6
Weko Beach	1	1/wk	48	13%	2
Beaches in Berrien County that were not monitored and that had no closing or advisory days in 2010:					
Bethany Beach area	Grand Mere State Park-	Grand Mere State Park-	Mizpah Park		
Galien River Park	Rosemary Beach	Waverland Beach	Warren Dunes State		
Gordon Beach	Grand Mere State Park-	Harbert Beach	Park North		
	Shoreline Beach				
Charlevoix County					
Depot Beach	1	1/wk	10	0%	0
East Jordan Tourist Park	1	1/wk	10	0%	0
Elm Point Beach	1	1/wk	10	0%	0
Ferry Beach	1	1/wk	10	0%	0
Fisherman's Island State Park	1	1/wk	10	0%	0
Glenwood Beach	3	None	10	0%	0
Hayes Township Park	1	None	9	0%	0
Lake Michigan Beach	1	None	11	0%	0
Norwood Park	1	none	10	10%	0
Peninsula Beach	1	1/wk	10	0%	0
Tannery Park	1	1/wk	10	0%	0
Washington Street Beach	3	None	10	0%	0
Whiting Park Beach	1	1/wk	10	0%	0
Young State Park Beach	1	1/wk	10	0%	0
Beaches in Charlevoix County that were not monitored and that had no closing or advisory days in 2010:					
Beaver Island Public Beach	Bill Wagner Memorial	Donegal Bay	Iron Ore Bay Beach		
	Campground Beach	Harbor Beach	Mt. McSauba Beach		
Cheboygan County					
Cheboygan City Park	1	1/wk	11	9%	0
Cheboygan State Park Duncan Bay	1	1/wk	11	0%	40
Mackinaw City Lighthouse Park	1	1/wk	11	0%	0
Wawatam City Park	1	1/wk	11	0%	0
Beaches in Cheboygan County that were not monitored and that had no closing or advisory days in 2010:					
Alexander Henry Park	Ditta Park	Mill Creek Public Access	Roadside Park MDOT,		
Cheboygan State Park-	Huron Street Beach	Pinewood Circle Road	US-23		
Lighthouse Point	Mackinaw City Beach	End Beach	Stoney Point Road		
			End Beach		
Chippewa County					
Brimley State Park	1	1/wk	53	49%	26
Four Mile Beach	1	1/wk	0	NA	5
Sherman Park	1	1/wk	7	29%	16
Sugar Island Township Park	1	1/wk	0	NA	18 (60)*

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Chippewa County					
Beaches in Chippewa County that were not monitored and that had no closing or advisory days in 2010:					
Bass Cove Beach– Drummond Island		Hiawatha National Forest– North of Big Pine Picnic	Hiawatha National Forest– Government Island	Public Shoreline Beach– Raber Bay stretch	
Bayview Campground		Hiawatha National Forest– North Pond	Lake Superior State Forest– Munuscong Lake	Public Shoreline Beach– Weatherhog Lake East Area	
Betsey Seaman Memorial Park–Drummond Island		Hiawatha National Forest– Pendills Bay	Public Shoreline Beach– Browns Creek Area	Public Shoreline Beach– Weatherhog Lake West	
Big Pines Beach		Hiawatha National Forest– Pendills Lake	Public Shoreline Beach– Brush Point	Public Shoreline Beach– West of Whitefish Point	
Big Shoal Cove Beach		Hiawatha National Forest– Point Iroquois Light	Public Shoreline Beach– Marsh Lake Area	Sand Bay Beach– Drummond Island	
De Tour State Park Shoreline Beach		Hiawatha National Forest– Tahquamenon Bay	Public Shoreline Beach– Northwest of Two Mile Lake	Tahquamenon Falls State Park–River Mouth Unit	
Detour Albany Beach		Hiawatha National Forest– Waiska Bay	Public Shoreline Beach– Point Aux Frenes	Whitefish Point Wilderness Beach	
Drummond Island Township Park		Hiawatha National Forest– West of Salt Point			
Dunbar Park					
Hiawatha National Forest– Nodoway Point Area					
Delta County					
Escanaba Bathing Beach	1	none	3	0%	0
Gladstone Bathing Beach/Van Cleve Park	1	none	3	0%	0
Beaches in Delta County that were not monitored and that had no closing or advisory days in 2010:					
Big Bay De Noc/ Fishdam River Public Access		Public Shoreline Beach– East Wilsey Bay	Public Shoreline Beach– Nahma	Public Shoreline Beach– Portage Peninsula	
Camp Harstad		Public Shoreline Beach– Fishdam River	Public Shoreline Beach– North End of Kregg Bay	Public Shoreline Beach– St. Vital's Island	
Fayette State Park		Public Shoreline Beach– Gilnet Haven	Public Shoreline Beach– North of Stonington	Public Shoreline Beach– USFS West Wilsey Bay	
Fuller Park		Public Shoreline Beach– Indian Point	Public Shoreline Beach– Ogontz Bay	Public Shoreline Beach– West Side of Kregg Bay	
Little Bay De Noc Public Beach Access		Public Shoreline Beach– Indian Town Lake USFS	Public Shoreline Beach– Peninsula Point	Sac Bay County Park MI354139	
Portage Bay Forest Campground		Public Shoreline Beach– Jacks Bluff	Public Shoreline Beach– Point Detour	Sac Bay County Park MI405957	
Public Shoreline Beach– Charboneau Point		Public Shoreline Beach– Martin Bay	Public Shoreline Beach– Portage Bay	Twin Springs Campground and Bathing Beach	
Public Shoreline Beach– County Road 481					
Emmet County					
Cross Village Beach	1	1/wk	10	0%	0
Mackinaw City Beach #1	1	1/wk	10	0%	0
Mackinaw City Beach #2	1	1/wk	10	0%	0
Magnus Park	1	1/wk	10	0%	0
Middle Village Park	1	1/wk	10	0%	0
Petoskey State Park	1	1/wk	10	0%	0
Readmond Township Beach	1	1/wk	10	0%	0
Sturgeon Bay Township Beach	1	1/wk	10	0%	0
Wilderness State Park	1	1/wk	10	0%	0
Zoll Street Beach	1	1/wk	10	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Emmet County					
Zorn Park–Harbor Springs	1	1/wk	10	0%	0
Beaches in Emmet County that were not monitored and that had no closing or advisory days in 2010:					
Bliss Township Beach Church Beach	Colonial Michilimamackinac State Park Forest Beach Petoskey Harbor	The Headlands County Park Thorne Swift Preserve Wilderness State Park–East of the Beach	Wilderness State Park–Sturgeon Bay Wilderness State Park–West of Beach		
Gogebic County					
Beaches in Gogebic County that were not monitored and that had no closing or advisory days in 2010:					
Black River Harbor Beach Little Girls Point Park Mouth of the Montreal	River Porcupine Mountain State Park–North	Presque Isle Beach Presque Isle State Campground	Public Shoreline Beach–West of Black River		
Grand Traverse County					
Bryant Park Beach	1	1/wk	63	11%	1
Clinch Park	1	1/wk	45	0%	0
East Bay Park (Milliken Park)	1	1/wk	48	8%	1
Traverse City State Park	1	1/wk	45	0%	0
West End Beach	1	1/wk	45	4%	0
Beaches in Grand Traverse County that were not monitored and that had no closing or advisory days in 2010:					
Acme Roadside Park (DNR) Acme Roadside Park & Beach MDOT Archie Park Bayside Acme Township Park Bowers Harbor Public Access Deep Water Point DNR Launch/Beach Center Road	East Bay Township Four Mile Road Haserot Beach Kroupa Road Access M-22 South of Crain Hill Road Leffingwell Point Beach Mouth of Boardman Old Mission–Center Road Natural Area Old Mission–MDOT Right of Way–South of M-37	Old Mission–Old Mission Point State Park Old Mission Lighthouse Old Mission Peninsula Twp Park–East of Light House Old Mission Peninsula Twp Park–West of Light House Old Mission Road Peninsula Volunteer Fire Station Point #2 Power Island Bay Park	Rose Street Access at Peninsula Drive Sayler Park Senior Center Sunset Park Swaney Road Yuba Beach		
Houghton County					
Agate Beach	1	1/wk	6	0%	0
Chassell Beach	1	1/wk	9	0%	0
Hancock City Beach	1	1/wk	9	0%	0
Houghton City Beach	1	1/wk	9	0%	0
Lake Linden Campground Beach	1	1/wk	9	0%	0
McLain State Park Beach	1	1/wk	9	0%	0
Sandy Bottom Beach/Dollar Bay	1	1/wk	9	0%	0
Beaches in Houghton County that were not monitored and that had no closing or advisory days in 2010:					
Calument Waterworks Beach Hubbell Park	Mink Farm Public Shoreline Beach–Le Chance Creek	Public Shoreline Beach–Mc Lain State Park Public Shoreline Beach–S. of Portage Entry	Public Shoreline Beach–Southwest County Border White City		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Huron County					
Bird Creek County Park	1	1/wk	45	4%	2
Caseville County Park	1	1/wk	48	0%	0
Harbor Beach City Park	1	1/wk	42	0%	0
Jenks County Park	1	1/wk	42	0%	0
Lighthouse County Park	1	1/wk	51	14%	5
McGraw County Park	1	1/wk	45	7%	1
Oak Beach County Park	1	1/wk	42	0%	0
Philp County Park	1	1/wk	42	0%	0
Port Crescent State Park–Camping Area	1	1/wk	48	0%	0
Port Crescent State Park–Day Use	1	1/wk	51	10%	2
Sleeper State Park	1	1/wk	43	0%	0
Thompson Park	1	1/wk	12	0%	0
Veterans Park	1	1/wk	45	4%	1
Beaches in Huron County that were not monitored and that had no closing or advisory days in 2010:					
County Road End	Harbor Beach Marina	Larned Road End	Mud Creek Public Access		
Geiger Road Public Access	Helena Road End	Lighthouse County Park–South	Stafford County Park		
Grindstone Public Access	Kinch Road End		Wagener County Park		
Iosco County					
Alabaster Township	1	1/wk	21	0%	0
Au Sable Township Park	1	1/wk	24	13%	0 (58)*
East Tawas City Park	1	1/wk	27	22%	3
MDOT Roadside Park	1	1/wk	21	0%	0
Oscoda Township Beach	1	1/wk	21	0%	0
Tawas City Park	1	1/wk	27	19%	2
Tawas Point State Park Campground	1	1/wk	21	0%	0
Tawas Point State Park–Day Use area	1	1/wk	21	0%	0
Beaches in Iosco County that were not monitored and that had no closing or advisory days in 2010:					
Au Sable Point Beach	North–Public Shoreline Beach	Lake To Lake Road	Tawas Point State Park–Central		
County Road End.		Alabaster Township			
Gateway Park	Huron National Forest	Douglas Drive Beach	Tawas Point State Park–North		
Huron National Forest	South–Public Shoreline Beach	Use Area			
Keweenaw County					
Eagle Harbor Beach	1	1/wk	9	0%	0
Beaches in Keweenaw County that were not monitored and that had no closing or advisory days in 2010:					
Bete de Gris Beach	Eagle River Beach	Fort Wilkins State Park–West	Point Isabelle Beach		
Brunette Park	Fort Wilkins State Park		Public Shoreline Beach–Big Traverse Bay		
Cat Harbor Beach	Fort Wilkins State Park–East	Great Sands Bay Beach			
Cooper Harbor Lighthouse Complex		Mouth of the Gratiot River Beach	Public Shoreline Beach–Gay Park		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Leelanau County					
Empire Municipal Beach	1	1/wk	46	0%	0
Northport Bay Marina	1	1/wk	45	9%	0
Sleeping Bear Dunes– CR 651 Good Harbor Bay	3	1/wk	51	0%	0
Sleeping Bear Dunes– CR 669 Good Harbor Bay	3	1/wk	51	0%	0
Sleeping Bear Dunes– DH Day Campground	3	1/wk	51	2%	0
Sleeping Bear Dunes–Esch Road Beach	no data	no data	54	0%	0
Sleeping Bear Dunes–Glen Haven Beach	3	1/wk	51	2%	0
Sleeping Bear Dunes– North Bar Lake MI Beach	no data	no data	54	2%	0
Sleeping Bear Dunes– Peterson Road Beach	no data	no data	54	0%	0
Sleeping Bear Dunes–Platte Point Bay	3	1/wk	54	4%	0
Suttons Bay Park	1	1/wk	45	0%	0
Beaches in Leelanau County that were not monitored and that had no closing or advisory days in 2010:					
Bay Front Park	Graham Green Park	MDOT Roadside Park & Beach M-22 N of Cherry Bend D	Reynolds Street Beach		
Boughy Park & Beach	Hendryx County Roadside Park	North Bar	Smith Street Beach Northport		
Cathead Bay, Leelanau State Park	Lake Street Beach, Glen Arbor	North Street Beach	Stoney Point County Roadside Park		
Cedar Street Beach	Leelanau State Park, Lighthouse	Northport 4th Street Beach	Suttons Bay Marina Park & Beach South		
Christmas Cove	Leland Harbor	Northport 5th Street Beach	Suttons Bay Public Launch and Beach		
Elmwood/Greilickville Park & Beach	M-22 at M-72 Public Access	Northport 7th Street Beach	Suttons Bay South Shore Park		
G. Marsten Dame Marina	MDOT Roadside Park & Beach	Northport Haserot Beach, Rose Street	Thompson Stree Beach		
Gils Pier		Omena Beach & Park			
Glen Arbor/Manitou Boulevard Beach		Peterson Park			
Luce County					
Beaches in Luce County that were not monitored and that had no closing or advisory days in 2010:					
Blind Sucker River # 1	Muskallonge Lake State Park Beach	Public Shoreline Beach– County Rd 412 and Crisp Pt	Public Shoreline Beach– West County Border Beach		
Blind Sucker River # 2	Public Shoreline Beach– Blind Sucker Flooding Area	Public Shoreline Beach– Little Sucker/Two Hearted R	Unnamed Road End #1		
Crisp Point Light House	Public Shoreline Beach– Coast Guard Line Road	Public Shoreline Beach– Three Mile Creek Area	Unnamed Road End #2		
Lake Superior Campground Beach	Public Shoreline Beach– County Rd 407		Unnamed Road End #3		
Mouth of the Two Hearted River Campground					
Mackinac County					
Kiwanis Beach	1	1/wk	15	0%	0
US 2 Roadside East of Brevort	1	1/wk	15	0%	0
Beaches in Mackinac County that were not monitored and that had no closing or advisory days in 2010:					
American Legion Memorial Park	Antoine Road End Best Western Lakefront	Big Knob State Forest Campground	Black River State Forest Campground		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Mackinac County					
Beaches in Mackinac County that were not monitored and that had no closing or advisory days in 2010:					
Boot Island		MDOT Overlook	Public Shoreline Beach #5– Little Hog Island area	Public Shoreline Beach– Pointe Aux Chenes Bay	
Coast Guard Pier Boat Launch and City Park		MDOT Roadside Park on US 2	Public Shoreline Beach– Epoufette Bay	Public Shoreline Beach– Seiners Point	
Epoufette Bay Campground		Miller’s Hog Island Subdivision Beach	Public Shoreline Beach– Fox Point Area	Public Shoreline Beach– South of Brevort River	
Foley Creek Campground		Mouth of Cut River Roadside Beach	Public Shoreline Beach– Little Hog Island area	Public Shoreline Beach– State Forest Matrix Point	
Harbour Light		Naubinway Bay Access	Public Shoreline Beach– Manitou Paymen Highbanks	Sand Point	
Hazelton Road End		Public Shoreline Beach #2– Little Hog Island area	Public Shoreline Beach– MDNR Matrix Point Area	State Roadside Park Beach	
Hiawatha National Forest– Carp River Access		Public Shoreline Beach #2– Manitou Paymen Highbanks	Public Shoreline Beach– Morean Township, Section 25	State Street Road End	
Hog Island Campground		Public Shoreline Beach #3– Little Hog Island area	Public Shoreline Beach– Naubinway Area	Straits State Park	
Horseshoe Bay		Public Shoreline Beach #4– Little Hog Island area		US 2 Roadside/ Campground	
Wilderness–North				Wetland Shoreline– St. Martin Point	
Horseshoe Bay					
Wilderness–South					
K Royale					
Kewadin Inn					
Macomb County					
H.C.M.A.–Metropolitan Beach Metropark	1	2/wk	295	13%	7
New Baltimore Park Beach	1	2/wk	132	8%	18
St. Clair Shores Blossom Heath Beach	1	2/wk	129	40%	2 (110)*
St. Clair Shores Memorial Park Beach	1	2/wk	129	20%	0 (70)*
Beaches in Mackinac County that were not monitored and that had no closing or advisory days in 2010:					
H.C.M.A.–Huron Point					
Manistee County					
Arcadia Park	1	1/wk	30	0%	0
Bar Lake Outlet	1	1/wk	30	0%	0
Fifth Avenue Beach	1	1/wk	30	0%	0
First Street Beach	1	1/wk	30	0%	0
Magoon Creek	1	1/wk	30	0%	0
Onekama Township Beach	1	1/wk	30	0%	0
Orchard Beach State Park	1	1/wk	30	0%	0
Pierport Township Beach	1	1/wk	30	0%	0
Sundling Park	1	1/wk	30	0%	0
Beaches in Manistee County that were not monitored and that had no closing or advisory days in 2010:					
Portage Park					
Marquette County					
Marquette South Beach	1	3/wk	33	21%	0
North Beach	1	3/wk	1	0%	0
North of Picnic Rocks	1	3/wk	1	0%	0
Picnic Rocks	1	3/wk	2	50%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Marquette County					
Beaches in Marquette County that were not monitored and that had no closing or advisory days in 2010:					
McCarty's Cove		Public Shoreline Beach– Big Huron River		Public Shoreline Beach– Little Presque Isle	
Mason County					
Bass Lake Outlet Beach	1	1/wk	30	0%	0
Buttersville Park Beach	1	1/wk	30	0%	0
Ludington State Park Campground Beach	1	1/wk	30	0%	0
South Pier Beach	1	1/wk	30	0%	0
South Summit Beach– Sunset Boulevard Beach	1	1/wk	30	0%	0
Sterns Park Beach	1	1/wk	27	0%	0
Summit Township Beach	1	1/wk	30	0%	0
Beaches in Mason County that were not monitored and that had no closing or advisory days in 2010:					
Ludington State Park Public Shoreline Beach North		Ludington State Park Public Shoreline Beach South		Manistee National Forest– Public Shoreline Beach N	Pere Marquette Harbor
		Manistee National Forest Campground Beach		Manistee National Forest– Public Shoreline Beach S	
Menominee County					
Henes Park	1	1/wk	57	5%	0
Memorial Beach	1	1/wk	54	2%	0
Beaches in Menominee County that were not monitored and that had no closing or advisory days in 2010:					
Airport Park Fox Park		Klienke Park Public Shoreline Beach– Cedar River		Public Shoreline Beach– Fox village	Wells State Park
Monroe County					
Estral Beach	1	1/wk	48	2%	0
Luna Pier City Beach	1	1/wk	58	9%	25
Sterling State Park	1	1/wk	50	4%	2
Woodland Beach	2	1/wk	48	0%	0
Beaches in Monroe County that were not monitored and that had no closing or advisory days in 2010:					
Avalon Beach Bolles Harbor		Detroit Beach LaSalle Township– Toledo Beach		Lost Peninsula North Cape Yacht Club	Point Aux Peaux Stoney Point
Montmorency County					
Beaches in Montmorency County that were not monitored and that had no closing or advisory days in 2010:					
East Twin Beach/Albert Township Park					
Muskegon County					
Bronson/Kruse Park	1	1/wk	15	7%	0
Duck Lake Channel Beach	1	1/wk	15	7%	0
Lake Harbor Park	1	1/wk	15	0%	0
Lighthouse/Sylvan Beach	1	1/wk	18	17%	1
Medbury Park Beach	1	1/wk	15	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Muskegon County					
Meinert County Park	1	1/wk	21	24%	7
Muskegon State Park	1	1/wk	18	11%	1
Old Channel Beach	1	1/wk	15	0%	0
P.J. Hoffmaster State Park–Campground	1	1/wk	15	0%	0
P.J. Hoffmaster State Park–Public Beach Area	1	1/wk	15	0%	0
Pere Marquette Park	1	1/wk	15	13%	0
Pioneer County Park	1	1/wk	15	0%	0
Beaches in Muskegon County that were not monitored and that had no closing or advisory days in 2010:					
Muskegon State Park-Shoreline Beach North					
Oceana County					
Claybanks Township Park	1	1/wk	30	0%	0
Lighthouse Beach at Silver Lake State Park	1	1/wk	30	3%	0
Mears State Park	1	1/wk	30	0%	0
Stony Lake Channel	1	1/wk	30	0%	0
Whiskey Creek	1	1/wk	33	6%	2
Beaches in Oceana County that were not monitored and that had no closing or advisory days in 2010:					
Cedar Point County Park Silver Creek Channel Silver Lake State Park					
Ontonagon County					
Ontonagon Township Park and Campground	1	1/wk	4	0%	0
Porcupine Mountains State Park–Union Bay	1	1/wk	4	0%	0
Beaches in Ontonagon County that were not monitored and that had no closing or advisory days in 2010:					
Green Park	Porcupine Mountain State Park	Public Shoreline Beach–Misery Bay	Public Shoreline Beach–Wolf Point		
Gull Point Beach	Porcupine Mountains Wilderness State Park–West	Public Shoreline Beach–Sleeping Bay	Union Bay Beach		
Mouth of the Big Iron River Beach					
Ottawa County					
Grand Haven City Beach	1	1/wk	33	3%	0
Grand Haven State Park	1	1/wk	33	0%	0
Holland State Park-Lake Michigan Beach	1	1/wk	78	4%	0
Kirk Park	1	1/wk	39	5%	0
Kouw Park	1	1/wk	40	3%	0
North Beach Park	1	1/wk	30	0%	0
Rosy Mound Recreation Area	1	1/wk	39	3%	0
Tunnel Park	1	1/wk	33	15%	0
Windsnest Park	1	1/wk	39	8%	0
Beaches in Ottawa County that were not monitored and that had no closing or advisory days in 2010:					
Mountain Beach P.J. Hoffmaster State Park–Shoreline Beach					

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Presque Isle County					
Hoeft State Park-North	1	1/wk	24	0%	0
Lakeside Park in Rogers City	1	1/wk	24	0%	0
Presque Isle Harbor Beach	1	1/wk	26	0%	0
Beaches in Presque Isle County that were not monitored and that had no closing or advisory days in 2010:					
40 Mile Point Park	Grace Access Site	Lakeview Park Beach	Seagull Point Park		
Ball Diamond Park	Hammond Bay Access Site	Manitou Beach	Thompson's Harbor State Park		
Bell Bay	Hammond Bay Harbor	New Lighthouse Park	US 23 Hammond Bay		
Evergreen Beach	Hoeft State Park-South	Presque Isle Harbor	US 23 Roger City		
Golden Beach	Lakeside Park Beach	Public Shoreline Beach-False Presque Isle Harbor			
Sanilac County					
Forester County Park	1	1/wk	51	6%	3
Forestville Beach	1	1/wk	48	0%	0
Lexington Beach	1	1/wk	24	0%	0
Lexington County Park	1	1/wk	24	0%	0
Port Sanilac Park	1	1/wk	24	0%	0
Beaches in Sanilac County that were not monitored and that had no closing or advisory days in 2010:					
Birch Beach	Birch Beach North #3	Great Lakes Beach	Sanilac County Roadside Park #1		
Birch Beach Middle #2	Delaware Park	Sanilac County Park #4			
Schoolcraft County					
Roadside Park Beach	1	1/wk	14	7%	6
Rogers Beach	1	1/wk	14	7%	6
Beaches in Schoolcraft County that were not monitored and that had no closing or advisory days in 2010:					
Doyle Township Park	Manistique Township Park	Public Shoreline Beach-S. of McDonald Lake	Public Shoreline Beach-Thompson Village		
Lakeview Park	Public Shoreline Beach-Goudreou's Harbor	Public Shoreline Beach-Thompson			
St Clair County					
Burtchville Township Park	1	1/wk	51	8%	1
Chrysler Park Beach	1	1/wk	54	17%	6
Conger-Lighthouse Beach	1	1/wk	54	11%	2
Fort Gratiot County Park	1	1/wk	54	9%	3
Holland Road Beach	1	1/wk	54	9%	2
Jeddo Road Beach	1	1/wk	51	6%	1
Keewadhin Road Beach	1	1/wk	51	6%	1
Krafft Road Beach	1	1/wk	48	13%	1
Lakeport State Campground	1	1/wk	51	8%	2
Lakeport State Park	1	1/wk	54	9%	3
Lakeside Beach	1	1/wk	90	8%	4
Marine City Beach	1	1/wk	48	2%	0
Marine City Diving Area	1	1/wk	48	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
St Clair County					
Metcalf Road Beach	1	1/wk	51	8%	2
Washington Street Park	1	1/wk	51	6%	2
Van Buren County					
Covert Township Park Beach	1	1/wk	30	0%	0
South Haven North Beach	1	1/wk	30	3%	0
South Haven South Beach	1	1/wk	36	19%	12
Van Buren State Park Beach	1	1/wk	33	9%	3
Wayne County					
Belle Isle Beach	1	2/wk	99	7%	0
Pier Park	1	2/wk	146	26%	35
Beaches in Wayne County that were not monitored and that had no closing or advisory days in 2010:					
Crescent Sail Yacht Club	Elizabeth Park	Southern Wayne County Border			

*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 Shannon Briggs, Michigan Department of Natural Resources and Environment,. Personal communication. May 2011.
- 2 Michigan Department of Environmental Quality. Michigan Beach Monitoring Year 2010 Annual Report. February 2011.

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



MINNESOTA

11th in Beachwater Quality

5% 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.

Minnesota has 79 public beaches along about 58 miles of Lake Superior coastline. During the 2010 swim season, the Minnesota Pollution Control Agency (MPCA) began transferring responsibility for the program to the Minnesota Department of Health (MDH), and as of April 2011, the Minnesota Lake Superior Beach Monitoring Program is fully administered by the MDH. As an interim step in moving the program from MPCA to MDH, MPCA contracted with the University of Minnesota Duluth's Natural Resources Research Institute (MDH's NRRI) to conduct monitoring and notification activities for the 2010 swim season.

The City of Duluth is in the process of adopting a new unified land development code. This code will be informed by the city's comprehensive plan, and will encourage green infrastructure and the preservation of open space. In addition to taking steps to reduce stormwater runoff, Duluth received financial assistance for wastewater treatment upgrades through the American Reinvestment and Recovery Act, and has embarked on the construction of a \$2 million wastewater storage facility that allows stormwater to be held during storms for later treatment so that the treatment plant is not overwhelmed during heavy rains. The project also includes pipe replacements between 7th Street and 21st Avenue East to reduce sewage leaks, and nearly \$2 million for a wastewater lift station and improvements in piping. These installations and upgrades will help to reduce discharges of raw or partially treated sewage to Lake Superior beachwater.¹

KEY FINDINGS IN MINNESOTA

Beachwater Contamination

(% of samples exceeding state standards in 2010)[†]

- Park Point 20th Street/Hearing Island Canal Beach in St. Louis County (50%)
- Park Point Sky Harbor Parking Lot Beach in St. Louis County (30%)
- Park Point New Duluth Boat Club/14th Street Beach in St. Louis County (20%)
- Leif Erikson Park Beach in St. Louis County (20%)

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

- 45 (74%) unknown sources of contamination
- 16 (26%) stormwater runoff

Monitoring Results

In 2010, Minnesota reported 90 coastal beaches and beach segments (including 11 beaches on the Grand Portage Reservation), 7 (8%) of which were monitored more than once a week, 43 (48%) once a week, and 40 (44%) 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, 5%* of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Park Point 20th Street/Hearing Island Canal Beach (50%), Park Point Sky Harbor Parking Lot Beach (30%), Leif Erikson Park Beach (20%), and Park Point New Duluth Boat Club/14th Street Beach

[†] To avoid capturing sampling locations that are not truly located at swimming beaches, NRDC does not normally include monitoring sites that were sampled less than 12 times per year in its Dirtiest Beachwater rankings. However, as discussed in this summary, Minnesota had a truncated sampling season in 2010, so NRDC is including all beaches with at least 10 samples in its Dirtiest Beachwater rankings for this state.

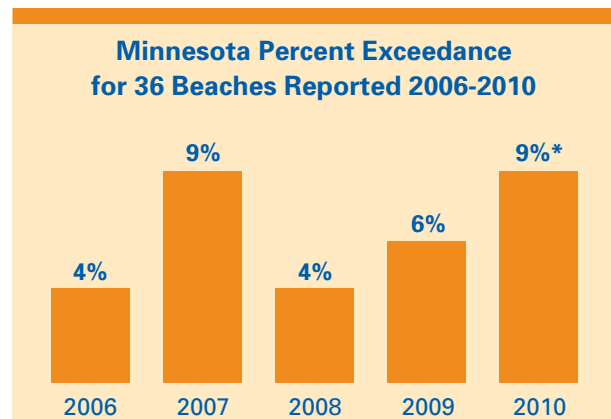
(20%), all in St. Louis County. St. Louis County had the highest exceedance rate (12%) in 2010, followed by Cook County (1%); there were no exceedances at beaches in Lake County. Less than 5% of Grand Portage samples exceeded standards.

Sampling Practices: Generally, beaches are monitored from the week before Memorial Day to the week after Labor Day, with some beaches monitored in May and October as well because of use by kayakers, surfers, and sailboarders. In 2010, the monitoring season was shortened because finalization of contracts between MPCA and UMD's NRRI was delayed, and beaches were sampled from August 18 to September 15.⁴

The state determines sampling practices, locations, standards, and notification protocols and practices at the beaches monitored under the program. Grand Portage Reservation, located on the north shore of Lake Superior near the Canadian border, has swimming beaches on Lake Superior, and the water at these beaches is monitored in a program separate from the state's Lake Superior Beach Monitoring Program. These beaches were sampled throughout the entire monitoring season. This summary describes only the Beach Monitoring Program's practices, but includes monitoring and notification data beaches in the Grand Portage Reservation. Grand Portage applies the same water quality standards as the state.¹

Samples are collected at a depth of 6 to 12 inches in water that is knee deep. In Minnesota, beaches are assigned high, medium, and low priority based on the potential for impacts from stormwater runoff, bather loads, waterfowl populations, and proximity to concentrated animal feeding operations and wastewater treatment discharges.²

When a beach is placed under advisory, monitoring occurs daily (Monday through Thursday) until the site meets the water quality standards. States that monitor more frequently after an exceedance is found will tend to have higher percent exceedance rates and lower total closing/ advisory days than they would if their sampling schedule did not alter after an exceedance was found.



Closings and Advisories

Total closing and advisory days for 15 events lasting six consecutive weeks or less decreased 38% to 61 days in 2010 from 99 days in 2009. In prior years, there were 257 closing and advisory days in 2008, 195 days in 2007, 73 days in 2006, and 143 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 15 events lasting six consecutive weeks or less, 97% (59) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, and 3% (2) were preemptive (i.e., without waiting for monitoring results) due to unspecified reasons.

Standards and Procedures: The Lake Superior Beach Monitoring Program does not issue beach closings; its policy is to issue advisories only¹ (the Grand Portage Tribe, however, does issue closings). Minnesota applies a single-sample maximum *E. coli* standard of 235 cfu/100ml and a geometric mean *E. coli* standard of 126 cfu/100ml for a minimum of five samples collected during a 30-day period. When a sample exceeds either the single-sample or geometric mean bacteria standard, an advisory is issued. There is no protocol for delaying or foregoing an advisory when a sample exceeds standards.

Minnesota has no preemptive rainfall standards, but does post advisories after known sewage overflows or other events that are considered likely to result in high bacteria levels. In addition, the public is advised to wait 24 hours before going swimming after rainfall in urban areas.³

* 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. The percent exceedance for this subset of beaches (9%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (5%).

Minnesota 2010 Monitoring Results and Closing or Advisory Days

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Cook County					
Grand Portage Bay Monitoring Location 1	1	1/wk	18	0%	0
Grand Portage Bay Monitoring Location 2	1	1/wk	18	0%	0
Grand Portage Bay Monitoring Location 3	1	1/wk	18	0%	0
Grand Portage Bay Monitoring Location 4	1	1/wk	18	0%	0
Grand Portage Bay Monitoring Location 5	1	1/wk	18	6%	2 (2)*
Grand Portage Bay Monitoring Location 6	1	1/wk	18	0%	0
Grand Portage Bay Monitoring Location 7	1	1/wk	18	0%	0
Grand Portage Bay Monitoring Location 8	1	1/wk	18	0%	0
Hollow Rock Resort Beach	1	1/wk	18	0%	0
Red Rock Beach	1	1/wk	18	0%	0
Reservation River Beach	1	1/wk	16	13%	12 (3)*
Beaches in Cook County that were not monitored and that had no closing or advisory days in 2010:					
Cutface Creek Wayside Rest Beach	Paradise Beach	Cascade State Park Campground Beach	Judge C.R. Magney State Park East Beach		
Durfee Creek Area Beach	Schroeder Town Park Beach	Cascade State Park West Beach	Judge C.R. Magney State Park West Beach		
Grand Marais Campground Beach	Sugarloaf Cove Beach	Coville Creek Beach	Ray Berglund Wayside Rest Beach		
Grand Marais Downtown Beach	Temperance River State Park Beach	Croftville Beach	Red Cliff Beach		
Kadunce Creek Beach	Chicago Bay Boat Launch Beach	Horseshoe Bay Boat Launch Beach	Temperance River State Park East Beach		
Old Shore Road Beach Area	Butterwort Cliffs Beach				
Lake County					
Agate Bay Beach	2	1/wk	1	0%	0
Burlington Bay Beach	2	1/wk	1	0%	0
Flood Bay Beach	2	1/wk	1	0%	0
Gooseberry Falls State Park Beach	2	1/wk	1	0%	0
Silver Bay Marina Beach	2	1/wk	1	0%	0
Split Rock Lighthouse State Park Beach	2	1/wk	1	0%	0
Split Rock River Beach	2	1/wk	1	0%	0
Tettegouche State Park Beach	2	1/wk	1	0%	0
Twin Points Public Access Beach	2	1/wk	2	0%	0
Beaches in Lake County that were not monitored and that had no closing or advisory days in 2010:					
Blueberry Hill Beach	Silver Creek Beach	Split Rock Lighthouse State Park/Gold Rock Point Beach	Tettegouche State Park/Baptism River Beach		
Knife River Marina Beach	Split Rock Lighthouse State Park/Corundum Point Beach	Split Rock Lighthouse State Park/Split Rock Point Beach	Tettegouche State Park/Crystal Bay Beach		
Manitou River Beach	Split Rock Lighthouse State Park/Crazy Bay Beach	Stewart River Beach	Two Harbors City Park Beach		
Palisade Beach					
Silver Cliff Beach					
St. Louis County					
42nd Avenue East Beach	2	1/wk	5	0%	0
Bluebird Landing Beach	2	1/wk	4	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
St. Louis County					
Boy Scout Landing Beach	2	1/wk	5	0%	0
Brighton Beach	1	2/wk	10	0%	0
Clyde Avenue Boat Landing Beach	2	1/wk	7	14%	4 (2)*
French River Beach	2	1/wk	5	0%	0
Lakewalk Beach	1	2/wk	9	11%	1 (1)*
Lakewalk East/16th Avenue East Beach	2	1/wk	7	14%	2 (1)*
Leif Erikson Park Beach	2	1/wk	10	20%	4 (1)*
Lester River Beach	2	1/wk	6	0%	0
Park Point 20th Street/Hearing Island Canal Beach	1	2/wk	14	50%	19 (2)*
Park Point Beach House	1	2/wk	11	0%	0
Park Point Franklin Park/13th Street South Beach	1	2/wk	12	0%	0
Park Point Lafayette Community Club Beach	1	2/wk	9	0%	0
Park Point New Duluth Boat Club/14th Street Beach	1	2/wk	10	20%	4 (1)*
Park Point Sky Harbor Parking Lot Beach	2	1/wk	10	30%	13 (2)*
Stony Point Beach	2	1/wk	5	0%	0
Beaches in St. Louis County that were not monitored and that had no closing or advisory days in 2010:					
Bayfront Park Beach	Lakewood Pump Station Beach	North Shore Drive Wayside Rest/72nd Avenue East Beach	Stony Point Wayside Rest Beach		
Blatnik Fishing Pier Beach	McQuade Road Safe Harbor Beach	North Shore Drive Wayside Rest/Cant Road Beach	Waterfront Trail/Interlake Beach		
Glensheen Cemetery Beach	Minnesota Point Harbor Beach	Park Point Southworth Marsh Beach	Waterfront Trail/Radio Towers Beach		
Indian Point Campground Beach	Morgan Park Beach	Smithville Park Beach	Waterfront Trail/Riverside Beach		

*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 Margaret Watkins. Grand Portage Environmental Department. May, 2011.
- 2 Brian Fredrickson, Minnesota Pollution Control Agency, personal communication, April 2011.
- 3 Minnesota Lake Superior Beach Monitoring Program. Minimizing Risk. Accessed at <http://mnbeaches.org>, February 2011.
- 4 Brian Fredrickson, Minnesota Pollution Control Agency, personal communication, June 2011.

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



MISSISSIPPI

20th in Beachwater Quality

10% 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.

Mississippi has 22 beaches stretching along 43 miles of Gulf of Mexico waters. The Mississippi Department of Environmental Quality (MDEQ) conducts Mississippi's beachwater quality monitoring program in conjunction with the State Beach Monitoring Task Force.

During 2010, Mississippi's beaches were impacted by the BP oil disaster. A total of 2,148 closure and advisory days at 17 beaches were issued in 2010 due to the spill. Clean-up crews were working along Mississippi's coast into 2011. Mississippi has posted additional signage at all of its beaches educating visitors about what to do if they encounter tarballs and what the health effects of the oil spill may be.

Although Gulf Park Estates had oil spill advisory days in 2010, the beach is now a boat launch and fishing pier area and swimming is no longer allowed.¹ Oil spill advisory days were issued at this beach in 2010.

Monitoring Results

In 2010, Mississippi reported monitoring information for 22 coastal beaches, all of which were monitored 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, 10%* of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Gulfport Central Beach (24%), Gulfport East Beach (20%), and Courthouse Road Beach (20%) in Harrison County and Front Beach in Jackson County (20%).

Harrison County had the highest exceedance rate (10%) in 2010 followed by Jackson (10%) and Hancock (7%) counties.

Sampling Practices: Mississippi's beaches are monitored year-round. The MDEQ determines sampling practices, locations, standards, and notification protocols and practices throughout the state. Samples are taken in the middle of the water column at wading depth (approximately 0.5 m). The frequency of routine monitoring for each beach is based on the period of recreational use, the nature and extent of use during each period, and the water quality history for the beach.

KEY FINDINGS IN MISSISSIPPI

Beachwater Contamination

(% of samples exceeding state standards in 2010)

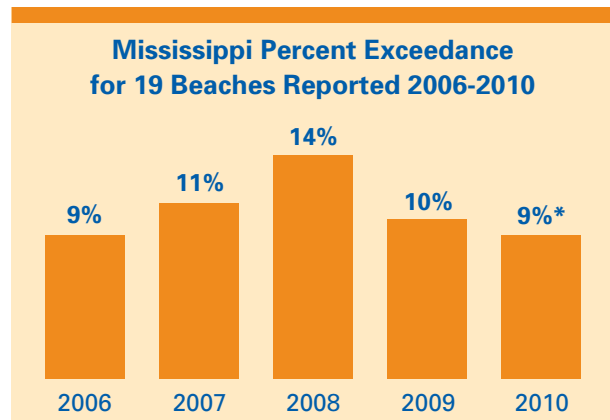
- Gulfport Central Beach in Harrison County (24%)
- Gulfport East Beach in Harrison County (20%)
- Courthouse Road Beach in Harrison County (20%)
- Front Beach in Jackson County (20%)

Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

- 76 (86%) unknown sources of contamination
- 12 (14%) sewage spills/leaks

Once a beach is placed under advisory, the monitoring frequency is increased until two consecutive samples meet standards, after which the beach is reopened.¹ States that monitor more frequently after an exceedance is found will tend to have higher percent exceedance rates and lower total closing/advisory days than they would if their sampling schedule was not altered after an exceedance was found.



Closings and Advisories

Total closing/advisory days for 17 events lasting six consecutive weeks or less decreased 73% in 2010, down to 88 days from 331 days in 2009. In prior years, there were 187 closing/advisory days in 2008, 249 days in 2007, 0 days in 2006, and 41 days in 2005. In addition, there were no extended events and 17 permanent events (2,148 days) in 2010 due to the BP oil disaster. 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 17 events lasting six consecutive weeks or less, 86% (76) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, and 14% (12) were preemptive (i.e., without waiting for monitoring results) due to known sewage spills/leaks.

Standards and Procedures: Notifications issued because of bacterial exceedances or anticipated bacterial exceedances caused by rainfall are called advisories; all other notifications are generally called closings, although but oil spill advisories were issued in 2010. To issue contamination advisories, Mississippi applies an enterococcus single-sample maximum standard of 104 cfu/100 ml. No geometric mean standard is applied when determining whether a beachwater sample exceeds bacterial standards.

When a sample indicates an exceedance, a resample is required. When two consecutive samples indicate exceedances, Mississippi issues an advisory.

In addition to bacteria samples, the MDEQ collects monthly nutrient and chlorophyll data. This additional information is not used to inform issuance of beach advisories or closings, but it is used along with the bacteria data to assess the quality of waters along the Mississippi Gulf Coast.¹

Mississippi has a standing preemptive rainfall advisory that warns against swimming at beaches for 24 hours following significant rainfall (characterized by noticeable runoff). Swimmers are particularly advised to avoid swimming near storm drains, which are present at nearly all of Mississippi's Gulf Coast beaches. Beaches are preemptively closed if there is a known sewage spill or when events such as a hurricane or beach recovery project make conditions unsafe for swimming.

* 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. The percent exceedance for this subset of beaches (9%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (10%).

Mississippi 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Hancock County					
Bay Street Louis Beach	1	1/wk	53	8%	14
Buccaneer State Park Beach	2	1/wk	24	0%	0 (120)*
Lakeshore	1	1/wk	29	14%	6 (120)*
Waveland Beach	2	1/wk	39	5%	0 (120)*

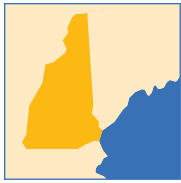
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Harrison County					
Biloxi East Beach	1	1/wk	49	2%	0
Biloxi Porter Ave Beach	1	1/wk	50	4%	0 (128)*
Biloxi West Central Beach	1	1/wk	34	0%	0 (129)*
Courthouse Road Beach	1	1/wk	44	20%	9 (128)*
Edgewater Beach	1	1/wk	38	11%	0 (128)*
Gulfport Central Beach	1	1/wk	45	24%	10 (128)*
Gulfport East Beach	1	1/wk	45	20%	7 (128)*
Gulfport Harbor Beach	1	1/wk	42	12%	9 (128)*
Gulfport West Beach	1	1/wk	39	10%	8 (127)*
Long Beach	1	1/wk	41	10%	4 (127)*
Pass Christian Central Beach	2	1/wk	37	5%	0 (126)*
Pass Christian East Beach	1	1/wk	36	6%	0 (127)*
Pass Christian West Beach	2	1/wk	37	5%	0 (126)*
Jackson County					
Front Beach	1	1/wk	59	20%	11
Gulf Park Estates Beach (retired)	2	no data	0	NA	0 (129)*
Pascagoula Beach East	1	1/wk	50	2%	0
Pascagoula Beach West	1	1/wk	53	8%	0
Shearwater Beach	1	1/wk	52	8%	5
St. Andrews Beach	2	1/wk	38	11%	5 (126)*

*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 Emily Cotton, Regional Biologist, Mississippi Department of Environmental Quality. Personal communication. February 2011.

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



NEW HAMPSHIRE 1st in Beachwater Quality

1% 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.

New Hampshire has 16 public coastal and estuarine beaches lining 18 miles of Atlantic waters. The state’s beachwater quality monitoring program is administered by the New Hampshire Department of Environmental Services (DES).

This summer, the second phase of a coastal bacteria source identification project being conducted by DES and a local environmental firm is scheduled for completion.

This phase of the project will identify potential bacteria sources and mitigation processes that will inform the development of watershed-based plans for North Hampton State Beach watershed and Wallis Sands at Wallis Road Beach watershed. Water quality at the

northeast portion of North Hampton State beach is impacted by the Little River, while Parson’s Creek has the potential to impact the southern portion of the public beach area at Wallis Sands at Wallis Road Beach. The source identification report, when complete, will be made available to the public and to municipal officials as they develop watershed-based plans for these beaches. These plans will promote the use of green infrastructure, a stormwater management practice that prevents bacterial contamination of beachwater by capturing runoff and allowing it to infiltrate into the soil.¹ A source identification project is also being conducted in the North Hampton State Beach watershed to identify sources of enterococcus in the river.²

KEY FINDINGS IN NEW HAMPSHIRE

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Foss Beach (5%) in Rockingham County
- State Beach (4%) in Rockingham County
- New Castle Town Beach (3%) in Rockingham County

Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

- 15 (94%) unknown sources
- 1 (6%) sewage sources

Monitoring Results

In 2010, New Hampshire reported 17 coastal beaches in Rockingham County. Of these, 10 (59%) were monitored more than once a week, 6 (35%) once a week, and 1 (6%) every other 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, 1% of all reported beach monitoring samples exceeded the state’s daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Foss Beach (5%), State Beach (4%), New Castle Town Beach (3%), and Wallis Sands Beach at Wallis Road (1%), all in Rockingham County.

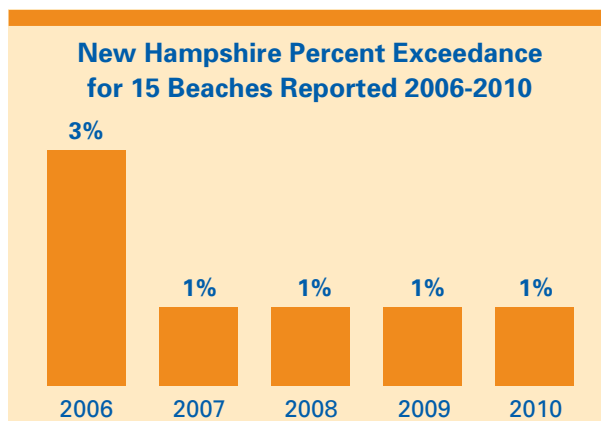
Sampling Practices: In 2010, the monitoring season ran from June 1 to September 1. The program continued to partner with a local Surfrider Foundation chapter that sampled three times in March and April at North Hampton State Beach² and North Beach³ in North Hampton, and at Sawyer Beach,⁴ Jenness Beach at Cable Road,⁵ and Jenness Beach State Park in Rye.⁶ Star Island, a conference center, cannot be sampled without a boat and was not sampled in 2010.¹

DES determines sampling and notification practices, locations, standards, and protocols at all of its public coastal beaches. Samples are taken in knee-deep water. Sampling frequencies at beaches in New Hampshire are based on beach history, microbial pathogen sources, and beach use. The number of samples collected at each beach is determined by beach length, with two samples taken at beaches less than 100 feet in length and three samples taken at longer beaches.²

When a sample exceeds water quality standards, DES samples daily until standards are met. Samples may also be collected at known and suspected discharge sources at New Hampshire's beaches, and extra wet-weather sampling may be conducted at beaches when stormwater runoff is expected to impact beach water quality.² States that monitor more frequently after an exceedance is found or after rainfall events 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.

Advisories

Total closing/advisory days for 6 events lasting six consecutive weeks or less increased 33% to 16 days in 2010, from 12 days in 2009. For prior years, there were 13 days in 2008, 2 days in 2007, 23 days in 2006, and 1 day in 2005. 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 6 events lasting six consecutive weeks or less, 94% (15) of closing/advisory days were due to monitoring that revealed elevated bacteria levels, and 6% (1) were preemptive (i.e., ordered without waiting for monitoring results) due to known sewage spills.



Standards and Procedures: New Hampshire's policy is to issue advisories and not closings at its beaches, but towns can issue closings at beaches within their jurisdiction. New Hampshire applies an enterococcus single-sample maximum of 104 cfu/100 ml. If two or more samples collected at a beach exceed the standard, or if one sample exceeds 174 cfu/100 ml, a beach advisory is issued.² There is no protocol for foregoing or delaying an advisory when these conditions are met. The state standard for the geometric mean of at least three samples collected over a 60-day period is 35 cfu/100 ml,⁷ but the geometric mean standard is not used to issue beach advisories.

The potential for issuing preemptive rain advisories at beaches in Rye and North Hampton is currently being studied, but to date preemptive rain advisories have not been issued at beaches in New Hampshire.

A preemptive advisory would be issued if a public beach area was threatened by a suspected sewage spill or leak. The public is encouraged to report if illness occurs after recreating at New Hampshire's public beaches and illness complaints could potentially initiate further investigation of beachwater quality.¹

New Hampshire 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Rockingham County					
Bass Beach	1	2/wk	76	0%	0
Foss Beach	2	1/wk	41	5%	4
Hampton Beach State Park	1	2/wk	150	0%	0
Hampton Harbor Beach	2	1/wk	31	0%	0
Jenness Beach at Cable Road	1	2/wk	82	0%	1

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Rockingham County					
Jenness Beach State Park	1	2/wk	86	0%	0
New Castle Town Beach	1	2/wk	91	3%	5
North Beach	2	1/wk	68	0%	0
Northside Park	2	1/wk	36	0%	0
Sawyer Beach	1	2/wk	76	0%	0
Seabrook Harbor Beach	1	2/wk	72	0%	0
Seabrook Town Beach	1	2/wk	72	0%	0
Star Island Beach	3	2/mo	0	NA	0
State Beach	1	2/wk	89	4%	4
Sun Valley Beach	2	1/wk	35	0%	0
Wallis Sands Beach at Wallis Road	1	2/wk	97	1%	2
Wallis Sands State Park	2	1/wk	36	0%	0

NOTES

- 1 Jody Connor, Water Division, New Hampshire Department of Environmental Services. June 2011.
- 2 New Hampshire Department of Environmental Services. North Hampton State Beach Water Quality Report, Summer 2010. January 2011.
- 3 New Hampshire Department of Environmental Services. North Beach Water Quality Report, Summer 2010. February 2011.
- 4 New Hampshire Department of Environmental Services. Sawyer Beach Water Quality Report, Summer 2010. February 2011.
- 5 New Hampshire Department of Environmental Services. Jenness Beach at Cable Road Water Quality Report, Summer 2010. February 2011.
- 6 New Hampshire Department of Environmental Services. Jenness Beach State Park Water Quality Report, Summer 2010. February 2011.
- 7 New Hampshire Department of Environmental Services, Beach Inspection Program. Accessed at <http://des.nh.gov/organization/divisions/water/wmb/beaches/samples.htm>. May 2011.

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



NEW JERSEY 2nd in Beachwater Quality

2% 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.

New Jersey has 700 public coastal beaches lining 127 miles of Atlantic waters.¹ Coastal water quality monitoring is conducted through the Cooperative Coastal Monitoring Program (CCMP), which is administered by the New Jersey Department of Environmental Protection (NJDEP).

New Jersey participates in a number of efforts to improve water quality at its beaches. Combined sewer systems in and around New York/New Jersey Harbor are designed so that during periods of wet weather, excess flows are discharged to harbor waters. These excess flows contain human waste, including litter and toilet waste, such as hygiene products. When discharged to the New York/New Jersey Harbor Complex, the floating debris tends to collect into slicks that can exit the harbor and wash up on beaches.² The multiagency Floatables Action Plan, which has been in place for 19 years,¹ involves several means of controlling floating debris, such as helicopter surveillance to locate slicks, skimmer vessels fitted with nets that collect floating debris, floating booms that trap debris near sewer-system discharge points for later collection, and sewer-system improvements intended to maximize the ability to retain floating debris. These methods have prevented tons of floating debris from reaching the harbor and New Jersey beaches. The NJDEP’s Clean Shores Program, in which state inmates remove floatable debris from the shorelines of the Hudson, Raritan, and Delaware estuaries and barrier island bays, removes thousands of tons of trash and debris from New Jersey shorelines each year as part of the Floatables Action Plan.¹

Elevated levels of enterococcus bacteria are discharged to the ocean from the Wreck Pond outfall during rain events. Source tracking efforts at Wreck Pond have shown that sources of pollution include stormwater runoff and suspected failing sewage infrastructure in the community surrounding the pond. In 2006, NJDEP completed a 300-foot extension to the Wreck Pond ocean discharge outfall pipe in order to carry contaminated stormwater further out into the ocean and reduce the impact to bathing beaches. Closings at the beaches nearest the outfall have since declined. Wet-weather sampling continues in an effort to pinpoint the sources of contamination at this pond. In 2009 and 2010, this included sampling for enterococcus within some of the stormwater lines that are suspected of causing beach impacts. This work helped to narrow down the areas where sewage infrastructure will be inspected.³

Beginning in 2007, NJDEP began working with the U.S. EPA as well as the health departments of Monmouth and Ocean counties and the Ocean County Utilities Authority in a joint sampling program to study the correlation among three different methods for the analysis of enterococcus bacteria in marine waters. Monmouth County used EPA Method 1600, a traditional culture approach, for this study. Enterolert was used by Ocean County for the 2007 bathing season only and for the 2007 comparative study. Additional samples were collected and analyzed by EPA using quantitative polymerase chain reaction (qPCR), a method for the rapid detection of enterococcus bacteria in bathing water. Samples

KEY FINDINGS IN NEW JERSEY

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Beachwood Beach West (Beachwood) (27%) in Ocean County
- Windward Beach (Brick) (17%) in Ocean County
- West Beach (Pine Beach) (15%) in Ocean County

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

- 101 (93%) stormwater
- 7 (6%) sewage spills/leaks
- 1 (1%) unknown sources of contamination

were collected at 20 ocean and bay stations in 2007, at two bay beaches in 2008, and at 10 ocean and bay stations in 2009 and 2010. The project will continue during the 2011 summer bathing season.³

The summer of 2010 was extremely dry, with few rain events, which contributed to a reduction in beach closings compared with previous years. Two sewage spills resulted in preemptive beach closings in 2010. On May 27, the New Jersey American Water Company reported a sewage spill of approximately 600 to 1,000 gallons in Ocean City, Cape May County. An estimated 500 gallons was discharged to the storm drain that flows to the ocean near 8th and 9th Streets. The Cape May County Health Department issued a preseason beach closing for 8th and 9th Street beaches as a precaution for anyone who might have primary contact with the water at those beaches. On June 28, approximately 1,000 gallons of raw sewage was discharged to the Cape May Harbor at the Corinthian Yacht Club in Cape May City due to a blocked line. The Corinthian Yacht Club beach was closed as a precaution.³

New Jersey beaches experienced an unusual number of notable sealife wash-ups in 2010. On July 1, a fish kill was reported in Deal Lake between Asbury Park and Loch Arbour in Monmouth County. Thousands of dead fish of different species were removed by local public works crews. The Monmouth County Health Department identified a bloom of cyanobacteria which likely resulted in extremely low measured dissolved oxygen levels. On August 11, another significant fish kill was reported on the Delaware Bay side of Cape May County. Tens of thousands of peanut bunker (young menhaden) washed up on approximately 12 miles of bay-side beaches. The line of dead fish was 15 feet wide in some areas, with the heaviest concentrations in High Beach. Water quality samples were collected by DEP, EPA's helicopter surveillance program, and the Cape May County Health Department. Phytoplankton samples were analyzed, and dinoflagellates were identified in the samples but at concentrations well below a bloom level. Measurements showed that the area suffered extremely low dissolved oxygen levels, which was the likely cause of the kill. Finally, between August 20 and 30, several bay beaches on Long Beach Island were closed as a precaution due to a suspected spill of raw sewage. Sample results from the area were well below the standard for fecal bacteria, and it was later determined that a massive wash-up of decaying potato sponges, *Craniella sp.*, was misidentified as sewage.³

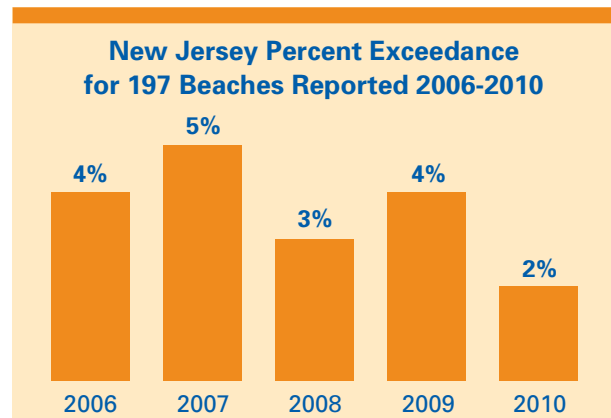
An algal bloom that did not result in wash-ups was reported between September 2 and 7, when pink water was observed off the coast of Monmouth County and in New York Harbor. Samples were collected and analyzed by the Bureau of Marine Water Monitoring, which determined that the cause of the pink water was the phototrophic ciliate *Mesodinium rubrum*, a nontoxic phytoplankton that was occurring in bloom concentrations.

Monitoring Results

In 2010 there were 700 lifeguarded, recreational ocean and bay beaches in New Jersey. Currently, NRDC's report contains information on 220 monitored recreational beach sites, each of which is monitored once a week. The remaining, unmonitored beaches are not in EPA's beach database. The lifeguarded recreational beaches that are not monitored do not have sources of pollution, such as storm drains, and the state considers the monitoring station nearest to these beaches to be representative of their water quality. 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, 2% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Beachwood Beach West (Beachwood) (27%), Windward Beach (Brick) (17%), West Beach (Pine Beach) (15%), Hancock (Seaside Heights) (15%), East Beach (Pine Beach) (13%), and 5th (Seaside Park) (11%), all back-bay or river beaches in Ocean County.

Ocean County had the highest exceedance rate (4%) in 2010, followed by Monmouth (1%), Atlantic (<1%), and Cape May (<1%) counties. The Ocean County Health Department conducted additional wet-weather sampling at ten river and back-bay beaches during the 2010 beach season, which is the likely cause of the high rate of exceedance in the county.



Sampling Practices: The sampling season runs from mid-May to mid-September. In addition to regular beachwater monitoring for bacteria concentrations, the NJDEP conducts aerial surveillance of near-shore coastal waters six days a week during the summer and routinely inspects the 17 wastewater treatment facilities that discharge to the ocean.³

NJDEP determines sampling practices, standards, and notification protocols and practices at coastal beaches throughout the state. Samples are taken 12 to 18 inches below the surface in water that is between knee and chest deep. Locations for monitoring stations are selected by local or county health departments. Ocean beach sampling stations are chosen on the basis of proximity to a potential pollution source. If there is no pollution source nearby, ocean sampling locations are chosen to represent water quality at several nearby beaches. Every recreational bay beach is sampled.³

Once an exceedance of bacterial standards is found, daily monitoring is conducted until the beachwater meets standards. States that monitor more frequently after an exceedance is found 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 decreased 39% to 109 days in 2010 from 181 days in 2009. For prior years, there were 209 days in 2008 (120 of those were caused by a criminal dumping event³), 142 days in 2007, 134 days in 2006, and 79 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 109 days from events lasting six consecutive weeks or less, 23% (25) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, 71% (77) were preemptive (i.e., without waiting for monitoring results) due to heavy rainfall, and 6% (7) were preemptive due to known sewage spills.

Only those beach closings ordered by local health officials are included here because these are the only closings that are recorded by CCMP. Data are not available for other types of closings, such as those due to rough seas, beach maintenance projects, shark sightings, and fish and clam wash-ups.³ The CCMP also does not include closings that are briefly in effect during the assessment of water conditions by local officials.³

Standards and Procedures: New Jersey's policy is to issue closings when bacteria levels exceed standards. The state's standard for marine beach water quality is a single-sample maximum for enterococcus of 104 cfu/100 ml.³ A geometric-mean standard is not applied when making beach closing decisions.

If bacteria levels exceed the single-sample standard, the beach is resampled immediately. If the second sample exceeds the standard, the beach is closed. Resampling is conducted in conjunction with a sanitary survey of the beach. County and local health departments are allowed, at their discretion, to issue swimming advisories after one exceedance of the bathing standard. In 2010, Monmouth County was the only county to issue swimming advisories when routine monitoring revealed that standards were exceeded.³ If high bacteria concentrations are found at an ocean or bay station, sampling is conducted linearly along the beach to determine the extent of the affected area. This "bracket sampling" can result in an extension of a beach closing to contiguous lifeguarded beaches.³

Four ocean beaches around the Wreck Pond outfall (Brown Avenue and York Avenue in Spring Lake and The Terrace and Beacon Boulevard in Sea Girt) are automatically closed for 24 hours after the end of all rainfall events that are greater than 0.1 inch or that cause an increased flow in storm drains, and for 48 hours from the end of all rainfalls greater than 2.8 inches within a 24-hour period. Lifeguards prohibit swimming near any parts of these beaches where the stormwater plume is observed to be mixing within the swimming area.³ L Street Bay Beach in Belmar and the Shark River Beach and Yacht Club in Neptune also have preemptive rainfall standards.

Beaches in New Jersey are closed if there is a known sewage spill that is suspected of contaminating the beachwater.¹ Health and enforcement agencies in New Jersey can close a beach to protect public health at any time.³

Algae samples are collected when remote sensing data indicate an increase in chlorophyll levels in a specific area. If a harmful algal bloom is identified, county and local health officials are notified and closing information is posted on the DEP Web page and phone line, and local beach managers close beaches as necessary.

New Jersey 2010 Monitoring Results and Closing or Advisory Days

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Atlantic County					
10th Street South (Brigantine)	1	1/wk	17	0%	0
11th Street (Longport)	1	1/wk	19	0%	0
15th Street South (Brigantine)	1	1/wk	18	0%	0
19th Street (Longport)	1	1/wk	19	0%	0
26th Street (Brigantine)	1	1/wk	17	0%	0
26th Street (Longport)	1	1/wk	19	0%	0
26th Street South (Brigantine)	1	1/wk	18	0%	0
33rd Street (Longport)	1	1/wk	19	0%	0
33rd Street South (Brigantine)	1	1/wk	17	0%	0
43rd Street South (Brigantine)	1	1/wk	17	0%	0
4th Street North (Brigantine)	1	1/wk	17	0%	0
Adriatic (Atlantic City)	1	1/wk	19	0%	0
Arkansas (Atlantic City)	1	1/wk	19	0%	0
Bartram (Atlantic City)	1	1/wk	19	0%	0
Chelsea (Atlantic City)	1	1/wk	19	0%	0
Dorset (Ventnor)	1	1/wk	17	0%	0
Granville (Margate)	1	1/wk	19	0%	0
Illinois (Atlantic City)	1	1/wk	19	0%	0
Kentucky (Atlantic City)	1	1/wk	19	0%	0
Lincoln (Atlantic City)	1	1/wk	19	0%	0
Michigan (Atlantic City)	1	1/wk	19	0%	0
Missouri (Atlantic City)	1	1/wk	19	0%	0
New Hampshire (Atlantic City)	1	1/wk	19	0%	0
New Haven (Ventnor)	1	1/wk	17	0%	0
New Jersey Avenue (Somers Point)	1	1/wk	20	10%	2
North Carolina (Atlantic City)	1	1/wk	19	0%	0
Oakland (Ventnor)	1	1/wk	17	0%	0
Osborne (Margate)	1	1/wk	19	0%	0
Pennsylvania (Atlantic City)	1	1/wk	19	0%	0
Seaside (Brigantine)	1	1/wk	18	6%	0
South Beach (Brigantine)	1	1/wk	18	0%	0
South Carolina (Atlantic City)	1	1/wk	19	0%	0
Street James (Atlantic City)	1	1/wk	19	0%	0
States (Atlantic City)	1	1/wk	19	0%	0
Atlantic County					
Texas (Atlantic City)	1	1/wk	19	0%	0
Washington (Margate)	1	1/wk	19	0%	0
Washington (Ventnor)	1	1/wk	17	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Cape May County					
103rd (Stone Harbor)	1	1/wk	17	0%	0
108th (Stone Harbor)	1	1/wk	17	0%	0
10th and JFK (North Wildwood)	1	1/wk	17	0%	0
119th (Stone Harbor)	1	1/wk	17	0%	0
15th (Avalon)	1	1/wk	17	0%	0
16th (Ocean City)	1	1/wk	17	0%	0
18th (North Wildwood)	1	1/wk	16	0%	0
21st (Avalon)	1	1/wk	17	0%	0
24th (North Wildwood)	1	1/wk	16	6%	0
24th (Ocean City)	1	1/wk	17	0%	0
28th (Ocean City)	1	1/wk	17	0%	0
29th (Sea Isle City)	1	1/wk	17	0%	0
2nd and JFK (North Wildwood)	1	1/wk	17	0%	0
2nd (Cape May City)	1	1/wk	17	0%	0
30th (Avalon)	1	1/wk	17	0%	0
34th (Ocean City)	1	1/wk	17	0%	0
34th (Sea Isle City)	1	1/wk	17	0%	0
40th (Avalon)	1	1/wk	17	0%	0
40th (Sea Isle City)	1	1/wk	17	0%	0
48th (Ocean City)	1	1/wk	17	0%	0
49th (Sea Isle City)	1	1/wk	17	0%	0
50th (Avalon)	1	1/wk	17	0%	0
55th (Ocean City)	1	1/wk	17	0%	0
57th (Avalon)	1	1/wk	17	0%	0
59th (Sea Isle City)	1	1/wk	17	0%	0
65th (Avalon)	1	1/wk	17	0%	0
65th (Sea Isle City)	1	1/wk	17	0%	0
76th (Avalon)	1	1/wk	17	0%	0
77th (Sea Isle City)	1	1/wk	17	0%	0
83rd (Stone Harbor)	1	1/wk	17	0%	0
85th (Sea Isle City)	1	1/wk	16	0%	0
90th (Stone Harbor)	1	1/wk	17	0%	0
90th (Yacht Club) (Stone Harbor)	1	1/wk	17	0%	0
96th (Stone Harbor)	1	1/wk	17	0%	0
9th (Avalon)	1	1/wk	18	6%	0
9th (Ocean City)	1	1/wk	18	0%	2
Beesley's Point (Upper Township)	1	1/wk	17	0%	0
Bennett (Wildwood)	1	1/wk	17	0%	0
Brainard (Cape May Point)	1	1/wk	17	0%	0
Broadway (Cape May City)	1	1/wk	17	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Cape May County					
Congress (Cape May City)	1	1/wk	17	0%	0
Corinthian Yacht Club (Cape May City)	1	1/wk	17	0%	1
Forgetmenot (Wildwood Crest)	1	1/wk	17	0%	0
Grant (Cape May City)	1	1/wk	17	0%	0
Hollywood (Wildwood Crest)	1	1/wk	18	0%	0
Jefferson (Wildwood Crest)	1	1/wk	18	0%	0
Lavender (Wildwood Crest)	1	1/wk	17	0%	0
Maple (Wildwood)	1	1/wk	17	0%	0
Miami (Wildwood Crest)	1	1/wk	18	0%	0
Montgomery (Wildwood)	1	1/wk	17	0%	0
North (Ocean City)	1	1/wk	17	0%	0
Ocean (Cape May Point)	1	1/wk	17	0%	0
Ocean Avenue (Cape May City)	1	1/wk	17	0%	0
Ocean City 8th Street	no data	None	18	0%	2
Ocean City Yacht Club (Ocean City)	1	1/wk	17	0%	0
Orchid (Wildwood Crest)	1	1/wk	18	0%	0
Park (Ocean City)	1	1/wk	17	0%	0
Philadelphia (Cape May City)	1	1/wk	17	0%	0
Poverty (Cape May City)	1	1/wk	18	0%	0
Queen North (Cape May City)	1	1/wk	17	0%	0
Richmond Avenue (Lower Township)	1	1/wk	18	0%	0
Schellenger (Wildwood)	1	1/wk	17	0%	0
Sea Isle City Yacht Club (Sea Isle City)	1	1/wk	17	0%	0
Surf (Ocean City)	1	1/wk	17	0%	0
Webster (Upper Township)	1	1/wk	17	0%	0
Whildin (Cape May Point)	1	1/wk	17	0%	0
Williard (Upper Township)	1	1/wk	17	0%	0
Wildwood Crest Yacht Club (Wildwood Crest)	1	1/wk	17	0%	0
Wildwood Gables Yacht Club (Wildwood Crest)	1	1/wk	17	0%	0
Yacht Club (Avalon)	1	1/wk	17	0%	0
Monmouth County					
12th (Belmar)	1	1/wk	20	5%	1
1st Avenue (Asbury Park)	1	1/wk	18	0%	1
20th Avenue (Belmar)	1	1/wk	18	0%	0
3rd (Asbury Park)	1	1/wk	19	0%	0
7th (Asbury Park)	1	1/wk	18	0%	0
7th Avenue (Belmar)	1	1/wk	19	0%	1
Area C–Surf Beach (Sandy Hook)	1	1/wk	18	0%	0
Area E–Visitor Center (Sandy Hook)	1	1/wk	17	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Monmouth County					
Army Recreation Beach (Sandy Hook)	1	1/wk	18	0%	0
Baltimore in Sea Girt Boro	no data	1/wk	20	5%	1
Beacon (Sea Girt)	1	1/wk	19	0%	16
Broadway (Ocean Grove)	1	1/wk	18	0%	0
Brown South (Spring Lake)	1	1/wk	19	0%	15
Cedar (Allenhurst)	1	1/wk	19	0%	0
Conner's Beach (Highlands)	1	1/wk	18	0%	0
Deal Casino (Deal)	1	1/wk	19	0%	1
East Main (Manasquan)	1	1/wk	18	0%	0
Elberon Beach Club (Long Branch)	1	1/wk	18	0%	0
Essex (Spring Lake)	1	1/wk	20	5%	1
Evergreen South (Bradley Beach)	1	1/wk	18	0%	0
Fort Hancock (Sandy Hook)	1	1/wk	17	0%	0
Ideal Beach (Middletown)	1	1/wk	20	5%	1
Imperial House (Long Branch)	1	1/wk	19	0%	0
Inlet Surfing Beach, Riverside Drive (Manasquan)	1	1/wk	17	0%	0
Joline (Long Branch)	1	1/wk	18	0%	0
L Jetty, Washington Avenue (Avon-by-the-Sea)	no data	1/wk	18	0%	2
L Street Beach (Belmar)	1	1/wk	18	0%	16
Laird (Long Branch)	1	1/wk	19	0%	0
Main (Ocean Grove)	1	1/wk	20	5%	1
Miller Beach (Highlands)	1	1/wk	19	5%	0
Monmouth Beach Club (Monmouth Beach)	1	1/wk	18	0%	0
Neptune (Sea Girt)	1	1/wk	19	0%	0
New York (Sea Girt)	1	1/wk	19	0%	0
North Bath (Long Branch)	1	1/wk	19	0%	0
Ocean Beach Club (Long Branch)	1	1/wk	20	5%	1
Ocean Park (Bradley Beach)	1	1/wk	20	5%	1
Public Beach (Sea Bright)	1	1/wk	18	0%	0
Rec Center (Highlands)	1	1/wk	20	5%	0
Seven Presidents Park (Monmouth Beach)	1	1/wk	17	0%	0
Shark River Beach and Yacht Club (Neptune Township)	1	1/wk	18	0%	1
South Bath (Long Branch)	1	1/wk	9	11%	1
Spray Avenue (Neptune Township)	1	1/wk	17	0%	0
Sylvania (Avon)	1	1/wk	18	6%	1
The Terrace (Sea Girt)	1	1/wk	20	0%	15
Thompson (Leonardo)	1	1/wk	18	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Monmouth County					
Union (Spring Lake)	1	1/wk	19	0%	1
Village Beach Club (Loch Arbour Village)	1	1/wk	20	5%	0
Washington (Spring Lake)	1	1/wk	19	0%	0
Worthington (Spring Lake)	1	1/wk	19	0%	1
York Avenue (Spring Lake)	1	1/wk	20	5%	16
Ocean County					
10th (Barnegat Light)	1	1/wk	18	0%	0
12th (Seaside Park)	1	1/wk	17	0%	0
14th (Ship Bottom)	1	1/wk	19	5%	2
14th Street (Ship Bottom)	no data	1/wk	19	5%	2
16th (Surf City)	1	1/wk	17	0%	0
23rd (South Seaside)	1	1/wk	17	0%	0
23rd (Surf City)	1	1/wk	18	0%	0
24th (Barnegat Light)	1	1/wk	18	0%	0
25th (Barnegat Light)	1	1/wk	18	6%	0
4th (Dover)	1	1/wk	17	0%	0
5th (Seaside Park)	1	1/wk	18	11%	0
75th (Harvey Cedars) NJ291054	1	1/wk	18	0%	0
75th (Harvey Cedars) NJ290055	1	1/wk	18	6%	0
7th (Brick)	1	1/wk	18	6%	0
Anglesea Avenue (Ocean Gate)	1	1/wk	23	4%	0
Bay Beach (Barnegat)	1	1/wk	15	0%	0
Beachwood Beach West (Beachwood)	1	1/wk	33	27%	2
Bergen (Harvey Cedars)	1	1/wk	18	0%	0
Berkeley Island (Berkeley)	1	1/wk	17	6%	0
Brick Beach (Brick)	1	1/wk	17	0%	0
Brighton (Seaside Park)	1	1/wk	18	6%	0
Broadway (Pt Pleasant Beach)	1	1/wk	17	0%	0
Brooklyn (Lavallette) NJ291024	1	1/wk	16	0%	0
Brooklyn (Lavallette) NJ290138	1	1/wk	17	6%	0
Bryn Mawr (Lavallette)	1	1/wk	16	0%	0
Central (Point Pleasant Beach)	1	1/wk	18	6%	0
East Beach (Pine Beach)	1	1/wk	24	13%	0
East Tuna Way (Chadwick)	1	1/wk	17	0%	0
Fielder (Dover)	1	1/wk	18	6%	0
Guyer (Lavallette)	1	1/wk	17	0%	0
Hancock (Seaside Heights)	1	1/wk	20	15%	0
IBSP 1 (Island Beach)	1	1/wk	18	0%	0
Island Beach State Park 2 (Berkeley Township)	1	1/wk	17	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Ocean County					
Jennifer (Stafford)	1	1/wk	16	0%	0
Jersey City (Lavallette)	1	1/wk	16	0%	0
Johnson (Bay Head)	1	1/wk	16	0%	0
Leeward (Beach Haven)	1	1/wk	18	0%	0
Lincoln (Seaside Heights)	1	1/wk	20	5%	0
Loveladies (Loveladies)	1	1/wk	18	0%	0
Lyman (Mantoloking)	1	1/wk	16	0%	0
Maryland (Point Pleasant Beach)	1	1/wk	18	6%	0
Maxson Avenue (Point Pleasant)	1	1/wk	23	0%	0
Money Island (Dover)	1	1/wk	21	10%	0
Mount (Bay Head)	1	1/wk	17	6%	0
New Jersey Avenue (Beach Haven Terrace) NJ290077	1	1/wk	17	0%	0
New Jersey Avenue (Beach Haven Terrace) NJ291076	1	1/wk	18	0%	0
North 10th (Surf City)	1	1/wk	18	0%	0
North Beach (Dover)	1	1/wk	17	0%	0
O Street (Seaside Park)	1	1/wk	18	6%	0
Parkertown (Little Egg Harbor)	1	1/wk	16	0%	0
Princeton (Mantoloking)	1	1/wk	16	6%	0
Reese (Lavallette)	1	1/wk	16	0%	0
River Avenue (Point Pleasant)	1	1/wk	26	8%	0
Shelter Island (Dover)	1	1/wk	16	0%	0
Sheridan (Seaside Heights)	1	1/wk	20	5%	0
South 3rd (Ship Bottom)	1	1/wk	18	0%	0
Stockton (Beach Haven Crest)	1	1/wk	20	10%	0
Stockton (Brant Beach)	1	1/wk	17	0%	0
Summit (Island Heights)	1	1/wk	27	4%	0
Trenton (Lavallette)	1	1/wk	16	0%	0
West Beach (Pine Beach)	1	1/wk	26	15%	0
Wildwood Avenue (Ocean Gate)	1	1/wk	23	4%	0
Windward Beach (Brick)	1	1/wk	24	17%	3

NOTES

- 1 Virginia Loftin, New Jersey Department of Environmental Protection, personal communication, May 2011.
- 2 U.S. EPA. Floatables Action Plan (Web site). Accessed at www.epa.gov/region02/water/. May 2008.
- 3 New Jersey Department of Environmental Protection. Cooperative Coastal Monitoring Program Summary Report for 2010. December 2010.

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



NEW YORK

19th in Beachwater Quality

9% 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.

New York is the only state in the nation with ocean, estuarine, and Great Lakes coastline. There are 127 miles of Atlantic Ocean coastline, 231 miles of shoreline on Long Island Sound, 548 miles of Long Island bayfront, and 83 miles of shoreline on islands off the Long Island coast. In addition to these marine waters, there are at least 200 miles of freshwater shoreline on Lake Erie and Lake Ontario. Nearly all of the state's coastal beaches are on Atlantic waters; only 39 are on Lake Erie or Lake Ontario. The coastal beach monitoring program in New York is administered by the New York State Department of Health.

About two-thirds of New York City's 6,600 miles of sewer system is combined with stormwater pipes, which can discharge a mixture of rainfall runoff and raw sewage into area waterways during and immediately after precipitation.¹ These excess flows contain floating debris made up of litter and toilet-generated waste such as hygiene products, as well as heavy pollutant loads. When discharged to the New York/New Jersey Harbor Complex, the floating debris tends to collect into slicks that can wash up on beaches. The multi agency Floatables Action Plan employs several means of controlling floating debris, such as: helicopter surveillance to locate slicks, skimmer vessels fitted with nets that collect floating debris, floating booms that trap debris near sewer-system discharge points for later collection, and sewer-system improvements intended to maximize the ability to retain floating debris. Each year, these methods have prevented tons of floating debris from reaching area beaches.

Monitoring Results

In 2010, New York reported 358 coastal beaches. Of these, 2 (1%) were monitored daily, 91 (25%) were monitored more than once a week, 127 (35%) were monitored once a week, 76 (21%) every other week, and 60 (17%) once a month; 2 (1%) 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, 9% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. More than 20 of New York's beaches exceeded the standard at least 20% of the time. The beaches with the highest percent exceedance rates in 2010 were Krull Park in Niagara County (64%); Pultneyville Mariners Beach in Wayne County (56%); Main Street Beach (44%), Wright Park East (42%), Point Gratiot Beach West (37%), Wright Park West (33%), Town of Hanover

KEY FINDINGS IN NEW YORK

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Krull Park in Niagara County (64%)
- Pultneyville Mariners Beach in Wayne County (56%)
- Main Street Beach in Chautauqua County (44%)

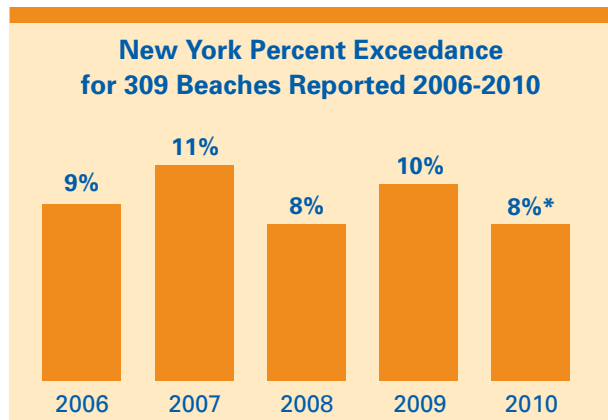
Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

- 598 (63%) stormwater runoff
- 278 (29%) unknown sources of contamination
- 86 (9%) sewage spills/leaks
- 28 (3%) other sources of contamination
- 12 (1%) wildlife

Totals exceed 100% because more than one contamination source was reported for some events.

Beach (32%), and Sunset Bay Beach Club (31%) in Chautauqua County; and Hamburg Bathing Beach in Erie County (31%). Beaches that were not open in 2010 are excluded from this list, because in New York, swimming is prohibited at beaches that are not open. Beaches that were not open included Lake Erie State Park Beach in Chautauqua County; Point Breeze Camp and Woodlawn Beach State Park in Erie County; Westcott Beach State Park—Camping Beach in Jefferson County, Selkirk Shores State Park Beach in Oswego County; Centerport Yacht Club, Miller Place Park, Sandspit Beach, Sound Beach POA East, Stony Brook Beach, and Woodhull Landing in Suffolk County, and Isle of San Socecci and Marinas Edge



in Westchester County.² Some of these beaches were monitored as part of water quality investigations even though they were not open, and their samples are included in NRDC's analysis. Niagara County had the highest exceedance rate (45%) in 2010, followed by Wayne (36%), Chautauqua (31%), Monroe (24%), Erie (21%), Queens (11%), Bronx (10%), Nassau (7%), Westchester (6%), Cayuga (6%), Suffolk (5%), Kings (5%), Richmond (4%), Jefferson (4%), and Oswego (2%) counties.

Sampling Practices: The monitoring season generally extends from May to September.

Sampling practices, locations, and notification protocols for coastal beaches in the state have been established by each of the administering agency's 11 contractors in accordance with the U.S. EPA guidance criteria for the requirements of the BEACH Act grant. Water samples are collected 18 inches below the surface in water that is approximately 3 feet deep. Monitoring locations and sampling frequency are determined by a variety of factors, including, but not limited to, potential pollution sources, historical water quality, and physical characteristics of the beach property.

Samples taken as part of sanitary surveys and special studies may be collected at outfalls and other sources.² Some jurisdictions sample more frequently once an exceedance of standards is found.

EPA's Helicopter Surveillance Program monitors algal blooms along the New York City coastline during the bathing season. Information about blooms is communicated to the New York City beach program and is considered when closing and advisory decisions are made for New York City beaches. The EPA also monitors the Atlantic coastline of Nassau and Suffolk counties for algal blooms.

Closings and Advisories

Total closing/advisory days for 447 events lasting six consecutive weeks or less decreased 46% to 956 days in 2010, from 1,775 days in 2009. For prior years, there were 1,610 days in 2008, 1,547 days in 2007, 1,280 days in 2006, and 827 days in 2005. In addition, there were no extended events and 14 permanent events (4,845 days total) 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 447 events lasting six consecutive weeks or less, 55% (527) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, 43% (409) were preemptive (i.e., ordered without waiting for monitoring results) due to heavy rainfall, and 2% (20) were preemptive due to other unspecified reasons.

Standards and Procedures: Both closings and advisories are issued for beaches in the state. For marine beaches, New York uses an enterococcus single-sample maximum of 104 cfu/100 ml. For freshwater beaches, New York uses an *E. coli* single-sample maximum of 235 cfu/100 ml or 61 cfu/100 ml for enterococcus.² Whether or not geometric-mean

* 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 (8%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (9%).

standards are applied when closing and advisory decisions are made depends on the local beach authority. New York City applies a geometric-mean standard for enterococcus of 35 cfu/100 ml for a series of five or more samples collected during a 30-day period.¹

When water quality monitoring reveals an exceedance of bacterial standards, the health department either notifies the public or resamples if there is reason to doubt the validity of the original sample result. Resampling is performed no more than 48 hours after the routine monitoring results indicate an exceedance. If the resample exceeds the water quality standard, a closing or advisory is issued. New York City does not issue an advisory or closing based solely on monitoring results. It uses administrative review and management tools when evaluating beach status to determine of the correct regulatory action. New York City conducts a resample or issues an advisory or closing after analyzing ongoing water quality trends, historical water quality data, reports of pollution events, and other factors that may be affecting the beach, including animal waste, septic or sewage disposal systems, and illegal sewage connections.³

All of the counties with marine beaches and most of the counties with Great Lakes beaches issue preemptive rain advisories or other preemptive advisories, many of which are based on rainfall amounts.

Several of New York's beachwater quality contractors have developed models of various designs and complexity for their beaches. For example, Monroe County uses a model based on amount of rainfall, the flow rate of the Genessee River, turbidity, algae, and other organic debris. The Interstate Environmental Commission has developed an extensive hydrodynamic loading model that is integrated into the beach monitoring and notification programs of the New York City Department of Health & Mental Hygiene and the health departments of Westchester, Nassau, and Suffolk counties. In 2010, the Chautauqua County Department of Health began using Virtual Beach software to predict water quality at beaches on Lake Erie.

At beaches in New York, a sanitation and safety survey or investigation that reveals the presence of floatable debris, medical/infectious waste or toxic contaminants, petroleum products, and/or other contamination on the beach or evidence of sewage and wastewater discharge can trigger an advisory or closing.³

New York 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Bronx County					
American Turners	1	1/wk	60	15%	15
Danish American Beach Club	1	1/wk	60	15%	15
Locust Point Yacht Club	3	1/wk	60	0%	9
Manhem Beach Club	1	1/wk	60	15%	14
Morris Yacht and Beach Club	1	1/wk	60	8%	16
Orchard Beach	1	1/wk	63	5%	0
Schuyler Hill Civic Association	1	1/wk	63	3%	12
Trinity Danish Young People's Society	1	1/wk	60	15%	15
West Fordham Street Association	1	1/wk	60	8%	8
White Cross Fish Club	1	1/wk	60	15%	15
Cayuga County					
Fair Haven Beach State Park Beach	1	1/wk	35	6%	0
Chautauqua County					
Blue Water Beach	3	1/wk	29	21%	2
Lake Erie State Park Beach	1	not open	0	NA	0 (365)*
Main Street Beach	1	1/wk	43	44%	35

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Chautauqua County					
Point Gratiot Beach East	2	1/wk	53	25%	28
Point Gratiot Beach West	2	1/wk	43	37%	37
Sheridan Bay Park	3	1/wk	25	4%	0
Sunset Bay Beach Club	3	1/wk	32	31%	14
Town of Hanover Beach	3	1/wk	31	32%	22
Wright Park East	1	1/wk	43	42%	39
Wright Park West	1	1/wk	55	33%	31
Erie County					
Bennett Beach	2	2/wk	44	14%	15
Evangola State Park Beach	2	1/wk	15	13%	2
Evans Town Park	2	2/wk	58	19%	14
Hamburg Bathing Beach	1	2/wk	42	31%	12
Lake Erie Beach	1	2/wk	57	19%	8
Pioneer Camp	2	2/wk	43	14%	13
Point Breeze Camp	3	not open	3	0%	0 (365)*
St. Vincent De Paul Beach	2	2/wk	40	20%	13
Wendt Beach	2	2/wk	44	16%	12
Woodlawn Beach State Park Beach	1	not open	86	31%	0 (365)*
Jefferson County					
Southwick Beach State Park Beach	1	1/wk	11	0%	0
Westcott Beach State Park–Main Beach	2	1/wk	12	8%	0
Westcott Beach State Park–Camping Beach	2	not open	0	NA	0 (365)*
Kings County					
Coney Island Beach Brighton 15th–6th	2	1/wk	22	9%	0
Coney Island Beach Brighton 6th–Ocean Parkway	2	1/wk	20	0%	0
Coney Island Beach Ocean Parkway–West 8th	2	1/wk	23	4%	0
Coney Island Beach West 16th–27th	2	1/wk	23	9%	0
Coney Island Beach West 28th–West 37th	2	1/wk	20	0%	0
Coney Island–West 8th St. To Pier	2	1/wk	20	0%	0
Gerritsen/Kiddie Beach	1	1/wk	57	14%	14
Kingsborough Community College	1	1/wk	63	5%	0
Manhattan Beach	1	1/wk	63	6%	0
Seagate Beach–38th Street	2	1/wk	60	0%	0
Seagate Beach–42nd Street	2	1/wk	60	0%	0
Monroe County					
Durand Beach	1	daily	98	17%	28
Hamlin Beach State Park–Area 3	1	1/wk	30	7%	3
Hamlin Beach State Park–Area 4	1	1/wk	39	28%	4

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Monroe County					
Ontario Beach	1	daily	263	27%	39
Nassau County					
Atlantic Beach Club	3	2/mo	11	0%	0
Atlantic Beach Estates	3	2/mo	19	0%	0
Bar Beach	1	1/wk	45	4%	4
Beekman Beach	3	2/mo	53	13%	0
Biltmore Beach	1	1/wk	169	5%	3
Catalina Beach	3	2/mo	11	0%	0
Centre Island Bay Beach	2	1/wk	51	2%	0
Centre Island Sound Beach	2	1/wk	54	11%	5
Clearwater Cabana Beach	3	2/mo	11	0%	0
Crescent Beach	2	1/wk	186	27%	0 (100)*
Dutchess Boulevard Beach	3	2/mo	11	0%	0
East Atlantic Beach	3	2/mo	19	0%	0
Eldorado Beach	3	2/mo	11	0%	0
Genessee Boulevard Beach	3	2/mo	11	0%	0
Harbor Isle Beach	2	1/wk	44	9%	0
Hempstead Harbor Beach Park	1	1/wk	44	5%	0
Hewlett Beach	1	1/wk	46	11%	4
Inc. Village of Laurel Hollow	1	1/wk	149	15%	27
Inwood Beach Club	3	2/mo	11	0%	0
Island Park Beach	1	1/wk	43	2%	4
Jefferson Boulevard Beach	3	2/mo	11	0%	0
Jones Beach State Park–West End Beach	2	1/wk	17	6%	0
Jones Beach State Park–Zach’s Bay	1	1/wk	31	13%	1
Jones Beach State Park–Central Mall Beach	2	1/wk	32	0%	0
Lattington Beach	2	1/wk	53	2%	1
Lawrence Beach	3	2/mo	11	0%	0
Lido Beach–Towers Condo	3	2/mo	10	0%	0
Lido Beach Park District	3	2/mo	29	0%	0
Lido Beach West	3	2/mo	19	0%	0
Long Beach City	2	1/wk	57	0%	0
Manor Haven Beach	2	1/wk	44	14%	0
Merrick Estates Civic Association	2	1/wk	44	5%	0
Montgomery Boulevard Beach	3	2/mo	11	0%	0
Morgan Memorial Beach	1	1/wk	54	15%	3
Nassau Beach Central Terrace	3	2/mo	21	0%	0
Nassau Beach East Terrace	3	2/mo	12	0%	0
Nassau Beach West Terrace	3	2/mo	12	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Nassau County					
Ocean Club Beach	3	2/mo	11	0%	0
Pebble Cove Homeowners Association	3	2/mo	11	0%	0
Philip B. Healey	1	1/wk	66	5%	3
Piping Rock Beach	2	1/wk	55	9%	11
Plaza Beach	3	2/mo	11	0%	0
Plaza Beach Club	3	2/mo	11	0%	0
Plaza West	3	2/mo	11	0%	0
Point Lookout Park District	3	2/mo	19	0%	0
Prybil Beach	2	1/wk	52	8%	3
Putnam Beach	3	2/mo	11	0%	0
Ransom Beach	2	1/wk	53	8%	3
Sands at Atlantic	3	2/mo	11	0%	0
Seacliff Beach	1	1/wk	49	16%	3
Silver Point Beach Club	3	2/mo	19	0%	0
Soundside Beach	2	1/wk	46	7%	4
Stehli Beach	2	1/wk	51	4%	3
Sun and Surf Beach	3	2/mo	11	0%	0
Sunny Atlantic Beach	3	2/mo	11	0%	0
Tappan Beach	1	1/wk	45	7%	3
The Creek Beach	2	1/wk	53	2%	4
Theodore Roosevelt Beach	1	1/wk	53	6%	3
Tobay Beach–Bay	1	1/wk	29	0%	0
Tobay Beach–Marina	2	1/wk	29	0%	0
Tobay Beach–Ocean	2	1/wk	31	0%	0
Town House Apartments at Lido	3	2/mo	10	0%	0
Town Park–Area D Sands/Lido/Anchor	3	2/mo	19	0%	0
Town Park Camp Anchor	3	2/mo	10	0%	0
Town Park Point Lookout	3	2/mo	48	0%	0
Vernon Avenue Beach	3	2/mo	20	5%	0
Village Club at Sands Point	3	2/mo	43	14%	0
West Harbor Memorial Beach	2	1/wk	53	2%	0
Westbury Beach Club	3	2/mo	12	8%	0
Niagara County					
Krull Park	2	1/wk	25	64%	9
Wilson–Tuscarora State Park Beach	1	1/wk	17	18%	4
Oswego County					
Brennan’s Beach	1	1/wk	13	8%	3
Chedmardo	1	1/wk	14	0%	0
Dowie Dale	1	1/wk	14	0%	0
Mexico Point State Park (Town)	1	1/wk	14	7%	1

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Oswego County					
Rainbow Shores	1	1/wk	14	0%	0
Sandy Island Beach State Park Beach	1	1/wk	15	0%	0
Selkirk Shores State Park Beach	1	not open	0	NA	0 (365)*
Queens County					
Breezy Point 219th Street	3	2/wk	9	0%	0
Breezy Point Reid Avenue	3	2/wk	10	0%	0
Douglas Manor	1	1/wk	60	25%	54
Rockaway Beach 126th–149th	3	2/mo	10	0%	0
Rockaway Beach 15th–22nd	3	2/mo	10	0%	0
Rockaway Beach 23rd–59th	3	2/mo	10	0%	0
Rockaway Beach 59th–80th	3	2/mo	10	0%	0
Rockaway Beach 80th–95th	3	2/mo	10	0%	0
Rockaway Beach 95th–116th	3	2/mo	10	0%	0
Rockaway Beach 9th–13th	3	2/mo	10	0%	0
Rockaway Beach–116th St. to 126th	3	2/mo	10	0%	0
Whitestone Beach	1	1/wk	60	17%	21
Richmond County					
Midland Beach/South Beach	2	1/wk	60	0%	0
South Beach	2	1/wk	60	8%	0
Wolfe's Pond Park	1	1/wk	63	5%	0
Suffolk County					
Albert's Landing Beach	3	1/mo	3	0%	0
Amagansett Beach Association	3	1/mo	5	0%	0
Amityville Beach	1	3/wk	68	10%	1
Asharoken Beach	2	2/wk	42	12%	1
Atlantic Avenue Beach	3	1/mo	5	0%	0
Atlantique Beach–Bay	2	1/wk	8	0%	0
Atlantique Beach–Ocean	3	1/mo	3	0%	0
Bath & Tennis Hotel	3	1/mo	4	0%	0
Bathing Corp of Southampton	3	1/mo	4	0%	0
Bay Hills Property Owners Association	2	2/wk	37	0%	1
Bayberry Beach and Tennis Club	2	3/wk	38	0%	1
Bayberry Cove Beach	2	2/wk	26	12%	1
Baycrest Association Beach	2	2/wk	37	5%	1
Bayport Beach	1	3/wk	68	4%	1
Bayview Beach	2	2/wk	26	0%	1
Beech Road Beach	1	2/wk	28	11%	4
Belle Terre Beach	2	2/wk	26	0%	0
Bellport Beach	3	1/mo	3	0%	0
Benjamins Beach	1	3/wk	47	28%	17

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Suffolk County					
Bridgehampton Club	3	1/mo	4	0%	0
Bridgehampton Tennis and Surf	3	1/mo	4	0%	0
Brightwaters Beach	2	2/wk	39	3%	1
Broadway Beach	2	2/wk	23	9%	1
Callahan's Beach	2	2/wk	39	5%	1
Camp Baiting Hollow	3	2/mo	15	13%	2
Camp Blue Bay	2	2/mo	3	0%	0
Camp De Wolfe	3	1/mo	14	7%	0
Camp Quinipet	3	2/mo	10	0%	0
Cedar Beach	3	2/mo	3	0%	0
Cedar Beach East–Mt. Sinai	2	2/wk	25	0%	0
Cedar Beach West–Mt. Sinai	2	2/wk	25	4%	0
Centerport Beach	2	2/wk	39	5%	1
Centerport Yacht Club	1	3/wk	40	10%	0 (365)*
Clearwater Beach	3	1/mo	3	0%	0
Club at Point O' Woods–Ocean	3	1/mo	2	0%	0
Cold Spring Harbor Beach Club	1	3/wk	37	3%	1
Coopers Neck Beach	3	1/mo	4	0%	0
Copiague Harbor	2	2/wk	34	0%	1
Corey Creek Beach	2	3/wk	40	5%	1
Cornell Co-Operative Extension Marine Center	3	2/mo	11	0%	0
Crab Meadow Beach	2	2/wk	39	3%	1
Crescent Beach–Huntington	2	2/wk	39	8%	4
Crescent Beach–Shelter Island	3	2/mo	10	0%	0
Culloden Shores	3	1/mo	5	0%	0
Cupsogue County Park	3	1/mo	4	0%	0
Davis Park Beach	3	1/mo	3	0%	0
Devon Yacht Club	3	1/mo	3	0%	0
Ditch Plains Beach	3	1/mo	5	0%	0
Dorothy P. Flint Camp	3	2/mo	12	0%	0
Dune Deck Hotel	3	1/mo	4	0%	0
Dunewood Beach	3	1/mo	3	0%	0
Dunewood Property Owners Association Beach (Bay)	2	1/wk	8	0%	0
Eagle Dock Community Beach	1	3/wk	30	3%	1
East Islip Beach	2	3/wk	43	14%	3
East Lake Drive Beach	3	1/mo	5	0%	0
Fair Harbor–Ocean	3	1/mo	3	0%	0
Fair Harbor Community Association–Bay	2	1/wk	8	0%	0
Fiddlers Green Association	3	2/wk	37	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Suffolk County					
Fifth Street Park Beach	2	1/mo	11	0%	0
Fisher's Island Country Club	3	1/mo	1	0%	0
Fleets Cove Beach	1	3/wk	39	10%	1
Fleets Neck Beach	3	2/mo	11	0%	0
Flying Point	3	1/mo	4	0%	0
Foster Memorial	3	2/mo	6	0%	0
Founder's Landing	2	1/wk	14	14%	0
Friendship Drive Beach	2	2/wk	24	4%	1
Georgica Beach	3	1/mo	3	0%	0
Gilgo Beach	3	2/mo	3	0%	0
Gold Star Battalion Beach	1	3/wk	39	3%	1
Goose Creek	2	1/wk	12	8%	0
Grantland Beach	1	2/wk	28	21%	1
Great Gun Beach	3	1/mo	3	0%	0
Gurney's Inn Resort and Spa	3	1/mo	5	0%	0
Haven's Beach	2	2/wk	25	8%	1
Hay Harbor Club	3	1/mo	1	0%	0
Head of the Bay Club	2	2/wk	38	3%	1
Heckscher State Park-Overlook Beach	2	1/wk	11	0%	0
Heckscher State Park-West Beach	2	1/wk	15	13%	3
Hither Hills State Park Beach	2	1/wk	15	0%	0
Hobart Beach-Bay	2	2/wk	39	5%	1
Hobart Beach-Inlet/Sound	2	2/wk	39	3%	1
Huntington Beach Community Association	1	3/wk	47	17%	15
Indian Field Beach	2	2/wk	25	4%	1
Indian Wells Beach	3	1/mo	5	0%	0
Iron Pier Beach	3	2/mo	15	13%	2
Island People's Project (Dock Beach)	3	1/mo	1	0%	0
Islip Beach	2	3/wk	42	17%	4
Kenny's Beach	3	2/mo	11	0%	0
Kirk Park Beach	3	2/mo	5	0%	0
Kismet Beach-Ocean	3	1/mo	3	0%	0
Knollwood Beach	1	3/wk	37	3%	1
La Ronde Beach Club	3	1/mo	4	0%	0
Lashley Pavilion	3	1/mo	4	0%	0
Little Bay Beach	2	2/wk	27	7%	1
Lloyd Harbor Estates	3	2/wk	36	0%	0
Lloyd Harbor Village Park	2	2/wk	37	0%	1
Lloyd Neck Bath Club	2	2/wk	38	3%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Suffolk County					
Long Beach	2	2/wk	26	0%	1
Maidstone Beach	3	1/mo	3	0%	0
Maidstone Club	3	1/mo	3	0%	0
Main Beach	3	1/mo	3	0%	0
Mattituck Breakwater Beach	2	2/wk	13	0%	0
McCabe's Beach	3	1/mo	11	0%	0
Mecox Beach	3	1/mo	4	0%	0
Meschutt Beach	3	2/mo	6	0%	0
Miller Beach Surf Club	2	2/wk	25	0%	0
Miller Place Park	2	not open	0	NA	0 (365)*
Nassau Point Causeway	3	2/mo	11	0%	0
Nathan Hale Beach Club	2	2/wk	37	3%	1
New Suffolk Beach	3	2/mo	11	0%	0
Nick's Beach	3	1/mo	5	0%	0
Nissequogue Point Beach	2	2/wk	29	14%	2
Norman Klipp Park	3	1/mo	11	0%	0
Ocean Beach–Bay	2	1/wk	9	11%	0
Ocean Beach–Ocean	3	1/mo	3	0%	0
Old Field Club	2	2/wk	26	0%	0
Orient Beach State Park Beach	2	1/wk	12	8%	0
Overlook Beach	3	1/mo	3	0%	0
Patchogue Village Pool and Beach Club	2	3/wk	33	3%	1
Peconic Dunes Camp–Sound	3	2/mo	10	0%	0
Perlman Music Camp	3	2/mo	10	0%	0
Pikes Beach	3	1/mo	4	0%	0
Point O' Woods Association–Bay	2	1/wk	7	0%	0
Ponquogue Beach	3	1/mo	4	0%	0
Port Jefferson Beach East	2	2/wk	18	0%	0
Port Jefferson Beach West	2	2/wk	26	0%	0
Prices Bend Beach	2	2/wk	40	8%	2
Pridwin Hotel	3	2/mo	10	10%	0
Quantuck Beach Club	3	1/mo	4	0%	0
Quogue Beach Club	3	1/mo	4	0%	0
Quogue Village Beach	3	1/mo	4	0%	0
Reeves Beach	3	2/mo	13	0%	0
Robert Moses State Park Beach–Suffolk County	2	1/wk	63	2%	0
Rogers Pavilion	3	1/mo	4	0%	0
Sagg Main Beach	3	1/mo	5	20%	0
Saltaire Beach–Bay	2	1/wk	7	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Suffolk County					
Saltaire Beach–Ocean	3	1/mo	3	0%	0
Sandspit Beach	2	not open	22	5%	0 (365)*
Sayville Beach	1	3/wk	66	8%	1
Sayville Marina Park	1	3/wk	65	3%	1
Schubert Beach	2	2/wk	26	0%	1
Scotts Beach	2	2/wk	24	0%	1
Seaview–Ocean	3	1/mo	3	0%	0
Seaview Beach Association (Bay)	2	1/wk	8	13%	0
Shelter Island Heights Beach Club	2	2/mo	10	0%	0
Shirley Beach	2	2/wk	36	0%	1
Shoreham Beach	2	2/wk	23	0%	1
Shoreham Shore Club	2	2/wk	25	0%	1
Shoreham Village Beach	2	2/wk	25	0%	1
Short Beach	2	2/wk	26	4%	1
Silver Sands Motel	2	1/wk	11	0%	0
Smith Point County Park	3	2/mo	14	0%	0
Sound Beach Property Owners Association East	1	not open	0	NA	0 (365)*
Sound Beach Property Owners Association West	1	2/wk	27	7%	1
Soundview Beach Association	2	2/wk	26	4%	1
South Jamesport Beach	3	2/mo	13	8%	0
Southampton Bath and Tennis	3	1/mo	4	0%	0
Southampton Peconic Beach and Tennis Club	3	1/mo	6	0%	0
Southold Beach	3	2/mo	11	0%	0
Steers Beach	2	3/wk	42	14%	1
Stony Brook Beach	2	not open	19	0%	0 (365)*
Stony Brook Yacht Club	1	3/wk	29	7%	1
Sunken Meadow State Park Beach	2	1/wk	17	6%	0
Surf Club of Quogue	3	1/mo	4	0%	0
Swordfish Club	3	1/mo	4	0%	0
Tanner Park	1	3/wk	68	21%	25
Terraces on the Sound	1	3/wk	24	0%	1
Tiana Beach	3	2/mo	4	0%	0
Tiana Shores Association	2	2/mo	7	14%	0
Tides Property Owners Association	1	3/wk	30	20%	8
Two-Mile Hollow Beach	3	1/mo	3	0%	0
Valley Grove Beach	1	3/wk	39	3%	1
Venetian Shores	1	3/wk	67	3%	1
Veterans Memorial Park	3	2/mo	13	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Suffolk County					
W. Scott Cameron	3	2/mo	4	0%	0
Wades Beach	3	2/mo	10	0%	0
Wading River Beach	3	2/mo	14	7%	0
Water Mill Beach Club	3	1/mo	4	0%	0
West Islip Beach	1	3/wk	40	8%	1
West Meadow Beach	2	2/wk	26	0%	0
West Neck Beach	2	2/wk	37	0%	0
West Oaks Recreation Club	2	3/wk	38	0%	1
Westhampton House	3	1/mo	4	0%	0
Wildwood State Park Beach	2	1/wk	12	8%	0
Wincoma Beach	2	2/wk	37	0%	1
Woodcliff Park Property Owners Association	3	2/mo	13	0%	0
Woodhull Landing	2	not open	0	NA	0 (365)*
Yardarm Condominium South	3	1/mo	4	0%	0
Wayne County					
Pultneyville Mariners Beach	3	1/wk	18	56%	30
Sodus Point Lakeside park	3	1/wk	9	22%	2
Sodus Point Park Bayside	3	1/wk	6	0%	0
Westchester County					
American Yacht Club	2	1/wk	19	5%	0
Beach Point Club	1	1/wk	18	6%	9
Beckwithe Pointe	1	1/wk	18	0%	0
Coveleigh Beach Club	2	1/wk	19	5%	9
Davenport Club	2	1/wk	18	6%	9
Echo Bay Yacht Club	1	1/wk	17	12%	13
Glen Island Park	1	1/wk	16	0%	0
Greentree Club	1	1/wk	18	6%	9
Harbor Island Beach	1	1/wk	53	8%	9
Hudson Park	1	1/wk	36	6%	9
Isle of Sans Souci	3	not open	0	NA	0 (365)*
Larchmont Manor Park	1	1/wk	19	5%	0
Larchmont Shore Club	1	1/wk	18	0%	0
Mamaroneck Beach and Cabana Club	1	1/wk	18	11%	9
Manunsing Island Club	2	1/wk	19	5%	0
Marinas Edge	3	not open	0	NA	0 (365)*
New Rochelle Rowing Club	3	1/wk	15	0%	0
Oriente Beach Club	1	1/wk	18	6%	9
Rye Playland Beach	1	1/wk	17	0%	0
Rye Town Park–Oakland Beach	1	1/wk	18	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Westchester County					
Shenorock Shore Club	2	1/wk	19	5%	0
Shore Acres Club	1	1/wk	18	11%	9
Surf Club	1	1/wk	21	24%	0
VIP Club	2	1/wk	19	5%	0
Westchester Country Club Beach	1	1/wk	19	5%	0

*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 "Sustainable Stormwater Management Plan." New York City Department of Environmental Protection. 2008.
- 2 Eric Wiegert. New York State Department of Health, personal communication. May 2011.
- 3 Lily Huang. New York City Department of Health and Mental Hygiene, personal communication. June 2007.

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



NORTH CAROLINA 7th in Beachwater Quality

4% 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.

Most of North Carolina's 240 public coastal beaches, which stretch along 320 miles of Atlantic waters, are located on barrier islands. The North Carolina Department of Environment and Natural Resources (NCDENR) administers the state's BEACH Act grant.

In late September 2010, 15 to 20 inches of rain fell in the southeastern part of the state, prompting a blanket beach advisory for the region³ (these types of advisories are not reported to the EPA and do not appear in NRDC's data analysis). Many of the year's beachwater quality exceedances occurred during this period.

While Kure Beach (Ocean Pier at K Avenue) has consistently enjoyed good water quality, the town of Kure Beach was concerned about discharging stormwater with elevated levels of fecal indicator bacteria to outfalls at its beach. This beach has a well-established dune system whose crest is 12 to 14 feet above sea level, and the town decided to explore filtering its stormwater through the sand in the dunes in order to remove the bacteria. To test the feasibility of this strategy, two filtration units were installed in 2006, treating 95% of the runoff from a residential section of town. The filtration units consist of plastic chambers on a bed of gravel. They are buried and covered with sand, which is then replanted with dune vegetation (American beach grass, panicum, and sea oats) to maintain stability. There has been no indication of the dunes slumping or eroding or of adverse effects on the water table. Fecal indicator bacteria levels of 1,000 cfu/100 ml in runoff at the entrance to the filtration units drop to typical groundwater concentrations of 10 cfu/100 ml at the base of the dunes. A third system was installed in 2009. The systems were paid for by the NC Department of Transportation, designed and monitored by NCSU-Biological and Agricultural Engineering, and installed by the Kure Beach Public Works department.¹

KEY FINDINGS IN NORTH CAROLINA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Jockey's Ridge Soundside Access in Dare County (22%)
- Colington Harbour Swimming Beach in Dare County (17%)

Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

- 345 (70%) stormwater runoff
- 298 (60%) wildlife
- 37 (7%) other sources of contamination
- 4 (1%) unknown sources of contamination

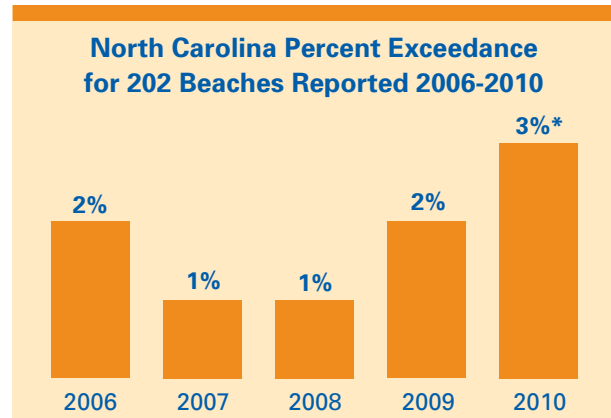
Totals exceed total days and 100% because more than one contamination source was reported for most events.

Monitoring Results

In 2010 North Carolina reported 240 coastal beaches, 114 (48%) of which were monitored once a week, and 126 (52%) every other 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 triplicate samples and samples taken outside the official beach season, if any). In 2010, 2% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Jockey's Ridge Soundside Access (22%) and Colington Harbour Swimming Beach (17%)

in Dare County, Lighthouse Park; Ed Zaleskiway Way - Oak Island in Brunswick County (15%), Park Service Dock in Carteret County (15%), Intracoastal Waterway, beach area between marker #28 & marker #29 in Brunswick County (14%), Kitty Hawk Bay Wildlife Ramp in jet ski riding area in Dare County (14%), and North side mouth of Town Creek in Beaufort in Carteret County (13%).

New Hanover County had the highest exceedance rate (4%) in 2010 followed by Dare (3%), Brunswick (3%), Pamlico (2%), Carteret (2%), Pender (1%), Beaufort (1%), and Currituck (1%) counties. There were no exceedances in Bertie, Camden, Chowan, Craven, Hyde, Onslow, Pasquotank, Perquimans, and Tyrell counties.



Sampling Practices: North Carolina’s swimming season is from April 1 to October 31. Monitoring occurs year-round but is less frequent during the off-season, and alerts and advisories are not issued during that period.² Off-season monitoring is conducted because it can allow authorities to find and correct bacteriological problems before the swim season begins.⁴

NCDENR conducts sampling and notification activities throughout the coastal waters of the state; these duties are not delegated to local authorities. Samples are collected in a variety of ways. Samples in the ocean surf are taken 16 feet from the sampler’s body using a telescopic golf ball retriever in knee-deep water, 6 to 12 inches below the surface of the water. Approximately half of the samples are collected by boat, and these samples are taken in water that is three feet deep, 12 inches below the surface. Samples taken from piers must be taken at the location of the most used area 6 to 12 inches below the water’s surface. North Carolina prioritizes its beaches for sampling based on usage.

Tier 1 beaches are adjacent to resort areas, public accesses, and sailing camps and are used on a daily basis. All ocean beaches are considered Tier 1. Tier 2 beaches constitute areas such as those in the intracoastal waterway, tidal creeks, and exposed shoals. People frequent Tier 2 sites mostly on weekends and they are usually accessed by watercraft. Tier 3 beaches are used an average of four times per month, or used less frequently but intensively for special events such as triathlons. North Carolina regularly monitors all of its beaches, including its Tier 3 beaches.³

Beaches with storm drains that extend to the water’s edge are sampled 10 feet on either side of the



Dune filtration unit under construction at Kure Beach.

* Why don’t the 2010 percent exceedance values in this summary match? To get the value in the header (4%), beachwater monitoring samples were compared to EPA’s single-sample maximum standard for designated beach areas. North Carolina applies this standard at its high-use Tier 1 beaches, but applies EPA standards that are not as strict at its moderately and lightly used beaches (Tier 2 and Tier 3 beaches, which are generally accessible only by boat). The percent exceedance value in the “Monitoring Results” section (2%) compares beachwater monitoring samples to North Carolina’s single-sample maximum standards. Also, 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 (3%) did not have the same value as the percent exceedance of state standards for all of the beaches monitored in 2010 (2%).

† NRDC has learned that the beach that has the highest rate of exceedances in the state, Southern Shores Private Soundside Access in Dare County, is not a public beach. Monitoring of this beach has been discontinued. If it were not included in the 2010 data, Dare County’s exceedance rate would be 3%.

drain when practical. Beaches with storm drains that do not extend to the water's edge are sampled where the water flowing back down the beach from the previous wave meets the next incoming wave.³ States that deliberately sample near potential sources of pollution, such as storm drains, tend to have higher percent exceedance rates than states that don't. In Dare County, lateral sampling is done to determine the extent of a bacteria plume from discharging storm drains after a storm. Lateral sampling is also done at some sites when the running monthly geometric mean water quality standard is exceeded, in order to determine the extent of the contaminated area.³ The NCDENR samples after storm events, sewage spills, dredge disposal, and floodwater pumping to confirm safe bacteria levels before lifting preemptive advisories.³ States that monitor more frequently after exceedances are found and after storm or pollution events will tend to have higher percent exceedance rates and fewer total closing/advisory days than they would if their sampling frequency did not increase after exceedances or storm/ pollution events.

North Carolina also monitors for *Karenia brevis*, a marine alga responsible for causing "red tide," a type of harmful algal bloom. If a *K. brevis* bloom is detected off the east coast of Florida, satellite imagery is used to locate the Gulf Stream. When the Gulf Stream comes near the North Carolina coast, sampling for *K. brevis* begins.

Alerts and Advisories

Total alert and advisory days for 41 events lasting six consecutive weeks or less more than doubled to 495 days in 2010, from 233 days in 2009. For prior years, there were 168 alert and advisory days in 2008, 123 days in 2007, 346 days in 2006, and 197 days in 2005. There were 2 extended (168 days) and no permanent events in 2010. Extended events are those in effect for more than six weeks but not more than 13 consecutive weeks; permanent events are in effect for more than 13 consecutive weeks. All alert and advisory days in 2010 were due to monitoring that revealed elevated bacteria levels.

Standards and Procedures: The NCDENR does not have the authority to close beaches; it issues alerts and advisories only. The public is notified of alerts and advisories through avenues that include the Internet and press releases, but signs are posted at the beach only for advisories. However, the state and county health directors do have the authority to close any body of water if necessary for the protection of public health.⁴

North Carolina uses the Enterolert® method for analysis instead of membrane filtration. This method produces bacterial counts in terms of most probable number (mpn) rather than colony-forming units (cfu), but both of these values are intended to represent the number of viable organisms in a sample. From May 1 to September 30, North Carolina's water quality standards at its Tier 1 beaches are a single-sample maximum of 104 mpn/100 ml water and a running monthly geometric mean of 35 mpn/100 ml. These match the EPA's criteria for designated beach areas. At Tier 2 beaches the standard is a single-sample maximum of 276 mpn/100 ml, and at Tier 3 beaches the standard is a single-sample maximum of 500 mpn/100 ml.⁴ North Carolina's single-sample maximum standard for Tier 2 beaches matches EPA's criterion for moderately used full-body-contact marine beachwater, and its standard for Tier 3 beaches matches EPA's criterion for lightly used full-body-contact marine beachwater.⁵ During April and October, the standard for Tier 1 beaches is generally the same as the standard for Tier 2 beaches.³ However, the NCDENR generally opts to apply Tier 1 standards during those months if temperatures are warm enough for high recreational usage.⁴

North Carolina has an elaborate process for determining when to issue a notification, based on three tiers.

- Tier 1 beaches whose water quality exceeds standards more than just occasionally are sampled in triplicate; other Tier 1 beaches have one sample taken per sampling event. For Tier 1 beaches that are sampled in triplicate, an advisory is issued without resampling when two out of three simultaneous samples exceed 104 mpn/100 ml (alerts do not apply to beaches that are sampled in triplicate). Between May 1 and September 30 at the Tier 1 beaches that are not sampled in triplicate, an alert is issued for beaches when enterococcus levels are between 104 and 500 mpn/100 ml. A second sample is collected immediately when an alert is issued, and if levels in the resample exceed 104 mpn/100 ml, the alert converts to an advisory. It is rare for an alert to become an advisory because the beaches for which alerts are issued have a history of good water quality and resamples almost never exceed standards. An advisory is issued without a resample at Tier 1 beaches if a single sample is greater than 500 mpn/100 ml.

- For Tier 2 beaches, an alert is issued if a sample is 276 to 500 mpn/100 ml. Then a resample is conducted, and the alert converts to an advisory if the resample exceeds 276 mpn/100 ml. An advisory is issued without a resample at Tier 2 beaches if a single sample is greater than 500 mpn/100 ml.

- Alerts are not issued at Tier 3 beaches. If a sample is higher than 500 mpn/100 ml at a Tier 3 beach, a resample is done, and if the second sample is above that level, an advisory is issued.³

The NCDENR observes fecal coliform results from the state’s shellfish-growing waters in order to get an indication of water quality at nearby recreational sites, but fecal coliform results are not used to issue advisories or alerts.

During extreme rain events such as tropical storms and hurricanes, the NCDENR sometimes issues blanket advisories that cover large regions or all of coastal North Carolina.⁴ (This type of advisory is not reported to the EPA and does not appear in NRDC’s data analysis.) In addition, permanent signs are posted on either side of storm drain outfalls stating that swimming between the signs is not recommended and that waters may be contaminated by discharge from the pipe.⁴ Otherwise, preemptive rainfall advisories (advisories issued after rain before monitoring results are available) are not issued because, according to the state, beachwater-quality monitoring data indicate that water quality at ocean beaches is not affected by rainfall except near storm drains. Preemptive advisories are issued after known sewage spills, when pumping of floodwaters between a primary dune area and an ocean beach occurs, or when dredge material from closed shellfishing waters is placed on ocean beaches.³

North Carolina 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Beaufort County					
Dock on south side of Highway 92 bridge on west side of bath	3	2/mo	20	0%	0
East shore of Blounts Bay–Pamlico River	2	2/mo	20	0%	1
Pamlico River–City Park	3	2/mo	19	0%	0
Pamlico River–junction of Upper Goose Creek and Dinah's Landing	2	2/mo	20	10%	0
Pamlico River–Maul's Point	3	2/mo	19	0%	0
Pamlico River–Ragged Point Swim Area	1	1/wk	26	4%	0
Pamlico River–Tripp Point Recreational Area	3	2/mo	19	0%	0
Pamlico River–Washington–railroad trestle	3	2/mo	19	0%	0
Southeast of Austin Point–Pamlico River	2	2/mo	19	0%	0
Sound access at intersection of East Main and Tooley, Belhaven	1	1/wk	33	0%	0
West of Hills Point–Pamlico River	2	2/mo	19	0%	0
Bertie County					
Boat ramp at intersection of State Route 1500 and Vincent Street	3	2/mo	19	0%	0
Brunswick County					
Beach access btw. Bald Head Harbor entrance & Bald Head Creek	1	1/wk	28	0%	0
Beach Access near Captain Jack’s on Holden Beach	1	1/wk	33	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Brunswick County					
Cape Fear River, beach area adjacent to Southport municipal pier	2	2/mo	19	0%	0
Caswell Beach Public access off Caswell Beach Road	1	1/wk	36	8%	28
East Beach area–beach access 42	1	1/wk	28	0%	0
Ferry Road Public access	1	1/wk	34	3%	0
Greensboro Street emergency vehicle access/stormwater outfall pipe	1	1/wk	33	0%	0
Intracoastal Waterway, marker 59 near Holden Beach	2	2/mo	20	5%	0
Intracoastal Waterway, soundside access at east end of Ocean Isle Beach	2	2/mo	19	0%	0
Intracoastal Waterway end of Beach Drive at Bonaparte's Landing	3	2/mo	22	5%	4
Intracoastal Waterway, beach area adjacent to Howells Point wildlife boat ramp	2	2/mo	21	10%	0
Intracoastal Waterway, beach area between markers 28 and 29	2	2/mo	21	14%	1
Intracoastal Waterway, marker 67 near Holden Beach	2	2/mo	20	5%	0
Intracoastal Waterway, shoreline adjacent to Ocean Isle wildlife boat ramp	2	2/mo	19	0%	0
Intracoastal Waterway, waterfront park at end of NE 52nd Street	3	2/mo	21	10%	0
Lighthouse Park, Ed Zaleskiway Way–Oak Island	1	1/wk	41	15%	23
Middleton Public access–Oak Island	1	1/wk	33	0%	0
Oak Island wildlife ramp off Fish Factory Road	2	2/mo	20	0%	1
Ocean pier at 30th Place West and Beach Drive	1	1/wk	35	3%	8
Ocean pier at Causeway and First Street	1	1/wk	33	3%	0
Ocean pier at Main Street and Sunset Boulevard	1	1/wk	33	0%	0
Ocean pier at Ocean Boulevard and Durham Street	1	1/wk	33	3%	0
Ocean pier between 14th and 15th Place East and Beach Drive	1	1/wk	33	0%	0
Park on Fish Factory Road in Southport	2	2/mo	21	10%	1
Public access at 40th and Main Street	1	1/wk	34	3%	1
Public access at Dawson Street–Ocean Isle Beach	1	1/wk	33	0%	0
Public access at Dolphin Street Holden Beach	1	1/wk	33	0%	0
Public access at Driftwood Street–Ocean Isle Beach	1	1/wk	33	3%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Brunswick County					
Public access at First and Chadbourn Street	1	1/wk	33	0%	0
Public access at Ocean Dr. and Keziah Street	1	1/wk	35	3%	7
Public access just west of marker 1	1	1/wk	33	0%	0
Public access, 46th St/SE and E. Beach Drive–Oak Island	1	1/wk	36	6%	28
Public access, 58th St/SE and E. Beach Drive–Oak Island	1	1/wk	36	6%	15
Public access, east end Holden Beach	1	1/wk	33	0%	0
Public access, east end Sunset Beach	1	1/wk	34	3%	0
Public access, west end of Oak Island Drive–Oak Island	3	2/mo	21	10%	0
South Beach area–beach access 17	1	1/wk	28	0%	0
Southwest side, Holden Beach Bridge	3	2/mo	19	0%	0
Waterway Park	3	2/mo	19	0%	0
Camden County					
Canal boat ramp on State Route 1153	3	2/mo	18	0%	0
Sound access on State Route 1153	3	2/mo	20	0%	0
Carteret County					
1/2 mile west of marker 10, oceanside	1	1/wk	33	0%	0
1/4 mile west of 20 1/2 marker, oceanside	1	1/wk	33	0%	0
100 yards northeast of Gallant's Channel Bridge by shore	3	2/mo	19	0%	0
2 1/4 miles north of Cape Point near Barden Inlet	1	1/wk	39	8%	16
400 yards southeast of Bean Island off Core Banks	3	2/mo	19	0%	0
50 yards east of NC Marine Fisheries Dock	2	2/mo	19	0%	0
Adams Creek off Silver Dollar Road	2	2/mo	16	0%	0
Atlantic Ocean–public beach access, Inlet Road, west-side junction of Coast Guard and Inlet Drive	1	1/wk	33	0%	0
Bogue Inlet, mouth of Coast Guard Channel	2	2/mo	19	0%	0
Bogue Sound–Archer Point	2	2/mo	19	0%	0
Bogue Sound–boat landing Tourist Center	2	2/mo	19	0%	0
Bogue Sound–canal leading to Moonlite Bay	3	2/mo	19	0%	0
Bogue Sound–east side of mouth of Gales Creek	2	2/mo	19	0%	0
Bogue Sound–Goose Creek, off campground	2	2/mo	19	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Carteret County					
Bouge Sound–West Salter Path, ~200 yards off Wam Squam Lane	2	2/mo	19	0%	0
Cape Lookout Coast Guard Dock	2	2/mo	19	0%	0
Cedar Island–beach area southeast of wildlife ramp adjacent to ferry landing	2	2/mo	19	0%	0
Core Sound–Shell Point off Harkers Island	2	2/mo	19	0%	0
Deer Creek–public access end of Bogue Sound Drive	2	2/mo	19	0%	0
Fort Macon, park access	1	1/wk	33	0%	0
Harker’s Island bridge at swimming area	2	2/mo	19	0%	0
Headen Lane Salter Path–soundside ~200 yards offshore	2	2/mo	19	0%	0
Intracoastal Waterway, marker 44	3	2/mo	19	0%	0
Intracoastal Waterway, Ski Beach, channel to Bogue Inlet	2	2/mo	19	0%	0
Indian Beach–public access at marker 12	1	1/wk	33	0%	0
Knob Island–north side	2	2/mo	19	0%	0
Lennoxville boat ramp	3	2/mo	19	0%	0
marker 15, oceanside	1	1/wk	33	0%	0
marker 7 1/2, oceanside	1	1/wk	33	0%	0
marker 19 1/2, oceanside	1	1/wk	99	0%	0
marker 4 1/2, ocean side of Pelican Drive	1	1/wk	33	0%	0
Morehead City–Drainpipe at 16th Street	3	2/mo	18	0%	0
Mouth of Back Creek–left side by beach	3	2/mo	18	0%	0
North end of Old Ferry Road, soundside	2	2/mo	19	0%	0
Newport River–public access northwest of bridge	2	2/mo	19	5%	0
North River–at Highway 70 bridge	2	2/mo	19	5%	0
North side mouth of Town Creek in Beaufort	1	1/wk	111	13%	29
Ocean end of Central Drive	1	1/wk	33	0%	0
Ocean end of Henderson Boulevard, Atlantic Ocean	1	1/wk	34	3%	0
Ocean end of New Bern Street, Atlantic Ocean	1	1/wk	33	0%	0
Off Brown’s Island	2	2/mo	19	0%	0
Park Service Dock	1	1/wk	41	15%	61
Pine Knoll Shores–Just east of marker 8 1/2–Highway 58 East	1	1/wk	33	0%	0
Public access near Fawn Drive, Emerald Isle	1	1/wk	33	0%	0
Radio Island public beach access	1	1/wk	108	3%	28
Shackelford Banks–by restrooms	2	2/mo	19	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Carteret County					
Shackelford Banks–nun buoy 2	2	2/mo	19	0%	0
Spoils Island off Salty Shores	2	2/mo	19	0%	0
Taylor’s Creek at post office dock	3	2/mo	19	0%	0
West side of mouth of South River	2	2/mo	16	0%	0
West end of Sugarloaf Island, Morehead City	2	2/mo	19	0%	0
Western tip of Bird Shoals on Rachel Carson Reserve	2	2/mo	19	0%	0
Whitehurst Island east of marker 24	2	2/mo	19	0%	0
Chowan County					
Chowan River wildlife ramp, east side of bridge	3	2/mo	12	0%	0
Craven County					
Hancock Creek Dock at wildlife ramp	3	2/mo	18	0%	0
Mouth of Slocum Creek, North Side Beach	3	2/mo	18	0%	0
Neuse River–200 yards north of mouth of North West Creek	3	2/mo	19	0%	0
Neuse River–Flanner’s Beach	2	2/mo	16	0%	0
Neuse River–Great Neck Point	2	2/mo	16	0%	0
Neuse River–Green Spring Swim Area	2	2/mo	16	0%	0
Neuse River–Pine Cliff Recreation Area	2	2/mo	16	0%	0
Neuse River–Union Point	3	2/mo	16	0%	0
Currituck County					
100 yards offshore in sound near intersection of Highway 12 and Albacore Street Corolla	2	2/mo	19	0%	0
Atlantic Ocean–2.8 miles north of Corolla Ramp	1	1/wk	33	0%	0
Corolla Lighthouse beach access	1	1/wk	36	6%	14
Corolla Ramp, end of paved road	1	1/wk	33	0%	0
Corolla, Albacore Street beach access	1	1/wk	33	0%	0
Currituck South Beach Access at Pine island	1	1/wk	33	0%	0
Dock at end of State Route 1245	3	2/mo	19	0%	0
Park on Woodhouse Dr. Grandy, NC	3	2/mo	20	0%	6
Swimming area at end of State Route 1142	3	2/mo	19	5%	6
Dare County					
1 1/2 miles southwest of RO Plant	2	2/mo	19	0%	0
1/4 mile east of EMS Station	1	1/wk	34	0%	0
100 feet north of Jennettes Pier	1	1/wk	33	0%	0
100 yards east-northeast of Little Bridge, Causeway, Nags Head	2	2/mo	19	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Dare County					
100 yards offshore at Island Creek Court, Avon	2	2/mo	19	0%	0
100 yards offshore at North Holiday Road, Rodanthe	2	2/mo	19	0%	0
100 yards offshore at Sunset Strip Drive, Frisco	2	2/mo	19	0%	0
100 yards offshore of 7517 South Virginia Dare Trail, Nags Head	2	2/mo	19	0%	0
2Mi southwest of Frisco Volunteer Fire Department	3	2/mo	19	0%	0
3/4 miles north of sound access across from ramp 29	2	2/mo	19	0%	0
500 yards offshore, 100 yards south of east side of Wright Memorial Bridge	2	2/mo	19	0%	0
500 yards off Sandyridge Road, Currituck Sound	2	2/mo	19	0%	0
500 yards off Spy Glass Road, Currituck Sound	2	2/mo	19	0%	0
750 yards off Ocean Bay Boulevard, Currituck Sound	2	2/mo	19	0%	0
800 yards off State Route 1425	2	2/mo	19	0%	0
Bathhouse at Ocean Bay Drive	1	1/wk	33	0%	0
Bathhouse on State Route 1206	1	1/wk	33	0%	0
Beach access 1 1/2 mile north of Kitty Hawk Pier	1	1/wk	33	0%	0
Beach access at 3rd Street	1	1/wk	33	0%	0
Beach access at Sportsman Drive	1	1/wk	33	0%	0
Beach access at Sprigtail Drive	1	1/wk	33	0%	0
Beach access south of refuge offices	1	1/wk	34	0%	0
Beach at Cape Hatteras Lighthouse	1	1/wk	34	0%	0
Canadian Hole	2	2/mo	19	0%	0
Colington Harbour swimming beach	1	1/wk	102	17%	0 (84)*
Conch Street beach access	1	1/wk	33	0%	0
Drainpipe at Hollowell Street	1	1/wk	33	3%	0
Drainpipe at Lake Drive beach access	1	1/wk	33	0%	0
Drainpipe at Martin Street	1	1/wk	33	9%	0
Drainpipe at milepost 10.5	1	1/wk	33	3%	0
Drainpipe at milepost 12.5	1	1/wk	33	0%	0
Drainpipe at milepost 8 3/4	1	1/wk	33	3%	0
Drainpipe at Oregon Street	1	1/wk	33	0%	0
Drainpipe at South Nags Head/ Federal Park border	1	1/wk	33	0%	0
Federal campground	1	1/wk	34	0%	0
Frisco Bathhouse	1	1/wk	34	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Dare County					
Hillcrest Drive access	1	1/wk	33	0%	0
Jockey's Ridge soundside access	1	1/wk	111	22%	22 (84)*
Kitty Hawk Bay wildlife ramp in JetSki riding area	2	2/mo	22	14%	28
Nags Head Bathhouse	1	1/wk	33	0%	0
New Inlet sound access	3	2/mo	19	0%	0
Northernmost beach access	1	1/wk	34	0%	0
Ocean Ramp 30	1	1/wk	34	0%	0
Oregon Inlet Coast Guard Station	3	2/mo	19	0%	0
Oregon Inlet Federal Campground	1	1/wk	33	0%	0
Ramp 23 and access	1	1/wk	20	0%	0
Ramp 34 and access	1	1/wk	34	0%	0
Ramp 38 and access	1	1/wk	34	0%	0
Ramp 55 and access	1	1/wk	34	0%	0
Roanoke Sound, Danube Street drainpipe, South Nags Head	2	2/mo	19	0%	0
Shallowbag Bay–swim platform, Manteo Bridge	2	2/mo	19	0%	0
Sound access across from ramp 29	2	2/mo	19	0%	0
Southeast side of Mann's Harbor Bridge	3	2/mo	19	0%	0
S-turns just north of Rodanthe	1	1/wk	34	0%	0
The Swimming Hole	2	2/mo	19	0%	0
Wanchese Seafood Industrial Park	3	2/mo	19	0%	0
Hyde County					
Atlantic Ocean–5 miles southwest of Ocracoke State Ferry	1	1/wk	34	0%	0
Beach access by airport ramp	1	1/wk	34	0%	0
Federal Campground–Ocracoke	1	1/wk	34	0%	0
Ocracoke–1st public access southwest of State Ferry	1	1/wk	34	0%	0
Swanquarter Bay–end of docks on State Route 1136	3	2/mo	19	0%	0
New Hanover County					
Area behind northern end Masonboro Island	2	2/mo	19	0%	0
Banks Channel–Waynick Boulevard–between Snyder and Seashore Streets	1	1/wk	117	10%	44
Banks Channel–Waynick Boulevard–between Taylor and Bellamy Streets	1	1/wk	108	4%	28
Banks Channel–Waynick Boulevard, ~150 yards north of Lula Street	1	1/wk	111	6%	29
Banks Channel, swimming beach south of Coast Guard station	1	1/wk	36	3%	28

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
New Hanover County					
Beach access at Periwinkle Lane, Carolina Beach	1	1/wk	33	0%	0
Cama access, corner of Waynick Boulevard and Sunset Ave (WB)	1	1/wk	114	5%	36
Cape Fear River, west end of Snows Cut	3	2/mo	19	0%	0
Carolina Beach Inlet–north end of Carolina Beach	2	2/mo	19	0%	0
Fort Fisher–Beach adjacent to NCWRC ramp	2	2/mo	19	0%	0
Fort Fisher Beach State Park access off Loggerhead Road	1	1/wk	33	3%	0
North end of Wrightsville Beach at public access 2 off Lumina Drive	1	1/wk	33	0%	0
Ocean Pier at K Avenue	1	1/wk	34	6%	0
Ocean pier at Nathan Street and South Lumina Drive	1	1/wk	33	3%	0
Ocean pier at Salisbury Street public access	1	1/wk	33	0%	0
Public access at Hanby Beach storm drain	1	1/wk	33	0%	0
Public beach, Masonboro Sound–end of Florida Avenue, Carolina Beach	2	2/mo	20	5%	1
Public beach access at Hemlet Avenue	1	1/wk	33	0%	0
Stone Street public access–oceanside Wrightsville Beach	1	1/wk	34	3%	0
Trails End public access on Masonboro Loop	3	2/mo	20	5%	0
Vehicle access, 600 yards from North Carolina Beach Pier at Dune Mark	1	1/wk	33	0%	0
Onslow County					
Atlantic Ocean–~1 mile south of Bogue Inlet	1	1/wk	33	0%	0
Atlantic Ocean–~2miles south of Brown's Inlet	1	1/wk	33	0%	0
Bogue Sound, 1/2 mile south of Bear Inlet, soundside	2	2/mo	18	0%	0
North Topsail Bridge–wildlife ramp	3	2/mo	19	0%	0
North Topsail, emergency vehicle access	1	1/wk	33	0%	0
New River at mouth of Southwest Creek	2	2/mo	19	0%	0
New River, Wilson Park	3	2/mo	19	0%	0
Onslow Beach–public access ~1/4 mile south of Onslow Beach Bridge	2	2/mo	20	0%	0
Public access, mouth of Northeast Creek–New River	2	2/mo	19	0%	0
Public access, North Topsail	1	1/wk	33	0%	0
Regional public access at marker 12 on New River Inlet Road	1	1/wk	33	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Onslow County					
Regional public access at marker 17 on New River Inlet Road	1	1/wk	33	0%	0
Sanders Creek at Bear Creek	2	2/mo	19	0%	0
Soundside Bear Island	3	2/mo	19	0%	0
Wards Shore–Bogue Sound	2	2/mo	19	0%	0
Pamlico County					
Dawson Creek, 100 yards north of bridge	2	2/mo	19	0%	0
Pamlico County					
Just east of mouth of Beard Creek	2	2/mo	19	0%	0
Just east of Wilkinson Point	2	2/mo	19	0%	0
Kennals Beach	2	2/mo	19	0%	0
Near mouth of Gatlin Creek	2	2/mo	19	5%	0
Neuse River, end of State Route 1310	2	2/mo	19	0%	0
Public beach, south side of Dawson Creek Bridge	1	1/wk	105	4%	1
Public beach southwest of mouth of Whittaker Creek, north of marker 3	2	2/mo	0	NA	0
Vandemere Creek	2	2/mo	20	0%	0
Pasquotank County					
Pasquotank River–E.C. Coast Guard Station Beach	3	2/mo	20	0%	0
Pender County					
Intracoastal Waterway, Highway 210 bridge at Surf City	2	2/mo	19	0%	0
Public access O-10 at Ocean Boulevard and Crews Avenue	1	1/wk	33	0%	0
Public access O-3 at marker 3	1	1/wk	33	3%	0
Public access S-1 at end of Shoreline Drive (soundside station)	1	1/wk	36	3%	0
Public access at Broadway Street & North Shore Drive	1	1/wk	33	3%	0
Public access at South Shore Drive and Kinston Avenue	1	1/wk	33	0%	0
Stump Sound just east of Dixon Point	2	2/mo	19	0%	0
Perquimans County					
Albemarle Sound at end of Holiday Lane Road	3	2/mo	19	0%	0
Tyrell County					
Albemarle Sound–Bull Bay Swimming Area 4H Camp	3	2/mo	17	0%	0

*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 Michael R. Burchell II, Ph.D., North Carolina State University. Personal communication. March 2011.
- 2 North Carolina Department of Environment and Natural Resources, North Carolina Beach Monitoring Project Quality Assurance Project Plan, revised January 4, 2005.
- 3 J.D. Potts, North Carolina Department of Environment and Natural Resources. Personal communication. March 2011.
- 4 North Carolina Department of Environment and Natural Resources. "Coastal Recreational Waters Monitoring, Evaluation, and Notification." 15A NCAC 18A .3400. Accessed at www.deh.enr.state.nc.us/shellfish/Water_Monitoring/RWQweb/images/15ANCAC8A3400Rules.pdf. February 2011.
- 5 U.S. EPA. "Ambient Water Quality Criteria for Bacteria–1986." January 1986.

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



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)

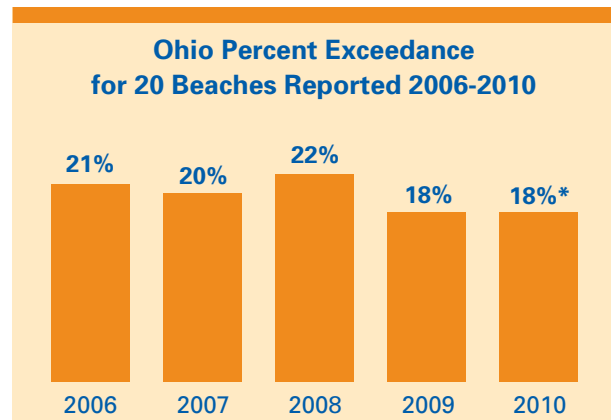
- Edson Creek in Erie County (64%)
- Euclid State Park in Cuyahoga County (44%)
- Noble Beach in Cuyahoga County (43%)

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
Pickerel 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.



OREGON

3rd in Beachwater Quality

3% 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.

Oregon has 91 beaches lining 186 miles of Pacific Ocean coastline. The state's beachwater quality monitoring program is administered by the Oregon Health Authority (OHA).

OHA officials work to inform the public about potential contamination sources. For example, the Ecola Court stormwater outfall, which flows across Cannon Beach in Clatsop County before emptying into the ocean, has a history of elevated fecal indicator bacteria levels. In March 2010, officials from the Oregon Beach Monitoring Program met with the Clatsop County Commissioner to explain the role of the program, to discuss the various

entities monitoring water quality at Cannon Beach, to address concerns about the consistently high bacteria levels found at the Ecola Court outfall, and to discuss possible educational signage to post above the outfall pipe.¹ Current signage is not particularly noticeable and difficult to read.

The city of Newport took steps to protect the public when monitoring revealed consistently high bacteria levels in stormwater discharges to Nye Beach in Lincoln County in 2006 and 2007. The city conducted smoke and dye testing of the stormwater and sewer lines and discovered that seven properties were discharging sewage directly to stormwater drains instead of to the city's sewage treatment system. In 2008, these cross-connections were rectified and a sign was posted above the stormwater discharge pipe warning the public not to play in the stormwater runoff or near the pipe.² Beachwater quality has improved, from 32% exceedances in 2007 to 7% in 2008 and 0% in 2009 and 2010.

Monitoring Results

In 2010 Oregon reported 91 coastal beaches and beach segments. Of these, 6 (7%) were monitored once a week, 20 (22%) were monitored twice a month 65 (71%) 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, 2%* of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The only beaches reporting exceedances in 2010 were Sunset Bay State Park Beach in Coos County (10%); D River Beach in Lincoln County (9%); Battle Rock State Park Beach in Curry County (7%); Bastendorf Beach in Coos County (5%); Harris Beach State Park in Curry County (4%); and Hug Point State Park Beach (3%), Tolovana State Park Beach (2%), and Seaside Beach (1%) in Clatsop County.

Coos County had the highest exceedance rate (8%) in 2010, followed by Lincoln (3%), Curry (1%), and Clatsop (1%) counties. There were no exceedances in Douglas, Lane, and Tillamook counties.

KEY FINDINGS IN OREGON

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Sunset Bay State Park Beach in Coos County (10%)
- D River Beach in Lincoln County (9%)
- Battle Rock State Park Beach in Curry County (7%)

Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

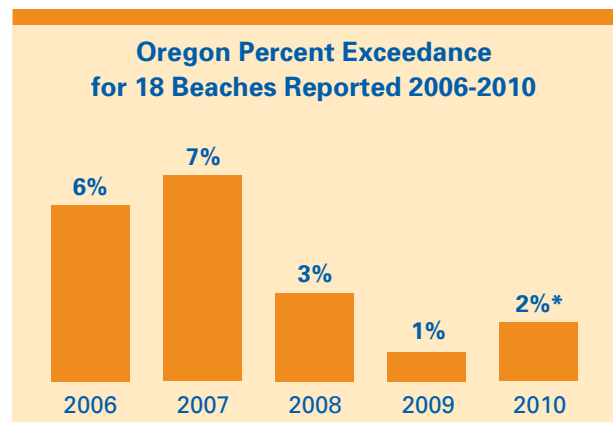
- 67 (100%) unknown sources of contamination

Sampling Practices: In 2010, sampling occurred from March to November, with more monitoring occurring during the peak season from May to September. Of the beaches that were monitored, some were sampled only during the nonpeak season (spring and fall), when they are frequented by surfers and wet weather commonly compromises water quality. Others were sampled only during peak season (Memorial Day to Labor Day).¹

OHA determines sampling practices, locations, standards, and notification protocols and practices throughout the state. All samples are collected and processed by an Oregon Department of Environmental Quality employee who travels the coastline in a mobile lab.¹ Samples are collected in ankle- to knee-deep water in the middle of typical bathing areas. Beaches are prioritized for sampling on the basis of the number of people in the water, previous water quality data, known and suspected point and non-point pollution sources, and public comments.¹

Water samples are taken near known or potential pollution sources. Following an advisory during the peak season, an additional sample is collected within 96 hours, if resources are available. The program also conducts follow-up monitoring after known sewage spills and major pollution events.¹ States that monitor more frequently after an exceedance is found and after pollution events 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 or after a pollution event.

Water samples are taken near known or potential pollution sources. Following an advisory during the peak season, an additional sample is collected within 96 hours, if resources are available. The program also conducts follow-up monitoring after known sewage spills and major pollution events.¹ States that monitor more frequently after an exceedance is found and after pollution events 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 or after a pollution event.



Advisories

In 2010, total advisory days for 11 events lasting six consecutive weeks or less decreased to 67 days, a drop of 37% from 106 days in 2009. For prior years, there were 86 advisory days in 2008, 101 days in 2007, 66 days in 2006, and 117 days in 2005. In addition, there were no extended or permanent events in 2010. Extended events are those in effect more than six but not more than 13 consecutive weeks; permanent events are in effect for more than 13 consecutive weeks. For the 11 events lasting six consecutive weeks or less, all 67 advisory days in 2010 were due to monitoring that revealed elevated bacteria levels.



© CHARLIE PLYBON
Children playing next to the Ecola Court outfall at Cannon Beach.

Standards and Procedures: In Oregon, the public is guaranteed free and uninterrupted use of all beaches along the coastline. Therefore, beach advisories are issued, but not closings. Oregon uses a single-sample maximum enterococcus standard of 158 cfu/100 ml for beach advisory decisions in marine waters. This standard corresponds to the EPA's "Moderate Full Body Contact Recreation" standard. OHA says their use of a standard that is less strict than the EPA's "Designated Beach Area" standard is protective of public health, given the water temperature and frequency and duration of use by swimmers and other recreational users of coastal waters in Oregon.² The geometric mean of sampling results is calculated for tracking trends only, not for issuing advisories.

* Why don't the 2010 percent exceedance values in this summary match? To get the value in the header (3%), beachwater monitoring samples were compared to EPA's single-sample maximum standard for designated beach areas. Oregon applies EPA's single-sample maximum standard for moderately used full body contact water recreation beaches, and the percent exceedance value in the "Monitoring Results" section (2%) compares beachwater monitoring samples to this less stringent single sample maximum standard.

Public notification of beach advisories occurs if a single sample result exceeds Oregon's action limit. Resampling, in lieu of public notification, is acceptable if there is reason to doubt the accuracy or certainty of the first sample, but to date, there have been no exceedances attributed to sampling or laboratory error that required resampling prior to the issuance of an advisory.¹

The state does not have preemptive standards for rainfall but does issue preemptive advisories after a known sewage spill or major pollution event where the potential exists for bacteria indicator levels to exceed the state standard.¹

Oregon 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Clatsop County					
Cannon Beach	1	1/wk	44	0%	0
Hug Point State Park Beach	1	1/wk	39	3%	2
Indian Beach at Ecola State Park	1	1/wk	44	0%	0
Seaside Beach	1	1/wk	68	1%	3
Tolovana State Park Beach	1	1/wk	45	2%	7
Beaches in Clatsop County that were not monitored and that had no closing or advisory days in 2010:					
Arcadia State Park Beach	Del Rey Beach State Recreation Site	Fort Stevens State Park Beach	Sunset Beach State Rec Site		
Coos County					
Bastendorf Beach	1	2/mo	58	5%	15
Sunset Bay State Park Beach	1	2/mo	60	10%	5
Beaches in Coos County that were not monitored and that had no closing or advisory days in 2010:					
Bandon State Natural Area	Cape Arago State Park– South Cove	Seven Devils State Recreation Site	Whiskey Run Beach	Bandon South Jetty County Park	
Curry County					
Battle Rock State Park Beach	1	2/mo	14	7%	2
Crissey Field State Recreation Site	1	2/mo	28	0%	0
Face Rock State Scenic Viewpoint	1	2/mo	14	0%	0
Gold Beach	1	None	2	0%	0
Harris Beach State Park	1	2/mo	28	4%	18
Hubbard Creek Beach	1	2/mo	43	0%	0
Sporthaven Beach	1	2/mo	21	0%	0
Beaches in Curry County that were not monitored and that had no closing or advisory days in 2010:					
Arizona Beach State Recreation Site	Hunter Creek Beach	Recreation Site	Samuel H. Boardman State Scenic Corridor– Lone Ranch Beach		
Buena Vista Ocean Wayside State Park	Mcvay Rock State Recreation Site	Paradise Point State Recreation Site	Samuel H. Boardman State Scenic Corridor– Whaleshead Beach		
Bullards Beach	Meyers Beach	Pistol River State Scenic Viewpoint			
Cape Blanco State Park– Sixes River Beach	Mill Beach	Port Point Beach			
Humbug Mountain State Park	Nesika Beach	Samuel H. Boardman State Scenic Corridor– China Beach			
	Ophir Beach				
	Otter Point State				
Douglas County					
Umpqua Beach	1	2/mo	21	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Lane County					
Florence North Jetty Beach	1	None	21	0%	0
Heceta Beach	1	2/mo	21	0%	0
Beaches in Lane County that were not monitored and that had no closing or advisory days in 2010:					
Carl G. Washburne Memorial State Park	Muriel O. Ponsler Memorial State Scenic Viewpoint	Oregon Dunes National Rec Area–South Jetty	Rock Creek Campground–Roosevelt Beach		
Devils Elbow State Park	Neptune Beach Oregon Dunes National Rec Area–Horsfall Beach	Oregon Dunes National Rec Area–Umpqua Dunes	Stonefield Beach State Recreation Site		
Lincoln County					
Agate Beach	1	2/mo	35	0%	0
D River Beach	1	2/mo	55	9%	15
Nye Beach	1	2/mo	56	0%	0
Otter Rock Beach	1	2/mo	28	0%	0
Beaches in Lincoln County that were not monitored and that had no closing or advisory days in 2010:					
Alea River Recreation Area Beach	Driftwood Beach State Recreation Site	Moolack Beach Nelscott Beach	Smelt Sands State Recreation Site		
Beachside State Park Beach	Fogarty Creek Beach Gleneden Beach	Ona Beach Roads End Beach	South Beach Tillicum Beach		
Beverly Beach	Governor Patterson State Park Beach	Seal Rock State Recreation Site	Yachats Wayside Beach		
Devils Punch Bowl State Natural Area	Lost Creek State Recreation Site	Siletz Bay Beach	Yaquina Bay State Park Beach		
Tillamook County					
Bob Straub State Park Beach	1	None	1	0%	0
Cape Kiwanda State Park Beach	1	2/mo	42	0%	0
Neskowin Beach	1	2/mo	21	0%	0
Oceanside Beach State Wayside	1	2/mo	21	0%	0
Rockaway Beach	1	2/mo	21	0%	0
Short Sand Beach	1	1/wk	88	0%	0
Twin Rocks Beach	1	2/mo	7	0%	0
Beaches in Tillamook County that were not monitored and that had no closing or advisory days in 2010:					
Barview County Park Beach	Cape Lookout State Park Beach Cape Mears Beach	Manhattan Beach State Park Manzanita Beach	Nehalem Bay State Park Beach		

NOTES

1 Oregon Department of Human Services. Annual Performance Report for the Oregon Department of Human Services BEACH Monitoring Program (Agreement #CU96088101)—Activity Period October 1, 2009, through September 30, 2010. Not dated.

2 Jennifer Ketterman, Oregon Health Authority. Personal communication. April 2011.

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



PENNSYLVANIA

13th in Beachwater Quality

6% 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.

Pennsylvania has 40 miles of Lake Erie coastline, eight miles of which are permitted public bathing beaches. The coastal beach monitoring program is administered by the Erie County Department of Health (DOH).

Swimming was prohibited at Beach 1 West and Beach 1 West Extension in 2010 because lifeguards could not be stationed there due to budget shortfalls.¹

Monitoring Results

In 2010, Pennsylvania reported 13 Lake Erie beaches in Erie County, of which 12 were reported as being monitored twice a week and 1 was reported as being monitored 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, 6%* of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Beach 1 East (9%), Beach 11 (8%), Barracks Beach (7%), Beach 6 (6%), and Beach 9 (Pine Tree Beach) (5%), all in Erie County.

Sampling Practices: Beachwater quality monitoring activities are conducted from Memorial Day to Labor Day.

Practices are regulated by the state, with permit holders allowed to monitor more frequently than the state requires if they desire. Samples are collected in water that is approximately 30 inches deep, midway between the surface and the bottom. By regulation, at least three samples of water are taken from each beach at least once a week. Two samples are taken approximately 50 feet from each end of the beach, and the third sample is taken at the center. Presque Isle State Park has established a protocol requiring two sampling events each week.

When a sample is found to exceed bacterial standards, beaches are resampled for three consecutive days in order to lift advisories and/or restrictions as soon as possible.² States that monitor more frequently after an exceedance is found will tend to have higher percent exceedances and lower total advisory days than they would if their sampling frequency did not change after an exceedance was found.

Restrictions and Advisories

Total closing/advisory days for 14 events lasting six consecutive weeks or less decreased 59% to 14 days in 2010 from 34 days in 2009. For prior years, there were 45 days in 2008, 6 days in 2007, 53 days in 2006, and 39 days in 2005. In addition, there were no extended and 2 permanent events (730 days) 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

KEY FINDINGS IN PENNSYLVANIA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

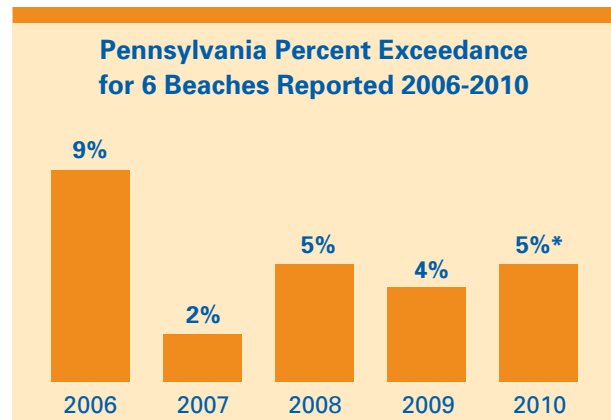
- Beach 1 East (9%) in Erie County
- Beach 11 (8%) in Erie County
- Barracks Beach (7%) in Erie County

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

- 14 (100%) stormwater

weeks. For 14 events lasting six consecutive weeks or less, 100% (14) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels.

Standards and Procedures: Swimming advisories and restrictions, rather than beach closings, are issued at Lake Erie beaches. In Pennsylvania, if a single-sample *E. coli* count is between 235 and 1,000 cfu/100 ml, a swimming advisory is issued. While swimming is permitted, the public is informed that the *E. coli* level exceeds standards, and people are advised about what precautions to take should they choose to enter the water. If a single-sample count is 1,000 cfu/100 ml or greater, a swimming restriction is posted and swimming is prohibited. Pennsylvania also uses the 5-sample, 30-day geometric mean standard for *E. coli* of 126 cfu/100 ml to post restrictions.³ There is no protocol for delaying or forgoing an advisory or restriction when bacterial standards are exceeded.



Pennsylvania issues preemptive rain advisories at its Lake Erie beaches when rainfall exceeds 0.5 inch in a 24-hour period.² Beaches are also preemptively posted with restrictions when there is a known sewage spill and when high waves and strong winds out of the west are present.²

The Erie County DOH started developing a predictive beachwater quality model in 2004 based on weather, known sewage discharges, storm events, and water currents. A stream gauge has been installed on a major tributary to Lake Erie that influences the water quality of the beaches to inform the development of predictive water quality models for beaches at Presque Isle State Park. In 2008, a buoy that retrieves water quality data in real time was deployed off of Presque Isle. Plans are to deploy a second buoy in 2011, and data from these buoys will be utilized in predictive model development.³

* 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 (5%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (6%).

Pennsylvania 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Erie County					
Barracks Beach	1	2/wk	96	7%	2
Beach 1 East	1	2/wk	99	9%	2
Beach 1 West	Not Open	2/wk	3	0%	0 (365)*
Beach 1 West Extension	Not Open	2/wk	3	0%	0 (365)*
Beach 10 (Bundy Beach)	1	2/wk	93	4%	1
Beach 11	1	2/wk	102	8%	2
Beach 2	1	2/wk	0	NA	0
Beach 6	1	2/wk	99	6%	2
Beach 7 (Water Works Beach)	1	2/wk	99	4%	2
Beach 8 (Pettinato Beach)	1	2/wk	93	4%	1
Beach 9 (Pine Tree Beach)	1	2/wk	93	5%	1

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Erie County					
Freeport Beach	1	1/wk	14	0%	0
Mill Road Beaches	1	2/wk	93	2%	1

*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 Doug Range, Erie County Department of Health, personal communication, May 2011.

2 Erie County Department of Health. Beach Sampling Information. Accessed at <http://www.ecdh.org/environmental/BeachSampleInfo.htm>. February 2011.

3 Doug Range, Erie County Department of Health, personal communication, April 2011.

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



RHODE ISLAND

18th in Beachwater Quality

8% 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.

Rhode Island has identified 236 public beach access points along about 400 miles of Atlantic Ocean and Narragansett Bay waters. The Rhode Island Department of Health is responsible for beachwater monitoring and water quality notifications.

Bristol Town Beach in Colt State Park is using green infrastructure to improve beachwater quality. Six catch basins have been installed to intercept runoff from the park before it reaches the beach. Rainwater is filtered mechanically in the catch basins, then further filtered by vegetation in the bioswales. The bioswales also significantly slow down the flow of rainwater, preventing surges of stormwater that may carry bacteria and other contamination. Other water quality projects are planned at this beach: The storm drain will be opened and restored so it functions like a winding creek, which will help clean the water it carries to the beach; the parking lot will be replaced by an ecofriendly parking lot with bioretention swales and specialized vegetation to further absorb and filter stormwater; and storage tanks for rainwater will reduce combined-sewer overflows from the nearest sewage treatment plant during periods of heavy rain.¹

Fewer bacterial exceedances in 2010 than in 2009 at Rhode Island's beaches may be partly attributable to less rain in 2010 than in 2009, but Rhode Island and many municipalities have worked to address the sources of contamination affecting the state's beaches. Rhode Island's commitment to improving its beachwater quality is illustrated by the State Tunnel Project, which was the biggest, longest-running public works project in state history, initiated in order to address beachwater contamination caused by combined-sewer overflows. During combined-sewer overflows, untreated or partially treated sewage is discharged to surface waters during rains that overwhelm the sewage treatment plants. The \$359 million project, completed in 2008, consists of a tunnel under downtown Providence. The tunnel can capture up to 1.5 inches of the precipitation from a rainstorm, holding it so it can be treated when treatment capacity is available. Beaches whose water was impacted by the combined-sewer overflows were also being affected by leaky septic tanks, and in 2009 the city of Warwick continued efforts to connect Greenwich Bay homes with septic tanks to municipal sewer systems. Approximately 8,000 homes have been connected to municipal sewage treatment since the beginning of the project.¹ The fraction of samples exceeding water quality standards at City Park Beach in Warwick has dropped from 19% in 2005 to 10% in 2007, 9% in 2008, 4% in 2009, and 2% in 2010.

A \$5.8 million ultraviolet treatment system to reduce bacteria levels from stormwater that discharges at the beach in the city of Newport is expected to begin operating prior to the start of the 2011 beach season.¹ Also in 2011, the Rhode Island beach monitoring program will conduct a study with approximately 20 volunteers who regularly swim in the ocean. Each volunteer will document his or her ocean swimming events along with water conditions, weather conditions, and health effects. These data will help the beach program understand statewide year-round water recreation and associated health risks.¹

KEY FINDINGS IN RHODE ISLAND

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Easton's Beach in Newport County (35%)
- Third Beach in Newport County (23%)
- Atlantic Beach Club in Newport County (22%)
- Conimicut Point Beach in Kent County (20%)

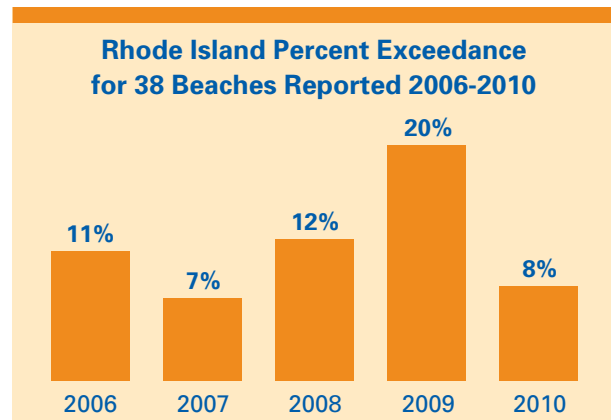
Reported Sources of Beachwater Contamination Statewide (number of closing/advisory days)

- 71 (100%) unknown sources of contamination

Now that the city of Newport has made improvements to the combined-sewage overflow system at Wellington Avenue, the Rhode Island beach monitoring program is working with Newport to reopen King Park Beach for the 2011 swimming season. This beach has been closed since 2006. Water quality testing at the beach will be conducted to ensure healthy swimming conditions.¹

Monitoring Results

In 2010, Rhode Island reported 236 coastal beaches, 15 (6%) of which were monitored more than once a week, 7 (3%) were monitored once a week, 13 (5%) every other week, 41 (17%) once a month, 1 (<1%) less than once a month, and 160 (68%) 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, 8% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Atlantic Beach Club in Newport County (22%), Conimicut Point Beach in Kent County (20%), and Easton's Beach (20%) and Grinnells Beach (17%) in Newport County. Although NRDC's lists of beaches with high exceedance rates elsewhere in this report exclude beaches sampled less than 12 times a year, it is worth noting here that Hazard's Beach in Newport county has a 20% exceedance rate. Newport County had the highest exceedance rate (13%) in 2010 followed by Kent (11%), Bristol (9%), and Washington (4%) counties. No beaches in Providence County were monitored.



Sampling Practices: The regular monitoring season runs from Memorial Day through Labor Day. In 2010, the city of Newport teamed with a local Aquidneck Island volunteer organization, Clean Ocean Access, to continue sampling Easton's Beach during the off season, when surfers use the beach area. Clean Ocean Access provides volunteers who collect samples year-round, and Newport pays for analysis.¹ Additional volunteer groups including the Surfrider Foundation assist with sampling efforts throughout the year as well.²

The Department of Health determines sampling practices, locations, standards, and notification protocols and practices throughout the state. Samples are collected in water that is approximately 3 feet deep, just below the surface. High priority for more frequent monitoring is given to beaches with direct known sources of pollution (e.g. stormwater outfalls, septic/sewer connections, population density, nearby sewer plants) and high usage, and to facilities that have exhibited poor water quality in the past.

Monitoring efforts are focused on areas of greatest concern, and samples are collected at times when high bacteria counts are most likely to be present. The number of samples collected on a beach is dependent on the length of coastline and the presence of physical barriers to circulation (jetties, groins, etc.) that can trap bacterial contaminants near the shore. If a beach is closed or placed under advisory, sampling is conducted daily until the water quality meets standards, after which the beach is reopened. Extensive wet-weather sampling is conducted to determine the reopening schedule for beaches under preemptive rainfall advisories.² States that monitor more frequently after an exceedance is found or after heavy rainfall will tend to have higher percent exceedance rates and lower total closing/advisory days than they would if their sampling schedule did not increase after an exceedance or after heavy rainfall.

Closings and Advisories

Total closing/advisory days for 45 events lasting six consecutive weeks or less decreased 60% to 71 days in 2010, from 178 days in 2009. For prior years, there were 124 days in 2008, 86 days in 2007, 256 days in 2006, and 57 days in 2005. 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. All closing and advisory days in 2010 were due to monitoring that revealed elevated bacteria levels.

Standards and Procedures: Rhode Island issues both beach closings (for bacterial contamination) and advisories (due to rain). Rhode Island's coastal bathing water standard is a single-sample maximum of 104 cfu/100 ml of enterococcus.¹ No geometric-mean standard is applied when determining whether to issue a beach closing.

Typically, if sampling results exceed the standard, a beach is closed. However, the Department of Health considers several environmental factors before deciding whether to close a beach, including the presence of wildlife, seaweed, how many tides have occurred since the sample was collected, the history of sample results for that beach, and rainfall.² On rare occasions, if environmental factors do not suggest fecal contamination, the beach may remain open while its water is resampled.

If a known sewage discharge occurs in close proximity to a beach, officials close the beach immediately, without waiting for sampling results to confirm contamination. Two beaches have preemptive rainfall standards: Scarborough Beach and Easton's Beach are closed when there is more than one inch of rainfall in a 24-hour period. Easton's Beach reopens within 12 hours of cessation of heavy rain. The beach monitoring program generally recommends no water contact within three days of heavy rainfall.²

The public is advised to avoid water contact at beaches north of Conimicut Point in Warwick and at Nayatt Point in Barrington because of ongoing water quality issues. A study of water quality at three urban beaches north of Conimicut Point is under way to determine whether licensing for water recreation should be allowed.¹

Rhode Island 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Bristol County					
Warren Town Beach	1	2 or 3/wk	41	10%	4 (4)*
Camp St. Dorothy	1	1/wk	5	20%	5 (1)*
Bristol Town Beach	1	3/wk	69	10%	5 (3)*
Barrington Beach	1	2 or 3/wk	65	8%	2 (2)*
Beaches in Bristol County that were not monitored and that had no closing or advisory days in 2010:					
Annawamscutt Beach	Barrington Unnamed #3	Camp Crosby	Rumstick Point		
Baia Beach	Barrington Unnamed #4	Hopeworth Beach	Touisset Beach		
Barrington Unnamed #1	Bristol Unnamed #1	Juniper Beach	Warren Unnamed #1		
Barrington Unnamed #2	Bristol Unnamed #2	Latham Park	Warren Unnamed #2		
Kent County					
City Park Beach	1	3/wk	48	2%	2 (1)*
Conimicut Point Beach	1	3/wk	80	20%	8 (4)*
Goddard Memorial State Park	1	3/wk	137	12%	5 (4)*
Oakland Beach	1	3/wk	119	7%	5 (2)*
Beaches in Kent County that were not monitored and that had no closing or advisory days in 2010:					
Buttonwoods Beach	Cole Farm Beach	Mill Cove Beach	Warwick Unnamed #1		
Cedar Tree Point	Gaspee Point	Potowomut	Warwick Unnamed #2		
Chepiwanoxet	Longmeadow	Rocky Point			
Newport County					
Atlantic Beach Club	1	4/wk	55	22%	8 (6)*
Briggs Beach	3	1/mo	10	0%	0
Easton's Beach	1	2/wk	111	20%	5 (4)*
Fogland Beach	2	2/mo	27	7%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Newport County					
Fort Adams State Park	1	3/wk	48	4%	2 (1)*
Gooseberry Beach	3	1/mo	11	0%	0
Goosewing Beach	3	1/mo	16	0%	0
Grinells Beach	3	2/mo	18	17%	0
Hazard's Beach	3	1/mo	10	20%	2 (1)*
King Park Swim Area	3	None	69	14%	0
Mackerel Cove Beach	2	1/mo	18	0%	0
Peabodys Beach	2	2/mo	33	15%	3 (2)*
Sachuest Beach	2	2/mo	23	0%	0
Sandy Point Beach	3	2/mo	22	9%	1 (1)*
South Shore Beach	3	1/mo	12	0%	0
Spouting Rock Beach Association	3	1/mo	17	0%	0
Third Beach	1	3/wk	84	10%	3 (2)*
Warrens Point Beach Club	3	1/mo	6	0%	0
Beaches in Newport County that were not monitored and that had no closing or advisory days in 2010:					
Collins Beach	Little Compton	Portsmouth Unnamed #12	Teddys Beach		
Easton's Point	Unnamed #9	Portsmouth Unnamed #13	Tiverton Unnamed #1		
Elm Street Pier	Little Compton	Portsmouth Unnamed #14	Tiverton Unnamed #2		
Fort Getty	Unnamed #10	Prudence Island	Tiverton Unnamed #3		
Fort Weatherill	Little Compton	Unnamed #1	Tiverton Unnamed #4		
Island Park	Unnamed #11	Prudence Island	Tiverton Unnamed #5		
Jamestown Unnamed #1	Marine Avenue Beach	Unnamed #2	Tiverton Unnamed #6		
Jamestown Unnamed #2	Mccorrie Point	Prudence Island	Tiverton Unnamed #7		
Jamestown Unnamed #3	Middletown Unnamed #1	Unnamed #3	Tiverton Unnamed #8		
Jamestown Unnamed #4	Middletown Unnamed #2	Prudence Island	Tiverton Unnamed #9		
Kings Beach	Newport Unnamed #1	Unnamed #4	Tiverton Unnamed #10		
Little Compton Unnamed #1	Newport Unnamed #2	Prudence Island	Tiverton Unnamed #11		
Little Compton Unnamed #2	Ochre Point (Ruggles)	Unnamed #5	Tiverton Unnamed #12		
Little Compton Unnamed #3	Patience Island	Unnamed #6	Vanzandt Pier		
Little Compton Unnamed #4	Unnamed #1	Prudence Island	West Beach		
Little Compton Unnamed #5	Portsmouth Unnamed #1	Unnamed #7	Bold Point		
Little Compton Unnamed #6	Portsmouth Unnamed #2	Prudence Island	Bullocks Neck		
Little Compton Unnamed #7	Portsmouth Unnamed #3	Unnamed #8	Cranston Unnamed #1		
Little Compton Unnamed #8	Portsmouth Unnamed #4	Prudence Island	Cranston Unnamed #2		
Little Compton Unnamed #9	Portsmouth Unnamed #5	Unnamed #9	Crescent Beach		
Little Compton Unnamed #10	Portsmouth Unnamed #6	Prudence Island	East Providence Unnamed #1		
Little Compton Unnamed #11	Portsmouth Unnamed #7	Unnamed #10	East Providence Unnamed #2		
Little Compton Unnamed #12	Portsmouth Unnamed #8	Prudence Island	Sabins Point		
Little Compton Unnamed #13	Portsmouth Unnamed #9	Unnamed #11			
Little Compton Unnamed #14	Portsmouth Unnamed #10	Rocky Beach			
Little Compton Unnamed #15	Portsmouth Unnamed #11	Sapowet Beach			
Little Compton Unnamed #16	Portsmouth Unnamed #12	Seaside Beach			
Little Compton Unnamed #17	Portsmouth Unnamed #13				
Little Compton Unnamed #18	Portsmouth Unnamed #14				
Little Compton Unnamed #19	Portsmouth Unnamed #15				
Little Compton Unnamed #20	Portsmouth Unnamed #16				
Little Compton Unnamed #21	Portsmouth Unnamed #17				
Little Compton Unnamed #22	Portsmouth Unnamed #18				
Little Compton Unnamed #23	Portsmouth Unnamed #19				
Little Compton Unnamed #24	Portsmouth Unnamed #20				
Little Compton Unnamed #25	Portsmouth Unnamed #21				
Little Compton Unnamed #26	Portsmouth Unnamed #22				
Little Compton Unnamed #27	Portsmouth Unnamed #23				
Little Compton Unnamed #28	Portsmouth Unnamed #24				
Little Compton Unnamed #29	Portsmouth Unnamed #25				
Little Compton Unnamed #30	Portsmouth Unnamed #26				
Little Compton Unnamed #31	Portsmouth Unnamed #27				
Little Compton Unnamed #32	Portsmouth Unnamed #28				
Little Compton Unnamed #33	Portsmouth Unnamed #29				
Little Compton Unnamed #34	Portsmouth Unnamed #30				
Little Compton Unnamed #35	Portsmouth Unnamed #31				
Little Compton Unnamed #36	Portsmouth Unnamed #32				
Little Compton Unnamed #37	Portsmouth Unnamed #33				
Little Compton Unnamed #38	Portsmouth Unnamed #34				
Little Compton Unnamed #39	Portsmouth Unnamed #35				
Little Compton Unnamed #40	Portsmouth Unnamed #36				
Little Compton Unnamed #41	Portsmouth Unnamed #37				
Little Compton Unnamed #42	Portsmouth Unnamed #38				
Little Compton Unnamed #43	Portsmouth Unnamed #39				
Little Compton Unnamed #44	Portsmouth Unnamed #40				
Little Compton Unnamed #45	Portsmouth Unnamed #41				
Little Compton Unnamed #46	Portsmouth Unnamed #42				
Little Compton Unnamed #47	Portsmouth Unnamed #43				
Little Compton Unnamed #48	Portsmouth Unnamed #44				
Little Compton Unnamed #49	Portsmouth Unnamed #45				
Little Compton Unnamed #50	Portsmouth Unnamed #46				
Little Compton Unnamed #51	Portsmouth Unnamed #47				
Little Compton Unnamed #52	Portsmouth Unnamed #48				
Little Compton Unnamed #53	Portsmouth Unnamed #49				
Little Compton Unnamed #54	Portsmouth Unnamed #50				
Little Compton Unnamed #55	Portsmouth Unnamed #51				
Little Compton Unnamed #56	Portsmouth Unnamed #52				
Little Compton Unnamed #57	Portsmouth Unnamed #53				
Little Compton Unnamed #58	Portsmouth Unnamed #54				
Little Compton Unnamed #59	Portsmouth Unnamed #55				
Little Compton Unnamed #60	Portsmouth Unnamed #56				
Little Compton Unnamed #61	Portsmouth Unnamed #57				
Little Compton Unnamed #62	Portsmouth Unnamed #58				
Little Compton Unnamed #63	Portsmouth Unnamed #59				
Little Compton Unnamed #64	Portsmouth Unnamed #60				
Little Compton Unnamed #65	Portsmouth Unnamed #61				
Little Compton Unnamed #66	Portsmouth Unnamed #62				
Little Compton Unnamed #67	Portsmouth Unnamed #63				
Little Compton Unnamed #68	Portsmouth Unnamed #64				
Little Compton Unnamed #69	Portsmouth Unnamed #65				
Little Compton Unnamed #70	Portsmouth Unnamed #66				
Little Compton Unnamed #71	Portsmouth Unnamed #67				
Little Compton Unnamed #72	Portsmouth Unnamed #68				
Little Compton Unnamed #73	Portsmouth Unnamed #69				
Little Compton Unnamed #74	Portsmouth Unnamed #70				
Little Compton Unnamed #75	Portsmouth Unnamed #71				
Little Compton Unnamed #76	Portsmouth Unnamed #72				
Little Compton Unnamed #77	Portsmouth Unnamed #73				
Little Compton Unnamed #78	Portsmouth Unnamed #74				
Little Compton Unnamed #79	Portsmouth Unnamed #75				
Little Compton Unnamed #80	Portsmouth Unnamed #76				
Little Compton Unnamed #81	Portsmouth Unnamed #77				
Little Compton Unnamed #82	Portsmouth Unnamed #78				
Little Compton Unnamed #83	Portsmouth Unnamed #79				
Little Compton Unnamed #84	Portsmouth Unnamed #80				
Little Compton Unnamed #85	Portsmouth Unnamed #81				
Little Compton Unnamed #86	Portsmouth Unnamed #82				
Little Compton Unnamed #87	Portsmouth Unnamed #83				
Little Compton Unnamed #88	Portsmouth Unnamed #84				
Little Compton Unnamed #89	Portsmouth Unnamed #85				
Little Compton Unnamed #90	Portsmouth Unnamed #86				
Little Compton Unnamed #91	Portsmouth Unnamed #87				
Little Compton Unnamed #92	Portsmouth Unnamed #88				
Little Compton Unnamed #93	Portsmouth Unnamed #89				
Little Compton Unnamed #94	Portsmouth Unnamed #90				
Little Compton Unnamed #95	Portsmouth Unnamed #91				
Little Compton Unnamed #96	Portsmouth Unnamed #92				
Little Compton Unnamed #97	Portsmouth Unnamed #93				
Little Compton Unnamed #98	Portsmouth Unnamed #94				
Little Compton Unnamed #99	Portsmouth Unnamed #95				
Little Compton Unnamed #100	Portsmouth Unnamed #96				
Little Compton Unnamed #101	Portsmouth Unnamed #97				
Little Compton Unnamed #102	Portsmouth Unnamed #98				
Little Compton Unnamed #103	Portsmouth Unnamed #99				
Little Compton Unnamed #104	Portsmouth Unnamed #100				
Little Compton Unnamed #105	Portsmouth Unnamed #101				
Little Compton Unnamed #106	Portsmouth Unnamed #102				
Little Compton Unnamed #107	Portsmouth Unnamed #103				
Little Compton Unnamed #108	Portsmouth Unnamed #104				
Little Compton Unnamed #109	Portsmouth Unnamed #105				
Little Compton Unnamed #110	Portsmouth Unnamed #106				
Little Compton Unnamed #111	Portsmouth Unnamed #107				
Little Compton Unnamed #112	Portsmouth Unnamed #108				
Little Compton Unnamed #113	Portsmouth Unnamed #109				
Little Compton Unnamed #114	Portsmouth Unnamed #110				
Little Compton Unnamed #115	Portsmouth Unnamed #111				
Little Compton Unnamed #116	Portsmouth Unnamed #112				
Little Compton Unnamed #117	Portsmouth Unnamed #113				
Little Compton Unnamed #118	Portsmouth Unnamed #114				
Little Compton Unnamed #119	Portsmouth Unnamed #115				
Little Compton Unnamed #120	Portsmouth Unnamed #116				
Little Compton Unnamed #121	Portsmouth Unnamed #117				
Little Compton Unnamed #122	Portsmouth Unnamed #118				
Little Compton Unnamed #123	Portsmouth Unnamed #119				
Little Compton Unnamed #124	Portsmouth Unnamed #120				
Little Compton Unnamed #125	Portsmouth Unnamed #121				
Little Compton Unnamed #126	Portsmouth Unnamed #122				
Little Compton Unnamed #127	Portsmouth Unnamed #123				
Little Compton Unnamed #128	Portsmouth Unnamed #124				
Little Compton Unnamed #129	Portsmouth Unnamed #125				
Little Compton Unnamed #130	Portsmouth Unnamed #126				
Little Compton Unnamed #131	Portsmouth Unnamed #127				
Little Compton Unnamed #132	Portsmouth Unnamed #128				
Little Compton Unnamed #133	Portsmouth Unnamed #129				
Little Compton Unnamed #134	Portsmouth Unnamed #130				
Little Compton Unnamed #135	Portsmouth Unnamed #131				
Little Compton Unnamed #136	Portsmouth Unnamed #132				
Little Compton Unnamed #137	Portsmouth Unnamed #133				
Little Compton Unnamed #138	Portsmouth Unnamed #134				
Little Compton Unnamed #139	Portsmouth Unnamed #135				
Little Compton Unnamed #140	Portsmouth Unnamed #136				
Little Compton Unnamed #141	Portsmouth Unnamed #137				
Little Compton Unnamed #142	Portsmouth Unnamed #138				
Little Compton Unnamed #143	Portsmouth Unnamed #139				
Little Compton Unnamed #144	Portsmouth Unnamed #140				
Little Compton Unnamed #145	Portsmouth Unnamed #141				
Little Compton Unnamed #146	Portsmouth Unnamed #142				
Little Compton Unnamed #147	Portsmouth Unnamed #143				
Little Compton Unnamed #148	Portsmouth Unnamed #144				
Little Compton Unnamed #149	Portsmouth Unnamed #145				
Little Compton Unnamed #150	Portsmouth Unnamed #146				
Little Compton Unnamed #151	Portsmouth Unnamed #147				
Little Compton Unnamed #152	Portsmouth Unnamed #148				
Little Compton Unnamed #153	Portsmouth Unnamed #149				
Little Compton Unnamed #154	Portsmouth Unnamed #150				
Little Compton Unnamed #155	Portsmouth Unnamed #151				
Little Compton Unnamed #156	Portsmouth Unnamed #152				
Little Compton Unnamed #157	Portsmouth Unnamed #153				
Little Compton Unnamed #158	Portsmouth Unnamed #154				
Little Compton Unnamed #159	Portsmouth Unnamed #155				
Little Compton Unnamed #160	Portsmouth Unnamed #156				
Little Compton Unnamed #161	Portsmouth Unnamed #157				
Little Compton Unnamed #162	Portsmouth Unnamed #158				
Little Compton Unnamed #163	Portsmouth Unnamed #159				
Little Compton Unnamed #164	Portsmouth Unnamed #160				
Little Compton Unnamed #165	Portsmouth Unnamed #161				
Little Compton Unnamed #166	Portsmouth Unnamed #162				
Little Compton Unnamed #167	Portsmouth Unnamed #163				
Little Compton Unnamed #168	Portsmouth Unnamed #164				
Little Compton Unnamed #169	Portsmouth Unnamed #165				
Little Compton Unnamed #170	Portsmouth Unnamed #166				
Little Compton Unnamed #171	Portsmouth Unnamed #167				
Little Compton Unnamed #172	Portsmouth Unnamed #168				
Little Compton Unnamed #173	Portsmouth Unnamed #169				
Little Compton Unnamed #174	Portsmouth Unnamed #170				
Little Compton Unnamed #175	Portsmouth Unnamed #171				
Little Compton Unnamed #176	Portsmouth Unnamed #172				
Little Compton Unnamed #177	Portsmouth Unnamed #173				
Little Compton Unnamed #178	Portsmouth Unnamed #174				
Little Compton Unnamed #179	Portsmouth Unnamed #175				
Little Compton Unnamed #180	Portsmouth Unnamed #176				
Little Compton Unnamed #181	Portsmouth Unnamed #177				
Little Compton Unnamed #182	Portsmouth Unnamed #178				
Little Compton Unnamed #183	Portsmouth Unnamed #179				
Little Compton Unnamed #184	Portsmouth Unnamed #180				
Little Compton Unnamed #185	Portsmouth Unnamed #181				
Little Compton Unnamed #186	Portsmouth Unnamed #182				
Little Compton Unnamed #187	Portsmouth Unnamed #183				
Little Compton Unnamed #188	Portsmouth Unnamed #184				
Little Compton Unnamed #189	Portsmouth Unnamed #185				
Little Compton Unnamed #190	Portsmouth Unnamed #186				
Little Compton Unnamed #191	Portsmouth Unnamed #187				
Little Compton Unnamed #192	Portsmouth Unnamed #188				
Little Compton Unnamed #193	Portsmouth Unnamed #189				
Little Compton Unnamed #194	Portsmouth Unnamed #190				

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Washington County					
Andrea Hotel	3	1/mo	5	0%	0
Atlantic Beach Casino Resort	3	1/mo	7	0%	0
Atlantic Beach Park	3	1/mo	6	0%	0
Atlantic Pizza And Grill	3	1/mo	6	0%	0
Blue Shutters Beach	3	1/mo	14	7%	0
Bonnet Shores Beach Club	2	2/mo	23	4%	0
Breezeway Inn	2	1/mo	3	0%	0
Camp Fuller-YMCA Beach	2	2/mo	6	17%	3 (1)*
Camp Grosvenor	1	3/wk	29	10%	4 (2)*
Capt Roger Wheeler	1	1/wk	36	0%	0
Charlestown Breachway	3	1/mo	9	0%	0
Charlestown Town Beach	2	1/mo	14	0%	0
Dunes Club	3	2/mo	26	0%	0
Dunes Park	3	1/mo	7	0%	0
East Beach	3	1/mo	16	0%	0
East Matunuck State Beach	3	1/mo	9	0%	0
Fred Benson Town Beach	3	1/mo	6	0%	0
Galilee Beach Club Association	3	1/mo	3	0%	0
Greenhill	3	1/mo	3	0%	0
Jims Trailer Park	2	1/mo	7	0%	0
Matunuck Town Beach	3	1/mo	15	0%	0
Misquamicut Club	3	1/mo	16	0%	0
Misquamicut Fire District Beach	3	1/mo	12	0%	0
Misquamicut State Beach	1	2/mo	7	0%	0
Narragansett Town Beach	1	3/mo	22	0%	0
North Kingstown Town Beach	1	2 or 3/wk	70	0%	0
Ocean House	3	2/yr	7	0%	0
Paddy's Beach	3	1/mo	5	0%	0
Pleasant View Inn	3	1/mo	5	0%	0
Plum Beach Club	2	2/mo	11	0%	0
Roy Carpenter's Beach	3	1/mo	8	0%	0
Salty Brine Beach	3	1/mo	3	0%	0
Sam's Beach	3	1/mo	6	0%	0
Sandy Shore Motel	3	1/mo	5	0%	0
Scarborough State Beach North	1	2/wk	122	10%	2 (2)*
Scarborough State Beach South	1	2/wk	80	11%	2 (2)*
Seaside Beach Club	3	1/mo	7	0%	0
Surf Hotel	3	1/mo	2	0%	0
Watch Hill Carousel	2	1/mo	1	0%	0
Weekapaug Fire District	3	1/mo	28	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Washington County					
Westerly Town Beach-New	3	1/mo	7	0%	0
Westerly Town Beach-Old	3	1/mo	18	0%	0
Willow Dell Beach Club	3	1/mo	4	0%	0
Beaches in Washington County that were not monitored and that had no closing or advisory days in 2010:					
Ballards Inn	Green Hill Beach	North Kingstown	North Kingstown	North Kingstown	North Kingstown
Block Island Unnamed #1	Kelly Beach	Unnamed #3	Unnamed #3	Unnamed #13	Unnamed #13
Block Island Unnamed #2	Moonstone Beach	North Kingstown	North Kingstown	Quonochotaug Beach	Quonochotaug Beach
Block Island Unnamed #3	Napa Tree Point Beach	Unnamed #4	Unnamed #4	Saunderstown Yacht Club	Saunderstown Yacht Club
Block Island Unnamed #4	Narragansett Unnamed #1	North Kingstown	North Kingstown	South Kingstown	South Kingstown
Block Island Unnamed #5	Narragansett Unnamed #2	Unnamed #5	Unnamed #5	Unnamed #1	Unnamed #1
Block Island Unnamed #6	Narragansett Unnamed #3	North Kingstown	North Kingstown	South Kingstown	South Kingstown
Block Island Unnamed #7	Narragansett Unnamed #4	Unnamed #6	Unnamed #6	Unnamed #2	Unnamed #2
Block Island Unnamed #8	Narragansett Unnamed #5	North Kingstown	North Kingstown	South Kingstown	South Kingstown
Block Island Unnamed #9	Narragansett Unnamed #6	Unnamed #7	Unnamed #7	Unnamed #3	Unnamed #3
Block Island Unnamed #10	Narragansett Unnamed #7	North Kingstown	North Kingstown	South Kingstown	South Kingstown
Block Island Unnamed #11	Narragansett Unnamed #8	Unnamed #8	Unnamed #8	Unnamed #4	Unnamed #4
Block Island Unnamed #12	Narragansett Unnamed #9	North Kingstown	North Kingstown	South Kingstown	South Kingstown
Cafe Pasture Beach	Narragansett Unnamed #10	Unnamed #9	Unnamed #9	Trustom Beach	Trustom Beach
Charlestown Beach	Narragansett Unnamed #11	North Kingstown	North Kingstown	Westerly Unnamed #1	Westerly Unnamed #1
Charlestown Unnamed #1	North Kingstown	Unnamed #11	Unnamed #11	Westerly Unnamed #2	Westerly Unnamed #2
Charlestown Unnamed #2	Unnamed #1	North Kingstown	North Kingstown	Westerly Unnamed #3	Westerly Unnamed #3
Deep Hole Beach	North Kingstown	Unnamed #12	Unnamed #12	Westerly Unnamed #4	Westerly Unnamed #4
	Unnamed #2			Westquage Beach	Westquage Beach

*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 Rhode Island Department of Health. Beach Program 2010 Season Report. March 2010.

2 Amie Parris, Rhode Island Department of Health. Personal communication. June 2011.

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



SOUTH CAROLINA

9th in Beachwater Quality

5% 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.

There are 63 beaches in South Carolina lining 180 miles of Atlantic coastline (102 miles on the mainland coast and 78 miles on islands without bridges from the mainland barrier islands, or on sandbars). The state's beachwater quality monitoring program is administered by the Department of Health and Environmental Control (DHEC).

Some of South Carolina's Grand Strand communities have constructed stormwater outfalls that discharge deep into the ocean instead of at the beach in order to reduce beach erosion and improve water quality for swimmers. These projects, which cost millions of dollars per ocean

outfall, have created a significant improvement in beachwater quality where they have been implemented. For example, the beach outfall at 7th Avenue South in North Myrtle Beach was converted to a deep ocean outfall in 2006. The percent of samples exceeding the standard for this portion of North Myrtle Beach dropped from an average of 34% between 2002 and 2005 to an average of 2% from 2006 to 2010. A similar effect was seen when Myrtle Beach converted the beach outfall for Deep Head Swash to an ocean outfall: the percent of samples exceeding the standard at this portion of Myrtle Beach dropped from an average of 34% between 2002 and 2005 to an average of 7% from 2006 to 2010.¹ At this time, Myrtle Beach is working on an additional ocean outfall that will be located at 4th Avenue North. When this project is complete, nine existing outfall pipes that currently discharge at the beach will be combined into one pipe underneath the seabed that discharges more than 1,000 feet into the Atlantic Ocean.² NRDC encourages coastal communities to explore solutions that prevent stormwater pollution before it occurs. The high cost of deep ocean outfalls as a solution to beach erosion and beachwater quality problems illustrates the importance of reducing stormwater runoff by implementing green infrastructure wherever possible. In addition to improving beachwater quality, green infrastructure does not transfer pollution to the ocean and has significant other benefits.

In August 2010, heavy rain that fell during Tropical Storm Colin, along with a higher-than-normal high tide, may have contributed to an unusual number of water quality exceedances off the beach on the south shore of Edisto Island. A second round of water quality exceedances occurred at Edisto Island in late September, during heavy rains caused by Tropical Storm Nicole. A sampling study of Big Bay Creek will be conducted in 2011 to try to identify the source of the contamination and to determine whether Edisto Island's monitoring tier status should be changed.²

Tropical Storm Nicole caused flooding in Horry County as well, after which many beachwater quality sample exceedances were observed. For example, along with heavy rainfall, two-thirds of samples taken by Coastal Carolina University for the City of Myrtle Beach on September 28 exceeded the single-sample maximum standard.²

KEY FINDINGS IN SOUTH CAROLINA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Myrtle Beach State Park and Campgrounds (15%) in Horry County
- Surfside Beach (11%) in Horry County
- Myrtle Beach (8%) in Horry County

Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

- 4 (100%) other unspecified sources

© SHANNON BERRY



Converting Deep Head Swash's stormwater outfall to a deep-ocean outfall in Myrtle Beach in 2006.

Myrtle Beach (8%), and Briarcliffe Acres Beach (6%) in Horry County; Edisto Island in Colleton County (5%); and Sullivans Island in Charleston County (5%). Horry County had the highest exceedance rate (7%) in 2010, followed by Colleton (5%), Beaufort (2%), and Charleston (1%) counties. There were no exceedances in Georgetown County.

Sampling Practices: The monitoring season in South Carolina runs from May 15 to October 15. DHEC determines monitoring locations, sampling practices, standards, and notification protocols, which are uniform throughout the state. Samples are taken 12 inches below the surface in water that is 20 to 40 inches deep. A sanitary survey is conducted every time a beach is sampled. In South Carolina, beaches are prioritized for inclusion in the monitoring program on the basis of level of use, water quality history, and other applicable factors. Most of the highest-priority (Tier 1) beaches have stormwater outfalls.²

Sampling is deliberately conducted at swashes and outfalls, where water quality is expected to be at its poorest. Portions of beaches whose water quality has fallen below standards are sampled daily. States that monitor more frequently after an exceedance is found or after heavy rain will tend to have higher percent exceedance rates and lower total advisory days than they would if their sampling schedule did not increase after an exceedance was found or after heavy rainfall.³

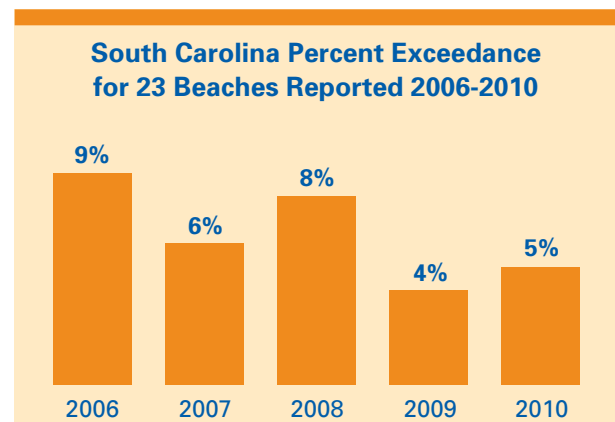
In addition to DHEC monitoring, the City of Myrtle Beach uses Coastal Carolina University to conduct year-round sampling at the sites in Myrtle Beach. Thus, during the state's monitoring season, these sites are monitored twice a week. Also, during the monitoring season, the County Park on Isle of Palms samples twice per month in addition to DHEC's twice a month monitoring schedule, so one of the 9 monitoring stations at this beach is monitored once a month.³

Advisories

Total advisory days for 2 events lasting six consecutive weeks or less decreased 92% to 4 days in 2010, from 48 days in 2009. For prior years, there were 36 days in 2008, 108 days in 2007, 684 days in 2006, and 592 days in 2005. 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 2 events lasting six consecutive weeks or less, 100% (4) of advisory days in 2010 were due to monitoring that revealed elevated bacteria levels.

Monitoring Results

In 2010, South Carolina reported 63 coastal beaches. Of these, 1 (2%) was monitored more than once a week, 6 (10%) were monitored once a week, 16 (25%) were monitored every other week, and 40 (63%) 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, 5% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Myrtle Beach State Park and Campgrounds (15%), Surfside Beach (11%),



Standards and Procedures: The beachwater quality monitoring program has the authority to issue advisories but not closings; in South Carolina, only elected officials can close a beach. South Carolina applies a single-sample maximum standard for enterococcus of 104 cfu/100 ml. Advisories are not issued in South Carolina on the basis of the geometric mean of five samples during a 30-day period.

DHEC issues an advisory immediately when the enterococcus level reaches 500 cfu/100 ml. If the bacteria level is above 104 cfu/100 ml but below 500 cfu/100 ml, an additional sample is collected. If the second sample is also above 104 cfu/100 ml, the department issues an advisory. Advisories include the area of the beach that is within 200 feet on either side of the monitoring station where the exceedance occurred.

A rain model is used for posting preemptive advisories at Horry County's Tier 1 beaches. Sampling results have indicated that use of the model may be resulting in the issuance of advisories that are not necessary, and work to improve the accuracy of the model is under way.¹ Most pipe outfalls and swashes in Horry County are under permanent rainfall advisory, with permanent signs posted. These signs advise the public against swimming in the area of the stormwater outfall.

South Carolina 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Beaufort County					
Fripp Island	2	2/mo	50	0%	0
Harbor Island	2	2/mo	31	3%	0
Hilton Head Island	2	2/mo	143	2%	0
Hunting Island	2	2/mo	61	2%	0
Beaches in Beaufort County that were not monitored and that had no closing or advisory days in 2010:					
Bay Pointe–North end	Dafuskie Island–	Lands End–North end	The Sands at Port Royal–	across from landing The Sands at Port Royal– beach area Trenchards Inlet (Bull Point)	
Bay Pointe–South end	North east end of island	Lands End–South end			
Beaufort River Sandbar	Hunting Island and Fripp Island Sandbar	May River Sandbar			
Charleston County					
Folly Beach	2	2/mo	96	0%	0
Isle of Palms	2	4/mo*	117	0%	0
Kiawah Island	2	2/mo	60	0%	0
Seabrook Island	2	2/mo	24	0%	0
Sullivans Island	2	2/mo	38	5%	0
Beaches in Charleston County that were not monitored and that had no closing or advisory days in 2010:					
Bird Key	Capers Inlet–South end	Deweese Island–South end	Prices Inlet		
Botany Bay	Capers Island	Kiawah–North end	Privateer Point		
Cape Romain–Key Inlet	Capers Island–North end	Lighthouse Inlet–Morris	Raccoon Key		
Capers Inlet–	Deveaux Banks–North side	Island South end	Stono River–		
North end Deweese Island	Deweese Inlet–North end of	Morris Island–	Limehouse sandbar		
	Isle of Palms	sandbar on North end	Stono River–Wolf Island		
Colleton County					
Edisto Island	2	2/mo	148	5%	4
Beaches in Colleton County that were not monitored and that had no closing or advisory days in 2010:					
Otter Island					

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Georgetown County					
Debordieu Beach	2	2/mo	20	0%	0
Garden City Beach	2	2/mo	10	0%	0
Georgetown County					
Huntington Beach State Park	2	2/mo	20	0%	0
Litchfield Beach	2	2/mo	30	0%	0
Pawleys Island Beach	2	2/mo	30	0%	0
Beaches in Georgetown County that were not monitored and that had no closing or advisory days in 2010:					
Debordieu–South end	North Island–North end	North Santee River–	South Island–North end		
Murrells Inlet–North side	North Island–South end	South end of South Island	South Santee River–		
Murrells Inlet–South side		Sandbar off shore of South end of Cedar Island	South end of Cedar Island		
Horry County					
Arcadia Beach	1	1/wk	92	3%	0
Briarcliffe Acres Beach	1	1/wk	68	6%	0
Garden City Beach	2	2/mo	46	0%	0
Myrtle Beach	1	2/wk	888	8%	0
Myrtle Beach State Park and Campgrounds	1	1/wk	92	15%	0
North Myrtle Beach	1	1/wk	232	1%	0
Springmaid Beach	1	1/wk	23	4%	0
Surfside Beach	1	1/wk	162	11%	0
Beaches in Horry County that were not monitored and that had no closing or advisory days in 2010:					
Little River Inlet–North side	Little River Inlet–South side				

NOTES

- 1 Shannon Berry, South Carolina Department of Health and Environmental Control. Personal communication. April 2011.
- 2 South Carolina Department of Health and Environmental Control. 2010 ocean water quality sampling and advisory data report for U.S. EPA Region IV. November 2010.
- 3 Shannon Berry, South Carolina Department of Health and Environmental Control. Personal communication. March 2011.

* One station at this beach (TRI-054B) is monitored 4/mo.

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



TEXAS

17th in Beachwater Quality

8% 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.

Texas has 169 public beaches. Out of approximately 2,500 miles of coastal, bay, and estuarine shoreline in Texas, 324 miles are subject to the BEACH Act. The Texas General Land Office (GLO) administers the Texas Beach Watch Program.

Texas experienced a much higher rate of beachwater quality exceedances in 2010 than in 2009. This is due in large part to the flooding that occurred along the Rio Grande River and in Mexico as a result of Hurricane Alex and Tropical Depression #2. The mouth of the Rio Grande River is located at Boca Chica Beach in Cameron County. The flooding increased the bacteria levels on Boca Chica Beach and South Padre Island beaches for a period of several days.¹

Beachwater at Cole Park and Ropes Park along Corpus Christi Bay is monitored at six sites through the Texas Beach Watch Program. These sites have a history of exceeding the water quality standard. These parks have stormwater outfalls and are located in a residential area of the city of Corpus Christi, and the potential for human contamination is high. In 2010, water samples from the monitoring stations at Ropes Park and Cole Park were analyzed using the polymerase chain reaction (PCR) method to detect the *esp* marker as an indicator of human contamination. The results of this preliminary study suggest there is some human contribution to the fecal contamination at these two parks, and investigations are continuing.¹

In 2010 Nueces County had nearly 50% of the state's closings and advisories. Texas's Coastal Management Program has awarded a grant to Texas A&M University–Corpus Christi to develop and conduct a sanitary survey for Nueces and Aransas counties. The grant begins October 1, 2011.²

In 2011, the Texas Beach Watch Program added two testing locations at Sylvan Beach Park. Sylvan Beach Park is located on Galveston Bay in the city of La Porte in Harris County.

Monitoring Results

In 2010, Texas reported 169 coastal beaches. Of these, 65 (38%) were monitored once a week, and 104 (62%) 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 values, including duplicate samples and samples taken outside the official beach season, if any). In 2010, 8% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches with the highest percent exceedance in 2010 were Palacios–Palacios Pavilion in Matagorda County (34%); Ropes Park (33%), Cole Park (29%), and Poenisch Park (22%) in Nueces County; Boca Chica State Park in Cameron County (20%); and Texas City Dike in

KEY FINDINGS IN TEXAS

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Palacios–Palacios Pavilion in Matagorda County (34%)
- Ropes Park in Nueces County (33%)
- Cole Park in Nueces County (29%)

Reported Sources of Beachwater Contamination

Statewide (number of closing/advisory days)

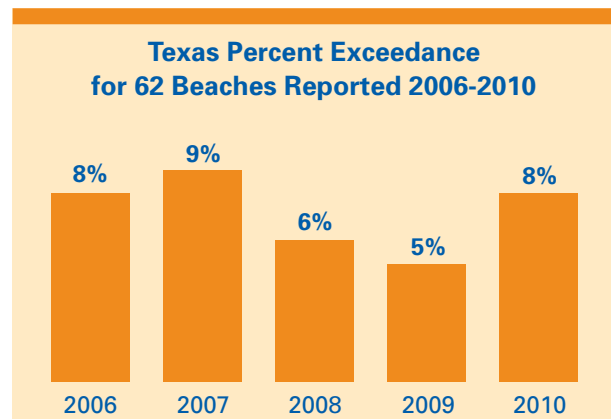
- 436 (62%) unknown sources
- 222 (32%) stormwater
- 38 (5%) other, unspecified sources
- 5 (1%) wildlife
- 2 (<1%) sewage

Galveston County (20%). Matagorda County had the highest exceedance rate (20%) in 2010, followed by San Patricio (13%), Nueces (11%), Aransas (11%), Kleberg (10%), Cameron (8%), Brazoria (5%), Galveston (4%), and Jefferson (1%) counties. Beaches in Calhoun, Chambers, Harris, Refugio, and Willacy counties were not monitored.

Sampling Practices: Beaches are monitored year-round, with more frequent monitoring from May to September for all monitored beaches and during the month of March to coincide with spring break at Gulf of Mexico beaches.³

The GLO determines sampling practices and locations, and recommends that local government and health departments issue beach advisories when the bacterial standard is exceeded. Samples are generally collected about one foot below the surface in water that is knee deep in an area where people are engaging in recreational activity. If the majority of recreational activity occurs at a depth significantly different than two feet, then samples can be collected at the location of greatest swimmer activity. Also, if the two-foot sampling depth is more than 50 meters from shore, samples can be collected at the location of greatest swimmer activity. Recreational beach segments used most frequently by the public and where health risks are the greatest are given priority for monitoring.

If a sample exceeds standards, monitoring is conducted daily until standards are met. States that monitor more frequently after an exceedance is found will tend to have higher percent exceedance rates and lower total closing/advisory days than they would if their sampling schedule did not alter after an exceedance was found.



Closings and Advisories

Total closing/advisory days for 508 events lasting six consecutive weeks or less tripled to 704 days in 2010, from 231 days in 2009. For prior years, there were 318 days in 2008, 532 days in 2007, 473 days in 2006, and 420 days in 2005. 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 508 events lasting six consecutive weeks or less, all closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels.

Standards and Procedures: The GLO applies an enterococcus single-sample maximum of 104 cfu/100ml when deciding whether to recommend advisories. In 2010, two samples were taken simultaneously at each location and the results were averaged before comparing with the standard.² No geometric mean standard for five samples taken over a 30-day period is applied. Beginning in 2011, one sample per station is being collected.

V. vulnificus causes a bacterial infection that may be contracted by eating contaminated seafood, especially oysters. The bacteria can also enter the body through open wounds when a bather is swimming or wading in tainted waters. Symptoms of infection include vomiting, diarrhea, abdominal pain, and a blistering dermatitis. The Texas Department of Health tests regularly for *V. vulnificus* in Galveston Bay as it is a primary health consideration to oyster consumption and harvesting as well as skin contact.

Texas does not have preemptive rainfall standards. In the case of a known sewage spill, the decision to issue a preemptive closing or advisory is made by local government.²

Texas 2010 Monitoring Results and Closing or Advisory Days

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Aransas County					
Rockport Beach Park	1	1/wk	332	11%	15
Beaches in Aransas County that were not monitored and that had no closing or advisory days in 2010:					
12th Street Copano Bay Bridge	Copano Bay State Fishing Pier Copano Causeway–North	Copano Causeway–South Goose Island State Park	Highway 188 at Port Bay North Highway 188 at Port Bay South		
Brazoria County					
Bryan Beach	1	1/wk	102	5%	2
Follets Island	1	1/wk	418	6%	14
Quintana	1	1/wk	181	8%	6
Surfside	1	1/wk	641	3%	9
Beaches in Brazoria County that were not monitored and that had no closing or advisory days in 2010:					
County Road 257A	Peach Point WMA San Luis Park	Seidler’s Landing Southwest Brazoria	Swan Lake		
Calhoun County					
Beaches in Brazoria County that were not monitored and that had no closing or advisory days in 2010:					
Bauer Road Bayfront Park Boggy Bayou Row Indianola Beach King Fisher Park	Lighthouse Beach and Bird Sanctuary Magnolia Beach Park Matagorda Island State Park–Backside 1 Matagorda Island State Park–Backside 2	Matagorda Island State Park–Backside 3 Matagorda Island State Park–Backside 4 Matagorda Island State Park–Gulf	Olivia Haterius Park Point Comfort City Park Port Alto Public Park Six Mile Road State Highway 35 Swan Point Park		
Cameron County					
Boca Chica State Park	1	1/wk	586	20%	101
South Padre Island (Town of South Padre Island)	1	1/wk	723	2%	56
Access Point #3	1	1/wk	85	5%	8
Access Point #4	1	1/wk	76	3%	8
Andy Bowie Park	1	1/wk	152	1%	0
Atwood Park	1	1/wk	171	9%	27
Isla Blanca Park	1	1/wk	152	3%	14
Park Road 100 Bay Access #2	1	1/wk	84	7%	2
South Padre Island Access Point #6	1	1/wk	163	3%	16
Beaches in Cameron County that were not monitored and that had no closing or advisory days in 2010:					
North Cameron County– Bayside	Park Road 100 Bay Access #1	South Padre Island–North			
Chambers County					
Beaches in Chambers County that were not monitored and that had no closing or advisory days in 2010:					
Chambers County	McCollum Park				

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Galveston County					
25th Street	1	1/wk	365	6%	11
45th Street	1	1/wk	494	7%	19
61st Street	1	1/wk	290	8%	11
Appfel Park	1	1/wk	160	5%	4
Clara Street	1	1/wk	312	3%	4
Crystal Beach–O’Neill Road	1	1/wk	80	5%	2
Dellanera Park	1	1/wk	152	0%	0
Galveston Island State Park	1	1/wk	152	0%	0
Galveston Island State Park Backside	1	1/wk	78	5%	2
Gulf Shores	1	1/wk	158	4%	3
Indian Beach	1	1/wk	76	0%	0
Pirates Beach	1	1/wk	344	1%	1
Port Bolivar–Rettilon Road	1	1/wk	78	8%	6
Rollover Pass East	1	1/wk	259	0%	0
Rollover Pass West	1	1/wk	76	3%	1
San Luis Pass	1	1/wk	156	3%	2
Seadrift	1	1/wk	78	3%	1
Spanish Grant/Bermuda Beach	1	1/wk	228	0%	0
Stewart Beach	1	1/wk	246	8%	9
Texas City Dike	1	1/wk	20	20%	2
West End	1	1/wk	197	3%	3
West End Galveston–Jamaica Beach	1	1/wk	78	3%	1
West End Galveston–Sea Isle	1	1/wk	154	2%	1
Beaches in Galveston County that were not monitored and that had no closing or advisory days in 2010:					
Caplen	Erman Pilsner Boat Ramp	Gilchrist West	High Island West		
Caplen/Crystal Beach	Frank Carmona Beach	Haney Park	Holiday		
East Beach	Gilchrist East	High Island East	Skyline Drive		
			Skyline Park		
Harris County					
Beaches in Harris County that were not monitored and that had no closing or advisory days in 2010:					
Bayland Park	Evergreen Road	Miramar Street	River Terrace Park		
Clear Lake Park	Lynchburg Row	Pine Gully Park	Sylvan Beach Park		
Jefferson County					
McFaddin National Wildlife Refuge	1	1/wk	481	1%	1
Sea Rim State Park	1	1/wk	228	0%	1
Kleberg County					
Kaufer–Hubert #1	2	1/wk	97	14%	8
Kaufer–Hubert #2	2	1/wk	101	8%	3
Kaufer–Hubert #3	2	1/wk	92	7%	2
Riviera Beach Pier	3	1/wk	87	9%	4

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Kleberg County					
Beaches in Kleberg County that were not monitored and that had no closing or advisory days in 2010:					
CR 1140 North		CR 1140 South		North Padre Island	
Matagorda County					
Jetty Park	1	1/wk	384	10%	18
Palacios–Palacios Pavilion	1	1/wk	278	34%	37
Sargent Beach	1	1/wk	337	18%	34
Beaches in Matagorda County that were not monitored and that had no closing or advisory days in 2010:					
East Bay		East Sargent Beach		Foley Reserve Park	Lookout Point
East Matagorda Peninsula		Farm Road 1095		Jenson's Point	Oyster Lake Road South Bay Boat Ramp
Nueces County					
Cole Park	1	1/wk	403	29%	60
Corpus Christi Beach–Main	1	1/wk	337	11%	20
Corpus Christi Marina	1	1/wk	267	16%	21
Emerald Beach	1	1/wk	85	14%	6
JFK Causeway–Southwest	1	1/wk	91	18%	8
J.P. Luby Park	1	1/wk	318	2%	2
Laguna Shores	1	1/wk	84	10%	3
Lighthouse Lakes Kayak Trail #1	1	1/wk	26	0%	0
McGee Beach	1	1/wk	164	13%	21
Mustang Island	1	1/wk	80	0%	0
Mustang Island State Park	1	1/wk	399	1%	0
Packery Channel Park	1	1/wk	81	4%	1
Padre Bali Park	1	1/wk	661	5%	19
Poenisch Park	1	1/wk	93	22%	17
Port Aransas–South	1	1/wk	167	2%	2
Port Aransas Park	1	1/wk	338	4%	6
Ropes Park	1	1/wk	217	33%	37
University Beach	1	1/wk	90	19%	7
Beaches in Nueces County that were not monitored and that had no closing or advisory days in 2010:					
Corpus Christi Beach–North		JFK Causeway–Southeast		Port Aransas–Jetty	SH 361 ROW–Southeast
Corpus Christi Beach–South		Mustang Island State Park–Backside		Port Street	SH 361 ROW–Southwest
Doddridge Park				Redhead Pond Wildlife Management Area	SPI Drive–Northeast
Hans and Pat Sutter Wildlife Refuge		Ocean Drive–East		Roberts Point Park	SPI Drive–Northwest
JFK Causeway–Northeast		Ocean Drive–West			SPI Drive–Southeast
JFK Causeway–Northwest		Palmetto Park		SH 361 ROW–Northeast	SPI Drive–Southwest
		Philip Dimitt Municipal Fishing Pier		SH 361 ROW–Northwest	Swantner Park
Refugio County					
Beaches in Refugio County that were not monitored and that had no closing or advisory days in 2010:					
Texas Parks and Wildlife Department Boat Ramp–Refugio					

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
San Patricio County					
Nueces Bay Causeway #3	3	1/wk	86	13%	5
Beaches in San Patricio County that were not monitored and that had no closing or advisory days in 2010:					
Highway 1069 Right-of-Way	Indian Point Park	Nueces Bay Causeway #1	Nueces Bay Causeway #2	Nueces Bay Causeway #4	
Willacy County					
Beaches in Willacy County that were not monitored and that had no closing or advisory days in 2010:					
Fred Stone Park	Mansfield Cut/County Line	Placement Area #8			

NOTES

- 1 Craig Davis, Texas General Land Office, personal communication, May 2011.
- 2 Coastal Coordination Council. Detection of human fecal contamination in Corpus Christi Bay: final summary report of results. Not dated.
- 3 Craig Davis, Texas General Land Office, personal communication, April 2011.

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



VIRGINIA

12th in Beachwater Quality

5% 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.

Virginia has 48 public beaches stretching along 70 miles of Atlantic and Chesapeake Bay waters. The state’s beachwater quality monitoring program is administered by the Virginia Department of Health (VDH).

The stormwater outfall at Fairview Beach in King George County was identified as the main source of elevated bacterial counts in its beachwater in both dry and wet weather. VDH and local officials located several apartments, homes, and trailers on old septic systems and moved them to the community sewer system,¹ reducing the fraction of samples exceeding bacteria standards from an average of 36% between 2006 and 2008 to 25% in 2009 and 2010. VDH conducted microbial source

tracking at Fairview Beach in 2010, revealing that remaining sources of fecal contamination include birds, dogs, wildlife, and humans. Additionally, VDH investigated the relationship between indicator bacteria and pathogenic bacteria (*Shigella* spp.) in sediments.² Final results of the 2010 studies will be reported soon.

KEY FINDINGS IN VIRGINIA

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Festival Beach in Mathews County (38%)
- Hilton Beach in the Independent City of Newport News (32%)
- King/Lincoln Park in the Independent City of Newport News (28%)

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

- 81 (100%) unknown sources

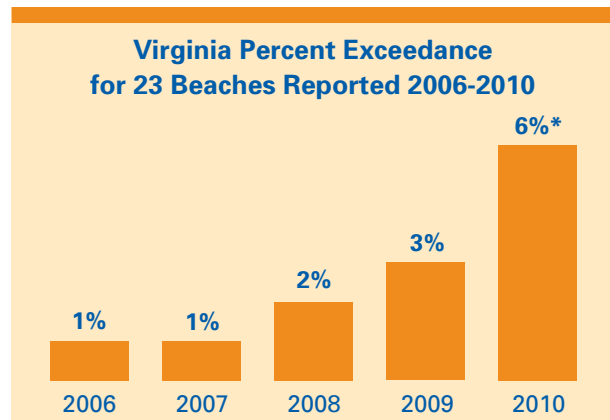
Monitoring Results

In 2010, Virginia reported 48 coastal beaches. Of these, 45 (94%) were monitored once a week and 3 (6%) 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. In 2010, 5%* of all reported beach monitoring samples exceeded the state’s daily maximum bacterial standards. The beaches with the highest percent exceedance rates in 2010 were Festival Beach in Mathews County (38%), Hilton Beach (32%) and King/Lincoln Park (28%) in the Independent City of Newport News, Fairview Beach in King George County (25%), Chick’s Beach (13%) and Lesner Bridge East (13%) in the Independent City of Virginia Beach, and Anderson’s Beach in the Independent City of Newport News (13%). Mathews County had the highest exceedance rate (38%) in 2010, followed by King George County (25%), the Independent City of Newport News (22%), the Independent City of Virginia Beach (3%), the Independent City of Hampton (2%), and the Independent City of Norfolk (1%). There were no exceedances in Accomack, Gloucester, Northampton, or York counties.

Sampling Practices: The monitoring season runs from mid-May through Labor Day, with some sites sampled through mid-September. In 2010, sampling at Gloucester Beach in Gloucester County and Festival Beach in Mathews County began on June 1.²

VDH determines sampling practices, locations, standards, and notification protocols and practices throughout the state. Samples are collected in water 0.5 meters deep, 0.3 meters from the surface.³

Sampling sites in Virginia are chosen on the basis of proximity to wastewater outfalls, bather load, and ease of access to the beach.³ If a beach is placed under advisory or closed, the water is resampled immediately (with a duplicate sample sent for microbial source tracking analysis). The monitoring frequency is increased until the water meets water quality standards, after which the beach is reopened.² States that monitor more frequently after an exceedance is found will tend to have higher percent exceedance rates and lower total closing/advisory days than they would have if their sampling frequency did not increase after an exceedance.



The Virginia Department of Environmental Quality and VDH, including the Virginia Division of Shellfish Sanitation, work together to regularly monitor the water and shellfish growing areas for the presence of harmful algal blooms and to conduct surveillance for human health effects.⁴

Closings and Advisories

Total closing/advisory days for 38 events lasting six consecutive weeks or less increased 59% to 81 days in 2010, from 51 days in 2009. For prior years, there were 29 days in 2008, 50 days in 2007, 43 days in 2006, and 42 days in 2005. 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. All closing and advisory days in 2010 were due to monitoring that revealed elevated bacteria levels.

Standards and Procedures: The VDH has the authority to issue advisories and close beaches. Virginia's water quality standard is a single-sample maximum of 104 cfu/100 ml. No geometric-mean standard is applied when making closing and advisory decisions. If more than one sampling site at a beach exists, the average of the results for all sampling sites is used to make closing and advisory decisions for that beach.² If a sample (or average of samples) exceeds the standard, an advisory is issued.² There is no protocol for delaying or forgoing an advisory or closing when an exceedance is found.

There are no preemptive rainfall standards, but closings and advisories may be considered on the basis of events such as harmful algal blooms, fish kills, oil spills, or sewage spills.³

* 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 (6%) did not have the same value as the percent exceedance for all of the beaches monitored in 2010 (5%).

Virginia 2010 Monitoring Results and Closing or Advisory Days					
Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Accomack County					
Assateague Island National Seashore	1	none	0	NA	0
Guard Shore	1	1/wk	17	0%	0
Gloucester County					
Gloucester Point Beach	1	1/wk	18	0%	0
Hampton County					
Buckroe Beach	1	1/wk	17	6%	1
Fort Monroe	1	1/wk	16	0%	0
Salt Ponds	1	1/wk	16	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
King George County					
Fairview Beach	1	1/wk	20	25%	18
Mathews County					
Festival Beach	1	1/wk	26	38%	10
Newport News County					
Anderson's Beach	1	1/wk	16	13%	6
Hilton Beach	1	1/wk	22	32%	8
Huntington Beach	1	1/wk	17	12%	6
King/Lincoln Park	1	1/wk	18	28%	10
Norfolk County					
10th View, Behind Quality Inn, 1010 West Ocean View Avenue	1	1/wk	16	0%	0
13th View, North End	1	1/wk	15	0%	0
21st Bay Street, North End Behind Ships Captain Restaurant	1	1/wk	15	0%	0
5th Bay Street, North End	1	1/wk	16	0%	0
Capeview Avenue, North End	1	1/wk	16	6%	9
East Community Beach, End of East Ocean View Avenue	1	1/wk	16	0%	0
North Community Beach	1	1/wk	16	0%	0
Ocean View Park, East Side of Parking Lot	1	1/wk	16	0%	0
Sara Constance Park, East End	1	1/wk	16	0%	0
Norrtampton County					
Kiptopeke State Park	1	1/wk	17	0%	0
Town Of Cape Charles Public Beach	1	1/wk	17	0%	0
Virginia Beach County					
15th Street	1	1/wk	21	5%	1
28th Street	1	1/wk	20	0%	0
45th Street	1	1/wk	20	0%	0
63rd Street	1	1/wk	19	0%	0
78th Street	1	1/wk	20	0%	0
Back Bay Beach	1	1/wk	20	0%	0
Camp Pendleton	1	1/wk	20	0%	0
Cape Henry Lighthouse	1	none	0	NA	0
Chesapeake Beach	1	1/wk	21	5%	1
Chick's Beach	1	1/wk	23	13%	3
Croatan	1	1/wk	20	0%	0
Dam Neck Middle	1	1/wk	13	8%	2
Dam Neck North	1	1/wk	12	0%	0
Dam Neck South	1	1/wk	12	0%	0
First Landing State Park	1	1/wk	21	5%	1

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Virginia Beach County					
Fort Story East	1	none	0	NA	0
Fort Story South	1	1/wk	22	5%	1
Fort Story West	1	1/wk	20	0%	0
Lesner Bridge East	1	1/wk	23	13%	3
Little Island Beach North	1	1/wk	20	0%	0
Little Island Beach South	1	1/wk	20	0%	0
Sandbridge North	1	1/wk	20	0%	0
Sandbridge South	1	1/wk	20	0%	0
Sea Gate	1	1/wk	20	5%	1
York County					
Yorktown Beach	1	1/wk	15	0%	0

NOTES

- 1 Virginia Department of Health. Virginia's Beaches Environmental Assessment and Coastal Health (BEACH) Program, Final Report on 2001–2009 EPA Beach Monitoring Grant–CU-98389606-0. January 29, 2010.
- 2 Virginia Department of Health. Virginia's Beaches Environmental Assessment and Coastal Health (BEACH) Program, Final Report on 2001–2010 EPA Beach Monitoring Grant–CU-98389607-0. February 28, 2011.
- 3 Dan Dietrich, Virginia Department of Health. Personal communication. June 2007.
- 4 Virginia Department of Health. "Harmful Algal Blooms and Other Organisms of Concern in Coastal Waters" (brochure). Not dated.

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



WASHINGTON

14th in Beachwater Quality

6% 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.

Washington State has more than 1,300 publicly accessible beaches along the Pacific Ocean and Puget Sound. The state's beach monitoring program is administered by the Washington State Department of Ecology and Department of Health.

In 2010, experts from Washington's Beach Environmental Assessment, Communication and Health (BEACH) Program worked with those from the state's Shellfish Program to develop shoreline survey forms and protocols designed to improve the information gathered about potential sources of beachwater pollution. The program conducted shoreline surveys at 10 beaches. These surveys have identified potential sources of contamination and provided information needed for designing special studies and for prioritizing beaches for monitoring.¹

Representatives of Washington's BEACH Program are striving to educate municipal sewage treatment plant operators about the importance of notifying them in a timely manner when there is a spill. Most sewage plant permits, but not all, require facility operators to contact Washington's Shellfish Program when there is a spill. The Shellfish Program typically notifies the BEACH Program when it hears of a spill, but the Shellfish Program is not always notified of a spill even when sewage treatment plant permits require it. For example, in early July 2010, the Blaine Wastewater Treatment Plant's chlorinating process malfunctioned, and sewage that was not properly disinfected was discharged. The Shellfish Program and BEACH Program were not notified for eight days. By the time the spill was reported, the plant was functioning properly, and Whatcom County decided not to issue an advisory.¹ At the beginning of August, BEACH was notified that the plant's disinfection process was failing again, and Semiahmoo County Park Beach was posted until repairs were made.² After working with BEACH, permitting entities have agreed that as permits are renewed, all wastewater treatment facility operators will be required to immediately notify the local health jurisdiction when there is a sewage spill and the Shellfish Program when there is a spill into marine waters.¹

Washington's BEACH Program is working to discover the cause of persistent high bacteria counts in late summer at the northern end of Larrabee State Park in Whatcom County. Vacation homes, a wastewater treatment outfall, and a sewage lift station have been ruled out as the cause of the contamination. The affected portion of the beach has deep wrack (piles of kelp and eel grass that accumulate at the high-tide line). Fecal indicator bacteria deposited in beach wrack tend to survive much longer than they normally would survive on a beach because the wrack provides shelter and a food source. Washington's BEACH Program completed some investigative sampling of the beach wrack, marine water, and freshwater streams at the beginning of November 2010, and further sampling is planned for July and August 2011.¹

KEY FINDINGS IN WASHINGTON

Beachwater Contamination

(% of samples exceeding state standards in 2010)

- Oak Harbor City Beach Park in Island County (26%)
- Freeland County Park/Holmes Harbor in Island County (24%)
- Larrabee State Park, Wildcat Cove in Whatcom County (23%)
- Pomeroy Park–Manchester Beach in Kitsap County (19%)

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

- 88 (67%) sewage spills/leaks
- 32 (24%) unknown sources of contamination
- 9 (7%) diesel oil spill
- 2 (2%) stormwater



© JESSICA ARCHER

Bottom sign warns about potential sewage overflows at Hollywood Beach.

monitoring results, the beach met state bacteria standards for 95% of the samples taken in 2010.

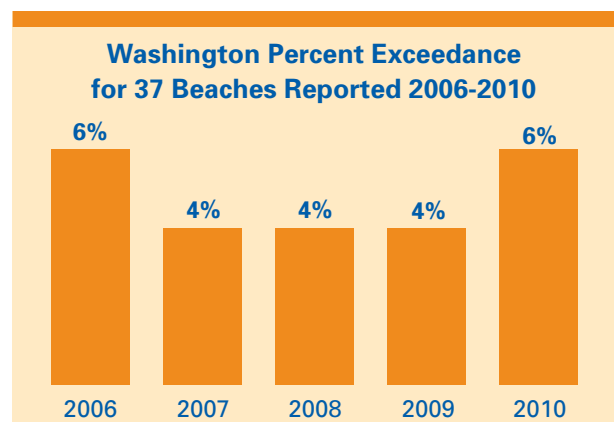
Combined sewage overflows (CSOs) occur up to 50 times in a typical year near Hollywood Beach in Port Angeles, Clallam County. CSOs discharge a combination of stormwater and untreated sewage into water bodies. In 2009 this beach was the only one in Washington whose water exceeded the chronic contamination standard for beachwater quality and it had the 9th highest seasonal geometric mean value for enterococcus density of beaches in the state in 2010. A small CSO notification sign is posted at Hollywood Beach; still, the beach is frequently filled with beachgoers wading in the water and playing in the sand. The BEACH Program would like the Clallam County Health Officer to post a more prominent, permanent advisory sign. However, for the 2011 season, the beach will be posted only when monitoring indicates elevated bacteria levels. BEACH Program officials are concerned that the public is at risk from playing in water that is often contaminated with untreated sewage and continually communicate this concern to county and city officials.¹

In late 2008, several failing septic tanks were identified near Purdy Sandspit County Park in Pierce County. The beach was closed and corrections were made. Last year bacteria tests indicated the water quality met standards, and the beach was reopened in July 2010.¹ According to

Monitoring Results

Due to limited funding, the BEACH Program sampled only 49 beaches in 2010. This was a decrease from 73 beaches in 2009. Cape Disappointment State Park in Pacific County was not monitored in 2009 or 2010 because of state park budget cuts; officials say that every effort will be made to find a suitable volunteer sampler for 2011.

In 2010 Washington reported 1,349 coastal beaches, and beach segments, 57 (4%) of which were monitored once a week, and 1,282 (96%) of which 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, 6% of all reported beach monitoring samples exceeded the state's daily maximum bacterial standards. The beaches



* Of the beaches considered to be "unmonitored," 310 are monitored six times per year by the recreational shellfish program at the Washington Department of Health. They are sampled for fecal coliform rather than enterococcus, but the BEACH Program considers the results of the fecal coliform tests when making beach advisory and closing decisions. However, NRDC does not include the results of the fecal coliform tests in its calculation of percent exceedances of federal standards because there are no federal fecal coliform standards for recreational marine waters.

with the highest percent exceedance rates in 2010 were Oak Harbor City Beach Park (26%) and Freeland County Park/Holmes Harbor (24%) in Island County, Larrabee State Park, Wildcat Cove in Whatcom County (23%), Pomeroy Park-Manchester Beach (19%) and Silverdale Waterfront Park (13%) in Kitsap County, and Birch Bay County Park in Whatcom County (13%).

Island County had the highest exceedance rate (17%) in 2010, followed by Whatcom (14%), Kitsap (8%), Jefferson (7%), Pierce (6%), Clallam (5%), Snohomish (4%), Mason (3%), King (1%), and Grays Harbor (1%) counties. There were no exceedances in Thurston County. No beaches in Pacific, San Juan, or Skagit counties were monitored.

Sampling Practices: The sampling season runs from a week before Memorial Day to Labor Day. Additionally, in 2010, sampling at two surfing beaches continued into October.¹

The administering agency determines sampling practices, locations, and standards and recommends notification protocols and practices throughout the state. County health officers have the authority to close beaches, and protocols for determining when a notification is issued vary from county to county. Samples are taken in knee-deep water. Beaches are chosen for monitoring on the basis of use; the degree to which tides and currents ensure that the water at the beach is exchanged with other water; and potential risks of fecal pollution from sewage treatment plants, septic tanks, stormwater drains, freshwater discharges, marinas, pet waste, livestock, marine mammals, and shorebirds.²

An effort is made to take samples near freshwater discharges and other sources of contamination.³ If a beach is closed or placed under advisory, the monitoring frequency is increased until the beach is reopened. States that monitor more frequently after an advisory 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 19 events lasting six consecutive weeks or less increased more than 2 ½ times to 131 days in 2010 from 48 days in 2009, 120 days in 2008, 19 days in 2007, 294 days in 2006, and 216 days in 2005. In addition, there were no extended events and 6 permanent events (1,358 days total) 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. In 2009 there were no extended events and 4 permanent events (1,302 days total).

For the 19 events lasting six consecutive weeks or less, 27% (35) of closing/advisory days in 2010 were due to monitoring that revealed elevated bacteria levels, 66% (87) were preemptive (i.e., without waiting for monitoring results) due to known sewage spills/leaks, and 7% (9) were preemptive due to a diesel oil spill.

Standards and Procedures: Local jurisdictions in Washington issue both beach closings and advisories (cautions). Washington uses the single-sample maximum enterococcus standard of 104 cfu/100 ml for making advisory decisions. A permanent advisory is posted if a beach's seasonal geometric mean exceeds 35 cfu/100 ml or when monitoring results indicate a chronic problem. Samples are taken from three locations at each beach, and the bacterial count for the simultaneous samples is averaged before comparison with the standard.

A closing is issued without resampling if a sampling event reveals enterococcus levels greater than 276 cfu/100 ml. If the results of a sampling event are greater than 104 cfu/100 ml but below 276 cfu/100 ml, then the beach is resampled, and if the resample event reveals enterococcus levels between 104 cfu/100 ml and 276 cfu/100 ml, an advisory is issued. Beaches are posted immediately upon notice of a sewage spill.²

Washington has no preemptive rainfall advisory standards but advises the public to avoid water contact for 24 hours after heavy rains.

Washington 2010 Monitoring Results and Closing or Advisory Days

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Clallam County					
Cline Spit County Park	1	1/wk	50	2%	0
Dakwas Park Beach, Neah Bay	no data	no data	83	11%	0
Front Street Beach, East	no data	no data	60	3%	0
Hobuck Beach	2	1/wk	114	4%	0
Hollywood Beach	2	1/wk	57	9%	7
Neah Bay Picnic Area	2	1/wk	60	3%	0
Neah Bay Waterfront, East	3	1/wk	83	11%	1
Port Williams Boat Launch	2	1/wk	53	8%	0
Salt Creek Recreation Area	1	1/wk	48	2%	0
Sooes Beach	2	1/wk	100	3%	0
Third Beach, Neah Bay	2	1/wk	66	0%	0
Beaches in Clallam County that were not monitored and that had no closing or advisory days in 2010:					
Agate Bay, Beach 420	Gibson Spit, Beach 411	Olsen's Marina	Sekiu River, Beach 429A		
Agate Bay, Beach 421	Hoko River, Beach 428	Ozette Beach Access, Olympic National Park	Sequim Bay State Park		
Brandt Point	James Island, La Push	Ozette Indian Reservation	Shi Shi Beach, Olympic National Park		
Cape Flattery	Jamestown	Ozette Island	Shipwreck Point Natural Resource Conservation Area		
Cape Flattery Trail Lookout	Jim Creek, Silver King Resort	Panorama Vista County Park	Shipwreck Point, Beach 429		
City Pier	John Wayne Marina	Paradise Cove	Slip Point, Beach 426		
Clallam Bay Marina	La Push First Beach	Pillar Point County Park	Snow Creek Boat Launch		
Clallam Bay State Park	La Push Marina #1	Pillar Point, Beach 424	South Diamond Point		
Clallam County Parcel	La Push Second Beach, Olympic National Park	Pillar Point, Beach 425	South Sooes		
Cline Spit	Lees Creek	Pioneer Memorial Park	Sunny Shores Beach		
Crescent Beach	Low Point Community Beach	Pitship Point	Travis Spit, Beach 411A		
Diamond Point, Beach 410	Lyre River Campground	Point Of Arches, Olympic National Park	Twin Rivers, Beach 422		
Dry Creek, Beach 414	Mains Farm	Port Angeles Boat Haven	Twin Rivers, Beach 423		
Dungeness Bay Boat Launch	Makah Marina	Port Angeles Ferry And Waterfront	Twin Rivers, Beach 423A		
Dungeness National Wildlife Refuge	Mcdonnel Creek	Port Williams Tidelands	W Kydaka Point		
Dungeness Recreation Area	Miller Peninsula State Park	Quillayute River Shoreline	Waadah Island		
Ediz Hook Boat Launch	Monterra Scenic Overlook	Rialto Beach, Olympic National Park	West Dnr 414		
Ediz Hook Park	Mouth Of Elwha River	S Pitship Point	West Green Point		
First Beach, Neah Bay	N Sequim Bay Sp	Second Beach, Neah Bay	Whiskey Creek Campground		
Freshwater Bay Boat Launch	North Olympic National Park	Sekiu Point, Beach 427			
Freshwater Bay, Beach 416	Old Town	Sekiu River Access			
Freshwater Bay, Beach 417					
Grays Harbor County					
Westhaven State Park, Half Moon Bay	2	1/wk	78	3%	0
Westhaven State Park, South Jetty	2	1/wk	48	0%	0
Westport--The Groins	2	1/wk	63	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Grays Harbor County					
Beaches in Grays Harbor County that were not monitored and that had no closing or advisory days in 2010:					
28th Street Boat Launch	Grays Harbor City		Ocean Shores, Marina View Drive Beach Access	South Oyhut and Illahee Beach	
9th Street Landing and Rayonier Point	Grenville Bay		Ocean Shores, North Jetty	South Queets River, North Raft River	
Bonge Road Beach Access	Halfmoon Bay–		Oyhut And Illahee Beach Access	South Raft River	
Bottle Beach State Park	City of Westport		Oyhut And Illahee Beach North	Southwest South Bay	
Bottle Beach Tidelands	Harms Field		Oyhut State Wildlife Area	Taholah, North Point Grenville	
Bowerman Basin	Hogsboack and Little Hogsback		Pacific Beach State Park	Taholah, Quinault River Mouth	
Cascade Land Conservancy	Iron Springs		Pacific Beach, Ocean Groove, Roosevelt Beach	Taurus Blvd Beach Access	
Cascade Land Conservancy –Aberdeen	Johns River Bridge		Pacific Blvd Ocean Shores	Tunnel Island	
Chance A La Mer/Ocean Shores Main Entrance	Johns River, WRA Boatlaunch		Point Grenville	Twin Harbors State Park	
City Of Hoquiam, Moon Island Road, Airport Way	Moclips, Sunset Beach, Pacific Beach		Point Grenville Islands	Unnamed–Bidn 990013	
Copalis Beach, Ocean City	N Cape Elizabeth		Port Of Grays Harbor	Unnamed–Bidn 990014	
Damon Point State Park, Protection Island	Ocean City Beach Access		Port Of Grays Harbor Hoquiam River	Unnamed–Bidn 990015	
Grayland Beach	Ocean City State Park		Raft River	Unnamed–Bidn 990016	
Grayland Beach Access	Ocean Lake Way Beach Access		Roosevelt Beach Access	Unnamed Bidn–990019	
Grays Harbor Audubon Society, Raft River	Ocean Shores		S Cape Elizabeth	Westport Beaches	
Grays Harbor Audubon, Humptulips, Chenois Creek	Ocean Shores Bulkhead		Sampson	Westport Light State Park	
	Ocean Shores Marina		South Bay Bridge	Westport Marina, Westhaven Cove	
Island County					
Freeland County Park/Holmes Harbor	1	1/wk	45	24%	0 (365)*
Oak Harbor City Beach Park	1	1/wk	43	26%	0 (190)*
Oak Harbor Lagoon	1	1/wk	45	4%	0
Windjammer Lagoon	no data	no data	45	4%	0
Windjammer Park	no data	no data	43	26%	0
Beaches in Island County that were not monitored and that had no closing or advisory days in 2010:					
Admiralty Bay, Beach 124	Cavelaro Beach		Driftwood County Park	Fort Casey State Park Tidelands	
Admiralty Bay, Beach 124A	Clinton Ferry Terminal		Dugualla Bay County Park	Fort Ebey State Park (DNR-140)	
Ala Spit County Park	Cornet Bay County Park		Dugualla Bay, Dnr-145	FS Mabana	
Baby Island	Cornet Bay Marina		Dugualla State Park	Glendale Road End	
Beachcombers Community Club Beach	Coupeville		E East Point	Glendale, DNR-100	
Blowers Bluff	Coupeville Wharf		East San De Fuca	Glendale, DNR-99	
Borgman Road End	Cultus Bay Recreation Site		Ebey's Landing National Historical Reserve	Grasser's Lagoon	
Bush Point	Cultus Bay Road End		English Boom	Harrington Beach	
Bush Point, Beach 101	Dave Mackie Memorial County Park		Flintstone Park	Hastie Lake Road Boat Launch	
Cama Beach State Park	Deception Pass State Park (Island)		Fn Camano Head	Hidden Beach	
Camano Island State Park	Double Bluff Park		Fn Onamac Point	High Road End	
Cavalero Beach County Park	Driftwood Beach		Fort Casey State Park		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Island County					
Beaches in Island County that were not monitored and that had no closing or advisory days in 2010:					
Indian Beach		Mariner's Cove Boat Launch	S Rocky Point	Sunset Beach Public Access Point	
Joseph Whidbey State Park		Monroe Landing	S Sandy Point	Tillicum Beach	
Keystone Ferry Terminal		Moran's Beach	S Strawberry Point	Tillicum Boat Launch	
Keystone Spit State Park		Mutiny Bay Boat Launch (Road End)	S Useless Bay	Town Boat Launch	
Lagoon Point		N Onamac Point	San De Fuca	Unnamed Bidn 260134	
Langley Marina		N Point Partridge	Saratoga Pass Tidelands	Useless Bay Tidelands State Park	
Langley Waterfront Park		N Randal Point	Scatchet Head	Utsalady County Park	
Langley Waterfront Park, The Inn At Langley		NE Cultus Bay	Scenic Avenue Rd End	W Beach Rd Public Beach Access	
Libbey Beach County Park		North Penn Cove	Snatelum Point	W Elgar Bay	
Livingston Bay Beach Tidelands		Oak Harbor City Marina	South Ebey's Landing	W Penn Cove	
Long Point Beach		Oak Harbor City Park	South Whidbey State Park	W Penn Cove Beach	
Mabana		Penn Cove / Madrona	Strawberry Point North, DNR-142	Westcliff Drive Road End	
Madrona Beach, Camano Island		Penn Cove Park	Strawberry Point, DNR-142	Whidbey Island Naval Air Station	
Main Street Road End		Possession Point Park	Sunlight Beach Road Ends	Winas-Maylor Point-West	
Maple Grove Boat Launch		S Point Susan	Sunlight County Park		
			Sunrise Beach		
Jefferson County					
Fort Worden State Park	1	1/wk	59	2%	0
Herb Beck Marina	2	1/wk	59	12%	7
Point Whitney Tidelands	3	1/wk	59	7%	6
Beaches in Jefferson County that were not monitored and that had no closing or advisory days in 2010:					
Adelma Beach		Bolton Peninsula, Beach 56	Downtown Port Townsend Business District	Kalaloch Beach & Campground, Olympic National Park	
Admirals Row Association Parcel		Bridgehaven Community	Duckabush	Kinney Point, Beach 404A	
Admiralty Condo's		Brinnon Tidelands	Duckabush Tidelands	La Push Third Beach, Olympic National Park	
Bay Vista Condo's		Brinnonwold	East Beach County Park	Ludlow Bay Village Parcels	
Bayview At Chevy Chase Beach 1, Olympic National Park		Broad Spit	East Beach County Park, Mystery Bay	Ludlow Beach Community	
Beach 2, Olympic National Park		Broad Spit, Coast	Edgewater Condo's	Ludlow Beach Tracts #1	
Beach 3, Olympic National Park		Brown Point, Beach 57B	Fisherman's Point	Marshall Add Community Club	
Beach 4, Olympic National Park		Camp Parsons Boy Scout Brinnon Camp	Fort Flagler State Park	Mats Mats Bay Boat Launch	
Beach 5, Olympic National Park		Cape George Colony Club	Gardiner Public Boat Launch	Meydenbauer Bay Yacht Club	
Beach 6, Olympic National Park		Cape George, Beach 407	Hadlock Boat Launch	Mystery Bay State Park	
Beach 7, Olympic National Park		Cape George, DNR-409	Hadlock Lions Park	N Tabook Point	
Beckett Point Fishermen's Club		Central Olympic National Park	Hicks County Park	Norland Community Beach	
		Chetzeomka Park	Hoh Indian Reservation	North Beach County Park	
		Chimacum Creek Park	Home Port Marina	North Chetzeomka	
		Coast Dabob East	J.B. Pope Marina Park	North Mcdaniel Cove	
		Dabob Cove Community	Jackson Cove, Beach 55		
		Discovery Bay Camp	Kala Point Beach Community		
		Dosewallips State Park			

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Jefferson County					
Beaches in Jefferson County that were not monitored and that had no closing or advisory days in 2010:					
North Quilcene Bay Tidelands	Pleasant Harbor State Marine Park	Right Smart Cove State Park	South Mcdaniel Cove		
North Quilcene Harbor	Pleasant Tides	Ruby Beach, Olympic National Park	South Old Port Townsend State Park		
North Squamish Harbor	Point Hudson Marina	SE Dabob Bay	South Tala Point Public Access		
North Triton Cove	Port Hadlock Yacht Club	Seal Rock Campground	Squamish Harbor, Beach 59		
North Triton Cove Access	Port Ludlow Associates Parcels	Seamount Estates Community Club	Tabook Point, Beach 57		
Northeast Quilcene Bay Tidelands Access	Port Ludlow Condos	Seven Sisters Beach, Point Hannon	Tala Shore		
Northwest Maritime Center	Port Ludlow Marina	Shine Tidelands	The Landing Condo's		
Northwest School of Wooden Boat Builders	Port of Port Townsend	Snake And Colvos Rocks	Toandos Tidelands State Park		
Oak Bay	Port Townsend Boat Haven	South Bay Community Association Parcels	Triton Cove State Park		
Oak Bay County Park	Port Townsend Railroad	South Bay Master Association Parcels	W Quilcene Bay		
Ocean Grove	Port Townsned Plaza	South Beach, Olympic National Park	West Bay, Port Ludlow Associates		
Old Fort Townsend State Park	Queets River Mouth	South Indian Island County Park	West Fort Flagler Bridge		
Pleasant Harbor Marina	Quilcene Bay Tidelands		West Hood Canal Bridge		
Pleasant Harbor Park	Quilcene Bay Tidelands Access		Wolfe Property State Park		
King County					
Alki Beach Park	1	1/wk	50	0%	0
Carkeek Park	1	1/wk	50	2%	0
Dash Point State Park	1	1/wk	0	NA	9
Golden Gardens	1	1/wk	53	4%	0
Lincoln Park	1	1/wk	49	0%	0
Lowman Beach	2	None	0	NA	2
Redondo County Park	1	1/wk	49	2%	0
Saltwater State Park	1	1/wk	49	2%	0
Seahurst County Park	1	1/wk	48	0%	0
Beaches in King County that were not monitored and that had no closing or advisory days in 2010:					
101 Avenue SW Road End	Bell Harbor Marina	Des Moines Marina City Beach Park	East Vashon Island, Beach 85		
146th Avenue SW Road End	Burton Acres Church Camp	Diagonal Ave South Pacific Access	Elliot Bay Marina		
16th Avenue West Access	Burton Acres County Park	Discovery Park	Elliot Bay Park		
1st Avenue South Bridge Boat Launch	Camp Kilworth	DNR-Seattle Art Museum	Emma Schmitz Me-Kwa Mooks Park		
20th Place Sw Road End	Camp Sealth	Dockton County Park	Fern Cove Park		
Alki Point Light Station	Camp Sealth South	Don Armeni Park	Harbor Island Marina		
Andover Place Road End	Carkeek Beach South	Dumas Bay Park Wildlife Sanctuary	Harbor Marina Corporate Center		
Anthony's Home Port Public Access	Colman Dock (Seattle Main Terminal)	Duwamish Public Access, Terminal 105	Herrings House Park (Tualtwx)/Terminal 107 Park		
Arroyos Natural Area	Cormorant Cove	Duwamish Waterway Park	Hiram M. Chittendon Locks		
Ballard Elks Public Access	Des Moines Fishing Pier				
	Des Moines Marina				

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
King County					
Beaches in King County that were not monitored and that had no closing or advisory days in 2010:					
Jack Block Park	Pier 66, Seattle Bell Street Pier	Seacrest Park	Three Tree Point		
Jack Perry Memorial Viewpoint	Pier 69, Seattle	Seattle Aquarium	Three Tree Street Road End		
Lisabuela Park	Pier 69, Seattle Waterfront	Seattle Waterfront Park	Tramp Harbor		
Lost Lake Park	Piers 62 And 63	Shilshole Bay Marina	Tramp Harbor Fishing Pier		
Magnolia Park	Point Heyer 'Kvi' Beach	Smith Cove Park	Vashon Ferry Docks/ West Seattle		
Magnolia Tidelands Park	Point Robinson County Park	Southeast Vashon Island, Beach 79	Washington Street Boat Access		
Maury Island Marine Park	Poverty Bay County Park	Southworth Ferry Dock, Vashon Island	West Vashon Island, Beach 77		
Maury Island, Beach 83	Quartermaster Marina	Spring Beach County Park	West Vashon Island, Beach 78		
Myrtle Edwards Park	Quartermaster Yacht Club	Terminal 115 Viewpoint	West Vashon Land Trust		
Normandy Beach Park/ Marine View Park	Redondo City Beach	Terminal 18 Public Access Park			
Northeast Vashon County Park	Richmond Beach				
Kitsap County					
Anna Smith Park	3	None	0	NA	11
Chico Boat Launch	3	None	0	NA	11
Eagle Harbor Waterfront Park	1	1/wk	51	12%	0
Evergreen Park	1	1/wk	48	4%	11
Fay Bainbridge State Park	2	1/wk	45	2%	0
Illahee State Park	1	1/wk	48	2%	0
Indianola Dock	1	1/wk	45	0%	0
Nad Marine Park	3	None	0	NA	11
Pomeroy Park–Manchester Beach	1	1/wk	54	19%	8
Scenic Beach State Park	2	None	45	0%	0
Silverdale County Park	1	1/wk	90	13%	16
Tracyton Boat Launch	3	None	0	NA	11
Beaches in Kitsap County that were not monitored and that had no closing or advisory days in 2010:					
American Legion Park	Bremerton Waterfront Condos	Driftwood Cove Beach	Foulweather Reserve		
Anderson Landing Reserve	Bremerton Yacht Club	Dyes Inlet Tidelands	Front Street Dock		
Anderson Point County Park	Brownsville	Eagle Harbor Condos	Gilberton Tidelands		
Annapolis Public Access Area	Brownsville Elementary School	Eagle Harbor Marina	Guillemot Cove Preserve		
Arness County Park	Brownsville Elementary School North Parcel	East Anderson Cove	Hansville, Beach 69		
Aroydy Thai Cuisine	Camp Indianola	East Dyes Inlet Tidelands	Harbour Marina		
Bachmann Park	Colby Beach	East Dyes State Tidelands	Harper County Park		
Bainbridge Condominiums	Country Club of Seattle	East Hood Canal Bridge	Harper Public Fishing Pier		
Bainbridge Island Land Trust	Crystal Springs Public Fishing Pier	East Indianola	Illahee Pier		
Blake Island State Park	Curley Creek	Eglon Boat Launch	Illahee Road Bridge		
Bloedel Reserve	Dockside Sales and Service	Ferncliff	Island Seniors Community		
Bremerton Ferry Terminal		Fort Ward State Park	Keyport Boat Launch		
		Foulweather Bluff, Beach 64	Keyport County Park		
			Keyport Marina		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Kitsap County					
Beaches in Kitsap County that were not monitored and that had no closing or advisory days in 2010:					
Kingston Ferry Terminal	North Murden Cove (State)	Poulsbo Yacht Club	South Oyster Bay		
Kingston Marina	North Oyster Bay	President Point Beach	South Point Southworth		
Kitsap County Consolidated Housing Authority	North Skiff Point	Prospect Point Beach	South Skiff Point		
Kitsap County Fair Grounds	North Wing Point	Queen City Yacht Club	South Tekiu, DNR-40		
Kitsap Memorial State Park	Northeast Phinney Bay	Rich Passage Estates	South Warren Bridge		
Kitsap Memorial State Park Tidelands	Northwest Point White	Richcove Beach	South Waterman Point		
Lala Cove Country Club	Olalla Bay Tidelands	Rockaway Beach Park	Southeast Port Washington Narrows		
Lents Landing	Olalla Beach	Rocky Point	Southwest Ostrich Bay		
Leslie Landing	Olalla Boat Launch	Rolling Bay	Southworth-Vashon Ferry		
Liberty Bay Marina	Old Man House Park	Roosevelt Field	Stavis Bay Beach		
Liberty Bay Park	Oyster Bay	Ross Point Tidelands	Sun Day Cove		
Liberty Bay Tidelands	Oyster Bay Plaza	S Agate Pass	Sunny Cove Community Club		
Lions Field	Oyster Plant Park	S Driftwood Cove	Suquamish (Old Man House)		
Little Norway Boardwalk	Pebble Beach Rd End	Salisbury Point County Park	Tacoma Christian		
Lynwood Center	Point No Point County Park, DNR-68	Salisbury Point County Park Tidelands	T'chookwop Park		
Madrona Heights	Point No Point	Seabeck Christian Conference Center	Tekiu Point		
Madrona Point Subdivisions	Lighthouse Park	Seabeck Land Trust	Thorpe Road		
Manchester State Park	Point White	Seabold	Tyee Yacht Club		
Manette Bridge	Port Of Brownsville Marine Park And Marina	Seattle Yacht Club	West Blakely Harbor		
Manzanita Bay	Port Of Waterman Beach	Seaview Terrace Homeowners	West Dyes Inlet		
Marine View Estates	Port Of Waterman Pier	Sinclair Inlet Marina (Unknown)	West Madrona Point Subdivisions		
Miller Bay Boat Launch	Port Orchard Boat Launch	Sinclair Inlet Wildlife Viewing Area	West Point Jefferson		
Miller Bay Tidelands	Port Orchard Marina	South Beach Condominiums	West Wing Point		
Misery Point Boat Launch	Port Orchard Pier	South Brownsville	Wilson Creek		
Mitchell Point	Port Orchard Waterfront Businesses	South Colby	Winslow Ferry Terminal		
Murden Cove, Blue Heron Hill Homeowners	Port Orchard Waterfront Park	South Eagle Harbor Tidelands	Winslow Wharf Marina		
N Fletcher Bay	Port Orchard Yacht Club	South Fay Bainbridge	Woodlawn Memorial Parl		
Nelson Park	Port Washington Marina	South Murden Cove	Wyndown Acres Community Beach		
Nesika Bay	Poulsbo Boat Launch and Marina		Wynn-Jones County Park		
Net Shed Park			Yacht Club Broiler Tidelands		
North Dyes Community					
North Lebo					
Mason County					
Potlatch State Park	1	1/wk	49	2%	0
Twanoh State Park	1	1/wk	58	3%	0
Walker County Park	1	1/wk	0	NA	0 (364)*
Beaches in Mason County that were not monitored and that had no closing or advisory days in 2010:					
Alderbrook Resort	Arcadia Boat Launch	Eagle Creek	Grapeview		
Allyn Park	Belfair State Park	End of Twanoh State Park	Grapeview Boat Launch		
Allyn Port And Dock	Dewatto Bay, Beach 44A	Fudge Point	Grapeview Harbor Marina		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Mason County					
Beaches in Mason County that were not monitored and that had no closing or advisory days in 2010:					
Hartstene Bridge Boat Launch	Jarrell Cove, Beach 34	Northwest Case Inlet Tidelands	Shelton Boat Launch and Marina		
Hartstene Island Bridge	Jorstad Creek Resort	Oakland Bay	Shorecrest (Jacoby) County Park		
Hartstene Island, Beach 33	Kennedy Creek Tidelands	Oakland Bay & Chapman Cove Exclusive	South Allyn		
Hartstene Pointe	Lilliwaup Tidelands State Park	Olympia Yacht Club–Pickering Passgae	South Graham Point		
Harvey Rendland State Park	Little Skookum	Olympic Beach Club	South Jorsted Creek		
Hood Canal Girl Scout Camp	Lynch Cove/ Hood Canal Land Trust	Pirates Cove Country Club	South Of Lilliwaup Tidelands State Park		
Hood Canal Saltwater Park	Manke Lumber Company Access	Port Of Allyn Public Boat Launch	Stretch Island Bridge		
Hood Canal, Beach 46	Mason County–Unknown3	Port Of Allyn Public Dock	Stretch Island, Beach 20		
Hood Canal, Beach 47	Mcmicken Island State Park	Potlatch State Park Tidelands	Summer Tide Resort and Marina		
Hood Canal, Beach 48	N Case Inlet	Reach Island Bridge	Timberlake Community Beach		
Hoodsport Hatchery	North Bay Res Access	Seabrook Community Beach	Union Public Boat Launch		
Hoodsport Marina	North Bay Res Tidelands	Shelton Bayshore Golf Course	Union River Wildlife Area (Theler Area)		
Hoodsport, Beach 43 (N Hoodsport Hatchery)	North Jorstad Creek				
Hope Island (Mason Co.)	North Oakland Bay				
Jarrell Cove State Park	Northeast Case Inlet Tidelands				
Pacific County					
Beaches in Pacific County that were not monitored and that had no closing or advisory days in 2010:					
10th Street Access	Highway 101 Bridge, South Willipa	Nemah River	Riekkola Unit, Willapa NWR		
Bay Avenue/ Ocean Park Beach	Hines	North Cove	Sandy Point		
Bay Center Boat Channel	Holman	North Cove Beach Access	Seaview		
Bolstead Beach Access	Klipsan Beach Access	North Klipsan	Seaview Beach Access		
Bone River	Leadbetter Point State Park Beach	North River Public Fishing Access	South Bend Fishing Access And Boat Launch		
Bruceport County Park	Lewis Unit, Willapa NWR	North Willapa Bay–Cascade Land Conservancy	South Bend State Dock		
Bush Pioneer Park	Long Beach	North Willapa National Wildlife Refuge	South Grayland Beach		
Cape Disappointment	Long Beach Boardwalk	Ocean Park	South Naselle River–State		
Cape Disappointment Coast Guard Station	Long Island Unit, Willapa Nwr	Ocean Park North	South Nemah River–State		
Cape Shoalwater	Loomis	Old Highway 105 Beach Access	Southeast Wilson Point		
City Of South Bend Boat Haven	Loomis Lake State Parks	Oysterville Beach Access	Tokeland Marina		
Cranberry Road Beach Access	Midway Beach Access	Pacific Beach	Tokeland Marina Tidelands		
Grayland Beach State Park	Nahcotta Small Boat Basin	Pacific Pines State Park	Warrenton Cannery Road Beach Access		
Hawks Point	Nemah	Palix River Boat Launch	Willapa Harbor Airport		
	Nemah II	Rhodesia Beach	Willapa National Wildlife Refuge Boat Launch		
Pierce County					
Chambers Creek	no data	no data	44	0%	0

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Pierce County					
Owens Beach/Point Defiance Park	1	1/wk	55	7%	0
Purdy Sandspit County Park	1	1/wk	58	5%	6 (188)*
Titlow Park	1	1/wk	55	4%	0
Waterfront Dock/Ruston Way	1	1/wk	77	10%	0
Beaches in Pierce County that were not monitored and that had no closing or advisory days in 2010:					
182nd Avenue Kpn Road End	Gig Harbor Waterfront	Narrows/Day Island Marina	South Anderson Island		
36th Street Nw Road End Boat Launch	Green Point	North Beach Dock, Herron Island	South Beach, Herron Island		
All Saints Camp	Haley State Park	Herron Island	South Filucy Bay		
Amsterdam Bay	Hall Road End Boat Launch	North Beach, Herron Island	South Hale Passage		
Anderson Island Ferry Dock	Hamilton Park	North Pitt Pass	South Maple Hollow		
Anderson Island, Beach 8	Harbor Lights Restaurant	North Steilacoom Beach	South Nearn Point		
Andrew Anderson's Marine Park	Harborview Drive Road End Viewpoint	North Sunrise Beach	South Oro Bay		
Arrbella's Marina	Herron Ferry Terminal–Main Land	North Taylor Bay	South Otso Point		
Berg Drive Road End Boat Launch	Herron Island Ferry Dock	Northeast Narrows	Southeast Narrows		
Browns Point Lighthouse Park	Home Boat Launch	Northwest Gig Harbor	Southwest Anderson Island		
Camp Coleman	Hylebos Marina	Northwest Narrows	Steilacoom Boat Launch		
Camp Gallagher	Jack Hyde Park	Ocean Fish Co–Johnny's Seafood	Steilacoom Ferry Docks		
Camp Seymour	Jerisich Park and City Dock	Old Fox Island Ferry Terminal	Steilacoom Marina		
Cedrona Cove Marina	Joemma State Park	Old Fox Island Ferry Terminal South	Sunnyside Beach North		
Cromwell	Johnnys Dock & Marina	Old Town Dock	Sunnyside Beach Park		
Cutts Island State Park	Johnson South Sound Preserve	Ole & Charlie's Marina	Sunrise Beach Park		
Dash Point County Park	Kamas Drive Road End	Oro Bay/Young Life Beach	Tacoma Demolay		
Devils Head	Katie Downs Tavern	Penrose Point State Park	Boys Camp		
Devils Head, Beach 13	Ketron Island Ferry Terminal/Dock	Pitt Passage, Beach 6	Taylor Bay		
Dickman Mill Park	Kopachuck State Park	Point Evans, Beach 36	Taylor Bay, Beach 16		
Eagle Island State Park	Kpn Olman Vaugh Bay Sandspit, Beach 18	Point Fosdick, Beach 1	Thea Foss City Marina		
East Devils Point	Lakebay School	Point Fosdick, Beach 1A	Thea Foss Waterway		
East Ketron Island	Longbranch Boat Launch	Puget Creek Beach	Thea's Park		
Fire Department # 5 Park	Longbranch Dock	Ram American Grill & Fishhouse	Totem Marina		
Fort Lewis	Luciano's Italian Restaurant	Randall Drive Boat Launch	Treble Point		
Fox Island Bridge	Maple Hollow Recreation Site	Ruston Way Waterfront Park	Tyee Marina		
Fox Island Bridge Boat Launch	Murphy's Landing Marina	S Eagle Island	Wauna Boat Launch		
Fox Island Fishing Pier	N Amsterdam Bay	Salt Point/South Gordon Point	Wauna, Beach 35		
Fox Island Yacht Club–Cedrona Cove	N Fort Lewis	Saltars Point Beach	Wauna, Beach 35A		
Gig Harbor City Park	N Fox Point	Shenanigan's Restaurant	West Gig Harbor		
Gig Harbor Marina	N Green Point	Silver Cloud Inn/Tacoma	West Ketron Island		
Gig Harbor Private Marina	Narrows Park	Solo Point Boat Launch	West Oro Bay Beach		
		Soundview Camp	Westshore Marina		
			Windy Bluff		
			Wollochet Bay–Tacoma Yacht Club		
			Wollochet Bay Boat Launch		

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
San Juan County					
Beaches in San Juan County that were not monitored and that had no closing or advisory days in 2010:					
4th of July Beach, DNR-326	Deer Harbor, Beach 240B	Jackson Beach County Park	Northeast Stuart Island, Beach 356		
Agate Beach County Park	Deer Harbor, Crane Island	James Island State Park	Northwest Decatur Island		
Albert Jensen And Sons Marine Repair	Deer Point, Beach 277	Johns Island	Northwest Mcconnell Island Rock		
Aleck Bay, DNR-308	Diamond Point, Beach 265	Johns Island Lighthouse Reserve	Oak Island, Beach 257A		
American Camp	DNR-299	Johns Point, Beach 307	Obstruction Island Park		
Andrews Bay	DNR-321	Jones Island State Park	Obstruction Pass Boat Launch		
Armitage Island, Beach 290	Doe Bay, Beach 281A	Justice Island	Obstruction Pass County Park		
Bartwood Lodge	Doe Island State Park	Justice Island, Dnr-367C	Obstruction Pass Recreation Site		
Bay Head Yacht Basin and Condominiums	Double Island, Beach 251	Kellett Bluff, Beach 341	Obstruction Pass, Beach 276		
Bazalgette Point	Double Island, Beach 251A	Lime Kiln Point State Park	Odlin County Park		
Beach Haven, Beach 238	Eagle Cove	Lindsey Memorial Park	Olga County Park		
Blakely Island Marina	Eagle Cove County Park	Little Patos Island, Beach 366A	Olga Marine State Park		
Blakely Island, Beach 290	East Sound, Beach 266	Little Sucia	Orcas Island Ferry Terminal Picnic Area		
Blakely Island, Beach 292	East Sound, Beach 267	Lopez Ferry Terminal	Orcas Island Yacht Club		
Blakely Island, Beach 292A	East Sound, Beach 270	Lopez Island Marina	Orcas Island, Beach 266B		
Blind Bay 260D	East Sound, Beach 274	Lopez Island, Beach 305	Orcas Island, Beach 279		
Blind Island State Park	East Sound, Beach 275	Lopez Pass, Beach 312A	Orcas Island, Beach 282		
Broken Point, Beach 260A	Edwards Point Community	Lopez Rd End	Orcas Island, Beach 283		
Cactus Islands, Beach 353A	English Camp Historic Park	Lopez Sound, Beach 315	Otis Perkins Day Park		
Cactus Islands, Beach 353B	Ewing Island, Beach 367A	Lopez Sound, Beach 317	Patos Island State Park		
Camp Orkila	Fish Creek Public Access	Lopez Sound, Beach 317	Pear Point, Beach 332		
Canoe Island, Beach 296A	Fisherman Bay	Lover's Cove, Beach 239	Point Colville		
Cape St. Mary, DNR-311	Fishery Point, Beach 363	Mackaye Harbor Boat Launch	Point Doughty Recreation Site		
Cattle Point	Fishing Bay Public Dock	Matia Island State Park	Point Doughty, Beach 236		
Cattle Point Lighthouse Recreation Site	Fishing Bay Waterfront Park	Mcardle Bay, Dnr-309	Point Hammond, Beach 362		
Cattle Point, Beach 326A	Flat Point, Beach 295	Mcconnell Island, Beach 245	Point Lawrence Recreation Site		
Cayou Quay Marina	Flower Isle, Beach 266B	Mccracken Point, Beach 340	Point Lawrence Tidelands		
Center Island Recreation Site	Freeman Island State Park	Mckaye Harbor, Beach 306	Point Thompson, Beach 234		
Center Island, Beach 324A	Friday Harbor Ferry Landing	Moran State Park	Pointer Island		
Channel Vista Shore Access	Friday Harbor Labs	Mosquito Pass, DNR-344	Port of Friday Harbor		
Clark Island State Park	Frost Island, Beach 318	Mt. Shadows Homeowners Beach	Posey Island State Park		
Coon Island, Beach 245A	Gibson's North Beach Inn	Mud Bay Dock Road End	President's Channel, Beach 240		
Crane Island, Beach 250A	Griffin Bay Recreation Site	Mud Bay Tidelands	Raccoon Point, Beach 233		
Crane Island, Beach 250B	Hankin Point, Beach 264	Mud Bay, Beach P1	Ram Island, DNR-312B		
Decatur Island, Beach 319A	Harney Channel, Beach 262	N Blakely Island			
Decatur Island, Beach 323	Henry Island, Beach 339A	N Spencer Spit			
Decatur Island, Beach 324	Hunter Bay County Dock	Neck Point, Beach 259A			
Decatur Island, Beach 325A	Hunter Bay, Beach 313	North Beach Road End			
Decatur Shores Community Dock	Hunter Bay, Beach 313A	North Finger Island, Beach 367B			
	Hunter Bay, Beach 314				
	Iceberg Island State Park				
	Indian Island, Beach 270A				
	Island Marine Center				

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
San Juan County					
Beaches in San Juan County that were not monitored and that had no closing or advisory days in 2010:					
Reads Bay, Beach 319	San Juan Preservation Trust, Waldron Island	South Finger Island, Beach 376C	Trump Island, Beach 320		Turn Island State Park
Reads Bay, Beach 325	Sandy Point, Beach 364	Southeast Stuart Island, Beach 356B	Turn Point Lighthouse		Twin Rocks State Park
Resort At Deer Harbor	Satellite Island, Beach 358	Spencer Spit State Park	Upright Channel Recreation Site		Upright Head, Beach 294
Reuben Tarte County Park	Shark Reef County Park	Sperry Road Access to Mud Bay	Victim Island, Beach 251B		Waldron Island Boat Launch, DNR-361A
Roche Harbor Marina	Shark Reef, Beach 304	Spieden Bluff, Beach 353	Waldron Island Preserve		Waldron Island, Beach 361
Roche Harbor Resort	Shaw Island County Park/ Indian Cove	Spieden Island, Beach 352	Waldron Island, Beach 361A		Waldron Island, Beach 361A
Rock Point, Beach 303	Shaw Island County Park Tidelands (DNR-296)	Spieden Island, Beach 352A	Wasp Passage, Beach 259		Weeks Point Way Access
Rocky Bay, Beach 336	Shaw Island, Beach 258	Spring Passage, Beach 240A	West Beach Resort		West Sound Marina
Rosario Resort	Shaw Island, Beach 260C	Stuart Island State Park	West Sound Marina		Yellow Island
Rosario, Beach 272	Shaw Island, DNR-260	Stuart Island, Beach 359			
San Juan Channel, Beach 298	Shaw Island, Beach 255A	Sucia Island State Park			
San Juan Channel, Beach 334	Ship Bay Beach	Swirl Island			
San Juan County Park	Skull Island State Park	Thatcher Pass, Beach 291			
San Juan Island, Beach 330	Smugglers Cove And Sunset Point Community	Thatcher Pass, Beach 322			
San Juan Preservation Trust, Henry Island	Smugglers Cove Marina	Three Coves Community Beach			
San Juan Preservation Trust, Stuart Island	Snug Harbor Resort and Marina				
Skagit County					
Beaches in Skagit County that were not monitored and that had no closing or advisory days in 2010:					
Alexander/Delmar	Cypress Head, Beach 209	Lower Cap Sante Park	Seafarer Park		
Anacortes Ferry Terminal Beach	Cypress Head, Beach 210	March Point Recreational Beach	Sharpe County Park		
Bayview Boat Launch	Cypress Head, Beach 211	Milltown Access	Similk Beach		
Bayview State Park	Deception Pass State Park (Skagit)	North Beach, Guemes Island	Sinclair Island Dock		
Boat Harbor, East Guemes Island	Deception Pass State Park Tidelands	North Fork Access	Sinclair Island Land, Beach 213A		
Burrows Bay, Far North	Dewey Beach	Northwest Island Marine Park	Sinclair Island, Beach 213		
Burrows Island East	Eagle Cliff, Beach 286	Padilla Bay National Estuarine Research Reserve	Sinclair Island, Beach 213A		
Burrows Island North	Eagle Harbor, Beach 212A	Pelican Beach Recreation Site	Skagit Island State Park		
Burrows Island State Park	Fidalgo Bay	Pioneer Park	Skyline Marina		
Burrows Island, Southeast	Goat Island	Quaker Cove Camp & Retreat Center	South Shore Drive Road End		
Camp Kirby	Guemes Island, Peach Reserve	Rosario Beach	Strawberry Bay, Beach 287		
Cap Sante Marina	Guemes Island, South	Saddlebag Island State Park	Strawberry Island Recreation Site		
Cap Sante Park	Hope Island (Skagit County)	Salmon Beach	Swinomish Channel Boat Launch		
Clark Point, North Guemes Island	Huckleberry Island	Sammish Island Recreation Area	Vendovi Island, Beach 214		
Community of Christ Church Camp	Jensen Access		Washington Park		
Cone Islands State Park	La Conner Marina		Young County Park North Beach		
Cypress Head Recreation Site	Larrabee State Park, Clayton Beach				

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Snohomish County					
Edmonds Marina	3	None	49	0%	0
Edmonds Underwater Park	1	1/wk	51	4%	0
Howarth Park	1	1/wk	49	10%	1
Jetty Island	1	1/wk	20	0%	0
Kayak Point County Park	1	1/wk	60	0%	0
Marina Beach South/Edmonds (Dog Park)	1	1/wk	0	NA	0 (364)*
Marina Beach South/Edmonds (No Dogs)	1	1/wk	49	0%	0
Mukilteo Lighthouse Park	3	1/wk	19	5%	0
Picnic Point County Park	1	1/wk	58	10%	1
Beaches in Snohomish County that were not monitored and that had no closing or advisory days in 2010:					
10th St Marine Park & Boat Launch	Meadowdale County Park	Park Avenue Street End	South Marine View Park		
Brown Bay Rail	Mission Beach Park	Picnic Point North, Rail	South Mukilteo Park		
Darlington Beach and Tidelands	Mukilteo Fishing Pier	Picnic Point South, Rail	Spencer Island County Park		
Darlington Beach North, Rail	Mukilteo Park South, Rail	Port Of Everett Marina	Tulalip Bay Marina		
Forest Park	Nakeeta Beach South, Rail	Port Susan Bay Preserve	Warm Beach		
Howarth Park South	Nakeeta Beach Tidelands	Silver Cloud Pier	Warm Beach Church Camp		
Leque Island	North Marine View Park	Skagit Wildlife Recreation Area	Wells Point North		
	Olympic Beach Park	Soundview Drive NW Road End	West Pass Access		
	Olympic View Rail		West Pass Bridge		
Thurston County					
Burfoot County Park	1	1/wk	56	0%	0
Priest Point Park	2	None	0	NA	0 (98)*
Beaches in Thurston County that were not monitored and that had no closing or advisory days in 2010:					
4th Ave Bridge	Forest Bay Acres Community	Nisqually Habitat Management Area	Southeast Budd Inlet		
Bayview Market Public Access	Frye Cove County Park	Nisqually National Wildlife Refuge	Steamboat Island Bridge		
Beachcrest Community	Green Park Community Club	Old Olympic Highway Bridge, Oyster Bay	Swantown Marina		
Boston Harbor Boat Ramp	Hawks Prairie Estate	Olympia Country & Golf Club	Tamoshan Homeowners Park		
Boston Harbor Marina	Highway 101 Bridge, Mud Bay	Percival Landing North	Thurston County Parcel (Indian Rd)		
Buzz's Tavern	Highway 101 Bridge, Oyster Bay	Port Plaza/Visitor Morage	Tolmie State Park		
Capitol Land Trust, South Eld Inlet	Hogam Bay Land Trust	Snug Harbor Community Beach	West Bay Park		
Carlyon Beach Country Club	Martin Marina	South Budd Inlet Waterfront	Westbay Marina		
Evergreen State College Beach	Mud Bay Bridge		Woodard Bay Natural Area		
Fiddlehead Marina			Zittel's Marina		
Whatcom County					
Birch Bay County Park	1	1/wk	54	13%	0
Larrabee State Park, Wildcat Cove	2	1/wk	87	22%	0
Marine View Park	2	1/wk	48	0%	0
Semiahmoo County Park	3	None	0	NA	12

Beach	Tier	Assigned Monitoring Frequency	Total Samples	% of Samples Exceeding State Standards	Closing or Advisory Days
Whatcom County					
Beaches in Whatcom County that were not monitored and that had no closing or advisory days in 2010:					
Birch Bay Near Terrell Creek	Community Beach	Little Squalicum Park	Point Whitehorn		
Birch Bay State Park	Chuckanut Island	Lummi Island Recreation Site	Semiahmoo Resort & Marina		
Birch Bay Village	Chuckanut Point	Lummi Island, Beach 220	Smugglers Cove North, Beach 221A		
Birch Point, Beach 372	Clarks Point	Lummi Island, Beach 223B	Smugglers Cove Point, Beach 221		
Blaine Harbor And Boat Launch	Cottonwood Beach County Park	Lummi Island, Beach 224	South Birch Point		
Blaine Rd. Bridge	Devils Slide, Beach 220A	Lummi Island, Beach 283	South Drayton Harbor		
Boulevard Park/ Bayview Marine Park	Drayton Harbor	Lummi Rocks	South Semiahmoo Bay		
Bumstead Spit South, Beach 223A	Drayton Harbor Park	Maple Beach	Squalicum Harbor		
Bumstead Spit, Beach 223	Drayton Harbor/Whatcom Land Trust	Marine Drive Park	Teddy Bear Cove		
Carter Point	Eliza Island	Monument County Park	Wildcat Cove Tidelands		
Chuckanut Beach	Lighthouse Marine County Park	Mud Bay, Chuckanut	Zuanich Park		
	Lily Point County Park	Padden Creek Lagoon			
		Point Roberts Marina and Resort			

*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 Washington State Department of Ecology. January-December 2010 (FFY09) Annual Report for Washington State's BEACH Program. Not dated.
- 2 Jessica Bennett, Washington Department of Ecology. Personal communication. March 2011.
- 3 Lynn Schneider, Washington Department of Ecology. Personal communication. May 2007.

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



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%)

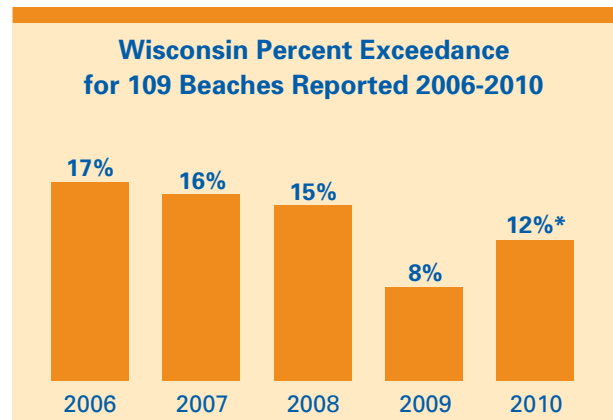
Reported Sources of Beachwater Contamination Statewide (number of closing/advisory days)

- 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.



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



© JULIE KINZELMAN

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

* 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	Riverside Drive Beach	Van Lanen Beach	Volk's Landing Boat Launch Beach		
Joliet Park	Town of Scott Park 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	Braunsdorf Beach	Clay Banks Beach 1	County TT Beach		
Bittersweet Lane Beach	Chippewa Drive Beach	Cliff View Drive 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	Kickapoo Drive Beach	Potawatomi State Park Beach 1	Sand Cove		
Goldenrod Lane Beach	Lakeshore Drive Beach Door	Potawatomi State Park Beach 2	Sunset Beach Fish Creek		
Hemlock Lane Beach	Pebble Beach Road Beach 1 Door	Sand Bay Beach 2	White Pine Lane Beach		
Isle View 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 Shauna 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.

TESTING THE WATERS



Sources of Beachwater Pollution

Most beach closings and advisories are issued because beachwater monitoring has detected bacteria that indicate the presence of pathogens—microscopic organisms from human and animal wastes that pose a threat to human health. The key known contributors of these contaminants are stormwater runoff, untreated or partially treated discharges from sewage treatment systems, discharges from sanitary sewers and septic systems, and wildlife.

STORMWATER RUNOFF


Stormwater runoff starts as rain or snowmelt. As it washes over roads, rooftops, parking lots, construction sites, and lawns, it becomes contaminated with oil and grease, pesticides, litter, and pollutants from vehicles. On its way to storm drains, it also can pick up fecal matter from dogs, cats, pigeons, other urban animals, and even humans. Human waste may also find its way into storm drain systems from adjacent sewage pipes that leak, or from businesses or residences that have illegally connected their sewage discharge to the storm drains. Illicit discharges also occur when people empty holding tanks from recreational vehicles and trailers into storm drains.

The amount of pollution present in urban runoff tends to correlate with the amount of impervious cover. Impervious cover is anything that stops water from soaking into the ground, such as roads, sidewalks, parking lots, and buildings. A study conducted in North Carolina found that a watershed that was 22% covered by impervious surfaces had an average fecal coliform count more than seven times higher than a watershed that was 7% covered by impervious surfaces.¹ However, even in less densely populated areas, uncontrolled runoff can foul beaches.

As the population along the U.S. coast grows, more land is converted to impervious surfaces that shed rather than absorb falling rain. Today, stormwater runoff from urban and



For more
information,
please
contact:

Jon Devine
jdevine@nrdc.org
(202) 289-6868
 switchboard.nrdc.org/
blogs/jdevine

www.nrdc.org/policy
www.facebook.com/nrdc.org
www.twitter.com/nrdc



suburban areas is posing a significant problem that is growing rapidly with rising populations and sprawling development. More than half of the people in the United States live in coastal counties, occupying only 17% of the nation's land mass (excluding Alaska). Between 1980 and 2003, the coastal population grew by 33 million, and it is projected to increase by another 12 million by 2015.² At the current rate, by 2025 more than a quarter of all of our coastal acreage will be developed.³

HUMAN SEWAGE FROM TREATMENT SYSTEMS

Sewage overflows from aging sanitary and combined sewer systems, leaking sewage pipes, and malfunctioning sewage treatment plants and pump stations have always been a major cause of pollution at ocean, bay, and Great Lakes beaches. As demonstrated at Rancho Santa Margarita, California, in March 2010, a single ruptured sewer line can quickly spill hundreds of thousands of gallons of untreated sewage into coastal waters and result in contaminated beachwater along miles of beaches.⁴

Combined Sewer Overflows

Combined sewer systems, concentrated in the Great Lakes region and northeastern United States, carry both raw sewage from residences and industrial sites and stormwater runoff from streets to sewage treatment plants. Although treating stormwater before releasing it to surface waters is desirable, during periods of rainfall or snowmelt, the volume of the combined wastewater can become too great for the treatment plant to handle. In such circumstances, the excess

flow is diverted to outfall points that discharge pollutants—including raw sewage; floatables such as trash, syringes, and tampon applicators; toxic industrial waste; and contaminated stormwater—into the nearest stream or coastal waterway. This is known as a combined sewer overflow, or CSO.

CSOs are a major cause of pathogen contamination in marine and Great Lakes waters near urban areas. As of 2002, CSOs discharged 850 billion gallons of raw sewage and stormwater annually, and 43,000 CSO events occurred per year nationwide. Although they are most prevalent in urban areas, CSOs affect 46 million people in 746 communities throughout 32 Northeast and Great Lakes states.⁵

CSOs contaminate shellfish waters as well as recreational beaches. Shellfish harvesting has been restricted in the majority of the 659 shellfish beds located close to a CSO outfall.⁶ Although an EPA policy that aims to reduce these overflows has been in effect since 1994, virtually all combined sewer systems continue to overflow when it rains. A significant number of communities with CSOs still have not submitted plans for controlling them.

Sanitary Sewer Overflows and Discharges From Sewer-Line Breaks

Sanitary sewer systems carry human and industrial waste from buildings to sewage treatment plants where it is treated. These sewer systems can discharge untreated sewage when the treatment plants are overwhelmed or malfunction or when sewer lines break, posing a threat to bathing beach safety. Separate sanitary sewers serve approximately 164 million people nationwide.⁷

Although most of these systems were built more recently than the combined sewer systems, they are aging and deteriorating rapidly. A nationwide survey of 42 treatment plants found some system components that have been in use for as long as 117 years; the average is 33 years.⁸ As population and sewer load increases and rehabilitation and maintenance schedules lag, pipes can deteriorate and break, spilling sewage directly onto streets or into waterways.

The EPA has estimated that 23,000 to 75,000 sanitary sewer overflows (SSOs) occur annually, discharging a total of 3 billion to 10 billion gallons per year. Nearly 70% of sewage overflows from human waste sewage lines are due to obstructions such as tree roots or grease clogs, line breaks, and mechanical failures.⁹

Wet weather places demands on sanitary sewer systems even though these systems do not treat stormwater runoff. This is because even when there are no improper connections between stormwater and sanitary sewers, water seeps through manholes and into the sewer lines and also falls onto the surface of the treatment units during rain events. This can lead to the discharge of raw sewage from manholes, overflowing pipes, and treatment-plant bypasses. Although only 26% of sanitary sewer overflows nationwide were caused by wet weather events and related inflow and infiltration, these events accounted for nearly 75% of the total SSO volume discharged.¹⁰

In January 2001, the EPA proposed SSO regulations that would have required improved capacity, operation, and maintenance as well as public notification when overflows occur. The Bush administration shelved this initiative, but the Obama administration's EPA announced in June 2010 that it is considering a suite of actions to address SSOs.

Inadequately Treated Sewage

Sewage plants near coastal waters tend to serve densely populated, rapidly growing urban areas. When too many homes and businesses are hooked up to a sewage treatment plant, the plant is prone to more frequent bypasses and inadequate treatment. Moreover, sewage treatment plants can, and often do, malfunction as the result of human error, breakage of old equipment, or unusual conditions in the raw sewage. When that happens, raw or partially treated sewage may be discharged into coastal waterways and their tributaries.

Some sewage systems also bypass all or a portion of their treatment plants when flows exceed capacity during rain events. This practice can also put pathogens in waterways and should be prevented.

HUMAN SEWAGE FROM SEPTIC SYSTEMS AND BOATING WASTE

Septic Systems

About one-third of new construction and 23% of existing U.S. dwellings use some kind of septic tank or on-site waste disposal system. If not sited, built, and maintained properly, septic systems near the coast can leach wastewater into coastal recreational waters, contaminating bathing beaches with fecal matter. Malfunctioning septic systems at just a few

near-shore properties can result in beachwater contamination that is significant enough to trigger a beach closure. Runoff can also carry bacteria from failing inland septic systems into streams that empty into recreational waters. Unfortunately, homeowners often do not adequately maintain their septic systems. Studies reviewed by the EPA cited failure rates of 10% to 20%.¹¹ Despite this, there is no federal regulatory program to control waste from septic systems, and local governments and states rarely inspect these systems sufficiently to prevent septic system failures.

Boating Waste

Marinas are generally located in areas that are naturally sheltered or where a breakwater has been constructed. This shelter results in reduced circulation of clean water around the docks, which allows boating waste to accumulate and pose a serious health threat. Waste may also be discharged improperly from boats that are in use, posing a health and aesthetic threat to bathing beaches.

Federal law requires boats with onboard toilets either to treat the waste with chemicals before discharging it or to hold the waste and later pump it out into a sewage treatment plant. Also, the federal Clean Vessel Act (CVA) of 1992 provides federal grant money to states for building pump-out and dump stations in marinas so boaters can dispose of human wastes in an environmentally sound manner. However, there is limited oversight of the adequacy of pump-out facilities in many areas.¹²

AGRICULTURAL DISCHARGES AND AGRICULTURAL RUNOFF

Agricultural pollution impacts nearly 40% of the country's polluted rivers and streams.¹³ The production of farm animals has increasingly shifted toward huge, industrial-scale operations where large numbers of animals are confined together. These confined animal feeding operations (CAFOs) often produce vast quantities of manure that far exceed the assimilation capacity of neighboring crops and pastures. Runoff from farms and animal feeding operations may contain high concentrations of pathogenic animal waste.

CLIMATE CHANGE AND ITS EFFECT ON DRY/WET WEATHER CONDITIONS

Beachwater quality is generally adversely affected by increased rainfall. Scientists agree that in many regions of the United States, climate change will increase the frequency and magnitude of rain and large storms; will cause more runoff, coastal flooding, and coastal erosion; and will bring warmer water and air temperatures. These changes will exacerbate existing causes of beachwater pollution that threaten public health. In fact, the Intergovernmental Panel on Climate Change found that “[w]aterborne diseases and degraded water quality are very likely to increase with more heavy precipitation.”¹⁴

In particular, global climate change is predicted to increase the amount of rainfall in regions where combined sewer systems are concentrated. In the Great Lakes region, climate modeling predicts that the regional average annual CSO frequency between 2060 and 2099 will increase between 13% and 70%.¹⁵

Even in areas that have separate sewer systems, like much of the West, an increase in extreme rainfall events can still lead to more pollution in coastal waters via increased stormwater runoff. For instance, in California, warmer temperatures can mean more winter precipitation that falls as rain and less that falls as snow, leading to more winter runoff. More winter runoff over saturated soils will result in larger sediment flows and more bacteria in beachwaters.

BEACHGOERS

In the 2005 study “Outbreaks Associated With Recreational Water in the United States,” researchers found that bathers themselves are an important localized source of contamination leading to illness outbreaks.¹⁶ All swimmers release fecal organisms when they enter the water in a process called bather shedding. Fecal accidents are also a health risk, as are diaper-aged children if care isn’t taken to ensure that their wastes are kept from entering the water. The presence of *E. coli* and coliform bacteria has been shown to correlate with the number of visitors and periods of high recreational use (generally the summer and weekends).¹⁷

WILDLIFE AND PET WASTE

Municipalities sometimes list waterfowl as the cause of beach closings or advisories. During migration season, large or excessive populations of waterfowl can gather at beaches or in suburban areas that drain into recreational waters.

Pet waste deposited on or near the beach also carries pathogens that can wind up in beachwater when pet owners do not pick up and properly dispose it. The fecal matter from these animals can overload the normal capacity of a beach to absorb wastes, degrading water quality, particularly if there is no vegetation around the waterway to absorb the waste.

¹ Mallin, Michael A., “Wading in Waste,” *Scientific American*, June 2006, pp. 53–59.

² NOAA-National Ocean Service, “Population Trends Along the Coastal United States: 1980–2008,” September 2004, pp. 1 & 6, http://oceanservice.noaa.gov/programs/mb/pdfs/coastal_pop_trends_complete.pdf.

³ Beach, Dana, “Coastal Sprawl—The Effects of Urban Design on Aquatic Ecosystems in the United States,” Pew Ocean Commission, 2002.

⁴ Barboza, Tony, “Major sewage spill could keep O.C. beaches closed through the weekend,” *Los Angeles Times*, March 26, 2010.

⁵ EPA, Report to Congress: Impacts and Control of CSOs and SSOs, pp. 4-13 to 4-19.

⁶ EPA, Report to Congress: Impacts and Control of CSOs and SSOs, p. 5-14.

⁷ EPA, Report to Congress: Impacts and Control of CSOs and SSOs, p. 4-22.

⁸ EPA, Report to Congress: Impacts and Control of CSOs and SSOs, p. 2-1.

⁹ EPA, Report to Congress: Impacts and Control of CSOs and SSOs, pp. 4-25 to 4-27.

¹⁰ EPA, Report to Congress: Impacts and Control of CSOs and SSOs, p. 4-27.

¹¹ EPA, Onsite Wastewater Treatment Systems Manual, February 2002, EPA/625/R-00/008, at pp. 1-4 and 1-6, <http://www.epa.gov/nrmrl/pubs/625r00008/625r00008.pdf>.

¹² U.S. General Accounting Office, “Water Quality: Program Enhancements Would Better Ensure Adequacy of Boat Pumpout Facilities in No-Discharge Zones,” GAO-04-613, May 2004.

¹³ EPA, National Water Quality Inventory: Report to Congress, 2004 Reporting Cycle, EPA 841-R-08-001, January 2009, p. 12.

¹⁴ IPCC, Fourth Assessment Report, Working Group II Report, “Impacts, Adaptation and Vulnerability,” Ch. 14, <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter14.pdf>.

¹⁵ EPA, “A Screening Assessment of the Potential Impacts of Climate Change on Combined Sewer Overflow (CSO) Mitigation in the Great Lakes and New England Regions,” EPA/600/R-07/033F, February 2008, p. 19.

¹⁶ Craun, Gunther F., Calderon, Rebecca L., and Craun, Michael F., “Outbreaks Associated With Recreational Water in the United States,” *International Journal of Environmental Health Research*, August 2005, Vol. 15, No. 4, pp. 243–262.

¹⁷ McDonald, A.T., Chapman, P.J., and Fukasawa, K. “The Microbial Status of Natural Waters in a Protected Wilderness Area,” *Journal of Environmental Management*, Vol. 87, No. 4, June 2008, pp. 600–608.

TESTING THE WATERS



The Impacts of Beach Pollution

Polluted beachwater makes swimmers sick and hurts coastal economies. Illnesses associated with polluted beachwater include conditions such as stomach flu, skin rashes, pinkeye, respiratory infections, meningitis, and hepatitis. In addition to the health risks from polluted beachwater, economists have estimated that a typical swimming day is worth approximately \$35 to each individual, so depending on the number of potential visitors to a beach, the “consumer surplus” loss on a day that the beach is closed or under advisory for water quality problems can be quite significant.

HEALTH RISKS


Diseases Caused by Pathogens in Bathing Waters

Polluted waters may contain disease-causing organisms called pathogens. The most common types of pathogens are those associated with human and animal waste, including bacteria, viruses, and protozoa. For instance, giardiasis is caused by the protozoa *Giardia lamblia*, North America's leading reported intestinal parasite.¹ Swimmers in sewage-polluted water can contract any illness that is spread by fecal contact, including stomach flu, respiratory infection, and ear and skin infections. Most swimming-related illnesses last from a few days to several weeks, but in some cases pathogens may cause severe,

long-term illness or even death. Sensitive populations such as children, the elderly, or those with a weakened immune system are particularly at risk for long-term effects. For example, research has shown that children under the age of 9 have more reports of diarrhea and vomiting from exposure to waterborne pathogens than any other age group, with at least a twofold increase occurring over the summer swimming months.² There is usually a delay of several days to two weeks between contact with contaminated water and expression of symptoms, and most people who get sick from swimming are not aware of the link.



For more
information,
please
contact:

Jon Devine
jdevine@nrdc.org
(202) 289-6868
 switchboard.nrdc.org/
 blogs/jdevine

www.nrdc.org/policy
www.facebook.com/nrdc.org
www.twitter.com/nrdc

Since 1971, the Centers for Disease Control and Prevention (CDC), the Environmental Protection Agency (EPA), and the Council of State and Territorial Epidemiologists have worked to maintain the Waterborne Disease and Outbreak Surveillance System for collecting and reporting waterborne diseases and outbreak-related data. In 2008, they reported that 78 waterborne disease outbreaks were on record between January 2005 and December 2006, causing illness in 4,412 people, leading to 116 hospitalizations and 5 deaths. The CDC concluded that this was the largest number of outbreaks reported to them in a two-year period. The increase was attributed to “a combination of factors, such as the emergence of pathogens (e.g., *Cryptosporidium*), increased participation in aquatic activities,” and better reporting, among other things.³

On the basis of beach visitation rates and monitoring data, researchers have estimated that 689,000 to 4,003,000 instances of gastrointestinal illness and 693,000 instances of respiratory illness occurred each year between 2000 and 2004 at Southern California beaches.⁴ While these estimates are subject to a great deal of uncertainty, they provide insight into the potential for underreporting of swimming-related illnesses.

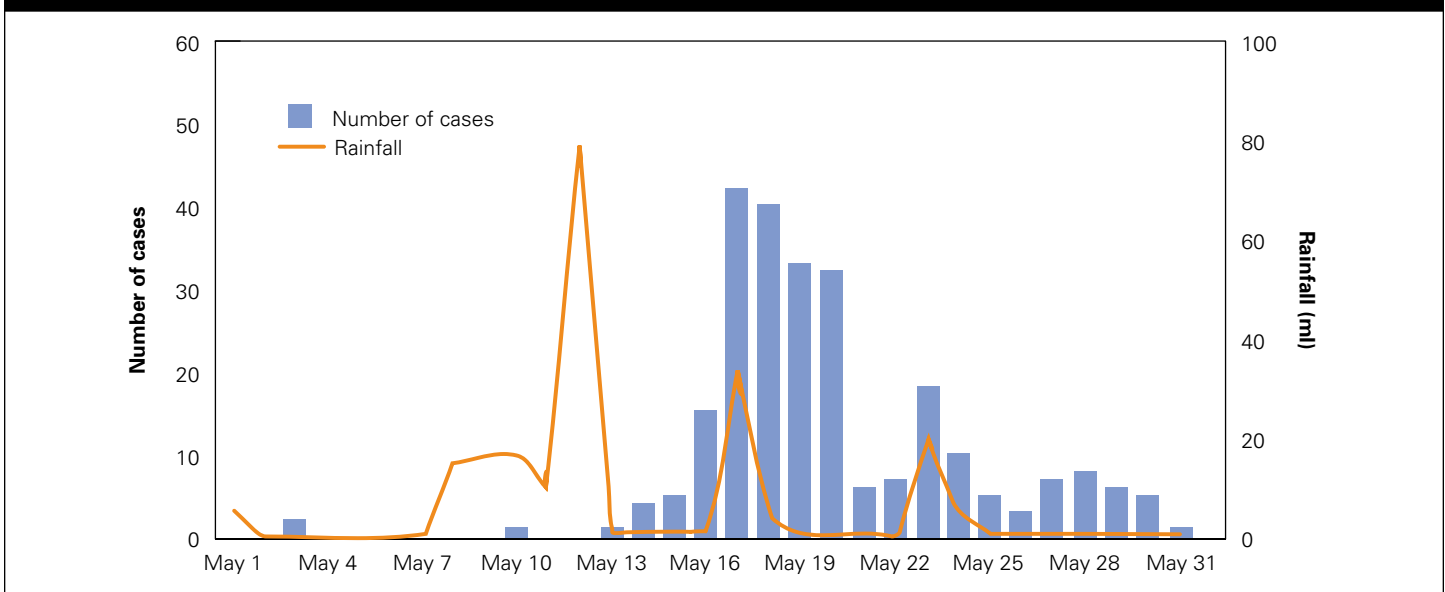
Climate Changes Will Also Affect Incidence of Disease

Discharges of polluted urban runoff result in elevated bacteria levels and increased illness rates among swimmers, and the association between heavy precipitation (leading to increased runoff) and waterborne disease outbreaks is well documented.⁵ For instance, in a 2004 California study:

[Researchers] compared rates of reported health symptoms among surfers in urban North Orange County (NOC) and rural Santa Cruz County (SCC), California, during two winters (1998 and 1999) to determine whether symptoms were associated with exposure to urban runoff. NOC participants reported almost twice as many symptoms as SCC participants during the 1998 winter. In both study years, risk increased across symptom categories by an average of 10% for each 2.5 hours of weekly water exposure. [Their] findings suggest that discharging untreated urban runoff onto public beaches can pose health risks.⁶

A large-scale 1995 epidemiological study, also in California, investigated possible adverse health effects associated with swimming in ocean waters contaminated by urban runoff.⁷ The study found an increase in risk of illness associated with

Figure 1: Influence of Heavy Rainfall on Occurrence of *E. coli* Infections



The Figure shows the relationship between unusually heavy rainfall and the number of confirmed cases of *E. coli* infection that occurred during a massive disease outbreak in Ontario, Quebec, in May 2000. The incubation period for *E. coli* is usually three to four days, which is consistent with the lag between extreme precipitation events and surges in the number of cases. Source: Amy Greer, Victoria Ng, and David Fisman, “Climate Change and Infectious Diseases in North America: The Road Ahead,” *CMAJ*, March 11, 2008, 178(6): 715–722.

Table 1: Possible Influence of Climate Change on Climate-Susceptible Pathogens

Pathogen	Climate-Related Driver	Possible Influence of Climate Change	Likelihood of Change	Basis for Assessment
<i>Vibrio</i> species	Rising temperature	Increasing ambient temperatures associated with growth in preharvest and postharvest shellfish (in absence of appropriate post-harvest controls) and increasing disease	Very likely	Likelihood of climate event is high, and evidence supports growth trend in ambient waters; adaptive (control) measures (refrigeration) would reduce this effect for postharvest oysters
		Increasing temperature associated with higher environmental prevalence and disease	Extremely likely	Likelihood of climate event is high, and evidence supports environmental growth trend
		Increasing temperature associated with range expansion	Very likely	Likelihood of climate event is high, and evidence collected to date supports trend; more data needed to confirm
	Changes in precipitation	Increasing precipitation and freshwater runoff leads to depressed estuarine salinities and increases in some <i>Vibrio</i> species	About as likely as not	Likelihood of climate event is probable, but additional research is needed to confirm pathogen distribution patterns
	Sea level changes	Rising sea level or storm surge increases range and human exposure	Likely	Likelihood of climate event is probable
<i>Naegleria fowleri</i>	Rising temperature	Increasing temperature associated with expanded range and conversion to flagellated form (infective)	More likely than not	Likelihood of climate event is high, but more research is needed to confirm disease trend
<i>Cryptosporidium</i>	Rising temperature	Expanded recreational (swimming) season may increase likelihood of exposure and disease	About as likely as not	Likelihood of climate event is high, but there is insufficient research on this relationship
	Changes in precipitation	Increasing precipitation associated with increased loading of parasite to water and increased exposure and disease	Very likely	Likelihood of climate event is probable, and research supports this pattern; adaptive measures (water treatment and infrastructure) would reduce this effect
<i>Giardia</i>	Rising temperature	Expanded recreational (swimming) season may increase likelihood of exposure and disease	About as likely as not	Likelihood of climate event is high, but there is insufficient research on this relationship
	Changes in precipitation	Increasing precipitation associated with increased loading of parasite to water and increased exposure and disease	Very likely	Likelihood of climate event is probable, and research supports this pattern; but adaptive measures (water treatment and infrastructure) would reduce this effect
	Shifts in reservoir host ranges or behavior	Increasing temperature associated with shifting range in reservoir species (carriers) and expanded disease range	About as likely as not	Likelihood of climate event is high, but there is insufficient research on this relationship

Adapted from "Analyses of the Effects of Global Change on Human Health and Welfare and Human Systems Final Report," Synthesis and Assessment Product 4.6, U.S. Climate Change Science Program and the Subcommittee on Global Change Research (EPA, July 2008).

swimming near flowing storm drain outlets in Santa Monica Bay, compared with swimming more than 400 yards away. For example, swimmers near storm drains were found to have a 57% greater incidence of fever than those swimming farther away.

Climate Changes Will Also Affect Incidence of Disease

Climate change is expected to increase the incidence of diseases contracted by swimmers. This is because water is more likely to become contaminated with pathogens in areas where there are larger storm events with increased runoff and combined sewer overflows (CSOs), and because warmer waters will allow pathogens to expand their range. Pathogens such as *Cryptosporidium parvum* and *Giardia lamblia*, which are associated with polluted runoff and CSOs,⁸ could increase in recreational waters in areas where climate change causes increased precipitation and runoff. An article in *Climate Research* notes that, although there are uncertainties, “a wetter climate in the [mid-Atlantic region] could lead to higher *C. parvum* loads in water.”⁹ A major cryptosporidium outbreak in Milwaukee in 1993, which killed 54 and sickened more than 400,000 people, occurred after stormwater interfered with a drinking water treatment plant.¹⁰

The bacterium *Vibrio cholerae*, which causes cholera, is Figure example of a pathogen that presents an increased threat to humans as a result of climate change. Extreme weather events and warmer waters can foster growth of the bacterium—one study found that *V. cholerae* was up to nearly 20 times more likely to occur at a temperature of 19°C or higher than at lower temperatures.¹¹ Increased freshwater runoff, high in nutrients and low in salinity, also may favor

the growth of *V. cholerae*. As one study of Chesapeake Bay concluded, “increased climate variability, accompanied by higher stream flow rates and warmer temperatures, could favor conditions that increase the occurrence of *V. cholerae* in Chesapeake Bay.”¹²

Threats to Swimmers From Harmful Algal Blooms

Harmful algal blooms (HABs), which are often known as red tides, are a growing problem in surface waters where nutrient-rich pollution can spur algal growth. Several species of phytoplankton produce potent toxins that can make people sick if they are exposed to contaminated water or if they eat contaminated fish or shellfish. These toxic organisms are a natural part of the phytoplankton community, but when conditions are right, they experience a rapid growth in numbers, resulting in a “bloom.” HABs can last for days, weeks, or months and cause serious and potentially life-threatening human illnesses that have a slew of symptoms, including diarrhea, nausea, vomiting, abdominal cramping, chills, diminished temperature sensation, muscular aches, dizziness, anxiety, sweating, seizures, numbness and tingling of the mouth and digits, and paralysis, as well as cardiovascular and respiratory symptoms.¹³ Approximately 10% of all food-borne disease outbreaks in the United States are caused by eating seafood contaminated by algal toxins.¹⁴ Toxins produced by harmful algae can aerosolize and cause respiratory distress even in beach visitors who do not enter the water.

The incidence of HABs has increased dramatically over the past 30 years.¹⁵ Indeed, analyzing data over nearly 50 years from the southwest coast of Florida, researchers at

Table 2: Algae and Their Threats to Human Health

Algal Blooms	Health Risk
Cyanobacteria (mainly <i>Microcystis</i> and <i>Anabaena</i>)	Severe dermatitis, burning or itching of the skin, erythematous wheals, redness of lips and eyes, sore throat, asthma symptoms, dizziness
<i>Karenia brevis</i> (and other marine algae)	Irritation of the skin, eyes, nose, and throat; coughing, shortness of breath
<i>Pfiesteria piscicida</i>	Headache, confusion, skin rash, eye irritation, respiratory irritation
<i>Alexandrium tamarense</i>	Paralytic shellfish poisoning: tingling, numbness, and burning of the perioral region; ataxia, giddiness, drowsiness, fever, rash, and staggering; respiratory arrest in more severe cases
<i>Pseudo-nitzschia australis</i>	Amnesic shellfish poisoning: nausea, vomiting, abdominal cramps, and diarrhea; in more severe cases dizziness, headache, seizures, disorientation, short-term memory loss, respiratory difficulty, and coma

the University of Miami determined that *Karenia brevis* red tides are occurring with greater frequency, closer to shore, and during more months of the year. They attribute this phenomenon to greater inputs of nutrients into coastal waters due to increased agricultural runoff and sewage discharges in the watershed over that time period.¹⁶ In August and September 2007, red tides occurred off the coast of Delaware, the first documented occurrence of *Karenia brevis* north of Cape Hatteras, North Carolina.¹⁷

As is the case with pathogens, warmer waters may also result in expanded ranges of some harmful algae species.¹⁸ According to a recent Chesapeake Bay Foundation report:

Climate change might be expanding the range of a few new toxic species of algae into the estuary, and causing others to bloom earlier, according to a 2008 report by a scientific advisory committee of the U.S. EPA Chesapeake Bay Program. For example, a toxic alga normally associated with Florida and the Gulf Coast, Alexandrium monilatum, in 2007 was believed to have been responsible for killing whelks (a species of sea snail) in the York River in Virginia. It was the first known bloom in this area, and it represented a potential shift northward, according to the EPA committee report. A large bloom of a toxic alga normally found in the Caribbean Sea, Cochlodinium polykrikoides, killed young fish and oysters in the lower Chesapeake Bay in August 2007.¹⁹

Efforts to deal with red tides have focused on mitigating the effects of these events, primarily through improved systems to monitor for harmful algal blooms, educate and communicate the risks to the general population, and learn more about the causes of harmful algal blooms and how they affect humans and aquatic life. Other techniques to prevent HABs involve restricting the movement of harmful algal species via the shellfish market and ship ballast water. For example, ballast water may be heated or chemically treated to prevent the introduction of invasive species, and trade may be restricted in shellfish from areas experiencing red tides. Strong efforts need to be made to control nitrogen and phosphorus pollution from sources such as sewage systems, urban and suburban stormwater, septic tanks, and agricultural runoff to reduce the number of red tide events.²⁰

ECONOMIC IMPACTS

Beaches, rivers, and lakes constitute the top vacation destination in the U.S. Americans take more than 900 million trips to coastal areas annually and spend approximately \$44 billion.²¹ Yet our coasts provide more than just recreation—in 2007, the nation's shoreline-adjacent counties contributed \$5.6 trillion toward the nation's gross domestic product and 47 million jobs.²² Economic activity directly associated with the ocean contributed more than \$138 billion to the U.S. economy in 2004.²³

The ways in which polluted water puts these revenues at risk are many and varied. Polluted beaches result in a loss of utility for those who have planned to visit and swim in the water; that in turn impacts local economies in the form of lost tourist dollars and the jobs they support. Clean beaches, on the other hand, can transform a community.

Coastal tourism, attributable in part to clean beaches, generates substantial revenues for state and local governments as well as for businesses lining the coasts. Economists estimate that a typical swimming day is worth approximately \$35 to each individual.²⁴ Depending on the number of potential visitors to a beach, this “consumer surplus” loss can be quite significant. For example, one study estimated economic losses as a result of closing a Lake Michigan beach due to pollution could be as high as \$37,030 per day.²⁵ Similarly, a Southern California study concluded that each year fecal contamination at Los Angeles and Orange County beaches caused between 627,800 and 1,479,200 excess gastrointestinal illnesses with a public health cost of \$21 million to \$51 million.²⁶

Another example of the potential for economic harm from beach pollution is found in Florida. One analysis of southeast Florida estimated that there were more than 18 million “person-days” of visits to natural reefs in four counties, leading to \$2.7 billion in sales and more than 40,000 full- and part-time jobs.²⁷ Yet coral reefs are adversely impacted by a combination of rising temperatures, increasing nutrients, and pathogen pollution from sources such as untreated or inadequately treated sewage. Fecal contamination from sewage in the Florida Keys is thought to be a major source of disease in coral.²⁸

Investments in improving water quality result in greater economic returns. For instance, a 2007 Brookings Institution study concluded that the \$26 billion Great Lakes Regional

Collaboration Strategy to clean and preserve the Great Lakes would result in present-value economic benefits of “[o]ver \$50 billion in long-term benefits; and between \$30 and \$50 billion in short-term multiplier benefits.”²⁹ A 2007 study by the National Oceanic and Atmospheric Administration found that an increase in water quality in Long Beach, California, to the healthier standards of Huntington City Beach would create \$8.8 million in economic benefits over a 10-year period.³⁰ A similar 2001 study compared the 1996 water quality of the Chesapeake Bay with the quality it would have had if legislation to clean the waters had never been passed. The study estimated that the water quality improvements increased annual boating, fishing, and swimming revenue by \$357.9 million to \$1.8 billion.³¹

Some areas either do not monitor their beaches or do not close them when water quality fails to meet standards. This can result in lower short-term losses for businesses in the area, but it also means that those who get sick will incur medical costs and lost workdays as a result. Cleaning up the sources of pollution so that beachwater does not pose a health risk is the optimal solution. In the meantime, protecting public health will require improved beachwater monitoring and closing of beaches when contamination is detected or suspected, rather than allowing people to swim and get sick. Given the large number of people using beaches and the substantial income from coastal tourism, the cost of monitoring programs is reasonable.

- 1 Health Canada (2004), “Guidelines for Canadian Drinking Water Quality: Supporting Documentation—Protozoa: Giardia and Cryptosporidium,” Water Quality and Health Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario, p. 11, www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/water-eau/protozoa/protozoa.pdf.
- 2 Centers for Disease Control and Prevention, “Giardiasis Surveillance—United States, 1998-2002,” January 2005, www.cdc.gov/mmwr/preview/mmwrhtml/ss5401a2.htm.
- 3 Yoder, J.S., et al., “Surveillance for Waterborne Disease and Outbreaks Associated With Recreational Water Use and Other Aquatic Facility—Associated Health Events—United States, 2005-2006,” Centers for Disease Control and Prevention, September 12, 2008/57(SS09), pp. 1-29, www.cdc.gov/mmwr/preview/mmwrhtml/ss5709a1.htm.
- 4 Brinks, M.V., et al., “Health Risk of Bathing in Southern California Coastal Waters,” *Archives of Environmental & Occupational Health*, Vol. 63, No. 3 (Fall 2008).
- 5 Curriero et al., “The Association Between Extreme Precipitation and Waterborne Disease Outbreaks in the United States, 1949-1994,” *American Journal of Public Health*, August 2001, www.ajph.org/cgi/reprint/91/8/1194.pdf.
- 6 Dwight, R.H., et al., “Health Effects Associated With Recreational Coastal Water Use: Urban Versus Rural California,” *American Journal of Public Health*, Vol. 94, No. 4 (April 2004).
- 7 Haile, R., et al., “An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay,” Santa Monica Bay Restoration Project (1996), cited in 64 Fed. Reg. 68,721 (December 8, 1999).
- 8 Hunter, P.R., “Climate Change and Waterborne and Vector-borne Diseases,” *Journal of Applied Microbiology*, 2003, 94, 37S-46S, p. 40S, <http://ncsp.undp.org/sites/default/files/climatechangeandwaterborneandvector-borne-diseases.pdf>.
- 9 Benson, Keith, Patricia Kocagil, and James Shortle, “Climate Change and Health in the Mid-Atlantic Region,” *Clim. Res.*, 2000, Vol. 69, No. 5, pp. 245-253.
- 10 Curriero et al., “The Association Between Extreme Precipitation and Waterborne Disease Outbreaks in the United States, 1948-1994,” *American Journal of Public Health*, August 2001, www.ajph.org/cgi/reprint/91/8/1194.pdf.
- 11 Louis, V.R., et al., “Predictability of *Vibrio Cholerae* in Chesapeake Bay,” *Applied and Environmental Microbiology*, May 2003, Vol., 69, No. 5, pp. 2,773-2,785.
- 12 Ibid.
- 13 Woods Hole Oceanographic Institution, “The Harmful Algae Page,” www.whoi.edu/redtide/.
- 14 Van Dolah, Frances M., “Marine Algal Toxins: Origins, Health Effects, and Their Increased Occurrence,” *Environmental Health Perspectives Supplements*, Vol. 108, No. S1, March 2000.
- 15 Woods Hole Oceanographic Institution, “The Harmful Algae Page,” www.whoi.edu/redtide/.
- 16 Brand, L.E., and A. Compton, “Long-Term Increase in *Karenia Brevis* Abundance Along the Southwest Florida Coast,” *Harmful Algae*, Vol. 6, No. 2 (February 2007), pp. 232-252.
- 17 State of Delaware, Department of Natural Resources and Environmental Control, Information on Red Tides, www.dnrec.delaware.gov/Pages/RedTideInformation.aspx.
- 18 Moore, S.K., et al. (2008); Mortsch, L., et al., “Climate Change and Water Quality in the Great Lakes Region: Risks, Opportunities, and Responses,” a report prepared for the Great Lakes Water Quality Board of the International Joint Commission (August 2003), p. 91..
- 19 Chesapeake Bay Foundation, “Bad Water 2009: The Impact on Human Health in the Chesapeake Bay Region,” July 2009, p. 9 (citation omitted).
- 20 See generally Woods Hole Oceanographic Institution, “Prevention, Control and Mitigation of Harmful Algal Blooms: A Research Plan,” September 2001, pp. 9-10, www.whoi.edu/science/B/redtide/pertinentinfo/PCM_HAB_Research_Plan.
- 21 EPA, “Liquid Assets: A Summertime Perspective on the Importance of Clean Water to the Nation’s Economy,” EPA, 800-R-96-002, 1996, at 2.
- 22 National Ocean Economics Program, Market Data, Coastal Economy Data, Shore Adjacent Coastal Zone Counties, <http://noep.mbari.org/Market/coastal/coastalEcon.asp>.
- 23 National Ocean Economics Program, Market Data, Coastal Economy Data, <http://noep.mbari.org/Market/ocean/coastalEcon.asp>.
- 24 Rabinovici, S.J., et al., “Economic and Health Risk Trade-Offs of Swim Closures at a Lake Michigan Beach,” *Environmental Science and Technology*, Vol. 36, No. 10, 2004, p. 2,742.
- 25 Ibid.
- 26 Given, S., et al., “Regional Public Health Cost Estimates of Contaminated Coastal Waters: A Case Study of Gastroenteritis at Southern California Beaches,” *40 Environ. Sci. Technol.* 4851 (2006).
- 27 Johns, G.M., et al., “Socioeconomic Study of Reefs in Southeast Florida,” Final Report October 19, 2001, as revised April 18, 2003, <http://coastalsocioeconomics.noaa.gov/core/reefs/02-01.pdf>.
- 28 “Sewage Casts Pox on Reefs,” *Nature*, June 18, 2002.
- 29 Austin, J.C., et al., “Healthy Waters, Strong Economy: The Benefits of Restoring the Great Lakes Ecosystem” (The Brookings Institution, September 2007), at 2, 5, 10, www.brookings.edu/metro/pubs.20070904_gleiecosystem.pdf.
- 30 Leeworthy, V.R., and P.C. Wiley, “Southern California Beach Valuation Project: Economic Value and Impact of Water Quality Change for Long Beach in Southern California,” NOAA, February 2007.
- 31 Morgan et al., “Benefits of Water Quality Policies: The Chesapeake Bay,” *Ecological Economics*, Vol. 39, No. 2 (November 2001), pp. 271-284.

TESTING THE WATERS




State Highlights

Many coastal states have worked hard and invested heavily in improving and preserving their beach water quality and protecting public health. While space does not permit a comprehensive compilation of all efforts to improve beach water quality and better protect the public, descriptions of some of the specific activities that states have shared with NRDC appear in this chapter, along with resulting improvements in water quality, if available. Contaminated runoff is the most commonly reported cause of poor beach water quality, so the chapter begins with a section on reducing the impacts of contaminated runoff. This includes a discussion of states' implementation of green infrastructure, which allows stormwater to infiltrate into the soil instead of being carried, along with pollutants, to natural bodies of water in storm drains. This section also includes examples of stormwater treatment techniques. Sewage is the second-most commonly reported cause of beach water contamination; accordingly, the next section is about preventing sewage from contaminating water by reducing sewage overflows, leaky septic tanks, illicit sewer connections, and discharges from boats. Next is a look at beach maintenance practices and beach infrastructure changes that can result in water quality improvement. A section about special efforts states are making to provide early notification to the public when beach water quality might be compromised includes a discussion of investigations into advanced monitoring technologies, use of predictive models that provide real-time estimates of beach water quality, and improved communication about sewage spills. The chapter concludes with a look at efforts to identify sources of contamination at beaches, with examples of microbial source tracking studies, sanitary surveys, and special monitoring studies.



For more
information,
please
contact:

Jon Devine
jdevine@nrdc.org
(202) 289-6868
 switchboard.nrdc.org/
 blogs/jdevine

www.nrdc.org/policy
www.facebook.com/nrdc.org
www.twitter.com/nrdc

REDUCING THE IMPACT OF CONTAMINATED URBAN RUNOFF

Two strategies for reducing contamination carried to beaches by stormwater runoff are discussed in this section: green infrastructure techniques and stormwater treatment.

Green infrastructure techniques

Green infrastructure strategies employ a variety of techniques to reduce urban stormwater discharges to surface waters. These strategies, which are also often termed low-impact development or LID, act to restore natural conditions by increasing the amount of permeable, usually vegetated areas that minimize the volume of stormwater discharges. Most often, these techniques retain and filter rainwater where it falls, letting it soak into the ground rather than dumping it into waterways. Green infrastructure reduces pollutant flows and minimizes the need for more expensive, traditional treatment by utilizing strategically placed rain gardens in yards, tree boxes along city sidewalks, green roofs that use absorbent vegetation on top of buildings, and permeable pavement. Green infrastructure also involves capturing and storing stormwater in rain barrels or cisterns and reusing it, most often for irrigation or other nonpotable uses. Many green infrastructure strategies have the added benefits of augmenting the water supply, providing wildlife habitat, minimizing greenhouse gas generation, and being aesthetically pleasing.¹

When surveyed for this year's *Testing the Waters*, many states reported that green infrastructure is gaining traction as success stories mount.

- The American Recovery and Reinvestment Act of 2009 specifically directs clean water funding to environmentally innovative projects, and grant recipients are using funds to help improve beach water quality by implementing green infrastructure techniques. For example, in California, the city of Hermosa Beach was awarded nearly \$1.3 million in Recovery Act funds in 2010 to turn one of its major thoroughfares into a “green street.” The project includes a new storm drain system designed to prevent bacteria-laden runoff from ending up in beach water that is listed as impaired because of high bacteria levels.²

- The city of Redondo Beach in California was given \$2.2 million in Recovery Act funds to protect coastal waters from urban stormwater by collecting rainwater for irrigation at a park and infiltrating excess water. This project will reduce discharges of bacteria in urban runoff to the city's beaches.³

- Green infrastructure techniques are being promoted in an effort to improve the water quality in Wreck Pond, a tidal pond in New Jersey that is high in fecal indicator bacteria and whose discharges are at least sometimes to blame for persistent water quality problems at beaches in the towns of Sea Girt and Spring Lake. The Wreck Pond Regional Stormwater Management Planning Committee is working with Rutgers University's Cooperative Extension to install six showcase rain gardens in the Wreck Pond watershed.⁴ These gardens will reduce overall runoff, sediment, and pollutant loading into streams in the Wreck Pond watershed, which will in turn improve water quality at beaches downstream of the pond.

- Bristol Town Beach in Colt State Park in Rhode Island is using green infrastructure to improve beach water quality. Six catch basins have been installed to intercept runoff from the park before it reaches the beach. Rainwater is filtered mechanically in the catch basins, then further filtered by vegetation in bioswales. The bioswales also significantly slow the flow of rainwater, preventing surges of stormwater that may carry bacteria and other contamination. Other water quality projects are planned at this beach: The storm drain will be opened and restored so that it functions like a winding creek, which will help clean the water it carries to the beach; the parking lot will be replaced by an eco-friendly parking lot with bioretention swales and specialized vegetation to further absorb and filter stormwater; and storage tanks for rainwater will reduce combined sewer overflows from the nearest sewage treatment plant during periods of heavy rain.⁵

Parking lots are a beach amenity that can contribute to the degradation of beach water. They are often constructed at the edge of bathing areas for ease of access, but pavement prevents water from soaking into the ground when it rains. Simple strategies like separating roads and parking lots from the beach with a strip of vegetation can prevent contaminated runoff from reaching the beach water.

- A \$7 million restoration project at Hobie Beach (Dog Beach) in Miami was conducted primarily for shoreline stabilization, but some of the changes are expected to have beneficial effects on water quality as well. In particular, stormwater management improvements were made to the parking lot and maintenance road. Semipermeable pavers now allows some rainfall to infiltrate into the soil, and a new drainage system is in place.⁶

■ At Zoo Beach and North Beach in Racine, Wisconsin, a series of dune ridges were developed 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, but the dune ridges retained all of the sheet flow from the parking lot. Together with a 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 preemptive closures.⁷

Green infrastructure policy development

In many locations, current stormwater management cannot meet clean beach water goals, and communities often struggle with the economic burden of repairing or expanding existing stormwater infrastructure. While retrofitting existing development to reduce runoff can be cheaper and more effective than constructing traditional stormwater treatment facilities, the most economical time to implement green infrastructure strategies is during construction. Several coastal areas around the country have developed policies that encourage or require the use of green infrastructure.

■ Measures outlined in Delaware's Inland Bays Pollution Control Strategy emphasize green infrastructure techniques. The strategy was created to meet total maximum daily load limits for nutrients, but many of its provisions will reduce bacterial discharges in runoff to the inland bays as well. For example, the strategy requires the establishment of buffer zones around wetlands as well as tidal and nontidal waters in the inland bay watersheds. It also allows the preservation or establishment of natural features like forest stands and encourages the use of rain gardens, natural landscaping, and constructed wetlands for management of stormwater.⁸

■ Maryland's recent initiatives to reduce stormwater pollution, including the Stormwater Management Act of 2007, a new general permit to control stormwater discharge during construction, and new municipal stormwater permits now being issued for Maryland's 10 largest counties, are expected to reduce urban stormwater by 20 to 30 percent when fully implemented.⁹

■ Duluth, Minnesota, is in the process of adopting a new unified land development code. This code will be informed by the city's comprehensive plan and will encourage green infrastructure and the preservation of open space.



© Julie Kinzelman

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

■ The second phase of a coastal bacteria source identification project being conducted by New Hampshire's Department of Environmental Services and a local environmental firm is scheduled for completion this summer. This phase of the project will identify potential bacteria sources and mitigation processes that will inform the development of plans for the North Hampton State Beach watershed and the Wallis Sands at Wallis Road Beach watershed. These plans will promote the use of green infrastructure.

Stormwater treatment

While prevention of stormwater runoff through the use of green infrastructure is preferred, there are situations in which it is more practical to focus on the treatment of contaminated stormwater. There are many means of treating stormwater to reduce bacterial contaminants, such as installing filters into outfall catch basins and using UV disinfection.

■ While Kure Beach (Ocean Pier at K Avenue) in North Carolina has consistently enjoyed good water quality, the town of Kure Beach was concerned about discharging stormwater with elevated levels of fecal indicator bacteria to outfalls at the beach. The beach has a well-established dune system whose crest is 12 to 14 feet above sea level, and the town decided to explore filtering stormwater through the sand in the dunes in order to remove bacteria. To test the feasibility of this strategy, two filtration units were installed in 2006, treating 95% of the runoff from a residential section of town. There has been no indication of any slumping or eroding of the dunes or of adverse effects on the water table since the treatment units were installed. Fecal indicator bacteria levels of 1,000 cfu/100 ml in runoff at the entrance to the filtration units drop to typical groundwater concentrations of 10 cfu/100 ml at the base of the dunes. A third system was installed in 2009.¹⁰

■ Beginning in late 2000, a stormwater outfall in Racine, Wisconsin that was affecting water quality at North Beach and Zoo Beach in Racine was reengineered. The improved outfall includes a pretreatment system that removes solid waste and oil from stormwater and then directs it to a series of infiltration/evaporation basins planted with native wetland species. In high-flow situations caused by large storms, stormwater bypasses the treatment structures and wetlands, discharging through a bypass outlet and into a plunge pool that also contains native vegetation before it is released into Lake Michigan.¹¹

■ The city of Newport, Rhode Island, has installed a \$5.8 million ultraviolet treatment system to reduce bacteria levels from stormwater that discharges at the city's beach. The system was expected to begin operating before the start of the 2011 beach season.¹²

PREVENTING SEWAGE CONTAMINATION

Discharges of partially treated and untreated sewage into waterways are the second-most commonly reported cause of beach water contamination. These discharges can be caused by malfunctions at sewage treatment plants, broken sewer lines, or equipment failures. Some plants treat a combination of stormwater runoff and domestic sewage, and when the volume of water overwhelms the plant's treatment capacity during storms, the plants discharge untreated or partially treated sewage in events called combined sewer overflows, or CSOs. Other sources of sewage contamination at beaches include leaky septic tanks, discharges from boats, and illicit sewer connections to storm drains.

Overflows from sewage treatment plants

Coastal localities that have taken steps to reduce sewer overflows are seeing improvements in beach water quality. One way to reduce overflows is to upgrade sewage treatment plants so they can handle a higher volume of waste. Installing holding tanks that allow sewage generated during high-flow events to be treated is another way to prevent overflows.

■ Lakewalk Beach in Duluth, Minnesota, used to have a number of advisory days every year due to sewage bypasses and overflows. The city installed a series of holding tanks, including one that holds a million gallons of wastewater, to reduce or eliminate sewage bypasses into Lake Superior and the St. Louis River. Water quality at Lakewalk Beach showed immediate improvement, with no advisory days in 2009 and just one in 2010.¹³



Dune filtration unit under construction at Kure Beach.

© Michael R. Burchell III

■ A 17-foot-diameter combined sewer overflow tunnel in South Boston, Massachusetts, was expected to become operational on June 1, 2011. In addition to holding combined sewer overflows for later treatment, this tunnel will store stormwater flows during all but the largest rainstorms and will pump both stormwater and combined sewer overflows for treatment as capacity allows, thus preventing a large source of bacteria from reaching the beaches of South Boston.¹⁴

■ Rhode Island's commitment to improving its beach water quality is illustrated by the State Tunnel Project, which was the biggest and longest-running public works project in state history, and which was initiated to address beach water contamination caused by combined sewer overflows. The \$359 million project, completed in 2008, consists of a tunnel under downtown Providence. The tunnel can capture up to 1½ inches of the rainfall from a storm and hold it until treatment capacity becomes available.¹⁵

Leaky septic tanks

Sometimes significant sewage contamination of coastal waters occurs from multiple smaller sources. Many states have found that the water quality at some of their beaches improves after malfunctioning septic systems are eliminated.

■ Eliminating failing septic systems upstream of Fairview Beach in Virginia has improved the water quality at the beach. Microbial source tracking showed that the stormwater outfall at Fairview Beach had a persistent human signature, regardless of rainfall levels. The Virginia Department of Health and local officials located several apartments, homes, and trailers on old septic systems and connected them to the community sewer system.¹⁶ The percentage of samples exceeding the single-sample maximum standard dropped from 37% in 2006, 28% in 2007, and 32% in 2008 to 25% in each of the past two years.

■ In 2009 the city of Warwick, Rhode Island, continued its effort to connect Greenwich Bay homes using septic tanks to municipal sewer systems. Approximately 8,000 homes have been connected to municipal sewage treatment since the beginning of the project. The proportion of samples exceeding water quality standards at City Park Beach in Warwick has dropped from 19% in 2005 to 10% in 2007, 9% in 2008, 4% in 2009 and 2% in 2010. (Some of the reduction may be due to Rhode Island's State Tunnel Project, which has reduced sewer overflows.)

■ In late 2008, several failing septic tanks were identified near Purdy Sandspit County Park in Pierce County, Washington. The beach there was closed, and corrections were made. Last year bacteria tests indicated that water quality met standards, and the beach was reopened in July 2010.¹⁷ According to monitoring results, the beach met state bacteria standards for 95% of the samples taken in 2010.

Other states report plans to eliminate septic tanks in coastal areas.

■ Construction of additional sewage treatment capacity in Delaware's inland bay watersheds and the subsequent elimination of tens of thousands of septic tanks and other sources of sewage contamination are expected to result in water quality improvement in the inland bays.

■ The city of Chatham, Massachusetts, began constructing a new wastewater treatment facility in the spring of 2010. Construction of the plant, five pump stations, and sewer mains will ultimately allow about two-thirds of city residents to be connected to municipal wastewater treatment instead of septic tanks.¹⁸

■ Construction of additional sewage treatment capacity in Delaware's inland bay watersheds and the subsequent elimination of tens of thousands of septic tanks and other sources of sewage contamination are expected to result in water quality improvement in the inland bays.¹⁹

Illicit sewer connections

Illicit sewer connections occur when homeowners and businesses unknowingly or purposely connect their sewage lines to storm drains instead of to municipal sewer lines. In coastal areas, the storm drains may flow straight to the beach, and the illicit connection results in beach water contamination.

■ The city of Newport, Oregon, took steps to protect the public when monitoring revealed consistently high bacteria levels in stormwater discharges to Nye Beach in Lincoln County in 2006 and 2007. The city conducted smoke and dye testing of the stormwater and sewer lines and discovered that seven properties were discharging sewage directly to stormwater drains instead of to the city's sewage treatment system. In 2008, these cross-connections were corrected.²⁰ Beach water quality has improved, from 32% exceedances in 2007 to 7% in 2008, and 0% in 2009 and 2010.

Boater waste

Carelessly handled waste from boats can be a source of fecal contamination at beaches. Maintaining adequate pump-out facilities in marinas and encouraging their use is one way to reduce dumping of boater waste in near-shore waters.

■ Because of elevated levels of enterococcus bacteria at Laite Beach and Camden Yacht Club Recreation Area, Maine Healthy Beaches conducted a boater education campaign. Activities were aimed at convincing boat owners to empty their sewage holding tanks into Camden's pump-out boat instead of emptying them into the ocean. In 2010, the pump-out boat handled 4,000 gallons more sewage than in 2009, though the values in 2009 may have been unusually low due to poor weather conditions and low boat traffic. Still, the 2010 figure represents an increase of 2,000 gallons compared with 2008, when there was similar weather and boat traffic; the additional capture in 2010 reflects well on the campaign.²¹

■ In July 2010, Pleasant Bay on Cape Cod, Massachusetts, became the state's latest no-discharge zone. No-discharge zones are designated by the U.S. EPA and prohibit both treated and untreated sewage discharges from boats. Within these zones, boat operators are required to retain their sewage onboard for disposal at sea (more than three miles from shore) or onshore at a pump-out facility.²²

BEACH INFRASTRUCTURE AND MAINTENANCE PRACTICES

Often, modifications that are intended to make a beach more attractive or accessible to visitors backfire because they contribute to poor water quality. Breakwaters, for example, make water less turbulent for swimmers, but they also reduce natural water circulation and trap polluted waters in areas where bathers congregate. Ironically, many "mothers' beaches" that are frequented by families with small



An oyster reef in the making after only two growing seasons in Belleville, Georgia.

children because of their quiet waters are prone to exceeding water quality standards. From a water quality standpoint, beach infrastructure that interferes with water exchange is undesirable.

- The beaches of East San Pedro Bay in Long Beach, California, illustrate the impact of infrastructure designed to reduce waves. Off the coast, a 2.2-mile World War II-era breakwater has been blamed for trapping water pollution from various sources, including the Los Angeles River, resulting in water quality exceedances at the beaches as well as ecological damage to the near-coast environment. The Army Corps of Engineers has lent its support to further study of the possible reconfiguration of the breakwater.^{23,24}

- Beachgoers might appreciate a long expanse of relatively flat and tightly packed sand, but sand harbors bacteria, and beach grooming techniques that pack and level the sand can increase the density of bacteria.^{25,26} Switching to beach grooming techniques that deeply groom the sand without leveling it can have a positive impact on beach water quality.²⁷ The city of Racine, Wisconsin, has altered its beach grooming practices to facilitate bacterial die-off in the sand through increased sun exposure and reduction of moisture content.

- Oyster reefs, which once covered the Georgia coastline, have been largely wiped out by pollution, overharvesting, and disease. It is difficult to estimate the original extent of the reefs, but information on commercial harvesting rates provides some sense of how much has been lost. In 1908, Georgia harvested 3.6 million kilograms of oyster meat; a century later less than 6,000 kilograms were harvested.²⁸ Oyster reefs play an important role in the health of estuaries, providing erosion control, water filtration, food production, and spawning and breeding habitat for many fish species. Georgia is now conducting projects to restore the reefs. These

efforts, focused on existing boat ramps, are motivated largely by the need to reduce coastal erosion and provide bank stability, but they are expected to improve beach water quality as well. Oyster reef restoration is accomplished by providing hard surfaces in the intertidal zone where oyster spat can attach and mature.

- Waterfowl also contribute to pollution. Birds are attracted by food sources, including handouts from misguided visitors as well as trash left on beaches and in overflowing garbage cans. Where there are birds there is fecal contamination. Waterfowl congregate more freely when areas adjacent to beaches have been cleared of trees and bushes that would provide cover for predators. Frequently, parking lots at the beach attract shoreline birds, and parking lot runoff washes their fecal matter into the beach water. Using border collies during the beach season to harass gulls every day from dawn to dusk²⁸ has been an effective means of improving water quality at two gull-impacted beaches in Chicago. The beach water at 63rd Street Beach (Jackson Park) exceeded standards more than half the time in 2006 and 2007. In 2008 border collies were used to reduce the number of gulls at the beach, and only 6% of water samples exceeded standards. In 2009 there was no gull harassment, and 66% of samples exceeded standards. Gull harassment was reinstated in 2010, and exceedances fell to 22%. Similar success was observed at 57th Street Beach. The beach water there exceeded standards 20% of the time in 2006 and 26% of the time in 2007. In 2008, when dogs were used to harass gulls at the beach, there was a 0% exceedance rate. The following year, when dogs were not used, the rate rose to 49%. Gull harassment was again in place in 2010, and 13% of samples exceeded standards.

PROTECTING THE PUBLIC WHEN WATER IS CONTAMINATED

When traditional culture methods are used to measure the fecal indicator bacteria counts that are the basis for beach advisories and closings, there is generally a 24-hour lag time between sampling and the issuance of advisories because it takes 24 hours for culture results to become available. As a result, beachgoers are not advised of high counts the day that bacterial counts exceed standards, but rather a day later. Many times, too, the culture results of samples taken the day a beach is placed under advisory reveal that the water quality on that day had already returned to acceptable levels. Many states are making a push to notify the public on the day that



Professional gull chasers at work at 63rd Street Beach (Jackson Park) in Chicago.

beach water is thought to be contaminated through improved communication about sewage spills that might impact beaches, investigations into advanced monitoring techniques that will allow faster test results, and the use of models that provide real-time predictions of beach water quality.

Investigating advances in monitoring technologies

For several years, EPA has been conducting research on the use of rapid test methods to determine beach water quality, particularly quantitative polymerase chain reaction (qPCR) methods. This approach detects the presence of specific sequences of genetic material and can be used to quantify the concentration of fecal indicator bacteria. EPA's investigations have studied how qPCR results correlate with other methods of determining fecal indicator bacteria concentrations, whether qPCR detects all strains of fecal indicator bacteria, and whether the method can be used to correlate the amount of indicator bacteria present with illness rates in swimmers. 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 are more likely to correlate with the concentration of living fecal indicator bacteria.

- The EPA included qPCR analysis in its National Epidemiological and Environmental Assessment of Recreational (NEEAR) Water Studies, which included water quality sampling and investigations of beachgoer illness rates at beaches on the Great Lakes and in Puerto Rico, Alabama, Florida, South Carolina, California, and Rhode Island.

- In 2007 New Jersey and EPA began an ongoing joint sampling program to study the correlation between two different culture methods and qPCR for enterococcus.
- A qPCR pilot study in Orange County, California, during the summer of 2010 demonstrated the practicality of issuing beach notifications using qPCR. In this project, the qPCR method resulted in higher bacterial counts than traditional culture methods, and more postings were issued than would have been issued if only traditional culture methods had informed the notification decisions.
- Researchers conducting a demonstration project in Racine, Wisconsin, in the summer of 2010 concluded that the same-day test method shows promise as a tool that would provide better public health protection and give beachgoers more timely information about beach water quality than traditional culture methods.³⁰

Another promising rapid test method is immunomagnetic separation/adenosine triphosphate (IMS/ATP), which exploits the unique properties of the surfaces of target cells (e.g., enterococcus or *E. coli*) to capture and tag the cells and count their concentrations in a given sample. One of the challenges of IMS/ATP is that strains of indicator bacteria for which antibodies do not yet exist are not detected.³¹ The use of IMS/ATP for detecting microbes in surface waters has not been studied as much as the use of qPCR, but the technique has been tested in epidemiological studies. In 2010 two of Ohio's beach water monitoring program partners conducted separate investigations of both qPCR and IMS/ATP.

- The Erie County (Ohio) General Health District worked with the U.S. Geological Survey in ongoing research of these two methods at several of its beaches; in 2011 the agencies will continue to improve IMS/ATP test method protocols.
- The Northeast Ohio Regional Sewer District conducted analysis using IMS/ATP and qPCR at three beaches. It found little correlation between IMS/ATP results and culture-based results at all three sampling locations, and slight but varying degrees of correlation between qPCR results and culture-based results.³²

In addition to rapid methods for quantifying fecal indicator bacteria, methods for directly identifying pathogens in beach water are being explored.

■ Delaware's Recreational Water Program has been providing support and funding for research into rapid methods of analysis of marine and inland bay waters for the presence of pathogenic and pathogen-like Epsilonproteobacteria. Pathogenic members of this group include *Heliobacter pylori* and *Campylobacter jejuni*, both of which are associated with human gastric disease and gastroenteritis. The correlation between results of this research and fecal indicator values is being studied. The goal is to be able to quickly identify harmful bacteria and improve the safety of recreational waters.³³

Using models to obtain real-time predictions of beach water quality

Beach water quality generally depends on many complex factors, but for some beaches, predictions of water quality can be fairly accurately calculated on the basis of a few physical measurements of daily conditions. Some states have created computer beach water quality models that rely on data from physical measurements such as rainfall levels, wind speed and direction, tides, wave heights, and currents. These models prepare rapid predictions of beach water quality and allow beaches to be closed or placed under advisory the day that bacterial levels are expected to be high, rather than 24 hours after samples with high bacteria concentrations are taken. The importance of predictive models in protecting public health was illustrated by a local beach manager who demonstrated that one year, advisories and closings based on monitoring results were issued inaccurately 100 percent of the time.³⁴ In other words, samples taken when the beach was under advisory or closure due to the previous day's monitoring results showed that in every case, the beach water quality met standards on the days that the beach was under advisory or closure.

Predictive models used at coastal waters around the country include the following:

■ Since 2003, San Diego County in California has used a predictive model to trigger beach closings at three beaches near the outlet of the Tijuana River. These beaches are Imperial Beach, Coronado Beach, and Silver Strand State Beach. The model assesses the need for closures based on real-time information about ocean currents and other parameters.³⁵

■ Several coastal beach managers in Illinois use predictive modeling (SwimCast) to make swim ban and advisory decisions. At a minimum, predictions are generally made at 9 a.m. and 1 p.m. and whenever hydrometeorological conditions change. For each beach where the SwimCast system exists, similar but slightly different predictive models are utilized. These models predict beach water conditions on a real-time basis, in contrast to standard culture methods for quantifying bacteria. Studies have shown that SwimCast provides a more accurate assessment of current beach water quality than does the previous day's bacterial density.³⁶

■ BEACH Act grants have been used to partially fund the development of models that predict beach water quality in Indiana. These models make predictions based on current conditions, turbidity, chlorophyll content, and color. A model called Project SAFE was used in 2010 for Ogden Dunes, Wells Street, Marquette, and Lake Street beaches. Each morning, Monday through Friday, beach managers were given the model's predicted likelihood that the *E. coli* count would exceed safe limits. On that basis, the beach manager chose whether to issue an advisory or closing. Physical bacterial monitoring continued at these beaches to complement the predictive modeling information.

■ Several of New York's beach water quality contracting entities have developed models of various designs and complexity for their beaches. For example, Monroe County uses a model based on amount of rainfall, the flow rate of the Genesee River, turbidity, algae, and other organic debris. The Interstate Environmental Commission has developed an extensive hydrodynamic loading model that is integrated into the beach monitoring and notification programs of the New York City Department of Health & Mental Hygiene and the Westchester, Nassau, and Suffolk County health departments. In 2010 the Chautauqua County Department of Health began using Virtual Beach software to predict water quality at beaches on Lake Erie.

■ Ohio uses a predictive model called Nowcast at two of its beaches, Edgewater and Huntington Beach. This model relies on environmental factors including rainfall, turbidity, and/or wave height to predict *E. coli* levels.

■ The city of Milwaukee, Wisconsin, uses predictive models in addition to monitoring to determine advisories for a few of its beaches.³⁷ In 2010, Ozaukee County, Wisconsin, began using a predictive model (NowCast) at its beaches.³⁸

Improved communication about sewage spills

Communication gaps between those responsible for sewage and stormwater treatment and those charged with protecting public health must be addressed. The public has the right to know that an overflow or discharge has occurred and should be informed when it happens, not several days later, after beach water monitoring results have been analyzed. Representatives of Washington's beach water quality monitoring and notification program (BEACH) are striving to educate municipal sewage treatment plant operators about the importance of notifying them in a timely manner when there is a spill. Most sewage plant permits, but not all, require facility operators to contact Washington's Shellfish Program when there is a spill. Washington's Shellfish Program typically notifies BEACH when it hears of a spill, but the Shellfish Program is not always notified of a spill even when sewage treatment plant permits require it. After working with BEACH, permitting entities have agreed that as permits are renewed, all wastewater treatment facility operators will be required to immediately notify the local health jurisdiction when there is a sewage spill and the Shellfish Program when there is a spill into marine waters.³⁹

SOURCE IDENTIFICATION

Information about sources of contamination is invaluable in terms of addressing poor water quality. It is only after sources are identified that the most prudent strategies for addressing those sources can be developed.

Microbial and chemical source tracking

In many cases, visual surveys and a knowledge of upstream sources of contamination (like sewage treatment plants and animal feedlots) fail to reveal the source of beach water contamination. This is often the case when many small or nonpoint sources are contributing to the contamination. Sometimes chemical markers (such as pharmaceuticals or their metabolites) are measured to determine whether a human sewage source is responsible for high bacteria counts. The presence of caffeine or optical whiteners used in laundry detergents is also used to determine whether contamination with human sewage has occurred.

■ This year, the Department of Health in Hawaii is working with the Kauai chapter of the Surfrider Foundation to investigate the presence of wastewater constituents in the waters of Nawiliwili Bay. In addition to identifying the species responsible for fecal indicator bacteria found in bay waters,

sampling will be conducted for two human pharmaceuticals, carbamazepine (an anticonvulsant) and sulfamethoxazole (an antibiotic).⁴⁰ These pharmaceuticals are present in wastewater but are not destroyed during wastewater treatment, which makes them useful indicators for the presence of wastewater effluent.

■ Because of elevated levels of enterococcus bacteria at Laite Beach and Camden Yacht Club Recreation Area, the Maine Healthy Beaches Program analyzed samples for enterococcus and optical whiteners. As a result of the effort, the town of Camden identified two illicit sewage cross-connections to the storm drain network.

There are many methods for identifying species responsible for fecal organisms present in water. Most microbial source tracking, as this process is called, relies on matching DNA or RNA "fingerprints" from bacterial strains found in contaminated beach water with those of bacteria found in various animal hosts and human sewage. Quantitative PCR (qPCR) is an example of a laboratory technique used in microbial source tracking.

■ Researchers at Stanford, the University of California at Los Angeles, the University of California at Santa Barbara, and the Southern California Coastal Water Research Project are developing a protocol for identifying the sources of fecal indicator bacteria found in beach water. This project will provide guidance for choosing appropriate technologies and sampling strategies for source identification studies. Researchers will select a subset of source identification techniques from among dozens of possibilities to test in detail at 20 to 30 California beaches. At these beaches, samples will be taken in rivers, creeks, and storm drains above the point of tidal influence, at the wave wash zone at the mouth of the outfalls, in sand near the outfalls, and in kelp washed up on the beach at the high tide line. The presence of human and other sources of fecal indicator bacteria will be determined. After the initial testing phase, a more thorough source identification study of the watersheds for some of the beaches will be conducted.⁴¹

■ Beach water at Cole Park and Ropes Park along Corpus Christi Bay in Texas is monitored through the Texas Beach Watch Program. These beaches have a history of exceeding the water quality standard. They both have stormwater outfalls and are located in a residential area of the city of Corpus Christi, so the potential for human contamination is

high. In 2010 water samples from the monitoring stations at Ropes Park and Cole Park were analyzed using the polymerase chain reaction (PCR) method to detect the esp marker as an indicator of human contamination. The results of this preliminary study suggest there is some human contribution, and investigations are continuing.⁴²

Sanitary surveys

Sanitary surveys used to be associated mainly with drinking water and shellfish safety programs, but more and more states are conducting sanitary surveys of their recreational beaches, either annually or when exceedances are found. In fact, sanitary surveys were in many cases the first step toward implementing the successful strategies described in this chapter. Beach sanitary surveys involve collecting information at the beach and sometimes information about the surrounding watershed. Information collected at the beach may include data regarding discharge from any outfalls, the number of birds at the site, the amount of litter, and the presence of seaweed or algae. Information about the watershed may reflect land use, the use of residential septic tanks, and locations of wastewater treatment facilities.

■ To identify and reduce sources of pollution at Delaware's lifeguarded beaches, the state's recreational water program initiated a beach shoreline survey. As a result of this survey, park staff and shop owners have been educated about the need to locate garbage receptacles away from storm drains, and residents' complaints about malfunctioning septic systems have been addressed.

Special monitoring studies

To help identify sources of contamination, officials may undertake special monitoring studies, in which additional samples are collected during storm events or in additional locations and in sources upstream of contaminated beaches.

■ Maine Healthy Beaches conducted special monitoring that revealed that Lincolnville Beach's elevated levels of bacterial pollution are likely caused by malfunctioning septic systems, wildlife, and illicit connections to the storm drainage network along U.S. Route 1.⁴³

■ In New Jersey, elevated levels of enterococcus bacteria are discharged to the ocean from Wreck Pond's outfall during rain events. Source tracking efforts at Wreck Pond have shown that sources of pollution include stormwater runoff and suspected failing sewage infrastructure in the community surrounding the pond. Wet-weather sampling continues in an effort to pinpoint the sources of contamination at this pond. In 2009 and 2010, this included sampling for enterococcus within some of the stormwater lines that are suspected of causing beach impacts. This work helped to narrow down the areas where sewage infrastructure will be inspected.⁴⁴

- 1 See NRDC's report "Rooftops to Rivers," www.nrdc.org/water/pollution/rooftops/contents.asp.
- 2 U.S. EPA, E-media kit, "Hermosa Beach Strand Gets \$1.3M in Recovery Act Funds for 'Green' Improvements to Protect Pacific Ocean," January 8, 2010, <http://yosemite.epa.gov/opa/admpress.nsf/0/F4C80640683FAFE4852576A5006A7F0D>.
- 3 U.S. EPA, "U.S. EPA, Redondo Beach Celebrate Stormwater Pollution Control Project Groundbreaking," February 9, 2010, <http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/400d957999f19b75852576c5006b0ae5!OpenDocument>.
- 4 Virginia Loftin, New Jersey Department of Environmental Protection. Personal communication. June 2010.
- 5 Rhode Island Department of Health. Beach Program 2010 Season Report, draft.
- 6 Miami Dade County. Rickenbacker Causeway Shoreline and Roadway Protection (memorandum). Not dated.
- 7 Kinzelman, J., City of Racine Health Department. Personal communication. April 2011.
- 8 Delaware Department of Natural Resources and Environmental Control. "Inland Bays Pollution Control Strategy." May 2008.
- 9 Heather Merritt, Maryland Department of the Environment. Personal communication. March 2011.
- 10 Michael R. Burchell II, Ph.D., North Carolina State University. Personal communication. March 2011.
- 11 Kinzelman, J., City of Racine Health Department. Personal communication. April 2011.
- 12 Rhode Island Department of Health. Beach Program 2010 Season Report. Draft.
- 13 Brian Fredrickson, Lake Superior Basin Coordinator, Minnesota Pollution Control Agency. Personal communication. May 25, 2010.
- 14 Chris Huskey, Massachusetts Department of Public Health. Personal communication. April, 2011.
- 15 Rhode Island Department of Health. Beach Program 2010 Season Report, draft.
- 16 Virginia's Beaches Environmental Assessment and Coastal Health (BEACH) Program. Final Report on 2001-2009 EPA Beach Monitoring Grant—CU-9839605-0. January 29, 2010.
- 17 Washington State Department of Ecology. January-December 2010 (FFY09) Annual Report for Washington State's BEACH Program. Not dated.
- 18 Chris Huskey, Massachusetts Department of Public Health. Personal communication. April, 2011.
- 19 Delaware Department of Natural Resources and Environmental Control. Inland Bays Pollution Control Strategy. May 2008.
- 20 Jennifer Ketterman, Oregon Health Authority. Personal communication. April 2011.
- 21 Maine Healthy Beaches Program. Camden Harbor Water Quality Project. April 2011.
- 22 Chris Huskey, Massachusetts Department of Public Health. Personal communication. April, 2011.
- 23 U.S. Army Corps of Engineers, Long Beach Breakwater (East San Pedro Bay) Ecosystem Restoration Study Reconnaissance Phase 905(b) Report, April 2010, www.longbeach.gov/civica/filebank/blobdload.asp?BlobID=27756.
- 24 East San Pedro Bay Ecosystem Restoration Study 905(B) Analysis, July 2009, www.longbeach.gov/civica/filebank/blobdload.asp?BlobID=23110.
- 25 Heaney, C.D., et al., "Contact With Beach Sand Among Beachgoers and Risk of Illness," *American Journal of Epidemiology*. 170(2): 164-172 (2009).
- 26 Kinzelman, J.L., K.R. Pond, K.D. Longmaid, R.C. Bagley, "The Effect of Two Mechanical Beach Grooming Strategies on Escherichia coli Density in Beach Sand at a Southwestern Lake Michigan Beach," *Aquatic Ecosystem Health & Management*, Vol. 7, No. 3, July 2004, pp. 425-432.
- 27 Great Lakes and St. Lawrence Cities Initiative, "Racine: Beach Grooming Tactics to Reduce Swimming Bans," June 2003, www.glsclities.org/best-practices/beaches/racine-beaches.cfm.
- 28 Power, A., B. Corley, D. Atkinson, R. Walker, D. Harris, J. Manley, T. Johnson, "A Caution Against Interpreting and Quantifying Oyster Habitat Loss From Historical Surveys," *J. of Shellfisheries Res.*, December 2010.
- 29 Hartmann, J.W., S.F. Beckerman, T.W. Seamans, R.M. Engeman, S. Abu-Absi, "Report to the City of Chicago on Conflicts With Ring-Billed Gulls and the 2009 Integrated Ring-Billed Gull Damage Management Project." March 25, 2010.
- 30 Wisconsin Department of Natural Resources. Wisconsin's Great Lakes Beach Monitoring and Notification Program Annual Report Beach Season 2010. Not dated.
- 31 Bushon, Rebecca, "Testing and Validating Rapid Analytical Methods for Assessments of Recreational Water Quality," National Beach Conference, Huntington Beach, CA, 2009.
- 32 Ohio Department of Health. Year 2010 Bathing Beach Monitoring Program Results, December 2010, www.odh.ohio.gov/odhPrograms/eh/bbeach/beachmon.aspx.
- 33 Delaware Department of Natural Resources and Environmental Control. 2010 Recreational Water Year-End Report. Not dated.
- 34 Shannon Briggs, Michigan Department of Environmental Quality. Personal communication. June 2009.
- 35 San Diego County Department of Environmental Health. San Diego County 2004 Beach Closure & Advisory Report. May 2008.
- 36 Justin DeWitt, Illinois Department of Health. Personal communication. May 2011.
- 37 Susan Phillips, U.S. Geological Survey. Personal communication. May 2011.
- 38 Wisconsin Department of Natural Resources. Wisconsin's Great Lakes Beach Monitoring and Notification Program Annual Report Beach Season 2010. Not dated.
- 39 Washington State Department of Ecology. January-December 2010 (FFY09) Annual Report for Washington State's BEACH Program. Not dated.
- 40 Watson Okubo, Hawaii Department of Health. Personal communication. February 2011.
- 41 Alexandria Boehm, Stanford University. Personal communication. April 2011.
- 42 Coastal Coordination Council. Detection of Human Fecal Contamination in Corpus Christi Bay: Final Summary Report of Results. Not dated.
- 43 Maine Healthy Beaches Program. 2010 Report to U.S. EPA. April 2011.
- 44 New Jersey Department of Environmental Protection. Cooperative Coastal Monitoring Program Summary Report for 2010. December 2010.

