Testing the Waters

June 2013, 23rd Edition

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EXECUTIVE OVERVIEW

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Dedication

NRDC dedicates "Testing the Waters" this year to the memory of Senator Frank Lautenberg, whose long list of legislative achievements includes sponsoring and leading the Congress in the passage of the Beaches Environmental Assessment and Coastal Health Act of 2000. That legislation is responsible for a marked improvement in beach monitoring and notification of water contamination, and is the reason that a significant amount of the data in "Testing the Waters" is available.

Acknowledgments

NRDC wishes to acknowledge the support of the Pisces Foundation and the TOSA Foundation.

NRDC would like to thank Janie Chen, Kelly Coplin, Marisa Kaminski, Anna Kheyfets, and Gopi Shah for reviewing various aspects of the report this year and Carol James for her input on elements of the report and distributing the report nationwide. We thank Spencer Eldred, Joey Firman, Emily Hampton, Amanda Jahshan for their contribution to the report.

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 beach water pollution.

Thank you to Matt Howes, Alexandra Kennaugh, Auden Shim, Patrick Hensley, Michael Barrish, Elise Marton, Rumi Matsuyama, and Sue Rossi for managing and supporting the production of the report. Many thanks to members of our media team—Dylan Gasperik, Jessica Lass, Josh Mogerman, Jenny Powers, Kate Slusark, and Jacqueline Wei—for orchestrating the release of the report to the press. Thanks to Steve Fleischli, Noah Garrison, Henry Henderson, Karen Hobbs, Larry Levine, Rob Moore, and Melissa Waage for helping to develop, release and publicize the report for NRDC this year. Thank you as well to our outreach partners in Maine, Michigan, and Ohio.

EXECUTIVE OVERVIEW

NRDC's annual analysis of water quality and public notification data at coastal U.S. beaches found that the number of beach closing and advisory days totaled 20,120 in 2012 (a decrease of 14 percent from 2011), exceeding 20,000 for the 8th time in the past 9 years. The decrease was largely due to a substantially drier beach season in large areas of the continental U.S. and Hawaii in 2012. Hawaii, which reported that it had much less rain in 2012 than the previous year, had the largest decrease in closing/advisory days (-3,960).

More than 80 percent of closings and advisories were issued because bacteria levels in beachwater exceeded public health standards, indicating the potential presence of human or animal waste in the water. The portion of all monitoring samples that exceeded the Environmental Protection Agency's health standards for designated beach areas decreased to 7 percent in 2012 from 8 percent in 2011; the national exceedance rate has fluctuated between 7 percent and 8 percent since NRDC started tracking this type of water quality information in 2005. In addition, there were 3,673 beaches with reported monitoring results in 2012, an increase of 2 percent from 2011. The largest known source of pollution was stormwater runoff (identified as a reason for 28 percent of closing/advisory days, compared with 47 percent the previous year). The 2012 results confirm that our nation's beaches continue to experience significant water pollution that puts swimmers and local economies at risk.

NRDC continues to push for improvements in beachwater quality standards and test methods. Last November, the Environmental Protection Agency issued new beachwater standards that leave the public inadequately protected from unsafe levels of disease-causing bacteria and viruses. While beachwater quality standards are critical, ultimately the most important long-term action is to adopt 21st-century solutions that address the sources of beachwater pollution, particularly stormwater runoff. The most important of these solutions remains incentivizing our cities to implement green infrastructure such as green roofs, porous pavement, and street plantings, which stop rain where it falls. Green infrastructure effectively reduces the amount of runoff that makes its way into beachwater or triggers harmful sewage overflows, transforming a source of beach pollution into a tremendous local water supply resource.

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 each year.[1] Many public health experts believe that the number of illnesses caused by untreated sewage and other beach pollution actually could be much higher than is currently recognized because people who get sick from swimming in contaminated recreational waters are not always aware of the cause of their illness and may not report it to doctors or local health officials.

Illnesses associated with polluted beachwater include stomach flu, skin rashes, pinkeye, respiratory infections, meningitis, and hepatitis. Children are especially vulnerable, perhaps because they tend to submerge their heads more often than adults 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 more likely than nonswimmers to have gastrointestinal illnesses; another study found that fecal contamination at Los Angeles and Orange County beaches caused between 627,800 and 1,479,200 excess gastrointestinal illnesses each year.[3,4]

Our coasts provide more than just local recreation—approximately 85 percent of all U.S. tourism dollars are spent in coastal states. According to a report by the National Ocean Economics Program, the nation's shoreline-adjacent counties contributed more than $6 trillion to the nation's gross domestic product and more than 47 million jobs in 2011.[5] With respect to beaches specifically, economists have estimated that a typical swimming day is worth approximately $35 (in year 2000 dollars) for 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. For example, one study estimated that economic losses as a result of closing one Lake Michigan beach due to pollution could be as high as $37,030 per day.[6] Similarly, the Los Angeles/Orange County study mentioned above concluded that the public health cost of the excess gastrointestinal illnesses caused by poor water quality was $21 million to $51 million per year.[7]

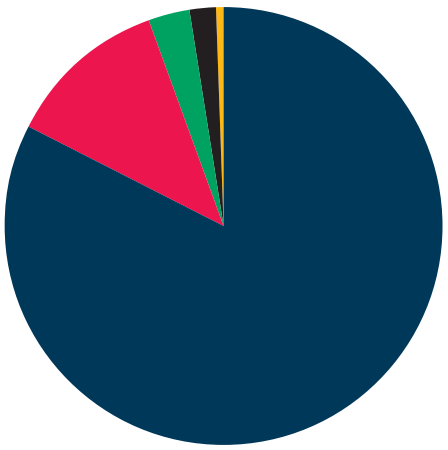
CLOSINGS AND ADVISORIES FOR 2012

In 2012, the number of closing and advisory days at ocean, bay, and Great Lakes beaches exceeded 20,000 days for the third consecutive year despite a beach season with substantially less rainfall than in 2011. There were a total of 20,120 closing and advisory days nationwide. This is a decrease of 14 percent (3,267 days) from the previous year. This total includes only those days occurring during events lasting six consecutive weeks or less.

In addition, there were 59 closing and advisory events that lasted more than six but not more than 13 consecutive weeks (which NRDC calls "extended" events) and 38 closing and advisory events that lasted more than 13 consecutive weeks ("permanent" events). Including closing and advisory days that occurred during extended events (3,277 days), the total number of beach closing and advisory days in 2012 comes to 23,397.

The continued high number 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 2012 was testing that revealed bacteria levels exceeding beachwater quality standards, indicating the potential presence of human or animal waste in the beachwater. Advisories and closings issued as a precaution when poor water quality was suspected were the second-most common type of notification (see Figure EO-1: Reasons Officials Closed Beaches or Issued Advisories in 2012).

Figure EO-1: Reasons Officials Closed Beaches or Issued Advisories in 2012



- 83% (16,662 days)
  Monitoring detected bacteria levels exceeding beachwater quality standards.
- 12% (2,448 days)
  Precautionary actions issued because of excessive rainfall, which, at many beaches, leads to stormwater runoff that carries pollution to swimming waters.
- 3% (542 days)
  Other precautionary actions, predominantly due to algae and storm-related swimmer safety concerns such as riptides and high waves.
- 2% (443 days)
  Known pollution events, such as sewage treatment plant failures or breaks in sewage pipes; in these cases, localities did not wait for monitoring results before deciding to close beaches or issue advisories.
- Less than 1% (48 days)
  Preemptive, due to real-time computer modeling using readily measurable physical parameters, such as wind speed and wave height, to predict indicator bacteria levels.

Totals exceed the number of closing and advisory days discussed in this section because some events began as preemptive rain advisories and were then continued when monitoring revealed high bacteria levels.

POLLUTION SOURCES THAT CAUSED CLOSINGS AND ADVISORIES IN 2012

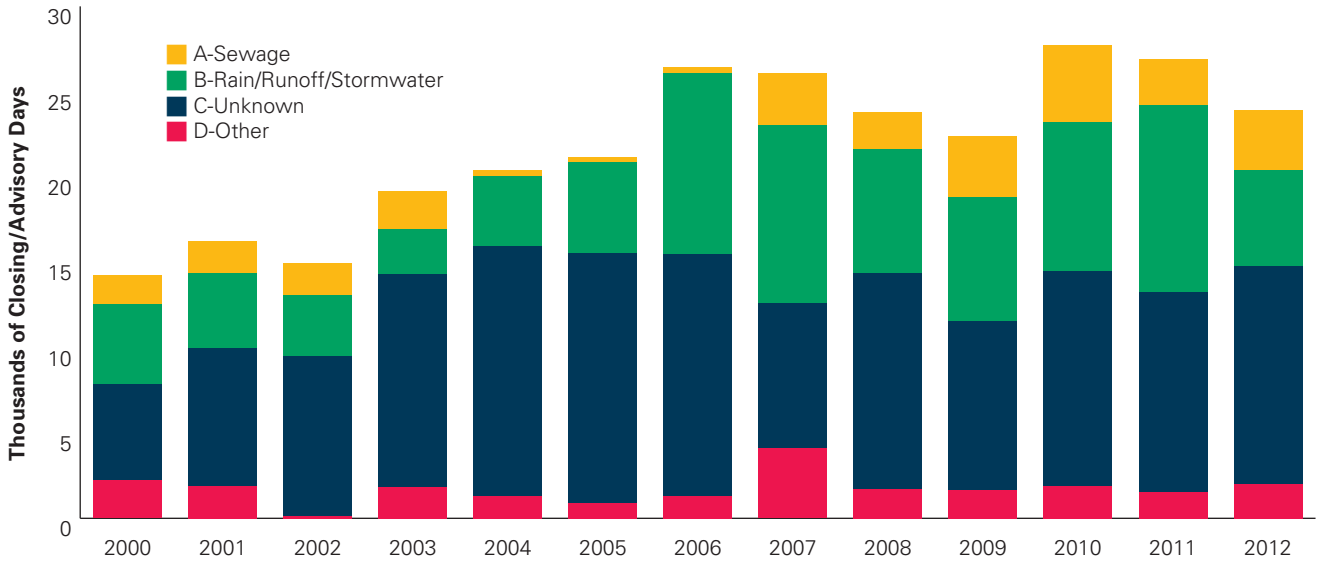
Most beach closings are issued because beachwater monitoring detects bacteria that are contained in human and animal waste. These bacteria levels indicate the presence of various pathogens—microscopic organisms that pose a threat to human health. The key reported contributors of these contaminants are (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, 2000–2012.)
For advisory and closing days issued during events that lasted six weeks or less:

- 63 percent (12,773 closing/advisory days) were attributed to unknown sources of pollution.
- 28 percent (5,654 closing/advisory days) were attributed to polluted runoff and stormwater. In 2011, 47 percent of closing advisory/days were attributed to polluted runoff and stormwater.
- 19 percent (3,747 closing/advisory days) were attributed to miscellaneous pollution sources. Of those, 1,887 days were attributed to wildlife sources.
- 10 percent (2,004 closing/advisory days) were attributed to sewage spills and overflows. This category includes combined sewer overflows, sanitary sewer overflows, breaks or blockages in sewer lines, and faulty septic systems.

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

Figure EO-2: Sources of Pollution That Caused Closings/Advisories, 2000–2012



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 2012

In 2012, the portion of all monitoring samples exceeding national recommended health standards for designated beach areas, indicating the potential presence of human or animal waste, decreased to 7 percent from 8 percent in 2010 and 2011. The exceedance rate was 7 percent each year from 2006 through 2009. Ohio, Wisconsin, Minnesota, Maine, and South Carolina had the highest percentage of samples exceeding the EPA's single-sample maximum for designated beach areas (see Table EO-1: Rank of States by Percentage of Beachwater Samples Received Exceeding the National Standard in 2012).[8]

Table EO-1: Rank of States by Percentage of Beachwater Samples Received Exceeding the National Standard in 2012

Rank	Percent Exceedance	State	2012 Total Samples	Beaches With Reported Monitoring Results
1	<1%	Delaware	559	24
2	1%	New Hampshire	1,006	16
3	2%	North Carolina	6,704	240
4	4%	Hawaii	3,516	149
5	4%	Alaska	153	10
6	4%	Virginia	1,198	47
7	4%	New Jersey	4,214	356
8	4%	Washington	3,168	64
9	4%	Massachusetts	8,006	601
10	5%	Oregon	541	16
11	5%	Maryland	801	67
12	5%	Georgia	970	27
13	5%	Florida	8,248	262
14	5%	Rhode Island	2,032	73
15	6%	Michigan	13,337	246
16	6%	Louisiana	827	26
17	8%	Connecticut	2,263	72
18	8%	Alabama	940	25
19	8%	Mississippi	1,128	22
20	8%	California	27,092	504
21	9%	Texas	7,086	62
22	9%	New York	9,280	359
23	9%	Pennsylvania	1,119	10
24	10%	Illinois	4,392	50
25	10%	Indiana	2,885	33
26	11%	South Carolina	2,209	22
27	11%	Maine	1,455	60
28	12%	Minnesota	1,136	52
29	14%	Wisconsin	4,531	117
30	21%	Ohio	2,898	61

The percent exceedances shown in this table are rounded to the nearest whole number, but state ranks are based on percent exceedances to one or two decimal places.

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

Most years, the EPA also issues a beach report summarizing closing/advisory information (see water.epa.gov/type/oceb/beaches/upload/national_facsheet_2011.pdf). NRDC's report differs from the EPA report in several important ways:

1. NRDC includes an analysis of monitoring data and compares states and beaches using the available water quality data.
2. NRDC provides state-by-state reporting and analysis of individual beach programs.
3. With respect to closings and 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. EPA reports the number of beaches with closings or advisories and the percentage of total "beach days" that were affected.
4. NRDC analyzes reported contamination sources associated with closings and advisories.
5. NRDC reports closings and advisories beyond monitored beaches. (In 2012, there were 325 closing/advisory days at 125 non-monitored beaches in seven states, plus 1 extended and 8 permanent events.) Additionally, NRDC's report does not exclude closing/advisory information from beaches with reported data that are not included in the state's BEACH Act program.

The Great Lakes had the highest exceedance rate (10 percent) of all regions in 2012, followed by the Gulf Coast (8 percent), western states (7 percent), the New York–New Jersey region (6 percent), New England (5 percent), the Southeast (4 percent), and the Delmarva region (3 percent).

In 2012, the list of beaches exceeding the national recommended daily standard more than 25 percent of the time included 115 beaches in 18 states, a decrease from 159 beaches in 22 states in 2011. Twenty beach areas in six states (California, Indiana, New Jersey, New York, Ohio, and Wisconsin) made this list in each of the last five years, 2008 through 2012 (see Table EO-2: Repeat Offenders: Beaches With More Than 25 Percent of Samples Received Exceeding the EPA's Applicable Recommended Single-Sample Maximum Bacteria Standards for Designated Beach Areas, Each Year, 2008–2012). 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, 2008–2012

State	County	Beach	Tier	Assigned Monitoring Frequency
California	Los Angeles	Avalon Beach 100 feet west of the Green Pleasure Pier	1	1/wk
California	Los Angeles	Avalon Beach 50 feet east of the Green Pleasure Pier	1	1/wk
California	Los Angeles	Avalon Beach 50 feet west of the Green Pleasure Pier	1	1/wk
California	Los Angeles	Avalon Beach East of the Casino Arch at the steps	1	1/wk
California	Orange	Doheny State Beach, 1000' South Outfall	1	2/wk
California	Orange	Doheny State Beach, 2000' South Outfall	1	2/wk
California	Orange	Doheny State Beach, 3000' South Outfall	1	2/wk
California	Orange	Doheny State Beach, North Beach	1	1/mo
California	Orange	Doheny State Beach, North of San Juan Creek	1	2/wk
California	Orange	Doheny State Beach, Surfzone at Outfall	1	2/wk
California	Orange	Poche County Beach	1	2/wk
Indiana	Lake	Jeorse Park Beach I	2	5/wk
Indiana	Lake	Jeorse Park Beach II	2	5/wk
New Jersey	Ocean	Beachwood Beach (Beachwood)	1	1/wk
New York	Monroe	Ontario Beach	1	Daily
Ohio	Ashtabula	Lakeshore Park	1	4/wk
Ohio	Cuyahoga	Euclid State Park	1	Daily
Ohio	Cuyahoga	Villa Angela State Park	1	Daily
Ohio	Erie	Edson Creek	1	4/wk
Wisconsin	Milwaukee	South Shore Beach	1	3/wk

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, many states 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. Similarly, states commonly will prioritize monitoring near suspected pollution sources, which can lead to higher exceedance rates. But identifying locations with high contamination levels is a responsible practice that helps local authorities protect swimmers from exposure to pathogens.

For 2012, the NRDC data set includes monitoring results for 123,706 samples at 3,673 beaches and beach segments (most state and local officials divide longer beaches into manageable sections for monitoring).[9] Although 2 percent more beaches were monitored in 2012 than in 2011, slightly fewer samples (<1 percent) were collected (123,886 samples were taken at 3,591 beaches and beach segments in 2011).

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. Because of this, swimmers generally do not know until the next day if the water they swam in was contaminated. On the other hand, because of this delay, beaches may remain closed even after water quality meets standards. There is a great deal of interest in technologies that can provide same-day beachwater quality results. Rapid test methods utilitize quantitative polymerase chain reaction (qPCR), an analytical method that quantifies the presence of a targeted genetic sequence. Traditional methods are used to analyze the samples alongside qPCR analysis, and the qPCR results, either alone or in combination with culture method results, are used to determine whether warnings about beachwater quality would be issued and posted.

Over the last three years, an increasing number of states have begun employing rapid test methods. In 2010, Racine, Wisconsin, and in Orange County, California, were the first to use rapid test method for issuing beachwater quality notifications at coastal beaches in the United States. In 2011, Ocean County New Jersey and Los Angeles County, California began issuing notifications based on rapid test pilot projects. In 2012, other states, including Ohio and Michigan, conducted field research on rapid test methods but have not yet used them to issue notifications.

Beachwater quality generally depends on many complex factors, but for some beaches, predictions of water quality can be calculated fairly accurately on the basis of measurements of a few physical conditions. Some states have taken advantage of this by creating computer models that rely on data such as rainfall level, wind speed and direction, tides, wave height, and currents. These models rapidly prepare predictions of beachwater quality and allow officials to close beaches or place them under advisory on the day that bacterial levels are expected to be high, rather than 24 hours later. States using computer models to inform closing and advisory decisions for at least some of their beaches in 2012 were California, Illinois, Indiana, New York, Ohio, Pennsylvania, and Wisconsin. Other states, including Louisiana, Michigan, Minnesota, and Texas are building predictive models to use at some of their beaches in the future.

Because the water quality at many beaches is adversely impacted by contaminated stormwater runoff, another means of protecting public health—less sophisticated but often effective—is to preemptively close beaches or issue advisories when indicator bacteria levels are expected to be high after rainfall events. Many states 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, and Wisconsin all have quantitative rainfall standards at some of their beaches, and New Hampshire is developing them. Eleven states reported preemptive rainfall closures or advisories at specific beaches in 2012: California, Connecticut, Hawaii, Maine, Massachusetts, Michigan, Minnesota, New Jersey, New York, Texas, and Wisconsin.

Some states, including California, Maryland, Minnesota, Mississippi, North Carolina, Rhode Island, South Carolina, 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 always reported in the closing and advisory data that the states send to the EPA.) For example, 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 the year-to-year change in the percentage of monitoring samples that exceed health standards is an objective assessment of water quality, a 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. With this method, the average value might 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. Despite this possibility, NRDC includes the results of every reported sample when calculating the percentage of all samples that exceed the standard in a given year.
- **Resample a beach after an exceedance before issuing a closing or advisory.** In some places, an exceedance triggers a resample, and 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.** Officials in some locations may act without current monitoring information if they suspect that pollution has affected beachwater quality or if there are non-pollution reasons to close a beach or issue an advisory. Reasons for these preemptive actions may include 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 collected at these beaches are included in the percent exceedance analysis.
- **Continue monitoring at beaches that have been closed for reasons other than pollution.** In some locations, officials may collect monitoring data even at beaches that are closed due to such factors as budget cuts or low attendance. While results of this sampling are reported to the EPA, the beach closing days may not be reported, or they may occur during events that are classified as extended or permanent and 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.

RECOMMENDATIONS FOR IMPROVING BEACHWATER QUALITY

To improve beachwater quality nationwide, our leaders need to adopt policies that clean up the sources of beach pollution. There are numerous things that federal, state, and local officials can do to rein in the sources of beach contamination and to improve beachwater monitoring and public information. For example, the federal government can and should increase its contribution to the Clean Water State Revolving Fund, which provides critical assistance for projects that repair and rebuild failing water and wastewater infrastructure.

However, the EPA is responsible for two national actions—one that it completed last year, and one in development—that would have a significant impact on efforts to make beaches cleaner and safer for swimming. Specifically, in November 2012, the EPA established standards designed for beach officials to use to keep people from being exposed to unsafe levels of disease-causing bacteria and viruses. The agency is currently developing revisions to the national requirements for sources of polluted runoff. EPA needs to strengthen both of these measures, as discussed below.

Cleaning Up Polluted Runoff: 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.[10]

Often, the best way of avoiding runoff-related pollution is to reduce the volume of stormwater flowing into the storm drains that carry it to nearby water bodies or, in some cases, into sewage systems that can overflow. Green infrastructure, which restores or mimics natural conditions, allows rainwater to infiltrate into the soil, thereby 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 and from carrying pollutants into natural bodies of water.

These smarter water practices on land not only prevent pollution at the beach but 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 American jobs. Many cities and states have embraced green infrastructure practices.

Consequently, the EPA needs to make overdue changes to 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. The EPA's rules must require new and redeveloped impervious areas—wherever they are located—to infiltrate, evaporate, or reuse the rain that falls on them and must ensure that existing sources of runoff pollution are similarly controlled to meet water quality goals.

Likewise, federal, state, and municipal leaders must use existing authorities—such as Clean Water Act permitting, oversight of sewage overflow control plans, and local planning responsibilities—to promote green infrastructure and reduce runoff-related contamination problems. NRDC's recent report *Rooftops to Rivers II*[11] spotlights how numerous cities around the country are embracing green infrastructure to address runoff pollution and improve the health of their inhabitants. These leaders have demonstrated the feasibility of green infrastructure solutions and are paving the way for policies that advance green infrastructure nationally.

Standards to Protect Beachgoers: The EPA is responsible for ensuring that recreational waters are safe for people. One element of this responsibility is establishing criteria that are sufficient to protect the public from contaminants in beachwater. Unfortunately, the agency's new allowable bacteria levels in recreational waters miss a critical opportunity to better protect the public. In fact, in some respects the criteria are even less protective than the 25-year-old standards they replace.

Most egregiously, EPA's criteria fail to protect against single-day exposures to pathogens. The prior criteria adopted in 1986 included a "single sample maximum" which was not to be exceeded. EPA now allows water quality to exceed the criteria up to 10 percent of the time without triggering a violation. This approach could mask a serious pollution problem and expose families to an unnecessary risk of illness. The criteria also are based on what the EPA has determined is an acceptable gastrointestinal illness risk of 3.6 percent. That is, the agency believes it is acceptable for 36 in 1,000 (1 in 28) swimmers to become ill with gastroenteritis from swimming in water that just meets its water quality criteria. This risk is unacceptably high and is not protective of public health. Additionally, the EPA does not adequately consider other health effects such as rashes and ear, eye, and sinus infections, all of which are commonly experienced by swimmers at U.S. beaches.

To address these flaws, the EPA must revise the level of acceptable risk so that it is protective of public health. A coalition of groups concerned about water quality, including NRDC, recently filed a 60-day notice of intent to sue EPA seeking to compel EPA to take action to protect beachgoers on any given day and to adopt criteria that adequately protect public health from all types of illnesses.

Endnotes

1 U.S. Environmental Protection Agency (EPA), "Notice of Proposed Rulemaking, NPDES Permit Requirements for Municipal Sanitary Sewer Collection Systems, Municipal Satellite Collection Systems, and Sanitary Sewer Overflows," January 4, 2001; withdrawn January 20, 2001.

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), 1-29, available at www.cdc.gov/mmwr/pdf/ss/ss5709.pdf.

3 Wade, T.J., et al., "Rapidly Measured Indicators of Recreational Water Quality Are Predictive of Swimming-Associated Gastrointestinal Illness," *Environmental Health Perspectives* 114, No. 1 (January 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," *Environmental Science and Technology* 40 (2006): 4851.

5 National Ocean Economic Program, Market Data, Coastal Economy Data, Shore Adjacent Coastal Zone Counties, noep.mbari.org/Market/coastal/coastalEcon.asp.

6 Rabinovici, S.J., et al., "Economic and Health Risk Trade-Offs of Swim Closures at a Lake Michigan Beach," *Environmental Science and Technology* 38, No. 10 (2004): 2742.

7 Given et al.

8 For the eighth consecutive year, NRDC used the BEACH Act's single-sample maximum standards for designated beach areas to compare water quality at U.S. beaches, whether or not the state applies that standard at all of its reported beaches. Before the EPA issued new standards in 2012, the designated beach area standard for enterococcus density was 104 cfu per 100 milliliters for marine waters; for freshwater, the standard was 235 cfu *E. coli* per 100 milliliters.

9 Beginning with last year's report, NRDC began to count each managed beach segment of longer beaches in California as an individual beach. This was prompted by California's update of the beach identification system it uses to report monitoring and notification data to EPA. For purposes of comparison with previous years, however, NRDC used the older beach identification/counting system.

10 EPA, "Report to Congress: Impacts and Control of CSOs and SSOs," April 26, 2004, EPA 833-R-04-001, 4-29, available at cfpub.epa.gov/npdes/cso/cpolicy_report2004.cfm.

11 Natural Resources Defense Council, "Rooftops to Rivers II: Green Strategies for Controlling Stormwater and Combined Sewer Overflows" (November 2011), available at www.nrdc.org/water/pollution/rooftopsII/default.asp.