

## Chapter 4

# Beachwater Quality Monitoring Programs and State-by-State Results

### 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.

While the BEACH Act authorizes \$30 million a year for state grants for monitoring and public notification, appropriations have funded only about one-third of that level each year. Since Fiscal Year 2002, EPA awarded between \$9.75 and \$10 million in grants to states, tribes,

and territories. The allocations for Fiscal Years 2009 and 2010 are included in Table 4-1. Many states and localities supplement their BEACH Act funding so that they can achieve the objectives of their beachwater monitoring programs.

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**Table 4-1. State Distribution of BEACH Act Funding for Beachwater Quality Monitoring and Notification for 2009 and 2010**

State or Territory	2009 Allocation	2010 Allocation
Alabama	\$262,000	\$264,000
Alaska	\$150,000	\$86,000
American Samoa	\$302,000	\$303,000
California	\$517,000	\$520,000
Connecticut	\$223,000	\$225,000
Delaware	\$211,000	\$212,000
Florida	\$528,000	\$531,000
Georgia	\$286,000	\$288,000
Guam	\$303,000	\$304,000
Hawaii	\$323,000	\$326,000
Illinois	\$243,000	\$245,000
Indiana	\$206,000	\$207,000
Louisiana	\$322,000	\$323,000
Maine	\$255,000	\$256,000
Maryland	\$269,000	\$271,000
Massachusetts	\$254,000	\$257,000

<b>State or Territory</b>	<b>2009 Allocation</b>	<b>2010 Allocation</b>
Michigan	\$278,000	\$281,000
Minnesota	\$204,000	\$206,000
Mississippi	\$257,000	\$259,000
New Hampshire	\$205,000	\$206,000
New Jersey	\$278,000	\$280,000
New York	\$348,000	\$351,000
North Carolina	\$302,000	\$305,000
Northern Marianas	\$303,000	\$304,000
Ohio	\$224,000	\$225,000
Oregon	\$229,000	\$230,000
Pennsylvania	\$222,000	\$224,000
Puerto Rico	\$328,000	\$330,000
Rhode Island	\$213,000	\$215,000
South Carolina	\$297,000	\$299,000
Texas	\$383,000	\$386,000
U.S. Virgin Islands	\$303,000	\$304,000
Virginia	\$277,000	\$278,000
Washington	\$270,000	\$272,000
Wisconsin	\$225,000	\$227,000
<b>Total</b>	<b>\$9,800,000</b>	<b>\$9,800,000</b>

Source: EPA Makes Grants Available to States to Implement Water Quality Monitoring and Public Notification Programs at the Nation's Beaches Fact Sheet, EPA 823-F-09-002, January 2009 and EPA Grants Available in 2010 for States to Implement Water Quality Monitoring and Public Notification Programs at the Nation's Beaches Fact Sheet, EPA 823-F-09-10, January 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.<sup>1</sup> 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 4-2 summarizes the states' use of water quality standards (more details about state standards are given in the individual state summaries).

## 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. Although the EPA has recommended daily beach monitoring of high-priority beaches, some local governments have stated that they lack the necessary staff and funding to carry this out. As a result, beaches may remain open during a contamination event that occurs between sample collections.

**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 <sup>a</sup>	•	•		
Delaware <sup>b</sup>	•	•		
Florida	•	•		•
Georgia	•	•		
Hawaii <sup>c</sup>	•	•		•
Illinois		•		
Indiana		•		
Louisiana	•	•		•
Maine		•		
Maryland <sup>d</sup>	•	•	•	
Massachusetts	•	•		
Michigan <sup>e</sup>	•		•	
Minnesota	•	•		
Mississippi		•		
New Hampshire <sup>f</sup>	•	•		
New Jersey		•		
New York <sup>g</sup>	•	•		
North Carolina <sup>h</sup>	•	•	•	
Ohio		•		
Oregon			•	
Pennsylvania	•	•		
Rhode Island		•		
South Carolina		•		
Texas		•		
Virginia		•		
Washington <sup>i</sup>	•	•		
Wisconsin <sup>j</sup>	•	•		

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 and a *Clostridium perfringens* standard at beaches that are monitored at least five times a month and the single sample maximum standard at other beaches.

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.

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. The geometric mean is calculated from at least three samples collected over a 60-day period.

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 or extended 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.

Source: See individual state summaries.

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.

### **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. A handful of states use more precaution; they use predictive modeling to issue preemptive closures or advisories when an exceedance of standards is expected based on beachwater conditions such as wind direction, water temperature and turbidity, and currents.

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.

## **STATE-BY-STATE RESULTS**

The following pages contain the summaries of state beachwater quality standards, monitoring and closing/advisory practices, and NRDC's 2009 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 and informing the public when they are polluted. States with comprehensive programs and closure practices should be commended for their efforts.

**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.**

The most 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 standard for designated beach areas. For the fifth consecutive year, thanks to provisions of the BEACH Act that require the EPA to make beach monitoring data available from all states receiving BEACH Act grants, NRDC was able to provide these values for beaches in all 30 coastal and Great Lakes states.

NRDC included U.S. territories for the purpose of comparing total closing/advisory days in the national overview with earlier years. However, we do not prepare individual summaries for each territory as we do for each U.S. state; the state summaries follow in this chapter.

### **Sources of Information**

For the seventh consecutive year, our research for Testing the Waters is based primarily on the EPA's electronic reporting system designed to implement provisions of 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 2009 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 received monitoring data from seven states (California, Connecticut, Delaware, Texas, Virginia, Washington, and Wisconsin) and downloaded data for 23 states from STORET (Alabama, Alaska, Florida, Georgia, Hawaii, Illinois, Indiana, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, and South Carolina). Seven states sent their closing/advisory data (California, Connecticut, Hawaii, Texas, Virginia, Washington, and Wisconsin) and the EPA sent the data for 22 states (Alabama, Delaware, Florida, Georgia, Illinois, Indiana, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, and South Carolina) and four U.S. territories (Guam, Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands—NRDC does not include American Samoa because EPA has only recently compiled data for this territory). Alaska's information was taken from its annual report to EPA.

NRDC sent its analysis of these data as well as the narrative material for each state summary to the state for review, verification, and comment.

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.

## HOW TO READ THE STATE SUMMARIES

### Rank in the Nation

Each state's national ranking in percent exceedances is based on the EPA's single-sample maximum standard for designated beach areas. Thus, all monitoring samples were compared to the same standard to arrive at the national ranking. Rankings go from 1st for the state with the lowest percent exceedances to 30th for the state with the highest percent exceedances.

### Monitoring

**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.

**Results:** This section describes the number of beaches monitored in the state and how frequently they are monitored. For the fifth year in a row, NRDC was able to provide the percent of samples that exceeded *state* standards, in addition to providing data on the percent of samples exceeding *national* standards. Information on monitoring frequency and percent exceedance is organized by county with beaches in alphabetical order. 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 dirtiest beaches 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 2009. When making year-to-year comparisons, NRDC only includes beaches that were sampled all four years. Thus, each state summary has three 2009 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 four years from 2006 to 2009.

**Figure 4-1. Why Don't 2009 Percent Exceedances Match?**



For example, the EPA's daily maximum bacterial standard for "designated beach areas" in marine waters is a density of 104 enterococcus per 100 milliliters of beachwater. However, along with enterococcus, Florida beach officials also test for the presence of fecal coliform. The state's fecal coliform standard is 400 cfu/100ml. County officials can close a beach or issue an advisory if either one of these standards is exceeded. In 2009, 4% of beachwater samples exceeded the federal enterococcus and/or the state fecal coliform standard, and 3% of samples exceeded only the federal enterococcus standard. Florida's national rank among the 30 states is based on the 3% exceedance rate. See Figure 4-1 for an explanation of any differences you might see in a state's 2009 percent exceedance values.

## Closings and Advisories

**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 to issue a closing or advisory.

**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, as well as standing advisories that warn against swimming whenever certain conditions occur, such as a heavy rainfall or stormdrain flow.
- 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. Individual and total beach closing and advisory days are included in each state summary.
- 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.

**Causes of closings and advisories:** The EPA asks states to report a cause and a source for each closing and advisory event. This information is given in this section. In 2008, some states began systematically reporting factors important in diagnosing sources of contamination at some of their monitored beaches to the EPA based on sanitary surveys. Results from this initial reporting effort are not included in the state summaries in this chapter as they are incomplete.

## NOTES

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