

May 2007

GREAT LAKES

EPA and States Have Made Progress in Implementing the BEACH Act, but Additional Actions Could Improve Public Health Protection





Highlights of [GAO-07-591](#), a report to Congressional Requesters

GREAT LAKES

EPA and States Have Made Progress in Implementing the BEACH Act, but Additional Actions Could Improve Public Health Protection

Why GAO Did This Study

Waterborne pathogens can contaminate water and sand at beaches and threaten human health. Under the Beaches Environmental Assessment and Coastal Health (BEACH) Act, the Environmental Protection Agency (EPA) developed limits on pathogens that states use to assess beach water quality. EPA can also provide grants to states to develop water quality monitoring and public notification programs.

GAO was asked to assess (1) the extent to which EPA implemented the BEACH Act including how it allocated grants to the states, (2) the monitoring and notification programs developed by Great Lakes states, and (3) the effect of the BEACH Act on water quality monitoring and contamination at Great Lakes beaches.

What GAO Recommends

GAO recommends that EPA distribute grant funds in a way that reflects states' monitoring needs and help states improve the consistency of their monitoring and notification activities. In addition, Congress should consider providing EPA more flexibility to allow states to use BEACH Act grants to investigate and remediate contamination sources.

EPA generally agreed with GAO's recommendations but stated that states may resist making substantial changes to the funding formula because of their tight budgets.

www.gao.gov/cgi-bin/getrpt?GAO-07-591.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Anu K. Mittal at (202) 512-3841 or mittala@gao.gov.

What GAO Found

EPA has taken steps to implement most of the provisions of the BEACH Act but has missed statutory deadlines for two critical requirements. While EPA has developed a national list of beaches and improved the uniformity of state water quality standards, it has not (1) completed the pathogen and human health studies required by 2003 or (2) published the new or revised water quality criteria for pathogens required by 2005. Moreover, the formula EPA has used to distribute approximately \$51 million in BEACH Act grants from 2001-2006 does not accurately reflect the monitoring needs of the states. This is because the formula emphasizes the length of the beach season more than the other factors—beach miles and beach use. These other factors vary widely among the states, can greatly influence the amount of monitoring a state needs to undertake, and can increase the public health risk.

All eight Great Lakes states have used BEACH Act grants to develop beach monitoring and public notification programs. However, because these programs vary among the states they may not provide consistent levels of public health protection within and across Great Lakes beaches. For example, GAO found that the states' monitoring and notification programs varied considerably in the frequency with which beaches were monitored, the monitoring methods used, and how the public was notified of potential health risks. For example, some states monitor their high-priority beaches as little as one or two times per week, while others monitor their high-priority beaches daily. In addition, when local officials review similar water quality results, some may choose to only issue a health advisory while others may choose to close the beach. According to state and local officials, these inconsistencies are in part due to the lack of adequate funding for their beach monitoring and notification programs.

The frequency of water quality monitoring has increased at Great Lakes beaches since the passage of the BEACH Act, helping states and localities to identify the scope of contamination. However, in most cases, the underlying causes of contamination remain unknown and unaddressed. This is because some state and local officials reported that they do not have the funds to investigate the source of the contamination or take actions to mitigate the problem, and EPA has concluded that BEACH Act grants generally may not be used for these purposes. For example, local officials at 67 percent of Great Lakes beaches reported that, when results of water quality testing indicated contamination at levels exceeding the applicable standards during the 2006 beach season, they did not know the source of the contamination, and only 14 percent reported that they had taken actions to address the sources of contamination. State and local officials indicated that an overall improvement in water quality throughout the Great Lakes will require long-term collaborative efforts to address the underlying causes of contamination, as well as increased funding.

Contents

Letter		1
	Results in Brief	4
	Background	6
	EPA Has Taken Steps to Implement the BEACH Act, but Its Grant Distribution Formula Does Not Adequately Reflect States' Monitoring Needs	11
	Great Lakes States' Beach Monitoring and Public Notification Programs Vary Across Localities and May Not Provide Consistent Levels of Public Health Protection	21
	The BEACH Act Has Helped Identify the Scope of Contamination, but Underlying Causes Remain Unaddressed	31
	Conclusions	40
	Matter for Congressional Consideration	41
	Recommendations for Executive Action	41
	Agency Comments and Our Evaluation	42
Appendix I	Scope and Methodology	45
Appendix II	Map of 35 States and Territories with Coastal Recreational Waters	49
Appendix III	GAO's Calculations for an Alternative BEACH Act Grant Distribution Formula	50
Appendix IV	Comments from the Environmental Protection Agency	57
Appendix V	GAO Contact and Staff Acknowledgments	60
Tables		
	Table 1: BEACH Act Grant Distribution Formula	19

Table 2: BEACH Act Funding Formula Inputs for Great Lakes States	20
Table 3: Number of Great Lakes Beaches Identified, Number and Percentage of Beaches Being Monitored for the 2006 Beach Season	23
Table 4: Great Lakes Prioritized Beaches Reported by States for Monitoring Using BEACH Act Grant Funds as of October 2006	24
Table 5: Monitoring Frequency of Great Lake Beaches by Priority	26
Table 6: Variation in Great Lakes States' Pathogen Indicator (<i>E. coli</i>) Thresholds and Responses to Water Quality Exceedances	29
Table 7: Great Lakes Beaches Reported Monitored by EPA in 2005, GAO Sample, and Sample Disposition by State	46
Table 8: EPA Beach Season Length Factor and States Associated Funding Levels	50
Table 9: EPA's Formula for Distributing \$30 Million in BEACH Act Grants	51
Table 10: EPA's Formula for Distributing \$10 Million in BEACH Act Grants	52
Table 11: Factors Used in BEACH Act Formula Allocations and Resulting 2006 Grants by State and Territory	52
Table 12: Difference in Allocations Using Current and Alternative Formulas	55

Figures

Figure 1: Map of the Five Great Lakes and Eight Great Lakes States with Population Density by County	7
Figure 2: Potential Sources of Fecal Contamination at Beaches in the Great Lakes	9
Figure 3: Time Lag Associated with Current Water Quality Monitoring and Public Notification Methods	17
Figure 4: Reported Depth of Water Quality Sampling at Great Lakes Beaches	28
Figure 5: Variation in Public Notification Signs at Great Lakes Beaches	30
Figure 6: Number of Identified Beaches and Number of Identified Beaches Monitored in the Great Lakes from 1999 to 2005	32
Figure 7: Estimated Changes in Frequency of Monitoring at Great Lakes Beaches Since Passage of the BEACH Act	33

Figure 8: Number of Great Lakes Identified Beaches Monitored and Monitored Beaches with at Least One Closure or Advisory from 1999 to 2005	34
Figure 9: Estimated Change in Ability to Make Decisions Based on Water Quality Data Since Passage of the BEACH Act	35
Figure 10: Changes to Beach Grooming Process at a Racine, Wisconsin, Beach	37
Figure 11: Estimated Change in Public Awareness of Personal Actions on Water Quality at Great Lakes Beaches Since Passage of the BEACH Act	38

Abbreviations

BEACH Act	Beaches Environmental Assessment and Coastal Health Act
EPA	Environmental Protection Agency
NOAA	National Oceanic and Atmospheric Administration
USGS	United States Geological Survey

This is a work of the U.S. government and is not subject to copyright protection in the United States. It may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.



United States Government Accountability Office
Washington, DC 20548

May 1, 2007

Congressional Requesters

There are hundreds of beaches along the 5,000 miles of Great Lakes' shoreline that spans eight states: Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin. These beaches provide recreational opportunities to more than 30 million residents and visitors each year. However, waterborne pathogens—bacteria, viruses, and parasites that live in the gastrointestinal tract of humans and other warm-blooded animals—can contaminate the water and sand at these beaches and threaten human health. The key contributors to this contamination are partially treated discharges from wastewater treatment plants; droppings from wildlife, such as gulls and geese; and agricultural and municipal waste that is often transported to beach-area waters by rain and storm water runoff. Contact with or accidental ingestion of contaminated water can cause vomiting, diarrhea, and other illnesses, and may be life-threatening for susceptible populations such as children, the elderly, and those with impaired immune systems. State and local health officials may issue health advisories or close beaches when they believe levels of waterborne pathogens are high enough to threaten human health. The Natural Resources Defense Council reported that, in 2005, the Great Lakes beaches had at least 2,740 days of health advisories or beach closures.

Under the Clean Water Act, the Environmental Protection Agency (EPA) is responsible for publishing water quality criteria that establish thresholds at which contamination—including waterborne pathogens—may threaten human health. States are required to develop standards, or legal limits, for these pathogens by either adopting EPA's recommended water quality criteria or other criteria that EPA determines are equally protective of human health. The states then use these pathogen standards to assess water quality at their recreational beaches. However, because many pathogens are difficult and costly to detect, state and local officials have typically used more easily identified organisms that indicate that pathogens may be present. During the 1960s and 1970s, EPA evaluated several types of bacteria for use as pathogen indicators and recommended using fecal coliforms—bacteria found in the intestines of humans and warm-blooded animals—as a pathogen indicator for states' recreational water quality standards. By 1986, new research questioned the reliability of using fecal coliforms as a pathogen indicator, prompting EPA to recommend new criteria using *E.coli* and enterococci as pathogen

indicators. However, as of 2000, only 11 states had adopted EPA's recommended 1986 criteria for testing their recreational waters.

Recognizing the need for consistent water quality criteria at recreational beaches, Congress passed the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000 to improve states' beach monitoring programs and processes for notifying the public of potential health risks from contamination at beaches. The BEACH Act amended the Clean Water Act to require the 35 eligible states and territories—including the 8 Great Lakes states—to update their recreational water quality standards using EPA's 1986 criteria for pathogen indicators. In addition, the BEACH Act required EPA to (1) complete studies on pathogens in coastal recreational waters and how they affect human health, including developing rapid methods of detecting pathogens by October 2003, and (2) publish new or revised water quality criteria by October 2005, to be reviewed and revised as necessary every 5 years thereafter.

The act also authorized EPA to award grants to states, localities, and tribes to develop comprehensive beach monitoring and public notification programs for their recreational beaches. To be eligible for BEACH Act grants, states are required to (1) identify their recreational beaches, (2) prioritize their recreational beaches for monitoring based on their use by the public and the risk to human health, and (3) establish a public notification program. EPA grant criteria give states some flexibility on the frequency of monitoring, methods of monitoring, and processes for notifying the public when pathogen indicators exceed state standards, including whether to issue health advisories or close beaches. The BEACH Act authorized EPA to provide \$30 million in grants annually for fiscal years 2001 through 2005.¹ However, since fiscal year 2001, congressional conference reports accompanying EPA's appropriations acts have directed about \$10 million annually for grants under the act. EPA has followed this congressional direction when allocating funds to the program.

In the context of continuing health advisories and beach closures at Great Lakes beaches since passage of the BEACH Act, you asked us to (1) determine the extent to which EPA has implemented the act and evaluate EPA's formula for allocating BEACH Act grants, (2) describe and evaluate the monitoring and notification programs the eight Great Lakes states have

¹Although the BEACH Act was originally authorized through 2005, Congress continued to fund EPA's efforts under the act in 2006 and 2007.

developed using BEACH Act grants, and (3) determine the effect that the BEACH Act has had on water quality monitoring and contamination at Great Lakes beaches.

To determine the status of EPA's implementation of the BEACH Act, we analyzed the act, obtained and analyzed relevant agency documentation, and interviewed officials from EPA headquarters and Region 5 (Chicago) offices. To evaluate EPA's formula for allocating BEACH Act grants, we obtained and analyzed EPA data on funding levels, interviewed officials that developed the allocation formula, and conducted simulations to demonstrate how alterations of the formula would shift funding and potentially affect current allocations. To evaluate the programs the eight Great Lakes states have developed using their BEACH Act grants, we conducted a survey of a random sample of 140 of the 563 beaches EPA identified as being monitored in the Great Lakes in 2005. Information obtained through this survey was used to produce estimates² of beach monitoring and notification activities at monitored Great Lakes beaches for the 2006 beach season. We distributed an electronic questionnaire via e-mail to local officials at a random sample of 140 beaches, and 93 percent of those surveyed responded to our questionnaire. Information obtained through this survey was used to produce estimates of beach monitoring and notification activities for the entire population of monitored Great Lakes beaches for the 2006 beach season. In addition, we interviewed BEACH Act administrators from each of the Great Lakes states. To determine the effect the BEACH Act has had on Great Lakes beach monitoring and contamination levels, we analyzed the results of our questionnaire and the information provided by the eight state BEACH Act administrators. We also met with and gathered information from other agencies and nonprofit organizations working on Great Lakes issues, such as the National Oceanic and Atmospheric Administration (NOAA), the U.S. Geological Survey (USGS), the Metropolitan Water Reclamation District of Greater Chicago, and the Natural Resources Defense Council. We took steps to assess the reliability of EPA data on monitored beaches. Appendix I includes more information about our scope and methodology. We conducted our work from June 2006 through March 2007 in accordance with generally accepted government auditing standards.

²In this report, all percentages based on our survey are estimates and subject to sampling error. Unless otherwise noted, all percentage estimates from this survey have 95 percent confidence intervals of within plus or minus 10 percentage points of the estimate.

Results in Brief

EPA has implemented seven of the BEACH Act's nine requirements and provisions. For example, EPA promulgated water quality standards for the 21 states and territories that had not adopted EPA's 1986 water quality criteria and developed a national list of beaches. However, EPA has not (1) completed the pathogen and human health studies that were required by 2003 or (2) published new or revised water quality criteria for pathogens or pathogen indicators that were required by 2005. EPA told us that the required studies are ongoing, but may take an additional 4 to 5 years to complete, and that the development of new pathogen indicators would follow completion of the studies. Although EPA has distributed approximately \$51 million in BEACH Act grants between 2001 and 2006 to the 35 eligible states and territories, EPA's formula for distributing BEACH Act grant funds does not reflect the states' varied monitoring needs. EPA considered the BEACH Act's emphasis on beach use and risk to human health in developing the formula, which is based on three factors—length of beach season; beach miles, as measured by length of shoreline; and beach use, as measured by coastal population. If the program had received its full funding of \$30 million, each of the three factors would have had approximately the same level of influence on the amount of BEACH Act grant funds allocated to the states. However, because funding allocations have only been about \$10 million annually, the beach season factor has had a greater influence (about 82 percent) on the total BEACH Act grants each state received, while beach miles and beach use, which vary widely among the states and can impact the public health risk, have had a significantly smaller impact (about 9 percent each). As a result, while the Great Lakes state's beach monitoring needs vary widely because of their differing coastlines and coastal populations, the amount of each state's BEACH Act grant is almost the same. For example, Indiana, which has 45 miles of shoreline and a coastal population of 741,468, received about \$205,800 in 2006 while Michigan, which has 3,224 miles of shoreline and a coastal population of 4,842,023, received about \$278,450 in 2006.

Each of the eight Great Lakes states has used its BEACH Act grant funding to develop beach monitoring and public notification programs, but these programs vary across states and localities and may not consistently protect public health. Prior to the BEACH Act, only five of the eight Great Lakes states had water quality monitoring programs, and now all eight have a program in place. However, the Great Lake states' monitoring and notification programs vary considerably in the frequency with which they monitor their beaches, their monitoring methods, and their means of notifying the public of health risks. For example, some states monitor beaches they have designated as high priority as little as one or two times per week, while others monitor their high-priority beaches daily. These

differences are due, in part, to the current BEACH Act funding levels, which some Great Lakes state officials reported are inadequate for sufficient monitoring. In addition, when local officials review water quality results, they may make different decisions on whether or not to issue a health advisory or close a beach even though the results show the same level of contamination. This happens because, according to Great Lakes states BEACH Act administrators, two states only issue health advisories, two states only close beaches, and four states may take either of these actions when water quality standards have been exceeded.

Since the passage of the BEACH Act, the frequency of water quality monitoring at Great Lakes beaches has increased, helping states and localities to identify the scope of contamination; however, in most cases, the underlying causes of the contamination remain unknown and unaddressed. Local officials reported that the frequency of monitoring had increased at 45 percent of Great Lakes beaches since the passage of the BEACH Act. The increased monitoring has helped state and local officials determine which beaches are more likely to be contaminated. However, in most cases, local officials do not know the causes of contamination and, consequently, have not been able to take actions to address those causes. Local officials at 67 percent of Great Lakes beaches did not know the sources of bacterial contamination causing their exceedances of water quality standards during the 2006 beach season. Furthermore, local officials indicated that actions to address the sources of contamination had only been taken at an estimated 14 percent of the monitored beaches we surveyed. Local officials generally stated that they do not have the funds available to do the investigations necessary to identify specific sources of contamination or to take actions to mitigate the problem, and they can not use BEACH grant funds for this purpose. Our review of the BEACH Act and discussions with EPA officials indicate that it appears EPA cannot award BEACH Act grants for these purposes. According to state and local officials, an overall improvement in water quality throughout the Great Lakes will require a long-term collaborative effort to address the underlying causes of contamination and also will require increased funding.

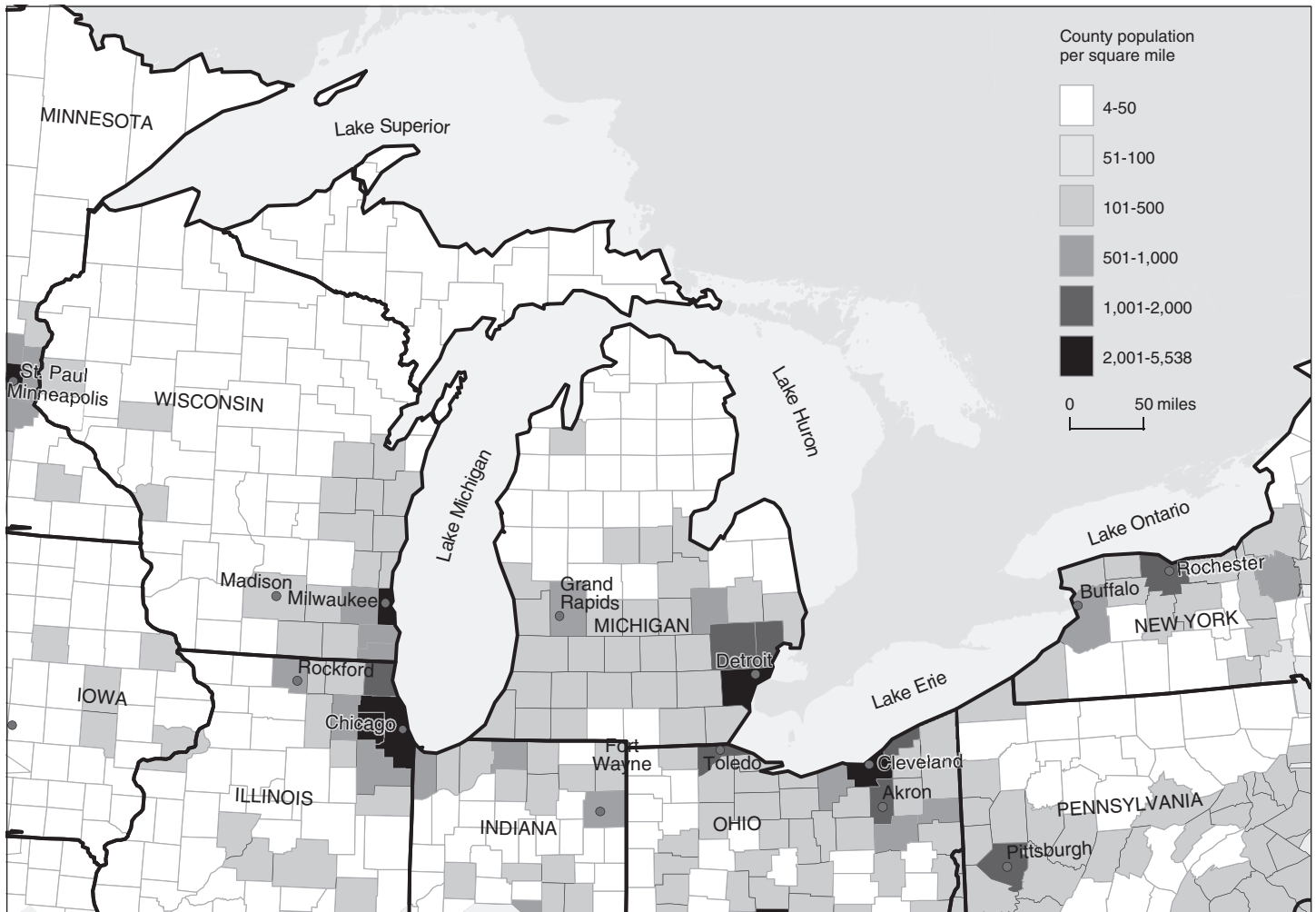
To assist states and localities in identifying and addressing sources of beach contamination, Congress should consider allowing states some flexibility to use their BEACH Act grants to undertake limited research to identify specific sources of contamination at monitored beaches and take certain actions to mitigate these problems. In addition, we are recommending that EPA establish a definitive time line for completing the studies on pathogens and their effects on human health and for publishing

new or revised water quality criteria for pathogens and pathogen indicators. To better account for states' varied monitoring needs, if current funding levels remain the same, EPA should reevaluate the funding formula factors to determine if the weight of the beach season factor should be reduced, and the weight of the other factors should be increased. To better ensure consistent levels of public health protection, EPA should also provide states and localities with specific guidance on monitoring frequency and methods and public notification. In commenting on the draft report, EPA generally agreed with GAO's recommendations and agreed to (1) take actions to establish an action plan and a definitive time frame to complete studies and publish revised water quality standards and (2) revise its guidance to states. With respect to our recommendation to revise the current funding formula to better reflect states' needs, EPA agreed with this recommendation, but stated that the states were reluctant to make any substantial changes to the formula and were supportive of EPA's plan to make only minor changes to the formula.

Background

More than 30 million people in the United States rely on the five Great Lakes—Superior, Michigan, Huron, Erie, and Ontario—as a principal source of their drinking water, recreation, and economic livelihood. There are hundreds of beaches along the Great Lakes' approximately 5,000 miles of U.S. shoreline that spans eight states: Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin. Figure 1 shows the five lakes and the eight states with Great Lakes shorelines, along with their population concentrations.

Figure 1: Map of the Five Great Lakes and Eight Great Lakes States with Population Density by County



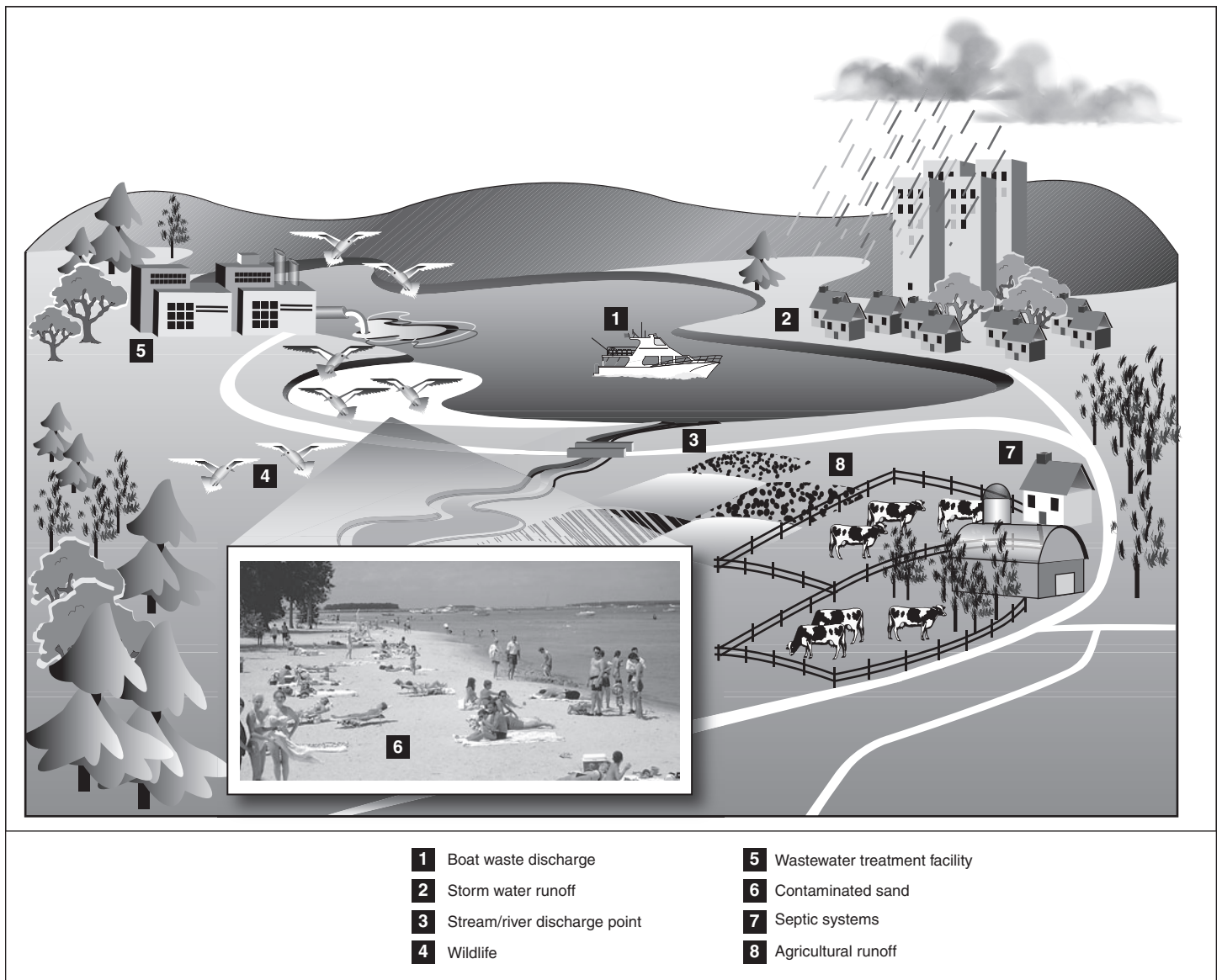
Sources: United States Census Bureau Population Estimates, 2005. Map: Ginny Mason, Congressional Cartography, Library of Congress, 2006.

Development on lands adjacent to the lakes has seriously degraded the lakes' water quality and, in some areas, contaminated recreational waters with pathogens—including bacteria, viruses, and parasites—that can threaten human health and force restrictions on recreational activities such as swimming at the beaches. Contact with or accidental ingestion of water contaminated with these pathogens can cause vomiting, diarrhea, and other illnesses, and may be life-threatening for susceptible populations such as children, the elderly, and those with impaired immune systems. When pathogen levels are high enough to threaten human health,

officials from local health departments or municipalities restrict public access to beaches by issuing health advisories or through the use of beach closures to lower the risk of public exposure to these pathogens.

One of the key contributors to this waterborne contamination is fecal matter from humans and other warm-blooded animals. While sources can vary from beach to beach, those close to urban areas are more likely to be affected by sources such as wastewater treatment plants, combined sewer overflows, and municipal storm sewer systems that can directly contribute to high levels of bacterial contamination. Beaches in states with large confined animal feeding operations may be affected by runoff from these operations. Many beaches are affected by nonpoint source pollution when storm water runs off impervious surfaces such as streets and parking lots and picks up pollutants along the way. In addition, wildlife—in particular seagulls and geese—can congregate on beaches and lead to significant levels of fecal contamination. Figure 2 shows some of the potential sources of fecal contamination at beaches in the Great Lakes.

Figure 2: Potential Sources of Fecal Contamination at Beaches in the Great Lakes



Sources: GAO (data); EPA (photo insert).

Under the Clean Water Act, EPA is responsible for publishing water quality criteria that identify thresholds at which pathogens may constitute a risk to human health. States can then use EPA's criteria, or propose

other criteria that EPA deems are as protective of human health, to develop water quality standards for their recreational beaches.³ Because pathogens are found sporadically in recreational waters and can be difficult and costly to detect, EPA has recommended other more easily identified organisms—called pathogen indicators—that can indicate the potential for the presence of pathogens. During the 1960s and 1970s, EPA evaluated several types of bacteria for use as pathogen indicators and recommended using fecal coliforms as a pathogen indicator for state recreational water quality standards. By 1986, new research questioned the reliability of using fecal coliforms as a pathogen indicator and prompted EPA to recommend new criteria using *E. coli* for freshwater and enterococci for fresh and marine recreational waters.

In 1997, EPA announced a new national program to work with state, tribal, and local governments to compile information on beach contamination defining the national extent of the problem. EPA began gathering information on state and local beach programs through its *National Health Protection Survey of Beaches* in 1998. The survey collected information on monitoring methods used to issue advisories and closures and the sources of contamination at swimming beaches. In 1999, EPA published a multiyear strategy aimed at improving recreational water quality programs. This action plan noted that water quality monitoring programs varied widely at the state and local levels, and its objective was to enable the consistent management of recreational water quality programs.

Congress passed the BEACH Act in 2000, amending the Clean Water Act to improve beach water quality monitoring notification programs. The act defines coastal recreation waters as Great Lakes and marine coastal waters designated for swimming, bathing, or similar water contact activities; inland waters are not included in this definition. The BEACH Act required states to adopt new or revised water quality standards by April 10, 2004, for pathogens and pathogen indicators for their coastal recreation waters that were as protective as EPA's published criteria. The act required EPA to propose regulations setting forth new or revised water quality standards for states that had failed to meet this deadline. In addition, the BEACH Act required EPA to conduct studies of the relationship between pathogens and human health and to publish new or

³Water quality standards include narrative and numeric criteria that support specific designated uses and also specify goals to prevent degradation of good quality waters.

revised criteria based on those studies. The BEACH Act also authorized EPA to award grants to states, local governments, and tribes to develop and implement beach monitoring and notification programs. The BEACH Act required EPA to develop and publish performance criteria that recipients must meet in order to receive these grants.

EPA Has Taken Steps to Implement the BEACH Act, but Its Grant Distribution Formula Does Not Adequately Reflect States' Monitoring Needs

EPA has implemented seven of the nine BEACH Act requirements and provisions and has distributed approximately \$51 million in BEACH Act grants since 2001 and created a national water pollution database, among other requirements. However, EPA has missed statutory deadlines for two actions: (1) completing required studies on pathogens and human health for both marine and freshwater by 2003 and (2) using these studies to publish new or revised water quality criteria for pathogen indicators by 2005. In addition, the grant distribution formula that EPA developed to distribute BEACH Act grants does not adequately reflect the states' varied beach monitoring needs because it does not appropriately reflect the length of beach miles needing monitoring or the population using the beaches.

EPA Has Implemented Some but Not All BEACH Act Requirements and Provisions

Of the nine actions required by the BEACH Act, EPA has taken the following seven:

Propose water quality standards and criteria—The BEACH Act required each state with coastal recreation waters⁴ to incorporate EPA's published criteria for pathogens or pathogen indicators, or criteria EPA considers equally protective of human health, into their state water quality standards by April 10, 2004. The BEACH Act also required EPA to propose regulations setting forth federal water quality standards for those states that did not meet the deadline. On November 16, 2004, EPA published in the *Federal Register* a final rule promulgating its 1986 water quality standards for *E. coli* and enterococci for the 21 states and territories that had not adopted water quality criteria that were as protective of human

⁴The BEACH Act defines coastal recreation waters as the Great Lakes and coastal waters (including coastal estuaries) that states, territories, and authorized tribes officially recognize (or "designate") for swimming, bathing, surfing, or similar activities in the water. The BEACH Act applies to 30 coastal and Great Lakes states and 5 U.S. territories. See appendix II for a map of the 35 states and territories with coastal recreational waters.

health as EPA's approved water quality criteria.⁵ According to EPA, all 35 states with coastal recreational waters are now using EPA's 1986 criteria, compared with the 11 states that were using these criteria in 2000.

Provide BEACH Act grants—The BEACH Act authorized EPA to distribute annual grants to states, territories, tribes and, in certain situations, local governments to develop and implement beach monitoring and notification programs. While the BEACH Act authorized \$30 million per year for BEACH Act grants, actual allocations have been about \$10 million a year in accordance with directions from Congressional conference reports. Since 2001, EPA has awarded approximately \$51 million in development and implementation grants for beach monitoring and notification programs to all 35 states. Alaska is the only eligible state that has not yet received a BEACH Act implementation grant because it is still in the process of developing a monitoring and public notification program consistent with EPA's grant performance criteria. EPA expects to distribute approximately \$10 million for the 2007 beach season subject to the availability of funds.

Publish beach monitoring guidance and performance criteria for grants—The BEACH Act required EPA to develop guidance and performance criteria for beach monitoring and assessment for states receiving BEACH Act grants by April 2002. After a year of consultations with coastal states and organizations, EPA responded to this requirement in 2002 by issuing its *National Beach Guidance and Required Performance Criteria for Grants*. To be eligible for BEACH Act grants, EPA requires recipients to develop (1) a list of beaches evaluated and ranked according to risk, (2) methods for monitoring water quality at their beaches, such as when and where to conduct sampling, and (3) plans for notifying the public of the risk from pathogen contamination at beaches, among other requirements.

Develop a list of coastal recreational waters—The BEACH Act required EPA to identify and maintain a publicly available list of coastal recreational waters adjacent to beaches or other publicly accessible areas, with information on whether or not each is subject to monitoring and

⁵EPA worked with the states and territories to identify their existing water quality standards and to review them for consistency with the BEACH Act requirements. On April 16, 2004, EPA sent a letter to environmental agencies at all 35 states with coastal recreational waters and proposed federal standards for those states that had not yet adopted EPA's 1986 criteria.

public notification. In March 2004, EPA published its first comprehensive National List of Beaches based on information that the states had provided as a condition for receiving BEACH Act grants. The list identified 6,099 coastal recreational beaches, of which 3,472, or 57 percent, are being monitored. The BEACH Act also requires EPA to periodically update its initial list and publish revisions in the Federal Register. However, EPA has not yet published a revised list, in part because some states have not provided updated information.

Develop a water pollution database—The BEACH Act required EPA to establish, maintain, and make available to the public an electronic national water pollution database. In May 2005, EPA unveiled “eBeaches,” a collection of data pulled from multiple databases on the location of beaches, water quality monitoring, and public notifications of beach closures and advisories.⁶ This information has been made available to the public through an online tool called BEACON (Beach Advisory and Closing Online Notification). EPA officials acknowledge that eBeaches has had some implementation problems, including periods of downtime when states were unable to submit their data, and states have had difficulty compiling the data and getting it into EPA’s desired format. EPA is working to centralize its databases so that states can more easily submit information and expects the data reporting will become easier for states as they further develop their system.

Provide technical assistance on floatable materials—The BEACH Act required EPA to provide technical assistance to help states, tribes, and localities develop their own assessment and monitoring procedures for floatable debris in coastal recreational waters. EPA responded by publishing guidance titled *Assessing and Monitoring Floatable Debris* in August 2002. The guidance provided examples of monitoring and assessment programs that have addressed the impact of floatable debris and examples of mitigation activities to address floatable debris.

Provide a report to Congress on status of BEACH Act implementation—The BEACH Act required EPA to report to Congress 4 years after

⁶In order to house the water quality data, EPA decided to use EPA’s previously existing STORET (STORAge and RETrieval) database. For beach advisory and closing data, EPA created the PRAWN (Program Tracking database for Advisories, Water Quality Standards, and Nutrients) database. STORET is the repository for water quality, biological, and physical data and is used by EPA offices, state environmental agencies, universities, and other organizations. PRAWN is a repository for beach advisory and closing data.

enactment of the act and every 4 years thereafter on the status of implementation. EPA completed its first report for Congress, *Implementing the BEACH Act of 2000: Report to Congress* in October 2006, which was 2 years after the October 2004 deadline. EPA officials noted that they missed the deadline because they needed additional time to include updates on current research and states' BEACH Act implementation activities and to complete both internal and external reviews.

EPA has not yet completed the following two BEACH Act requirements:

Conduct epidemiological studies—The BEACH Act required EPA to publish new epidemiological studies concerning pathogens and the protection of human health for marine and freshwater by April 10, 2002, and to complete the studies by October 10, 2003. The studies were to: (1) assess potential human health risks resulting from exposure to pathogens in coastal waters; (2) identify appropriate and effective pathogen indicator(s) to improve the timely detection of pathogens in coastal waters; (3) identify appropriate, accurate, expeditious, and cost-effective methods for detecting the presence of pathogens; and (4) provide guidance for state application of the criteria. EPA initiated its multiyear *National Epidemiological and Environmental Assessment of Recreational Water Study* in 2001 in collaboration with the Centers for Disease Control and Prevention. The first component of this study was to develop faster pathogen indicator testing procedures. The second component was to further clarify the health risk of swimming in contaminated water, as measured by these faster pathogen indicator testing procedures.⁷ While EPA completed these studies for freshwater—showing a promising relationship between a faster pathogen indicator and possible adverse health effects from bacterial contamination—they have not completed the studies for marine water. EPA initiated marine studies in Biloxi, Mississippi, in the summer of 2005, 3 years past the statutory deadline for beginning this work, but the work was interrupted by Hurricane Katrina. EPA officials reported that additional studies are planned for the summer of 2007, pending funding.

⁷EPA used quantitative polymerase chain reaction (PCR) method to quantify two types of bacteria, enterococci and bacteroides, at four freshwater beaches on Lake Michigan and Lake Erie. The results of the water quality tests were then correlated to health surveys of beachgoers who swam at the beaches, by interviewing beachgoers as they left the beach, and again by telephone 10 to 12 days after their beach visit to assess the levels of diarrhea and gastrointestinal illness, as well as other adverse health effects.

Publish new pathogen criteria—The BEACH Act required EPA to use the results of its epidemiological studies to identify new pathogen indicators with associated criteria, as well as new pathogen testing measures by October 2005. However, since EPA has not completed the studies on which these criteria were to be based, this task has been delayed.

An EPA official reports that EPA has not established a time line for completing these two remaining provisions of the BEACH Act but estimates it may take an additional 4-5 years. One EPA official told us that the initial time frames in the act may not have been realistic. EPA's failure to complete studies on the health effects of pathogens for marine waters and failure to publish revised water quality criteria for pathogens and pathogen indicators prompted the Natural Resources Defense Council to file suit against EPA on August 2, 2006, for failing to comply with the statutory obligations of the BEACH Act.

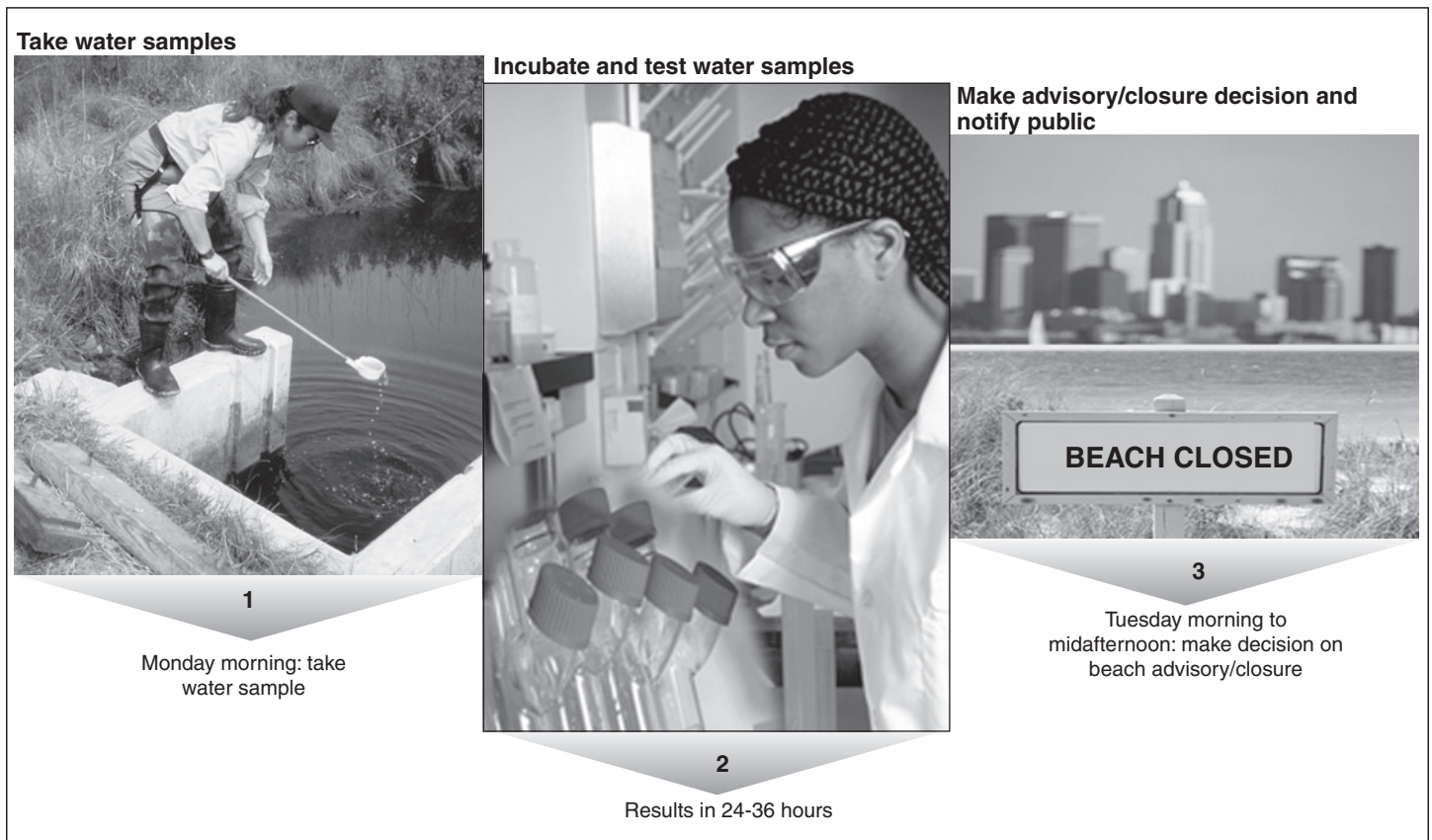
In the absence of new criteria for pathogens and pathogen indicators, states continue to use EPA's 1986 criteria. EPA reaffirmed the use of these indicators when it published the draft *Implementation Guidance for Ambient Water Quality for Bacteria* in May 2002 and when it set forth state water quality standards in November 2004. However, there are two significant limitations to using these indicators:

- The current approved methods of analyzing *E. coli* and enterococci require a long incubation period, during which time the bacteria grow to detectable levels. Local officials at 96 percent of Great Lakes beaches reported that it took 18-36 hours to get results on water quality samples once the samples reached the laboratory. Consequently, water quality sample results indicate the previous day's bacterial levels, and health advisories or beach closures are based on those levels. By the time the results are compiled and health advisories or notices are posted, the contamination may or may not have cleared up. In any case, beach monitoring personnel would need to retest the water to determine whether there was still contamination and go through this 18-36 hour cycle again to establish the current conditions. Real-time or near-time analytical methods would enable officials to better protect human health because their actions would be based on more timely and current information. EPA scientists acknowledge that the public would like nearly immediate testing methods, but note that the technology does not yet exist.
- The current pathogen indicators—*E. coli* and enterococci —may not be good indicators of the presence of pathogens or health risks. EPA scientists also noted that *E. coli* may not be an effective indicator because

it is ubiquitous and occurs naturally in many environments. In addition, current testing methods cannot distinguish whether fecal contamination is from a human or animal source. Human fecal contamination may indicate the presence of pathogens that pose a greater risk to humans than does the presence of fecal contamination from pets or wildlife. While there are methods to determine the source of fecal contamination, such as microbial source tracking, scientists we spoke with noted that this method is time-intensive, expensive, and not readily available.

The lack of a reliable indicator and the lag time for test results using current methods could lead to unnecessary beach closures, or conversely, keeping beaches open when they should have been closed. Because local officials generally use the same laboratory tests to determine the results of water quality sampling, this is a potential problem for all 35 states and territories with coastal recreational waters and not just the Great Lakes states. A time lag of the entire process is shown in figure 3.

Figure 3: Time Lag Associated with Current Water Quality Monitoring and Public Notification Methods



Sources: GAO and (left to right) PhotoDisc, Creatas, and Fish and Wildlife Service (photographs).

Note: Figure 3 represents a best case scenario where test results are available within 24 hours. In some cases, it may take officials upward of 36-48 hours to get water quality results and make notification decisions.

EPA's BEACH Act Grant Formula Does Not Adequately Reflect States' Monitoring Needs

While EPA distributed approximately \$51 million in BEACH Act grants between 2001 and 2006 to the 35 eligible states and territories, its grant distribution formula does not adequately account for states' widely varied beach monitoring needs. When Congress passed the BEACH Act in 2000, it authorized \$30 million in grants annually, but the act did not specify how EPA should distribute grants to eligible states. Beginning in 2001, EPA consulted with representatives from the Coastal States Organization and the Association of State and Interstate Water Pollution Control Administrators to consider the states' needs. EPA determined that initially \$2 million would be distributed equally to all states to cover the base cost of developing water quality monitoring and notification programs. EPA then developed a distribution formula for future annual grants that

reflected the BEACH Act's emphasis on beach use and risk to human health. EPA's funding formula includes the following three factors:

- *Length of beach season*—EPA selected beach season length⁸ as a factor because states with longer beach seasons would require more monitoring.
- *Beach use*—EPA selected beach use as a factor because more heavily used beaches would expose a larger number of people to pathogens, increasing the public health risk and thus requiring more monitoring. EPA used coastal population⁹ as a proxy for beach use because information on the number of beach visitors was not consistently available across all the states.
- *Beach miles*—EPA selected beach miles because states with longer shorelines would require more monitoring. EPA used shoreline miles,¹⁰ which may include industrial and other nonpublicly accessible areas, as a proxy for beach miles because verifiable data for beach miles was not available.

Once EPA determined which funding formula factors to use, EPA officials weighted the factors. EPA intended that the beach season factor would provide the base funding and would be augmented by the beach use and beach mile factors. EPA established a series of fixed amounts that correspond to states' varying lengths of beach seasons to cover the general expenses associated with a beach monitoring program. For example, EPA estimated that a 3-month, or less, beach season would require approximately two full-time employees costing \$150,000, while states with beach seasons greater than 6 months would require \$300,000. Once the allotments for beach season length are distributed, EPA determined that 50 percent of the remaining funds would be distributed according to states' beach use, and the other 50 percent would be distributed according to states' beach miles, as shown in table 1.

⁸EPA used information on the length of beach seasons reported in the *National Health Protection Survey of Beaches* for the states or territories that submitted a completed survey. EPA estimated the beach season length for Alaska based on several factors.

⁹EPA used the Census Bureau's 2000 Census data as a surrogate for coastal population.

¹⁰EPA used NOAA's *The Coastline of the United States* to quantify shoreline miles.

Table 1: BEACH Act Grant Distribution Formula

Formula factor	Amount of grant
Beach season length	Less than 3 months: \$150,000
	3-4 months: \$200,000
	5-6 months: \$250,000
	Greater than 6 months: \$300,000
Beach use	50% of funds remaining after allotment of beach season length funding.
Beach miles	50% of funds remaining after allotment of beach season length funding.

Source: EPA.

^aStates with less than a 3-month beach season only receive the \$150,000 in beach season length funding.

EPA officials told us that, originally, the factors would have received relatively equal weight. Using the distribution formula above and assuming a \$30 million authorization, this would have resulted in the following allocation across the 35 eligible states: beach season—27 percent (about \$8 million); beach use—37 percent (about \$11 million); and beach miles—37 percent (about \$11 million). However, since 2002, funding levels for BEACH Act grants have been about \$10 million each year. Once the approximately \$8 million, of the total \$10 million available for grants, was allotted for beach season length, this left only \$2 million, instead of nearly \$22 million, to be distributed equally between the beach use and beach miles factors. This resulted in the following allocation across the 35 eligible states: beach season—82 percent (about \$8 million); beach use—9 percent (about \$1 million); and beach miles—9 percent (about \$1 million). As a result, beach use and beach miles, which vary widely among the states, account for a much smaller portion of the distribution formula and, consequently, there is little variation in grant amounts across the states compared with their monitoring needs.

Across the Great Lakes, there is significant variation in coastal populations and in miles of shoreline, but the current BEACH Act grant allocations are relatively flat. For example, Indiana, which has 45 miles of shoreline and a coastal population of 741,468, received about \$205,800 in 2006, while Michigan, which has 3,224 miles of shoreline and a coastal population of 4,842,023, received about \$278,450 in 2006. If EPA were to reweight the factors so that they were still roughly equal given the \$10 million

appropriation, states' grants would better reflect these variations.¹¹ Table 2 shows the Great Lakes states' beach season lengths; beach use, as indicated by coastal populations; and beach miles, as indicated by shoreline miles; and compares their current BEACH Act grants with estimates of how much their grants would be if EPA reweighted the formula given the current appropriation levels of approximately \$10 million.¹²

Table 2: BEACH Act Funding Formula Inputs for Great Lakes States

State	Beach season length	Beach use (coastal population in 2000)	Beach miles (shoreline miles)	Grant allocation (based on \$10 million appropriation)	Estimated grant allocation using reweighted factors (based on \$10 million appropriation)	Estimated difference
Illinois	4	6,021,097	63	\$246,646	\$250,310	\$3,664
Indiana	4	741,468	45	206,304	91,485	-114,819
Michigan	4	4,842,023	3,224	285,214	402,148	116,934
Minnesota	4	236,946	189	204,639	84,932	-119,707
New York ^a	4	16,088,089	2,625	361,565	702,739	341,174
Ohio	4	2,767,328	312	225,694	167,821	-57,873
Pennsylvania	4	2,946,892	140	224,471	163,007	-61,464
Wisconsin	4	1,992,393	820	\$227,448	\$174,729	-\$52,719

Sources: EPA and GAO.

^aIncludes Atlantic and Great Lake coasts.

Because of the current formula allocations, some states and localities have expressed concerns that their BEACH Act grants are insufficient to adequately monitor their beaches. For example, state officials in Michigan and Wisconsin reported that, due to limited financial resources and the large number of beaches in their states, they are unable to test all of their beaches, or to test them more than once per week. Similarly, local officials

¹¹We conducted a simulation to allocate funding based on the ratios obtained when the \$30 million authorization was anticipated. We constructed the formula to maintain the 27 percent weight for beach season while allocating a \$10 million appropriation amount. This simulation demonstrates how altering the formula would shift funding, affecting current allocations for the Great Lakes states.

¹²GAO conducted a simulation for all 35 coastal states and territories to determine how their grants funding levels would change if EPA reweighted the formula given the current appropriation levels of approximately \$10 million. See appendix III for a description of this simulation and results for all states.

at 44 percent of the beaches we surveyed reported that their BEACH Act grants were either inadequate or very inadequate for the purpose of monitoring their beaches; while 31 percent reported that their BEACH Act grants were adequate or very adequate.¹³ One state official indicated that if their state's funding level decreases, several of their localities would prefer to end their beach monitoring programs.

EPA recognizes that there are limitations to the factors in its grant distribution formula and that, as a result of current funding allocations, the factors are no longer relatively equally weighted. Beginning in February 2006, EPA convened six workshop meetings to evaluate potential changes to the formula, with 25 of the 35 eligible states participating. The work group considered several modifications to the formula including: (1) reducing the fixed factor based on beach season length from a base of \$150,000 to \$100,000, so that other factors have more weight; (2) replacing shoreline miles data with actual beach length data now available from the BEACON database; and (3) replacing coastal county population with data from a NOAA marine survey of the number of participants in beach recreation activities. EPA notes that the work group has also discussed including a factor related to the number of water samples collected. At the time of this report's release, EPA had not changed the funding formula.

Great Lakes States' Beach Monitoring and Public Notification Programs Vary Across Localities and May Not Provide Consistent Levels of Public Health Protection

All eight Great Lakes states have used BEACH Act grants to develop beach monitoring and public notification programs. However, the frequency with which they monitor their beaches, the methods to monitor beaches, and the processes for notifying the public of health advisories and beach closures vary within and across states. These variations may lead to inconsistent levels of public health protection across beaches in the Great Lakes.

¹³Based on our survey, an estimated 41 percent believe that their grants were inadequate, and an estimated 3 percent believe that these grants are very inadequate. Further, about 30 percent believe that their grants were adequate, and 1 percent believe that these grants are very adequate.

Great Lakes States Used BEACH Act Grants to Develop Beach Monitoring and Public Notification Programs

All eight Great Lakes states have used BEACH Act grants to develop beach monitoring and public notification programs. Three of the eight Great Lakes states—Indiana, Minnesota, and Wisconsin—did not have water quality monitoring programs prior to the BEACH Act and used their BEACH Act grants to implement such programs. The remaining five states expanded their existing beach monitoring programs. In most cases, EPA gives the BEACH Act grants directly to state environmental protection agencies, which administer the grants, compile and submit water quality monitoring and public notification data to EPA, and prepare grant applications and annual reports.¹⁴ The states usually distribute the funds they receive to localities who implement or develop monitoring and notification programs. The localities, through local health departments or other public health agencies, usually collect water samples at local beaches and post results. EPA notes that localities have traditionally played the lead role in implementing these programs because they are often more familiar with local problems and may be better suited to address them.

To be eligible for BEACH Act grants, EPA requires states, tribes, or local governments to develop, among other things: (1) a list of beaches evaluated and ranked according to risk; (2) methods for monitoring water quality at their beaches, such as when and where to conduct sampling, and (3) plans for notifying the public of the risk from pathogen contamination.

Develop a list of beaches. EPA required states and territories that received BEACH Act grants to develop and submit to EPA lists of their beaches that identified whether there was a monitoring program in place for each beach. EPA's BEACH Act grant performance criteria also required states and local government to rank their beaches based on beach use and risk to human health from pathogens. In developing their beach classification and prioritization schemes, the Great Lakes states considered beach use and accessibility, historical contamination problems, and proximity to known sources of contamination. Table 3 shows the number of Great Lakes beaches and the percentage being monitored, as reported by officials from the Great Lakes states for the 2006 beach season.

¹⁴The only exception is Pennsylvania, where all of the state's beaches are in Erie County. As such, in 2006, Pennsylvania became the only state in the country with a county-run program, and Erie County is the only locality that receives grants directly from EPA.

Table 3: Number of Great Lakes Beaches Identified, Number and Percentage of Beaches Being Monitored for the 2006 Beach Season

State	Number of Great Lakes beaches identified	Number of beaches monitored	Percentage of beaches monitored
Illinois	69	54	78%
Indiana	30	25	83
Michigan	905	212	23
Minnesota	79	39	49
New York ^a	38	38	100
Ohio	54	54	100
Pennsylvania	12	12	100
Wisconsin	192	123	64
Total	1,379	557	40%

Source: GAO analysis of information provided by state BEACH Act officials.

^aNew York has shoreline miles both along the Atlantic Ocean and along Lake Erie and Lake Ontario. There are 348 beaches in the state of New York, and all are monitored.

Develop methods for monitoring water quality. EPA also recommended that states and localities develop a three-tiered plan that prioritizes beaches for monitoring. EPA intended the beach prioritization scheme to allow beach managers to devote more resources and intensive monitoring and notification efforts to those high-use and/or high-risk beaches. A tier 1 classification indicates that the beach is a high-use and/or high-risk beach and, therefore, is a high priority for monitoring. A tier 2 beach is a medium-use and/or medium-risk beach and is a lower priority for monitoring. A tier 3 beach is a low-use and/or low-risk beach and is a low priority for monitoring. All eight Great Lakes states prioritized their beaches for monitoring according to EPA’s suggested factors of beach use and risk to human health. Great Lakes beaches have varying numbers of high, medium, and low-priority beaches, as shown in table 4.

Table 4: Great Lakes Prioritized Beaches Reported by States for Monitoring Using BEACH Act Grant Funds as of October 2006

State	Number of beaches by priority			Beaches prioritized for monitoring
	High	Medium	Low	
Illinois ^a	49	5	15 ^b	54
Indiana	7	10	6	23
Michigan	207	Varies ^c	334	207
Minnesota	9	30	0	39
New York	20	13	5	38
Ohio	41	0	11	52
Pennsylvania	11	1	0	12
Wisconsin	34	39	50	123

Source: GAO analysis of information provided by state BEACH Act officials.

^aDoes not include Chicago beaches because Chicago did not originally apply for BEACH Act grants.

^bIllinois does not monitor its 15 tier 3 beaches.

^cMichigan reported that the number of tier 2 (medium) priority beaches varies. Michigan does not monitor its 334 tier 3 beaches.

Develop public notification plans. EPA’s grant performance criteria require states and localities that find their beach water contamination exceeds EPA’s criteria to notify the public or resample the water. EPA’s guidelines allow states to monitor for two pathogen indicators in freshwater—*E. coli* and enterococci—using two water quality testing options—a single sample or a geometric mean (“geomean”) based on no fewer than five samples equally spaced over a 30-day period. Health departments may also use observations of the presence of visible debris/contaminants, as well as predicted high levels of rainfall or sewage releases.¹⁵ If there is a water quality exceedance, states or localities may resample if there is reason to doubt the accuracy or certainty of the sample results. If the second sample indicates that a water quality standard has been exceeded, states and localities must provide prompt public notification. State or local health officials decide whether or not to issue a health advisory or close a beach. EPA’s performance criteria allow states and localities to develop signs or “functionally equivalent”

¹⁵In the case of predicted high levels of rainfall or sewage releases, local officials responding to our survey reported that about 13 percent of Great Lakes beaches issue preemptive closures.

communication measures, which may include press releases, signs posted at the beach, or Internet sites, among other things. All of the Great Lakes states have developed public notification plans and may post beach advisory and/or closure decisions on signs on the beach, or on the Internet, among other methods.

Variation in Beach Monitoring and Public Notification Methods May Lead to Inconsistent Protection of Public Health

While the Great Lakes states and localities have generally adhered to EPA's criteria for receiving BEACH Act grants, their beach monitoring and public notification programs vary considerably. EPA grant criteria and the BEACH Act give states and localities some flexibility as to: (1) the frequency of monitoring; (2) which beaches are selected for monitoring, methods of monitoring; and (3) processes for notifying the public when pathogen indicator levels exceed state standards, including the decision to close beaches or issue a public health advisory. Nevertheless, we identified significant variability in the Great Lakes states beach monitoring and public notification programs, including the frequency at which they monitor high-priority beaches, the depths at which they take water samples, and the processes they use for notifying the public of health risks from pathogen criteria.

Frequency of monitoring. Some Great Lakes states are monitoring their high-priority beaches almost daily, while other states monitor their high-priority beaches as little as one to two times per week. The frequency with which the Great Lakes states monitor their beaches varies, due in part to the availability of funding. For example, state officials in Michigan and Wisconsin reported a lack of funding for monitoring. While EPA officials reported that daily beach monitoring is recommended for high-priority beaches, EPA acknowledges that frequency and location of monitoring may be limited by funding and staffing levels. Table 5 shows the variation in monitoring at Great Lakes beaches.

Table 5: Monitoring Frequency of Great Lake Beaches by Priority

State	High-priority	Medium-priority	Low-priority
Illinois	5-7 days per week	1 day per week	Not monitored
Indiana	5 days per week	5 days per week	5 days per week
Michigan	1-2 days per week	1 day per year	Not monitored
Minnesota	2 days per week	1 day per week	Not monitored
New York	1-2 days per week	Once every 2 weeks	1 day per month
Ohio	4 days per week	Not applicable ^a	1 day per week
Pennsylvania	2 days per week	1 day per week	Not applicable ^b
Wisconsin	4-7 days per week	2 days per week	1 day per week

Source: GAO analysis of information provided by state BEACH Act officials.

^aOhio reported that the state does not currently classify any beaches as tier 2.

^bPennsylvania reported that the state does not currently classify any beaches as tier 3.

Because of the variation in the number of days beaches are tested, more information is known about some beaches than others, and it is difficult to compare data across beaches. For example, local officials at one high-priority beach in our sample reported that their beach was monitored on 10 days out of the 90-day beach season. On 1 of these 10 testing days—or 10 percent, the samples exceeded the applicable water quality standards, causing the beach to be closed. In contrast, local officials at another high-priority beach in our sample reported that their beach was monitored on 92 days of its 95 day beach season. On 22 of these 92 testing days—or 24 percent, the samples exceeded the applicable water quality standards, causing the beach to be closed. At first glance, the first beach would appear to have better water quality than the second beach. However, because the first beach was tested on only 10 days, conclusions cannot be reliably drawn about the water quality for the remaining 80 days of the beach season. One state official commented that human health could be better protected if the managers were taking more samples.

Without daily testing at all beaches, conclusions also cannot be drawn about the number of safe days at beaches. However, EPA appears to do just that in its annual performance report, which concluded that beaches were “open and safe for swimming” on 97 percent of the days of the 2005 season nationwide, exceeding EPA’s 94 percent benchmark goal for fiscal year 2006. This percentage assumes that any day that a beach was open it

was safe for swimming, even if it was not tested.¹⁶ Additionally, according to EPA data, in 2005, 3,245 of the possible 58,710 beach days in the Great Lakes, or 5.5 percent, were under an advisory or closure and unsafe for recreational use.¹⁷ Based on EPA's methodology, the beaches were open and safe for swimming on the other 94.5 percent of the days during the season. However, this conclusion cannot be drawn because nothing is known about the quality of the water on days that water is not tested. According to EPA officials, the balance of the other 94.5 percent of the days for which no advisory or closure action was in effect—days on which the beaches are open—is subject to the limitations and uncertainties of current monitoring practices, including relatively infrequent monitoring for the most part, and testing methods that require 18-36 hours to obtain results. EPA officials indicated that the benefits of water quality monitoring generally outweigh these limitations and uncertainties.

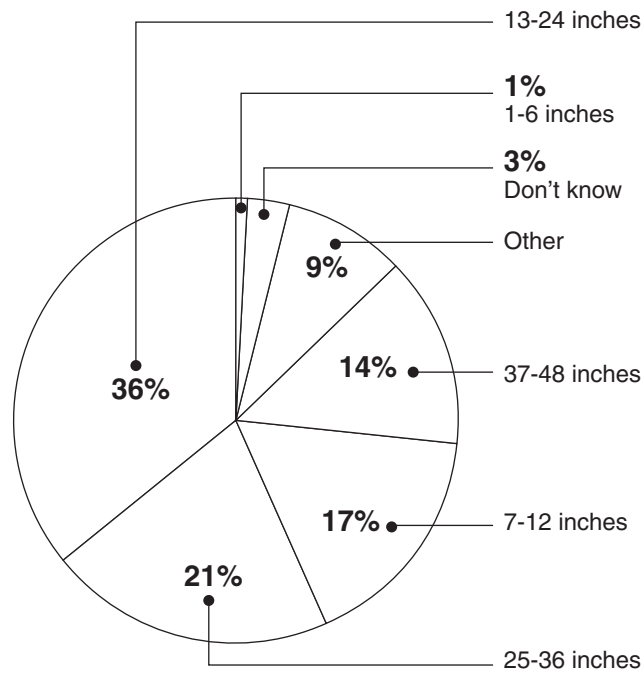
Methods of sampling. Most of the Great Lakes states and localities use similar sampling methods to monitor water quality at local beaches. For example, officials at 79 percent of the beaches we surveyed reported that they collected water samples during the morning, and 78 percent reported that they always collected water samples from the same location. Collecting data at the same time of day and from the same site ensures more consistent water quality data. However, we found significant variations in the depth at which local officials in the Great Lakes states were taking water samples. According to EPA, depth is a key determinant of microbial indicator levels.¹⁸ EPA's guidance recommends that beach officials sample at the same depth—knee depth, or approximately 3-feet deep—for all beaches to ensure consistency and comparability among samples. Great Lakes states, however, varied considerably in the depths at which they sampled water, with some sampling occurring at 1-6 inches and other sampling at 37-48 inches. Figure 4 shows the variation in the depths at which Great Lakes state officials took water quality samples.

¹⁶If a sample exceeds a standard, a locality will typically resample until the test is normal.

¹⁷EPA calculates the total number of beach days by estimating a beach season (number of days the beach is open) for each beach and summing this across all beaches in the Great Lakes.

¹⁸EPA's *Environmental Monitoring for Public Access and Community Tracking* (EMPACT) project examined five beach environments to determine if beach-specific characteristics impact beach monitoring results and found that the depth of water sample collection influences bacterial densities.

Figure 4: Reported Depth of Water Quality Sampling at Great Lakes Beaches



Source: Responses to GAO's survey of monitored beaches in the Great Lakes.

Note: Percentages may not sum to 100 percent due to rounding.

Public notification. Local officials in the Great Lakes differ in the information they use to decide whether to issue a health advisory or close beaches when water contamination exceeds EPA criteria and in how to notify the public of their decision. The EPA criteria for single-sample tests or a 5-day geometric mean for *E. coli* indicate that single-sample test results cannot exceed 235 bacteria colonies per 100/ml sample, and geometric mean results cannot exceed 126 bacteria colonies per 100/ml sample.¹⁹ However, even with these designated testing thresholds, the decisions on whether or not to issue a public health advisory or close a beach can vary within and across the Great Lakes states. This happens because states have established different standards for triggering an advisory or closure, and states vary in whether they will issue advisories or closures or both.

¹⁹EPA's 1986 *Ambient Water Quality Criteria for Bacteria*. Michigan, New York, and Wisconsin also continue to test for fecal coliforms in addition to *E. coli*.

For example, Minnesota and Ohio only issue health advisories; Indiana, Michigan, and Wisconsin issue both health advisories and beach closures; and Illinois, New York, and Pennsylvania only issue beach closures. In addition, while most states will issue an advisory or close a beach following the first water quality standard exceedance, in some cases, officials will resample and not close the beach until the standard is exceeded on 2 consecutive days. Table 6 shows the variation in states' pathogen indicator thresholds and responses to water quality exceedances.

Table 6: Variation in Great Lakes States' Pathogen Indicator (*E. coli*) Thresholds and Responses to Water Quality Exceedances

State	Issue advisory	Advisory threshold ^a	Issue closure	Closure threshold
Illinois	No ^b	Not applicable	Yes	235 single sample
Indiana	Yes	235 single sample or 126 geomean	Yes	235 single sample or 126 geomean
Michigan	Yes	300 single sample or 130 geomean	Yes	300 single sample or 130 geomean
Minnesota	Yes	235 single sample or 126 geomean ^c	No	Not applicable
New York	No	Not applicable	Yes ^d	235 single sample or 126 geomean
Ohio	Yes	235 single sample	No	Not applicable
Pennsylvania	No	Not applicable	Yes	235 single sample or 126 geomean
Wisconsin	Yes	235 single sample or 126 geomean	Yes	1,000 single sample

Source: GAO analysis of information provided by state BEACH Act officials.

^aColonies per 100/mL.

^bThe Chicago Park District issues advisories following a 235 single sample and issues closures following a 1,000 single sample.

^cEPA approved Michigan's threshold in 1993 determining that there was no statistical difference between 235 and 300 based on the estimated number of gastrointestinal illnesses per 1,000 swimmers.

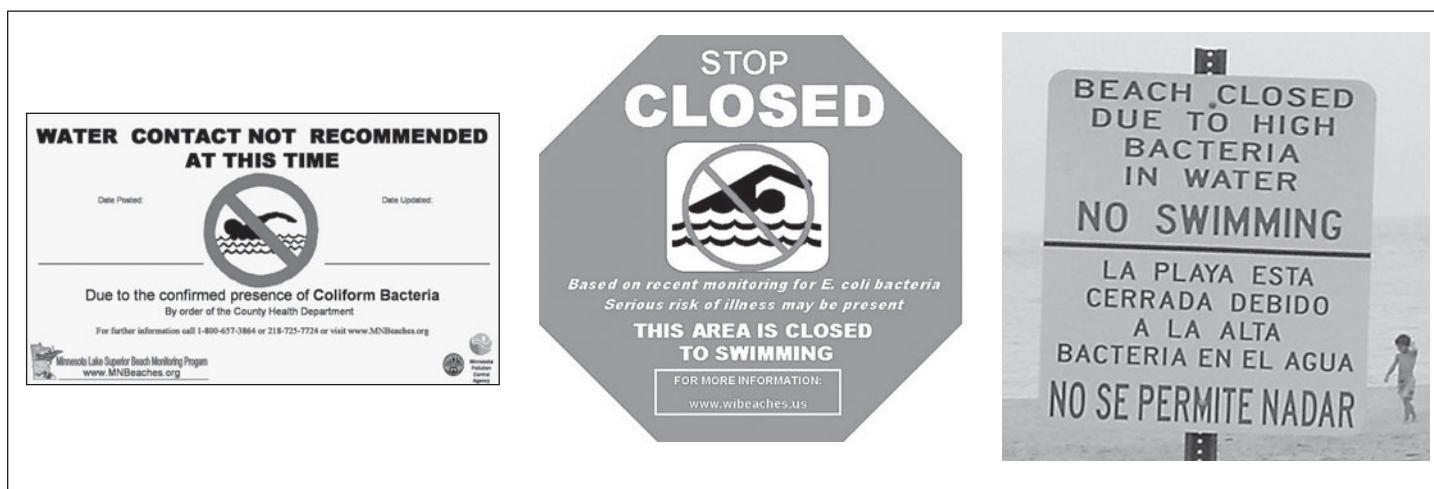
^dNew York state officials indicated that a 235 single sample or 126 geomean would generally prompt a beach closure, however the state sanitary code provides local health departments some flexibility to conduct site specific assessments to determine if a beach closure is appropriate.

In addition to using information from water quality samples, officials in at least four Great Lakes states—Indiana, Illinois, Ohio, and Wisconsin—are using predictive models that use real-time data such as rainfall and water temperature to predict water quality conditions and to help make more timely decisions about beach closings and advisories. Officials in Lake County, Illinois, have used BEACH Act grants in the development of SwimCast, a predictive model that has proven to be 89-95 percent accurate when comparing measured results versus predicted conditions. In Indiana, officials have used BEACH Act grants and worked with officials from

USGS to develop Project SAFE (Swimming Advisory Forecast Estimate), which uses real-time information on weather and water data collected at several locations to predict *E. coli* count probability. EPA guidance states that predictive models can effectively supplement but not replace beach monitoring programs to provide conservative estimates during the lag time between sampling and water quality test results.

Also, states' and localities' means of notifying the public of health advisories or beaches closures vary across the Great Lakes. Some states post water quality monitoring results on signs at beaches; some provide results on the Internet or on telephone hotlines; some distribute the information to local media. When asked to rank the most effective method of notifying the public of a water quality exceedance, six state BEACH Act Administrators indicated that posting signs at the beach is the single most effective method; however, states also vary in the form and content of their beach signage. Of the beach signs that we reviewed, the appearance and wording varied considerably and, although it was recommended in EPA's performance criteria, not all included the effective date(s) of the health advisory or beach closure or the date the water quality sampling was conducted, as shown in figure 5.

Figure 5: Variation in Public Notification Signs at Great Lakes Beaches



Sources: (left to right) Minnesota Pollution Control Agency, Wisconsin Department of Natural Resources, and GAO.

The BEACH Act Has Helped Identify the Scope of Contamination, but Underlying Causes Remain Unaddressed

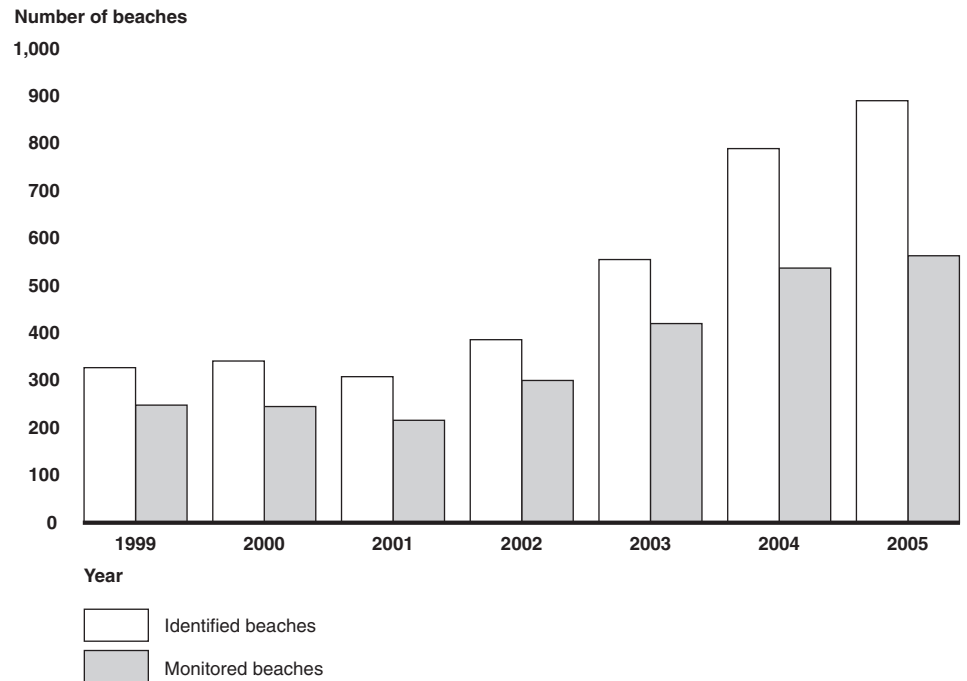
Since the passage of the BEACH Act, increased monitoring has improved the overall understanding of the scope of contamination in the Great Lakes and helped local officials determine which of their beaches are more likely to be contaminated. However, the underlying causes of contamination are largely unknown and remain unaddressed. Although a few localities have been able to use the results of monitoring to identify and take steps to address sources of bacterial contamination, most do not know the sources of the contamination and, consequently, have not taken actions to address them. State and local officials generally stated that they did not have the funds available to investigate and address specific sources of contamination.

Increased Monitoring Has Helped States Identify the Scope of Contamination

Because the frequency of monitoring has increased at Great Lakes beaches since the passage of the BEACH Act, states and localities have a better understanding of the overall scope of contamination. BEACH Act officials from six of the eight states—Illinois, Michigan, Minnesota, New York, Ohio, and Wisconsin—reported that the number of beaches being monitored in their state has increased since the passage of the BEACH Act in 2000. For example, in Minnesota, state officials reported that only one beach was being monitored prior to the BEACH Act, and there are now 39 beaches being monitored in three counties. In addition, EPA data shows that, in 1999, the number of identified beaches in the Great Lakes was about 330, with about 250 of those being monitored. In 2005, the most recent year for which data are available, the Great Lakes states identified almost 900 beaches and were monitoring about 550, as shown in figure 6.²⁰

²⁰EPA officials have had difficulty tracking the total number of monitored and unmonitored beaches because states have changed their beach inventories over the years. In addition, double counting of beaches has occurred in the past as historical data were not always vetted by the state officials, and because local counties with dual jurisdictions may have double counted beach data.

Figure 6: Number of Identified Beaches and Number of Identified Beaches Monitored in the Great Lakes from 1999 to 2005

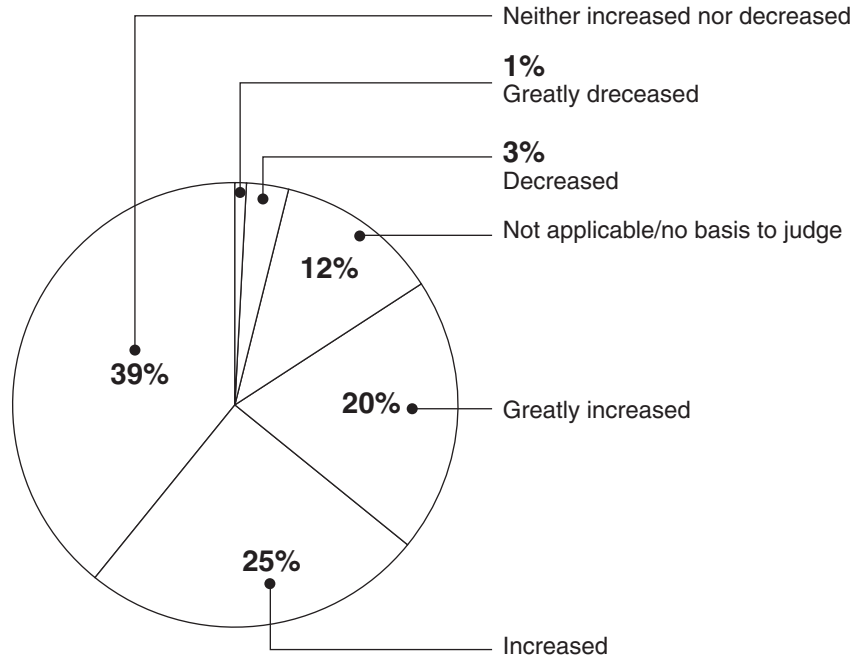


Source: EPA.

Note: From 1998-2002, EPA collected information on beach monitoring from states through a series of voluntary surveys; participation rates in these surveys varied from year to year. States receiving BEACH Act grants are now required to submit information on the number of beaches in their state, number of monitored beaches, and other related information to EPA.

In addition to an increase in the number of beaches being monitored, the frequency of monitoring at many of the beaches in the Great Lakes has increased. For example, state BEACH Act officials in Pennsylvania and Indiana reported that, although the number of beaches being monitored in their states had not increased, the frequency with which the beaches were monitored did. Indiana officials noted that, prior to the BEACH Act, monitoring was done a few times per week; now monitoring is done 5-7 days per week. In addition, based on our survey, an estimated 45 percent of Great Lakes beaches increased the frequency of their monitoring since the passage of the BEACH Act, as shown in figure 7. For example, local officials in one Ohio county reported testing some beaches along Lake Erie twice a month prior to the BEACH Act; they are now tested once a week.

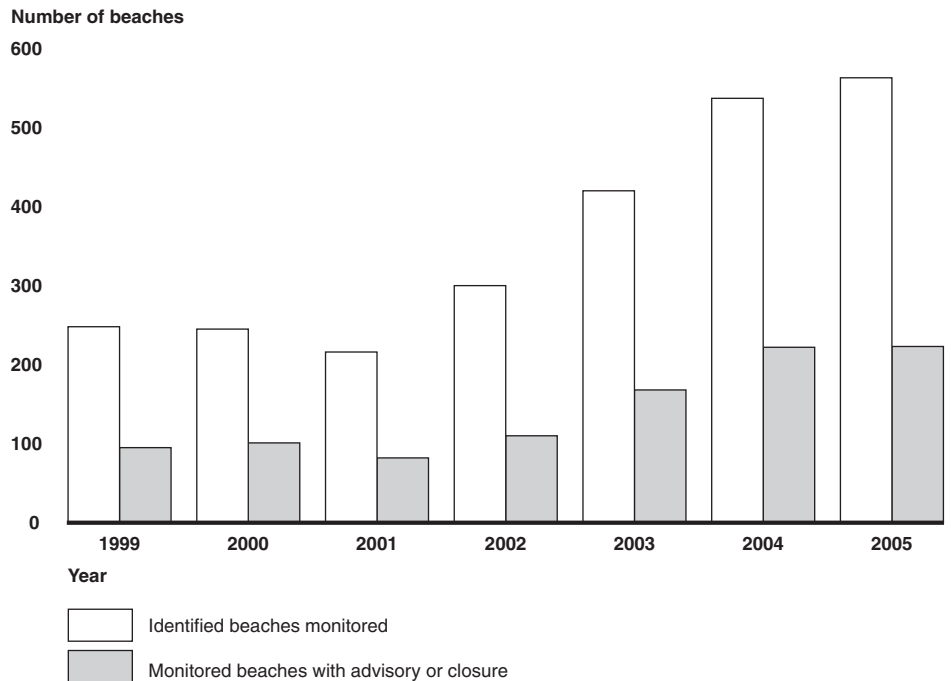
Figure 7: Estimated Changes in Frequency of Monitoring at Great Lakes Beaches Since Passage of the BEACH Act



Source: Responses to GAO's survey of monitored beaches in the Great Lakes.

The increased scope and frequency of monitoring, in response to the BEACH Act, is helping to identify the overall scope of contamination in the Great Lakes. While the number of beaches being monitored in the Great Lakes has increased, the percentage of beaches reporting at least one health advisory or closure remained around 40 percent from 1999 to 2005. Figure 8 shows the number of monitored beaches with at least one advisory or closure from 1999 to 2005.

Figure 8: Number of Great Lakes Identified Beaches Monitored and Monitored Beaches with at Least One Closure or Advisory from 1999 to 2005

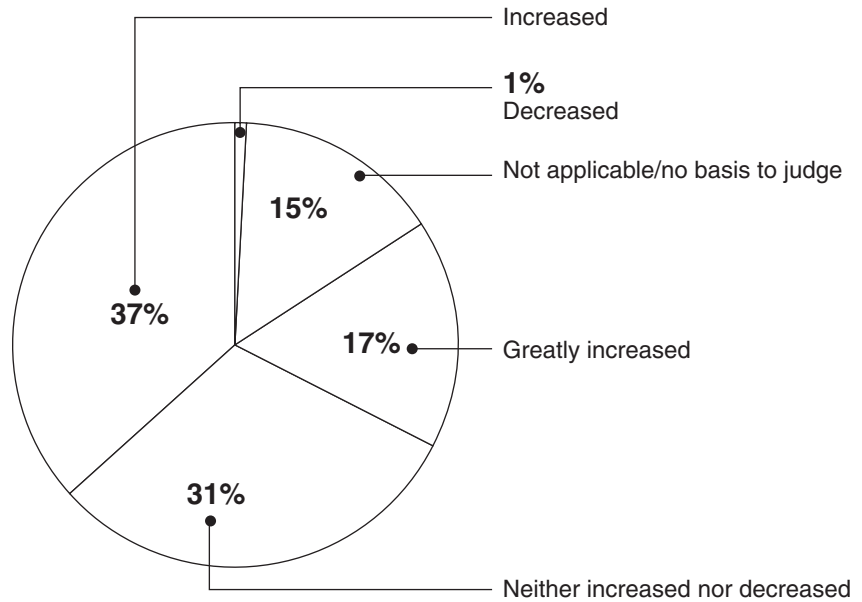


Source: GAO analysis of EPA data.

Note: From 1998-2002, EPA collected information on beach monitoring from states through a series of voluntary surveys; participation rates in these surveys varied from year to year. States receiving BEACH Act grants are now required to submit information on the number of beaches in their state, number of monitored beaches, and other related information to EPA.

Because of the information available from BEACH Act monitoring activities, state and local beach officials are now better able to determine which of their beaches are more likely to be contaminated, which are relatively clean, and which may require additional monitoring resources to help them better understand the levels of contamination that may be present. For example, state BEACH Act officials reported that they now know which beaches are regularly contaminated or are being regularly tested for elevated levels of contamination. Officials at 54 percent of Great Lakes beaches we surveyed believe that their ability to make advisory and closure decisions has increased or greatly increased since the BEACH Act initiated water quality monitoring, as shown in figure 9.

Figure 9: Estimated Change in Ability to Make Decisions Based on Water Quality Data Since Passage of the BEACH Act



Source: Responses to GAO's survey of monitored beaches in the Great Lakes.

Note: Percentages may not add to 100 percent due to rounding.

Most of the Underlying Causes of Contamination Remain Unknown and Unaddressed

While some localities have been able to identify and address local sources of contamination, the specific sources of contamination at most Great Lakes beaches are not known. States and localities report that, because they lack funding to investigate and mitigate sources of contamination, the underlying causes of contamination at most beaches have not been identified or addressed. Based on our survey, local officials at 67 percent of Great Lakes' beaches did not know the sources of bacterial contamination causing their exceedances of water quality standards during the 2006 beach season.

Nonetheless, five of the eight Great Lakes state BEACH Act officials reported that the increased monitoring has helped some local officials in their state identify the sources of contamination. These officials identified the following examples of localities where contamination sources have been identified and, in some cases, local actions have been taken to address them:

-
- *Illinois*—Beach monitoring led officials at one beach in Chicago to identify a sewer break, prompting the city to fix the leaking sewer and remove 6 million cubic yards of sand.
 - *Michigan*—In Traverse City, local officials have used monitoring data to identify problems at their wastewater treatment plants which resulted in plant improvements.
 - *Ohio*—The Lucas County Health Department has identified private sewage systems that are contaminating local beaches.
 - *Minnesota*—With the establishment of the state’s beach program following the BEACH Act, state and local officials in Minnesota formed a beach committee that includes representation from the state pollution control agency, local and state health departments, local sewage districts and utilities, University of Minnesota researchers, and other groups. The beach committee has coordinated efforts to identify the sources and causes of beach contamination. For example, where beach monitoring data has indicated problems at normally clean beaches, the sanitary district has investigated these situations and found and repaired broken pipes.
 - *Wisconsin*—Officials in Racine began looking into high numbers of beach closures and advisories at one of their beaches in 1999. Using the results of water quality monitoring, these officials were able to identify a storm water outfall adjacent to the beach that was contributing to the contamination and developed an underground treatment system and wetland area to filter the discharge. In addition, city officials determined that beach grooming procedures and the overall geography of the beach were also contributing to the contamination, and they improved their beach grooming techniques and regraded the beach to reduce standing water. With these corrective actions, the city was able to reduce the number of beach health advisory and closure days from 62 in 2000 to 3 in 2006. Figure 10 illustrates the changes to the city’s beach grooming processes.

Figure 10: Changes to Beach Grooming Process at a Racine, Wisconsin, Beach



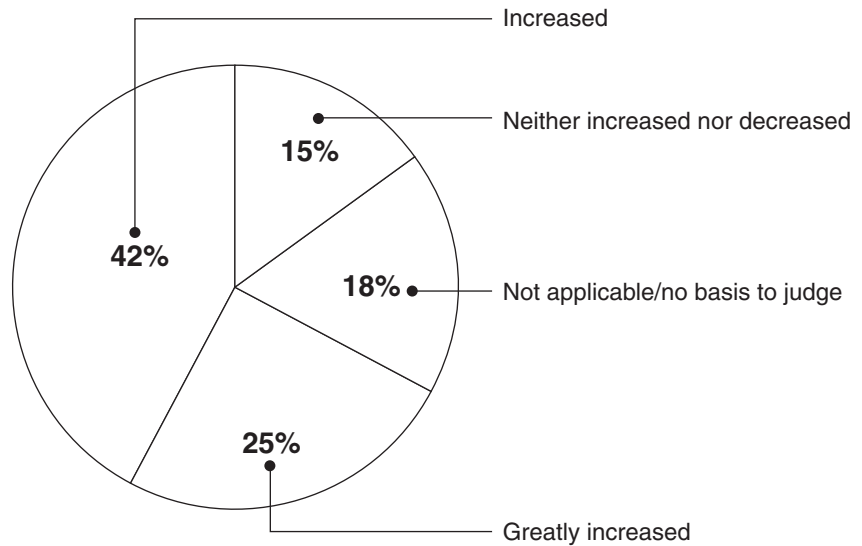
Source: Dr. Julie Kinzelman, City of Racine Health Department Laboratory.

Before: Past grooming practices leveled and compacted beach sands, which increased bacterial density.

After: Current grooming practices remove debris from beach sands while reducing bacterial density.

In addition to these efforts to identify and address local sources of contamination, local officials report an overall increase in awareness of how personal actions can impact water quality at beaches, as shown in figure 11. For example, not adhering to proper beach practices—such as using swim diapers for young children—or not properly disposing of trash can lead to increased problems with wildlife such as seagulls and geese. In addition to actions that the public can take to mitigate contamination, there are also actions beach managers can take, such as ensuring the availability of sufficient trash cans and functioning restrooms, that can also help mitigate beach contamination. Local officials report that they have taken some of these actions on a limited basis.

Figure 11: Estimated Change in Public Awareness of Personal Actions on Water Quality at Great Lakes Beaches Since Passage of the BEACH Act



Source: Responses to GAO's survey of monitored beaches in the Great Lakes.

Nevertheless, EPA officials stated that the primary source of contamination at beaches generally is reported by state officials as “unknown.” Comprehensive sanitary surveys can help local water program managers identify persistent problems; ascertain the sources and magnitude of contamination; suggest appropriate actions to control contamination and identify priority locations for sampling.²¹ Although local officials at Great Lakes beaches reported conducting field observations to determine the sources of contamination at 88 percent of the beaches, comprehensive sanitary surveys have been conducted at only 48 percent of the beaches.

One reason why sanitary surveys have not been more widespread is lack of funding, but EPA has concluded that BEACH Act grant funds can only

²¹Sanitary surveys are used to identify sources of pollution and provide information on source controls and identification, persistent problems, and management actions. EPA's *National Beach Guidance and Required Performance Criteria for Grants* states that a sanitary survey can be an effective tool for protecting human health at bathing beaches and providing information that helps in designing monitoring programs.

be used for this purpose under certain circumstances.²² In particular, sanitary surveys can be done during the development of a monitoring program when states are prioritizing their beaches for monitoring or when there is a need to reprioritize the beaches. EPA has initiated a pilot sanitary survey effort throughout the Great Lakes, working with state and county Great Lakes beach managers to design and implement a beach sanitary survey project for Great Lakes recreational waters. EPA posted a Request for Proposal in August 2006 indicating that \$500,000 would be available to fund pilot surveys at Great Lakes beaches. Nine state or county agencies submitted proposals for conducting sanitary surveys at numerous beaches. EPA expects that this work will result in the development of a tool for watershed-based sanitary surveys that could be used by others. EPA made award decisions in December 2006 and anticipates grant awards in April 2007.

Because state and local officials do not have enough information on the specific sources of contamination and generally lack funds for remediation, most of the sources of contamination at Great Lakes' beaches have not been addressed. Local officials indicated that actions to address the sources of contamination had only been taken at an estimated 14 percent of the monitored beaches. While none of the eight Great Lakes state officials suggested that the BEACH Act was intended to help remediate the sources of contamination, some said that they lack the funds needed to mitigate the sources of contamination that increased monitoring has helped to identify. However, our review of the BEACH Act and EPA's criteria found that they both specify that BEACH Act grant funds should be used only for monitoring and notification purposes. Several state officials believe that it may be more useful to use BEACH Act grants to identify and remediate sources of contamination rather than just continue to monitor water quality. Local officials also reported a need for funding to identify and address sources of contamination. Furthermore, at EPA's National Beaches Conference in October 2006, a panel of federal and academic researchers recommended that EPA provide the states with more freedom on how they may spend their BEACH Act funding.

²²The BEACH Act provides that EPA may award grants to states and localities for "monitoring and notification" programs. 33 U.S.C. § 1346(b)(2)(A). According to EPA officials, the term "monitoring" encompasses limited investigations to determine sources of contamination but does not include remediation to address the source of the contamination.

According to state and local officials, as well as other Great Lakes stakeholders, an overall improvement in water quality throughout the Great Lakes will require a substantial effort directed toward both large-scale initiatives and localized actions to address the underlying causes of contamination. State officials reported that combined sewer overflows and sewage disposal problems throughout the Great Lakes must be addressed. Although some communities have taken steps in this direction, others continue to discharge partially treated wastewater into the Great Lakes as part of their wastewater treatment processes. In addition, more localized action is also needed to address some sources of contamination at Great Lakes beaches. Examples include regrading the beaches to reduce standing water and minimizing the use of impervious surface materials to construct parking lots adjacent to beaches to reduce storm water runoff.

Conclusions

EPA has made progress in implementing many of the BEACH Act's requirements but two critical actions, relating to the completion of pathogen studies and developing new water quality criteria, have not been completed as required by the act and may not be completed for several more years. Without the completion of these studies and the development of new water quality criteria, states will have to continue to use existing methods that are already outdated for monitoring water quality at their beaches. The use of these methods limits states' ability to obtain water quality test results and make beach closing decisions in a timely manner to ensure that public health is adequately protected. However, EPA has not established a firm time line to guide the completion of the studies and the development of the new criteria, so it is unclear when states can expect to receive updated methods to guide their monitoring efforts.

In addition, although EPA developed a formula to distribute BEACH Act grants to the states, this formula was based on the assumption that the program would receive its fully authorized allocation of \$30 million. During the last 5 years, the program has not received full funding, and EPA has not adjusted the formula to reflect the impacts of reduced levels of funding. As a result, the current distribution formula fails to adequately take into account the monitoring needs of the states. Instead, it places the greatest emphasis on the length of the beach season and not enough emphasis on other factors, such as beach use and beach miles, that vary greatly across states, and which also impact the public health risk and significantly influence the level of monitoring that states need to undertake. While we recognize that any changes to the distribution formula would inevitably result in some states receiving more funds and

some less, unless the program is fully funded as authorized, the current distribution formula does not reflect the states' varied monitoring needs.

Finally, the BEACH Act has had a significant impact in helping the Great Lakes states increase their level of monitoring, which in turn has increased their knowledge about the scope of contamination at area beaches. However, the variability in how the states are conducting their monitoring and how they are using their monitoring results to notify the public have raised concerns about the adequacy of protection provided among and across Great Lakes states. In addition, because it appears that BEACH Act funds cannot currently be used to investigate the source of contamination or remediate an identified problem, states have been unable to address the contamination that they now know exists. While we recognize that funding for BEACH Act grants has been limited over the last 5 years, we believe that additional flexibility for the states to use a portion of their BEACH Act grants to help them identify the source of contamination if their monitoring has identified a reoccurring problem would be helpful. In this regard, we also believe that EPA could provide guidance to ensure that states are still conducting the monitoring programs expected by the BEACH Act and not diverting all their monitoring funds to investigation and mitigation.

Matter for Congressional Consideration

As it considers reauthorization of the BEACH Act, Congress should consider providing EPA some flexibility in awarding BEACH Act grants to allow states to undertake limited research to identify specific sources of contamination at monitored beaches and certain actions to mitigate these problems, as specified by EPA.

Recommendations for Executive Action

To ensure that EPA complies with the requirements laid out in the BEACH Act, we recommend that the Administrator of EPA take the following three actions:

- Establish a definitive time line for completing the studies on pathogens and their effects on human health, and for publishing new or revised water quality criteria for pathogens and pathogen indicators;

-
- If current funding levels remain the same, revise the formula for distributing BEACH Act grants to better reflect the states' varied monitoring needs by reevaluating the formula factors to determine if the weight of the beach season factor should be reduced and if the weight of the other factors, such as beach use and beach miles should be increased; and
 - To better ensure consistent levels of public health protection, EPA should provide states and localities with specific guidance on monitoring frequency and methods and public notification.

Agency Comments and Our Evaluation

In commenting on the draft report, EPA generally agreed with GAO's recommendations and agreed to (1) take actions to establish an action plan and a definitive time frame to complete studies and publish revised water quality standards and (2) revise its guidance to states. With respect to our recommendation to revise the current funding formula to better reflect states' needs, EPA agreed with this recommendation, but stated that the states were reluctant to make any substantial changes to the formula and were supportive of EPA's plan to make only minor changes to the formula. EPA's comments are included in appendix IV.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the EPA Administrator and other interested parties. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or mittala@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix V.



Anu K. Mittal
Director, Natural Resources
and Environment

List of Requesters

The Honorable Evan Bayh
United States Senate

The Honorable Richard Durbin
United States Senate

The Honorable Russell D. Feingold
United States Senate

The Honorable Carl Levin
United States Senate

The Honorable Richard Lugar
United States Senate

The Honorable Barack Obama
United States Senate

The Honorable Debbie Stabenow
United States Senate

The Honorable George Voinovich
United States Senate

The Honorable John Dingell
House of Representatives

The Honorable Rahm Emanuel
House of Representatives

The Honorable Luis V. Gutierrez
House of Representatives

The Honorable Brian M. Higgins
House of Representatives

The Honorable Dale Kildee
House of Representatives

The Honorable Carolyn C. Kilpatrick
House of Representatives

The Honorable Mark Kirk
House of Representatives

The Honorable Dennis Kucinich
House of Representatives

The Honorable Sander M. Levin
House of Representatives

The Honorable Janice Schakowsky
House of Representatives

The Honorable Louise Slaughter
House of Representatives

The Honorable Bart Stupak
House of Representatives

Appendix I: Scope and Methodology

The objectives of this review were to (1) determine the extent to which the Environmental Protection Agency (EPA) has implemented the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000 and evaluate EPA's formula for allocating BEACH Act grants, (2) describe and evaluate the monitoring and notification programs the eight Great Lakes states have developed using BEACH Act grants, and (3) determine the effect that the BEACH Act has had on water quality monitoring and contamination at Great Lakes beaches.

We identified and analyzed applicable laws, regulations, policies, and procedures to determine what actions EPA has taken to implement the act and what remains to be addressed. Specifically, we reviewed the act to identify what actions the agency was required to take. To identify the actions EPA has taken to implement the act's requirements and provisions, we reviewed notices and regulations published in the Federal Register and agency documents, and interviewed agency officials at EPA headquarters, EPA's Great Lakes National Program Office, EPA Region 5 (Chicago), EPA Region 2 (New York), and EPA's National Exposure Research Laboratory. To assess the criteria EPA uses to allocate BEACH Act funds to eligible states, we interviewed officials that were involved in developing the funding formula and conducted a funding formula simulation to demonstrate how slight alterations of the BEACH Act grant funding formula would shift funding and potentially affect current allocations.

To determine how the eight Great Lakes states have used BEACH Act funds to develop monitoring and notification programs, we used a data collection instrument to gather information from state level BEACH Act Administrators from each of the Great Lakes states—Illinois, Indiana, Ohio, Michigan, Minnesota, New York, Wisconsin, and Pennsylvania. We interviewed an official from Erie County, Pennsylvania, where BEACH Act funds are distributed directly to the county because this is the only county in the state with coastal recreational waters. EPA identified these officials as the person(s) responsible for coordinating beach monitoring and notification programs for each state and collecting and submitting information generated by these programs to EPA.

In addition, we conducted a survey of the 563 Great Lakes beaches EPA identified as having monitoring programs in 2005. To gather data representative of the Great Lakes beaches, we conducted a random sample of 140 beaches which were selected systematically for each state. This ensured that the sample selected was proportional to the number of Great Lakes beaches in each of the states. Table 7 summarizes sample size and disposition by state.

Table 7: Great Lakes Beaches Reported Monitored by EPA in 2005, GAO Sample, and Sample Disposition by State

State	Total beaches monitored	Sample beaches	Responding beaches	Response rate
Illinois	73	19	15	79%
Indiana	25	6	5	83
Michigan	214	53	49	92
Minnesota	39	10	10	100
New York	38	9	9	100
Ohio	47	12	11	92
Pennsylvania	12	3	3	100
Wisconsin	115	28	28	100
Grand total	563	140	130	93%

Source: GAO.

Information obtained through this survey was used to produce estimates of beach monitoring and notification in the 2006 beach season at the Great Lakes beaches that conducted monitoring in 2005. Since our beach sample is only one of a large number of samples that we might have drawn, and each sample could have provided different estimates, we express our confidence in the precision of our particular sample’s results as a 95 percent confidence interval. This is the interval that would contain the actual population value for 95 percent of the samples we could have drawn. All proportion estimates from this sample used in this report have 95 percent confidence intervals within plus or minus 10 percentage points, unless otherwise noted.

Even though we surveyed a random sample of beaches in the Great Lakes, the practical difficulties of conducting any survey may introduce other types of errors, commonly referred to as “nonsampling errors.” For example, differences in how a particular question is interpreted or the sources of information available to respondents can introduce unwanted variability into the survey results. We included steps in both the data collection and data analysis stages to minimize these nonsampling errors. For example, in the research design and data collection stages, we took the following steps:

- We obtained from EPA a list of contacts for beaches with monitoring programs in the Great Lakes. We then attempted to contact all listed local officials via telephone and asked them to tell us if they or someone else would be the most appropriate contact and to provide their e-mail address.

Some officials identified more appropriate survey respondents. In order to obtain the appropriate contacts for beaches where we were not able to contact the officials using EPA's list, we asked state BEACH Act officials for the most appropriate contact and obtained telephone and/or e-mail contacts from them.

- We reviewed EPA's *National Health Protection Survey of Beaches*.
- We pretested the survey with officials from four beaches between November 13, 2006, and November 27, 2006, and used their feedback to refine the survey. These beaches were selected randomly from the list of monitored beaches provided by EPA. For these pretests, we sent officials a draft of the survey. We then interviewed the officials to ensure that (1) questions were clear and unambiguous, (2) terms were precise, and (3) data needed to respond to the questions were available to the local officials. As a result of our pretests, we refined some of the survey questions. A GAO survey specialist also independently reviewed the questionnaire.
- We e-mailed the survey as an attachment on December 5, 2006, to local officials at 140 beaches. We asked respondents to return the survey by e-mail within 15 working days of receiving our e-mail. We sent e-mail reminders and called nonrespondents and accepted responses to the surveys through February 2, 2007.

To minimize nonsampling errors in the data analysis stage, we contacted local officials to clarify survey responses, when necessary, and used a centralized tracking document to record all changes. Changes made in the tracking document were verified against the keypunched data to ensure all changes and updates were recorded. When changes took place after a survey was keypunched, the updates were made in the computer program used to generate survey results.

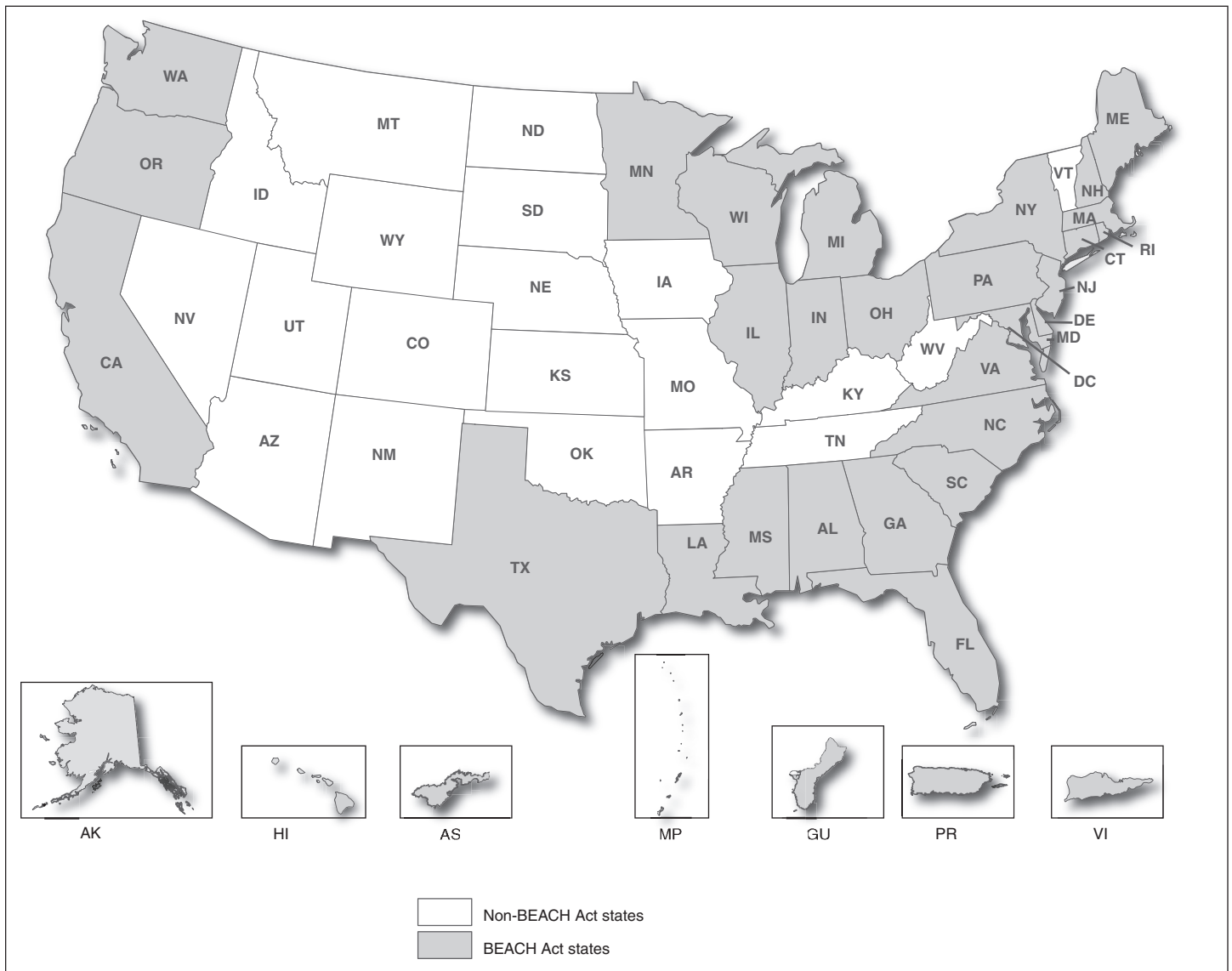
As summarized in table 7, we received completed questionnaires for 130 of the 140 sample beaches, for an overall response rate of 93 percent. We did not receive a completed questionnaire from 10 beaches. We do not know if the responses for these beaches would have differed materially from those for the 130 beaches we did receive. From the questionnaires we received, we gathered information for each including: (1) the potential sources of contamination; (2) water quality standards in place; (3) methods of monitoring, including depth and location of samples; (4) frequency of monitoring and number of sampling days where water quality standards were exceeded; and (5) public notification and remediation efforts.

To determine the effect the BEACH Act has had on Great Lakes beach monitoring and the identification of sources of contamination, we analyzed the results of our survey and information obtained from state BEACH Act Administrators. In addition, we reviewed EPA data on the number of beaches identified in the Great Lakes, the number of identified beaches being monitored, and the number of monitored beaches with health advisories and beach closures. We interviewed agency officials regarding a series of data reliability questions addressing such areas as data entry, data access, quality control procedures, and data accuracy and completeness. We asked follow-up questions whenever necessary. We determined that these data were sufficiently reliable for the purposes of this report.

Finally, we conducted interviews with organizations working on Great Lakes issues including the National Oceanic and Atmospheric Administration (NOAA), the U.S. Geological Survey, the Natural Resources Defense Council, the International Joint Commission, the Alliance for the Great Lakes, and the Northeast-Midwest Institute Great Lakes and St. Lawrence Cities Initiative, among others.

We conducted our work from June 2006 through March 2007 in accordance with generally accepted government auditing standards.

Appendix II: Map of 35 States and Territories with Coastal Recreational Waters



Sources: Map Resources (map) and EPA Office of Water.

Appendix III: GAO's Calculations for an Alternative BEACH Act Grant Distribution Formula

This appendix describes EPA's BEACH Act grant distribution formula and the results of our calculation using an alternative formula allocation. Currently, EPA's grant formula allocates about 82 percent of the grant funds according to beach season and about 9 percent each to beach use and beach miles. Our simulation reweights the factors used in EPA's formula so that beach season receives a weight of about 27 percent, beach use receives a weight of about 36 percent, and beach miles receive a weight of about 36 percent as EPA originally intended. The resulting funding amounts are shown for each of the 35 states and territories. Finally, we present information on how EPA can alter its formula to minimize fluctuations in funding amounts if funding levels increase.

EPA's BEACH Act Grant Distribution Formula

EPA distributes BEACH Act grants to eligible states and territories according to a formula that considers the length of the beach season, beach use, and beach miles. EPA intended that the beach season length factor would provide the base funding and would be augmented by the beach use and beach miles factors. EPA established a series of fixed amounts that correspond to states' varying lengths of beach season to cover the general expenses associated with a beach monitoring program. For example, EPA estimated that a 3-month beach season would require states to fund salaries for two employees, which would cost approximately \$150,000, while states with beach seasons greater than 6-months would require \$300,000. The eight Great Lakes states are all classified as having 3 to 4 months of beach season, as shown in table 8.

Table 8: EPA Beach Season Length Factor and States Associated Funding Levels

State	Beach season	Base amount
Alaska	<3 months ^a	\$150,000
Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Virginia, Washington, Wisconsin	3–4 months	\$200,000
Alabama, Georgia, Louisiana, Mississippi, North Carolina, South Carolina	5–6 months	\$250,000
American Samoa, California, Florida, Guam, Hawaii, Northern Mariana, Puerto Rico, Texas, U.S. Virgin Islands	>6 months	\$300,000

Source: EPA.

^aStates and territories with seasons of less than 3 months receive season-based funding only.

Once the allotments for beach season length are distributed, EPA determined that 50 percent of the remaining funds would be distributed to states according to beach use, and the other 50 percent would be

Appendix III: GAO’s Calculations for an Alternative BEACH Act Grant Distribution Formula

distributed according to states’ beach miles. Because consistent data across states on beach usage are not available, EPA uses coastal population of counties as a surrogate for beach use. Similarly, EPA currently does not have beach mileage data in a format that can be used for the allocation formula and, therefore, uses shoreline miles as a surrogate for beach miles.¹

EPA developed this formula with the expectation that BEACH Act grants would be allocated funding at their authorized level of \$30 million annually. Using this authorized amount and EPA’s distribution formula \$30 million and using this distribution formula, each factor would have received approximately equal weight, with beach season accounting for about 27 percent of each state or territory’s grant, and the remainder equally divided between the two other factors—beach use (36 percent) and beach miles (36 percent) as shown in table 9.

Table 9: EPA’s Formula for Distributing \$30 Million in BEACH Act Grants

Factor	Allocation
Beach season length	27% of total annual BEACH Act funds, or \$8 million, distributed as follows: < 3 months: \$150,000 ^a 3-4 months: \$200,000 5-6 months: \$250,000 >6 months: \$300,000
Shoreline miles	36% of total annual BEACH Act funds, or \$11 million
Coastal population	36% of total annual BEACH Act funds, or \$11 million

Sources: EPA and GAO.

^aStates and territories with seasons of less than 3 months receive season-based funding only.

However, since 2002, funding levels for BEACH Act grants have been about \$10 million each year. Given the lower than anticipated funding levels, once the approximately \$8 million (which now accounts for 82 percent of the total grant funding) was allocated in accordance with each state’s beach season, this left only about \$1.85 million or about 18 percent of the total funding to be divided equally (about \$1 million or 9 percent

¹The estimate of shoreline miles are taken from NOAA’s *The Coastline of the United States*. Population estimates are taken from the 2000 Census.

Appendix III: GAO's Calculations for an Alternative BEACH Act Grant Distribution Formula

each) between the beach use and beach miles factors, as shown in table 10.

Table 10: EPA's Formula for Distributing \$10 Million in BEACH Act Grants

Factor	Allocation
Beach season length	< 3 months: \$150,000 ^a
	3-4 months: \$200,000
	5-6 months: \$250,000
	>6 months: \$300,000
Shoreline miles	50% of remaining \$1.85 million funds, or \$.92 million
Coastal population	50% of remaining \$1.85 million funds, or \$.92 million

Sources: EPA and GAO.

^aStates and territories with seasons of less than 3 months receive season-based funding only.

Because the beach season factor accounts for a much larger proportion of each state's BEACH Act grant as compared with beach miles or beach use, BEACH Act grant amounts may vary little between states that have widely varied shorelines or coastal populations, as shown in table 11.

Table 11: Factors Used in BEACH Act Formula Allocations and Resulting 2006 Grants by State and Territory

State	Beach season length	Minimum allocation	Shoreline miles	Shoreline ratio	Coastal population (2000)	Population ratio	Grant allocation in 2006
Alabama	6	\$250,000	607	0.0099	540,258	0.0044	\$262,170
Alaska	2	150,000	33,904	0.0000	538,258	0.0000	150,000
American Samoa	12	300,000	126	0.0020	57,291	0.0005	302,140
California	12	300,000	3,427	0.0557	24,260,099	0.1991	516,960
Connecticut	4	200,000	618	0.0100	2,120,734	0.0174	223,370
Delaware	4	200,000	381	0.0062	783,600	0.0064	210,750
Florida	12	300,000	8,436	0.1371	15,982,378	0.1311	528,410
Georgia	6	250,000	2,344	0.0381	538,469	0.0044	286,200
Guam	12	300,000	110	0.0018	154,805	0.0013	302,600
Hawaii	12	300,000	1,052	0.0171	1,211,537	0.0099	323,020
Illinois	4	200,000	63	0.0010	6,021,097	0.0494	242,940
Indiana	4	200,000	45	0.0007	741,468	0.0061	205,800
Louisiana	6	250,000	7,721	0.1255	2,170,717	0.0178	322,010
Maine	4	200,000	3,478	0.0565	944,847	0.0078	254,730
Maryland	4	200,000	3,190	0.0518	3,592,430	0.0295	269,250

**Appendix III: GAO's Calculations for an
Alternative BEACH Act Grant Distribution
Formula**

State	Beach season length	Minimum allocation	Shoreline miles	Shoreline ratio	Coastal population (2000)	Population ratio	Grant allocation in 2006
Massachusetts	4	200,000	1,519	0.0247	4,783,167	0.0392	254,440
Michigan	4	200,000	3,224	0.0524	4,842,023	0.0397	278,450
Minnesota	4	200,000	189	0.0031	236,946	0.0019	204,270
Mississippi	6	250,000	359	0.0058	363,988	0.0030	257,510
New Hampshire	4	200,000	131	0.0021	389,592	0.0032	204,530
New Jersey	4	200,000	1,792	0.0291	7,575,546	0.0622	277,730
New York	4	200,000	2,625	0.0427	16,088,089	0.1320	348,740
North Carolina	6	250,000	3,375	0.0548	826,019	0.0068	302,480
Northern Mariana Islands	12	300,000	206	0.0033	69,221	0.0006	303,330
Ohio	4	200,000	312	0.0051	2,767,328	0.0227	223,650
Oregon	4	200,000	1,410	0.0229	1,326,072	0.0109	228,780
Pennsylvania	4	200,000	140	0.0023	2,946,892	0.0242	222,530
Puerto Rico	12	300,000	700	0.0114	2,685,883	0.0220	328,450
Rhode Island	4	200,000	384	0.0062	1,048,319	0.0086	212,640
South Carolina	6	250,000	2,876	0.0467	981,338	0.0081	296,660
Texas	12	300,000	3,359	0.0546	5,211,014	0.0428	382,890
Virgin Islands	12	300,000	175	0.0028	108,612	0.0009	303,180
Virginia	4	200,000	3,315	0.0539	4,440,709	0.0364	276,900
Washington	4	200,000	3,026	0.0492	4,070,515	0.0334	270,320
Wisconsin	4	200,000	820	0.0133	1,992,393	0.0163	225,270
Total	220	\$8,150,000	61,535	1.0000	121,873,396	1.0000	\$9,803,100

Sources: EPA and GAO.

Note: The totals exclude shoreline miles and coastal population for Alaska because Alaska beach season is less than 3 months.

As a result, states and territories with 12-month beach seasons may receive larger BEACH Act grants than states with much longer shorelines. For example, shoreline miles in the Great Lakes states range from 63 miles in Illinois to 3,224 in Michigan; therefore, Michigan may need to monitor 50 times as many shoreline miles as Illinois. However, because the beach miles factor accounts for a much smaller portion of each state's BEACH Act grant than beach season, the BEACH Act grant amount distributed to Michigan is only 35 percent more than that for Indiana (\$278,450 and \$205,800, respectively).

Because of the way in which the current formula allocates funding, states and territories with 12-month beach seasons may also receive larger

BEACH Act grants than more populous states. For example, in general, EPA's grant distribution formula gives territories an advantage over the states, because they tend to be in warmer climates with longer beach seasons. Territories receive an average of \$309,000 each year, while states receive an annual average of \$294,000. The Great Lakes states, with their comparatively short beach seasons, receive an annual average of \$248,000. Similarly, states with larger populations are currently at a disadvantage to the territories that have a longer beach season but significantly smaller coastal populations. For example Guam and American Samoa, with coastal populations of less than 200,000 each, receive larger grants than Maryland and Virginia, with coastal populations of 3.6 and 4.4 million, respectively. However, if greater weights were assigned to coastal populations, Maryland and Virginia would see an increase in their grant allocation.

Simulations of Alternative BEACH Act Distribution Formulas

We calculated the distribution of \$10 million in annual BEACH Act grants according to an alternative formula that weights each of the factors equally (27 percent for beach season, 36 percent for beach use, and 36 percent for beach miles) in accordance with the weights that EPA had built into its formula when it anticipated that \$30 million would be available in annual funding levels. For the purposes of our calculation, we reduced the total amount available to be allocated to beach season length from 82 to 27.2 percent of the current \$10 million funding levels. Given this simulation, the total amount allocated on the basis of beach season length falls from \$8.15 million to roughly \$2.72 million, and the proportion allocated to beach use and beach miles increases to \$3.65 million (or 36.4 percent) each.

Under this alternative formula, Alabama's total allocation, for example, would decrease by 48.6 percent, from \$263,225 to \$135,399, and its share of funding that is based on the length of the beach season would fall from \$250,000 to \$83,333. Table 12 shows how each state and territory's allocations would differ if EPA applied the percentages it built into its formula when it anticipated \$30 million in funding compared with the current \$10 million.

**Appendix III: GAO's Calculations for an
Alternative BEACH Act Grant Distribution
Formula**

Table 12: Difference in Allocations Using Current and Alternative Formulas

States and territories	BEACH Act grant allocation of \$10 million	Amount based on beach season	27.2% of amount based on beach season	Estimated BEACH Act grant under simulated formula	Difference between actual and estimated allocations (in dollars)	Difference between actual and estimated allocations
Alabama	\$263,225	\$250,000	\$83,333	\$135,399	-\$127,826	-48.6%
Alaska	150,000	150,000	50,000	50,000	-100,000	-66.7
American Samoa	302,329	300,000	100,000	109,169	-193,160	-63.9
California	535,645	300,000	100,000	1,027,721	492,076	91.9
Connecticut	225,386	200,000	66,667	166,609	-58,777	-26.1
Delaware	211,675	200,000	66,667	112,629	-99,046	-46.8
Florida	548,115	300,000	100,000	1,076,811	528,696	96.5
Georgia	289,322	250,000	83,333	238,142	-51,180	-17.7
Guam	302,828	300,000	100,000	111,136	-191,692	-63.3
Hawaii	325,009	300,000	100,000	198,459	-126,550	-38.9
Illinois	246,646	200,000	66,667	250,310	3,664	1.5
Indiana	206,304	200,000	66,667	91,485	-114,819	-55.7
Louisiana	382,538	250,000	83,333	605,128	222,590	58.2
Maine	259,453	200,000	66,667	300,729	41,276	15.9
Maryland	275,218	200,000	66,667	362,797	87,579	31.8
Massachusetts	259,137	200,000	66,667	299,486	40,349	15.6
Michigan	285,214	200,000	66,667	402,148	116,934	41.0
Minnesota	204,639	200,000	66,667	84,932	-119,707	-58.5
Mississippi	258,159	250,000	83,333	115,455	-142,704	-55.3
New Hampshire	204,926	200,000	66,667	86,061	-118,865	-58.0
New Jersey	284,435	200,000	66,667	399,081	114,646	40.3
New York	361,565	200,000	66,667	702,739	341,174	94.4
North Carolina	307,003	250,000	83,333	307,749	746	0.2
Northern Mariana Islands	303,622	300,000	100,000	114,260	-189,362	-62.4
Ohio	225,694	200,000	66,667	167,821	-57,873	-25.6
Oregon	231,260	200,000	66,667	189,735	-41,525	-18.0
Pennsylvania	224,471	200,000	66,667	163,007	-61,464	-27.4
Puerto Rico	330,908	300,000	100,000	221,682	-109,226	-33.0
Rhode Island	213,729	200,000	66,667	120,716	-93,013	-43.5
South Carolina	300,681	250,000	83,333	282,859	-17,822	-5.9
Texas	390,044	300,000	100,000	454,496	64,452	16.5
Virgin Islands	303,455	300,000	100,000	113,602	-189,853	-62.6

**Appendix III: GAO's Calculations for an
Alternative BEACH Act Grant Distribution
Formula**

States and territories	BEACH Act grant allocation of \$10 million	Amount based on beach season	27.2% of amount based on beach season	Estimated BEACH Act grant under simulated formula	Difference between actual and estimated allocations (in dollars)	Difference between actual and estimated allocations
Virginia	283,536	200,000	66,667	\$395,541	112,005	39.5
Washington	276,382	200,000	66,667	\$367,377	90,995	32.9
Wisconsin	227,448	200,000	66,667	\$174,729	-52,719	-23.2
Total	\$10,000,001	\$8,150,000	\$2,716,667	\$10,000,000	-\$1	0.0%

Source: GAO.

Note: Differences noted are due to rounding.

By simulating the distribution of BEACH Act grants given the more equally weighted percentages EPA built into its original formula, states with large populations, such as Florida, California, and New York would receive almost twice as much grant funding as their current allocations. However, this increase would come at the expense of states such as Alabama and Indiana, and territories such as Puerto Rico, which would receive as little as half of their current allocations. California's allocation, for example, would increase by 92 percent, while Indiana's allocation would decrease by 56 percent. It is important to recognize that such large swings in allocations could make it difficult for states that have come to depend on BEACH Act funding over the last 6 years to continue to monitor their beaches. EPA could consider using a hold-harmless provision to minimize states' potential loss of large portions of their BEACH Act grants. The hold-harmless provision would ensure that the current grantees would maintain, at a minimum, their previous year's allocation, while any additional funding would be allocated to those states with longer shorelines and larger populations.

Appendix IV: Comments from the Environmental Protection Agency



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 13 2007

OFFICE OF
WATER

Ms. Anu Mittal
Director, Natural Resources and Environment
U.S. Government Accountability Office (GAO)
Washington, DC 20548

Dear Ms Mittal:

Thank you for the opportunity to comment on the draft report entitled: *Great Lakes: EPA and States Have Made Progress in Implementing the BEACH Act, but Additional Actions Could Improve Public Health Protection (GAO-07-591)*. The Office of Water has reviewed the draft report and offers the following comments in response to the three "Recommendations for Executive Action."

Recommendation: Establish a definitive timeline for completing the studies on pathogens and their effects on human health, and or publishing new or revised water quality criteria for pathogens and pathogen indicators.

The report accurately represents EPA's efforts in developing new or revised recreational water criteria. On March 26-30, EPA sponsored a week-long national and international experts' workshop on the scientific and research needs associated with producing new recreational water quality criteria. The workshop underscored the challenge EPA faces in developing new criteria that are scientifically sound, advance public health protection, and are able to be easily adopted and implemented by States. Although there have been numerous advances in science (including significant work completed by EPA) since the development of the 1986 Ambient Water Quality Criteria for Bacteria, there remain substantial gaps in the state of scientific knowledge in this area. For example, although there appears to be general agreement in the scientific community that recreational waters contaminated with animal waste pose less risk to humans than waters contaminated with human waste, this has yet to be quantified. New criteria that do not account for this difference would likely lead to over-regulation in cases where the sole source or predominant source of fecal contamination is animal waste. EPA will develop a science action plan and definitive timeline for the completion of additional studies and research and will use these data to develop and publish new or revised water quality criteria.

Internet Address (URL) • <http://www.epa.gov>
Recycled/Recyclable • Printed with Vegetable Oil Based Inks on 100% Postconsumer, Process Chlorine Free Recycled Paper

Recommendation: If current funding levels remain the same, revise the formula for distributing BEACH Act grants to better reflect the states' varied monitoring needs by reevaluating the formula factors to determine if the weight of the beach season factor should be reduced and if the weight of other factors, such as beach use and beach miles should be increased.

In 2006-2007, EPA engaged the states in a year-long stakeholder dialogue to discuss whether and how to modify the current BEACH Act grant allocation formula. There was high state participation in a series of conference calls (25 of the 35 BEACH Act states and territories participated), the purpose of which was to explore the same types of questions that GAO has raised. EPA developed and presented to the states approximately 5 allocation funding options, some of which generated outcomes very close to those produced by GAO. EPA was successful in producing allocation formulas that provided larger grants to states with more beaches and more people. However, the potential impact to established beach monitoring programs in the states that would have lost funding was viewed by the workgroup participants, winners and losers alike, as unacceptably detrimental to programs in those states and to the national BEACH Act program. This is because there is a minimum level of funding that is needed to operate a beach monitoring and advisory program---regardless of the number of beach miles or the length of the beach season.

This level of funding includes funding a state beach coordinator and sufficient resources to effect the other requirements of the BEACH Act, including collection and submission to EPA of data on water quality and advisories. Other factors relating to the extent of beaches and population are accounted for to some extent in the current allocation formula, but GAO is correct in pointing out the same disparities that led EPA to convene a dialogue with state partners to consider options for revisiting the formula. For many states, budgets are very tight, and recreational water monitoring is limited to the amount received in BEACH Act grant funding. These states are extremely sensitive to the prospect of any reductions in their grant amounts, to the point where they could choose to opt out of EPA's BEACH Act grant program if reductions occurred.

For states such as Florida and California, which use BEACH Act funds to supplement existing state funding for beaches, tourism and associated beach use are major drivers of the states' economies. Although these two states are among those that receive proportionally less than might otherwise be the case under alternative allocation scenarios, both provide very substantial additional monies for beach monitoring, and both were supportive of EPA's plan to make only minor changes to the current allocation formula.

Recommendation: To better ensure consistent levels of public health protection, EPA should provide states and localities with specific guidance on monitoring frequency and methods and public notification.

By design, EPA allows states a substantial degree of latitude within its published performance criteria in the implementation of their beach monitoring and advisory

3

programs. This is in deference to the range of conditions that exist in the various states, the range of agencies that implement the beach programs in the states, and the capabilities and creativity of local beach managers in carrying out their programs. This being said, the science of sampling and monitoring of beach waters has progressed substantially since the enactment of the BEACH Act and the initial publication of EPA's 2002 National Beach Guidance. EPA envisions beginning the process of revising this guidance document in the near future. In the meantime, EPA will provide additional information to the states on developing best practices and successful strategies for monitoring and notification through vehicles such as its National Beach Conference.

Again, thank you for the opportunity to review and comment on the draft report. I look forward to our comments being reflected in the final report. If you have questions or concerns about the comments or the BEACH Act program, you may contact me, or have your staff contact Ephraim King, Director, Office of Science and Technology, at 202-566-0430.

Sincerely,



Benjamin H. Grumbles
Assistant Administrator

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

Anu K. Mittal, (202) 512-3841, mittala@gao.gov

Staff Acknowledgments

In addition to the individual named above, Edward Zadjura, Assistant Director; Eric Bachhuber; Joanna Chan; Robert Dinkelmeyer; Greg Dybalski; Heather Holsinger; DuEwa Kamara; Matt Michaels; Omari Norman; Alison O'Neill; Mark Ramage; and Walter Vance made key contributions to this report. Also contributing to the report were Kim Raheb, Jena Sinkfield, and John Wanska.

GAO's Mission

The Government Accountability Office, the audit, evaluation and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's Web site (www.gao.gov). Each weekday, GAO posts newly released reports, testimony, and correspondence on its Web site. To have GAO e-mail you a list of newly posted products every afternoon, go to www.gao.gov and select "Subscribe to Updates."

Order by Mail or Phone

The first copy of each printed report is free. Additional copies are \$2 each. A check or money order should be made out to the Superintendent of Documents. GAO also accepts VISA and Mastercard. Orders for 100 or more copies mailed to a single address are discounted 25 percent. Orders should be sent to:

U.S. Government Accountability Office
441 G Street NW, Room LM
Washington, D.C. 20548

To order by Phone: Voice: (202) 512-6000
TDD: (202) 512-2537
Fax: (202) 512-6061

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: www.gao.gov/fraudnet/fraudnet.htm

E-mail: fraudnet@gao.gov

Automated answering system: (800) 424-5454 or (202) 512-7470

Congressional Relations

Gloria Jarmon, Managing Director, JarmonG@gao.gov (202) 512-4400
U.S. Government Accountability Office, 441 G Street NW, Room 7125
Washington, D.C. 20548

Public Affairs

Paul Anderson, Managing Director, AndersonP1@gao.gov (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, D.C. 20548