

2.4 Recreation in and on the Water

Our nation's rivers, lakes, and oceans are used for recreation in many different ways, including swimming, fishing, and boating. Environmental programs implemented under the Clean Water Act (CWA) have significantly improved the quality of many of our nation's waters since the early 1970s. These programs help to maintain the quality of waters that have been specifically designated for recreational uses and ensure that they do not become degraded in the future. Despite this progress, recreational waters are threatened or affected by pollution at some times and in various locations. For example:

- During and following heavy rainfall, the sewer systems in some cities may become overloaded, resulting in the temporary discharge of raw sewage, wastewater, and storm water into rivers and coastal areas.
- Lakes and ponds may be affected by non-point source pollution, for example from septic tanks and agricultural sources, resulting in chemical contamination and elevated levels of nutrients.
- Industries are issued permits under the Clean Water Act that allow discharges of certain treated wastewaters to rivers and streams. These discharges compromise our ability to also use those waters for recreational purposes.

Perhaps the greatest human health concern associated with pollution of recreational waters is the potential for exposure to human pathogens. Many Americans risk illness from exposure to contaminated recreational waters. Epidemiology studies in the U.S. and abroad have consistently found an association between disease burden and contaminated waters. State and local officials monitor water quality at public beaches and close the beaches or issue advisories when monitoring indicates that pathogens in water may have exceeded thresholds for public safety. The fact that hundreds of beach advisories and closings are issued every year at recreational rivers, lakes, and coastal waters throughout the U.S. suggests that our recreational waters are significantly impacted by pollution. Three questions are posed with regard to recreational waters:

- What is the condition of waters supporting recreational use?
- What are sources of recreational water pollution?
- What human health effects are associated with recreation in contaminated waters?

An indicator has been developed to help answer the first of these three questions, at least with regard to pathogens in recreational waters. The second and third questions are addressed in Sections

2.4.2 and 2.4.3, respectively. No indicators were identified to answer these two questions. Note that concerns associated with consumption of fish and shellfish, including fish and shellfish caught through recreational activities, are discussed in Section 2.5.

2.4.1 What is the condition of waters supporting recreational use?

Indicators

Number of beach days that beaches are closed or under advisory

As described in Section 2.2.1, a number of programs collect information on the condition of waters at a national scale, including the conditions that support recreational uses of waters. However, for a variety of reasons described in Section 2.2.1, none of these programs (including the widespread CWA-mandated 305[b] state data collection and reporting program) produce data with sufficient confidence and scientific credibility to serve as a national indicator for water quality condition. Nevertheless, data from an entirely different source (state and local monitoring of water quality at beaches) can be used to help answer the question "What is the condition of surface waters that support recreational use?"—at least with respect to pathogen contamination.

When local and state officials monitor water quality at beaches, they generally test for indicator organisms, such as coliforms. Not all of these organisms are harmful themselves, but their presence generally suggests that disease-causing microorganisms are also likely to be present. When indicator organisms exceed certain thresholds, local or state officials will close the beach to the public. The number of days that beaches are closed or under advisory provides the basis for an indicator for recreational water quality with respect to pathogen contamination. This indicator reflects decisions made by state and local governments about whether pathogen levels are above their public health thresholds at beaches under their jurisdiction. Beach closure/advisory data predominantly represent coastal and Great Lakes areas. Data on inland waterways generally are not available or are not collected and reported. Thus, the question "What is the condition of surface waters that support recreational use?" can only be addressed for a portion of coastal and Great Lakes beaches on a national level at this time.

Indicator

Number of beach days that beaches are closed or under advisory - Category 2

Data on beach closures are collected by EPA under the Beaches Environmental Assessment and Coastal Health (BEACH) Program. This program is authorized by Section 104 of the Clean Water Act and described in EPA's Action Plan for Beaches and Recreational Waters (EPA, ORD, OW, March 1999).

The BEACH program collects data for the National Health Protection Survey of Beaches by sending a questionnaire to managers (usually in health or environmental quality departments in states, counties, or cities) who are responsible for monitoring swimming beaches on the coasts or estuaries of the Atlantic Ocean, Pacific Ocean, and Gulf of Mexico, and the shoreline of the Great Lakes. Information on some other inland fresh water beaches has also been collected. Responses to these surveys are voluntary and have increased substantially from 159 local, state, and federal agencies reporting in 1997, to 237 agencies reporting on 2,445 beaches in 2001.

What the Data Show

Using the survey data, EPA compiles the number of days that beaches are closed or under advisory and compares that to the total number of "beach days"—i.e., days that the beaches would normally be open to the public. In 2001, survey respondents reported a total of approximately 320,000 beach days during the swimming season for the 2,445 beaches for which data were col-

lected. These beaches were closed or under advisory on almost six percent (over 19,000) of those beach days.

Indicator Gaps and Limitations

This indicator has a number of limitations:

- Since reporting is voluntary, the data cannot be extrapolated to accurately determine the suitability on a national level of surface waters to support recreation.
- The indicator applies primarily at this time to coastal and Great Lakes beaches, as relatively few fresh water inland beaches are surveyed.
- The causes of closures vary greatly among states; therefore, linking beach closures to human health problems or stressors is difficult.
- Some reports are based upon infrequent monitoring. Infrequent monitoring could miss events that would cause closures.
- In interpreting the data, the assumption is made that the public was at minimal risk of exposure to waterborne illness on days the beach was open. However, this may not always be true.

Data Source

Data for this indicator came from EPA's National Health Protection Survey of Beaches. (See Appendix B, page B-17 for more information.)

2.4.2 What are sources of recreational water pollution?

As mentioned earlier, beach advisories and closings in the U. S. are generally due to elevated levels of indicator organisms, such as coliforms, some of which do not themselves cause disease but may indicate the presence of disease-causing microorganisms. In the survey of beaches (see Section 2.4.1), respondents are asked to identify, based on best professional judgment, the sources of pollution (i.e., the indicator organisms and any associated pathogens) that caused a beach advisory or closing. Exhibit 2-32 presents the sources reported for the 2001 swimming season.

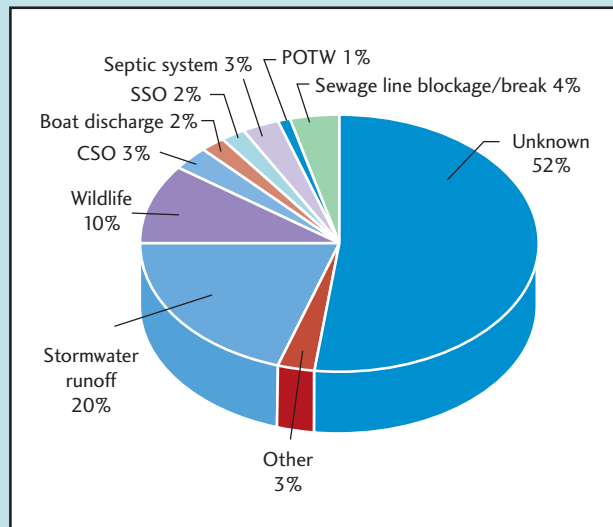
For just over half the cases, the sources were unknown. Storm water runoff was the reported cause for one-fifth (20 percent) of the beach closing or advisories. Rainfall, particularly heavy rain, creates runoff from farmland, city streets, construction sites, suburban lawns, roofs and driveways. This runoff contains harmful contaminants,

including human and animal wastes, sediments, and excess nutrients. Runoff can enter waterbodies directly or via the storm water drainage system. Other reported causes of beach closings and advisories were: wildlife (10 percent), sewage line blockages and breaks (four percent), improperly functioning onsite wastewater facilities (i.e., septic systems—see Chapter 3—Better Protected Land) (three percent), combined sewer overflows (three percent), sanitary sewer overflows (two percent), boat discharges (two percent), and publicly owned treatment works (one percent). No indicators have been identified to answer the question "What are the sources of recreational water pollution?" at this time.

2.4.3 What human health effects are associated with recreation in contaminated waters?

The primary health concern associated with recreational waters is the risk of infection from waterborne pathogens. People may be at

Exhibit 2-32: Reported sources of pollution that resulted in beach closings or advisories, 2001



CSO - Combined Sewer Overflow

SSO - Sanitary Sewer Overflow

POTW - Publicly Owned Treatment Works

Source: EPA, Office of Water. EPA's BEACH Watch Program: 2001 Swimming Season. May 2002.

risk if they ingest or inhale contaminated water, or simply through general dermal contact with the water. Some people may be more vulnerable than others, either because they are more susceptible to infection or because they have greater exposure to the water. For example, children may be more vulnerable to environmental exposure due to their active behavior and developing immune systems. Elderly and immunosuppressed persons may also be more vulnerable.

The health effects of swimming in contaminated waters are usually minor—sore throats, ear infections, and diarrhea. In some instances, however, effects can be more serious and even fatal. Waterborne microbes can cause meningitis, encephalitis, and severe gastroenteritis (EPA, ORD, OW, March 1999). However, data on the effects and number of occurrences are limited. The number of occurrences are likely under-reported because individuals may not link common symptoms (e.g., gastrointestinal ailments, sore throats) to exposure to contaminated recreational waters. At this time, no indicators have been identified to quantify the health effects associated with recreation in contaminated waters. Additional research is needed to better understand the types and extent of health effects associated with swimming in contaminated water.