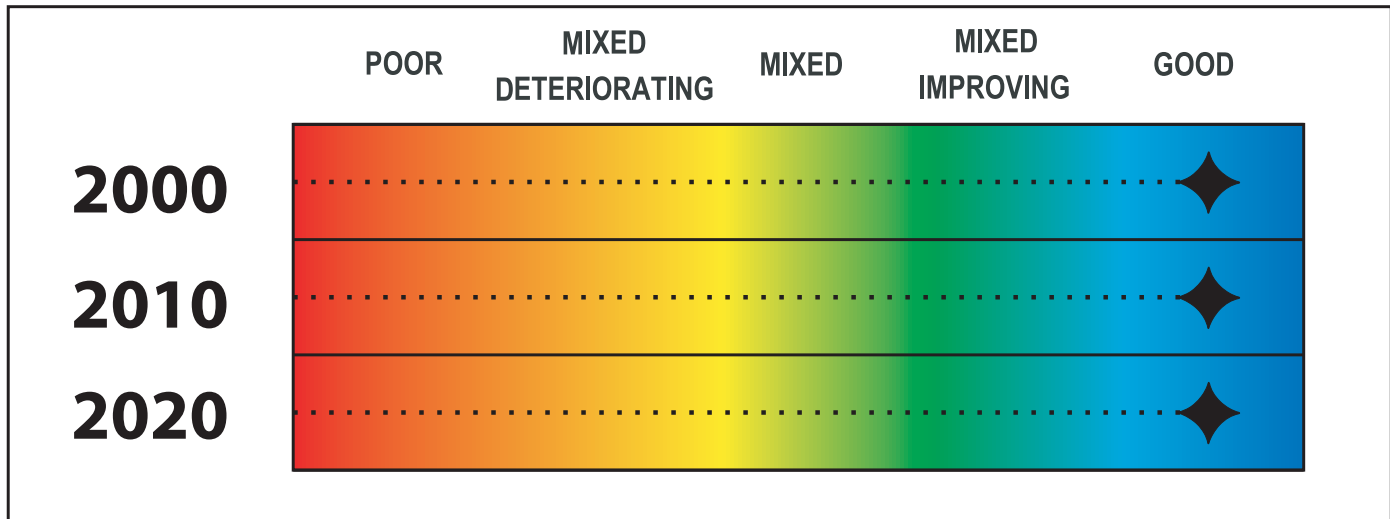




## Subgoal 2 Can we drink the water?



### Status

The drinking water in the Lake Michigan basin is of good quality, although there have been sporadic outbreaks of illness related to drinking water. The waters of Lake Michigan and surrounding areas are a primary source of drinking water for 10 million people who live in the basin. Because the average adult in the United States consumes about 1.6 quarts of water each day, health effects can be serious if the drinking water supply has high levels of some contaminants. This water is obtained from a variety of suppliers, both public and private.

### Challenges

- (1) To understand possible vulnerabilities in water sources and prepare protection plans.
- (2) To monitor for possible new contaminants.
- (3) Groundwater depletion in the basin increases the number of requests to tap into the Lake Michigan source; these requests need to be tracked.

### Drinking Water Contaminants

Various contaminants can adversely impact drinking water, including microorganisms (for example, bacteria, viruses, and protozoa such as cryptosporidium), chemical contaminants (including

naturally occurring chemicals and anthropogenic or synthetic chemicals), and radiological contaminants (including naturally occurring inorganic and radioactive materials and metals). Some contaminants in raw (untreated) water supplies, such as aluminum, arsenic, copper, and lead, can be both naturally occurring and the result of human activities. Other contaminants, such as household chemicals, industrial products, urban storm water runoff, fertilizers, human and animal waste, nitrate (from fertilizers and sewage), and pesticides, may also end up in raw water supplies

Certain chemical contaminants pose a concern when present in drinking water because of possible health consequences associated with these substances. These contaminants may be in raw water as a result of industrial and agricultural activities or treated wastewater discharges. Some may also be present in treated water as a result of chemicals used in the drinking water treatment process (Health Canada, 1998). The impact of contaminants is diluted in a large water body like Lake Michigan but could be more serious in a groundwater source.

Microbial contamination of drinking water can pose a potential public health risk in terms of acute outbreaks of disease. The illnesses associated with contaminated drinking water are mainly of a gastrointestinal nature, although some pathogens



are capable of causing severe and life-threatening illness. In most communities, drinking water is treated to remove contaminants before it is piped to consumers, and bacterial contamination of municipal water supplies has been largely eliminated by adding chlorine or other disinfectants to drinking water in order to prevent waterborne disease. As a result, diseases such as typhoid and cholera have been virtually eliminated. Although other disinfectant treatments are available, chlorination still tends to be the treatment of choice. When used with multiple barrier systems (that is, coagulation, flocculation, sedimentation, and filtration), chlorine is effective against virtually all infective agents (Health Canada, 1998).

In general, drinking water provided by public water suppliers is likely to remain of good quality because of the multiple pollutant barrier approach being implemented across the basin. Not only are treatment systems and operating practices continually improving, increased monitoring is also providing more information about source water supplies and the need for source water protection. In the past two years, greater emphasis has been placed on assessing and protecting raw sources of drinking water. Both the source water assessments that must be completed for all public water supplies by 2003 (see text box) and recent data collected from 22 sites around the Great Lakes are providing more information about raw water supplies. Samples from the 22 sites were assessed for microbiological and chemical contaminants. The samples revealed that the health of the Great Lakes raw drinking water supply, including Lake Michigan, is good (SOLEC 2001). All of the parameters assessed in the study were found to be consistently below drinking water standards. In particular, no fecal coliform exceedances have

been observed at the U.S. sites included in the study for the past ten years.

Overall, violations of chemical and microbial standards in water provided by public water systems in the basin are extremely rare. The risk of human exposure to contaminants is low (SOLEC 2001). The quality of water delivered, however, can vary due to the possibility of contaminants entering the distribution system.

## Drinking Water Monitoring and Reporting

Continuing efforts must be made to inform health professionals and the public of the results of analyses of drinking water. EPA requires that public water supplies be monitored for bacteriological, inorganic, organic, and radiological contaminants. The analyses of drinking water include tests for the physical and chemical characteristics of the water as well as for contaminants from natural sources or human activities. In addition, the EPA Office of Groundwater and Drinking Water (OGWDW) web site at [www.epa.gov/OGWDW](http://www.epa.gov/OGWDW) provides detailed information on the nation's drinking water, including drinking water and health information, drinking water standards, and local drinking water



Great Blue Heron

Photo courtesy of Donald Breneman\*

information. Community water suppliers deliver high-quality drinking water to millions of people every day, and a network of government agencies is in place to ensure the safety of public drinking water supplies. Our drinking water is safer today than ever before, but problems can and do occur although they are relatively rare.

Information on local water quality is available from several sources, including state public health departments and local water suppliers. To inform the public of the results of analyses of drinking water and to demonstrate a commitment to protecting human health, each community public water supplier is required to generate an annual Consumer Confidence Report that is made available to all residents receiving water from the water system. A Consumer Confidence Report provides information about the source of water used, its susceptibility to contaminants, the levels of contaminants detected in the water, the likely sources of contaminants, and potential health effects of any contaminant detected at a concentration above its maximum contaminant level (MCL). Consumer Confidence Reports can

be reviewed to get an indication of the overall quality of treated surface water and groundwater and the condition of the drinking water provided. In addition, starting in 2003, the states will distribute information on the status of the source waters used by public water suppliers and the level of susceptibility of those source waters to contamination.

### Next Steps

- By 2002, EPA will track and report on raw source water for Green Bay, Milwaukee, Chicago, and Muskegon.
- By 2003, source water assessments (including security assessment) will be completed and reported.
- By 2005, plans will be in place to address drinking water susceptibility to contamination.

U.S. EPA. 1997. *Water on Tap: A Consumer's Guide to the Nation's Drinking Water*. EPA 815-K-97-002

Health Canada. 1998. *Summary: State of Knowledge Report on Environmental Contaminants and Human Health in the Great Lakes Basin*. Great Lakes Health Effects Program, Ottawa, Canada

### Source Water Assessments for Public Water Systems Drawing Water from Lake Michigan

Under the 1996 amendments to the Safe Drinking Water Act (SDWA), states and tribes are required to develop comprehensive Source Water Assessment Programs (SWAP) that will

1. identify the areas that supply public tap water,
2. inventory contaminants and assess water system susceptibility to contamination, and
3. inform the public of the result.

Funds to implement the assessments are available through the SDWA Drinking Water State Revolving Fund. Most states are currently conducting the assessments, and the results will be reported to the public in 2003.

Because of the unique nature of water intakes in the Great Lakes, a special approach has been developed by the Great Lakes states to determine the source water assessment areas for Great Lakes water suppliers. A "critical assessment zone" sensitivity factors is determined by multiplying the distance of a water intake from the shore (L) by the water depth (D) in feet:

$$S=L \times D$$

Generally, S values less than 25,000 represent highly sensitive intakes, while S values greater than 125,000 indicate lower sensitivities. The shallower, nearshore intakes are more sensitive to shoreline influences than the deep, offshore intakes. This information is used by the states to determine the size of assessment areas, help prioritize assessment activities, and assist with susceptibility determinations.

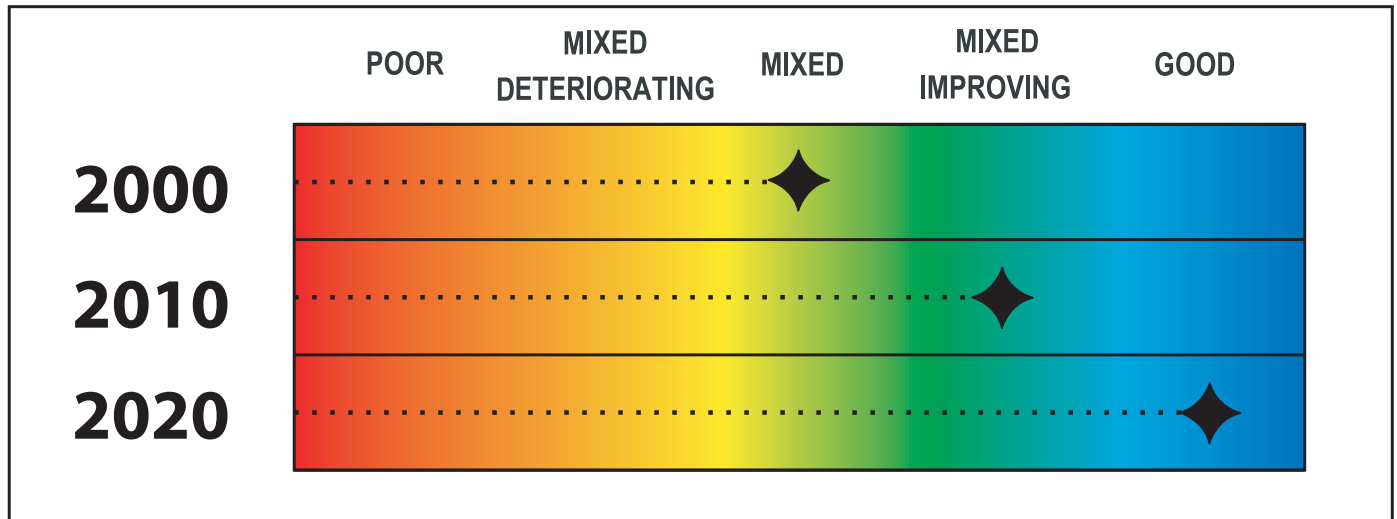
Information on source water assessment approaches and assessment results will be available from each of the Lake Michigan states by 2003.





## Subgoal 3

### Can we swim in the water?



#### Status

Lake Michigan contains the world's largest collection of freshwater sand dunes and associated beaches, particularly along its eastern shore. Of a total of 3,100 coastal acres, 1,200 acres is publicly owned and available for use, while an additional 1,200 privately owned acres has significant potential for public use. It is important to note that most shoreline areas along Lake Michigan fully support swimming and secondary contact recreation. However, some areas do experience beach closures because of contamination. As a result, the current status of the goal is mixed.

#### Challenges

- (1) Maintain and not overtax the wastewater control infrastructure.
- (2) Address nonpoint sources of pathogen load to beaches and water bodies.
- (3) Build a real-time beach monitoring and reporting system.

#### Beach Closures

Beach closures resulting from high pathogen loads have a negative effect on the lake's significant tourist industry. Wet weather that causes overflows from aging wastewater collection systems or treatment plants, runoff from cities and farms, improperly

sited or maintained septic systems, and natural sources release pathogens into tributaries and the lake. When pathogen levels exceed standards, beach managers post "No Swimming" notices in order to protect human health.

Because the Lake Michigan states currently use different standards and measurement methods to determine the need for beach closings, there are limitations on the ability to compare frequencies of exceedances of microbiological standards in order to evaluate trends in recreational water quality. Despite these limitations, the frequency of beach postings has traditionally been used as an indicator of recreational water quality. Microbial standard exceedances may be a better measure of the actual health risk associated with recreational water quality. By April 2004, all Great Lakes states will adopt bacteria criteria at least as protective as EPA's Ambient Water Quality Criteria for Bacteria – 1986. EPA's annual voluntary beach survey program provides an indication of the status of beach health. In 2000, Lake Michigan had 206 beach closings. Of the 211 beaches on the lake, 137 were monitored for pathogens. See Figure 3 for a summary of beach closure locations in 2000.

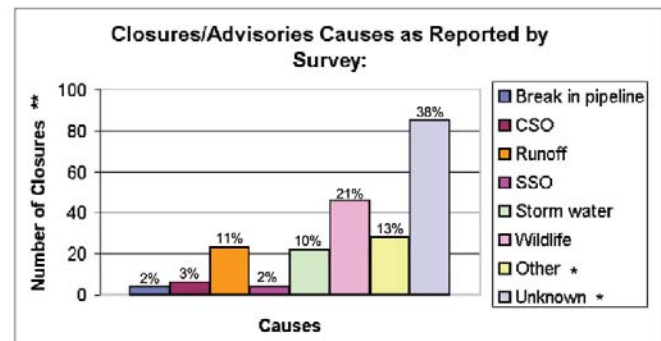
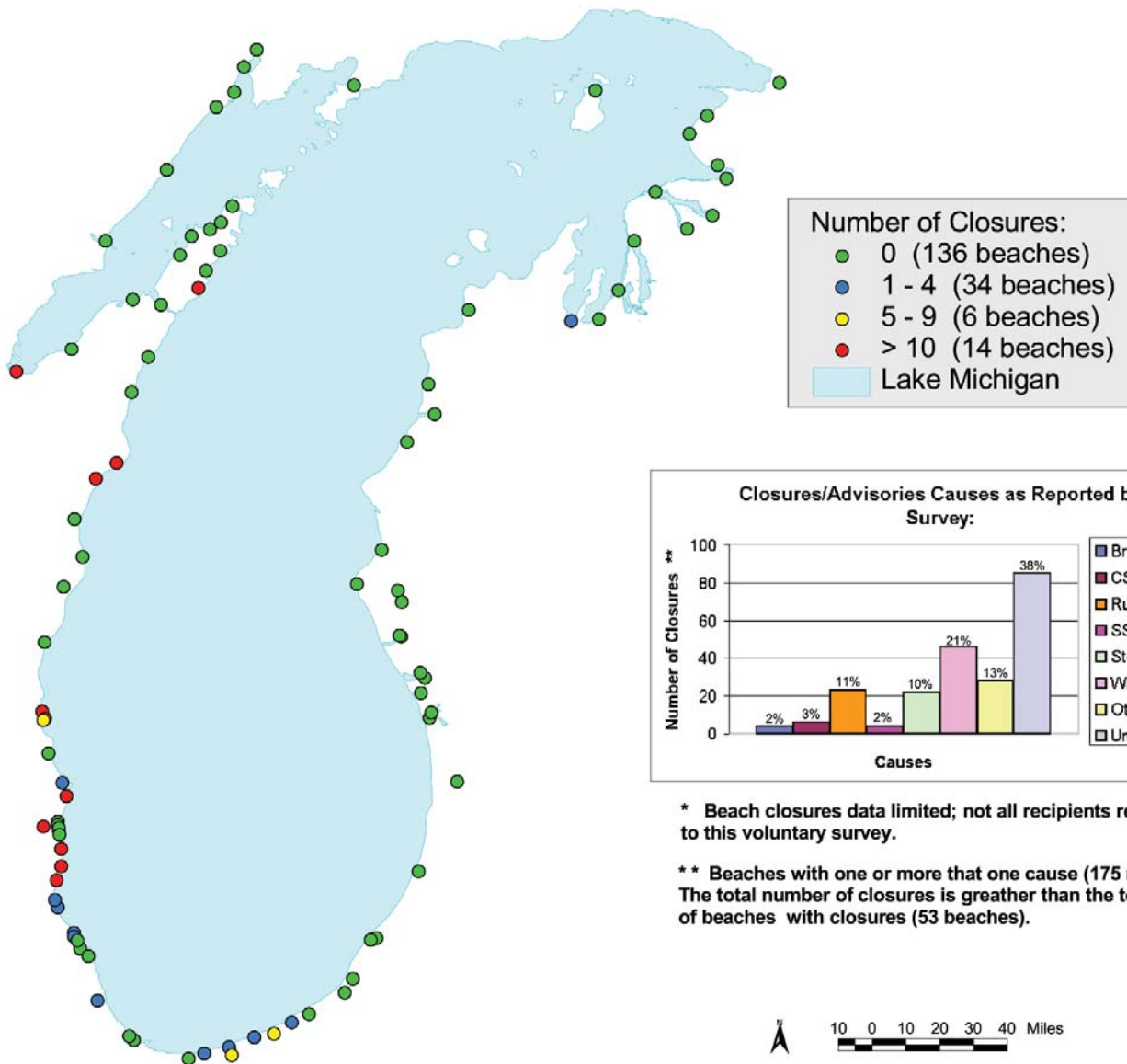


## Federal Beach Bill

In October 2000, the U.S. Congress passed federal legislation amending the Clean Water Act that is referred to as the Beaches Environmental Assessment and Coastal Health Act, or the BEACH Act. The BEACH Act requires adoption of consistent bacterial standards nationwide, research on new pathogens and pathogen indicators, issuance

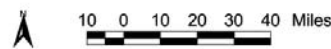
of new or revised criteria and guidance within 5 years, and development of rapid analytical techniques for faster notification of the public regarding elevated bacteria levels. The act also authorizes EPA to award grants to eligible coastal and Great Lakes states in order to set up beach monitoring and public notification programs. In 2001, \$2 million was appropriated for coastal

## Lake Michigan Beaches Closures/Advisories in 2000



\* Beach closures data limited; not all recipients responded to this voluntary survey.

\*\* Beaches with one or more that one cause (175 records). The total number of closures is greater than the total number of beaches with closures (53 beaches).



Data sources: National Health Protection Survey of Beaches 2000 for swimming season.

Map create by: Martha Aviles-Quintero  
ORISE Research, US EPA Region 5, 03/28/02



states to develop beach monitoring and notification programs, and an additional \$10 million has been appropriated in 2002 to continue program development and implementation. Out of the 2002 appropriation, the four Lake Michigan states received over \$1 million.

To provide more protection against gastrointestinal illness, EPA requires that all states adopt E. coli criteria for use as beach indicators by 2004. The BEACH Act grants will result in improved beach monitoring and public notification programs. EPA's Office of Research and Development (ORD) will be conducting epidemiological studies to examine health risks associated with swimming at several beaches across the country, including beaches on the Great Lakes.

### **Great Lakes Beach Conference and Follow-up Activities**

In February 2001, an EPA, LaMP, and City of Chicago-sponsored Great Lakes Beach Conference was held to share information on the science and technology of beach monitoring as well as research on exposure, health effects, and water quality indicators. More than 250 environmental and public health officials, beach managers, and regulators attended the 3-day conference. A draft National Beach Guidance and Performance Criteria for Recreational Waters was produced by EPA, and the associated public notice appeared in the Federal Register; the comment period ended in October 2001. The guidance will be used to help local health departments and beach managers implement a nationally consistent water quality monitoring program for beaches. At the conclusion of the conference, EPA presented a technical workshop on the BEACH Act that was passed in October 2000. This workshop provided conference participants with the opportunity to learn about the purpose of the BEACH Act and the funding available under the act. Additional information regarding the BEACH Act is available at [www.epa.gov/OST/beaches](http://www.epa.gov/OST/beaches).

Several follow-up activities have occurred since the Great Lakes Beach Conference. An interactive Listserv and networking opportunities have been established. In addition, Great Lakes beach closure maps have been updated by EPA Region

5. Additional educational and outreach materials have been developed, and a Lake Michigan volunteer water quality monitoring workshop was held in March 2002. Additional opportunities for information sharing and networking will be pursued.

For more information on beach management issues, see the following web sites:

BeachNet e-mail list -  
[www.great-lakes.net/lists/beachnet/beachnet.info](http://www.great-lakes.net/lists/beachnet/beachnet.info)

Great Lakes Beach Conference 2001 complete conference proceedings -  
[www.glc.org/monitoring/beaches/GLBC/](http://www.glc.org/monitoring/beaches/GLBC/)

Additional beach information or applying for beach grant funds -  
[www.epa.gov/waterscience/beaches](http://www.epa.gov/waterscience/beaches)

Great Lakes Information Network's new human health web site -  
[www.great-lakes.net/humanhealth/](http://www.great-lakes.net/humanhealth/)

### **Next Steps**

- By 2004, states will adopt criteria, standards, and monitoring programs for beach bacteria.
- By 2005, achieve a 30 percent reduction from the 1992 per capita loadings from combined sewer overflows (CSO), POTWs, and industry.
- By 2005, 95 percent of high-priority beach waters (as defined by the state) will be monitored and a public advisory system will be in place.
- By 2007, 90 percent of monitored high-priority beach waters (as defined by the state) will meet federal and state bacteria standards for more than 95 percent of the average swimming season.

