

IOWA'S WATER

Ambient Monitoring Program



Iowa's Beach Monitoring Program 2007

The Beaches Environmental and Coastal Health Act of 2000 (BEACH Act) requires states with coastal or Great Lakes beaches to monitor those waters according to United States Environmental Protection Agency (EPA) guidelines. Iowa is one of only twenty states not given funding under the BEACH Act to monitor beaches, as it has no coastal or Great Lakes beaches. However, since thousands of people visit Iowa's state beaches each year, the Iowa Department of Natural Resources (IDNR) understands the need for a comprehensive beach monitoring program.

Now in its eighth consecutive year, the IDNR Beach Monitoring Program tests Iowa's state park beaches routinely for indicator bacteria in order to safeguard public health while striving to enhance the public's understanding of watershed processes and the impacts of bacteria on the waters in which we recreate.

Beach Policy

Throughout the eight-year history of the IDNR Beach Monitoring Program, all beaches have been posted with educational signs providing information on ways to reduce health risks associated with swimming at public beaches. These signs also include methods to obtain water quality results and other information about the program.

As in previous years, beach policy was based on the two water quality standards used in Iowa for recreational waters: a one-time sample maximum and a geometric mean. The first standard is used at beaches that have experienced consistent problems in recent years; those

What Are Indicator Bacteria?

Indicator bacteria are used to assess the microbiological quality of water because, although not typically disease causing, they are correlated with the presence of several water-borne disease-causing organisms. It is difficult and costly to analyze water for the many disease-causing organisms that may be present. Instead, *E.coli* and enterococci are used as the primary indicators of fecal contamination, as they are easy to collect, relatively safe to handle, and are usually present when pathogens are in the water. An increase in the level of indicator bacteria indicates a potentially elevated risk of contact with pathogens. In addition to the possible health risks associated with the presence of elevated levels of fecal bacteria, they can also be associated with cloudy water, unpleasant odors, and an increased oxygen demand, all of which impact the overall health of the lake and the life it supports.

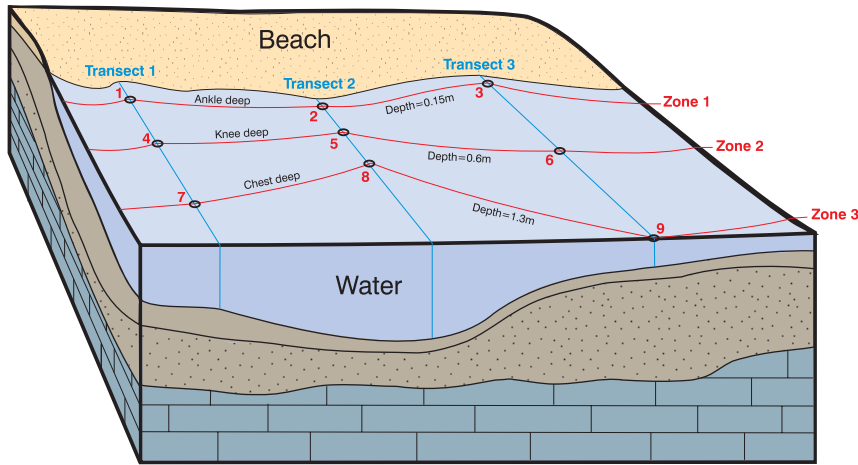


Figure 1. Block diagram of beach monitoring points. The location of sampling points at each beach varies depending on the size of the beach and how gradually the water increases in depth. Numbered points along the three transects represent the nine individual points that comprise the composite sample for each beach.

classified as “vulnerable” or “transitional” beaches. Whenever these beaches had an individual *E.coli* result exceeding 235 organisms per 100 ml of water, a “Water Quality Advisory” was posted. On the other hand, the geometric mean standard is used to determine if beaches are experiencing chronically high levels of *E.coli*. This standard is based on five or more samples collected within a 30-day period. While sample results often vary by orders of magnitude, the geometric mean calculation provides

an unbiased average across a number of samples. “Water Quality Advisory” signs were posted at any beach exceeding Iowa’s geometric mean for *E.coli* bacteria of 126 organisms per 100 ml of water.

Sample Collection

A few significant changes were made to the program during the 2007 beach monitoring season. A crew of summer interns was hired to sample all 37 state beaches. They were also responsible for conducting re-samples whenever routine samples were above standards, while also conducting comprehensive bacterial monitoring throughout the same watersheds and around the lakes when elevated bacteria levels occurred at the beach. Additionally, samples were analyzed in-house in the IDNR’s newly expanded and renovated water quality laboratory. This expedited the process of sample collection through analysis, allowing beaches to be re-sampled in the event of high bacteria results early in the week, with re-sample results available before the weekend.

State park beach monitoring took place between Memorial Day and Labor Day with weekly samples collected at 37 state-owned beaches. Program staff collected water from three transects (left, center, and right) at three water depths (ankle-, knee-, and chest-deep) for a total of nine points within the swimming area (Figure 1). The water gathered from these locations was combined and mixed to form a composite sample for each beach. This sampling strategy gives more representative conditions of current water quality than collecting and analyzing only a single sample from the beach.

Results

During the 2007 monitoring season, 22 state park beaches exceeded the one-time standard for *E.coli* (235 organisms per 100 ml water) and four beaches exceeded the geometric mean standard for *E.coli* (126 organisms per 100 ml water).

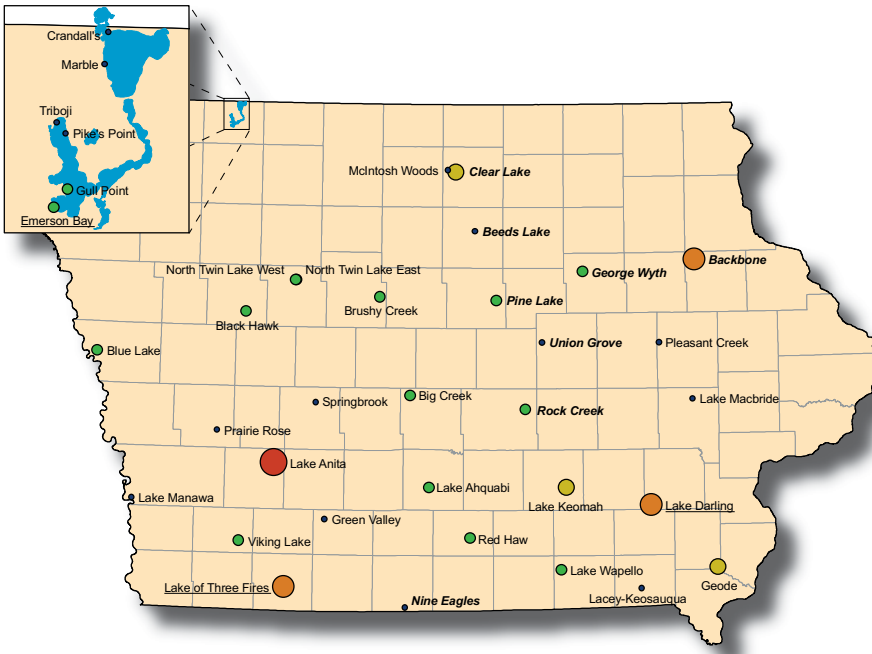


Figure 2. Percentage of state park beach samples exceeding the EPA and state standards during the 2007 recreational season. Beach classes are noted in the lake name: standard text = "less vulnerable," underline = "transitional," and bold/italicize = "vulnerable."

Legend

Percentage of samples exceeding standard

- 0
- 1 - 9.9
- 10 - 19.9
- 20 - 29.9
- 30 - 39.9

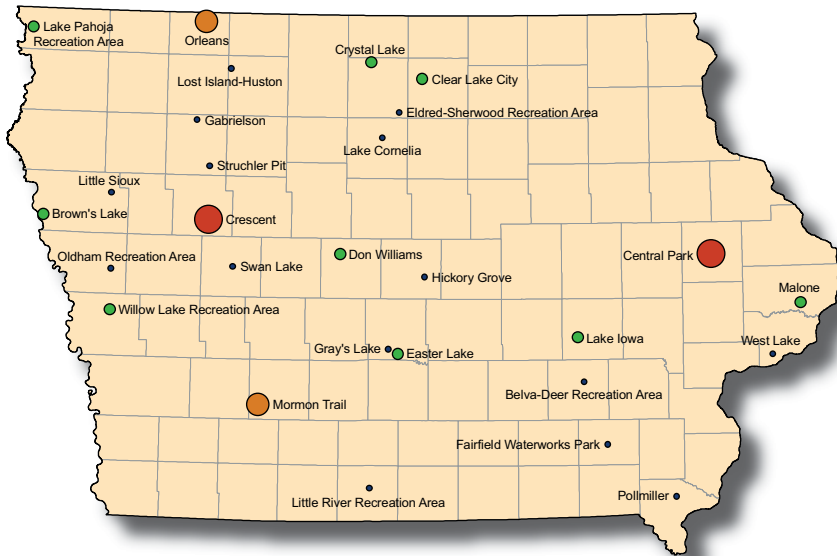


Figure 3. Percentage of locally managed beach samples exceeding the EPA and state standards during the 2007 recreational season.

Legend

Percentage of samples exceeding standard

- 0
- 1 - 9.9
- 10 - 19.9
- 20 - 29.9
- 30 - 39.9

Most state park beaches in 2007 had more than 26 results reported between Memorial Day and Labor Day. During that time, 15 of the 37 state park beaches had no samples exceeding state water quality standards of 235 *E.coli* per 100 ml for individual samples or 126 *E.coli* per 100 ml for geometric mean results, while another ten only had one such result exceeding either standard. At the same time, only four beaches had high enough bacteria levels to result in geometric mean exceedances. Results for 2007 are shown in Figure 2.

Additionally, since Iowa's Beach Monitoring Program began in 2000, weekly bacteria results for *E.coli* have been below the level that the EPA deems safe 92.1% of the time. Furthermore, for the third year in a row there was a decrease in the number of swimming advisories issued at Iowa state park beaches, while 2007 exhibited the lowest total number of results exceeding *E.coli* standards since 2001.



The IDNR also has arranged for any locally managed beaches in the state to participate in the IDNR Beach Monitoring Program. This is done on a completely voluntary basis, with beaches not on state-owned property allowed to use the data as they see fit for management and beaches on state property being subject to IDNR policy. In 2007, 13 of the 28 beaches participating in the program had no samples exceeding state water quality standards, while another six only had one such result. At the same time, only four beaches had high enough bacteria levels to result in geometric mean exceedances. Compiled local beach results are illustrated in Figure 3. (Note: locally managed beaches that did not submit at least 2/3 of weekly samples throughout the summer are not represented.)

Looking Ahead

Current plans for 2008 focus on increasing the frequency of beach monitoring at many beaches around the state, while maintaining the same swimming advisory policy. For the past eight years, beach monitoring has been done on a weekly basis at all state park beaches. In order to have more representative sampling and to provide better information to make public health and management decisions, most beaches will be sampled at least twice per week during the summer of 2008. This will not only allow for a closer distribution of one-time samples, but it will also allow the geometric mean to be calculated in a narrower window. Instead of calculating the geometric mean based on five samples over five weeks, the number will be calculated on five samples over a two- or three-week period. With the implementation of these changes, one more step will be taken toward providing the public with the most up-to-date information on beach conditions throughout the state.

Acknowledgements

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Iowa Water Monitoring Program Web Site – wqm.igsb.uiowa.edu



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