

IOWA'S WATER

Ambient Monitoring Program

The Iowa Beach Study Experience

Background – by Eric O'Brien

Every beach has a story to tell. That is one of the fundamental things that I have learned over the last four years of working with the Iowa Department of Natural Resources' (IDNR) Beach Monitoring Program. During my first year with this program, I spent countless days at beaches across the state taking samples from throughout their watersheds, trying to discover each beach's story in order to determine the typical sources of fecal contamination.

It wasn't until I attended my first set of public meetings to present watershed specific sampling results that I understood the desperate need for more research on public health aspects at Iowa beaches. At nearly all public meetings, two prominent themes consistently arose. First, we were told that nobody has ever gotten sick from swimming at the local beach. Second, we were asked how the U.S. Environmental Protection Agency (EPA) decided on current bacteria standards and how they are applicable to Iowa. Because of these consistent concerns, Beach Monitoring staff decided to work with University of Iowa (UI) researchers on a pilot study to gauge the relative health risks associated with swimming at beaches in Iowa.

Site Selection and Methods

During the summer of 2005, three beaches clustered in eastern Iowa were selected as the study area for this project (Figure 1). They were chosen due to their high use and relative proximity to research facilities on the UI campus. One beach at Lake Macbride State Park is IDNR owned and managed. West Overlook Beach and Sandy Beach, both on the Coralville Reservoir (owned and managed by the U.S. Army Corps of Engineers) were also studied.

From mid-June through July 2005, trained student researchers collected water samples at each beach and recruited volunteers daily to participate in follow-up surveys. All samples were analyzed for *E.coli* and enterococci, both indicators of fecal pollution. Additional analysis was conducted for total microcystin toxins, which are naturally occurring compounds produced by cyanobacteria (blue-green algae).

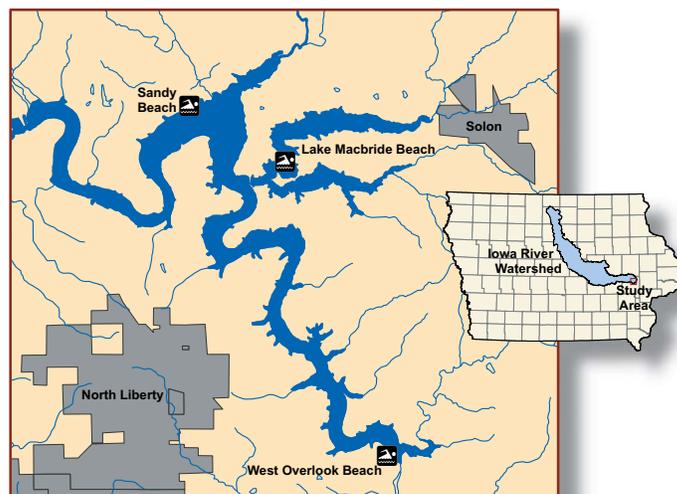


Figure 1. Beaches in the study area in Johnson County.

Student Researcher Perspective – by Heather Buresh

The beach study was one of the most exciting projects I have had the privilege to work on since I began working as a student for the IDNR in 2004. This is not only because we got to spend all day everyday on the beach in the sun but rather because of the camaraderie and great acquaintances we made during the study. This may lead some to think that the beach study was all fun and games, but it was not. We took our jobs very seriously and loved being on the beach talking to the beachgoers about our passion for water quality.

The summer staff was a tight knit group. We developed an unspoken challenge amongst ourselves to see which group/beach could sign up the most people any given day. While we originally had the best luck recruiting beachgoers at Lake Macbride, due to its tight family-oriented atmosphere, we soon found out that the same groups of families consistently visited this beach, leaving less opportunity to find new enrollees. On the other hand, while beaches on the Coralville Reservoir typically had swimmers with less interest in signing up, they did not have as many repeat visitors. Therefore, we were able to recruit people all season at these beaches.

An interesting dichotomy developed in the demographics of those enrolling in the study. The college-aged beach-goers were usually very willing to fill out surveys. However, this group did not seem to have very good follow through when it came to the subsequent surveys. The opposite was true of people in their late twenties and early thirties with families. This group tended to be more reluctant, and often asked the most questions about the study, but were more likely to complete the follow-up surveys. They became very familiar with us and had no problem talking to us about how things were going in the study as the summer progressed.

The beach study was a learning experience for both the participants and staff. For my part, I came away with a new awareness of how much people understand about water quality. I was surprised by the level of understanding in the general public about the complexities of water quality. Information that I was exposed to as a young child had not been presented to the majority of the general public. Most people wanted to blame water quality problems on one specific group. In reality, everyone has an impact on water quality in Iowa.





Student Researcher Perspective – by Jason McCurdy

Having been born and raised in Iowa, I possessed some sense of problems affecting our lakes and streams. From a young age I was aware of the unpleasant appearances of some water bodies near my home. As I grew older I learned of much more serious issues regarding surface waters in the state, particularly accounts of high bacteria concentrations in lakes and streams. While studying at the University of Iowa, a professor informed me that the IDNR was preparing to conduct a study on *E.coli* bacteria and its effects on the health of swimmers at several nearby beaches. Having been concerned with environmental issues for

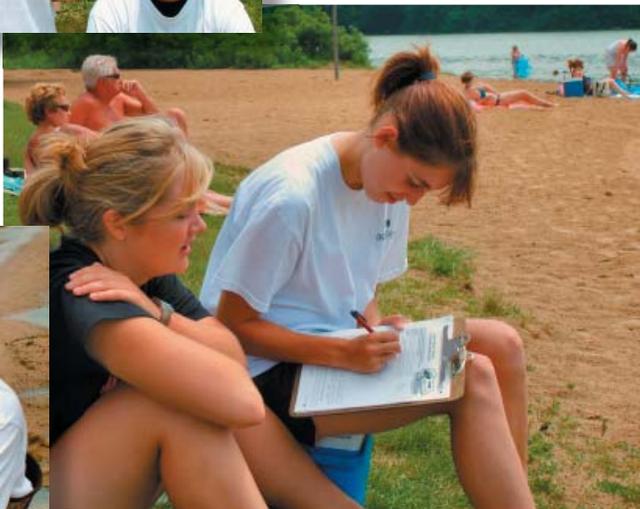
many years, this was an excellent opportunity to gain first-hand knowledge on one of many steps being taken to improve overall water quality in Iowa.

Being familiar with water quality issues in the state, I wasn't surprised by the level of concern many beachgoers conveyed about the water quality at Coralville Reservoir and Lake Macbride. Most people had a belief that the water was contaminated, but few had any specific information regarding current water conditions or plans being implemented to make improvements.

Many said they refused to enter the water and came to the beach only to sunbathe while others said they dared not venture in any further than waist deep. Although not surprised by these attitudes, I was still dismayed by the level of anxiety Iowans had about swimming at local beaches.

At the same time I was encouraged by the genuine curiosity shown by many beachgoers regarding the study. They wondered about the potential sources of bacteria and what steps were currently being taken to remedy the problem. Many were amazed, often expressing disbelief, that average *E.coli* concentrations at all of the beaches being studied were generally low. Some were optimistic as well, hoping that the efforts of the IDNR and other organizations could ensure better water quality, thereby providing a safer place for their friends and families to enjoy the outdoors.

On any given day, groups of student researchers would visit each of the three study beaches to collect water samples, while recruiting and enrolling beachgoers for participation in this study.





The small watershed of Lake Macbride (right) tends to deliver less sediment than the much larger Iowa River delivers to the Coralville Reservoir (left), as shown here during a flood in 1972.

Study Results

During the study, 1,039 people were enrolled with 261 participants completing online weekly follow-up surveys. Correlations were calculated for contaminant exposures and health symptoms with the following significant relationships: enterococci level and diarrhea at West Overlook Beach, enterococci level and skin irritation/rash symptoms at Lake Macbride Beach, and microcystin toxin level and skin irritation/rash at West Overlook Beach. This means that as the levels of the highlighted contaminants increased at the associated beaches, a significant increase was also observed in the associated health symptom.

Enterococci geometric mean levels at West Overlook Beach exceeded the EPA recommended geometric mean standard (33 organisms per 100mL) 29 times in 47 days, while the levels at Lake Macbride Beach exceeded this standard 24 times. The most significant variable related to risk for skin irritation with all factors was microcystin toxin level as the correlation was so strong at West Overlook Beach. This association was not expected since the microcystin levels at this beach were relatively low during the study with all values <1 micrograms per liter and no visual algal blooms were identified.

The results of this pilot study indicate that more research is needed to determine if these associations exist on a larger scale at other Iowa beaches and to further explore the positive correlation between low levels of microcystin toxin and skin irritation/rash at this beach.

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Photos on pages 2-3 by student researchers, page 4 photo by the University of Iowa Photographic Services.

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



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