What Goes Into Beach Monitoring and Testing?

Public Health Madison and Dane County monitors Madison area beaches for *E. coli* and harmful algal blooms in order to protect the public from pathogen and toxin risk during recreational activities. We want to keep you safe, not deter you from using our lakes!

Challenges in the Monitoring of Bacteria and Cyanobacteria (Blue-Green Algae)

Counts of indicator bacteria vary quickly and drastically over time
Higher bacteria counts are found in shallow water, closer to shore.
High counts can be associated with:
- ✓Storm runoff
- ✓Wind erosion
- ✓Re-suspension of lake sediment
- ✓Waterfowl, wildlife and pet waste

Cyanobacteria toxin content varies over the course of a bloom and is not fully understood, making it difficult to predict the toxicity of algal blooms.
But here's what we *do* know:
Cyanobacteria surveillance needs to be well-timed and prompt
Conditions may change within hours, causing the size and toxicity of a scum to change. Wind can push blooms towards shore.
Monitoring is intensified during blooms and can be initiated by:
- ✓Lifeguard notification
- ✓Field sampler's observations
- ✓Citizens' calls

Samples are evaluated qualitatively for the presence of various species and toxin analysis is performed in the PHMDC laboratory.

The results of the evaluation dictate whether any intervention is appropriate. Interventions may include hazard communication to the public or temporary restriction of water contact activities

Surface scums can pose health risks, which are likely greater for the young, old, and immunocompromised

The CDC has concluded that the incidence of infection associated with recreational water use has steadily increased over the past several decades

Can We Predict Beach Contamination ?

Real-time environmental data can be used to predict pathogen occurrence :
Our results show significant associations between some bacterial densities and some environmental factors.

The following can be useful for predicting elevated *E. coli* levels:
- ✓Rainfall
- ✓Wind speed
- ✓Wave height and water level
- ✓Turbidity
- ✓Specific conductance

Some organizations are developing rapid molecular testing capabilities in near real-time testing.

Algal booms can change and travel quickly. Algal blooms on Lakes Monona and Mendota.

The Troubles of Beach Monitoring

Timing. Frequency. Speed. Adequacy.

These are the challenges we face in the sampling and the interpretation of results and are critical to determining whether a health risk exists.

Indicator bacteria counts and algae blooms can change in a matter of hours.

Testing often takes 18-24 hours, making it difficult to make real-time decisions.

The relationship between indicator bacteria and pathogenic organisms is uncertain-which makes it difficult to use this relationship as a predictor of events.

Sample Collection and Analysis

- Standard Operating Protocols
- Approved Analytical Methods
- Routine Monitoring for indicator bacteria
  - ✓*E. Coli*
- Field Observations
  - ✓Water Temperature
  - ✓Presence of Weeds and Algae
  - ✓Waterfowl (ducks and geese)
  - ✓Bird or Other Animal Excrements
  - ✓Swimmer and Waterfowl Activity
  - ✓Any Fecal Accidents

E. coli

Scum isn't always harmful, but it's sensible to avoid it and the area around it.

Cyanobacteria Species

Early Bloomers:
Anabaena sp.
Microcystis aeruginosa

Late Bloomers:
Aphanizomenon sp.
Oscillatoria sp.
Planktothrix sp.
Gloeotrichia sp.
Lyngbya sp.
Merismopedia sp.

Short-Term Steps to Managing Health Risks

Primary goal: Protection of public health.

Intervention may include informing the public of risks, symptoms of exposure, and avoidance of hazards., sometimes by temporarily restricting water-contact activities.

Increased monitoring following high bacteria counts and during blooms.

PHMDC encourages YOU to contact the health department when you are uncertain of water quality.

Contaminants Can Be Due To Runoff From:

- ✓Urban Lawns
- ✓Yards
- ✓Paved Surfaces
- ✓Rooftops
- ✓Golf Courses
- ✓Agriculture
- ✓Waterfowl (geese waste)

Other Factors That Can Lead to Unsafe Conditions:

- ✓Rain, storms, higher temperatures
- ✓Swimmers (re-suspension of sediment in the lake)
- ✓Proximity to shorelines
- ✓Heavy accumulations of algae or lake weeds

Concerns for the Future

Water can transmit outbreaks of very serious diseases and can even be fatal for animals.

"Water-borne diseases and degraded water quality are very likely to increase with more heavy precipitation due to global warming." (IPCC)

Threats from emerging illness-causing organisms and the severity of illness are little-understood.

We need to learn more about emerging pathogens and understand their public health consequences. We need tests aimed at pathogens to provide good info on beach safety.

We need to learn more about forecasting water quality.

Clean up efforts to control and eliminate contamination sources need to be accelerated.

E. Coli O157:H7 was detected at a Madison beach where many resident geese were present. Two other strains of *E. coli* were previously identified in water and bird droppings in Madison.

Evidence for potentially severe health outcomes of pathogens or heavy blooms exists.

Symptoms from exposure to cyanotoxins may include:

- •Rashes
- •Blistering of lips
- •Sore throat
- •Breathing problems
- •GI problems
- •Headaches
- •Muscle / joint pain

For more information on beach locations or conditions, check out our website:

www.publichealthmdc.com/beaches

Or call us at (608) 243-0356

Public Health
MADISON & DANE COUNTY
Healthy people and places