



Water Quality & Public Health

March 2018



Public Health Mission

- Working with the community to enhance, protect, and promote the health of the environment and the well being of all people.
- We do this through:
 - Monitoring to detect & observe changes and trends in health indicators, evaluate the occurrence of potential problems, and assess health threats.
 - Interpreting data.
 - Identifying contamination sources.

Mission translated into action

Goal – managing health risks to insure swimmable, fishable, useable beaches / lakes and high quality drinking water

- Surface water (including Recreational Water) – Monitoring to prevent acute disease and waterborne illness
- Groundwater – Monitoring to prevent chronic illness through water quality

Water Quality Concerns

- **Surface waters**

- Safety of surface waters and beaches for recreational use
 - Monitoring of 16 beaches for bacterial contamination
 - Harmful algal blooms (HABs) Cyanobacteria
 - E. coli (Pathogens (bacteria, viruses, and parasites))
- Environmental quality
 - Contamination (residential, industrial)



- **Ground water**

- Drinking water quality (public and private wells)
- Contamination from aging water systems

Recreational Water Protection & Monitoring

- Timely & accurate reporting of lakes and shoreline waters for microbiological indicators.
- Monitor area beaches for *E. coli* and harmful algal blooms in order to protect the public from pathogen and toxin risk during recreational activities.
 - In 2015, approximately 50 %, in 2016, 17 % and in 2017 66 % of beach closures due to HABs



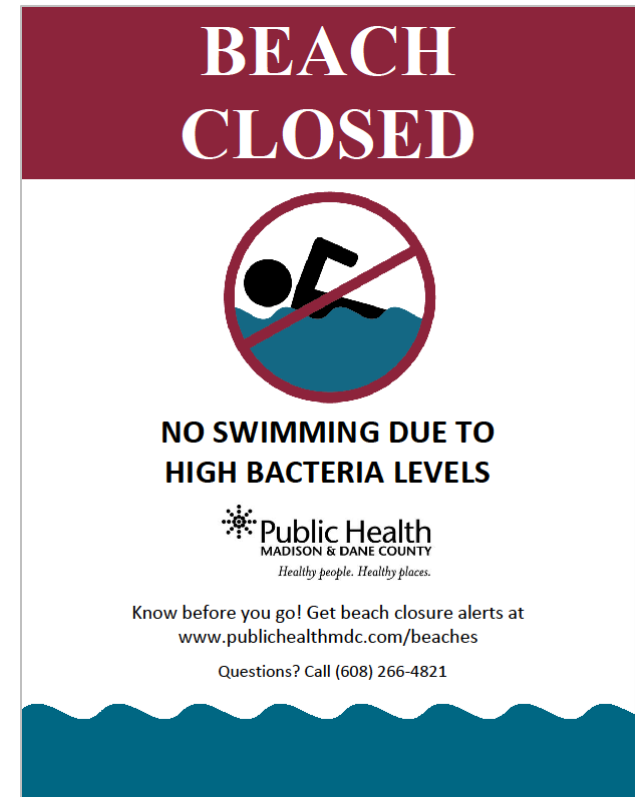
Recreational Water Protection & Monitoring

- Monitoring provides early warning for protecting human health
- Communicate and control risks.
- Unsafe beaches posted, public educated about potential health threats



Monitoring Frequency

- Beaches are sampled weekly for *E. coli*
 - Follow up testing when elevated results until counts decrease
 - Weekly samples from UW Madison for Hoofer's pier, Union and Porter Boathouse
- Harmful Algae Blooms are sampled once per day during bloom
 - HAB are identified by:
 - Field Sampler
 - Lifeguards at guarded beaches
 - Citizen complaints

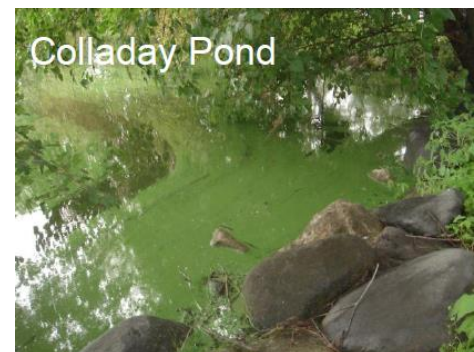
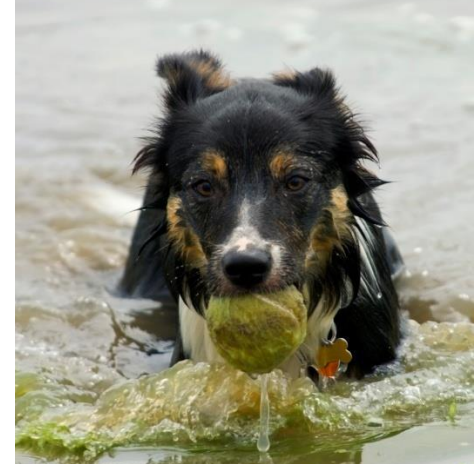


Laboratory Testing & Public Health

Sample	Tests	# Test 2017	Benefit
Public water supplies	Bacteria, nutrients and metals	1513	Safe drinking water
Private wells	Bacteria, fluoride, nitrate, pesticides	990	Safe drinking water and dental health
Lakes and outfalls		5776	
Recreational water - Beaches	<i>E. coli</i> , blue-green algae (cyanobacteria), and cyanotoxins	466	Safe swimming and Water recreational activities (human/animal)
Swim / Whirl Pools	Coliform bacteria	746	
Zoo pools	<i>E. coli</i>	153	
Groundwater near landfills	Metals, nutrients, other inorganic constituents	6199	Prevent and detect leaching into groundwater and drinking water
Paint chips & drinking water	Lead and other metals	336	Minimize poisoning risk

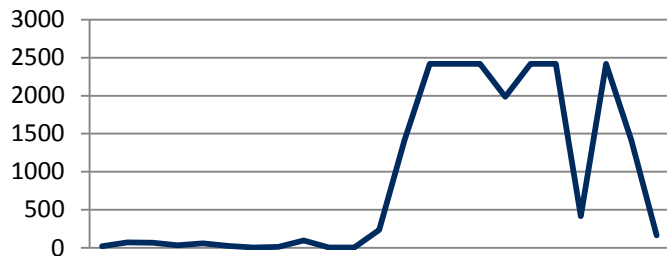
Harmful Algal Blooms

- Under favorable conditions, cyanobacteria can form dense “blooms” that can be toxic.
- Discolored water, reduced light penetration, DO depletion, taste and odor problems
- High nutrient (P and N) run-off from agriculture:
- Some species can fix atmospheric nitrogen.
 - Warm temperature
 - Calm winds
 - Hydrodynamics
- Mass developments, especially surface scum pose risks
- Blooms are difficult to predict



E. Coli Contaminant Sources

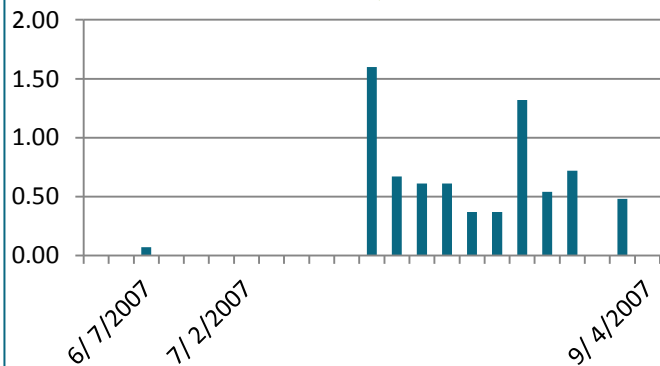
Bernies *E. coli*, MPN/100 mL



Sanitary
Storm

Sanitary & Storm Sewer Lines @ Bernie's

Rainfall, inches

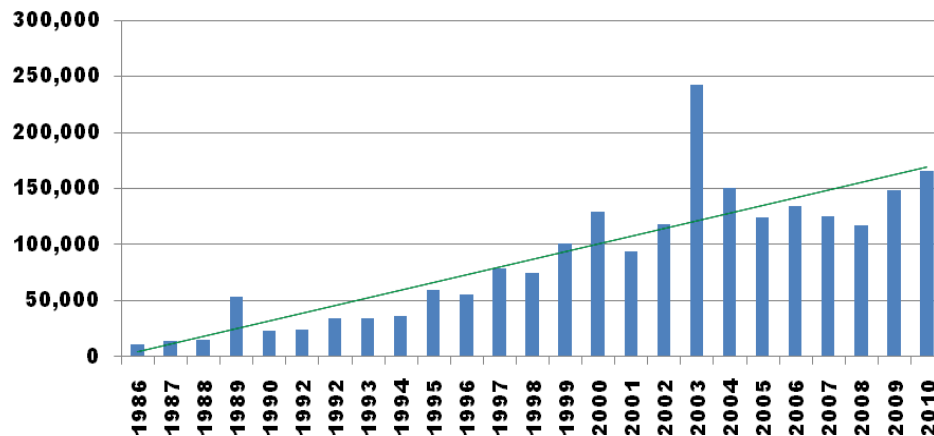


- Contaminants from streets, pets, wild animals and other sources of fecal contamination
- Storm sewer lines
- Breaks in sanitary sewers
- Rainfall exhibits significant correlation with *E. coli* on most beaches

E. Coli Contaminant Sources



Population of Resident Canada Geese in WI from 1986-2010



Urban geese are a major source for beach contamination at some beaches.

Goose counts exhibit a statistically significant correlation with *E. coli* concentrations at many beaches.

Managing Health Risks

Goal – swimmable, fishable, useable beaches / lakes

- Protect public health to ensure safe water recreation, not to deter the use of lakes.
- High bacteria counts & mass population of cyanobacteria is a potential health hazard with high probability of adverse effects. Scum is not always harmful but it is sensible to avoid contact with it.
- Monitoring intensified during bloom situations. Follow-up testing when high bacteria counts identified.
- Intervention may include informing the public on pathogen and cyanobacteria risks, symptoms of exposure and avoidance of hazards. In some cases, restriction of water contact activities may be judged appropriate.

Managing Health Risks

Closures due to *E. Coli*:

- Indicate the presence of human and animal waste. In most cases, the beach is opened within two days of inspection.
- Typically only isolated areas affected by *E. coli*, except for when geese present (Vilas 43 days & Olin 41 days in 2010, 21 Goodland 2017).
- 2017 – 13 closures, 36 days

Closures due to cyanobacteria:

2008	88 %
2009	96 %
2010	2 %
2011	56 %
2012	42 %
2013	17 %
2014	36 %
2015	50 %
2016	18 % (Goodland Park)
2017	66 %

Surface Water

Goal: managing health risks to insure swimmable, fishable, useable beaches / lakes and high quality drinking water

- Provide a rapid response, identify problems, investigate, determine solutions and ensure mitigation/clean-up of releases of harmful substances, educate and prosecute as necessary.
- Illicit Discharges
- Assure regulatory compliance for local ordinances.
- Assist facility owners /operators to achieve compliance with relevant standards (GMPs)
- Collaborate with other agencies to follow up on violations and establish performance standards.
- Laboratory tests conducted to identify substances, assess clean-up needs
- Addressed 60 complaints & trained ~250 people in 2017



Surface Water Protection

- Point source discharge permitting (MGO 7.47)
 - Monitor point source discharges from local industries and businesses and update and maintain permits for their facilities.
 - Assure adequate discharge water quality - sample and test chemical contaminants.
- Assess hazardous materials releases
 - Provide guidance on good environmental practices and potential health threats.
 - Take corrective actions to prevent contaminant migration.
- Monitor lakes and rivers
 - Evaluate trends in water quality.
 - Address special issues, such as road salt.
 - Tests: Metals, general chemical parameters, nutrients, E. coli
- Monitor storm water discharges from urban/agricultural sources
 - Increase awareness of impacts of behavior changes in mitigating problems

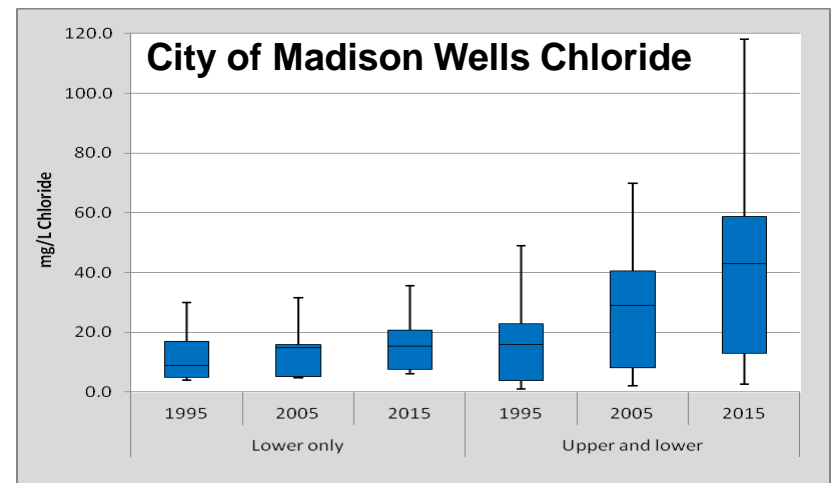
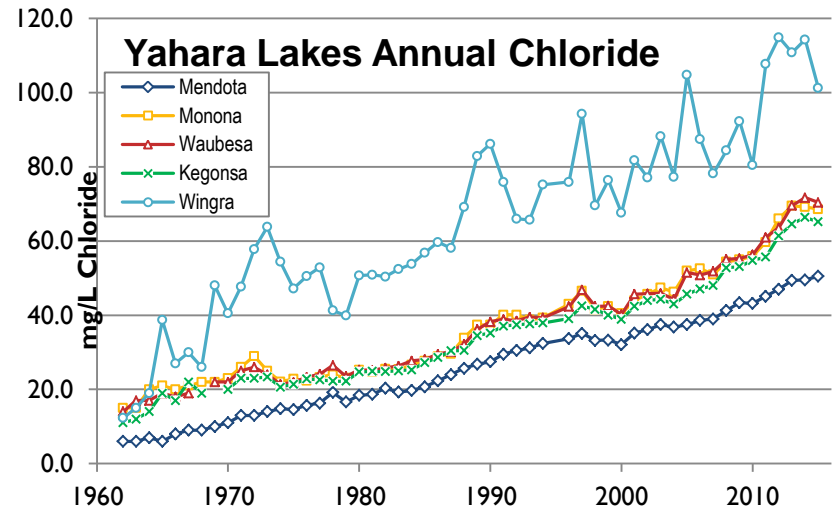


Water Quality Concerns

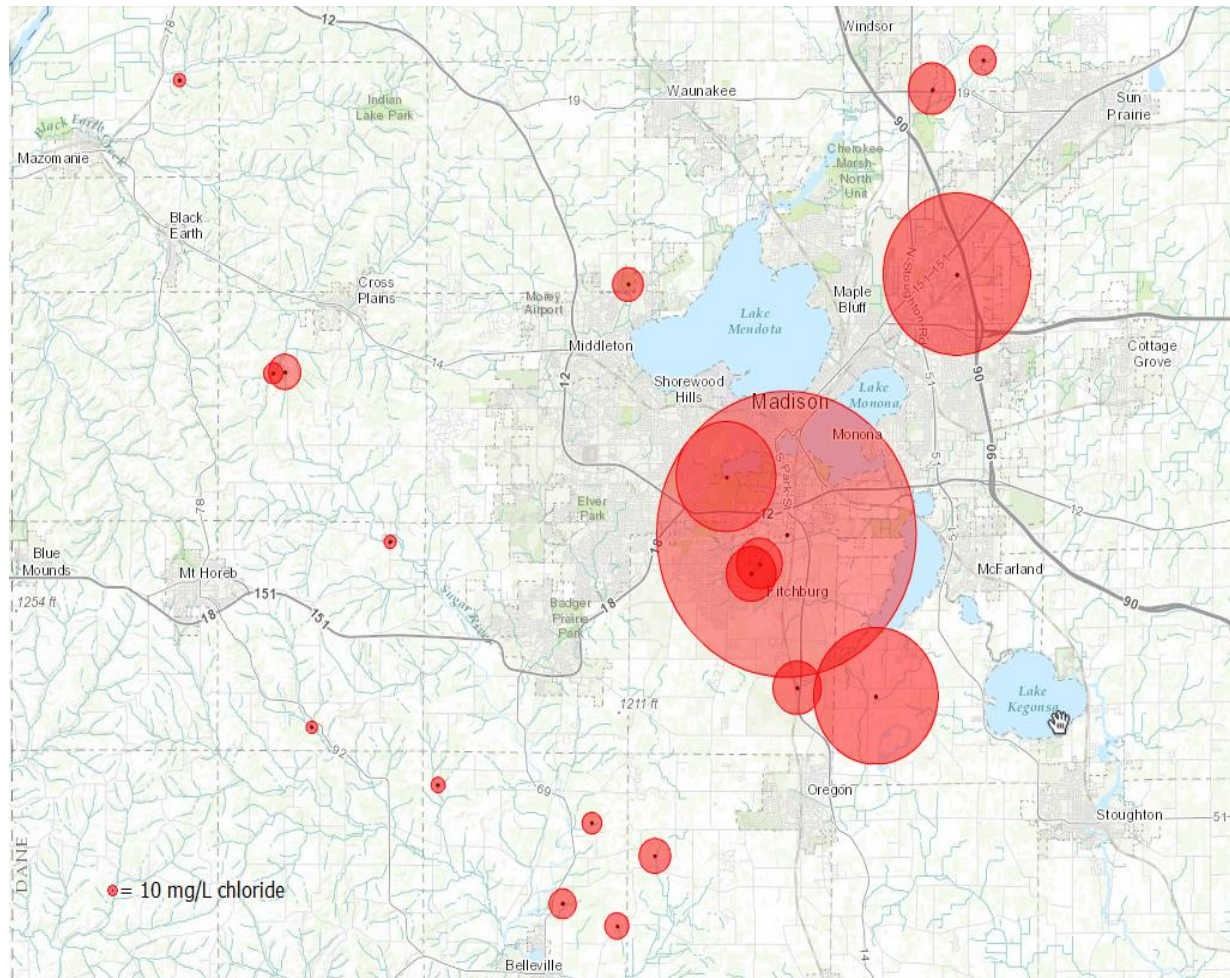
Once salt is in the water, it does not break down

Chloride from salt in our drinking water may have an impact on health.

Chloride from salt is toxic to small aquatic life and degrades the natural eco-system of our waterways.



Water Quality Concerns



Circle diameter increases proportionally to chloride concentration (13 – 300 mg CL^-/L)

Questions?

