



Update on Public Health Monitoring and Management of Alberta's Recreational Waters



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**Health Protection Branch, Alberta Health
September 24, 2015**

Outline

- **Alberta Health Services (AHS) Routine Recreational Water Monitoring Program**
- **Highlights of monitoring & research (2012-2014)**
- **2015 changes to AHS cyanobacterial bloom advisory messaging**
- **Development of new recreational water quality management protocol**

AHS Routine Recreational Water Quality Monitoring Program

-Prior to formation of AHS there were different procedures to deal with cyanobacterial blooms in different health regions.

-Now, AHS has a DSOP that applies across zones and helps achieve consistency of response to blooms.

-AHS summer students collect water samples on a weekly or monthly basis (depending on bloom history and resources) between early May and late August

-Sampling of high-use recreational beach water from 32 lakes (47 beaches).

-North: 7 lakes (7 beaches)

-Edmonton: 8 lakes (13 beaches)

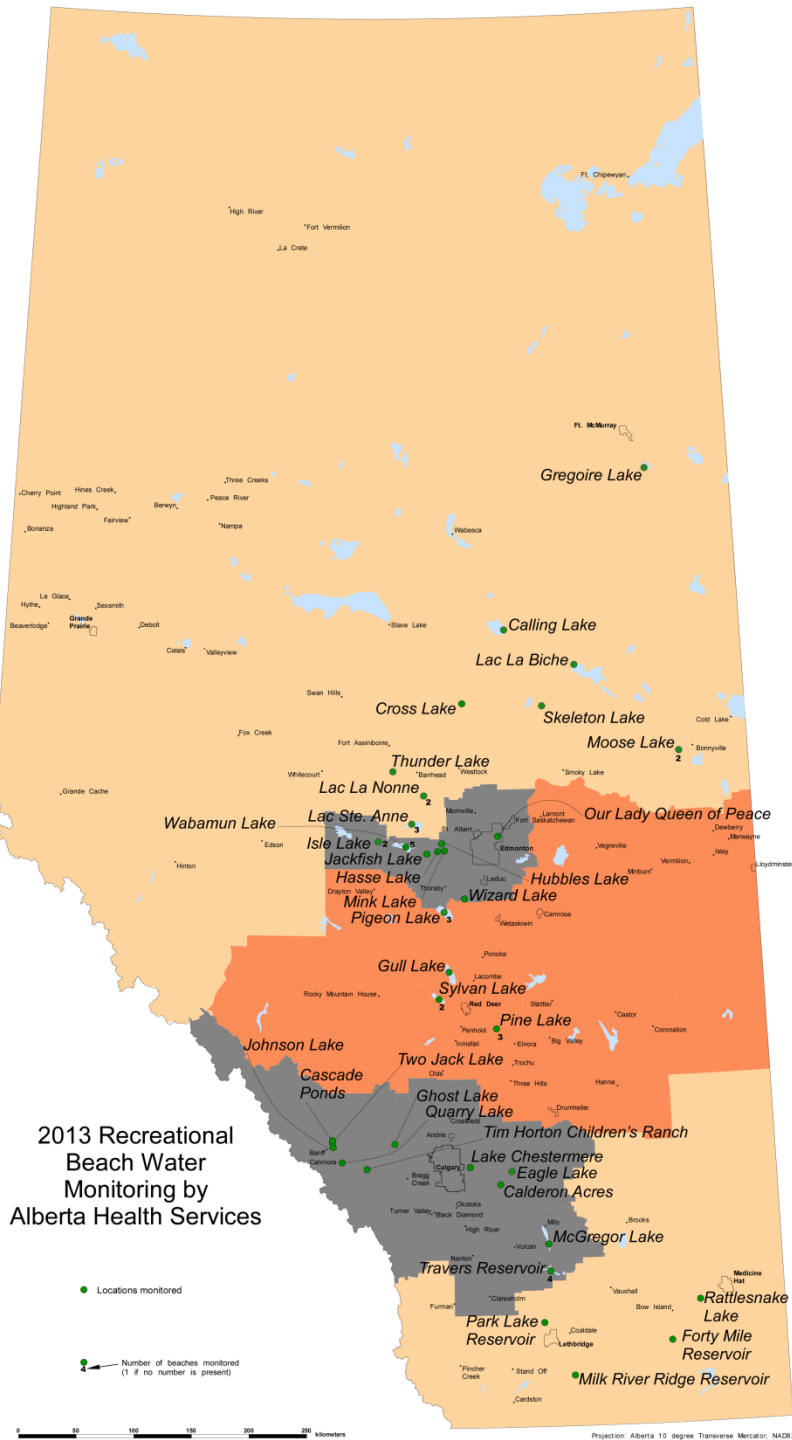
-Central: 4 lakes (11 beaches)

-Calgary: 9 lakes (11 beaches)

-South: 4 lakes (4 beaches)

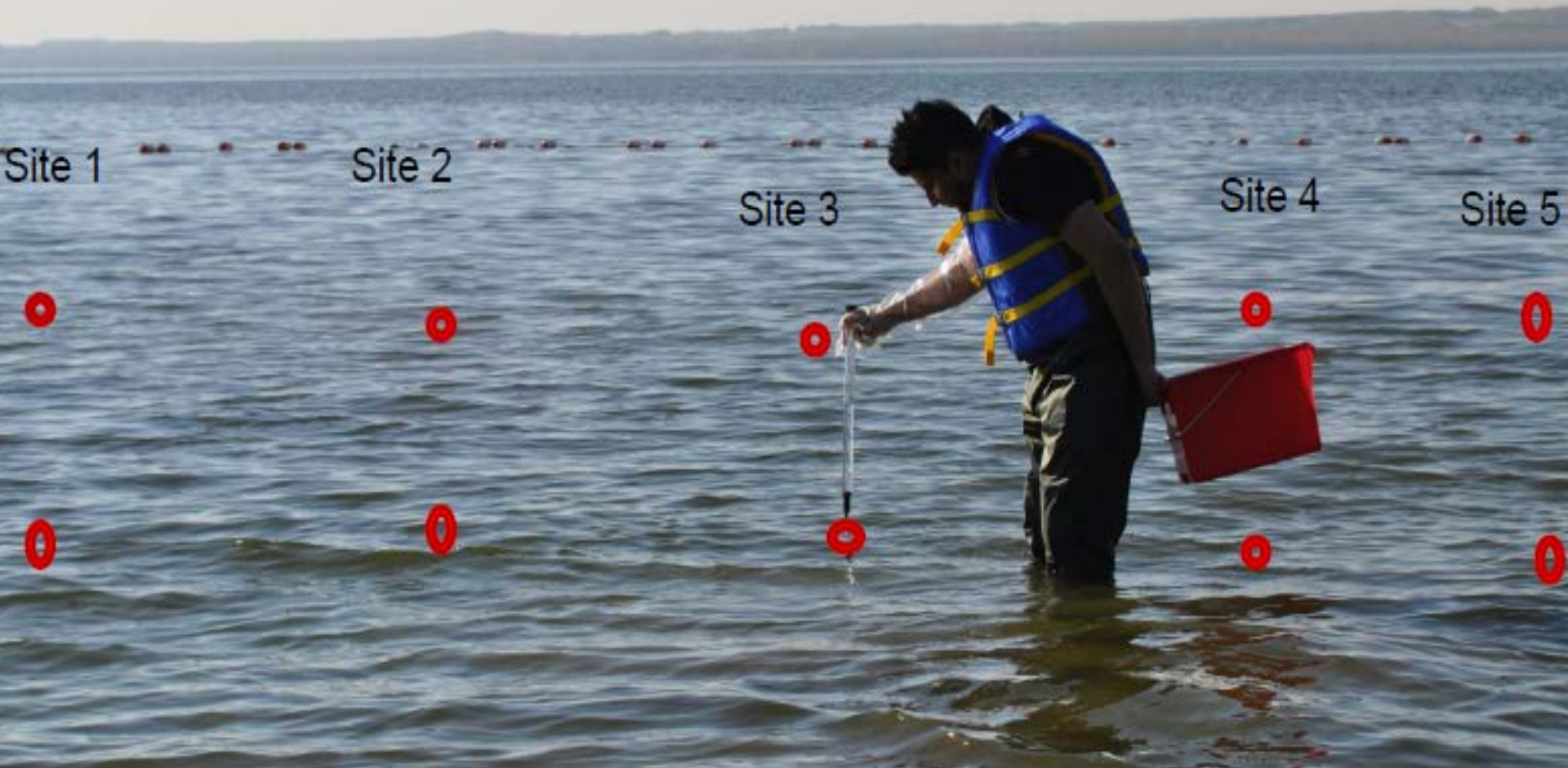
-Public Health Inspectors (PHIs) also investigate complaints from the public

-Approximate total number of samples to be submitted for characterization of cyanobacterial blooms = ~500



2013 Recreational
Beach Water
Monitoring by
Alberta Health Services

Beach Sampling for Cyanobacteria



Composite sampling: collect water samples from 10 locations along the beach and analyze a subsample of the resulting mixture

2012-2015*
Cyanobacterial Bloom and Contaminated Water (Faecal) Advisories

Year	Lakes	Beaches	Cyanobacterial Bloom Advisories (Total)	Cyanobacterial Bloom Advisories (Monitored Lakes)	Cyanobacterial Bloom Advisories (Referrals)	Contaminated Water (Faecal) Advisories
2012	36	57	17	5	12	5
2013	37	55	34	13	21	0
2014	33	48	30	14	16	5
2015*	32	47	25	9	16	7

*to August 31, 2015

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Health Canada Guidelines for Canadian Recreational Water Quality (2012)

Total microcystins: 20 µg/L

Total cyanobacteria: 100,000 cells/mL

Total cyanobacteria guideline has the effect of protecting against other possible toxins present and skin irritation effects

Health Canada guidance recommends that both total cyanobacterial cell densities and total microcystin concentrations be monitored as part of a risk management strategy for cyanobacteria and their toxins in Canadian recreational waters.

Microcystins

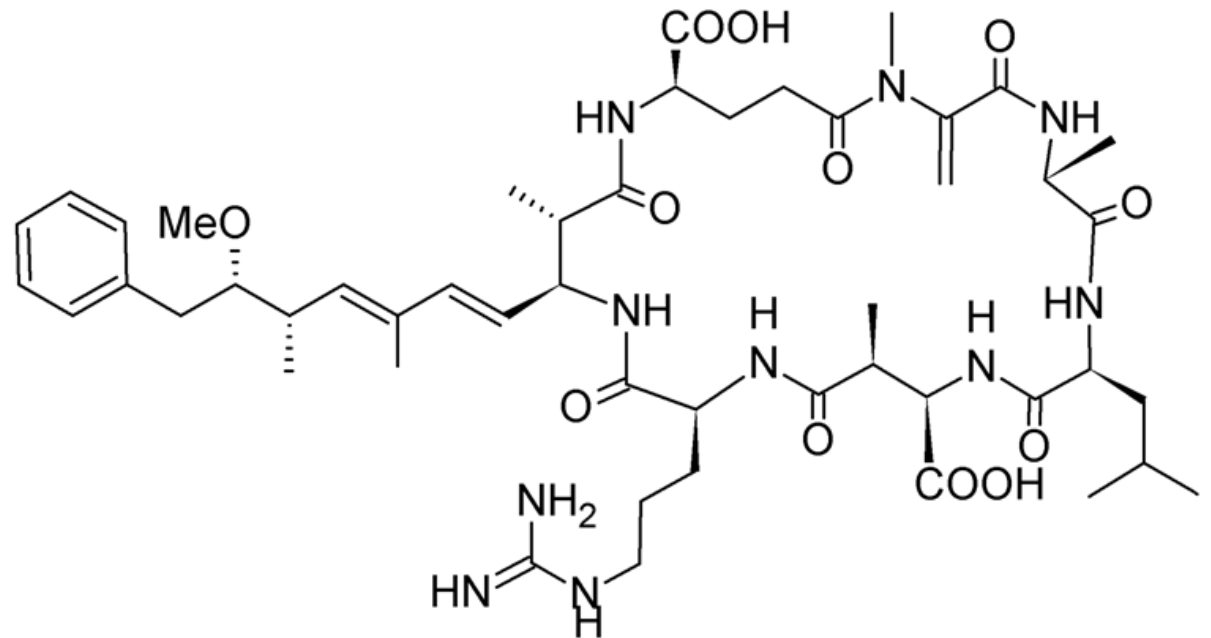
Class of toxins produced by certain cyanobacteria (e.g., *Microcystis*, *Planktothrix*, *Anabaena*, *Nostoc*)

Monocyclic heptapeptides

Hepatotoxic, inhibit protein phosphatases

Over 80 known variants with very different toxicities

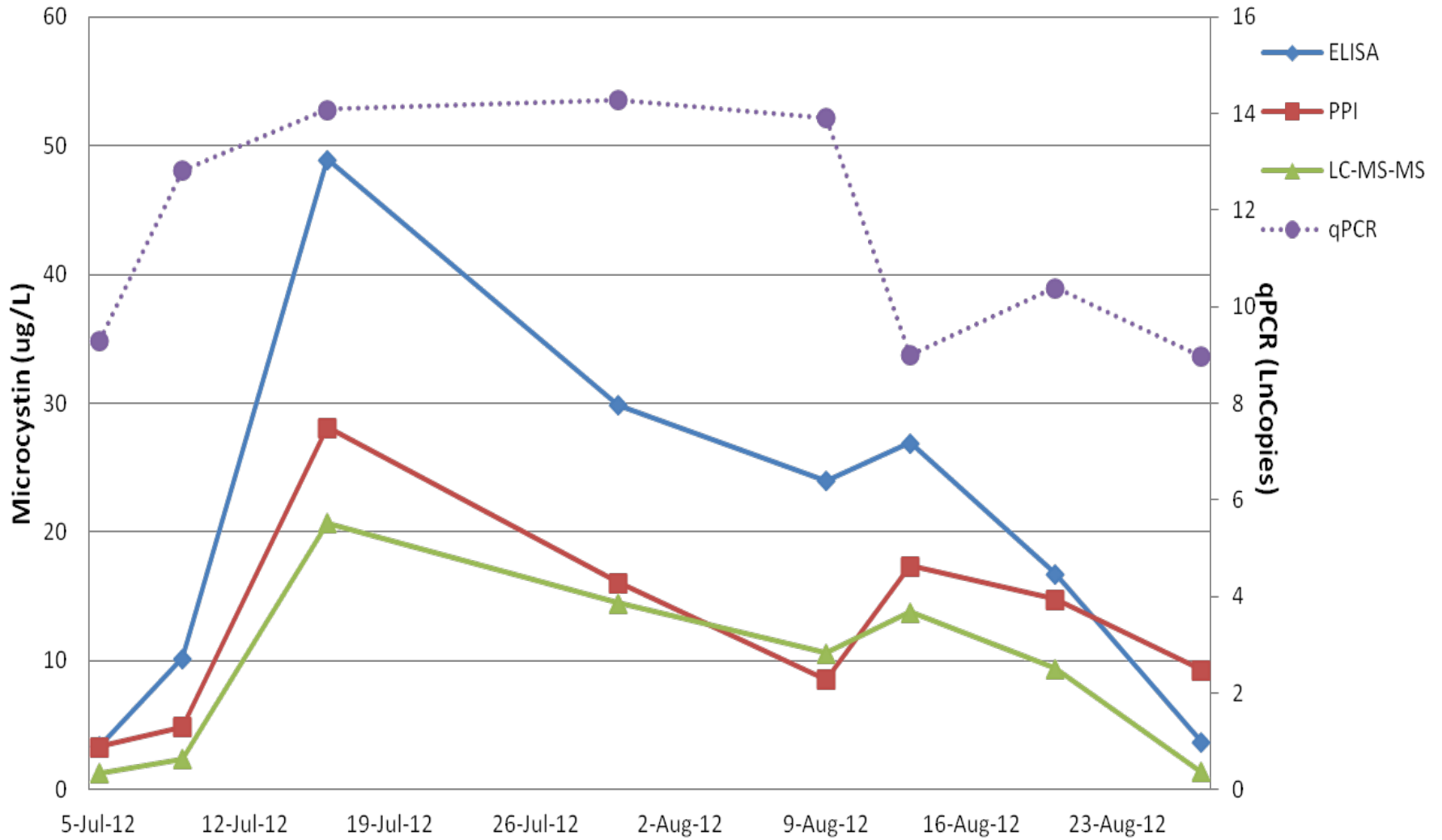
Microcystin-LR



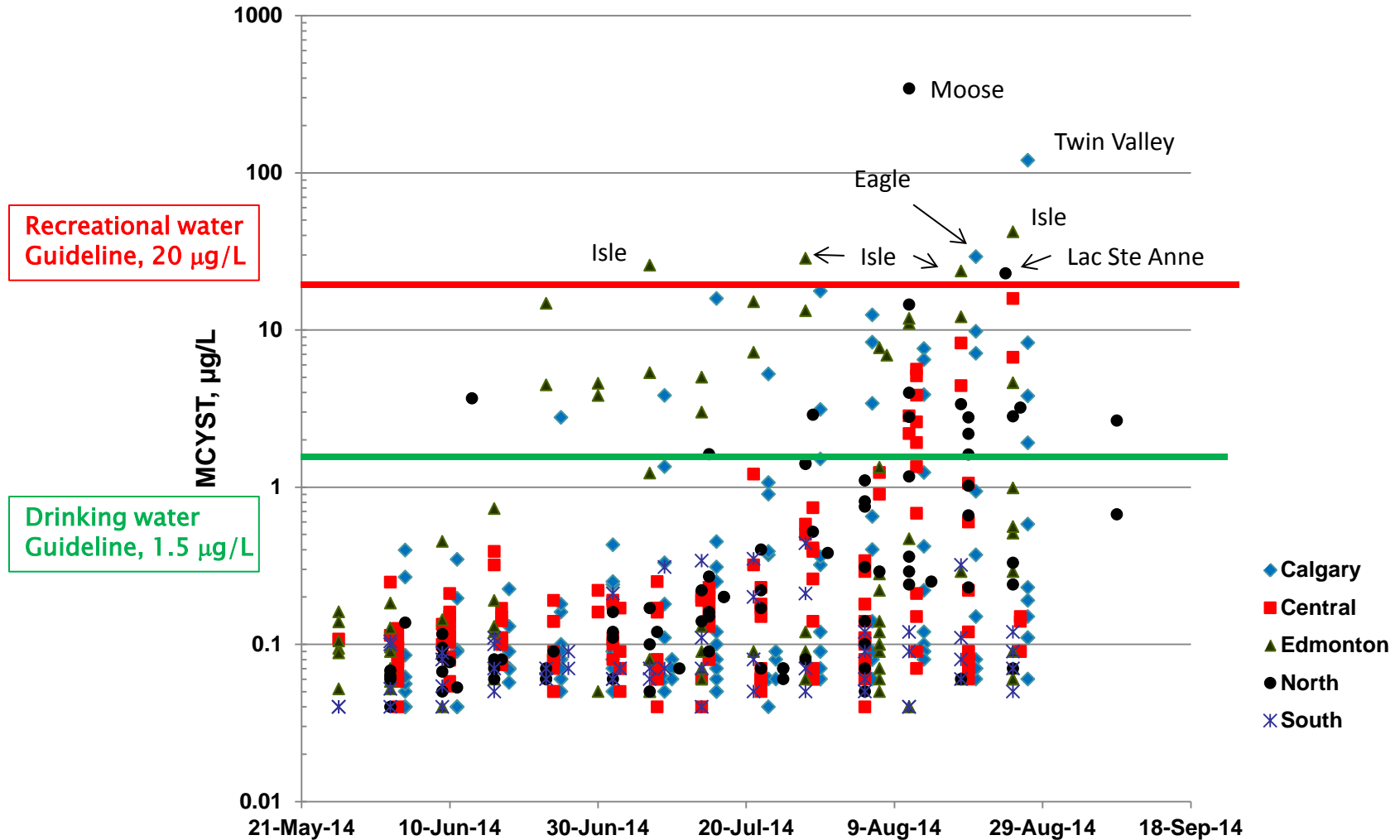
Methods

Method	Principle	Application
Visual Inspection	Observe beach water for visual evidence of bloom	Issuing advisories
Cell count	Identify and quantify cyanobacteria species in water bodies	Assessing bloom prevalence/formation, identifying health hazards
PPI	Quantify MCYST levels in water body (protein phosphatase inhibition)	Screening MCYST toxicity
ELISA (lab)	Quantify MCYST levels in water body (antibody reaction)	Screening MCYST toxicity
ELISA (field strip)	Identify the presence of MCYST in the field (antibody reaction)	Assisting visual inspection
LC-MS/MS	Quantify MCYST levels in water body (chemical mass)	Confirming MCYST toxicity
qPCR	Quantify mcyE gene	Developing early warning system

Isle Lake (Gainford)



2014 Microcystin in Water Results (PPI)



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Samples exceeding microcystin guidelines are almost always associated with visual confirmation of bloom

All samples that exceeded the drinking water guideline of 1.5 µg/L were assessed for associated visual confirmation of a bloom:

- 2012: **86% of samples** (81/94) visual confirmation of cyanobacterial bloom
- 2013: **93% of samples** (39/42) visual confirmation of cyanobacterial bloom
- 2014: **94% of samples** (62/66) visual confirmation of cyanobacterial bloom

100% of samples in all 3 years that exceeded the 20 µg/L recreational water guideline also had an associated visual confirmation of a cyanobacterial bloom

August 20, 2015

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Blue-green Algae (Cyanobacteria) bloom advisory issued for Reesor Lake

MEDICINE HAT – A blue-green algae (cyanobacteria) bloom has been identified in areas of Reesor Lake in Cypress Hills Provincial Park, 13 km east of Elkwater. Residents living near the shores of this lake, as well as visitors to this lake, are advised to take the following precautions:

- Avoid all contact with blue-green algae (cyanobacteria) blooms. If contact occurs, wash with tap water as soon as possible.
- Do not swim or wade (or allow your pets to swim or wade) in any areas where blue-green algae (cyanobacteria) is visible.
- Do not feed whole fish or fish trimmings from this lake to your pets.
- Consider limiting human consumption of whole fish and fish trimmings from this lake, as it is known that fish may store toxins in their liver. (People can safely consume fish fillets from this lake).

As always, visitors and residents are reminded to never drink or cook with untreated water directly from any lake, including Reesor Lake, at any time. Boiling lake water will not remove the toxins produced by blue-green algae (cyanobacteria). An alternate source of drinking water should also be provided for pets and livestock, while this advisory is active.

Blue-green algae (cyanobacteria) is naturally occurring, and often become visible when weather conditions are calm. Appearing like scum, grass clippings, fuzz or globs on the surface of water, blue-green algae (cyanobacteria) can be blue-green, greenish-brown, brown, and/or pinkish-red, and often smell musty or grassy.

People who come in contact with visible blue-green algae (cyanobacteria), or who ingest water containing blue-green algae (cyanobacteria), may experience skin irritation, rash, sore throat, sore red eyes, swollen lips, fever, nausea and vomiting and/or diarrhea. Symptoms usually appear within one to three hours and resolve in one to two days. Symptoms in children are often more pronounced; however, all humans are at risk of these symptoms.

Weather and wind conditions can cause algae blooms to move from one location in the lake to another. As such, this advisory will remain in effect for Reesor Lake, until further notice.

Please note that areas of Reesor Lake in which the blue-green algae (cyanobacteria) bloom is NOT visible can still be used for recreational purposes, even while this Blue-green Algae (Cyanobacteria) Advisory is in place.

Do not swim or wade
in areas where
blooms are visible



Areas of lake where blooms
are not visible can be used
for recreation while the
advisory is in place



HEALTH ADVISORY

Blue-green Algae

(Cyanobacteria)

A blue-green algae (cyanobacteria) bloom and/or toxin has been identified in this lake water.

To protect yourself and your pets, avoid contact with blue-green algae blooms; don't swim or wade in water where blue-green algae are visible; do not drink or cook with water from this lake.

If contact occurs, wash with clean water as soon as possible.

You can safely consume fish fillets from this lake but should limit your consumption of whole fish and trimmings as fish may store toxins in their liver.

Pets should avoid eating whole fish and trimmings.

Persons experiencing illness after having contact with lake water are advised to call Health Link Alberta (1.866.408.5465)



Blue-green Algae (Cyanobacteria)

What are blue-green algae?

- Also known as "cyanobacteria," blue-green algae occur naturally in many Alberta lakes. Most of the year it is present at low levels and is less of a concern. However, warm summer weather allows the organism to increase rapidly or "bloom."

Why should I avoid blue-green algae blooms?

- Blue-green algae can produce a number of health risks to humans and animals.
- Contact with a blue-green algae bloom can cause eye, ear, skin irritation, rashes and allergic reactions.
- Ingesting untreated contaminated water from the lake can cause nausea, diarrhea, vomiting, stomach cramps and liver damage; in high concentrations, the toxin can cause severe illness and death.

What do blue-green algae blooms look like?

- Blue-green algae (cyanobacteria) blooms can appear blue-green, green-brown, brown or red/pink. It may look like grass clippings, globules, fuzz balls or paint/pea soup. Decomposing blooms can appear white or purple, and smell of ammonia.

- Blue-green algae blooms are unpredictable, can develop very quickly and can move to other areas of the lake.

How can I protect myself and others?

- Avoid swimming in water with visible blooms.
- Do not drink untreated lake water. Boiling the water does not remove or destroy toxins.
- Avoid contact with blue-green algae that has washed up on shorelines.
- Keep children, pets and livestock away from blue-green algae blooms.



What do I do if I come into contact with a blue-green algae bloom?

If you have been exposed to a blue-green algae bloom, shower promptly with clean, treated water. If symptoms develop, please contact:

Health Link Alberta 24/7 toll free at 1.866.408.5465

www.albertahealthservices.ca/eph.asp



Permanent Information Signs

In 2015, there were 20 lakes with 2 consecutive years of cyanobacterial bloom advisories:

**Baptiste Lake
Pine Lake
Cross Lake
Calling Lake
Kehewin Lake
Twin Valley Reservoir
Eagle Lake
Lac la Nonne
Shiningbank Lake
Lake Isle
Lac St. Anne
Long Lake
Moonshine Lake
Thunder Lake
Hastings Lake
Pigeon Lake
Vincent Lake
Lac La Biche
Muriel Lake
Severn Lake**

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Recreational Water Management Protocol (RWMP)

Debra Mooney

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October 2015

RWMP History

- Part 3, Public Beaches of the *Nuisance and General Sanitation Regulation* was outdated and did not reflect current practice.
- Rescinded Part 3 with recommendation to introduce a new protocol
- Cross-ministry team was organized to develop a draft protocol:
 - Environment and Parks
 - Municipal Affairs
 - AHS/Prov Lab
 - University of Alberta
 - Agriculture and Forestry

RWMP Purpose

- Develop a comprehensive risk assessment strategy to encompass bacteriological, chemical and physical risks to bathers.
- Set clear water quality standards
- Introduce a non-regulatory approach based on cooperation and collaboration between government and related agencies and operators (EP, WPAC, Watershed Stewardship Groups).
- Shift responsibility for assessment, monitoring, and management to operators.

Proposed Water Quality Standards

Parameter	Measure	Standard
Fecal Coliforms (2016 and 2017 season)	Geometric mean (GM)**	200 cfu/100ml (mean of 5 samples)
	Single sample maximum concentration	400 cfu/100ml (no 2 consecutive samples to exceed)
Enterococcus (beginning in 2018)	Geometric mean (GM):	30 cfu/100 ml (culturable), or 300 cce/100ml
	Single statistical threshold value (STV)	110 cfu/100 ml, or 1280 cce/100 ml
	Beach Action Value	60 CFU/100ml, or 640 cce/100 ml
Total Cyanobacterial toxins	Visual observation of cyanobacterial bloom	See Appendix G
	Microcystin concentration	No greater than 20ug/L (expressed as microcystin-LR)
	Total number of cells	No greater than 100,000 cells per ml
Swimmers Itch	Complaints	Public reporting of symptoms

RW Safety Plan

(Getting to know the rec water site)

1. Complete RW Site Survey
 - Past and present information; land uses; sampling results; lake conditions; and biological, chemical and physical hazards
2. RW Monitoring Plan
 - Based on monitoring requirements and standards
 - Prepare a plan to monitor identified hazards (as needed)
3. RW Risk Management Plan
 - Complete management plan template outlining priority hazards, short and long term preventative and response measures

RWMP Implementation Plan

2015:

- Build inventory of sites; consult with key stakeholders; conduct a desk top exercise; revise and complete draft protocol.

2016:

- Introduce RWSP at priority sites which are already under surveillance.
- Training and orientation for operators and health inspectors.
- Develop/test laboratory procedures

2017:

- Evaluate the RWMP process
- Assess risk at remaining recreational sites and need for RWSP.



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Questions??

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