



Lake Winnipeg Update Manitoba Water Stewardship

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Manitoba 

Outline

- Provincial water quality monitoring program on Lake Winnipeg, tributaries, beaches
- Update on other projects underway related to Lake Winnipeg



Provincial Monitoring on Lake Winnipeg

- Routine program initiated in 1999
- Over 2500 samples collected from 65 lake-wide monitoring stations (1999-2008)
- Monitoring in partnership with the Lake Winnipeg Research Consortium and Manitoba Conservation



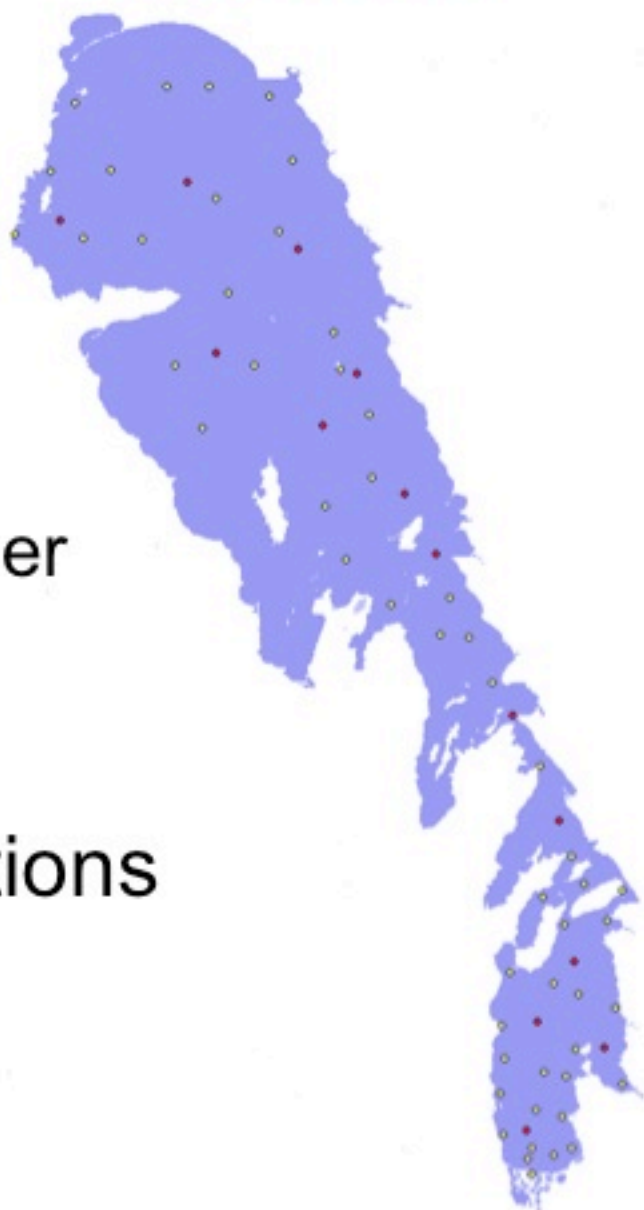
Monitoring Objectives

- Determine the impact of anthropogenic activities on water quality and aquatic life
- Evaluate long term water quality trends
- Provide information to support and protect the health of Lake Winnipeg



Monitoring Design

- 14 long-term monitoring stations (red)
 - Samples collected 4 times per year
 - Open Water and Ice Cover
- 50 auxiliary monitoring stations
 - Sampled as resources and timing permit



Collection

- Depth integrated euphotic zone sample
- Samples collected at depth (0.5 m from bottom) with CTD Rosette
- Profiles
 - PAR, temperature, dissolved oxygen, conductivity



Monitoring

- All Stations:
 - Routine chemistry, nutrients, chlorophyll a
- Fourteen Long-Term Stations:
 - Metals, Ions
 - Pesticides (3 stations)
 - Phytoplankton composition
 - Microcystin-LR
 - Benthos and Sediment (1x/yr)



2010 Monitoring

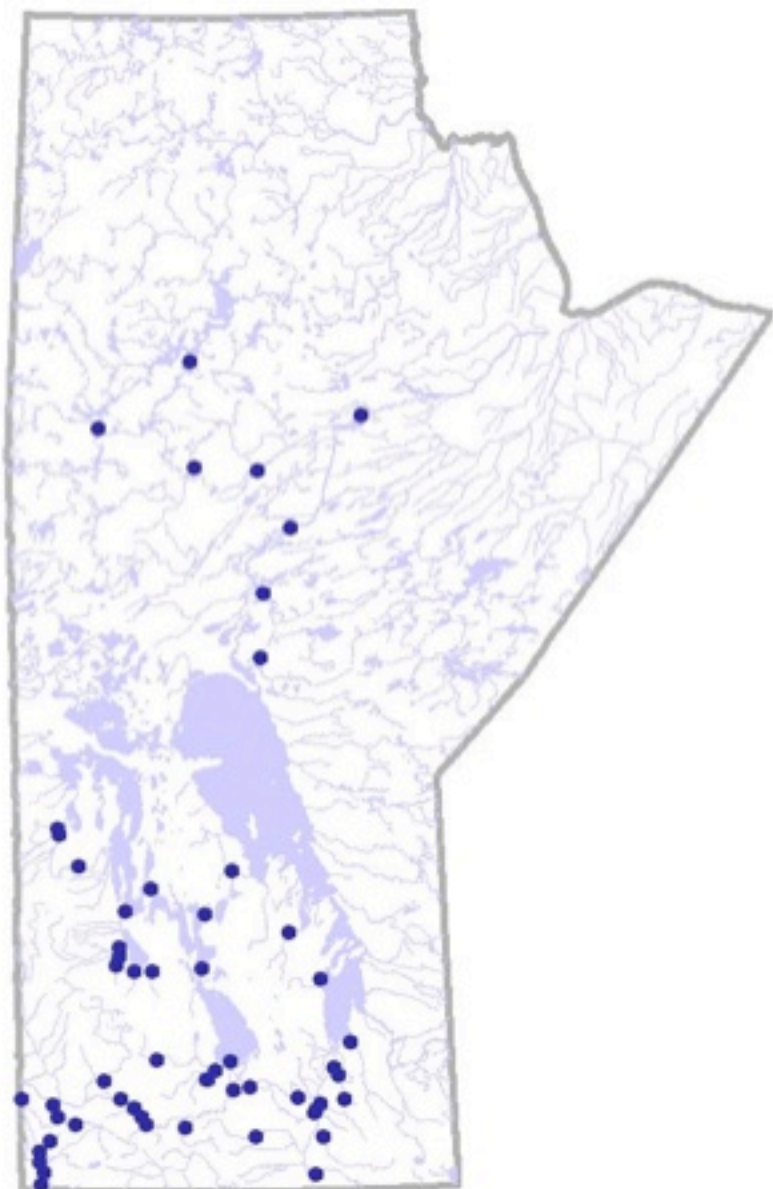
- Winter Lake Survey
 - South Basin (Complete)
 - North Basin (this week!)
- 2010 monitoring during spring, summer, fall cruises

Long-term water quality monitoring – Lake Winnipeg tributaries

- Ambient monitoring network on major streams across Manitoba including Lake Winnipeg tributaries
- Historical record stretches back to the early 1970s
- Historically sampled monthly or quarterly
- In 2009, initiated weekly/daily sampling in Red River, Assiniboine River, and tributaries during spring freshet
- More than 100 water quality variables measured

Long-term water quality monitoring stations

- 70 stations across Manitoba
- Includes tributaries to Lake Winnipeg – Red, Winnipeg, Saskatchewan, Dauphin, Brokenhead, Icelandic, Fisher
- Plus Nelson River



Beach Monitoring Program

- Monitor public bathing beaches for densities of indicator bacteria
- Provide timely results to the general public - data posted on Manitoba Water Stewardship's website and weekly news releases
- Provide a mechanism for posting swimming advisory signs on beaches when there is a risk to bather health



Beach Monitoring Program

- Lake Winnipeg monitored for densities of the indicator species *Escherichia coli*
- 16 beaches on Lake Winnipeg monitored weekly
- West Grand Beach and Gimli monitored daily Monday to Friday
- Research on mechanism of transport of *E. coli* from sand to lake water



Algae Toxin – Microcystin-LR

- Algae samples collected when blooms observed during long-term monitoring work, beach monitoring and in response to calls from the public.
- Analyzed for concentration of microcystin-LR and cyanobacteria counted and ID
- Except for Grand Beach lagoon, no reports of algae blooms at south basin beaches in summer 2009



State of the Lake Report

- With Environment Canada, leading the preparation of a status report on information collected on Lake Winnipeg between 1997 and 2007
- Many other contributors to various chapters
- Physical, chemical and biological conditions
- Manitoba Water Stewardship leading chapters on fish, water chemistry, phytoplankton, algae toxins, aquatic invasive species, *Escherichia coli* and nutrient loading to the lake

Lake Winnipeg Nutrient Objectives

- Long-term ecologically relevant nutrient objectives must recognize goals such as:
 - Minimizing the frequency and severity of algae blooms (cyanobacteria and those that impact fish harvest)
 - Ensuring a healthy functioning Lake Winnipeg ecosystem
 - Protecting the downstream environment (Nelson River, Hudson Bay)
- Long-term ecologically relevant nutrient objectives must consider:
 - Historical nutrient concentrations in Lake Winnipeg
 - Objectives in contributing watersheds
 - The social and economic implications of implementation and compliance

Steps for Developing Ecologically Relevant Nutrient Objectives – Within Lake Work

- What were historical nutrient concentrations in Lake Winnipeg? Paleolimnology
- How do algae respond to changes in nutrient concentrations? Nutrient enrichment studies and water quality modelling
- How does the aquatic community respond to changes in nutrient loading? Water quality and food web modelling

Steps for Developing Ecologically Relevant Nutrient Objectives – Moving Upstream

- What were historical nutrient concentrations in tributaries to Lake Winnipeg? Trend Analysis
- What concentrations of nutrients in tributaries to Lake Winnipeg will be protective of aquatic life in the rivers and streams? Relationships between nutrients and indicators of the health of the aquatic community (e.g. benthic invertebrate metrics)

Thank You

