

# The Quebec Volunteer Lake-Monitoring Program



Photo : CRE Laurentides



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Développement durable,  
Environnement  
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Québec 

# Presentation Plan

- ▶ Program
  - ▶▶ Objectives
  - ▶▶ Background
  - ▶▶ Participants
- ▶ Who does what?
- ▶ Water quality monitoring
  - ▶▶ What is analyzed and why?
- ▶ Why get involved in the VLMP?

# What is the VLMP?

- ▶ The **Volunteer Lake-Monitoring Program** is based on a partnership between :
  - ▶ MDDEP
  - ▶ Participants (lake associations)
  - ▶ Municipalities
  - ▶ Partner organizations and university researchers

# Objectives of the VLMP

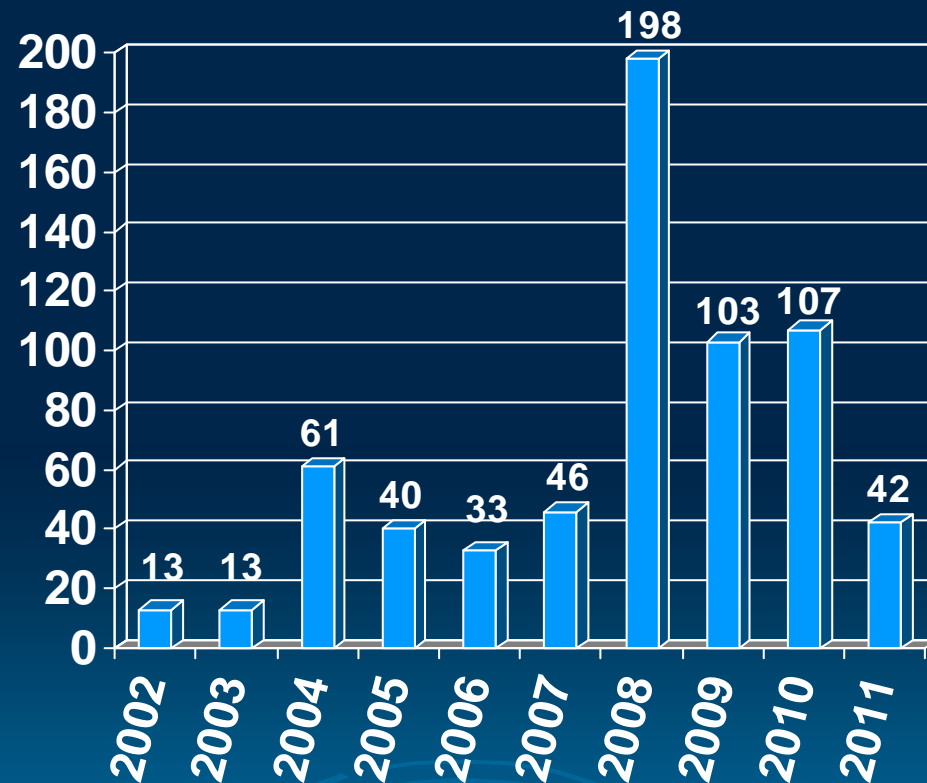
- ▶ **Assess** the trophic level of a large number of lakes and monitor their evolution over time
- ▶ **Identify** lakes showing signs of eutrophication
- ▶ **Provide an overview** of the state of Quebec's recreational lakes
- ▶ **Raise awareness, inform, educate and** support participants
  - ▶ To acquire knowledge
  - ▶ To better manage their lake

# Program Background

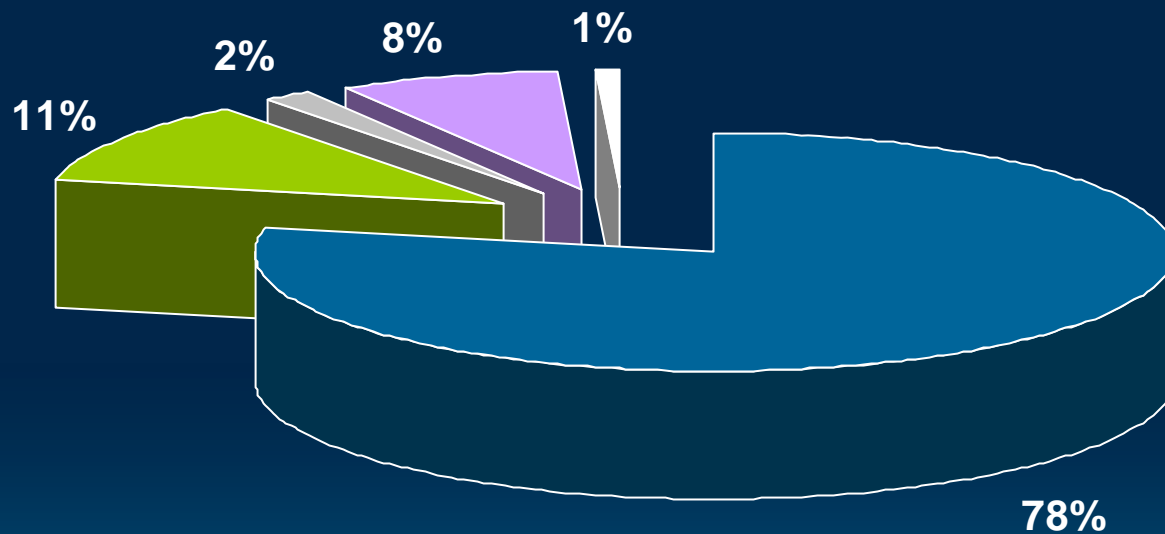
- ▶ 2002-2003:
  - ▶ Pilot project
- ▶ 2004:
  - ▶ Open to the public
  - ▶ Registration is limited to 50 new lakes per year
- ▶ 2008:
  - ▶ Increase in number of places to 150 new lakes per year
- ▶ 2011:
  - ▶ A total of 656 lakes are registered in the Program
- ▶ 2012:
  - ▶ Our goal is to have 700 lakes registered in the Program

# Evolution of number of annual registrations

The VLMP had a total of 656 lakes registered in 2011

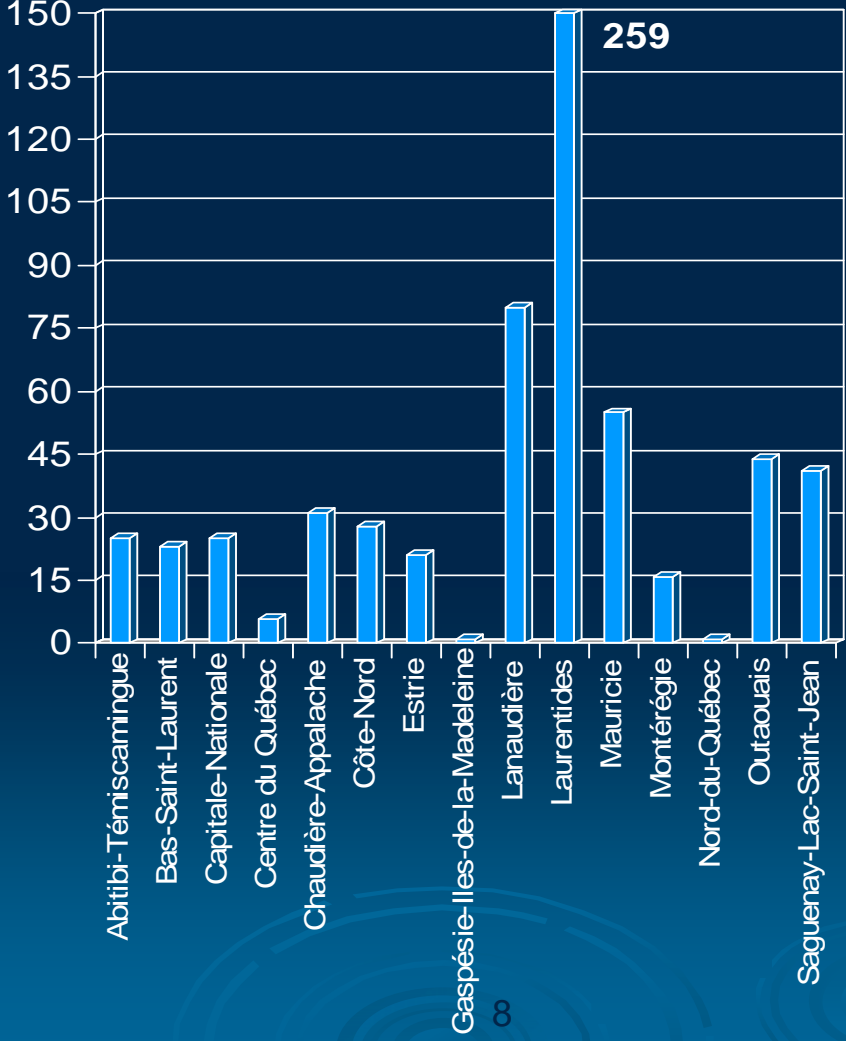


# Distribution of participants



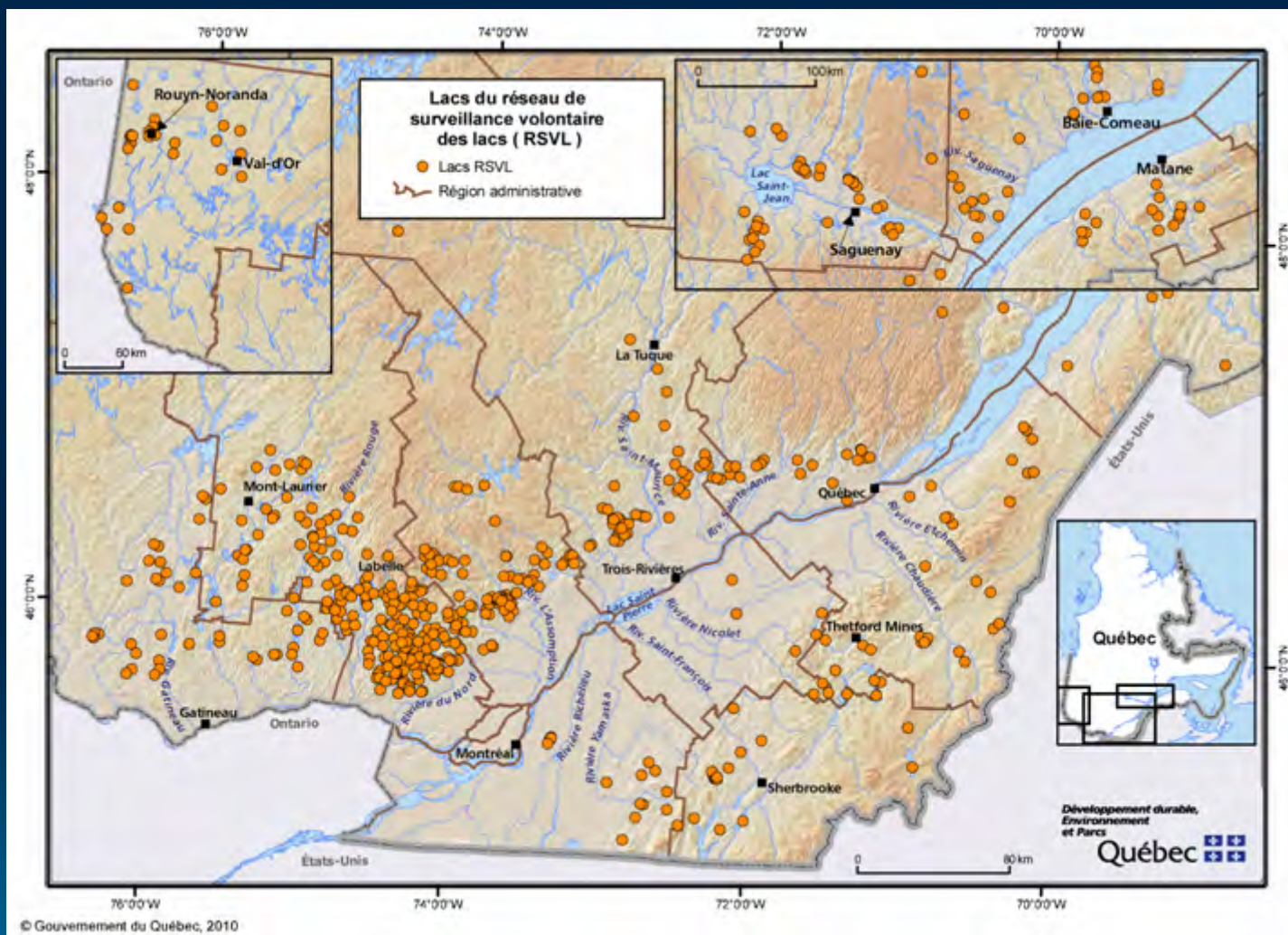
- Associations
- Municipalities
- Parks
- Watershed Management Councils
- Individuals

# Geographic distribution of participants





# Map of lakes in VLMP



# Who does what?

## MDDEP :

- ▶ Structures and manages the Program
- ▶ Develops protocols
- ▶ Provides technical and scientific support for volunteers
- ▶ Performs laboratory analyses (CEAEQ)
- ▶ Analyzes, interprets and provides the results
- ▶ Ensures data quality assurance & control
- ▶ Develops a network of local partners

# Who does what?

## The lakeside resident :

- ▶ Collects water transparency data and water samples
- ▶ Collects information about the **littoral zone** - the shallow transition zone between dry land and open water of a lake where sunlight reaches the bottom
- ▶ Pays for laboratory analyses and equipment

# Who does what?

## Municipalities can participate :

- ▶ In recruiting lake associations
- ▶ In financing participation in the Program
- ▶ In data collection
- ▶ In technical support

# Who does what?

Partners and university researchers can :

- ▶ Ensure technical and scientific support
- ▶ Participate in the training of volunteers
- ▶ Ensure quality control in the field
- ▶ Participate in protocol development
- ▶ Carry out complementary monitoring

# Water quality monitoring

## Variables analyzed :

- ▶ Total phosphorus (trace levels)
- ▶ Chlorophyll *a*
- ▶ Dissolved organic carbon



Photo : ABVLACS

# Water quality monitoring

## Basic program

- ▶ Three water samples (June, July and August) taken over a minimum of two consecutive years
- ▶ Water sampling is resumed after a four-year break following the last year of sampling
  - ▶▶ Example: for a lake in which water sampling is carried out in 2011 and 2012, sampling will resume in 2017 for two consecutive years, etc.
- ▶ Costs for a monitoring station: \$340 for the first year, and \$288 for the second year\*

\* Costs in 2011: subject to change

# Water quality monitoring

## Variable measured

- ▶ Transparency (Secchi depth)
  - ▶▶ Annual monitoring
  - ▶▶ Monitoring period
    - ▶▶ From the beginning of June until Thanksgiving
  - ▶▶ Frequency of measurements
    - ▶▶ Every two weeks (≈10 measurements)
  - ▶▶ Measuring site
    - ▶▶ Deepest part of the lake



Photo : CRE Laurentides



# Phosphorus

- ▶ TP: total phosphorus (trace level)
- ▶ Unit of measurement: microgram per litre ( $\mu\text{g/l}$ )
- ▶ Phosphorus is a nutrient essential to the growth of plants and algae. It is found in dissolved and particulate forms in lakes.

# Where does phosphorus come from?

## Natural sources:

- ▶ Bedrock and soils
- ▶ Animal manure and decomposition of organic matter
- ▶ Natural habitats (forests and wetlands)

# Where does phosphorus come from? (continued)

## Anthropogenic sources (related to human activity)

### ▶ Direct sources

- ▶▶ Natural or chemical fertilizers
- ▶▶ Domestic wastewater
- ▶▶ Cleaning products containing phosphates

### ▶ Factors promoting exportation

- ▶▶ Deforestation in the lake watershed and riparian zone
- ▶▶ Shoreline erosion
- ▶▶ Poorly designed roadside ditches

# Why measure phosphorus?

- ▶ Phosphorus is found in small quantities in lake water, relative to the needs of plants and algae, which is why we say that this element is the limiting factor for their growth. Therefore, an increase in the abundance of vegetation in a lake is directly related to an increase in available phosphorus.

# Chlorophyll *a*

- ▶ Chl *a* : chlorophyll *a*
- ▶ Unit of measurement: microgram per litre ( $\mu\text{g/l}$ )
- ▶ Chlorophyll is the photosynthetic pigment that gives plants, algae, and cyanobacteria their green colour

# Why measure chlorophyll?

- ▶ Indicator of the biomass (amount) of microscopic algae in water
- ▶ Algae are at the bottom of the food chain and reflect the potential productivity of a lake
- ▶ Nutrient enrichment → High productivity → lake eutrophication

# Dissolved organic carbon

- ▶ DOC: dissolved organic carbon
- ▶ Unit of measurement: milligram per litre (mg/l)
- ▶ Dissolved organic carbon is mainly composed of humic substances (wood components) and of partially decomposed plant and animal material

# Why measure DOC?

- ▶ DOC is a good indicator of water colour
- ▶ Highly coloured waters (like strong tea) have a reduced transparency compared to uncoloured waters
- ▶ Water colour affects water transparency and must be taken into account to correctly assess Secchi disk readings



# Transparency

- ▶ Unit of measurement: depth of visibility of Secchi disk in metres
- ▶ Transparency indicates the amount of light penetration into a lake. The clearer the water, the greater the depth at which the Secchi disk is visible.
- ▶ Water transparency decreases when the amount of suspended matter increases

# Why measure transparency?

- ▶ A decrease in water transparency in a lake is often a sign of diminishing water quality
- ▶ Since the quantity of algae increases with nutrient concentration, there is a relationship between water transparency and the trophic status of a lake

# Complementary indicators

Current :

- ▶ Riparian zone

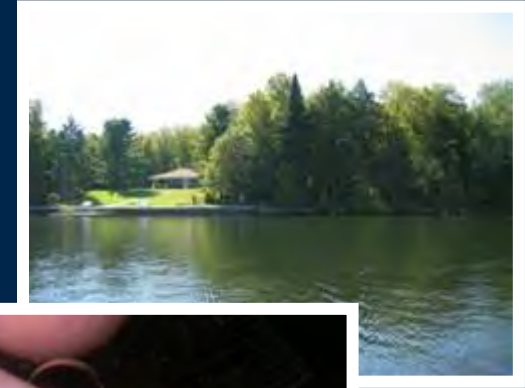


Photo : MDDEP

- ▶ Periphyton



Photo : MDDEP

Upcoming :

- ▶ Aquatic plants



Photo : MDDEP

- ▶ Substratum

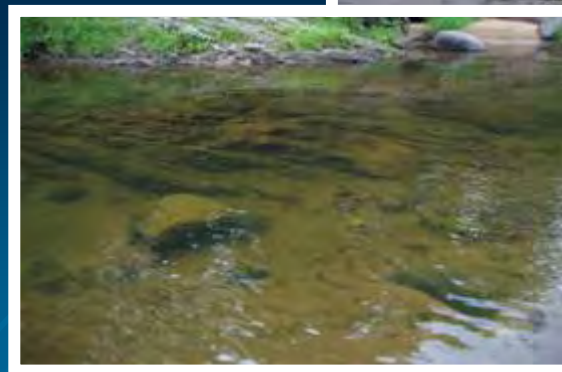


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# Why use complementary indicators?

- ▶ Water quality does not tell it all
- ▶ Signs of enrichment will appear in the littoral zone before water quality deteriorates in the deepest zone
- ▶ Littoral zone indicators are easily observable and signs of eutrophication are more evident

# Why take part in the VLMP?

- ▶ Offers a good starting point to get to know your lake
- ▶ Enables you to monitor the evolution of your lake over the years
- ▶ Encourages lakeside residents to take action to protect their lake
- ▶ Provides lake associations with a structured and rigorous approach for lake assessment

# Why take part in the VLMP? (continued)

- ▶ Benefit from a well-established program
- ▶ Receive support from experts at a low cost
- ▶ Etc.

# Lakeside residents have their say

*“ The VLMP gives credibility to what our association says, which is very useful in promoting awareness among lakeside residents. Our participation in this program is with a long-term perspective, and enables us to remain up to date in our knowledge about the state of our lake, and to monitor its evolution.”*

*Mr. Michel Fleury, Association des propriétaires du lac Sept-Îles à Saint-Raymond*

# Lakeside residents have their say

- ▶ *“ The VLMP enables our association to monitor the evolution of the state of Brome Lake. This program brings rigour to our action, and it is reassuring to be guided and accompanied by the experts from the MDDEP. ”*

Mr. Pierre Beaudoin, *“ Renaissance Lac Brome ”*



# Lakeside residents have their say

- ▶ *"Being part of the Voluntary Lake-Monitoring Program gives credibility to the actions of our association. The support offered by the VLMP team, and the results obtained within the framework of this program encourages lakeside residents to keep up their efforts to protect the lake."*

*Ms. Lise Lépine, Association des propriétaires du lac Bill à Saint-Mathieu-du-Parc*

# Lakeside residents have their say

- ▶ *"We are monitoring the evolution of our recreational lakes in collaboration with lake associations. It is a community project in our municipality that brings people together to work towards a common goal."*

The municipality of Saint-Alphonse-Rodriguez

THANK YOU!

