MEMPHRÉMAGOG CONSERVATION INC.

Stanstead Township
February 21, 2015

Healthy Fitch Bay:

From Diagnoses to Solutions

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Presentation Plan

1. Objectives of the Project
2. Why Fitch Bay?
3. Water Quality
4. Environmental Diagnoses
5. Possible Solutions
6. Collaborations
7. Next Steps
8. Discussion

Objectives of the Project

Objectives of the Project

- Improve the water quality of Fitch Bay

- Conserve biodiversity and ecosystem functions of Fitch Bay and its watershed

To ensure:

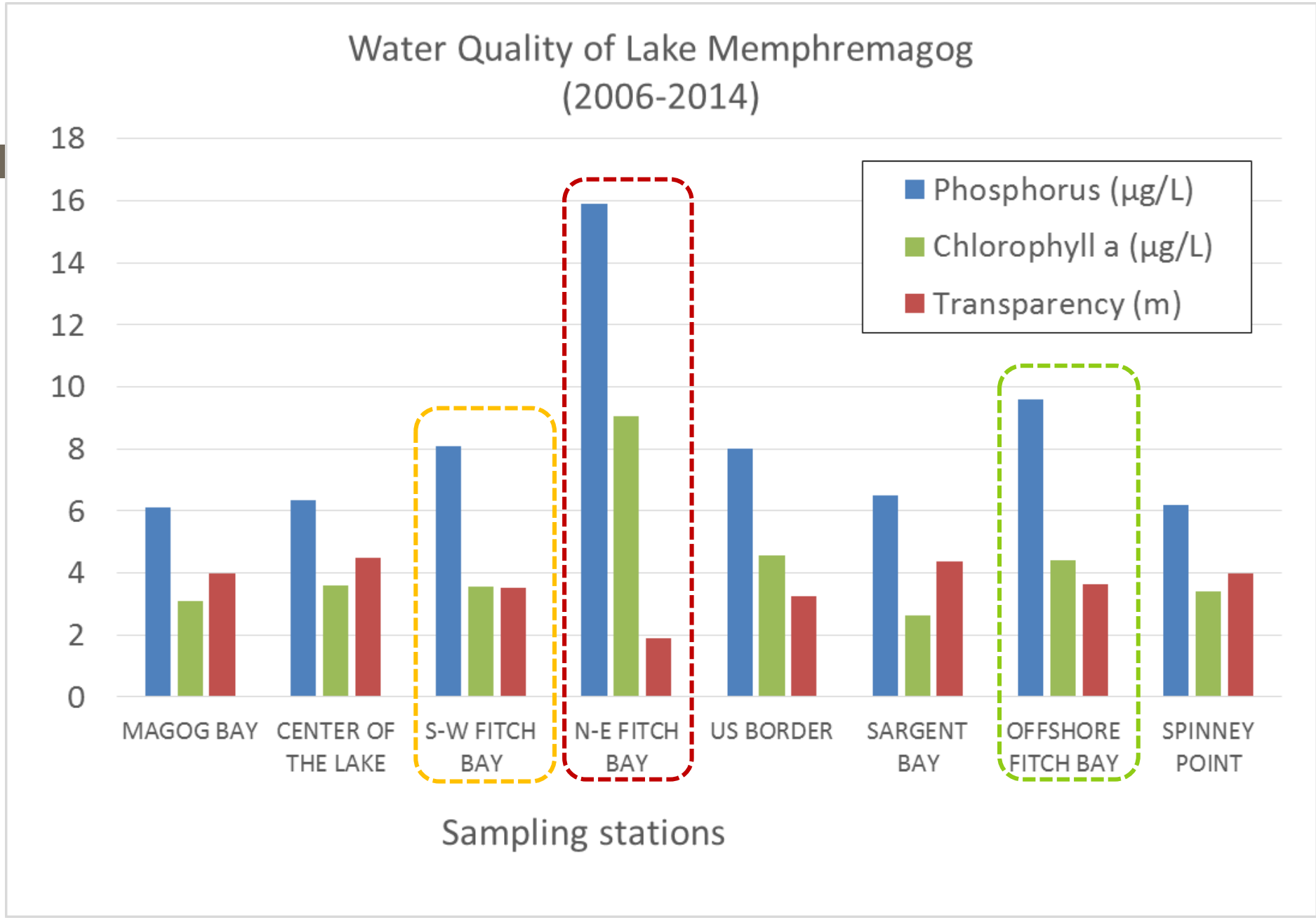
- The health of Fitch Bay and its watershed

Why Fitch Bay?

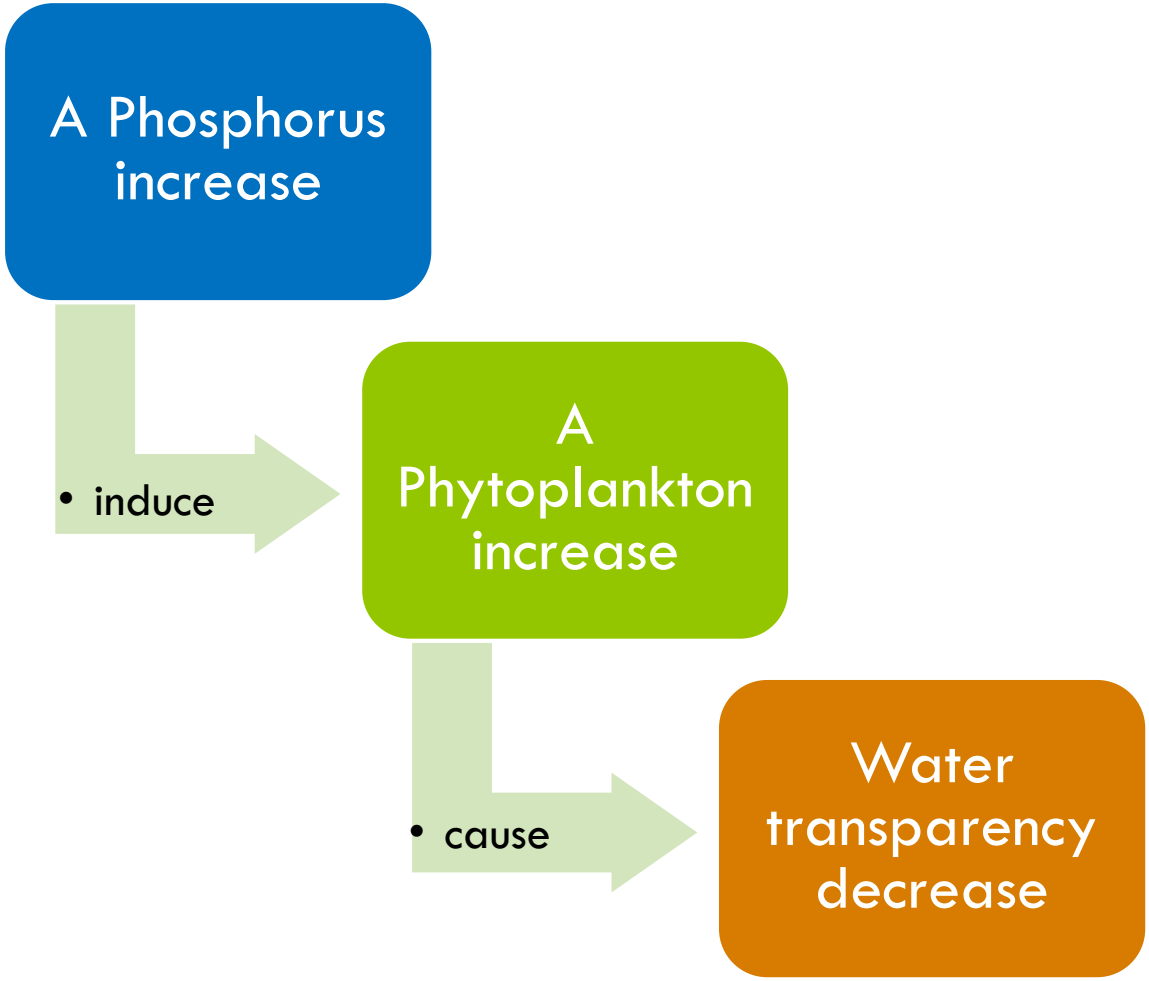
Fitch Bay, a sensitive environment to protect!

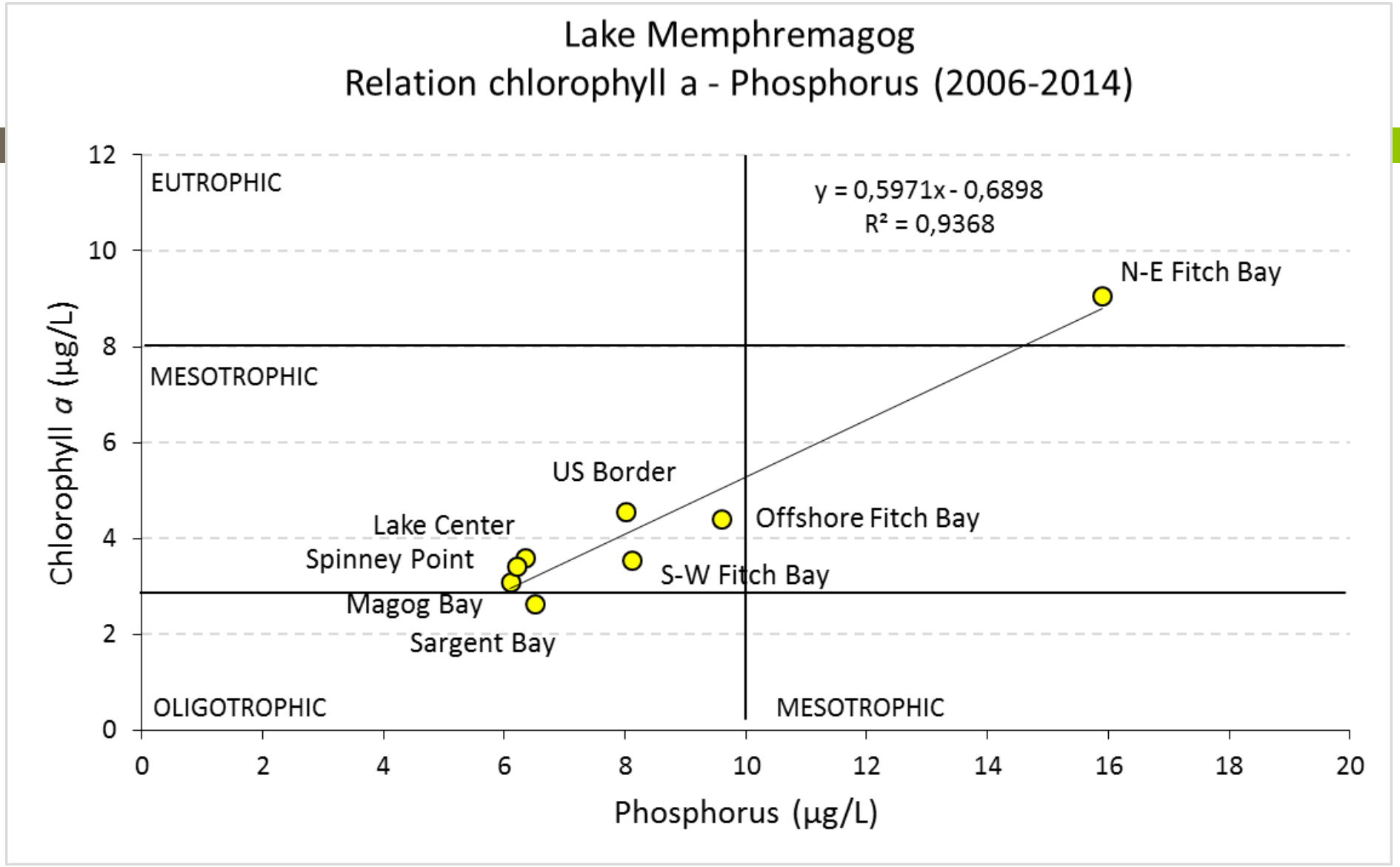
- Contribution to the life quality of the residents
- Recreational importance (bay and landscapes)
- Ecological interest of its natural landscapes

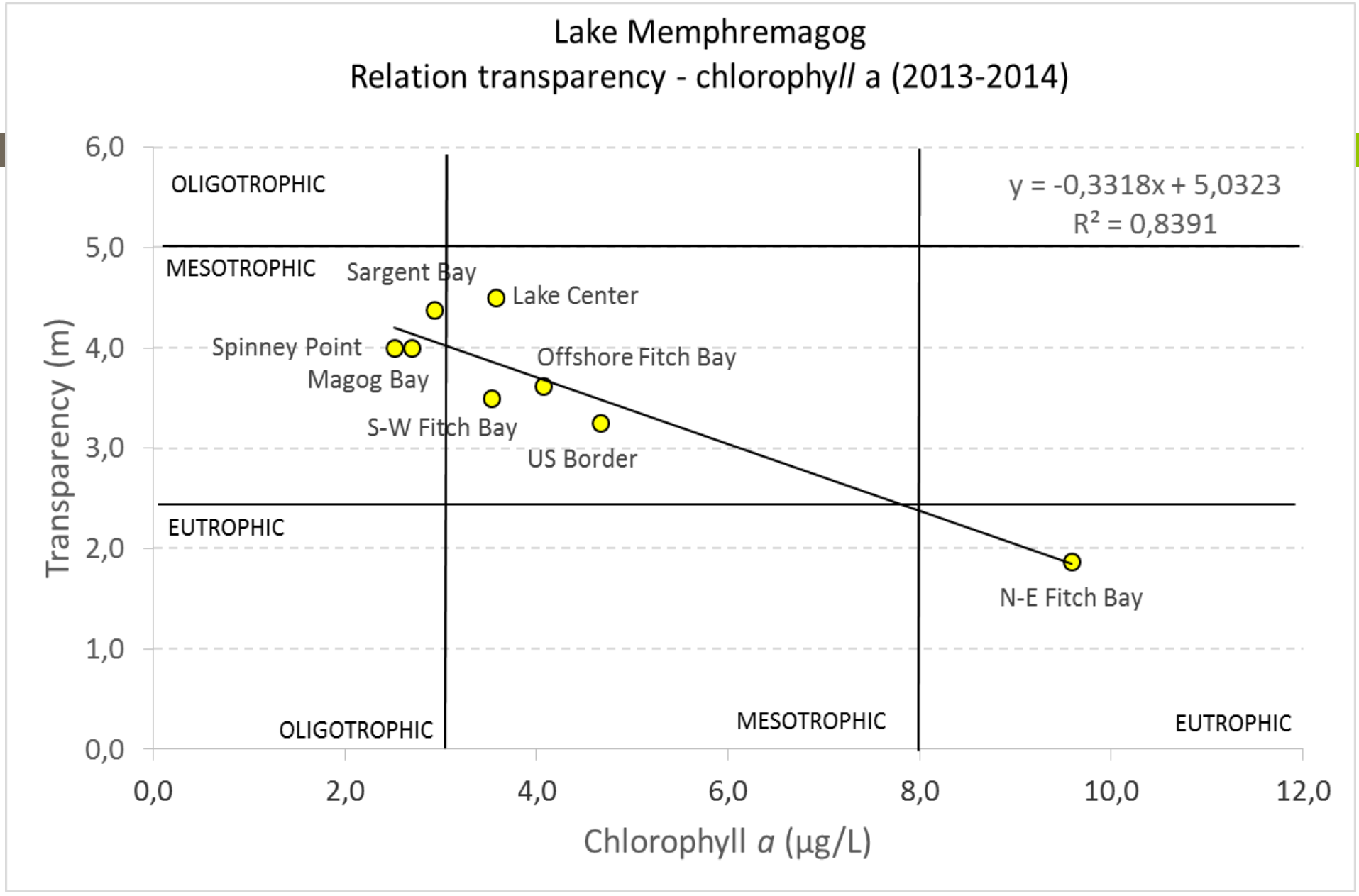
Water Quality of Concern

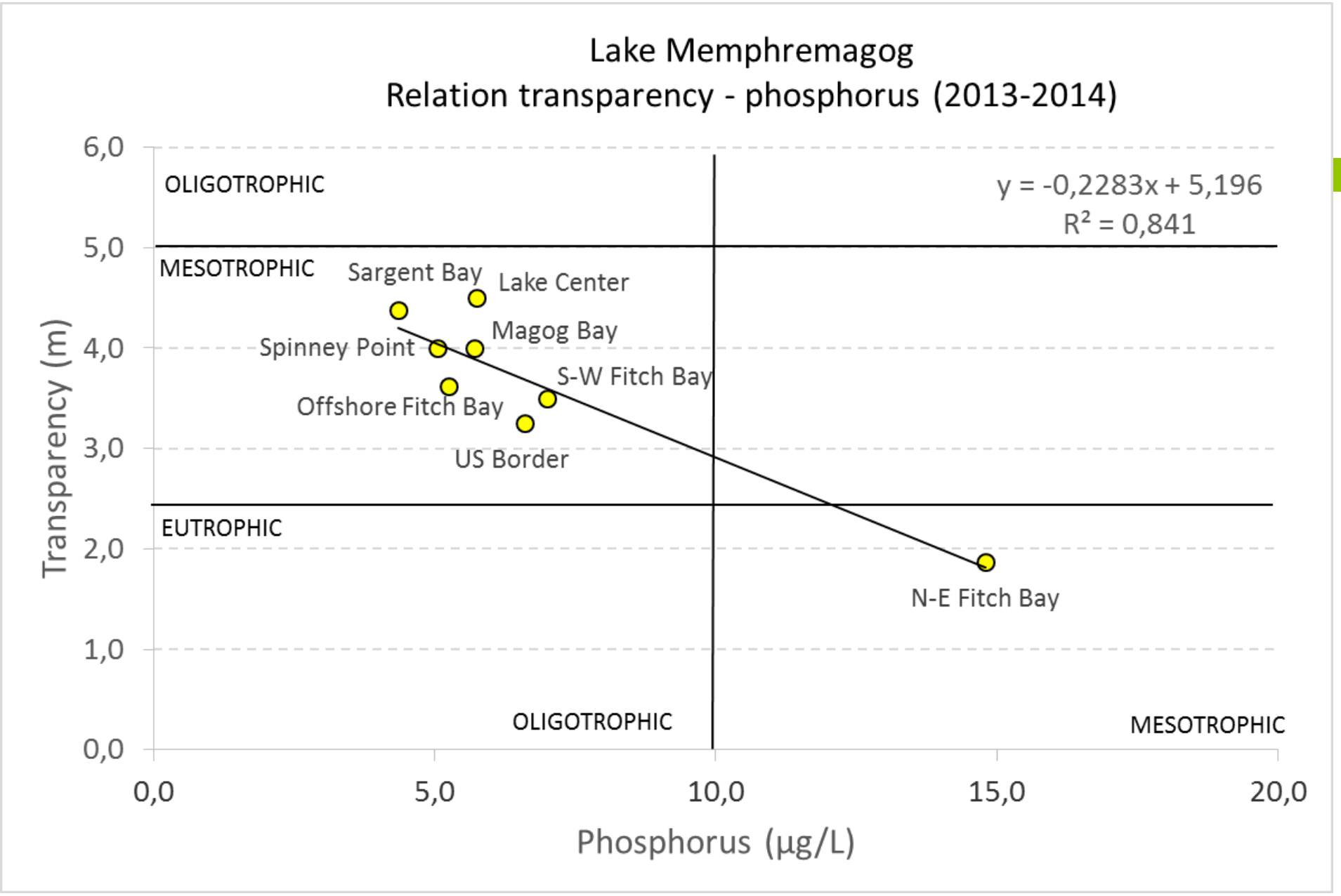

Water Quality of Lake Memphremagog
(2006-2014)
18
16
14
12
10
8
6
4
2
0
Phosphorus (µg/L)
Chlorophyll a (µg/L)
Transparency (m)
MAGOG BAY
CENTER OF THE LAKE
S-W FITCH BAY
N-E FITCH BAY
US BORDER
SARGENT BAY
OFFSHORE FITCH BAY
SPINNEY POINT
Sampling stations

Why Phosphorus?




Lake Memphremagog
Relation chlorophyll a - Phosphorus (2006-2014)
EUTROPHIC
MESOTROPHIC
OLIGOTROPHIC
MESOTROPHIC
y = 0,5971x - 0,6898
R² = 0,9368
N-E Fitch Bay
US Border
Offshore Fitch Bay
Lake Center
Spinney Point
S-W Fitch Bay
Magog Bay
Sargent Bay
Chlorophyll a (µg/L)
Phosphorus (µg/L)
0
2
4
6
8
10
12
14
16
18
20


Lake Memphremagog
Relation transparency - chlorophyll a (2013-2014)
y = -0,3318x + 5,0323
R² = 0,8391
OLIGOTROPHIC
MESOTROPHIC
EUTROPHIC
OLIGOTROPHIC
MESOTROPHIC
EUTROPHIC
Sargent Bay
Lake Center
Spinney Point
Magog Bay
Offshore Fitch Bay
S-W Fitch Bay
US Border
N-E Fitch Bay
Transparency (m)
Chlorophyll a (µg/L)
6,0
5,0
4,0
3,0
2,0
1,0
0,0
0,0
2,0
4,0
6,0
8,0
10,0
12,0


Lake Memphremagog
Relation transparency - phosphorus (2013-2014)
y = -0,2283x + 5,196
R² = 0,841
OLIGOTROPHIC
MESOTROPHIC
EUTROPHIC
OLIGOTROPHIC
MESOTROPHIC
Sargent Bay
Lake Center
Magog Bay
Spinney Point
S-W Fitch Bay
Offshore Fitch Bay
US Border
N-E Fitch Bay
Transparency (m)
Phosphorus (µg/L)
6,0
5,0
4,0
3,0
2,0
1,0
0,0
0,0
5,0
10,0
15,0
20,0

Trophic Levels of Lakes and Correspondent Values of Total Phosphorus, Chlorophyll a and Transparency

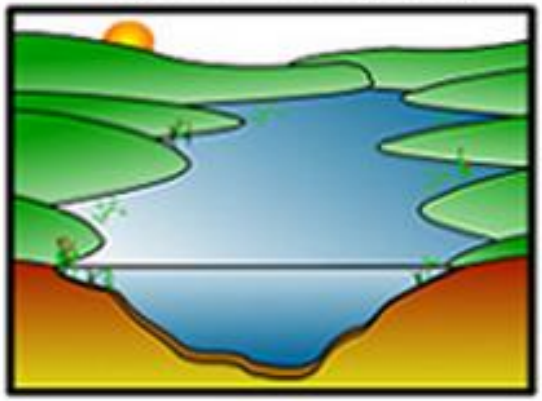
Trophic Levels	Total Phosphorus (µg/L)	Chlorophyll a (µg/L)	Water Transparency (m)
Oligotrophic	< 10	< 3	> 5
Oligo-mesotrophic	7 - 13	2,5 – 3,5	4 - 6
Mesotrophic	10 - 30	3 - 8	2,5 - 5
Meso-eutrophic	20 - 35	6,5 - 10	2 - 3
Eutrophic	> 30	> 8	< 2,5

SOURCE: http://www.mddep.gouv.qc.ca/eau/rsvl/methodes.htm

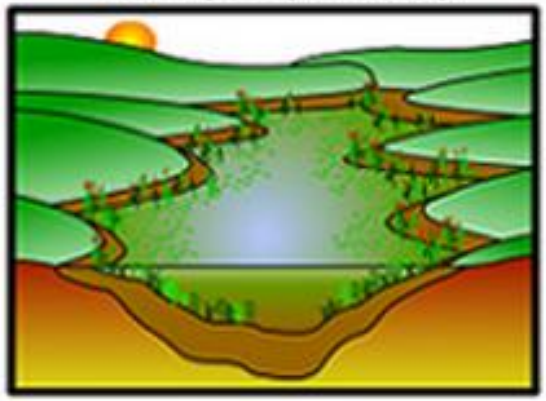
What is Eutrophication?

Natural process: **tens of thousands of years**
Process accelerated by human activities: **decades**

Oligotrophic (young lake)



Eutrophic (old lake)



- Clear waters
- Fresh waters
- Not much aquatic vegetation
- Well-oxygenated waters
- Rock, sand, gravel bottoms
- Many animals species

- Opaque waters
- Warm waters
- Lots of aquatic vegetation
- Water low in oxygen
- Silt bottoms
- Few animals species

Source: RAPPEL, 2012

Eutrophication Impacts

Environmental impacts

- Ecosystem modifications:

- Intolerant species (trout, bass, walleye…) will be replaced by more adapted species to eutrophication (bullhead, perch, sunfish ...).

Impacts on humans

Recreational activities limited

- The invasion of aquatic plants may limit navigation
- Silting makes swimming unpleasant
- Negative impact of many fish species decrease on fishing
- Cyanobacteria limit swimming activity

Decrease of the potential to drink water

May decrease the property values

Blooms of Cyanobacteria

September 19, 2014

November 17, 2014

The only two blooms of cyanobacteria reported on Lake Memphremagog last year were in Fitch Bay

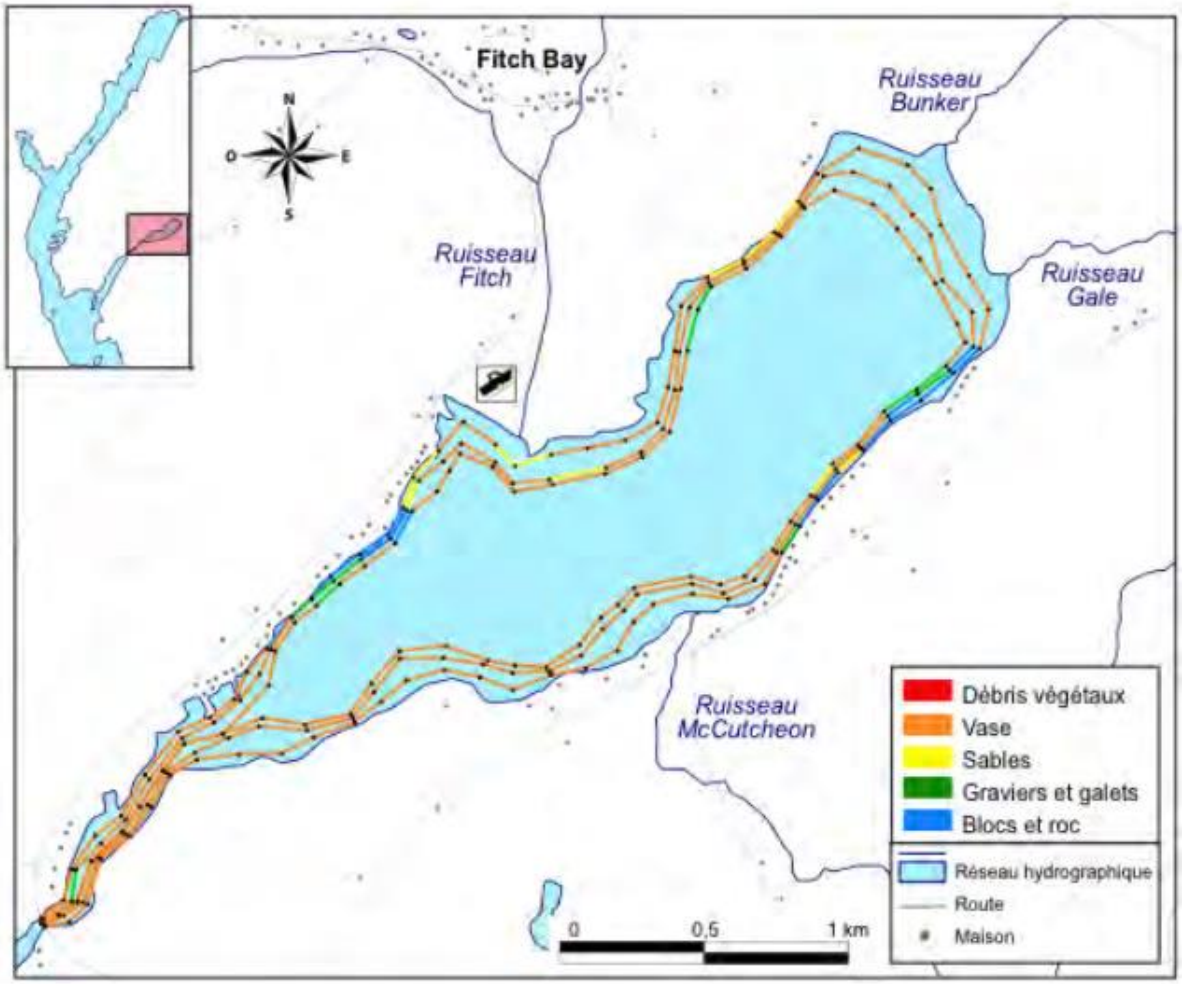
Silting in Fitch Bay

Origins :

a) Algae and aquatic plants decomposition at the end of each growing season

b) Soil erosion from the watershed:

The more soils are deprived of vegetation the more they are vulnerable to erosion



What are Fitch Bay eutrophication causes?

Natural:

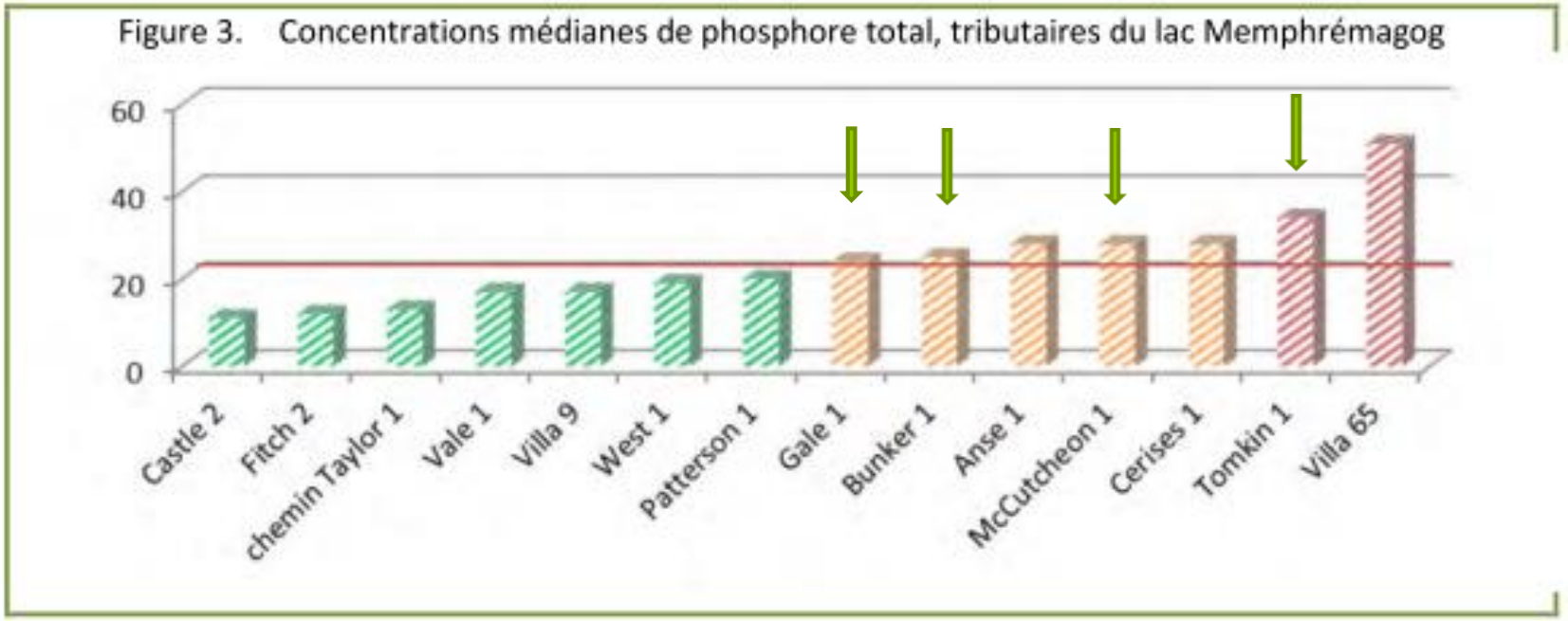
- Low flows and gentle slopes of the littoral zone increase the silting and vulnerability to infestations of aquatic plants

Human origin:

- Flooding of Fitch Bay (1883)
- Pollutant inputs from the watershed

Water Quality of the Tributaries

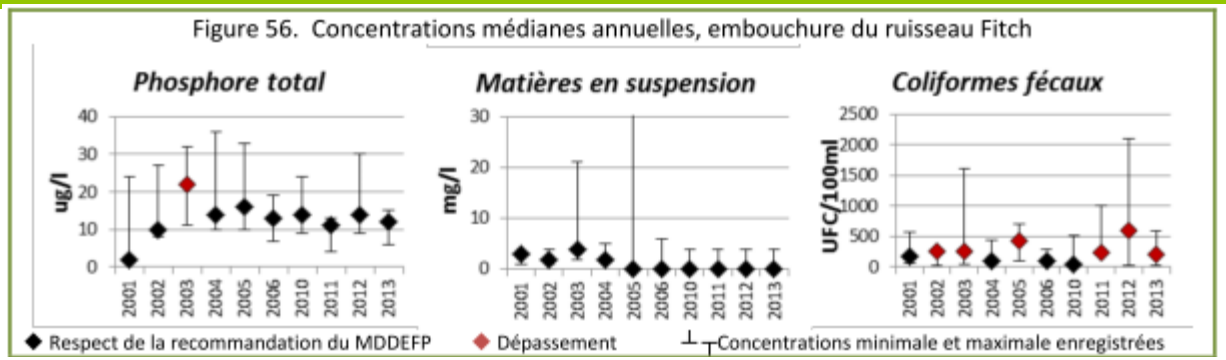
Total phosphorus concentration in the tributaries of Lake Memphremagog in 2013:



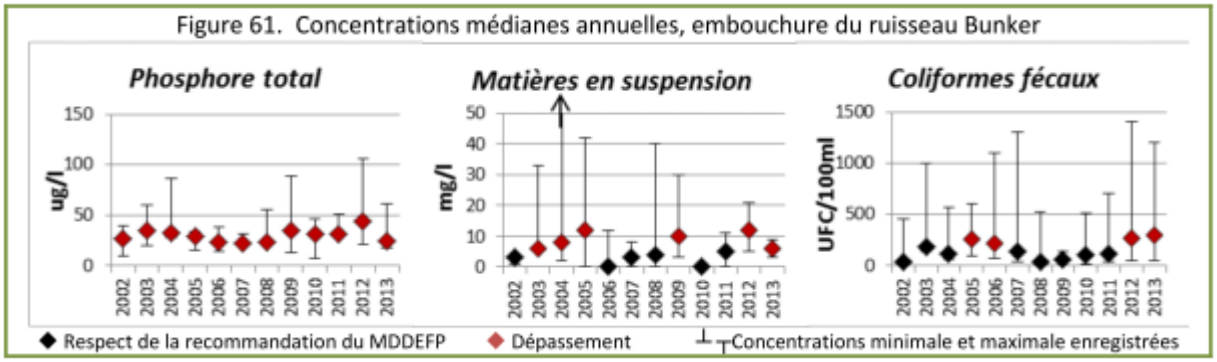
(Roy, 2014)

Water Quality of the Tributaries

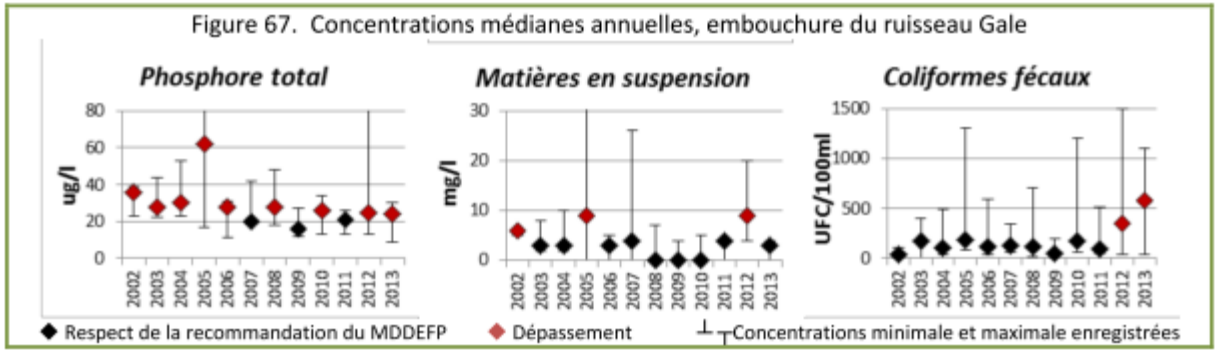
- Fitch



- Bunker



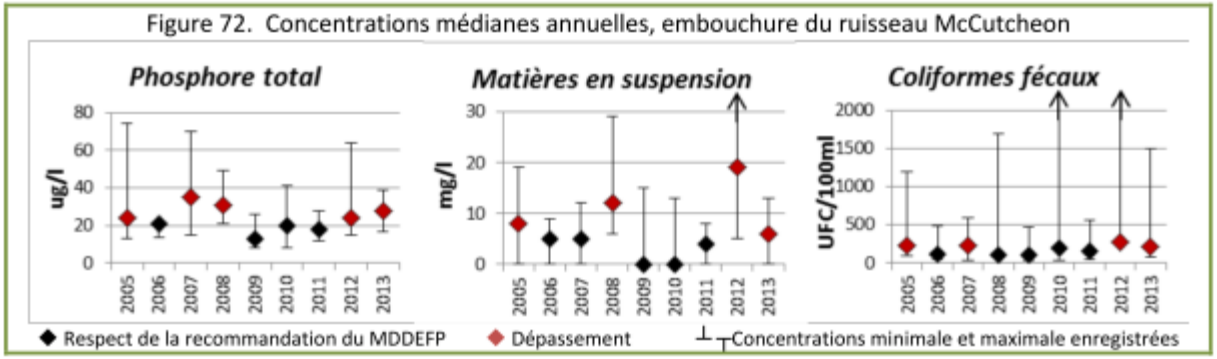
- Gale



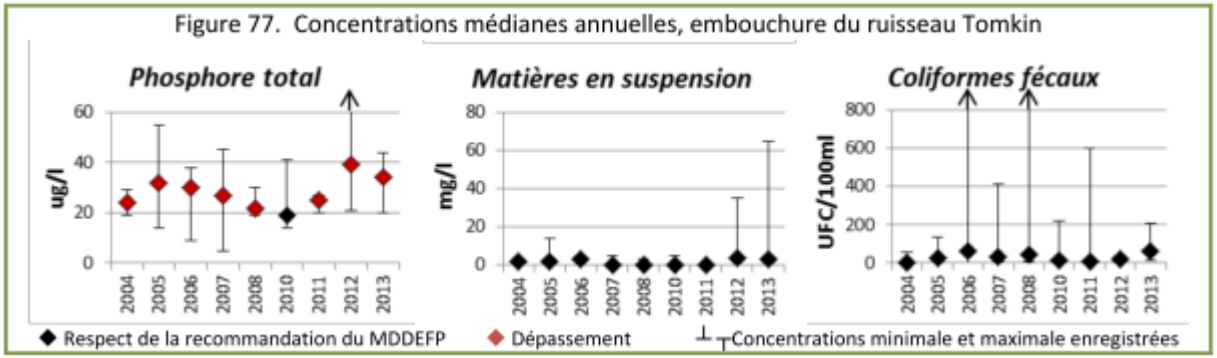
(Roy, 2014)

Water Quality of the Tributaries

- McCutcheon



- Tomkin

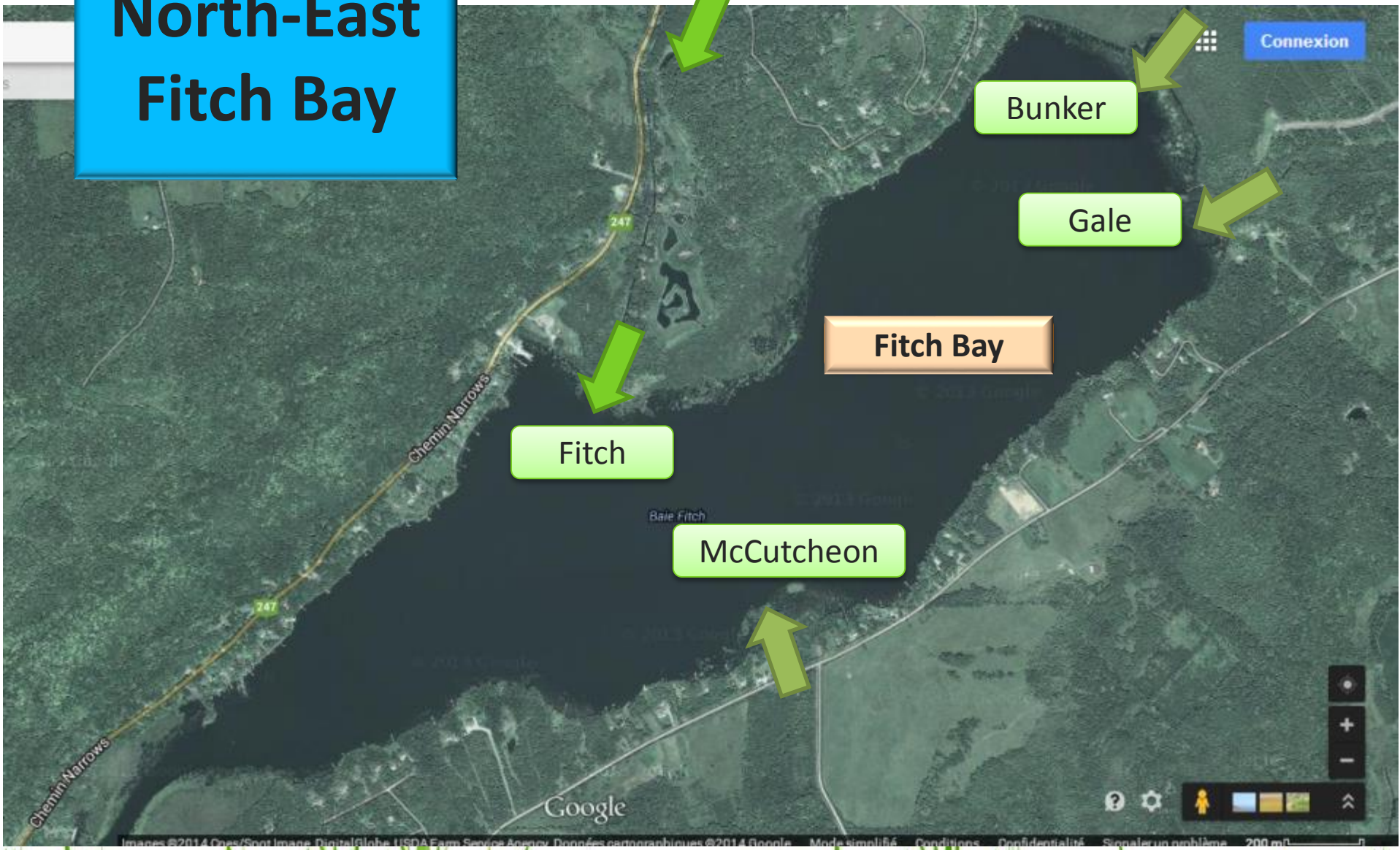


MDDELCC Objectives:

- Total Phosphorus: 20 µg/L
- Suspended Matter: 5 mg/L
- Fecal Coliforms: 200 UFC/100 mL

(Roy, 2014)

North-East Fitch Bay



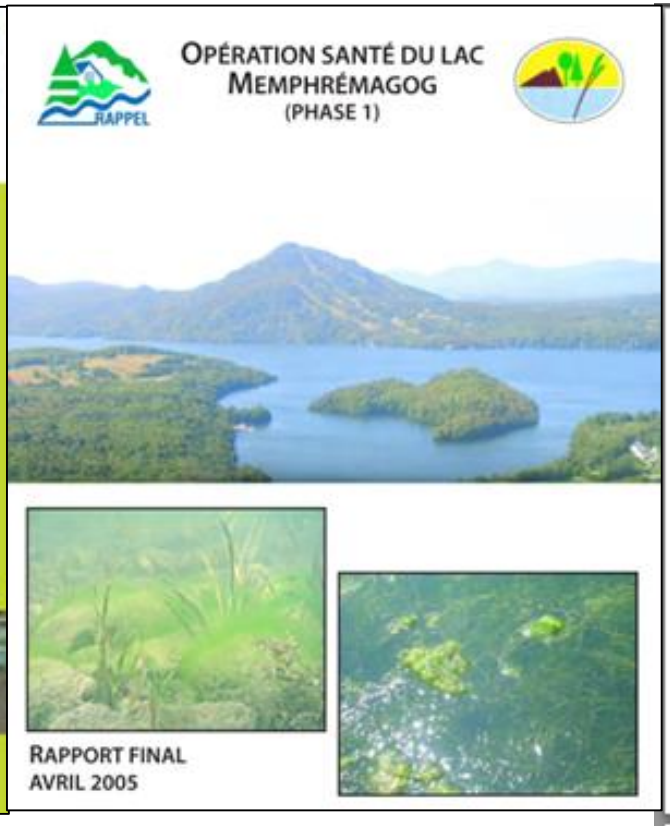
Statement and Tendency 2001-2013

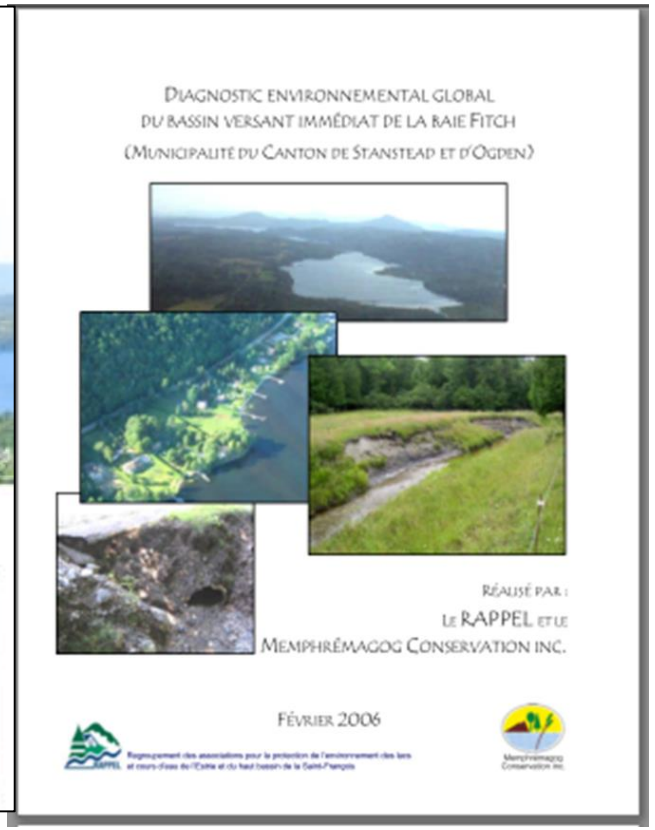
PARAMETER Objective	TOTAL PHOSPHORUS 20 µg/L	SUSPENDED MATTER 5 mg/L	FECAL COLIFORMES 200 UFC/100 ml
Fitch	1/10	0/10	6/10
Bunker	12/12	6/12	4/12
Gale	9/12	3/12	2/12
McCutcheon	5/9	4/9	4/9
Tomkin	8/9	0/9	0/9

Arrow pointing up: deterioration
Arrow centered: stability
Arrow pointing down: improvement

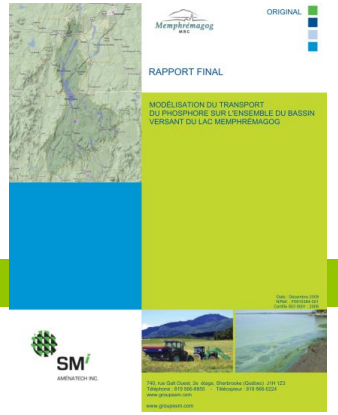
In the arrow:
1st number: indicate the number of years of exceeded
2nd number: indicate the number of years of observation

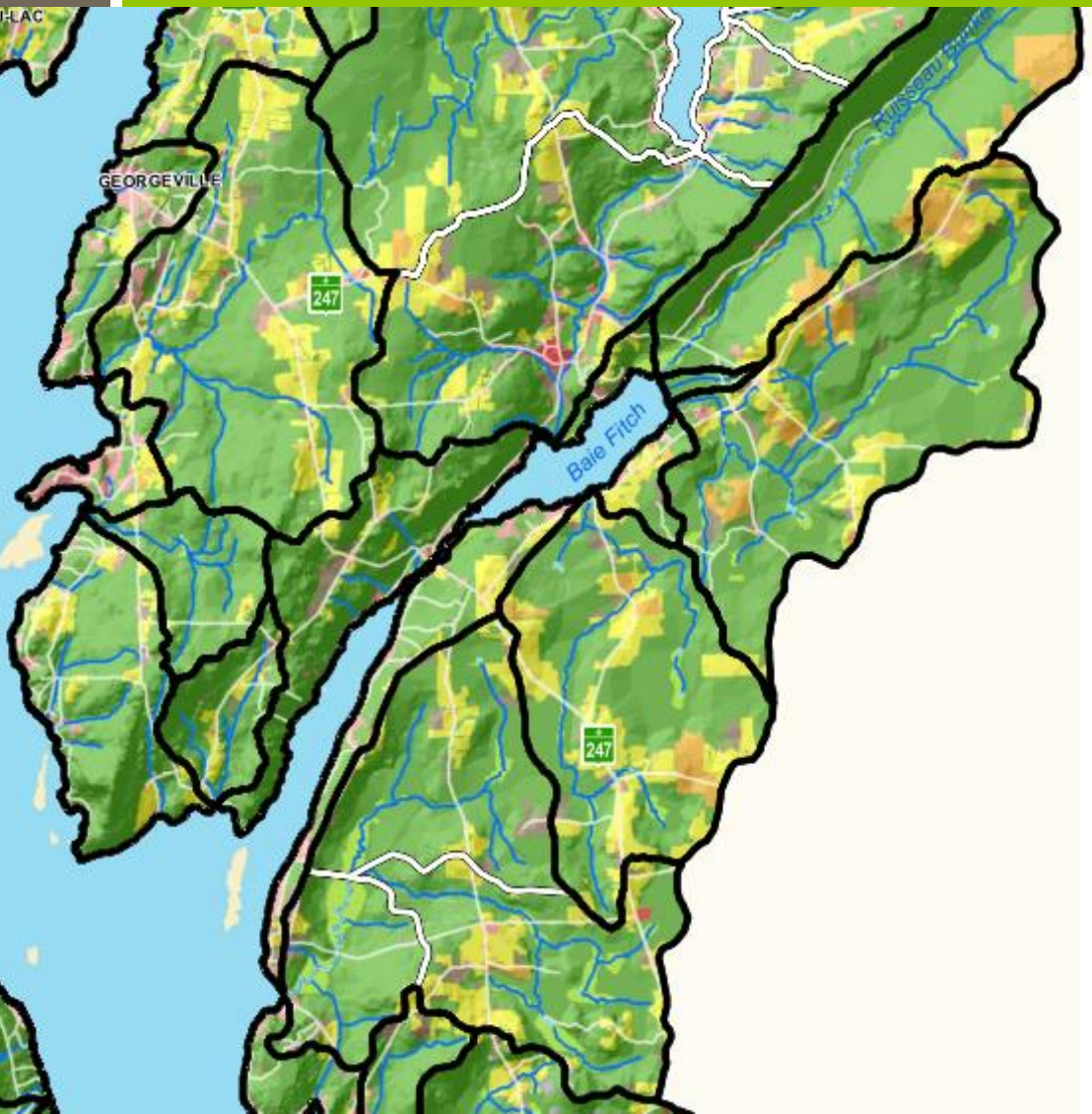
Inputs of pollutants: diagnoses





Where does phosphorus come from?

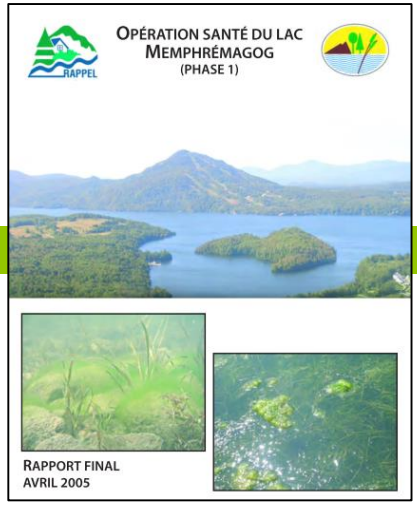


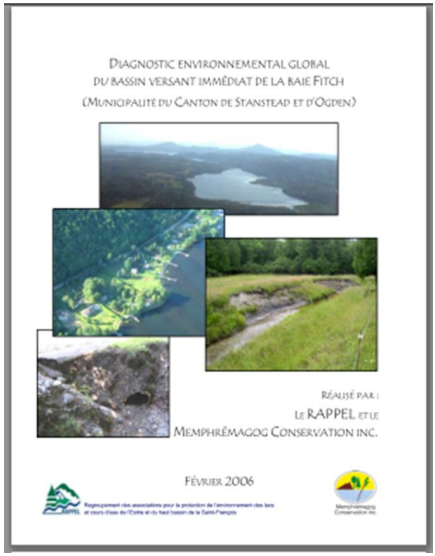


Exportation coefficient (kg/km²/year)
305
106
305
87 à 277
52
20
5
125
20
105

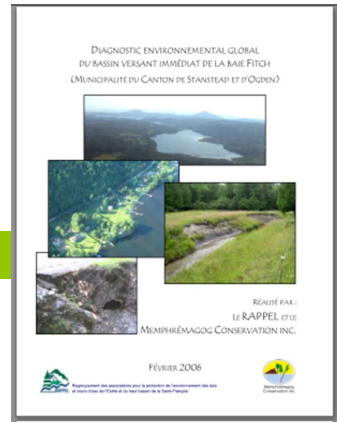
Potential Sources of Pollutants

- Residential:
  - shore artificialization,
  - septic systems poorly maintained,
  - use of fertilisers and pesticides,
  - decrease in forest cover.
- Roadside ditches
- Agricultural, forestry, recreational practices





Examples of identified problems



Ponceau et érosion (point 31)

Ponceau bloqué (point 13) *Artificialisation des rives (point 14)*

Passage à gué et accès du bétail (point 21) *Travaux résidentiels*

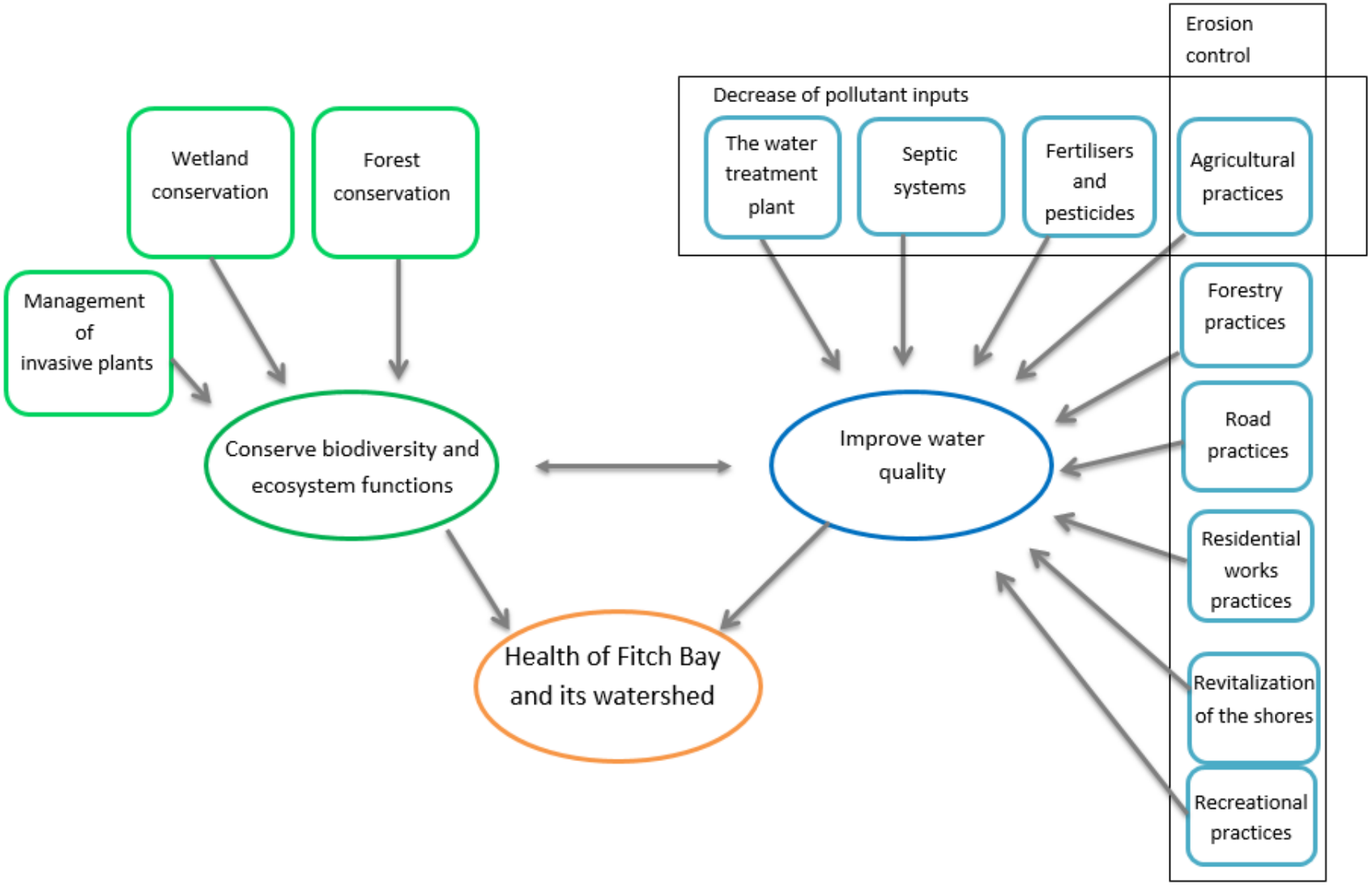
Terres agricoles près du chemin Griffins Érosion dans un pâturage

(MCI/RAPPEL, 2006)

Healthy Fitch Bay: From Diagnoses to **Solutions!**

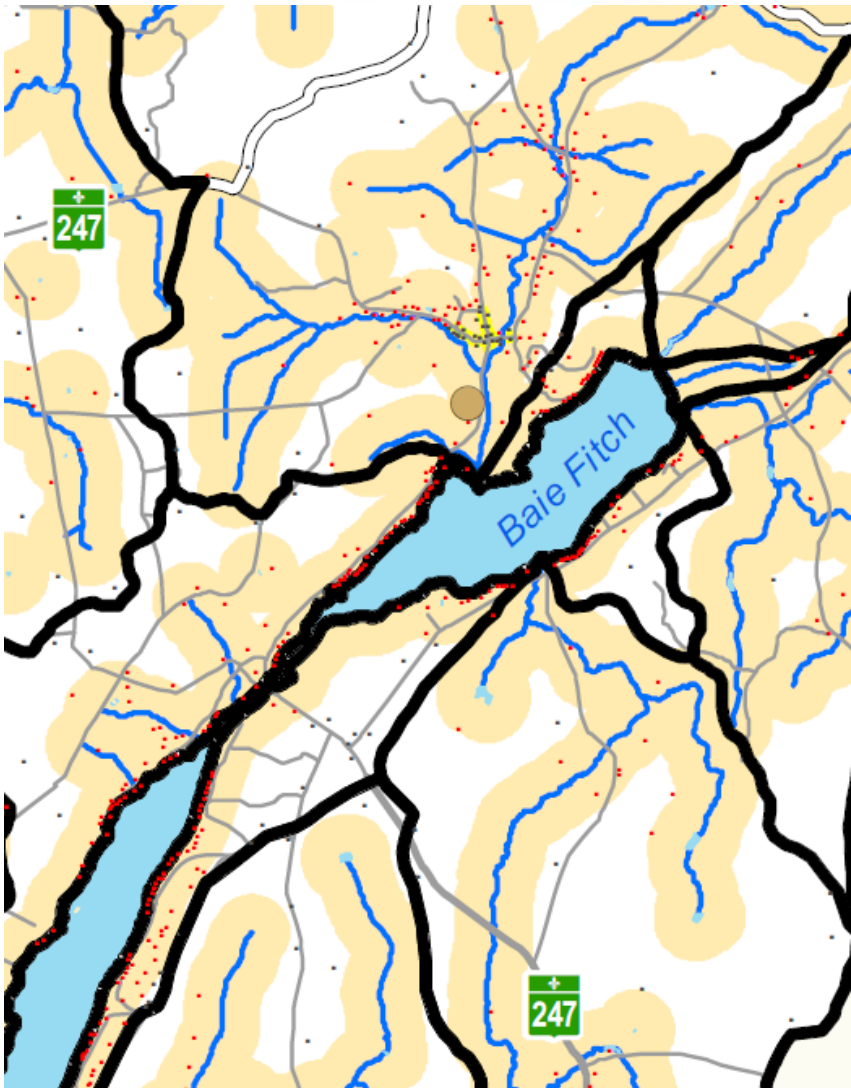
Possible solutions to ensure the health of Fitch Bay

Areas of Intervention



Septic Systems

Inadequate or deficient installations can release large quantities of phosphorus and coliform bacteria



Solutions:

- Verify the **conformity with regulations** of your septic system
- Have your septic tank **emptied on a regular basis**
- Use biodegradable, **phosphate free cleaning products**
- Ensure that you have an appropriate **buffer zone** between your filter bed and the shoreline

Revitalization of the shores

Revitalisation of the shoreline at Weir Park, Ogden

- **Reduce erosion and the transport of contaminants**
- **Protect wildlife habitat**:
  - Provide shelter and food for wildlife,
  - maintain water at a cooler temperature,
  - limit the transport of sediments that may harm fish.

A proper shoreline buffer zone should:

- Be sufficiently **large**: ≥10 metres on slopes of less than 30 degrees, and ≥15 metres on slopes of greater than 30 degrees
- Be composed of **native plants**
- Be composed of **three layers**, grasses, shrubs and trees.
- **Not contain any bare soil** or mulch

Fertilizers and pesticides on residential lands

- **Phosphorus is found in all types of fertilizers**
- **Pesticides** can have important impacts on **human and environmental health**

Solutions:

- **Avoid** the use of fertilizer **on lawns**
- **Avoid** the use of fertilizer **in shoreline buffer zones**
- Use low impact pesticides only in the case of **insect infestations**

Residential works practices

A construction site without erosion control can add **10 to 100 tons of soil to the lake per acre**.

Solutions:

- Erosion and sediment control
- Sedimentation basins and sediment barriers
- Covering excavated or bare soil
- Conserving the maximum vegetative cover possible
- Renaturalizing as quickly as possible

Road maintenance practices: roadside ditches, culverts, management of deicing salt

- Poorly maintained ditches erode very easily
- 50 % of the water entering the lake arrives via roadside ditches before entering the lake (RAPPEL, 2004).
- Road salt can modify PH levels and certain species can be favored over others

Solutions:

- Using the "Bottom Third" ditch maintenance technique when its possible
- Stabilizing culverts
- Optimizing management of road salt (type, quantity, etc.)

Source: RAPPEL

Recreational practices

Motorboat waves

- Near the shoreline: **shoreline erosion**, noise pollution
- Shallow areas: Causing **bottom sediments** containing nutrients to go into **suspension** in the water column.

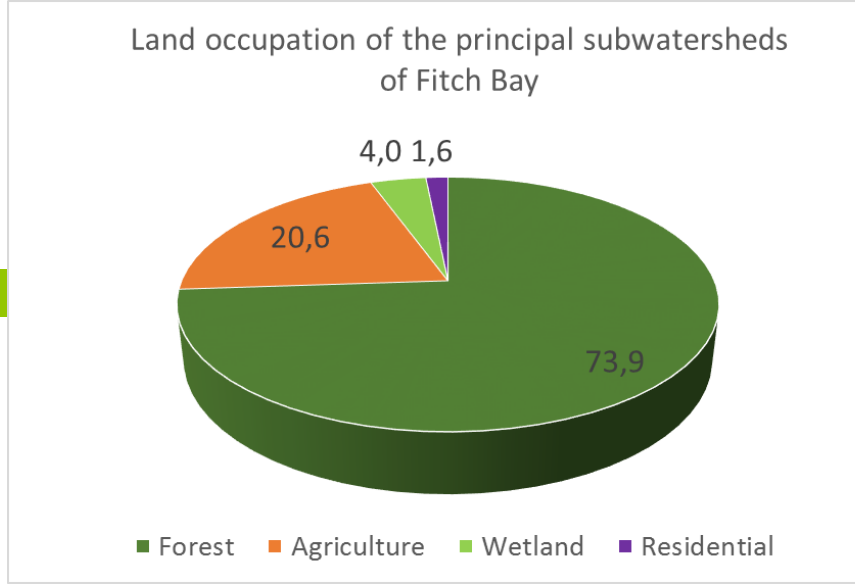
- A boat with a 50 horsepower engine deposits nutrients to a depth of 4.6 metres (Faucher, 2007)

Solutions:

Use of motorboats far from shorelines and shallow areas

Agricultural practices

- Maintain a shoreline buffer zone wide enough
- Preventing livestock from accessing bodies of water
- Using only the amount of agricultural fertilizer needed
- Confine animal faeces to appropriate watertight structures
- Conserve sensitive areas



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Forestry practices

Can create a large amount of soil erosion

Solutions

- Ensuring that **crossings** and culverts are **stable**
- **Avoiding tree cutting on slopes** greater than 30 degrees.
- Always **preserving** at least 50% of the **forest cover**.
- Respecting shoreline buffer zones and **sensitive areas.**
- Giving preference to **small machinery** over large equipment.

Invasive plants

Milfoil

Common Reed

Purple Loosestrife

- Take the place of native species
- Milfoil: Abundant in Fitch Bay
- Difficult to control

Solutions to limit its spread and to prevent the arrival of other invasive species:

- Power washing of boats before they are transferred from one lake to another
- Avoid the use of motor boat in aquatic plants
- Controlling invasive plants on residential properties

Conservation of natural areas of Fitch Bay Watershed

Why protect ?

3 main reasons:

- Ecosystems provide essential functions for the environment;
- Constant pressures on natural areas;
- Impact on the environment and our well-being.

Examples of ecosystemic functions that provide us with goods and services

Wetlands

- Flood control
- Groundwater refill
- Water purification
- Erosion control
- Recycling nutritious elements
- Hotbeds of biodiversity

Forests

- Filters that maintain water and air quality
- Forests slow down and retain up 20 % of water flow
- Minimize erosion and stream sedimentation
- Stock up water in the ground
- Larger the proportion of forest in the watershed is, the better the water quality. (70% - 75%)
- Wildlife habitat

Goods and services in the watershed

- Water supply and the quality of our drinking water;
- Global climate regulation;
- Harvesting of timber and other natural products;
- Hunting and trapping;
- Sport and commercial fishing;
- Recreation;
- Aesthetics and spirituality;
- Education and scientific research;
- Maintaining the beauty of our landscapes - a tourist attraction that is a mainstay of our regional economy;
- Maintaining natural surroundings that contribute to our quality of life.

New York example

- When New York's drinking water no longer met the established standards, the installation cost of a filtration plant was estimated at between 6 to 8 million dollars and running costs were appraised at 300 million dollars a year.

- The city chose instead to re-establish the 'natural capital' of its watershed at a cost of only 660 millions dollars (ESA, 2000).

What to protect ?

- Forests, waterways, lakes, wetlands, biodiversity;
- Large forests (10 000 ha and more) and natural corridors;
- Ecological services for our well-being;
- Landscapes, sites of historical interest;
- The basis of the economic development of our region (tourism, forestry, real estate,…);
- Quality of life…for all.

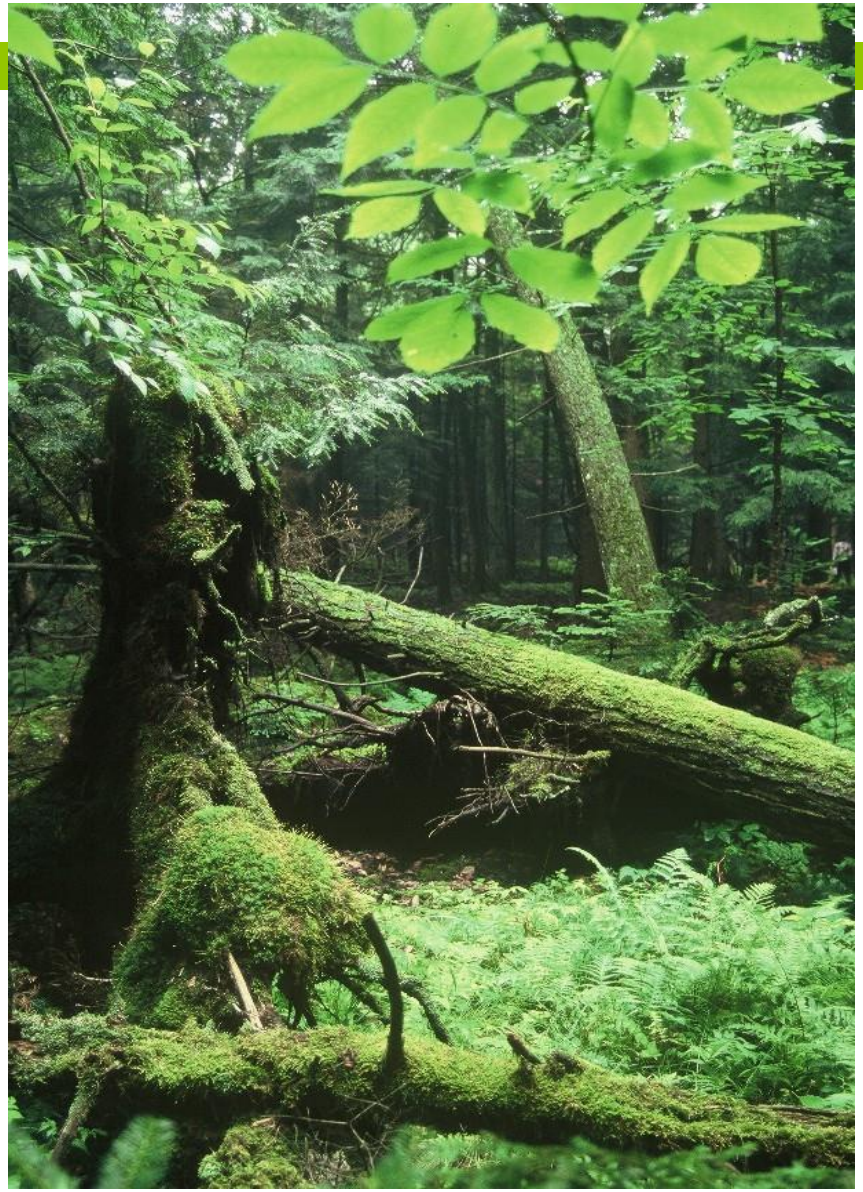
Fragile areas

- Elevation areas (350 m and up) and steep slopes(30 to 49% and 49 % and up)
- Thin soil sectors (50 cm and less)
- Lakes, streams, riperian bands and floodplains
- Wetlands.

Areas of special interest

- Rare ecosystems;
- Populations of threatened or vulnerable species;
- Essential wildlife habitat.

Exceptional forest ecosystem



Essential wildlife habitats

Deer yards

Waterbird concentration areas

Muskrat habitat

Fish habitat

Population of birds in decline

How do we protect natural areas and their functions ?

- Increase the extent of protected areas;
- Strive for balance between protection and development of the region.

2 Approaches:

- Voluntary conservation with landowners;
- Collaboration with MRC and municipalities.

Voluntary Conservation

Voluntary participation of private landowners

Taking into account:

- ❑ Landowners' personal objectives;
- ❑ Ecological characteristics of the property;
- ❑ MCI's conservation objectives.

Supporting landowners throughout the process

- Informing them of their legal options and the fiscal and financial incentives available;
- Evaluating the ecological value of the property;
- Overseeing all the actors involved: licensed evaluators, surveyors, negotiators, biologists, and numerous other partners (MDDELCC, EC, etc…);
- Obtaining funds to finance the process;

- **Protecting the property in perpetuity !**

Conservation options

- Acquisition
- Donation
- Donation of servitude
- Acquisition of servitude
- Private nature reserve status

Collaboration with Stanstead Township, Ogden and the MRC

Working in partnership with the municipalities and the MRC

- Integrating the concept of conservation in all steps of the planning process and management of the territory;

- Improving the management master plan, urban plan and regulations taking into account natural areas and high stress zones.

Residential development models to be encouraged

- Re-evaluate the type of development in relation to the impacts of deforestation, drainage, availability of potable water and the carrying capacity of any bodies of water;

- Study different development models, such as Growing Greener, Cluster Development, etc.

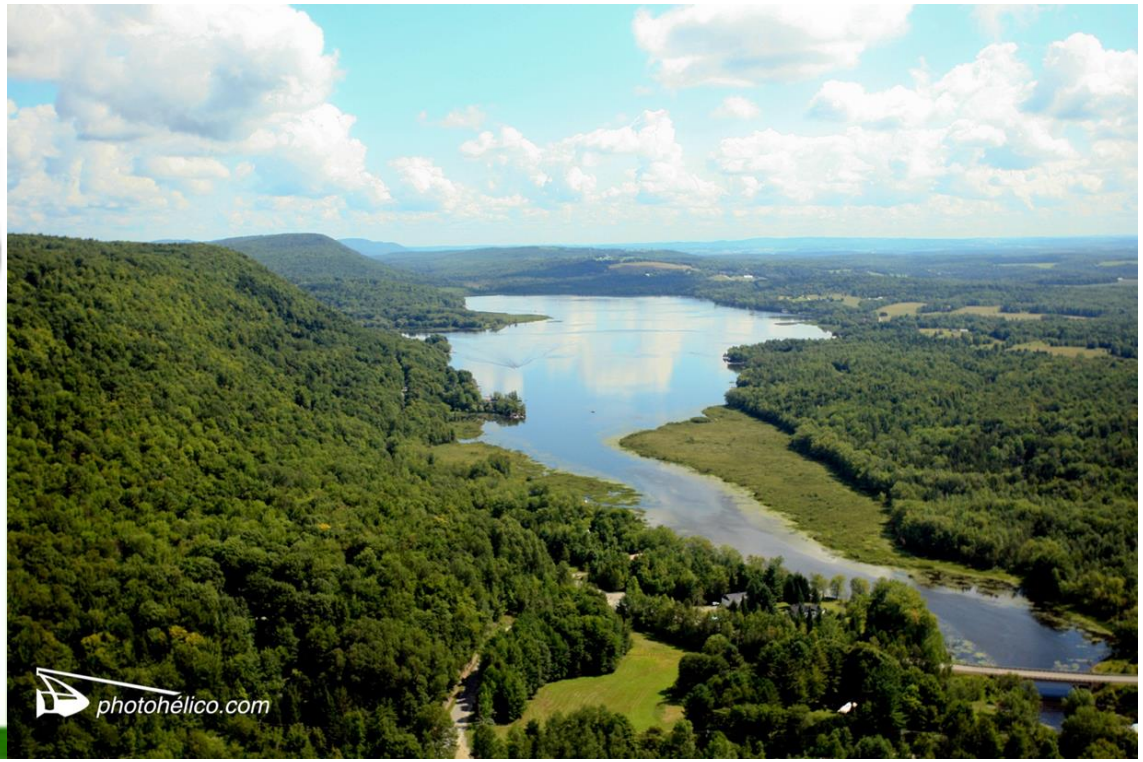
Some examples:

- Production of a conservation plan for the City of Magog and the municipalité of Austin;
- Delineation of the Millington wetland in Austin;
- Characterization of wildlife corridors - Castle Brook and Cherry River in Magog and Orford.

Conclusion

- Protect natural areas, biodiversity and ecological functions;
- Recognize that ecological goods and services benefit our well-being;
- Encourage private landowners and municipalities to take part in the conservation process.

Collaborations needed



Collaborations needed

MCI and…

- Stanstead Township
- Ogden
- MRC Memphremagog
- Governments (MDDELCC, MAPAQ,…)
- COGESAF
- Farmers
- Foresters
- Developers
- Users of the bay
- Residents of the watershed

Next steps

1. Complementary and joint action plan (May 2015)
    - Updated diagnosis
    - Prioritization of the actions
    - Assignment of roles and responsibilities

2. Implementation of the actions (2015-2020)

MEMPHRÉMAGOG CONSERVATION INC.

Healthy Fitch Bay:

From Diagnoses to Solutions

We are working together!

Discussion

- Have you noticed improvements or deterioration in the environment over the years?
- Can you think of any other possible actions to ensure the health of Fitch Bay?
- What are the priorities to ensure the health of Fitch Bay?
- What role should the residents of the Fitch Bay watershed play in ensuring its health?

Watershed residents should

- Respect the integrity of shoreline buffer zones and renaturalize artificial landscapes (for example shoreline rock walls)
- Minimize the amount of lawn in relation to areas with natural vegetation
- Adequately build and maintain docks
- Limiting the use of fertilizers and pesticides
- Ensure the capacity and effectiveness of septic installations
- Protect and avoid overtaxing septic installations
- Conserve natural environments
- Get involved in the protection of Fitch Bay and its watershed:
  - Report abusive practices to the inspector
  - Spread the word about good environmental practices
  - Get involved with organizations who aim to ensure the health of Fitch Bay

Comments/questions?

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