Missisquoi Bay Basin Project

Identification of Critical Source Areas of Phosphorus Pollution

Background and Task Description

International Joint Commission Public Hearings

November 15th (Swanton, VT, US) and November 16th (Clarenceville, QC, CA)

Lake Champlain Basin Program

- *The **Lake Champlain Basin Program** (LCBP) is a federal, state, provincial, and local initiative to restore and protect Lake Champlain and its surrounding watershed for future generations.*

- *With funding and guidance from the **International Joint Commission**, through an appropriation by US Senator Patrick Leahy, the LCBP will undertake a new task to identify critical source areas of phosphorus pollution entering Missisquoi Bay.*

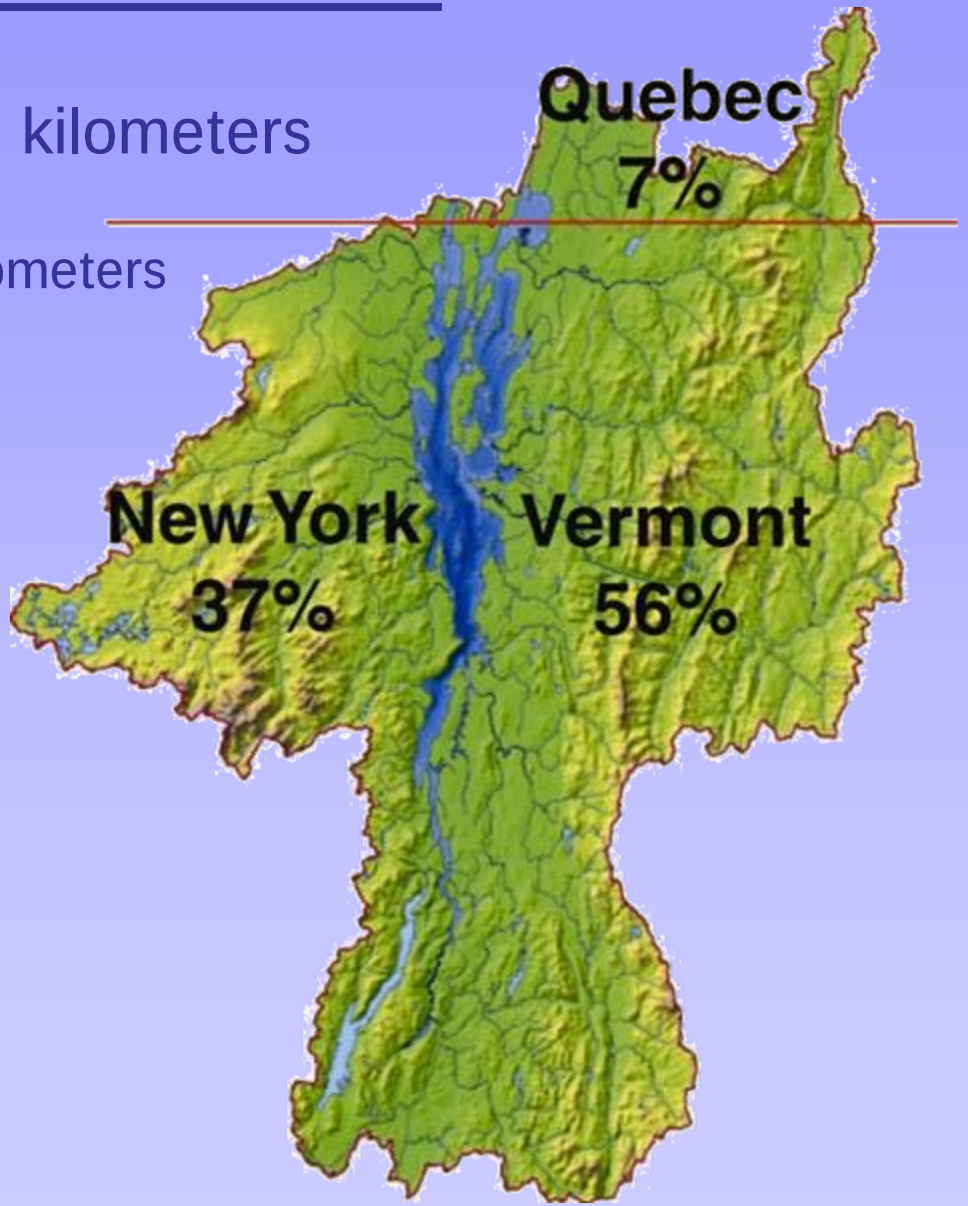
- *A better understanding of the location and nature of critical source areas of phosphorus loading will enable limited management resources to be more effectively allocated to projects and locations where they will do the most good.*

The Lake Champlain Basin

The Basin: – 21,326 square kilometers

The Lake: – 1,127 square kilometers

- Over 122 meters deep
- 965+ kilometers of shoreline
- 193 kilometers long



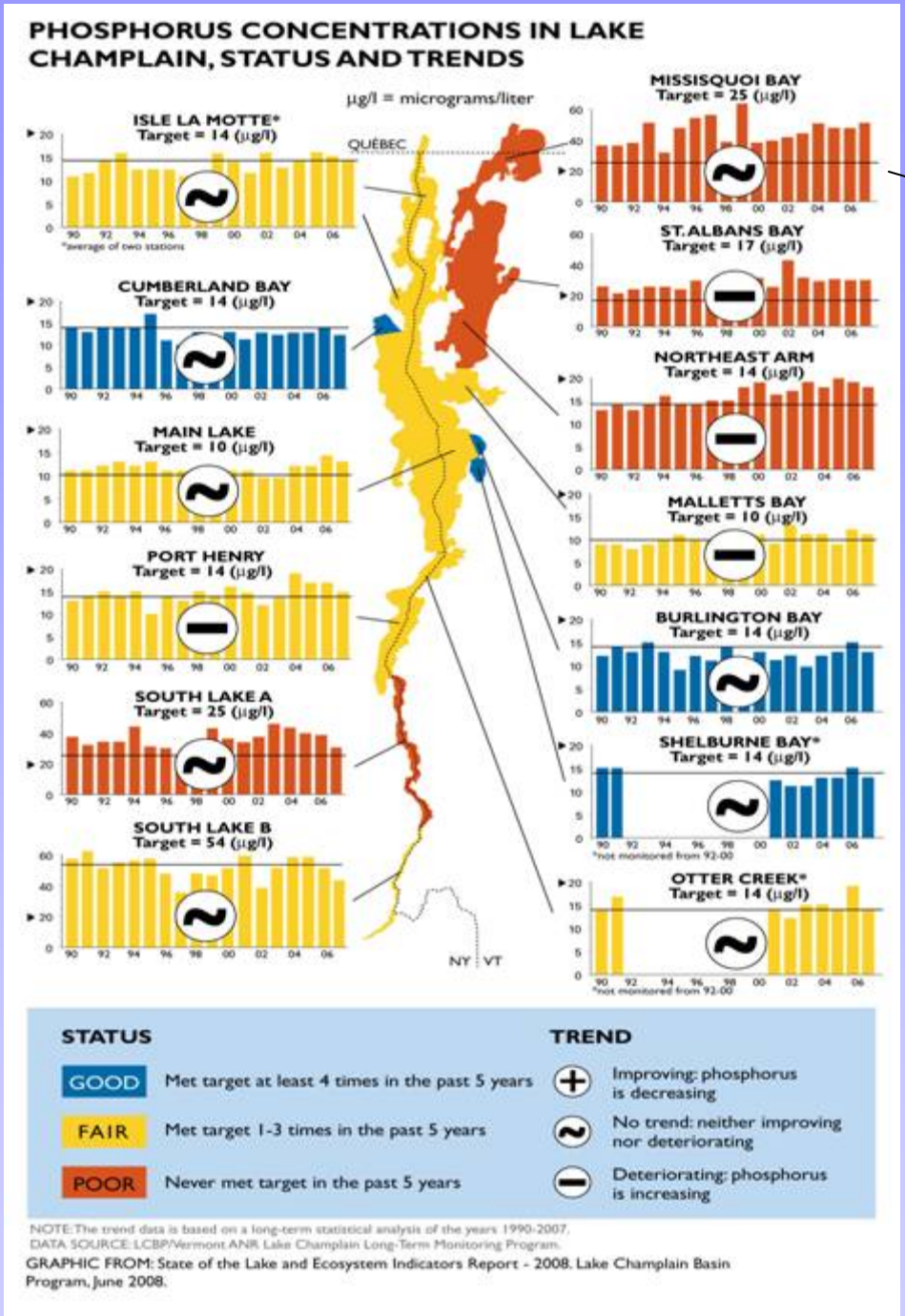
Why is Phosphorus such a Problem?

- **Phosphorus levels are too high** in much of the Lake due to human activities, especially in ***Missisquoi Bay***, *the Northeast Arm and South Lake*.

- **Vermont and Quebec have agreed on Water Quality Standards** and set P concentration criteria for each lake segment, to serve as the management goals

- The **Total Maximum Daily Load (TMDL)** is the plan to reduce phosphorous loads to the lake
  - Set by VT and NY in 2002
  - Estimates the amount of P the Lake can receive without impairing the water quality and use

- **Great reductions** have been made with Sewage Treatment Plant upgrades, but **challenges remain** from nonpoint source runoff



Missisquoi Bay

- **Greatly exceeds P target**
- **Frequent Seasonal Bluegreen Algae blooms**

What does excess P do to the Lake?

- **P is an essential nutrient**
- **Excess P accelerates eutrophication**
- **Excess P threatens water quality, living organisms, and human use and enjoyment of Lake Champlain**
- **Excess P causes excessive growth of algae**

<u>Algae Blooms</u>:

- **Turn water green, reduce transparency, create odor problems;**
- **Sometimes produce toxins dangerous to human health;**
- **Deplete oxygen through cell decomposition;**
- **Can damage habitats for fish and other wildlife.**

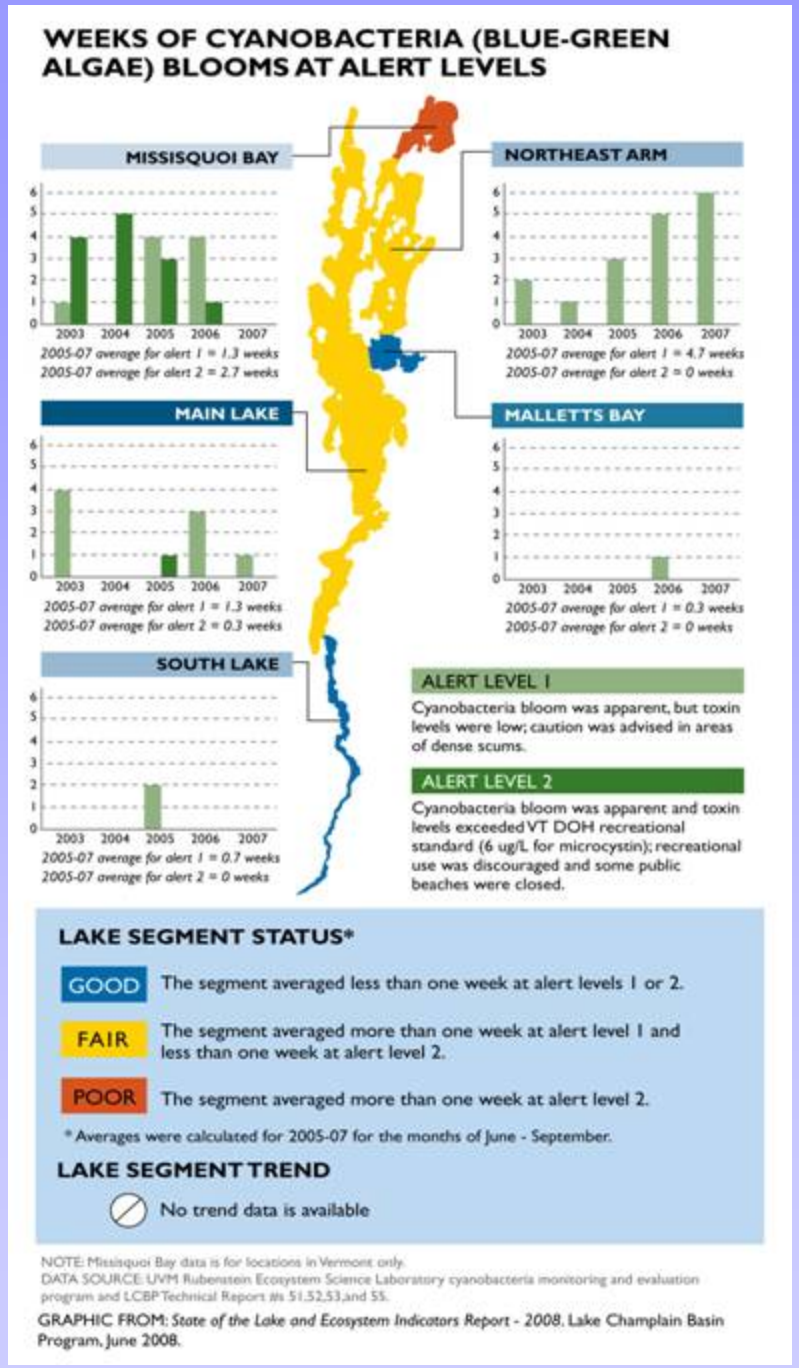
The Blue-green Algae Problem

A Health Risk?

Yes, especially in Missisquoi Bay, St. Albans Bay, and smaller northeastern bays, but most of Lake has never had a dense bloom.

Skin irritant at low exposure levels. If ingested in quantity: gastrointestinal problems and serious liver/nervous system damage.

Alert System relies on collaborative research funded by LCBP and the Province of Quebec.



Treatment Plants and Phosphorus Discharges

Wastewater discharges were a relatively small source of P loading to *Missisquoi Bay* during 2002-2005

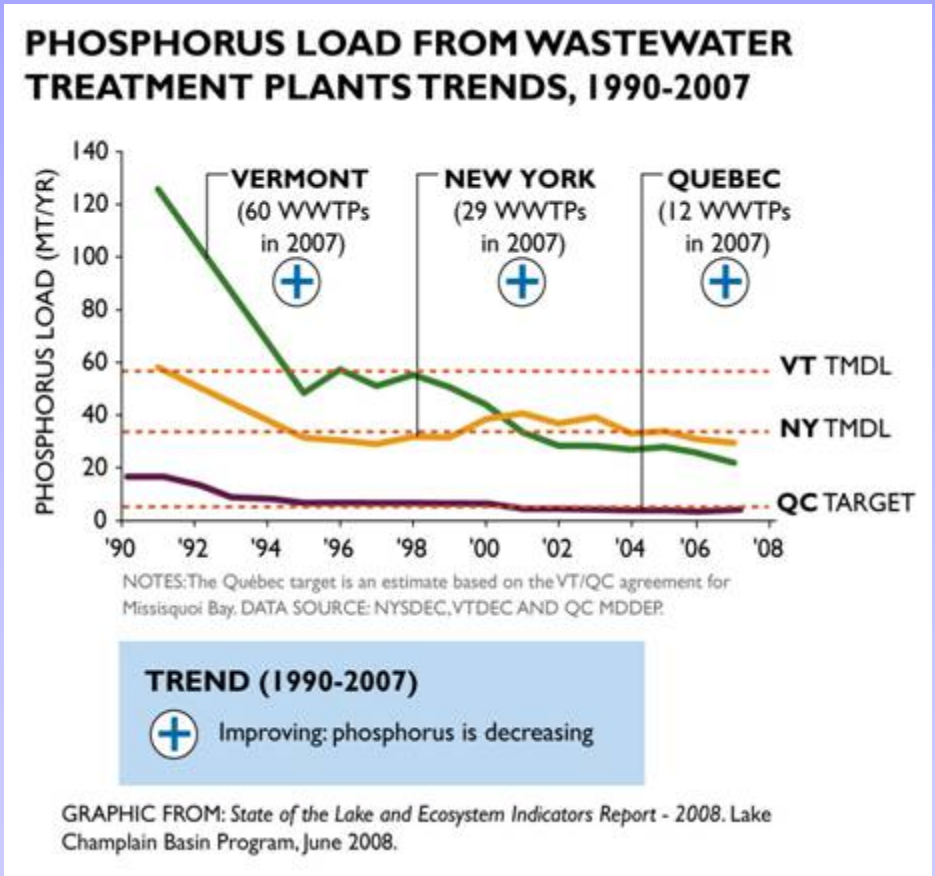
–Vermont =1.6%

(73% reduction since 1991)

–Québec = 3.1%

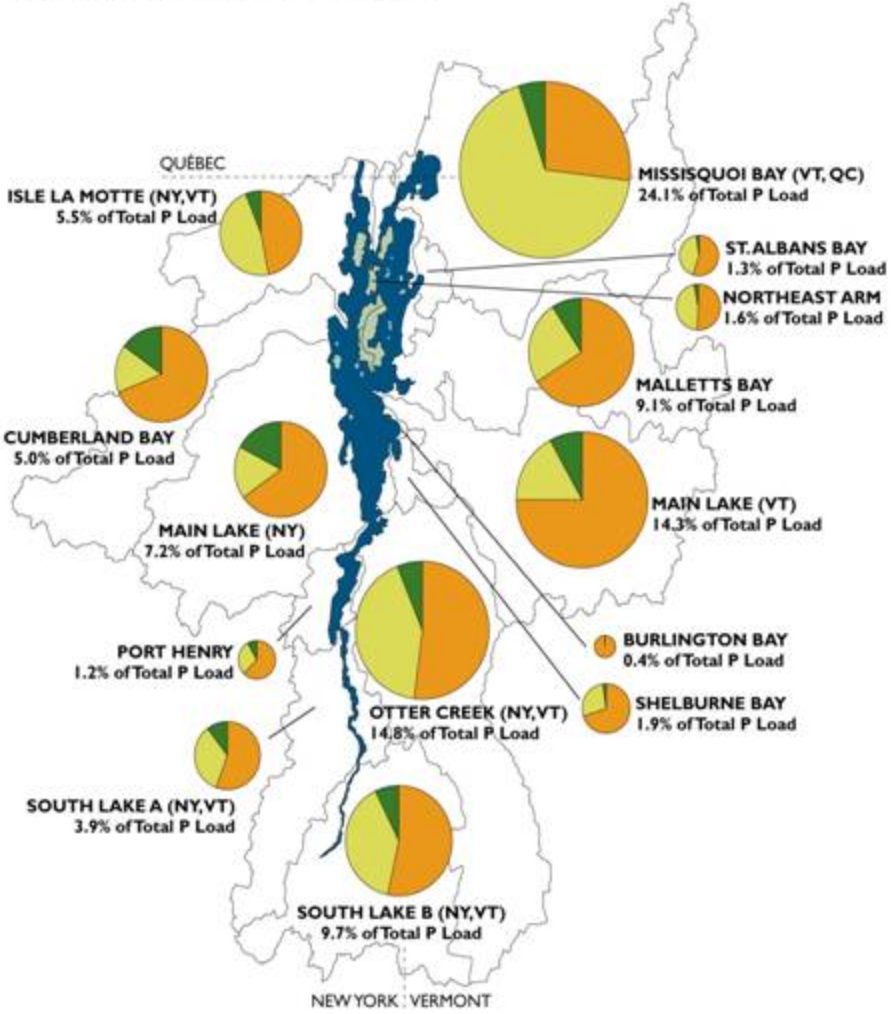
(74% reduction since 1991)

Data below apply to the *whole* Lake



GRAPHIC FROM: *State of the Lake and Ecosystem Indicators Report - 2008*. Lake Champlain Basin Program, June 2008.

ESTIMATED NONPOINT SOURCE PHOSPHORUS LOADING BY LAND USE TYPE



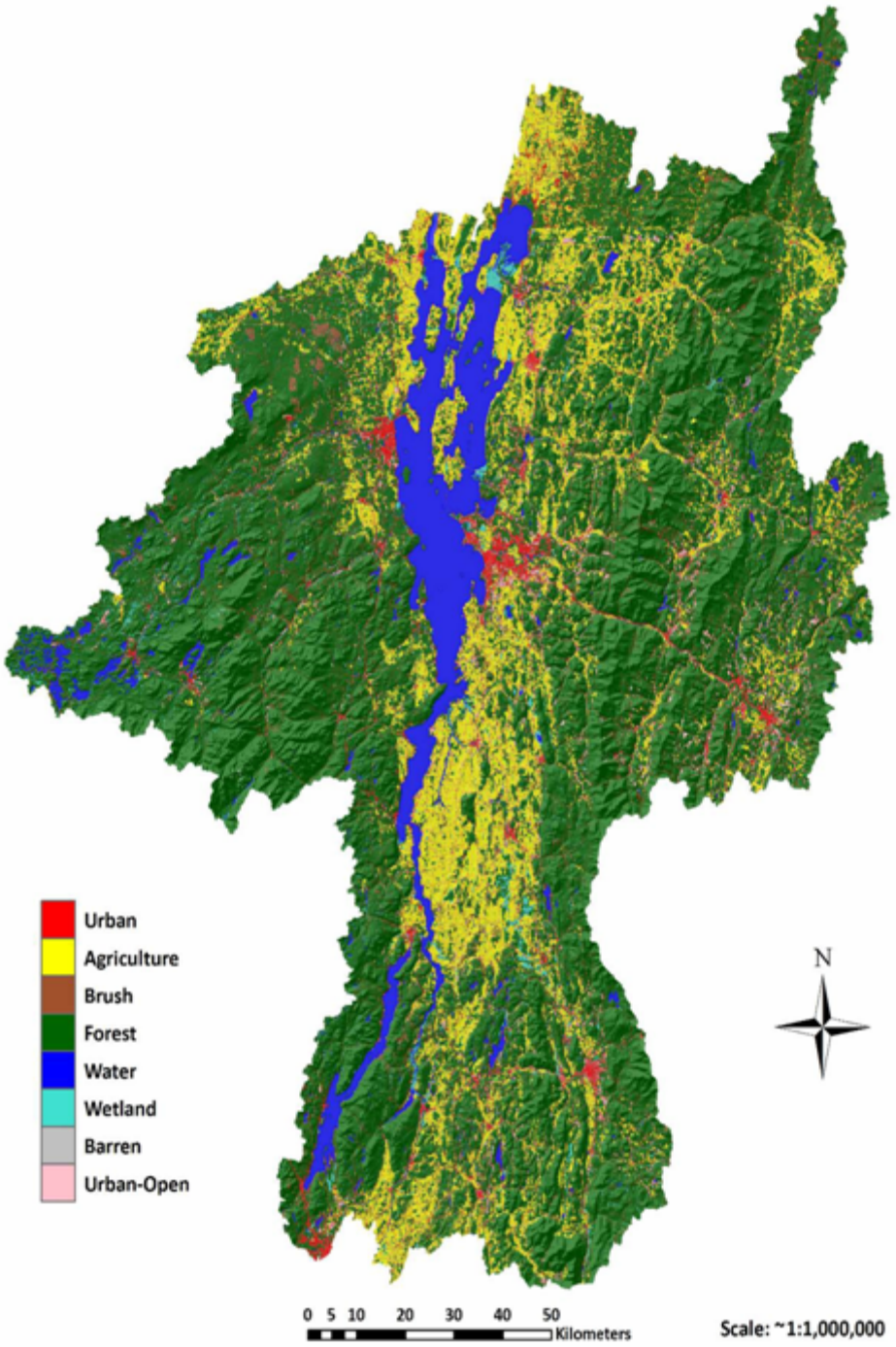
LAND USE TYPES

DEVELOPED
All roads, cities, suburbs, lawns and large-lot buildings.

AGRICULTURE
Crop and livestock production.

FORESTED
Areas covered primarily with trees.

NOTE: The land use data is from 2001 satellite imagery— the most recent comprehensive and complete data for this region.
DATA SOURCE: Updating the Lake Champlain Basin Land Use Data to Improve Prediction of Phosphorus Loading. LCBP Technical Report #54. May 2007. Page 45, Table 2-11.
GRAPHIC FROM: State of the Lake and Ecosystem Indicators Report - 2008. Lake Champlain Basin Program, June 2008.



Land Use and Phosphorus Loading

- ***Missisquoi Land Use - 2001***
  - Urban/suburban 7%
  - Agricultural 22%
  - Forest 66%

  (not including wetlands, waterbodies and barren lands)

- ***Missisquoi Phosphorus loading estimates - 2001***
  - Urban/suburban 27%
  - Agricultural 68%
  - Forest 05%

***Updating the Lake Champlain Basin Land Use Data to Improve Prediction of Phosphorus Loading*.**
LCBP Technical Report #54. A. Troy et al. University of Vermont. 2007

Much Work Done to Date

- **Vermont and Quebec have agreed on Water Quality Standards** and set P concentration criteria for each lake segment, to serve as the management goals.

- **Vermont and Quebec have agreed to share responsibility** to reduce excess phosphorus loading. The agreement states that Vermont will have 60% of the responsibility for reducing phosphorus loads to the Bay, and Quebec will assume 40% of the responsibility. Accordingly, the target phosphorus load for Vermont will be 58.3 metric tons per year (mt/yr), and the target load for Quebec will be 38.9 mt/yr.

- **For Vermont, (60%)** the required **Total Maximum Daily Load (TMDL)** for phosphorus reduction is a bi-state agreement with New York, approved by the US EPA. The TMDL estimates the amount of P the Lake can receive without impairing the water quality and use, and plans to reduce daily P loads to that level. Vermont's **Clean and Clear** program is working closely with **USDA NRCS** to reduce P loads.

- **For Quebec (40%)** all farms have been visited and audited for management practice compliance. Several new wastewater treatment plant upgrades have been completed.

Examples of on-going work by partners: Vermont Clean and Clear Action Plan

The ***Vermont Center for Clean and Clear*** was created in 2007 to focus especially on the northern Lake Champlain watersheds.

Recent Clean & Clear Actions:

- **Obtained high-resolution aerial photography and LiDAR data in part of the Missisquoi and St Albans watersheds to support critical source area identification.**
- **Supported USDA-EQIP projects to improve water quality on farms.**
- **Conducted a resource inventory of small farms.**
- **Developed strategic stormwater retrofit pilot projects.**
- **Completed geomorphic assessments and implemented targeted stream restoration projects.**
- **Enhanced watershed monitoring in the Rock River watershed.**
- **Opened a local office in St. Albans**

Examples of on-going work by partners: Quebec – MDDEP, MAPAQ and IRDA

Quebec has invested over $9.6M invested in a government action plan

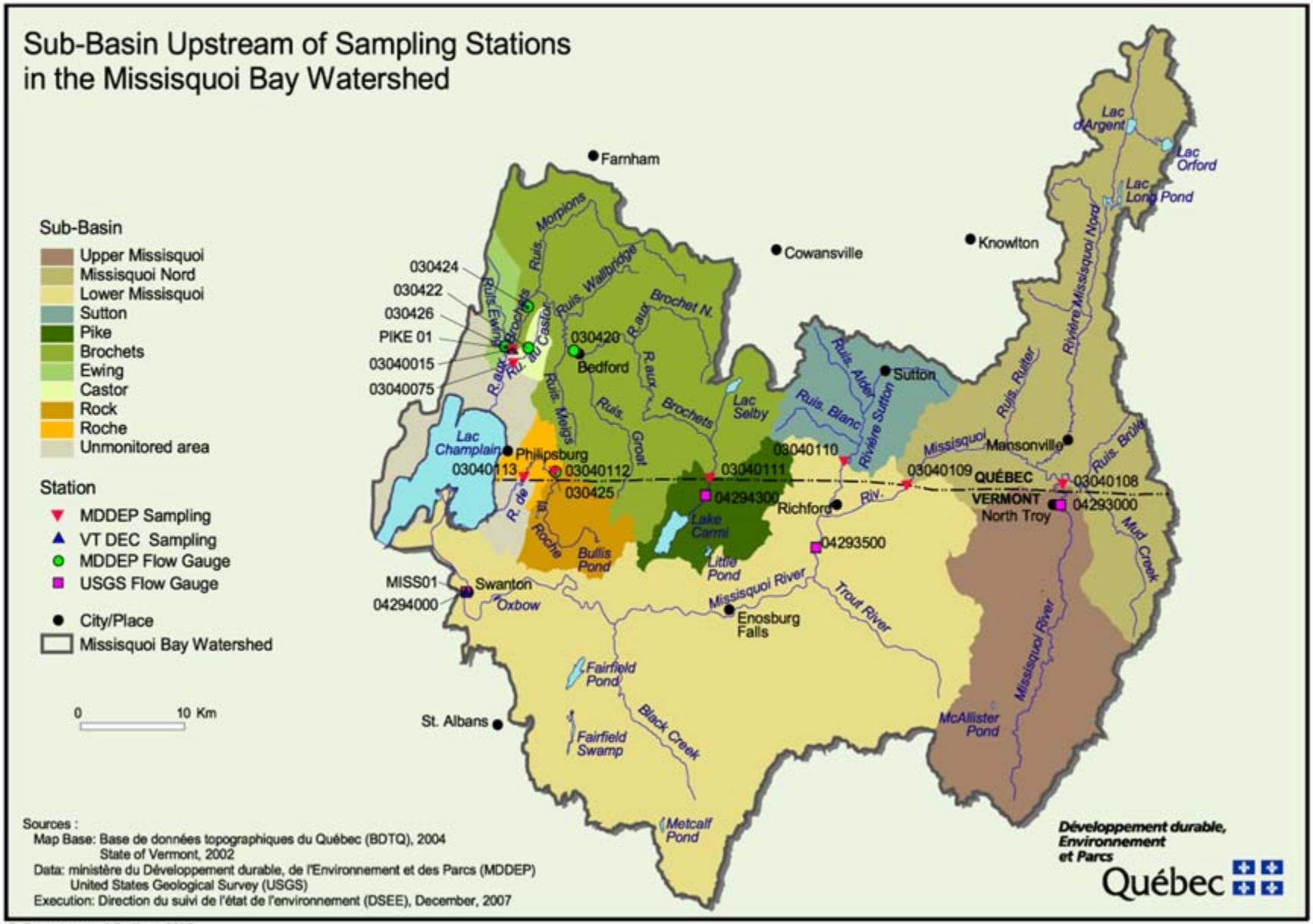
<u>Recent Quebec Actions:</u>

- **Preserve *914 ha* of wetlands or woodlands for protected areas**
- **Construct and upgrade wastewater management infrastructure. All wastewater treatment plants provided for in the program will be operational by the end of 2009**
- **Inspect all *831 farms* in the watershed**
- **Educate and raise public awareness through communication programs in schools and through various events, including by supporting the activities of the *Missisquoi Bay Watershed Corporation* (CBVBM)**
- **Reduction in phosphorus concentrations in *Rivière aux Brochets,* following beneficial effects of the treatment of point sources and other pollution control measures taken since 1991 in the watershed**

Examples of on-going work by partners: Quebec – MDDEP, MAPAQ and IRDA

Recent Quebec Actions:

- **Increase the number of farms that belong to an agri-environmental club and have an agri-environmental plan to *229.***
- **Inspect about *one third* of the 64 industrial, commercial and institutional facilities that are not connected to a sewer system**
- **Establish more than *78 km of 9-metre buffer strips* on farms as part of the "*Lisière Verte*" project with the *Coopérative de solidarité du bassin versant de la Rivière-aux-Brochets* and the *Quebec Department of Agriculture, Fisheries and Food* (MAPAQ)**



Identifying Critical Source Areas

Goal: Help reduce the load of phosphorus entering the Bay by identifying and delineating areas of the basin that contribute a disproportionately large amount of pollution

Three Main Tasks:

- ***Convene a Workshop and Meeting Series***
- ***Implement Short-term Tributary Monitoring***
- ***Conduct Critical Source Area Analysis***

Workshop and Meeting Series

Workshop series is designed to provide input to guide the Identification of Critical Source Areas

- Workshop 1: Tributary Monitoring
- Workshop 2: Defining CSA and Identifying the Needs of End-users
- Workshop 3: Approaches to Understanding and Modeling Phosphorus Pollution
- Workshop 4: Data –
  - what is available?
  - what is needed?
- Workgroup Meetings: RFP Development

Tributary Monitoring

- Establish 10 new monitoring locations in the Missisquoi Bay Basin to be maintained for at least 2 years
- This monitoring data is intended to assist in identifying and assessing Critical Source Areas

Critical Source Area Identification

- Project will be done through a *Request for Proposals* Process.
- The RFP will be informed by the workshop series.
- Identification of CSAs will occur through a modeling approach
  - identified by the successful applicant and
  - informed by the workshop series
  - with the benefit of available monitoring data.

Questions?

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