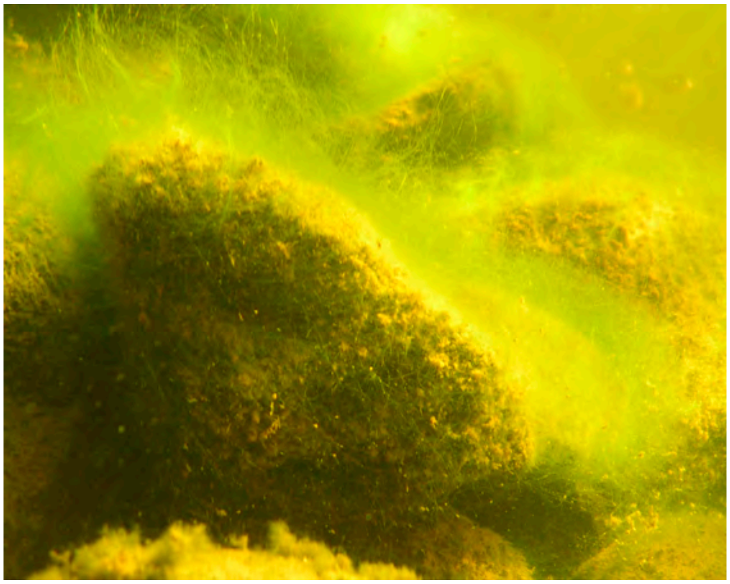
# OPERATION HEALTHY LAKE

# LAKE MEMPHREMAGOG
## VERMONT



**FINAL REPORT**
APRIL 2006

## Pictures of the front page

Top: View of the American part of Lake Memphremagog
Bottom right : *Vallisneria americana* (most important aquatic plant species of the lake)
Bottom left : Green algea on the bottom of the littoral

## How to cite this report

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# OPERATION HEALTHY LAKE

## LAKE MEMPHREMAGOG
## (VERMONT)

REALIZED BY :

Program for water quality monitoring in lakes and watercourses of RAPPEL

**Project coordinator and editor of report**
Camille Rivard-Sirois (B. Sc. Biology)

**Supervision of project and final revision of report**
Marie-Florence Pouet (Ph. D. Génie de l'Environnement)

FOR :

MEMPHRÉMAGOG CONSERVATION INC.

VERMONT
CLEAN AND CLEAR
AGENCY OF NATURAL RESOURCES

April 2006

State of Vermont

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Dear Reader,

In May 2005, Memphremagog Conservation Inc. (MCI) asked RAPPEL to present their Operation Healthy Lake report to the Quebec-Vermont Steering Committee for the Management of Lake Memphremagog, a committee established by Quebec Premier Jean Charest and Vermont Governor James H. Douglas to share information and coordinate management of the lake that crosses our border. Operation Healthy Lake is an impressive report on the condition of Lake Memphremagog in Quebec. At the conclusion of the presentation, Donald Fisher, then-President of MCI, suggested that RAPPEL be commissioned to complete the study on the Vermont side of the lake; and he offered to help pay for the study. I quickly agreed, and this report is the result of our partnership.

I would like to thank Don and MCI, as well as all those Don cites in his letter, for their contributions to the development of this wonderful report. This has truly been, and continues to be, a very productive and rewarding partnership. I would also like to extend our thanks to Newport City Manager John Ward, who provided free dockage during the study and to Vermont Fish and Wildlife Department (FWD) Chief Warden, Colonel Robert Rooks, who loaned us a Department boat to use during the study. It is also important that I mention Jack Watson who served as the capable boat captain during the study.

We believe that the complete, lake-wide Operation Healthy Lake reports provide an important base line of information that will be extremely valuable for the management of Lake Memphremagog both now and in the future.

**Canute E. Dalmasse**
Deputy Secretary

VERMONT

MEMPHRÉMAGOG
CONSERVATION INC.

Dear Reader,

In the summer of 2004, MCI commissioned RAPPEL to execute a study to examine the health of the Québec shoreline of Lake Memphremagog. The study was made public in May of 2005 and drew praise for the work done by RAPPEL. There was only one problem: the waters of the Lake respect no national boundaries.

A financial collaboration with our Vermont friends (Vermont 2/3 MCI 1/3) provided the funds for RAPPEL to repeat the Québec study; this time in Vermont.

Collaboration extended well beyond financial considerations. MCI and State of Vermont Agency of Natural Resources enjoyed a productive informal relationship with many decisions agreed to with a handshake over the phone. To this end we are indebted to Canute Dalmasse, Deputy Secretary, who recognized the value to Vermont in extending the Québec study. The end result of this was to produce for the first time a global picture of the health of Lake Memphremagog. A great partner to work with, Canute made it easy for all by ironing out potential problems as they surfaced.

Space limits a complete listing of those who helped but we must make mention of Cathy Zaccone in Vermont Senator Jefford's office in Washington DC, who was instrumental in steering us through the federal corridors of Immigration and Department of Homeland Security and Officer Beadle at U.S. Customs at Derbyline who made crossing the border every day a breeze for the RAPPEL team. Additionally, we extend our appreciation to Fritz Gerhardt of NorthWoods Stewardship Center who made available to us the results of his Vermont tributary study.

MCI Board member, Robert Benoit was on the ground every day giving tireless support on all fronts during the execution of the study.

We congratulate Camille Rivard-Sirois and her RAPPEL team for once again producing a professional, first-rate study. A better job could not have been done.

**Donald Fisher**
Vice-President

Regroupement des associations pour la protection de l'environnement des lacs
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Dear Reader,

For the past ten years, the group RAPPEL has implemented a water quality monitoring program for lakes and watercourses to carry out its mission of protecting and restoring the aquatic milieu.

This year, RAPPEL has again been pleased to work on a diagnosis of the state of health of Lake Memphremagog, thereby completing the study begun in 2004 in partnership with MCI, and in 2005 with the contribution of the Vermont Agency of Natural Resources.

As in 2004, Operation healthy Lake (Vermont), was carried out by Camille Rivard-Sirois and her team of biologists. Their enthusiasm for the mission and attention to making all the actors in the milieu aware of the importance of the scientific findings have been important to its success.

I would also like to thank Donald Fisher and Robert Benoit most sincerely for offering RAPPEL the chance to promote and export its skills and knowledge to Vermont, thereby making it possible to carry out a complete study of Lake Memphremagog, on both sides of the border. This important study for MCI and the Vermont Agency of Natural Resources is the first step in developing a global action plan to preserve Lake Memphremagog and to restore fragile zones.

RAPPEL is proud to have been called upon to meet this challenge. Many thanks to all who have contributed to the success of this important "first"!

**Marie-Florence Pouet**
Director of the program for water quality monitoring in lakes and watercourses
RAPPEL

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# Summary

Lake Memphremagog, renown for its natural beauty and ecological value as well as the recreational and vacation activities it offers, is a major force for the local economy on both the Quebec and Vermont sides. Different users and managers on both sides of the border are concerned about the health of the lake, and believe it is necessary to assess its state of health.

This is why, in 2004, Phase 1 of Operation Healthy Lake (Opération santé du lac), a report on the health of the Quebec part of Lake Memphremagog, began. In 2005, the Vermont phase of this operation was carried out, this time at the American part of the lake. This completed Phase 1 and allowed us to draw up a report on the health of the American part of the lake. This sector is of particular importance to the overall health of the lake, because the majority of waters that drain into the lake come from Vermont.

The diagnosis is based on the condition of the lake shores, water quality, the condition of the main tributaries and the condition of the littoral zone (sediments, aquatic plants and green algae). The inventory of the condition of the littoral and the shore was carried out by a team from the group RAPPEL* for the entire American part. Altogether nearly 900 portions of the littoral (transects) and 300 portions of the shore were inventoried. The results of the physico-chemical tests of lake's waters carried out every year by the MDDEP* were integrated into the study. Finally, we have incorporated a water quality report for the four main rivers on the US side which were tested in 2005 by NWSC*.

The results of Operation Healthy Lake (Vermont) show that this sector presents significant symptoms of erosion and accelerated eutrophication. Much of the shore has been cleared and de-naturalized. The waters of the lake are mesotrophic. Moreover, the John's, Black and Barton Rivers carry disquieting quantities of phosphorous and suspended matter. Finally, a number of regions of the littoral present a considerable accumulation of fine particles, a proliferation of aquatic plants, significant communities of Eurasian watermilfoil (a species considered invasive) and abundant green algae.

In all, six zones have been identified as top priority: South Bay, the narrows at Newport, Derby Bay, Holbrook Bay, the bays at Lake Park and Maxfield Bay. These are zones that are naturally susceptible to premature eutrophication. However, degradation in these zones is of human origin. We would note particularly the de-naturalization of the shores as well as the sediment and nutrient load from a variety of activities in the watershed.

With this in mind, it is important to take effective action to reduce the sediment and nutrient loads and to limit soil erosion in the drainage basin (by controlling sediments). Each of the players (shorefront property owners, managers of the territory, foresters, farmers and entrepreneurs) must play a role. Protecting the shoreline zones, protecting soils from erosion, re-naturalizing shores that have been altered by human activity (replanting and allowing them to return to a natural state), avoiding the use of garden and agricultural fertilizers and pesticides near the lake and its tributaries, and managing ditches in a more ecological manner - these are some of the solutions to consider.

* **RAPPEL** : Regroupement des associations pour la protection de l'environnement des lacs et des cours d'eau de l'Estrie et du haut bassin de la rivière Saint-François
**MDDEP** : Ministère du Développement Durable, de l'Environnement et des Parcs du Québec
**NWSC** : NorthWoods Stewardship Center (Ecosystem Management Project)

# Thanks

Many people and groups have helped to make *Operation Healthy Lake Memphremagog (Vermont)* a success. I would like to offer special thanks to the following:

**Marie-Forence Pouet**, director of water quality monitoring for lakes and bodies of water at RAPPEL, who supervised and edited the final report.

**Canute E. Dalmasse**, Deputy Secretary **Vermont Agency of Natural Resources**, for his assistance and support in carrying out this project and arranging for work permits.

**Memphrémagog Conservation Incorporé (MCI)**, in particular: **Donald Fisher**, Robert Benoit, Gisèle Lacasse-Benoit for their exceptional participation to all the steps of the project.

The firm **Iulus**, particularly **Hugues Brizard**, director of information systems, for developing an information system for the capture and mapping of our results which has greatly contributed to the effectiveness of the project.

**Vermont Department of Fish and Wildlife** for making available to us a boat to carry out an inventory on the condition of the littoral and shoreline.

The **NorthWoods Stewardship Center**, in particular **Fritz Gerhardt**, for providing the physico-chemical data on water quality in the tributaries.

The **MDDEP**, particularly **Marc Simoneau**, aquatic milieu analyst, for providing data on the water quality of the lake.

The **board of directors** and the **executive committee of RAPPEL**, especially Diane Pratte and Josée Beaurivage, in charge of the project administration.

**Christian Desgané**, **José Audet-Lecouffre** and **Isabelle Nault**, who carried out the land inventory on the condition of the littoral and shoreline.

**Jack Watson,** responsible for handling the boat during the land inventory.

**Christina Richards** for translating the report.

Your collaboration has been a part of our success. Many thanks to all !

Camille Rivard-Sirois, Biologist
Coordinator for Monitoring water quality in lakes and watercourses
RAPPEL

# The Problem Defined

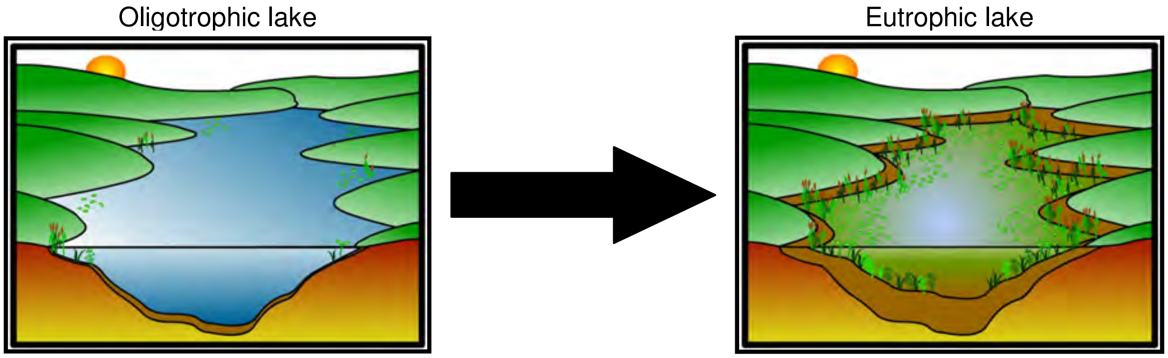
Renown for its natural beauty and ecological value as well as for the recreational and vacation activities it offers, Lake Memphremagog is very important to the local economy for residents of Quebec and Vermont. The lake, like many bodies of water in the region, is subject to various human pressures (urban development, seasonal-recreational development, agricultural and forest activities) that lead to deterioration of water quality.

One of the consequences of human activity is excessive nutrient and sediment load. The **nutrient load** of elements such as phosphorous and nitrogen from poorly maintained septic systems and excessive use of fertilizers, among other causes, is responsible for the accelerated eutrophication of the lake. The **sediment load**, essentially caused by soil erosion in the drainage basin, silts up the bottom and also contributes to accelerated eutrophication of the watercourse.

Eutrophication is a process of transformation, of aging of lakes, characterized by an increase in the productivity of a lake, specifically the growth of aquatic plants and algae (Hade, 2003). This is a natural geological phenomenon, but here it is speeded up by the nutritive materials and sediments carried as a result of various human activities (see figure 1).

In a young and healthy stretch of water, the nutritive elements are present in low concentrations and ensure normal growth of aquatic plants and microscopic algae (phytoplancton). When phosphorous becomes too abundant, it causes excessive growth of aquatic plants. The invasion of aquatic plants and algae causes a deterioration of water quality. This affects the aesthetic quality, the taste and smell of water, and it changes the composition of aquatic fauna present, including the types of fish that are of interest to anglers and sports fishermen (Hébert et Légaré, 2000). The health and longevity of a body of water and the various type of human use are therefore greatly affected by eutrophication.

**Figure 1**: Eutrophication of a lake



Natural process: **tens of thousands of years**

Process accelerated by the pressure of human activities: **tens of years**

# Chapter 1: Methodology

## 1.1 Description of the Project and its Objectives

The health of Lake Memphremagog is of concern to different stakeholders in the region, which is why various groups on both sides of the border analyze the quality of its waters. Among others, the Ministère du Développement durable, de l'Environnement et des Parcs du Québec (MDDEP) in collaboration with Memphremagog Conservation Incorporated (MCI) has surveyed water quality in the deep parts of the lake for a number of years.

Water is only one of the components of a lake. A lake is an aquatic ecosystem characterized by different components: it is a physical place or habitat (shores, bottom …), plant populations, animal populations and water. To learn more about these other components of the lake, *Operation Healthy Lake Memphremagog (phase 1)* was set up in the summer of 2004. A year later, *Operation Healthy Lake Memphremagog (Vermont)* began to complete Phase 1 and to provide a diagnosis of the health situation on the American side of the lake.

Figure 2 presents a general description of the project *Operation Healthy Lake Memphremagog (Vermont)*. This project is intended to draw up a baseline portrait of the health of the lake on the American side, to identify the main degraded sectors and to determine the indicators that would allow a proper monitoring of its condition. To do this, two main steps in data acquisition are identified:

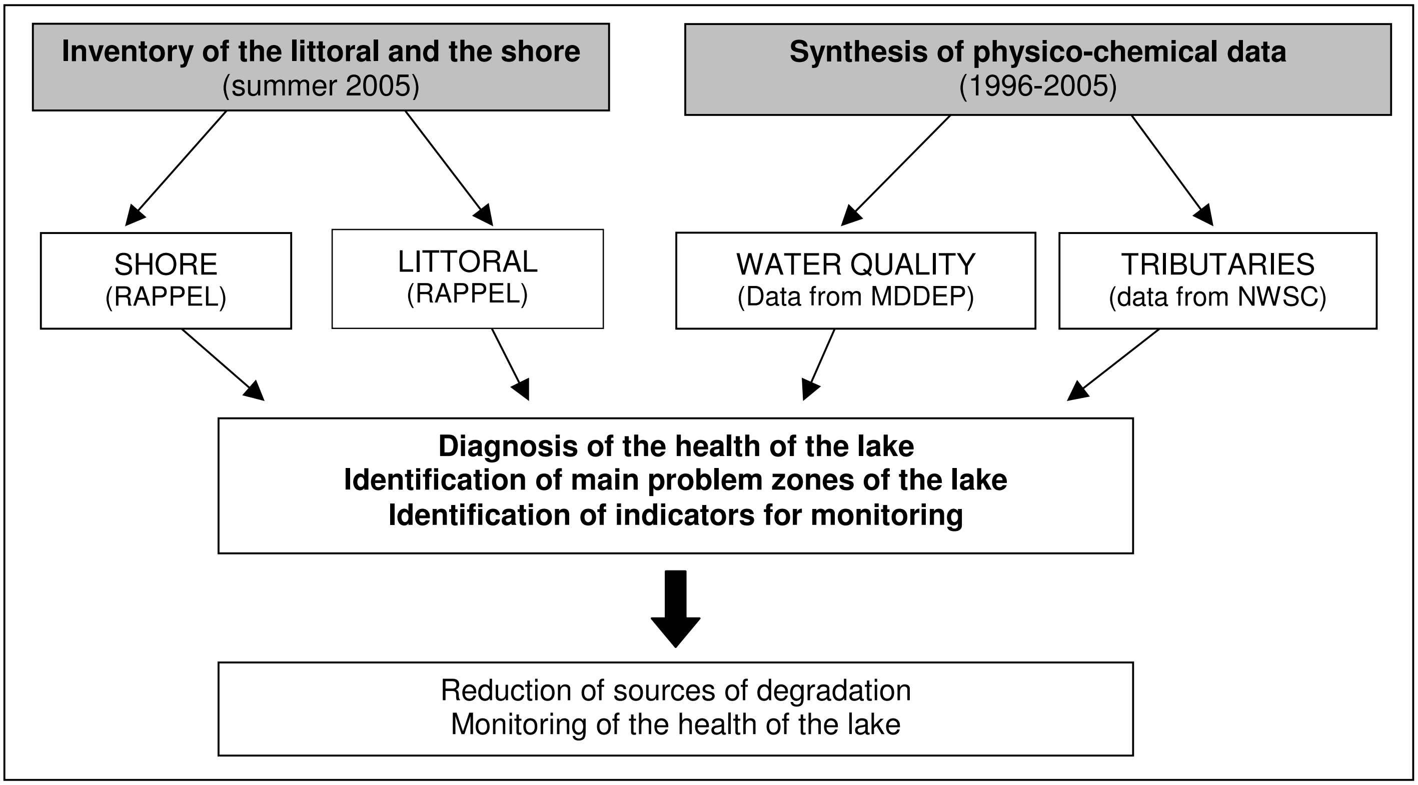
- An **inventory of the condition of the littoral and the shore** by a team from RAPPEL.
- Integration of a **synthesis of physico-chemical analyses** carried out by the MDDEP and NWSC.

These two steps covered data gathering on the state of the following 4 components of the lake:

- The **shore**, since the shore is an integral part of the lake and plays a very important ecological role. The "artificialization" of the shore (transformation for human purposes) harms the health of the lake by contributing to erosion, by bringing nutritive elements into the lake and by warming the shallow waters.
- The **littoral zone**, because this is the first zone of the lake to show signs of degradation (accelerated eutrophication and erosion in the watershed). Moreover, this zone serves as a habitat for many aquatic animals and its degradation leads to harmful consequences for biodiversity in the lake.
- The **waters of the lake**, because the analysis of water quality makes it possible to draw up a global picture of the condition of the lake and to determine its trophic level.
- The main **tributaries**, because the analysis of the quality of their waters makes it possible to identify the load of pollutants, such as nutrients and sediments.

Finally, this project is part of a strategy to monitor the changes in eutrophication of the lake in the medium and long term, and to identify and reduce the sources of degradation of the lake. This report will be a tool to inform interveners from the surrounding area about the health of the lake and to mobilize them around possible solutions, with the objective of protecting and using, in the most sustainable way possible, this wonderful treasure in our midst, Lake Memphremagog.

**Figure 2**: General description of the project



**RAPPEL** : Regroupement des associations pour la protection de l'environnement des lacs et des cours d'eau de l'Estrie et du haut bassin de la rivière Saint-François

**MDDEP** : Ministère du Développement Durable, de l’Environnement et des Parcs du Québec

**NWSC** : NorthWoods Stewardship Center (Ecosystem Management Project)

## 1.2 Parameters Studied

Table 1 gives a brief description of the parameters studied to determine the condition of the shore and littoral. Table 2 presents the different physico-chemical parameters analyzed to determine water quality in the lake, and the condition of the tributaries.

**Table 1**: Parameters studied during the inventory of the shore and littoral
(Source: Hade, 2003; Haury, 2000; Meunier, 1980)

| Parameters | Description |
|---|---|
| Degree of artificialization of the shore | • Percentage of the area of the shore occupied by artificial structures or facilities on portions of the shore measuring approximately 100 metres long and 10 metres wide.<br>• Artificial elements: Facilities or structures developed and maintained by people (structures made of concrete, wood or other inert material, buildings, riprap, fill, sand brought in, lawn and flower bed maintenance, etc.).<br>• Artificialization of the shores interferes with the health of a stretch of water by promoting erosion, bringing nutritive elements into the lake and warming shallow waters. |
| Sediments from the littoral | • Material (mineral and organic materials) that cover the bed of a body of water, made up of suspended solids (SS) which fall to the bottom and accumulate.<br>• Made up of coarse materials (boulders, shingles, gravels, sands, vegetal debris) and fine particles (clay, silt and fine organic materials).<br>• The **type of sediments** (substrate) characterizes the condition of the aquatic habitat (governs rooting and development of aquatic plants, forms the living environment of organisms at the bottom and is a spawning ground for various fish).<br>• The **thickness of fine sediments** (sedimentary accumulation) results from soil erosion in the watershed as well as decomposition of plants and other organisms in the body of water. Thus a large sedimentary accumulation is a visible sign of excessive deposits of soil particles and organic materials. |
| Aquatic plants on the littoral | • Large (macroscopic) vascular plants having leaves, a stem and roots.<br>• Role: to filter particles in suspension and nutritive elements, provide a habitat and food for various species of fauna (They are essential to an aquatic ecosystem).<br>• Biological indicators of water quality and the trophic level.<br>• The **density of beds of aquatic plants** (the percentage of coverage) and the **diversity of species** (relative abundance of species and the presence of invasive species) indicating the trophic level of the lake. |
| Green algae on the littoral (periphyton) | • Algae: Aquatic plants without real leaves, stems or roots.<br>• Green algae: Groups of algae that are coloured green and have a web-like texture.<br>• Periphyton: Algae that attach themselves to a solid substratum (rock, plants, boats, dock, etc.).<br>• Generally of microscopic size (invisible to the naked eye), but in the presence of human inputs of phosphorus, they adhere and form macroscopic masses.<br>• The **presence of green algae masses visible on the lake bottom** constitutes a biological indicator of local nutrient pollution. |

**Table 2** : Physico-chemical parameters analyzed
(Source: Hade, 2003; Hébert et Légaré, 2000; Lévêque, 1996)

| Parameters | Description |
|---|---|
| Transparency of water | • Depth of the water column as far as light penetrates<br>• Parameter measured at the trench, using a Secchi disk.<br>• Parameter to determine the trophic level of the waters of a lake.<br>• Parameter influenced by the abundance of dissolved organic components and suspended solids that colour the water or make it turbid. |
| Total Phosphorus (TP) | • Phosphorus: An essential nutritive element (nutrient) for living organisms that causes excessive growth of aquatic plants (premature eutrophication) when it is too abundant.<br>• TP: All the different forms of phosphorus (dissolved and associated with particles) measured in a water sample taken from a lake or tributary.<br>• Makes it possible to determine the trophic level of the waters of a lake and to detect the presence of nutritive pollution in a tributary.<br>• Sources: Domestic fertilizers, agricultural fertilizers, municipal and industrial waste waters, improper and inadequate septic systems, and abusive forestry cuts. |
| Chlorophyll *a* | • Pigment in all organisms that carry on photosynthesis including specifically microscopic algae in suspension in water (phytoplancton).<br>• Indirect reflection of the quantity of phytoplancton in the water of a lake.<br>• Makes it possible to determine the trophic level of the waters of a lake.<br>• Parameter related to the abundance of phosphorus in water that represents the algal biomass. |
| Suspended solids (SS) | • Tiny particles which can remain for a certain time in the water column (soil particles, decomposing organic matter, phytoplancton).<br>• Indicates the intake of soil particles that contribute to warming the water, decreasing the dissolved oxygen content, silting up the bottom of the watercourse, covering spawning grounds and blocking the respiratory system of some fish.<br>• Sources: Soil erosion in the watershed (agricultural soils, forest soils, artificialized shores, quarries and sand pits, construction sites, road ditches, etc.), municipal and industrial waste water. |
| Total nitrogen | • Nitrogen: Essential nutritive element for living organisms that causes excessive growth of aquatic plants (premature eutrophication) when it is too abundant.<br>• Total nitrogen: All the various forms of nitrogen (organic, ammoniac, nitrites, nitrates) measured, based on a water sample taken from a lake or tributary.<br>• Makes it possible to detect the presence of nutritive pollution in a tributary.<br>• Sources: Use of garden fertilizers, agricultural fertilizers, municipal and industrial waste water, improperly installed and inadequate septic systems. |

## 1.3 Procedures used to Inventory the Shore and the Littoral

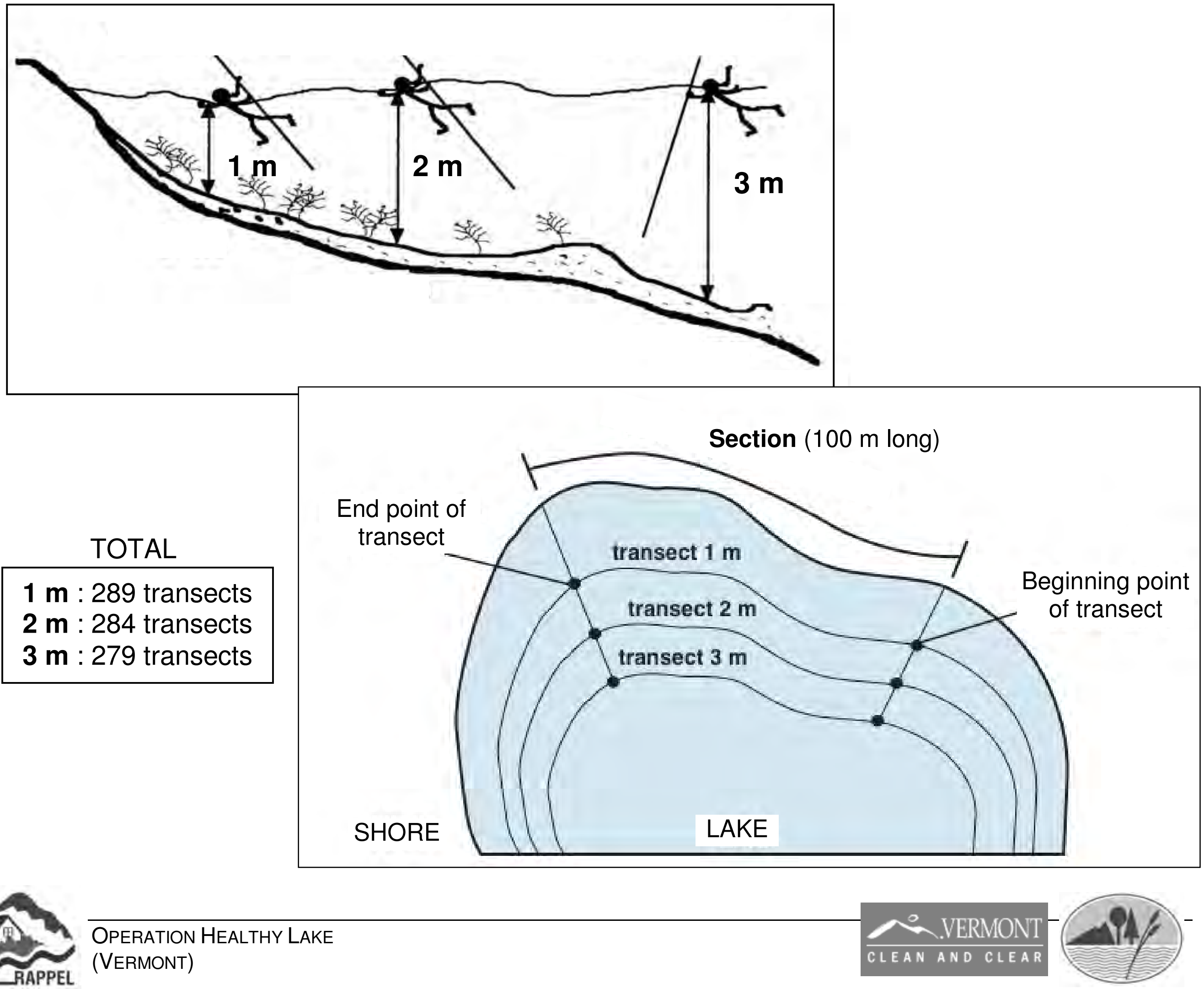
The inventory of the littoral and the shore was carried out from **August 8 to 19, 2005**. The entire perimeter of the littoral of the lake was divided into sections (portions of the littoral measuring about 100 metres in length). Each section followed the last, so that the end of one corresponds to the beginning of the next one.

For each section studied, information concerning the condition of the shore and littoral was obtained and noted by a team of biologists from RAPPEL. The degree of artificialization of the shore was assessed visually in a zone 10 metres wide. Data related to the condition of the littoral (sediments, aquatic plants, periphyton) were gathered using the **transects method**.

A transect is an imaginary line along which data are gathered. In this inventory, transects were drawn above a water column of a pre-set height (**one**, **two** or **three** metres), parallel to the shore (see figure 3). Thus, for each section studied, three transects were inventoried (one transect at one metre in depth, one at two metres and a third at three metres in depth). These three depths were chosen to give a good representation of the littoral zone, the zone where aquatic plants grow. Each of these transects measures about 100 metres long and two metres wide.

For more detail concerning the inventory protocol, see Appendix 1: *Protocol for the Inventory of the Littoral and the Shore*.

**Figure 3**: Location of the transects for inventorying the condition of the shore and littoral



TOTAL

**1 m** : 289 transects
**2 m** : 284 transects
**3 m** : 279 transects

The littoral of the lake was divided into **289 sections**, for a total of **852 transects**. The total number of sections is lower than the perimeter of the lake divided by 100 metres, because the length of the transects was measured with a GPS starting from a depth of 1 metre and not in relation to the high water line. The perimeter of the lake above the water column 1 metre deep is less than the perimeter of the lake calculated from the high water line.

Note: Because of the need for visibility, the transects were spaced on the map. Please refer to Appendix 2: *Location of Transects inventoried* to see the geographic coordinates of each transect.

## 1.4 Weather Information

Table 3 presents a synthesis of climatic data gathered in two weather stations situated near Lake Memphremagog (Magog and Georgeville) during the summer of 2005. You will also find the normal weather readings calculated from data registered between 1971 and 2000. Note that normal readings for the Georgeville station were not available at the time of going to press.

In this table, it can be seen that in the summer of 2005, average temperatures and total precipitation observed in these two stations was similar to the normal weather pattern.

**Table 3**: Summary of weather conditions
(Source : Environnement Canada, 2005)

| | | **Magog** | | **Georgeville** | | **Normal regional weather *** |
|---|---|---|---|---|---|---|
| | | 2005 | Normale | 2005 | Normale | |
| **Average temperature** (°C) | May | 9.7 | 12.0 | 9.9 | - | 11.2 |
| | June | 19.5E | 16.9 | 20.2E | - | 16.0 |
| | July | 20.3 | 19.4 | 20.4E | - | 18.6 |
| | August | 19.6 | 18.2 | 20.5* | - | 17.4 |
| **Total rainfall** (mm) | May | 88.8 | 100.0 | 151.6E | - | 97.2 |
| | June | 161.4 | 110.4 | 111.3* | - | 112.8 |
| | July | 121.4 | 120.2 | 131.6 | - | 119.8 |
| | August | 105.8 | 120.0 | 99.6* | - | 129.0 |

**E** : the value is estimated
***** : the value posted is based on incomplete data

# Chapter 2: General Portrait of the Lake

It is important to consider the morphological characteristics of the lake and its drainage basin. Depending on these characteristics, the lake will be more or less vulnerable to anthropic pressures that could lead to accelerated eutrophication.

## 2.1 General Description of the Watershed

The watershed for Lake Memphremagog covers a total area of 1764 sq. km, of which 75 % is on the American side of the border. Moreover, 71 % of the water comes from Vermont (Dimension Environnement Ltée, 1980). Thus, the condition of the drainage basin of the American side plays an extremely important role for the health of both sides of the lake.

**Size of the drainage basin**

**Canadian side**: 433 km$^2$
**American side**: 1331 km$^2$

The lake, oriented north-south, originates on the American side and flows towards its outlet, the Magog River. After flowing into the Magog River, the waters flow down to the St. Francis River. Thus Lake Memphremagog and its watershed are an integral part of the sub-basin of the Magog, and the middle basin of the St. Francis River.

More than thirty permanent and ephemeral tributaries flow directly into Lake Memphremagog. The Black River, Barton River and Clyde River are the main tributaries on the American side of the lake. On the Quebec side, the main tributaries are the Rivière-aux-Cerises (Cherry River) and the following brooks and creeks: Castle Brook, McIntosh (Benoit), Powell Brook, West, Glen, Vale, Tompkin Fitch, Bunker, Gale and McCutcheon, Lime Kiln, Belmère (Boyton), Taylor and Oliver.

**Principal municipalities of the lake**

**Canadian side**: Magog, Austin, Saint-Benoît-du-lac, Ogden, Potton, Stanstead CT
**American side**: Newport, Derby

## 2.2 Morphological Characteristics of the Lake

Lake Memphremagog is a long lake situated at an altitude of 208 metres above sea level. This lake was created by the retreat of the Wisconsin Glaciation, about 11,000 years ago. Then, with the end of the Champlain Ocean phase, around 9,500 years ago, the lake was formed (Ilec, 2004). This magnificent lake, in the heart of the Appalachian mountain chain, has a very special morphology surrounded by the peaks of this range.

Table 4 presents the main morphological characteristics of the lake. Figure 5 shows the bathymetry of the American part of the lake.

**Table 4**: Morphological characteristics of Lake Memphremagog
(Source: Ilec, 2004)

| Characteristics | Global | American side | Québec side |
|---|---|---|---|
| Maximum depth (trench) | 107 m | 12 m | 107 m |
| Average depth | 15.5 m | - | - |
| Residence time | 700 days | - | - |
| Area of the lake | 102 $km^2$ | 28 $km^2$ | 74 $km^2$ |
| Volume of water | $1.7 \times 10^9$ $m^3$ | - | - |
| Length | 53 km | - | - |
| Maximum width | 4 km | - | - |
| Perimeter | 160 km | 40 km | 120 km |

These morphological characteristics have various consequences on water quality. For example, a residence time of 700 days means that it takes nearly two years for the water to be renewed. This must be taken into account when looking at improving water quality. Furthermore, this residence time is important for the lake to allow part of the suspended solids and phosphorus in the water to settle on the bottom.

Lake Memphremagog is a big, deep lake. In such lakes, one notes that pollutants are diluted in the huge volume of water. Thus the consequences of the arrival of pollutants from tributaries, ditches and runoff are not immediately reflected in water quality in the trench. This is one of the reasons that the littoral zone may present symptoms of eutrophication before it is seen in the deepest waters of the lake.

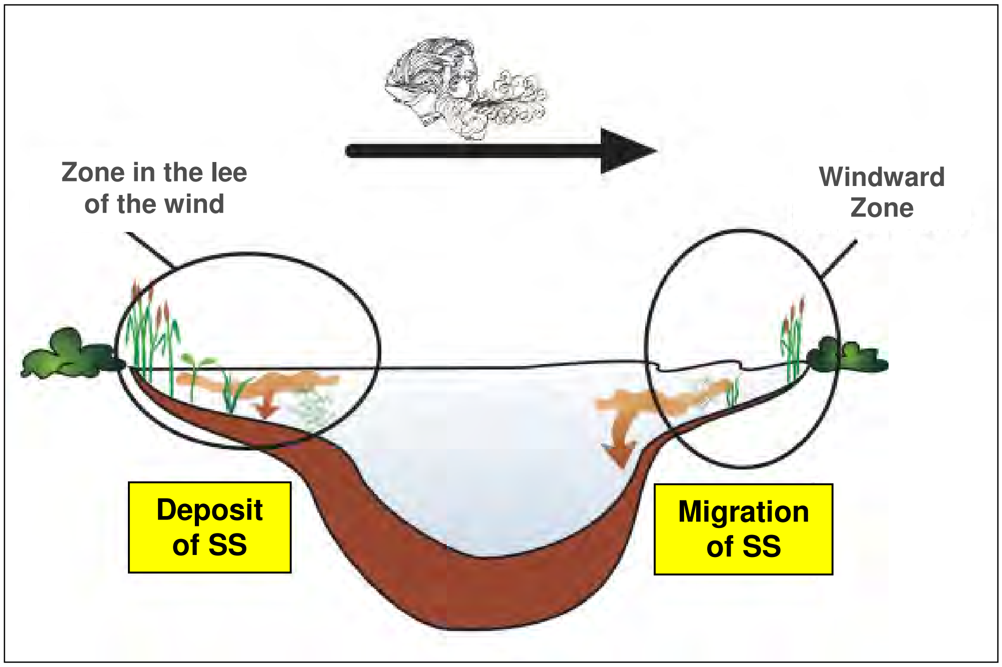
On the other hand, certain zones of the lake are more susceptible to sedimentation from suspended materials and nutrients (see Figure 4). In a general way, sediments accumulate more quickly in:

- quiet bays (where the mixing of water caused by wave activity is reduced);
- sheltered zones (with little exposure to the prevailing winds and waves);
- zones characterized by a gentle slope (wave action is less significant).

In these zones aquatic plants are also more likely to get a foothold, because the water is calmer and warmer, there is good light penetration and there are finer sediments, richer in phosphorus (Meunier, 1980). It is, therefore, in these zones that the first symptoms of eutrophication are likely to be seen.

Taking into account the morphological characteristics, one might conclude that South Bay, Holbrook Bay, Derby Bay, the bays of Lake Park and all of the narrows at the southern end of the lake are the zones most vulnerable on the American side of Lake Memphremagog (see figure 5).

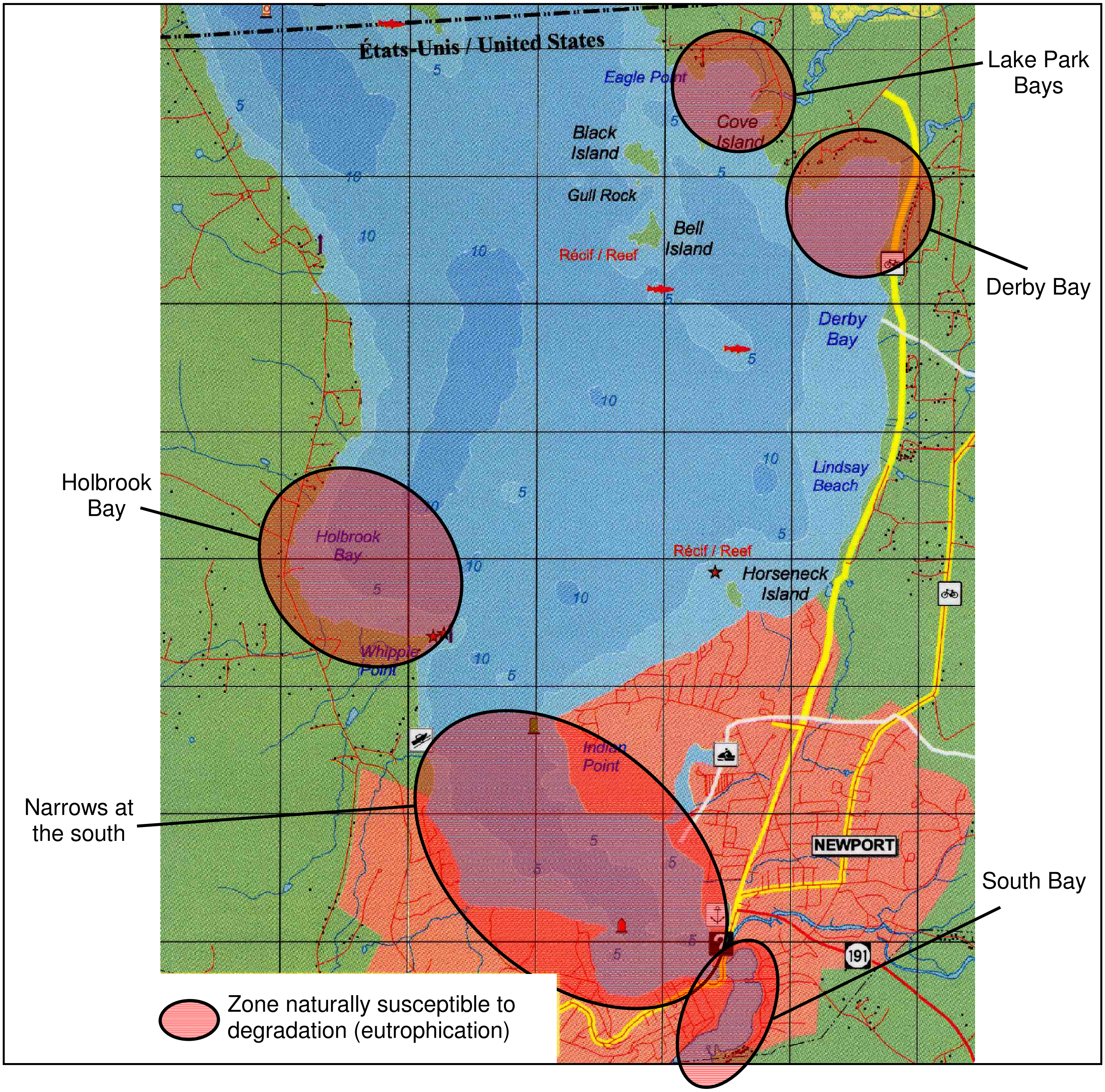
**Figure 4**: Impact of exposure to the prevailing winds on sedimentation



**Comments on the entire lake**

The entire American part of the lake is shallow, with a gently sloping littoral, in comparison to the Quebec side of the lake. Thus the American side is one of the sectors of Lake Memphremagog which is the most likely to show signs of eutrophication.

**Figure 5**: Zones naturally susceptible to silting and development of aquatic plants (adapted from TRAK, Concepts de cartes, 2002)



# Chapter 3: Condition of the Shore

According to the *Politique de la protection des rives, du littoral et de la plaine inondable* (a policy to protect shores, the littoral and the flood plain in Québec), **the shore** is legally defined as *the part of the terrestrial milieu contiguous to a lake or watercourse. The shore provides the transition between the aquatic milieu and the strictly terrestrial milieu. It allows a protective buffer zone of 10 or 15 metres in width to be maintained around the perimeter of lakes and bodies of water. The shore is measured from the high water mark inward toward land* (MEF) (trans. for this report). According to this policy, the width of the shore to be protected corresponds horizontally to a minimum of 10 metres if the slope is less than 30 % with a talus or embankment of less than 5 metres, and 15 metres minimum if the slope is greater than 30 % with a slope of more than 5 metres. It is important to keep the shore in a natural state. Unlike artificialized shorelines, a natural shore keeps a stretch of water in good health because it checks erosion, filters out nutrients, cools the water and provides a habitat for wildlife.

The degree of artificialization has been assessed for each section, on portions of the shore measuring about 100 metres in length and 10 metres in width. Depending on how many artificial structures there are (the percentage of the area), the shoreline in each section has been classified in one of the five following categories:

| Categories of shoreline | Presence of artificial structures |
|---|---|
| Natural | Less than 10 % of the area |
| Slightly modified | Between 10 % and 25 % of the area |
| Quite modified | Between 25 % and 50 % of the area |
| Greatly modified | Between 50 % and 75 % of the area |
| Totally artificial | More than 75 % of the area |

Figure 6 presents the number of sections in each category of shore for all the sections studied in the American part of Lake Memphremagog. Nearly a majority of the shore sections have been greatly modified (45 % were assessed as being greatly or totally modified). Fortunately, nearly one-quarter of the shore still remains in a natural condition. Figure 7 presents the condition of shores in the relatively homogeneous zones of the lake. This shows the degree of artificialization or modification in similar sections. Note that this is an overall assessment and that both totally artificial and natural shores are seen in all parts of the lake. To find out more about the state of artificialization in each section of the lake, please refer to the Appendix 3: *Raw Results of Transects inventoried*.

It is clear that **regions that are left in their natural condition** are rare and of small dimension on the American side of Lake Memphremagog. These areas are basically found at:

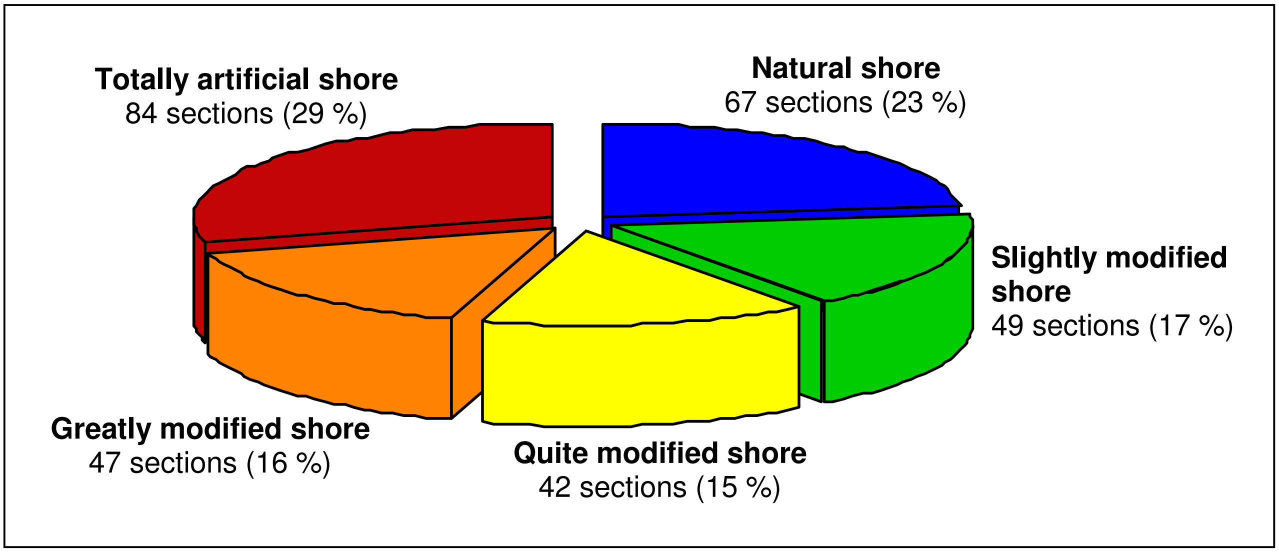
- the east and west parts near the Canadian border;
- the south of South Bay;
- the southern part of Indiana Point;
- the part near Horseneck Island.

The **most artificialized regions** were those situated in:

- Holbrook Bay;
- Around the mouth of the bay at Newport;
- the northern part of South Bay;
- the northern part of Derby Bay;
- the points at the north and south of Lake Park.

Note that these particularly vulnerable artificialized regions correspond to zones considered naturally the most vulnerable, with the exception of the points at Lake Park (see figure 5 in the previous chapter).

**Figure 6**: The condition of the shore in the 289 sections on the American part of the lake



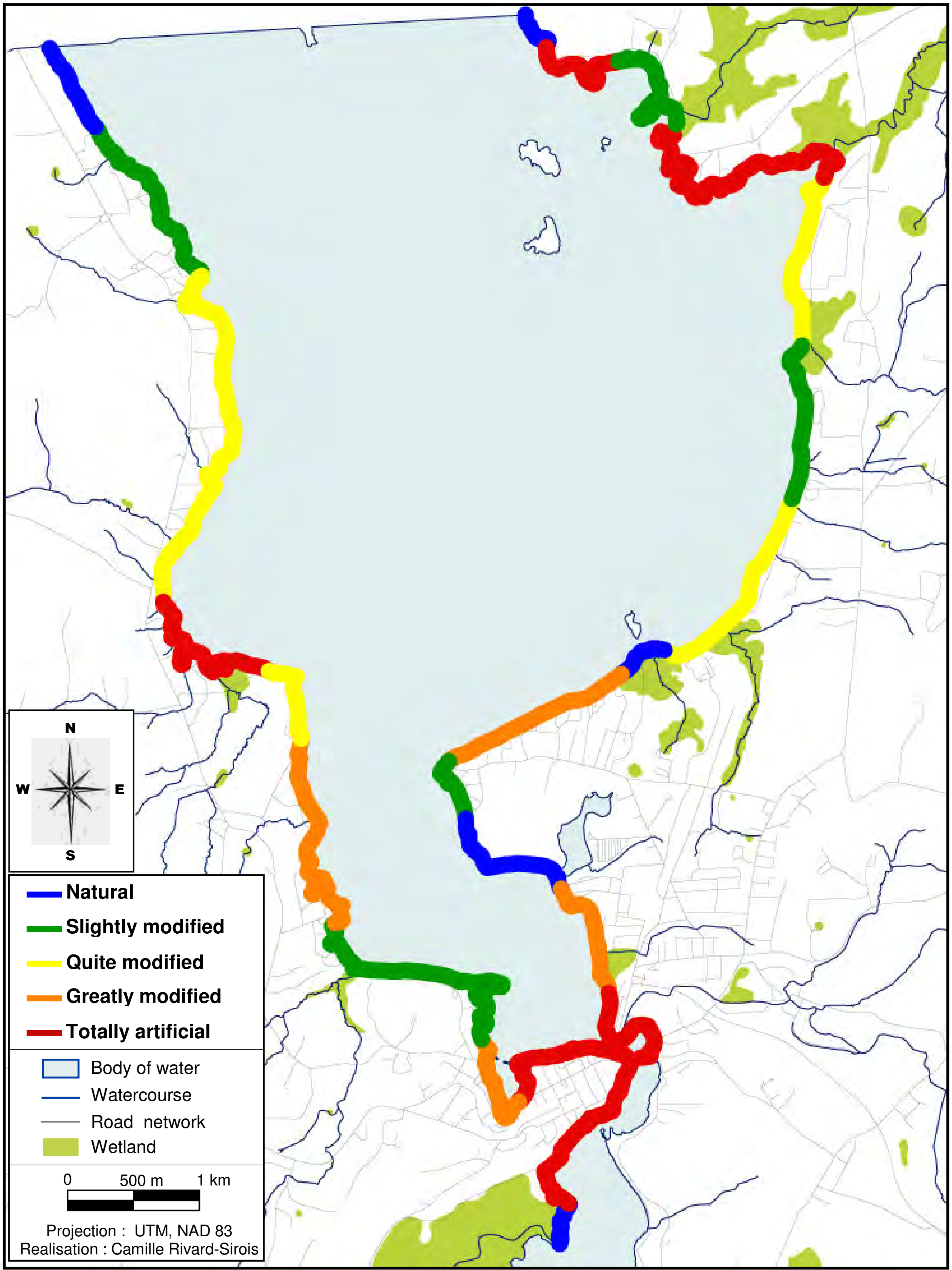
To conclude, the American part of Lake Memphremagog presents different categories of shoreline. The lake still has beautiful sites in an almost natural state, which is positive, both from an environmental and from a tourism perspective. It is important to protect the shores in as natural a state as possible. However, several zones are now very degraded. Restoring these shores is an essential strategy for maintaining the health of the lake.

For more information about protecting and replanting these shores, please see *Nature and Shorelines* (RAPPEL, 2001).

### Commentary on the whole lake

At the American part of the lake, the problem of artificialization of the shore is considered, overall, to be at the intermediate level. In fact, in Vermont, the degree of total artificialization is assessed at 25-50 %. At the Quebec part of the lake, the level of total artificialization was estimated at 10-25 % in 2004 (RAPPEL, 2005).

**Figure 7**: Condition of the shores in the American part of the lake, by homogeneous zones



# Chapter 4: Water Quality in the Lake

To evaluate the water quality on the American side of Lake Memphremagog, the results of physico-chemical analyses by the **Ministère du Développement durable, de l'Environnement et des Parcs** (MDDEP) have been used. The parameters considered are total phosphorus, chlorophyll *a* and transparency of water. Please refer to section *1.2 Parameters studied* for a description of each of these parameters.

Table 5 presents the criteria used to determine the trophic level of each parameter studied. Figure 8 presents the location of the two testing stations used by MDDEP. Note that when there is no agreement between the calculation for trophic level based on these various parameters, it is the indicator calculated from chlorophyll which is used.

**Table 5**: Criteria used to evaluate the trophic level according to each parameter
(Source : MDDEP, 2004)

| | | **Chlorophyll *a*** (µg/l) | **Total Phosphorus** (µg/l) | **Transparency of water** (m) |
|---|---|---|---|---|
| Low nutrient content | **Oligotrophic** | < 3 | < 10 | > 5 |
| Medium nutrient content | **Oligo-mesotrophic** | 2.5 – 3.5 | 7 - 13 | 4 - 6 |
| | **Mesotrophic** | 3 – 8 | 10 – 30 | 2.5 - 5 |
| High nutrient content | **Meso-eutrophic** | 6.5 -10 | 20 - 35 | 2 - 3 |
| | **Eutrophic** | > 8 | > 30 | < 2.5 |

**Note**:

An **oligotrophic** lake is a young lake characterized by waters that have a low nutrient content, are clear and well oxygenated, and by a low production of aquatic vegetation. At the other extreme is a **eutrophic** lake rich in nutrients and vegetal matter. It has reached an advanced stage of eutrophication leading to, among other things, a change in animal communities, growth in organic material and an oxygen deficit in deep waters. Finally, a **mesotrophic** lake is characterized by an intermediate level of aging.

When the values obtained for the different parameters are at the limit for the main trophic levels, they are called **oligo-mesotrophic** and **meso-eutrophic**.

**Figure 8**: Location of sampling stations (lake and tributaries)
(Adapted from MDDEP, 2006 and NWSC, 2006)

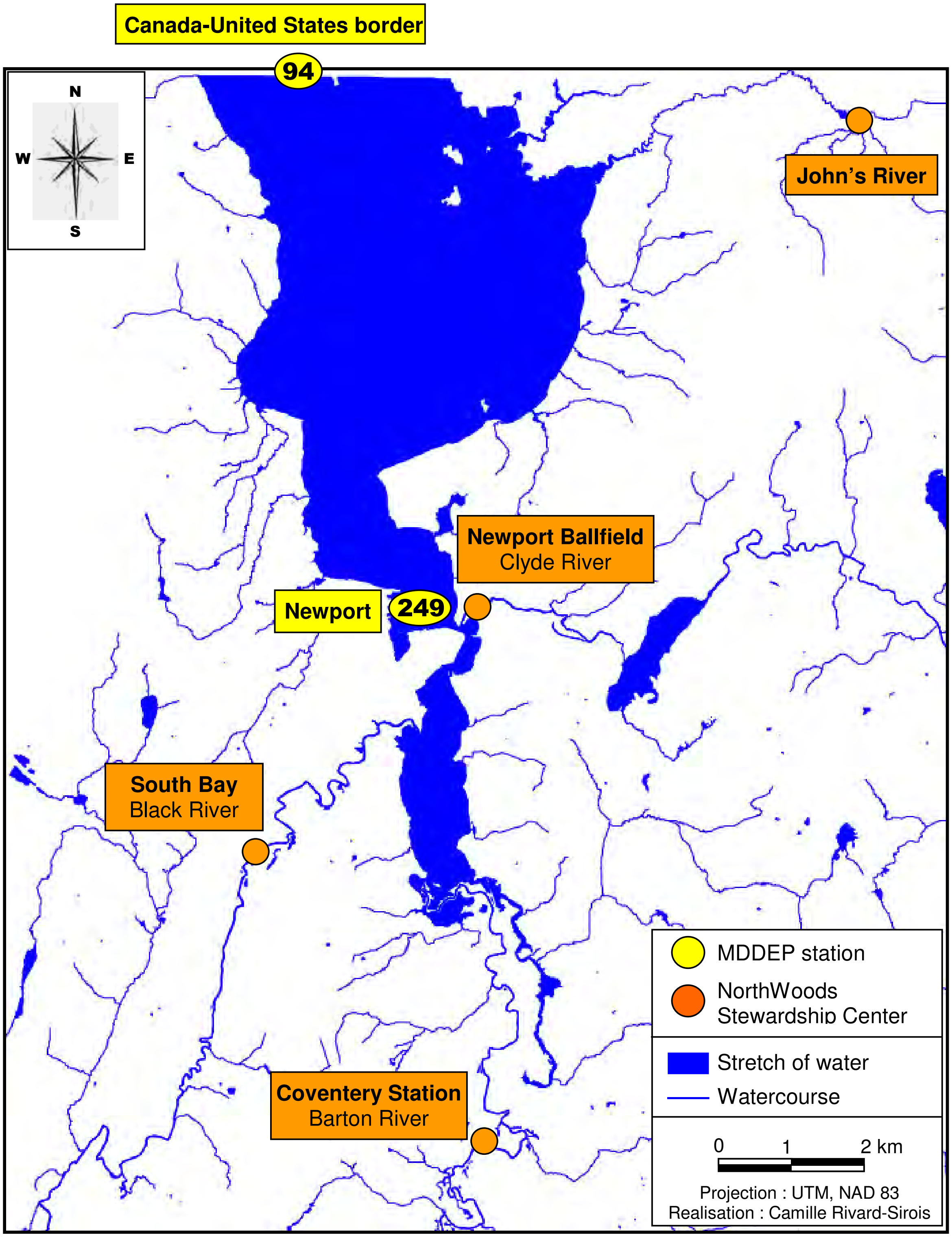


Table 6 presents a view of water quality at the two sampling stations used by the MDDEP. The raw data are found in Appendix 4: *Raw Data on the Quality of the Lake's Waters*.

**Table 6**: Synthesis of lake's water quality (annual median values) at the MDDEP stations (Source : MENV, 2005 ; MDDEP, 2006b; Simoneau 2004)

| | | **Chlorophyll *a*** (µg/l) | **Total phosphorus** (µg/l) | **Transparency of water** (m) | **Trophic level** |
|---|---|---|---|---|---|
| **94** Canada-US border | **1996** | 4.41 | 13.5 | 6.1 | Mesotrophic |
| | **1997** | 5.70 | 14.5 | 3.9 | Mesotrophic |
| | **1998** | 5.52 | 12.0 | 3.5 | Mesotrophic |
| | **1999** | 5.90 | - | 3.0 | Mesotrophic |
| | **2000** | - | - | 4.3 | Oligo-Mesotrophic |
| | **2001** | 7.10 | - | 4.5 | Meso-eutrophic |
| | **2002** | 4.47 | - | 4.2 | Mesotrophic |
| | **2004** | 7.35 | 11.8 | 4.5 | Meso-eutrophic |
| | **2005** | 4.45 | 11.5 | 3.9 | Mesotrophic |
| **249** Newport | **2004** | 6.73 | 11.4 | 4.3 | Meso-eutrophic |
| | **2005** | 5.01 | 18.5 | 3.6 | Mesotrophic |

These results show the following:

- The two stations present a similar water quality.
- The waters of the American side of Lake Memphremagog are assessed overall as **Mesotrophic** (typical of an intermediate level of eutrophication).
- For each station and each parameter, there is a **certain variation** between the values obtained every year, which is normal.
- These tables show **no trend** in the medium term to improvement or deterioration. The condition of the American part of the lake thus seems to have remained stable since 1996.
- Data from the Newport station.

Theoretically, a lake of this size and age should present oligotrophic water, not mesotrophic (Simoneau, 2004). This indicates that the lake is receiving excess loads of phosphorus which is causing an acceleration of eutrophication. Among the activities causing this are the use of chemical fertilizers on shorefront lawns, agricultural use of fertilizers, municipal waste waters, sewage effluents, industrial and landfill leachates, urban runoff and abusive forestry practices.

### Comments on the entire lake

Waters on the Quebec side are also considered mesotrophic, according to the sampling done at eight stations by the MDDEP (MDDEP, 2006 and Simoneau, 2004). Nevertheless, the closer one goes to the outlet of the lake (Magog River) the clearer the water and the lower the phosphorus content.

# Chapter 5: The Condition of the Main Tributaries

The quality of water carried to the lake by its tributaries has a major impact on the water quality of the lake. In fact, a large amount of the phosphorus load that arrives in the lake comes from its tributaries. This is why we have included data related to water quality in the main tributaries as part of our diagnosis of the health of the lake. However, we note that the quality of water carried by ditches is also extremely important, which is why it is necessary to properly maintain ditches (See Appendix 8: *General Solutions to Improve the Health of a Lake*).

In 2005, the **NorthWoods Stewardship Center (NWSC)** tested water quality from four major tributaries: the Black, Barton, Clyde and John's Rivers. For each of these, different sampling stations were studied. To obtain a global picture of the quality of water coming into the lake, we integrated only those results from stations situated near the lake.

The sampling stations where studies were carried out by NWSC are presented in Appendix 5: *Raw Data on the Condition of the Tributaries*. Figure 8, in the previous chapter, presents the location of the NWSC stations used for our assessment. The following sections present the results from each of these stations.

For each one, different physico-chemical parameters were studied: Total phosphorus, suspended solids and total nitrogen. Please refer to section *1.2 Parameters studied* for a description of these parameters.

The assessment of these parameters was carried out, based on quality criteria (tolerance threshold) for the protection of aquatic life (see Table 7). Every tributary where the concentration of total phosphorus or suspended solids exceeded the quality criteria set is likely, in the long term, to give rise to chronic harmful effects for aquatic life. Note that there is no fixed threshold for the total nitrogen concentration.

**Table 7:** Water quality criteria for the protection of aquatic life
(Source: MDDEP, 2006b)

| Parameters | Quality criteria |
|---|---|
| Total phosphorus (TP) | < 20 µg/l |
| Suspended solids (SS) | < 5 mg/l |

**µg/l** : microgram per litre
**mg/l** : milligram per litre

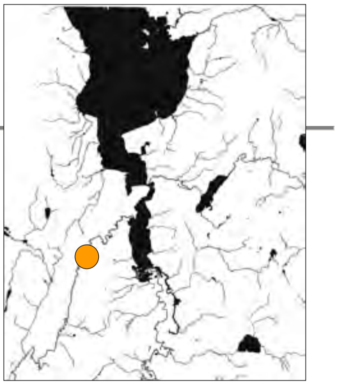


Table 8 presents the physico-chemical results on the condition of the Black River at the South Bay station. These results show that:

- For the three parameters, the highest values were measured during the months of June and July.
- The concentration in phosphorus is higher than the level set in the criteria to protect aquatic life. This indicates the presence of polluting activities (that produce phosphorus) at the mouth of the tributary.
- The concentration of suspended solids is a reason for some concern, especially because the outflow of this river is significant. Half of the measurements exceed the threshold tolerance level set.
- The concentration of total nitrogen is within the normal range (Hébert et Légaré, 2000).

**Table 8**: Physico-chemical results for the Black River (South Bay station) in 2005
(Source: NWSC, 2006)

| | **Total phosphorus** (µg/l) | **Suspended solids** (mg/l) | **Total nitrogen** (mg/l) |
|---|---|---|---|
| May | 15.6 | 2.0 | 0.36 |
| June | 34.3 | 10.0 | 0.49 |
| July | 39.4 | 12.6 | 0.47 |
| August | 25.9 | 3.9 | 0.44 |
| September | 24.7 | 4.0 | 0.40 |
| October | 23.5 | 7.6 | 0.36 |
| **Average** | **27.2** | **6.7** | **0.42** |
| **Median** | **25.3** | **5.8** | **0.42** |

To summarize, the Black River appears to be an important entry point for phosphorus. To improve water quality, it will be important to conduct research to locate and eliminate local sources (both point and non-point source) in the drainage basin.

Analysis of the data from stations upstream reveals the presence of human activities that are polluting the entire drainage basin. Only stations at the head of the drainage basin (Craftsbury and Lake Elligo stations) present water of good quality (NWSC, 2006).

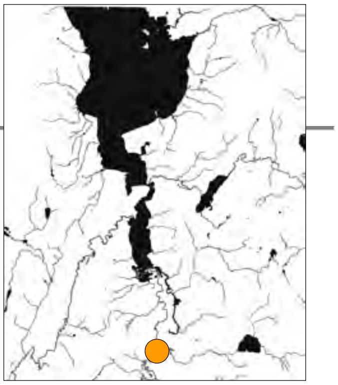


Table 9 presents the physico-chemical results of the condition of the Barton River at the Coventry station. These results show that:

- The highest values were observed in the month of June.
- The average concentration of phosphorus is slightly above the norms. One or several polluting activities (that produce phosphorus) appear to have taken place in June and October.
- The concentration of suspended solids is also a problem, because the outflow from this river is significant. Only the measurement for the month of September was below the level set for this quality criterion.
- Concentrations of total nitrogen were within the range of normal values (Hébert et Légaré, 2000).

**Table 9**: Physico-chemical results for the Barton River (Coventry Station) in 2005

(Source: NWSC, 2006)

| | **Total phosphorus** (µg/l) | **Suspended solids** (mg/l) | **Total nitrogen** (mg/l) |
|---|---|---|---|
| May | 14.9 | 5.7 | 0.30 |
| June | 37.3 | 27.7 | 0.35 |
| July | 18.7 | - | 0.32 |
| August | 18.2 | 5.6 | 0.34 |
| September | 19.5 | 2.3 | 0.30 |
| October | 27.7 | 17.3 | 0.32 |
| **Average** | **22.7** | **11.7** | **0.32** |
| **Median** | **19.1** | **5.7** | **0.32** |

To summarize, the Barton River appears to be an important point of entry for suspended solids, especially because this river has a significant outflow. To improve the quality of its water, it is important to search for and eliminate sources of erosion in its drainage basin. The phosphorus load does not seem to be a major problem here. However, it would be useful to check to see whether pollution has occurred, for example, at the time of spreading agricultural fertilizers.

Moreover, the analysis of data from stations situated upstream reveals that there are sources of degradation present throughout the drainage basin. Only the stations situated at the head of the drainage basin (Willoughby River, Cristal Lake and Glover Road stations) present waters of good quality (NWSC, 2006). We should note that at the stations upstream, the pH values are often above 8.5, the criterion set for the protection of recreational activities and aesthetic aspects in Quebec (MDDEP, 2006).

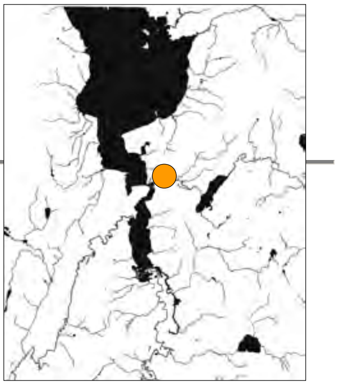


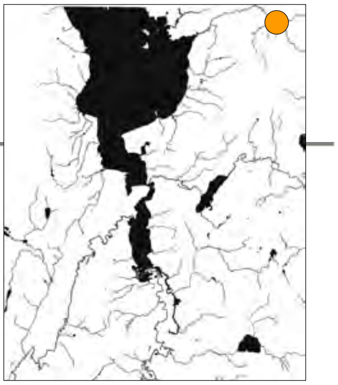
Table 10 presents the physico-chemical results for the condition of the Clyde River at the Newport Ballfield station. These results indicate that:

- The average values for phosphorus and suspended solids are slightly below the norm for the protection of aquatic life.
- However, in the month of July and August, the concentrations observed were problematic for these two parameters.
- The concentrations of total nitrogen are within the normal range of values (Hébert et Légaré, 2000).

**Table 10**: Physico-chemical results for the Clyde River (Newport ballfield station) in 2005
(Source: NWSC, 2006)

| | **Total phosphorus** (µg/l) | **Suspended solids** (mg/l) | **Total nitrogen** (mg/l) |
|---|---|---|---|
| May | 12.9 | 1.8 | 0.41 |
| June | 18.5 | 2.3 | 0.38 |
| July | 24.7 | 12.5 | 0.41 |
| August | 22.1 | 7.2 | 0.65 |
| September | 13.7 | 1.6 | 0.23 |
| October | 18.0 | 1.7 | 0.43 |
| **Average** | **18.3** | **4.5** | **0.42** |
| **Median** | **18.3** | **2.0** | **0.41** |

To summarize, the Clyde River does not appear to be a major point of entry for phosphorus or for sediments. Moreover, the quality of water at the different stations situated farther upstream in the drainage basin is essentially of good quality for all parameters (NWSC, 2006).



## 5.4 Condition of John's River

Table 11 presents the physico-chemical results for the condition of John's River. These results show that:

- There seems to be a problem at this river, starting in June.
- The concentration of phosphorus is clearly a problem for aquatic life. This indicates the presence of polluting activities (producing phosphorus) upstream in the tributary.
- The concentration of suspended solids is also a problem for aquatic life. This indicates the presence of erosion upstream in the tributary.
- The majority of concentrations measured are below the tolerance threshold for the protection of aquatic life except during the month of July and August.
- Concentrations of total nitrogen are above the usual range observed on Quebec rivers (Hébert et Légaré 2000). This indicates that the quantities of nutrients and suspended organic solids are abnormally elevated.

**Table 11**: Physico-chemical results for John's River in 2005
(Source: NWSC, 2006)

| | **Total phosphorus** (µg/l) | **Suspended solids** (mg/l) | **Total nitrogen** (mg/l) |
|---|---|---|---|
| May | 16.6 | 1.8 | 2.50 |
| June | 49.7 | 21.6 | 1.39 |
| July | 81.5 | 12.1 | 2.94 |
| August | 51.9 | 17.0 | 6.06 |
| September | 29.9 | 1.0 | 5.12 |
| October | 27.9 | 4.7 | 1.49 |
| **Average** | **42.9** | **9.7** | **3.25** |
| **Median** | **39.8** | **8.4** | **2.72** |

To summarize, John's River appears to be the most problematic of the 4 rivers analyzed by the NWSC. Annual concentrations of phosphorus and SS are significantly above the threshold tolerance level. Furthermore, the concentration of total nitrogen is very high. It would be useful to determine the content of various forms of nitrogen (nitrites, nitrates, ammonia nitrogen) in order to identify the sources of pollution.

Harmful quantities of nutrients and sediments were carried by this river in 2005. Fortunately, there is a wetland near the lake which was able to filter out some part of these pollutants.

To improve water quality, it will be necessary to search for and eliminate the local sources (identifiable and dispersed) in the drainage basin.

# Chapter 6: Sediments on the Littoral

This study of silting is based both on the type of dominant sediments (substrata) and the thickness of the unconsolidated sediments (fine particles). Please see section *1.2 Parameters Studied* for more information.

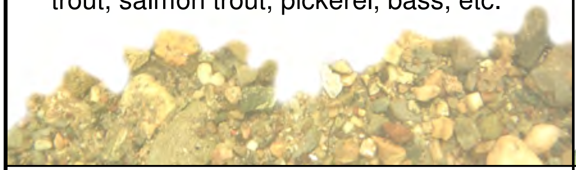
There are different types of substrata (see Table 12) making up the bottom of a lake. These serve as habitat for the flora and fauna of the lake. Each type plays a role in the aquatic ecosystem; thus a great diversity at the bottom is essential for the longevity of the ecosystem. An accumulation of fine particles (a mixture of fine organic materials and fine mineral particles) on the littoral disturbs the aquatic habitat. The accumulation of these fine particles comes from the **decomposition of living organisms** or from **soil erosion in the drainage basin**.

When plants and animals die, they fall to the bottom and are progressively decomposed into fine organic materials thereby forming fine sediments. Thus, the richer the lake is in algae and aquatic plants, the more dead organisms gather on the bottom at the end of each growing season and the greater the sedimentary accumulation.

When the ground is stripped, the erosive action of raindrops dislodges many fine particles which are then carried to the lake via ditches and watercourses, thereby filling the lake with sediments. Thus, as more natural vegetation ground cover is lost in the watershed, the soils become vulnerable to erosion, and more earth is carried toward the body of water.

Note that there is normally an equilibrium between the allochthonous sediment load (from outside the lake) and the degradation of these sediments by the micro-organisms in the lake. In this natural process, almost all the sediments that arrive in the lake are degraded and recycled, and there is practically no sedimentary accumulation (Carignan, 2003). However, when the inputs surpass the quantity decomposed, for example when there is a large amount of soil erosion in the watershed, sediments build up on top of each other (silting of the lake bottom).

**Table 12**: Different types of sediments (substrata)
(Adapted from CRJC, 2003)

| **of mineral origin**<br>Result of soil erosion | **of organic origin**<br>Result of decomposition of organisms | |
|---|---|---|
| COARSE SUBSTRATA<br>**Boulders** (rocks): more than 20 cm in diameter<br>**Shingle** (pebbles or cobbles): diameter between 2 and 20 cm<br>**Gravel**: diameter between 0.2 and 2 cm<br>**Sands**: diameter between 0.05 and 2 mm<br>• Carried only by strong currents.<br>• Used as spawning grounds by trout, lake trout, salmon trout, pickerel, bass, etc.<br> | VEGETAL DEBRIS<br>**Leaves** (aquatic and terrestrial plants)<br>**Branches** and **pieces of bark**<br>Other plant debris<br>• Eventually decomposed into fine organic matter.<br>• Offers a habitat for certain animals including worms and insects.<br>• Serves as food for animal decomposers.<br> | **Coarse materials**<br>Not favourable to implantation of aquatic plants. |
| FINE MINERAL PARTICLES<br>**Clay** and **silt**: diameter smaller than 0.05 mm<br>• Easily carried by the current and remain for a long time in suspension in water (SS).<br>• Shelter worms and bacteria.<br>• Serve as spawning grounds for catfish and chub, but may cover up the spawning grounds of trout, lake trout, salmon trout, pickerel, bass, etc.<br> | FINE ORGANIC MATTER<br>**Small organic particles** that result from the decomposition of living organisms<br>• Easily carried by the current and may remain for a long time in suspension in water (SS).<br>• Shelters worms and bacteria.<br>• Serves as spawning ground for catfish and chub, but may cover up the spawning grounds of trout, lake trout, salmon trout, pickerel, bass, etc.<br> | **Fine Particles**<br>Favourable to the implantation and growth of aquatic plants. |

In the context of our inventory, the categories of substrata are:

- Rock (bed-rock)
- Boulders
- Shingle or cobbles
- Coarse gravel (more than 1 cm)
- Fine gravel (less than 1 cm)
- Sands
- Fine particles (fine mineral particles + fine organic matter)
- Vegetal or plant debris

## 6.1 Types of Substrata

Table 13 presents the many different types of dominant and sub-dominant substrata for each of the three depths studied in the littoral zone for the American side of Lake Memphremagog. Figure 9 presents the overall range (all depths together). From these data, the following principal facts emerge:

- In a general way, the size of particles declines with the depth of the transects, which is quite normal considering that the regular mixing of the waters and the wave action carry fine particles to the deeper zones.

- Fine particles constitute the principal type of sediment in the littoral zone for each of the three water depths inventoried. These particles constitute the dominant or sub-dominant substratum in 86 % of the transects.

- Sands are also frequently present. They are found as the dominant or sub-dominant substratum in 66 % of the transects.

- Boulders and gravels are less abundant. These substrata are present (dominant or sub-dominant) in 29 % and 8 % respectively of the transects studied.

- Most of the transects (69 %) where gravels or boulders dominate are undergoing silting (fine particles make up the sub-dominant sediment).

- Rocks and vegetal debris are not abundant.

- The 1 m zone is the zone richest in boulders and gravels of the entire littoral. Boulders were found in 36 % of the transects, coarse gravel in 17 %, and fine gravels in 2 %.

- The 3 m zone presents the most important signs of silting. In fact, fine particles are found there as the dominant or sub-dominant substratum in almost all transects.

**Table 13**: Different types of substrata found for each depth

| | | Rock | Boulders | Gravels | Sands | Fine particles | Vegetal debris |
|---|---|---|---|---|---|---|---|
| **Dominant sediment** | 1 m | 2 % | 24 % | 7 % | 34 % | 33 % | 0.3 % |
| | 2 m | 2 % | 9 % | 4 % | 34 % | 51 % | 0 |
| | 3 m | 1 % | 3 % | 3 % | 22 % | 70 % | 1 % |
| **Sub-dominant sediment** | 1 m | 2 % | 12 % | 12 % | 29 % | 42 % | 3 % |
| | 2 m | 1 % | 23 % | 7 % | 32 % | 31 % | 6 % |
| | 3 m | 0.4 % | 17 % | 5 % | 37 % | 32 % | 9 % |

**Figure 9**: Overall proportion of different types of substrata found

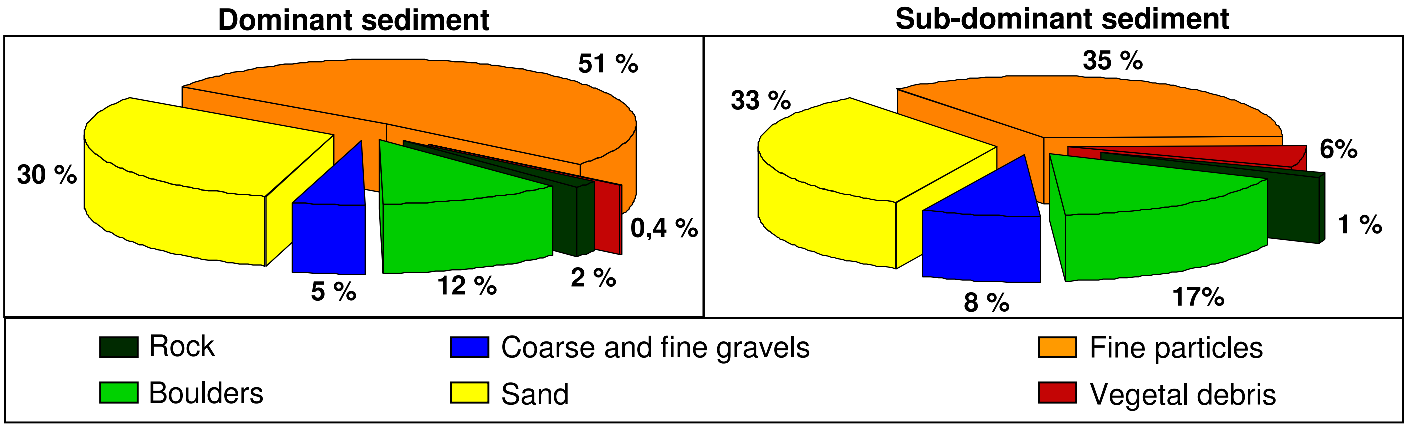


Figure 10 shows the type of dominant bottom for each transect studied. There are few sites of boulders and gravels and these are small. They are mainly located in the zones where there has been less human exploitation and those that are naturally less susceptible to silting because of their very steep slope and their exposure to water currents (see section 2.2 *Morphological Characteristics of the Lake*).

The main **rocky areas**, suitable for lake trout and small-mouth bass, are found:

- on the west side near the border (especially at the 1 m-transects),
- on points in Lake Park, and
- near the bridge on Highway 5.

The main **gravel areas**, favourable for spawning of various trout species, are basically in the 1 m transects:

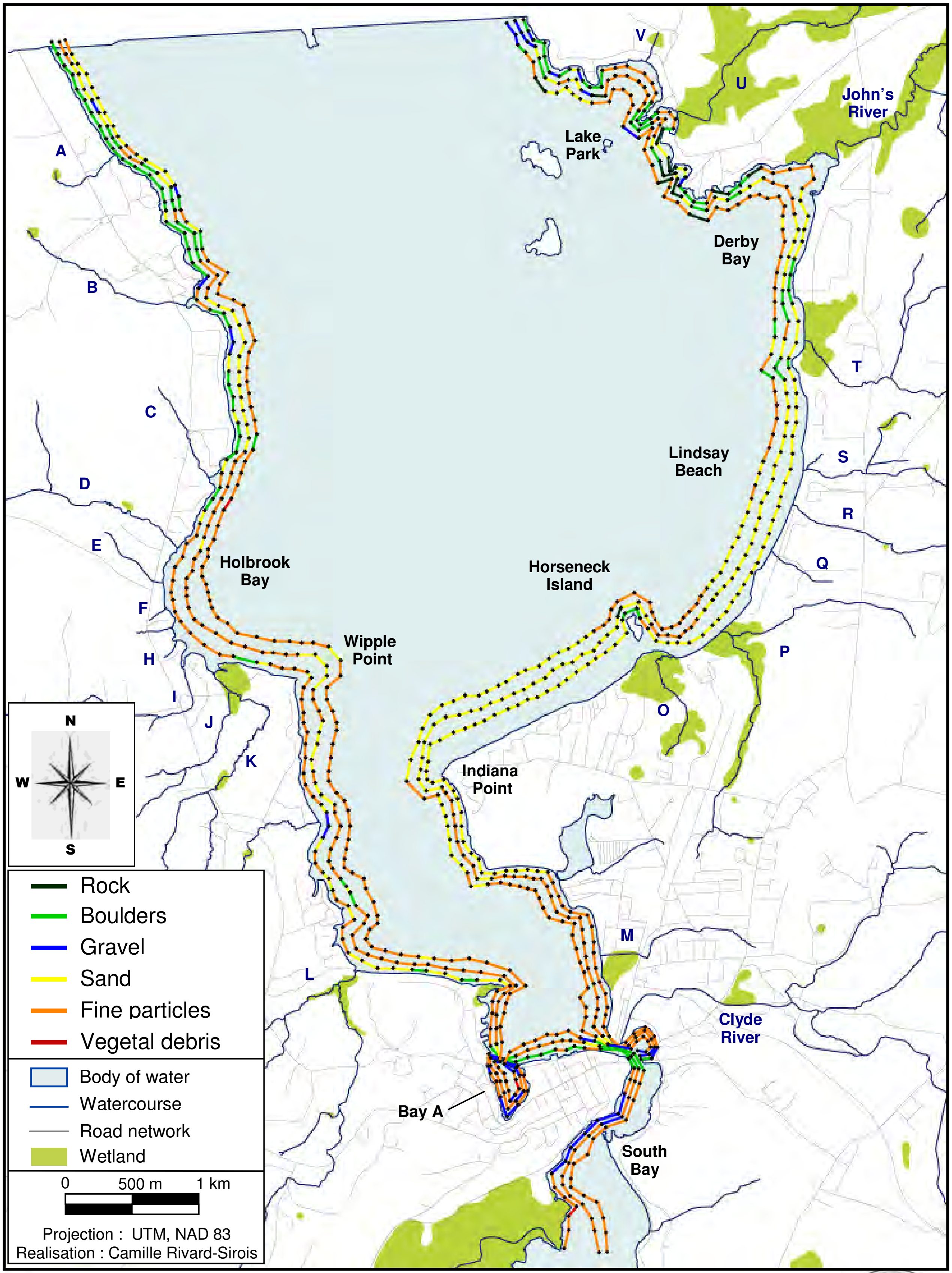
- on the east side, near the border;
- near Maxfield Bay;
- at the mouth of un-named creek K;
- in the un-named bay A;
- to the northwest of South Bay.

**Plant debris** makes up part of the habitat of many living organisms, including certain fish and mollusks, and a number of insects and worms. It should also be noted that during the inventory, fresh water sponges on dead branches were regularly encountered by biologists. These vegetal debris were surveyed as sub-dominant substrate at:

- the portion between Maxfield and Holbrook Bays (especially at the 3 m transects);
- Wipple Point;
- the mouth of un-named creek L;
- Indiana Point.

The abundance of **sands** and **fine particles** is favourable for other tolerant fish species. While inventorying the littoral and the shore, many chub, catfish, yellow perch and sunfish were seen. The sands at Lindsay Beach seem to be a favourable habitat for mussels which are plentiful in the region.

**Figure 10**: Types of dominant substrate in the littoral zone
at the American part of Lake Memphremagog (at 1, 2 and 3 m)



## 6.2 Thickness of Sediments

The study of sediment accumulations provides evidence of anthropic pressures on a stretch of water. Considerable recent sedimentary accumulation shows that the soil erosion in the watershed and eutrophication of the milieu are more than the lake can support. As an example, the natural accumulation is practically non-existent from one year to the next on the littoral, and it hardly varies more than one cm per year in the trench of a lake, and this does not take into account normal sediment compaction (Carignan, 2003). Thus a finding of sedimentary accumulation on the littoral during a human lifetime is a sign of degradation.

Figure 11 shows the sedimentary accumulation found in each of the three depths studied in the littoral on the American part of Lake Memphremagog. It shows the percentage of the measurements of thickness from five different classes. The following important findings are derived from this table:

- Sedimentary accumulation increases with the depth of the transects, which is normal because the regular mixing of the water and the wave action bring fine particles to the deeper zones.

- The average **overall** sedimentary thickness (all depths considered together) is evaluated at 80-90 cm which is considered high in the littoral zone. A significant number of measurements of sedimentary thickness exceeded one metre.

- The average sedimentary thickness for the **1 m zone** is evaluated at 30-40 cm, even if most of the measurements were less than 10 cm, because several very high measurements brought up the average value (median 5-10 cm).

- In the **2 m** zone, the average sedimentary thickness was evaluated at 80-90 cm and the median at 30-40 cm. In addition, 27 % of the measurements exceeded one metre in height.

- The **3 m zone presents a very high** accumulation of unconsolidated, fine sediments. In fact, nearly half of the sedimentary thickness measurements show more than one metre of deposit and 19 % of these measurements exceed three metres in thickness. The average and median sedimentary thicknesses were very high: 130-140 cm and 90-100 cm respectively.

**Figure 11**: Thickness of sediments for each depth studied

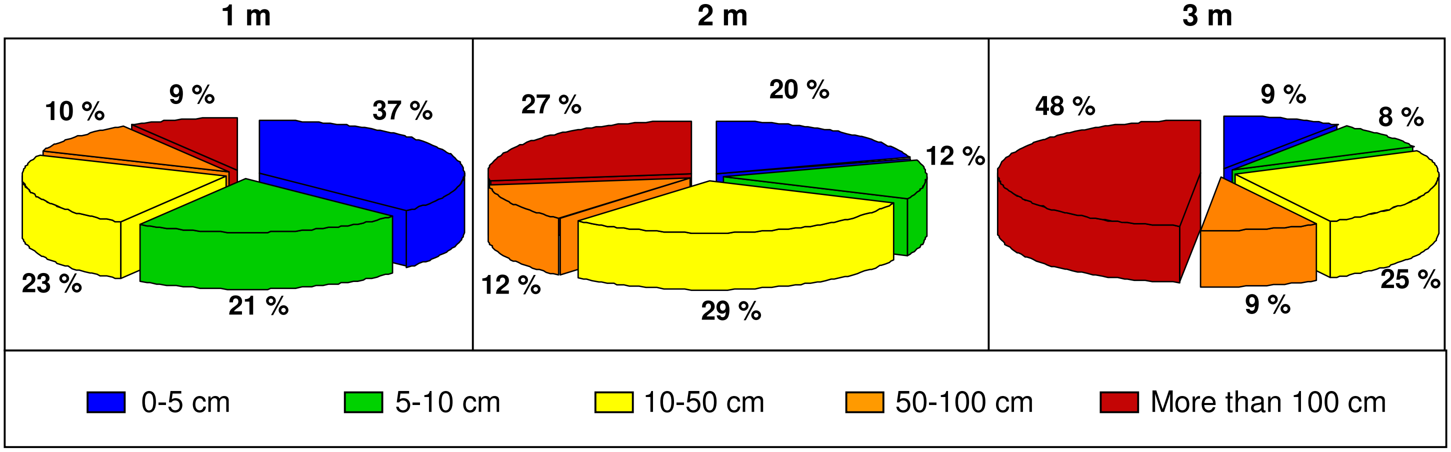


Figure 12 shows the median thickness of sediments for each transect studied. Note that to show these locations, the transects are spaced from one another. Signs of silting are visible in several areas. Major sedimentation deltas are found at:

- Maxfield Bay (mouth of the un-named creek B);
- North of Holbrook Bay (mouth of the un-names creeks C, D, E, F, G, H, I and J );
- the entire narrowing at the south end of the lake;
- un-named bay A;
- South Bay;
- around Horseneck Island (mouth of the un-named creeks O, P, Q and R);
- Derby Bay (mouth of John's River);
- the bays of Lake Park (mouth of un-named creeks U and V).

It is normal to observe a certain delta of sediments at the mouth of a tributary. Nevertheless, sediments that have accumulated in the zones mentioned above are clearly attributable to human causes, because there are so many. Thus, all human activities that strip the soil, the shores or even the ditches (as is the case for certain forestry, agricultural shoreline and municipal practices and some construction methods) may cause erosion and thus carry sediments to the lake. Moreover, the steeper the slope of the ground, shore or bank or ditch, the higher the chance of erosion.

Several tributary streams appear to bring, year after year, sizeable quantities of suspended solids into the lake; these are deposited in vulnerable zones (see figure 5 in Chapter 2). The analysis of the tributaries has shown that the John's, Black and Barton Rivers carry abnormal quantities of soil particles.

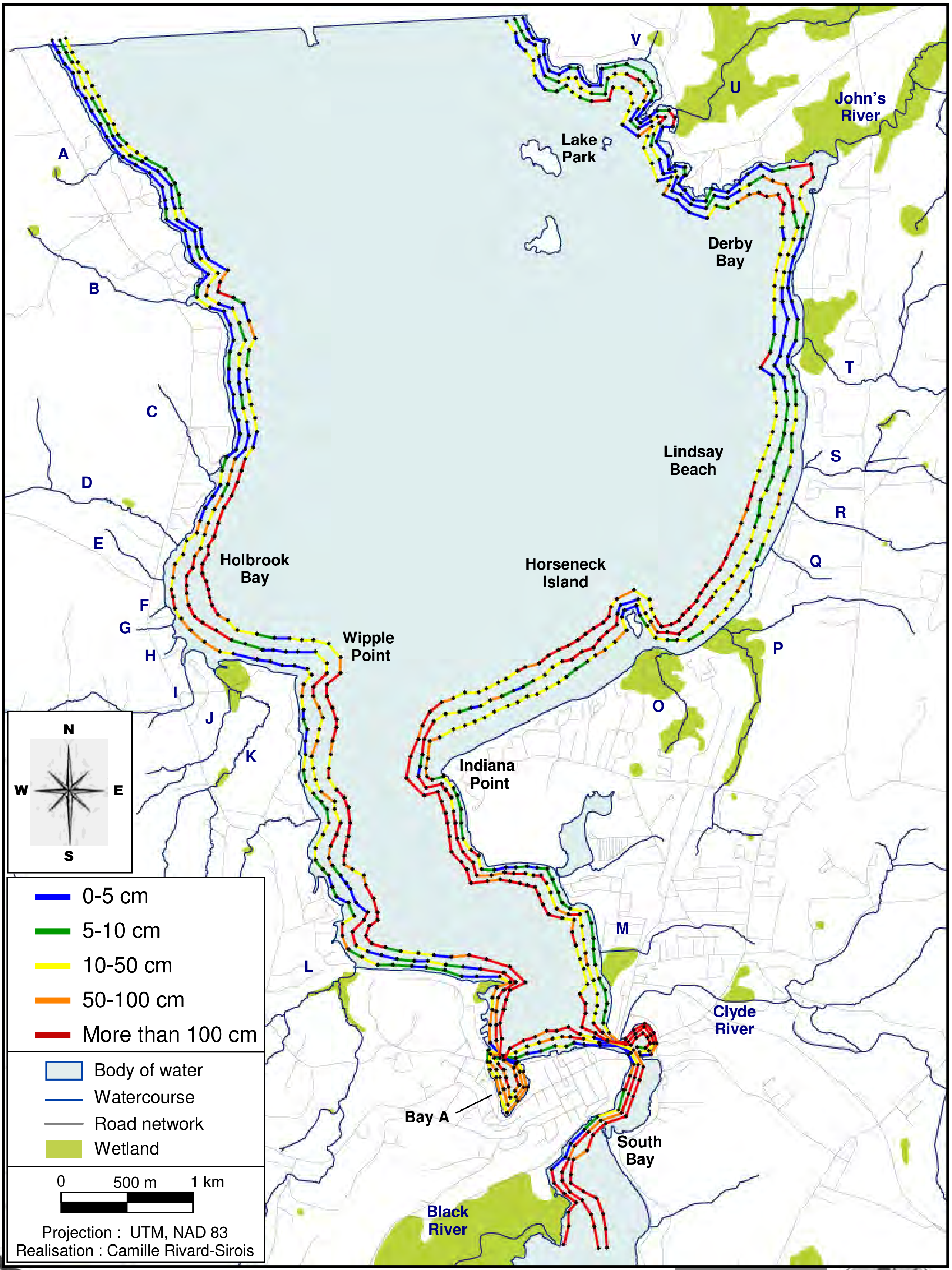


**Figure 12**: Thickness of sediments in the littoral zone at the American part of Lake Memphremagog (1, 2 and 3 m)

# Chapter 7: Aquatic Plants (Macrophytes) of the Littoral

The invasion of aquatic plants was assessed by integrating results concerning the density and biodiversity of aquatic species and the distribution of the species considered invasive (See Table 14).

Aquatic plants are essential for the health of the aquatic ecosystem. It is normal and necessary to have aquatic plants in the lake because they are required as food, habitat and for reproduction of many fish species.

However, as is the case with human health, it is a question of quantity and quality. Thus, a high density of certain aquatic plants indicates excessive intake of nutrients that cause premature eutrophication of the lake. Various activities in the watershed contribute to this degradation, specifically the spreading of fertilizers and manure near the water, outflow from non-conforming households, commercial or municipal septic systems, the artificialization of shores and excessive wood cutting.

**Table 14**: Density and diversity of aquatic plants as a function of trophic level

| | **Density of grass beds** | **Diversity of species** |
|---|---|---|
| Ultra-oligotrophic | Grass beds sparse and dispersed in certain zones | Low to moderate |
| Oligotrophic | Grass beds sparse and very dispersed | Moderate to high |
| Oligo-Mesotrophic | Grass beds, moderate density | Very high |
| Mesotrophic | Grass beds, intermediate density | Moderate |
| Eutrophic | Very dense grass beds, widely distributed | Low |
| Ultra-eutrophic | Very dense grass beds distributed throughout the littoral of the lake | Very low |

## 7.1 Density of Aquatic Plants Beds

The density of grass beds has been assessed by the percentage of coverage by aquatic plants, that is, the percentage of the area of the littoral occupied by all aquatic plants without distinguishing among species. Figure 13 shows the percentage of coverage by aquatic plants for the transects at 1 m, 2 m and 3 m. Characteristics corresponding to the mesotrophic to eutrophic levels are noted:

- Less than a quarter of the littoral (150 transects) shows a low density (less than 10%).
- More than half of the littoral (447 transects) presents a high density of aquatic plants (more than 50 %). Furthermore, in more than one quarter of the littoral (219 transects), more than 75 % of the area is covered over.
- Only 36 transects (4 %) have no aquatic plants.
- The average surface area covered (all depths considered together) is around 50 %.
- The **2 m** zone is the zone with the highest density of aquatic plants. This is consistent with observations in other lakes of the region (RAPPEL, 2004).

**Figure 13**: Percentage of area covered by aquatic plants for each depth

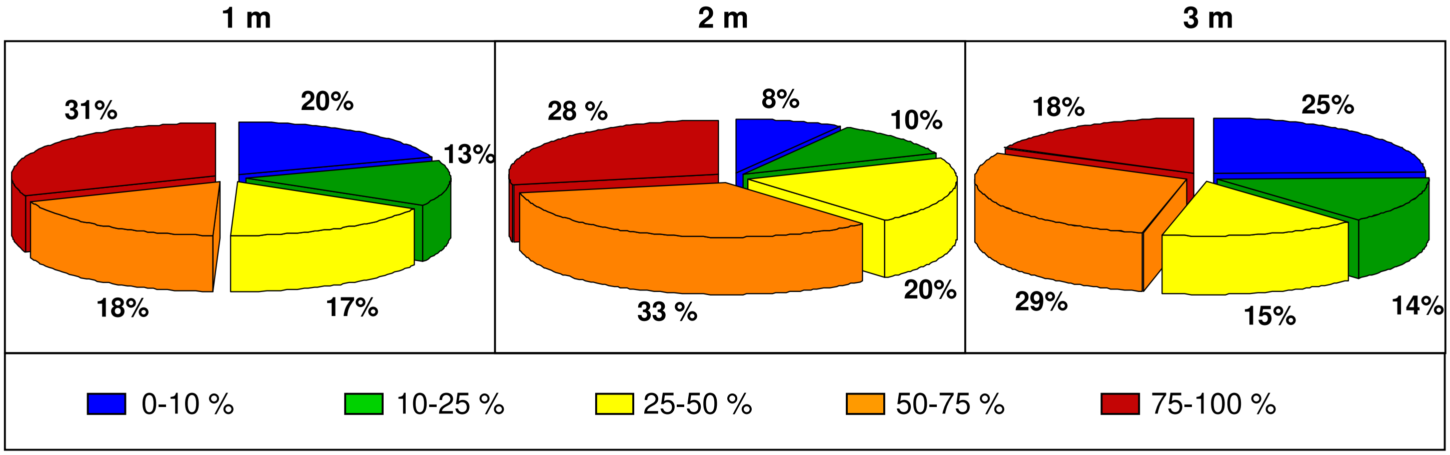
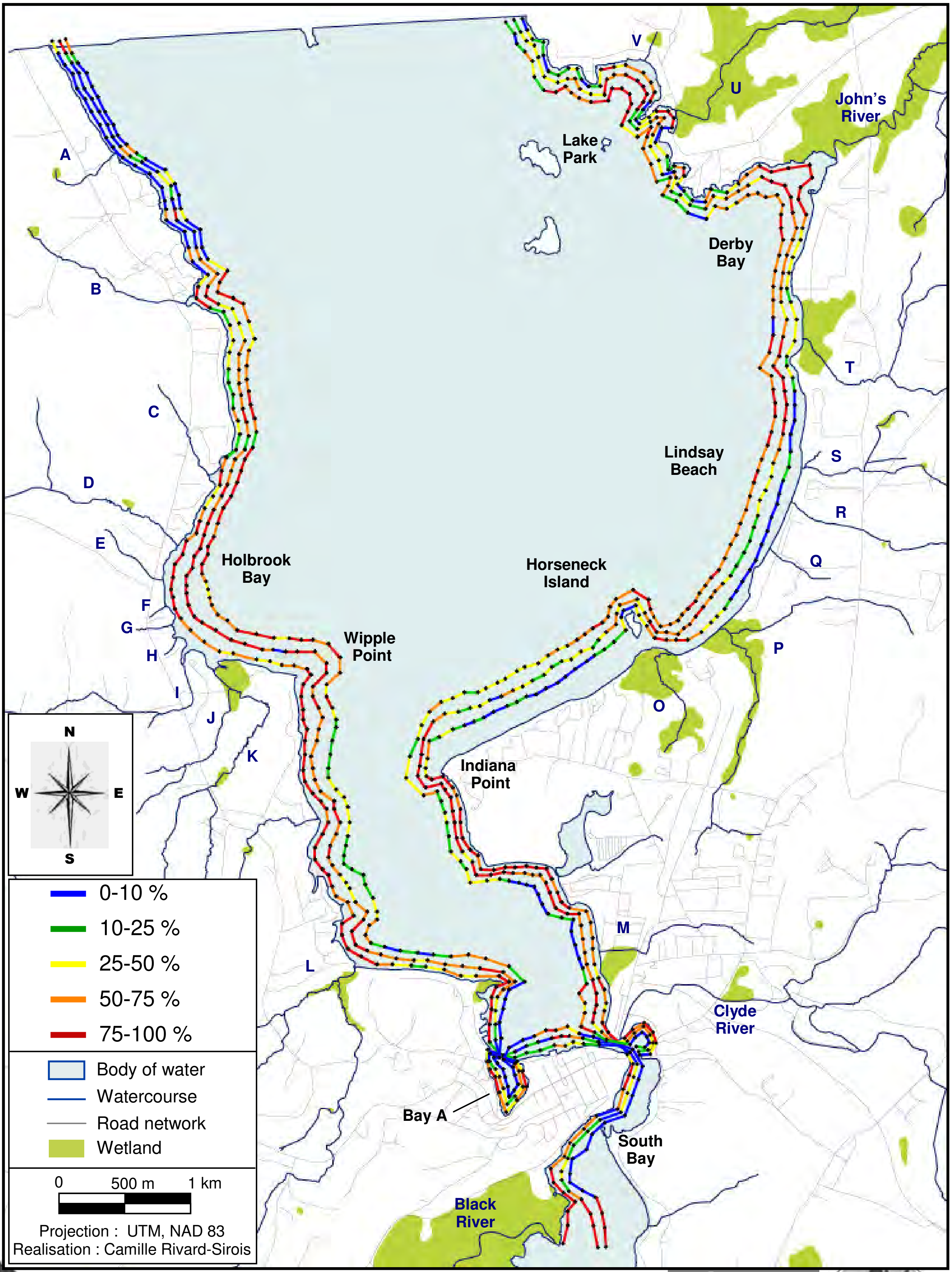


Figure 14 shows the percentage observed for each transect. This map shows dense grass beds in several regions. The most problematic of these are situated at:

- Maxfield (mouth of un-named creek B);
- all of Holbrook Bay (from the mouth of un-named creek C to Wipple Point);
- the entire narrowing at the south end of the lake and un-named bay A;
- South Bay (mouth of the Black and Clyde Rivers);
- Lindsay Beach (especially at the 3 m transect);
- Derby Bay (mouth of John’s River);
- the bays of Lake Park (at the mouth of un-named creeks U and V).

In general, these regions correspond to zones considered naturally favourable to the development of aquatic plants (See Chapter 2) and regions where sedimentation has been identified as being significant (See Chapter 6). However, the cause of proliferation is the intake of nutrients from various human activities. Furthermore, analysis of the tributaries has shown that the John’s, Black and Barton Rivers carry abnormal quantities of phosphorus.

**Figure 14** : Percentage of the area studied covered by aquatic plants in the littoral zone of the American part of Lake Memphremagog (1, 2 and 3 m)



## 7.2 Diversity of Species

The inventory found nearly thirty species of different aquatic plants. When compared with about fifty other lakes in the region, the American part of Lake Memphremagog contained large number of different species (RAPPEL, 2004). This great diversity, useful to support aquatic fauna, is explained by the size of the lake combined with the diversity of habitats it offers. For a description of each of these species, please refer to the Appendix 6: *Description of Species of Aquatic Plants*.

### 7.2.1 Relative Abundance of the Species

Table 15 presents the dominance of different species found in all transects studied (all depths considered together). This table also shows the trophic level generally associated with each of these species. Figure 15 presents the amount of the main species found as a function of the depth of the transects. These data lead to the following observations:

- The principal species in the American part of Lake Memphremagog are typical of **mesotrophic to eutrophic waters**.

- This sector of the lake presently has only a few species associated with oligotrophic waters.

- As was the case on the Quebec side of the lake (RAPPEL, 2005), the most important species is ***Vallisneria americana***. This species dominates the most transects and those studied the most frequently. Vallisneria americana is an indigenous species of average height, which is common and important in aquatic ecosystems. It was found to occur in 590 transects, where it generally covered less that 25 % of the area. However, in 32 % of these transects, it occupies more than 25 % of the area, and in 9 %, it covers more than 50 % of the area.

- ***Heteranthera dubia*** and ***Potamogeton zosteriformis*** are second. These species, which are morphologically similar, were found in 475 transects. In 67 % of the transects, these big plants cover less than 25 % of the area. However, they cover more than 50 % of the area in 9 % of the transects.

- The third most important species is ***Myriophyllum spicatum***. This is a large exotic species considered invasive in a number of lakes in the region; it grows especially in the 2 m and 3 m zones. This species was found in 298 transects. It covered less than 25 % of the area in the majority of transects (84 %) where it was found. However, in four cases, this species alone occupied more than 50 % of the area.

- The great majority of species found are, in fact, not widely distributed.

**Table 15**: Dominance of species of aquatic plants (all depths considered together)
(Source trophic level: Meunier, 1980 and Fleurbec, 1987)

| **Espèces** | **Pourcentage of transects** (%) | | | | **Trophic level** |
|---|---|---|---|---|---|
| | **Dominant 1** | **Dominant 2** | **Dominant 3** | **Total** | |
| **American eel-grass** | 42.1 | 19.4 | 7.7 | 69.2 | M / E |
| **Water star-grass** & **Zostera-like pondweed** | 25.4 | 20.2 | 10.2 | 55.8 | M / E |
| **Eurasian watermilfoild** | 7.7 | 13.1 | 14.1 | 35.0 | M / E |
| ***Chara* and *Nitella (Algae)*** | 5.9 | 2.9 | 3.6 | 12.4 | M / E |
| **Slender Naias** | 4.8 | 11.2 | 9.5 | 25.5 | M / E |
| **Robbin's pondweed** | 3.2 | 1.4 | 2.1 | 6.7 | M / E |
| **Canada waterweed** | 2.2 | 7.3 | 9.4 | 18.9 | M / E |
| **Long-peduncled pondweed**, **Richardson's pondweed** & **Bupleuroid pondweed** | 1.6 | 6.3 | 13.6 | 21.6 | ND |
| **Hornwort** | 1.1 | 2.7 | 2.5 | 6.2 | E |
| **Small & Leafy pondweed** | 0.6 | 3.1 | 3.4 | 7.0 | M / E |
| **Large-leaved pondweed** | 0.2 | 0.6 | 1.5 | 2.3 | M / E |
| **Bur reed sp.** | 0.2 | 0.1 | 0.6 | 0.9 | ND |
| **Rush sp.** | 0.2 | 0.1 | 0.6 | 0.9 | ND |
| **Nuttall's waterweed** | 0.2 | 0 | 0.2 | 0.5 | ND |
| **Alternate watermilfoil** | 0.1 | 0.7 | 0.7 | 1.5 | M |
| **Grass-leaved pondweed** | 0.1 | 0.5 | 1.4 | 2.0 | ND |
| **Grass-like arrowleaf** | 0 | 0.7 | 1.6 | 2.3 | O |
| **Beck's water marigold** | 0 | 0.5 | 3.2 | 3.6 | M / E |
| **Slender watermilfoil** | 0 | 0.5 | 0.1 | 0.6 | O |
| **Pondlily sp.** | 0 | 0.4 | 0.1 | 0.5 | M / E |
| **Subterminal Club-rush** | 0 | 0.4 | 0.1 | 0.5 | ND |
| **Illinois pondweed** | 0 | 0.2 | 0.6 | 0.8 | ND |
| **Dimorphous ponweed** | 0 | 0.2 | 0.5 | 0.7 | ND |
| **Waterlily sp.** | 0 | 0.1 | 0.1 | 0.2 | ND |
| **Floating pondweed** | 0 | 0.1 | 0.0 | 0.1 | ND |
| **Curly pondweed** | 0 | 0 | 0.2 | 0.2 | ND |
| **Spiny-spored quillwort** | 0 | 0 | 0.2 | 0.2 | O / M |
| **Emersed pondweed** | 0 | 0 | 0.1 | 0.1 | O / M |
| **No aquatic plant** | 4.2 | 7.4 | 11.9 | 23.5 | - |

**O** : Oligotrophic
**M** : Mésotrophic
**E** : Eutrophic
**ND** : Not determinated

**Figure 15**: Abundance of the principal species for each depth inventoried

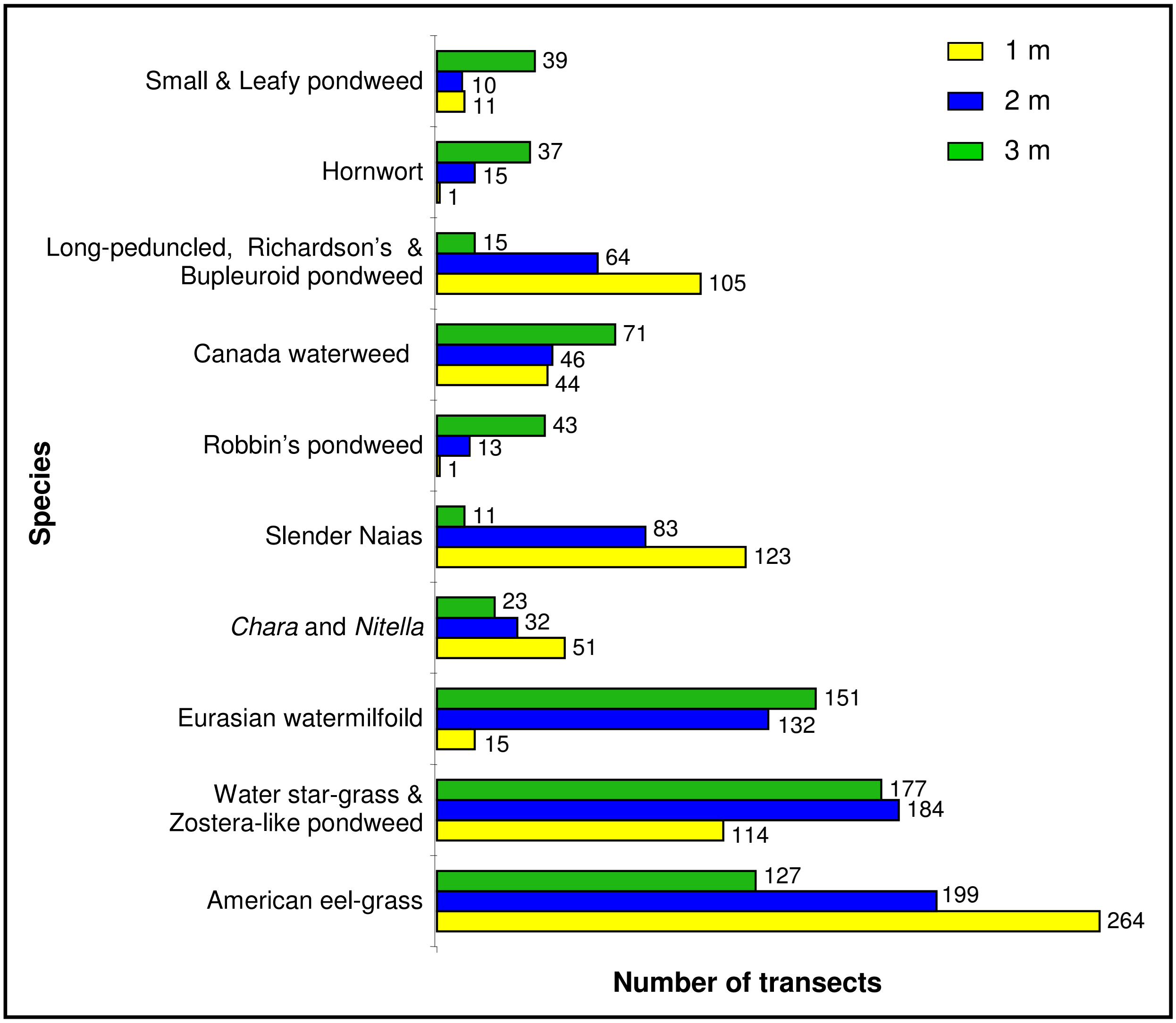
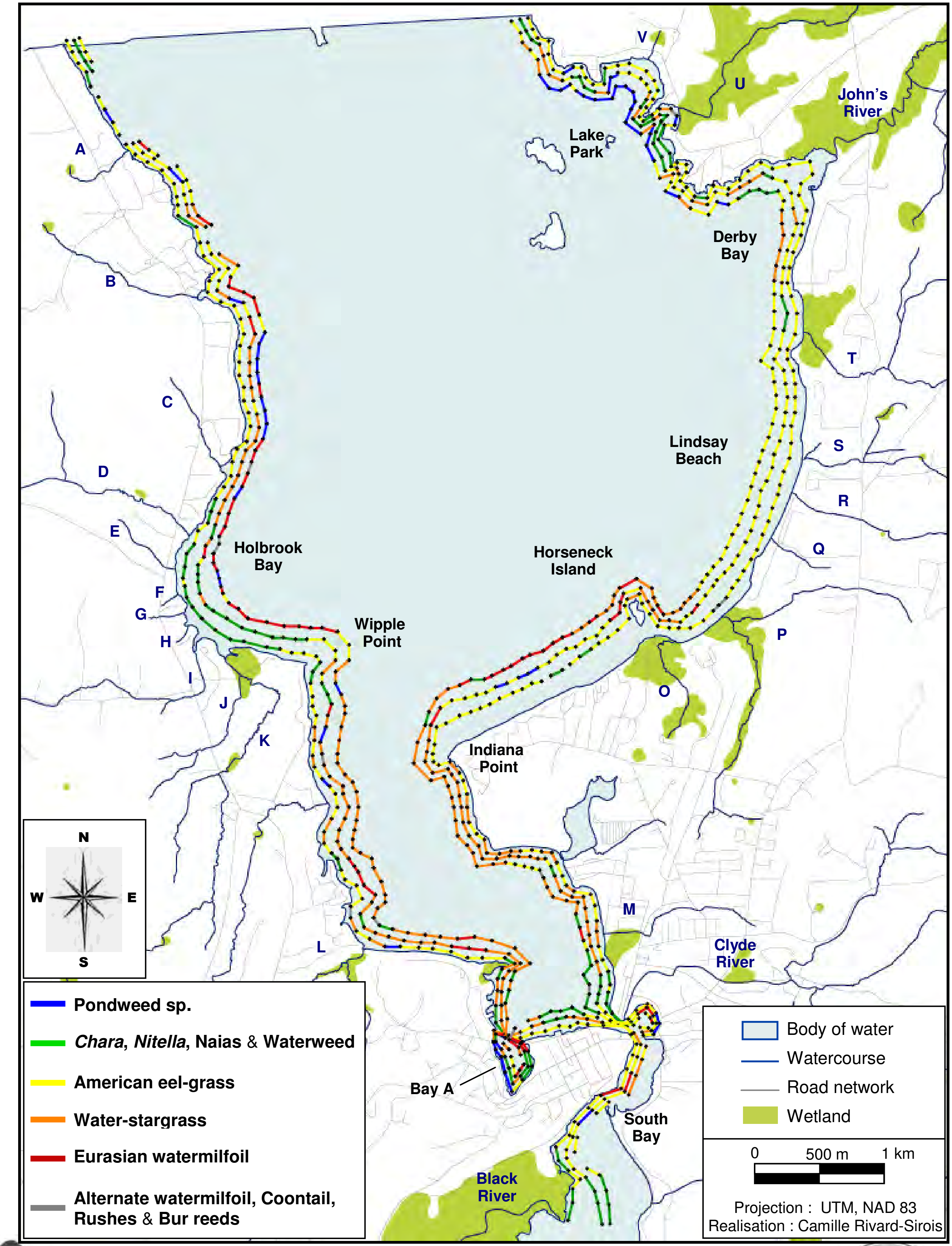


Figure 16 presents the dominant aquatic plant species in each transect studied. Note that:

- The different species are dispersed across the entire lake, but the dominant species are often the same ones.
- The most extensive grass-beds are those of American eel-grass (*Vallisneria americana*), the largest of which is situated between Horseneck Island and Derby Bay. On the lake bottom of Derby Bay, American eel-grass occupies between 75-100 % of the area, by itself.
- The grass beds of water star-grass (Heteranthera dubia) are also very large. This species dominates the entire narrows at the south end of the lake.
- The different pondweed species are relatively scarce. They are mainly found between Maxfield Bay and un-named creek C, on the east of un-named bay A and in the bays of Lake Park.

**Figure 16**: Distribution of the main aquatic plant communities in the littoral zone at the American part of Lake Memphremagog (at 1, 2 and 3 m)



### 7.2.2 Invasive Species

Certain aquatic plants are considered invasive because they reproduce rapidly, extend their distribution easily and displace other species. They are recognized as threatening the biodiversity of an environment (Haury *et al*, 2000) and their presence can cause problems in the ecosystem (White *et al*, 1993). In Vermont, the best known of these are *Myriophyllum spicatum*, *Trapa natans* and *Lythrum salicaria*. Canada waterweed is also known to reach a high density. Since it is indigenous, it is not a problem species of invasive plant (Bove, 2006). Nevertheless, we consider it to be invasive here, because its dense beds are sign of an ecological disequilibrium.

In Lake Memphremagog, only the Eurasian watermilfoil and Canada waterweed are seen to be invasive. Curly-leaved pondweed is also present, but is quite rare and is not a problem. Certain aquatic plants become invasive and cause problems under certain conditions. They multiply abnormally quickly when their **environment is fertilized** by nutritive elements and when **shallow waters warm up** because of clearing of the shore. Thus, the only measures that are effective in limiting the invasion of a body of water by these plants are conservation and restoration of the shoreline buffer zone and reduction of the amount of nutrients coming into the lake (see Appendix *8: General Solutions to Improve the Health of a Lake*).

Figure 17 presents the distribution of **Eurasian watermilfoil** (*Myriophyllum spicatum*) in the littoral zone of the lake. Eurasian watermilfoil is a ubiquitous species frequently found in the American part of the lake (where it is the third most abundant species). This species, introduced from Europe, is considered to be a problem in a number of bodies of water in Canada and the U.S. (Environment Canada, 2003). Eurasian watermilfoil is the dominant species in more than one-third of the littoral studied at depths of 1, 2 or 3 m (298 transects). It is found in nearly the entire littoral zone and especially at depths of 2 m and 3 m. The most dense and extended communities are found in:

- Maxfield Bay at the mouth of un-named creek B;
- Holbrook Bay and at the mouth of un-named creek C;
- the narrows at the south end of the lake;
- the portion between Indiana Point and Horseneck Island;
- around the mouth of un-named creek T.

Figure 18 shows the distribution of **Canada waterweed** *(Elodea canadensis)* in the littoral zone of the lake. Less of a problem in Lake Memphremagog than Eurasian watermilfoil, Canada waterweed is the dominant species (at 1, 2 and 3 m) in nearly one-fifth of the littoral (161 transects). It can be found just about everywhere in the littoral at all depths. The most important communities are situated:

- in Maxfield Bay at the mouth of un-named creek B;
- at the mouth of un-named creek C;
- throughout the narrows at the southern end of the lake;
- in un-named bay A;
- north of the Black River;
- at Indiana Point;
- in the northern portion of Derby Bay.

**Figure 17**: Distribution of Eurasian watermilfoil *(Myriophyllum spicatum)* in the littoral zone of the American part of Lake Memphremagog (at 1, 2 and 3 m)

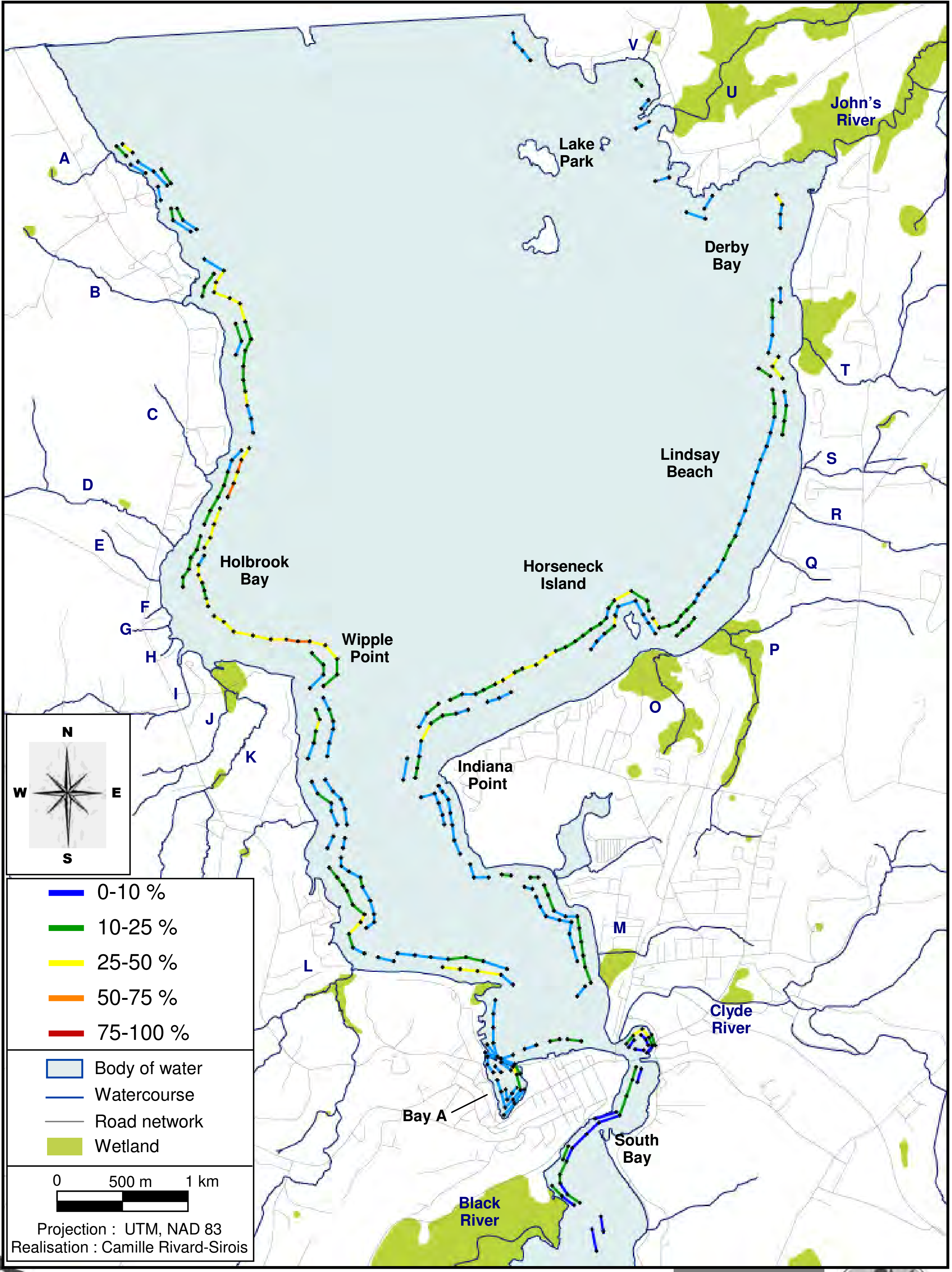
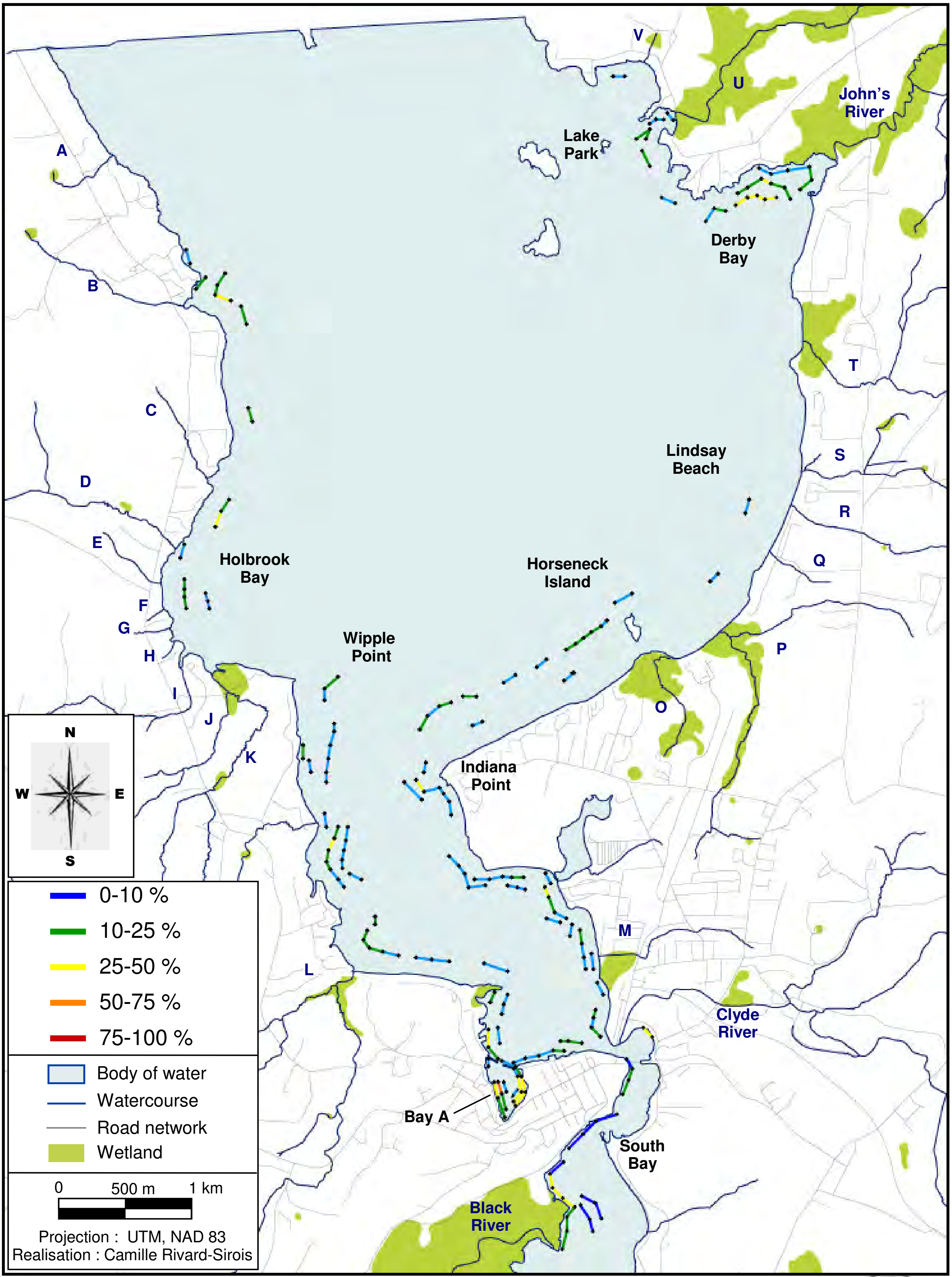


**Figure 18**: Distribution of Canada waterweed *(E. canadensis)* in the littoral zone of the American part of Lake Memphremagog (at 1, 2 and 3 m)



# Chapter 8: Algae on the Bottom of the Littoral (Periphyton)

There are at least 17,000 different species of green algae (Raven et al., 2000). Most of them are found in fresh water, but a few are marine. These algae attach themselves to a solid substrate such as rocks, docks and wharves, boats and aquatic plants. Green algae can also form floating mats. Green algae are normally microscopic, but when large quantities of nutritive elements are available, the algae multiply to create visible, sticky mats. These mats are biological indicators that reveal the presence of one or several sources of local pollution (nutrients) (Kalff, 2002). Green algae reach their maximum density around mid-July (Kalff, 2002). Note that the inventory began in the month of August, which coincided with the maximum development of these algae.

Figure 19 presents an overall picture of the abundance of green algae in the littoral zone of the lake. Figure 20 shows the density of green algae in each of the transects studied. To summarize, half the transects do not present any algae visible to the naked eye. However, these algae form visible mats in a large portion of the littoral (401 of the transects studied). In addition, several transects present clearly abnormal densities, including at:

- Maxfield Bay at the mouth of un-named creek B;
- the mouth of un-named creek C;
- Holbrook Bay;
- Wipple Point;
- the entire narrows at the south of the lake;
- un-named bay A;
- around the mouth of the Clyde River;
- the mouth of the Black River;
- Derby Bay at the mouth of John's River;
- the bays at Lake Park, to the mouth of un-named creeks U and V.

The study of green algae confirms that the nutrient load exceeds the lake's capacity to assimilate it. Analysis of the tributaries showed that the John's, Black and Barton Rivers are important entry points for phosphorus (See Chapter 5).

**Figure 19**: Percentage of coverage by green algae

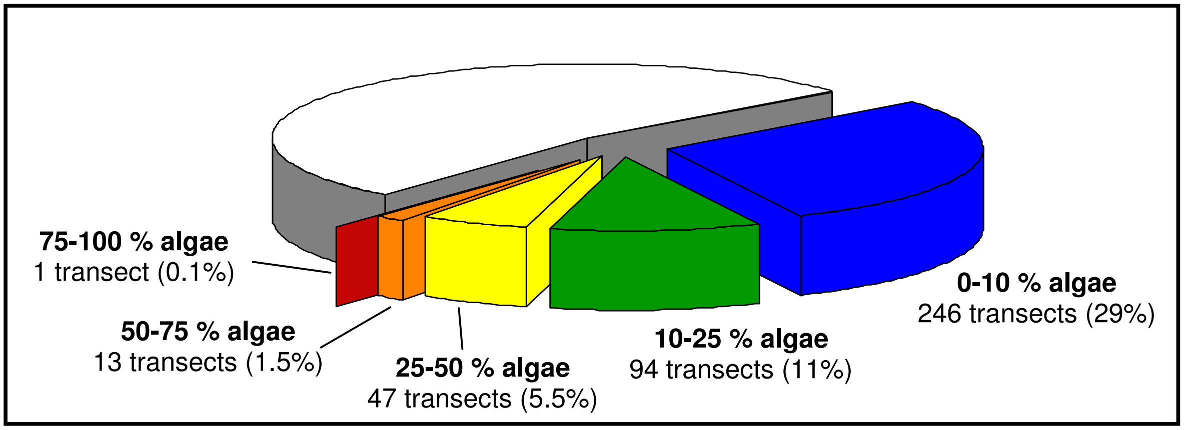
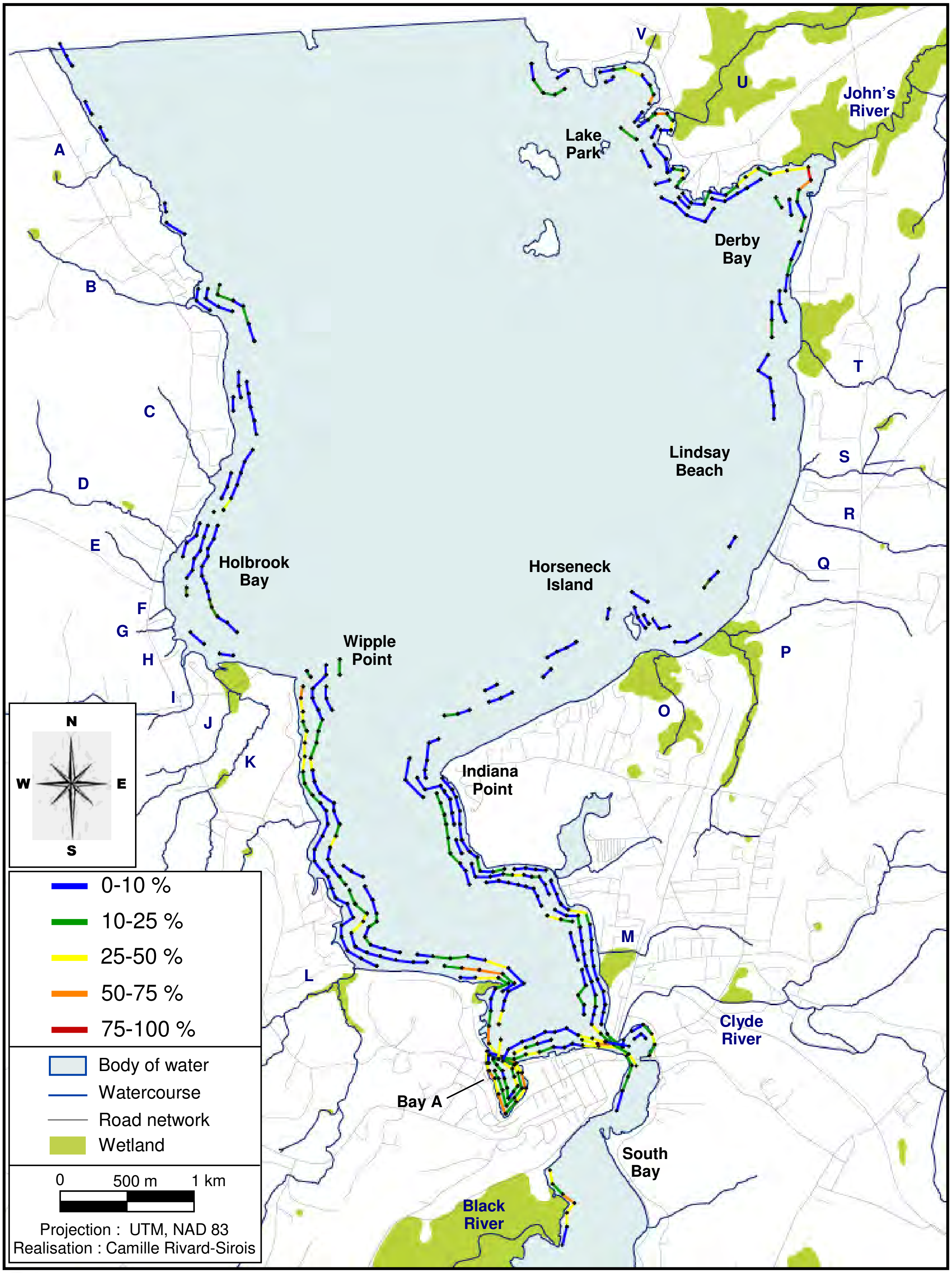


**Figure 20**: Distribution of green algae (Periphyton) in the littoral zone at the American part of Lake Memphremagog (at 1, 2 and 3 m)



# Chapter 9: Diagnosis of the Health of the Lake

This chapter deals with the overall health of Lake Memphremagog. It is a summary of Chapters 3, 4, 5, 6, 7 and 8.

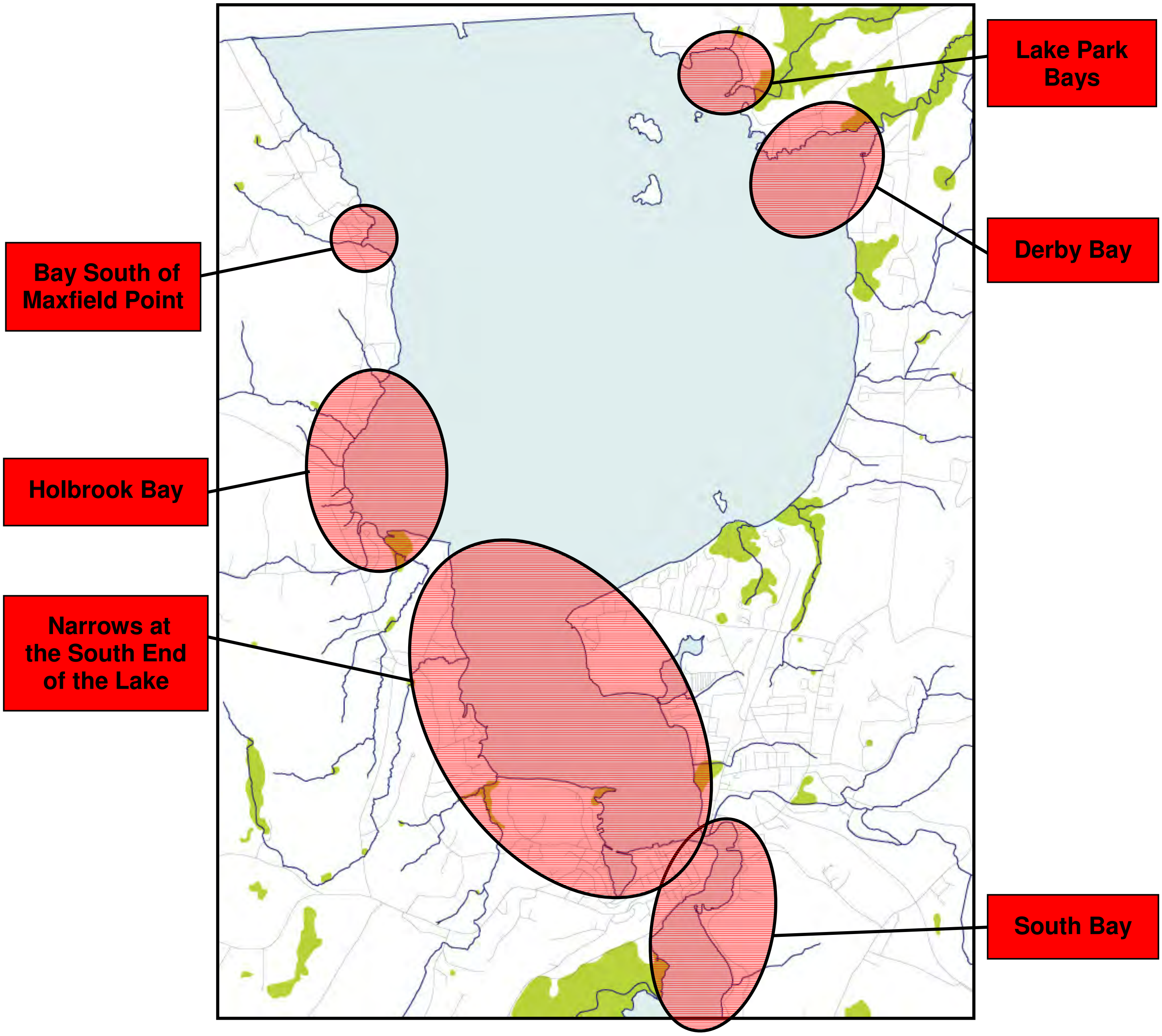
## 9.1 Global portrait

| | Parameters | Evaluation |
|---|---|---|
| **Condition of the shore** (chap. 3) | Degree of artificialization (median) | Shore quite artificialized |
| **Condition of the littoral** (chap. 6, 7 and 8) | Thickness of sediments (median) | • Zone 1 m: 5-10 cm<br>• Zone 2 m: 30-40 cm<br>• Zone 3 m: 90-100 cm |
| | Type of sediments | Abundance of fine particles and sands |
| | Density of aquatic plants (median) | • Zone 1 m: 50 %<br>• Zone 2 m: 50-75 %<br>• Zone 3 m: 50 % |
| | Diversity of aquatic plants | • About 30 different species<br>• Eurasian watermilfoil is abundant |
| | Periphyton | Elevated presence of green algae |
| **Condition of the waters of the lake** (chap. 4) | Chlorophyll *a*<br>Phosphorus<br>Transparency of water | Mesotrophic |
| **Condition of the tributaries** (chap. 5) | Phosphorus<br>Suspended solids | John's, Barton and Black Rivers have phosphorus and suspended solids loads that are problematic |

## 9.2 Zones where there are Problems

Figure 21 presents problematic zones identified from study results. The problematic zones are the hot spots, priorities where energy should be focused. These are sites that are suffering from strong human pressures; they should be restored without delay to reduce the degradation of the lake and the loss of ecological and anthropic uses that stem from this. These zones must be made priorities in the action plan to reduce sources of degradation of Lake Memphremagog. It is important to act now to prevent future problems by taking measures to avoid degradation of zones that are in good health or only slightly damaged.

**Figure 21**: Problematic zones at the American part of Lake Memphremagog



Portrait (sections 267 to 289):

| | Parameters | Evaluation |
|---|---|---|
| **Condition of the shore** | Degree of artificialization | • Southern portion: shores little artificialized<br>• Northern portion: shores very artificialized |
| **Condition of the littoral** | Sediments | • Bottom made up of fine particles and sands<br>• Very large sedimentary accumulation (especially at 2m and 3 m) |
| | Aquatic plants | • Proliferation of aquatic plants (especially at 1m) |
| | Periphyton | • Increased presence of green algae north of the Black River and around the Clyde River |
| **Water condition** | Black River | • Problem of phosphorus<br>• Slight problem of SS |
| | Barton River | • Problem of SS<br>• Slight problem of phosphorus |
| | Clyde River | • No major problems |

Special comments

This zone was not included in the inventory to be carried out in the summer of 2005 under the terms of the memorandum of understanding. However, since the team of biologists had finished the inventory before the final date, the biologists decided to inventory the northern part of this zone.

Environmental characteristics

This is one of the zones that is naturally most vulnerable to silting and the proliferation of aquatic plants in the entire lake because of its geographic location, sheltered from the prevailing winds and the gentle slopes there.

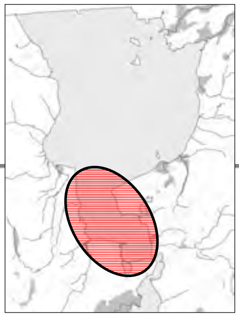
This zone is very irrigated; a large part of the sediments and nutrients that come into this area could have been deposited by the rivers (especially the Black and Barton).

Principal anthropic causes (caused by human activities)

Despite its natural vulnerability, the fact remains that human activities are the cause of the degradation. Various elements contribute to the deterioration in this zone, including:

- High **residential density** and **extremely modified shores** situated at the north of this zone cannot retain either the sediments or the nutritive elements; both contribute to the warming of the shallow waters.
- **Agricultural activities** in the watershed can bring a surplus of nutrients, particularly if the shoreline buffer zone is too small, if drainage ditches are not re-vegetated or if cattle have access to watercourses.
- The road network, which is a significant land use in this zone, can facilitate the transportation of soil particles and pollutants to the lake, especially if the **roadside ditches** are maintained in the conventional way (devegetation of the sides).
- **Industrial activities** in the drainage basin.
- **Forestry activities** in the drainage basin.
- **Urban and recreational and tourism activities** in the drainage basin of this zone are potential sources of sediments and nutritive elements.

This zone presents significant symptoms of erosion and premature eutrophication. Because the health of this zone appears to be a cause for concern, this zone should be a priority in the action plan to reduce sources of degradation of Lake Memphremagog. This is even more important because this zone is fed by watercourses with a significant volume of flow. The most important actions to take include re-naturalizing the shores and controlling the fertilization and erosion in the watershed (See Appendix *8: General Solutions to Improve the Health of a Lake*).



Portrait (sections 60 to 50):

| | Parameters | Evaluation |
|---|---|---|
| **Condition of the shore** | Degree of artificialization | • Median: about 50 % artificial<br>• Portion near Newport: shores very artificialized |
| **Condition of the littoral** | Sediments | • Bottom made up mainly of fine particles and sands<br>• Very large sedimentary accumulation (especially at the 2 m and 3 m levels) |
| | Aquatic plants | • Proliferation of aquatic plants (especially at the 1 m to 2 m levels) |
| | Periphyton | • Greater presence of green algae near Newport and in un-named bay A. |

Environmental characteristics

The water is calm due to the narrowing of the lake; this promotes the deposit of suspended solids and the development of aquatic plants.

Principal anthropic causes (human activities)

In spite of its natural vulnerability, the cause of degradation is human activities. A number of factors contribute to deterioration in this zone, specifically:

- **High residential density** and **artificialized shores** near Newport that hold neither sediments nor nutritive elements; both factors contribute equally to warming of the shallow waters.
- The road network, which is a significant factor in this zone, helps to transport soil particles and pollutants to the lake, especially if **roadside ditches** are maintained in the conventional way (de-vegetation of the slopes).
- **Urban and recreo-tourism activities** in the watershed for this zone are potential sources of sediments and nutritive elements.

This zone presents significant symptoms of erosion and of premature eutrophication. Because its health appears to be of concern, this zone should also be a priority in an action plan to reduce the sources of degradation of Lake Memphremagog. Among the most important actions to take are the re-naturalization of the shores and control of the use of fertilizers and erosion control (see Appendix *8: General Solutions to Improve the Health of a Lake*). We also recommend assessing water quality in un-named tributaries K, L and M because they appear to be entry points for sediments and nutrients.

Portrait (sections 208 to 230):

| | Parameters | Evaluation |
|---|---|---|
| **Condition of the shore** | Degree of artificialization | • South portion: shores quite artificialized<br>• North portion: very artificialized shores |
| **Condition of the littoral** | Sediments | • Bottom made up mainly of fine particles and sands<br>• Presence of a large sediment delta at the mouth of John's River |
| | Aquatic plants | • Very dense bed of aquatic plants at the mouth of John's River |
| | Periphyton | • Increased presence of green algae at the mouth of John's River |
| **Water condition** | John's River | • Particularly problematic in terms of phosphorus<br>• Problematic in terms of SS |

Environmental characteristics

The tranquillity of the waters and gentle slope of the littoral of this bay allow deposits of sediments of suspended solids and nutriments particularly from John's River. This bay is, therefore, naturally particularly susceptible to silting and the proliferation of aquatic plants.

Principal anthropic causes (human activities)

Despite this natural vulnerability, the fact remains that it is human activity that has caused the degradation. Several factors contribute to deterioration in this zone, including:

- **High residential density** and **artificialized shores** on the north shore of this zone hold neither sediments nor nutritive elements and both contribute to warming of the shallow waters.
- **Agricultural, forestry and urban activities** in the watershed of John's River may carry a surplus of nutrients and sediments.
- The road network may favour transport of soil particles and pollutants to the lake, especially if **roadside ditches** are maintained by conventional methods (complete de-vegetation of the sides).

This zone presents significant symptoms of erosion and premature eutrophication. Because its health is cause for concern, this zone should be made a priority when drawing up the action plan to reduce sources of degradation of Lake Memphremagog. Because John's River is the most problematic tributary in the lake, particular attention should be given to human activities in its drainage basin. Among the most important actions to take are the re-naturalization of the shores and control of the use of fertilizers and erosion (see Appendix *8: General Solutions to Improve the Health of a Lake*).

# Bays at Lake Park

Portrait (sections 239 to 256) :

| | Parameters | Evaluation |
|---|---|---|
| **Condition of the shore** | Degree of artificialization | • Degree of artificialization varies from natural to completely artificial |
| **Condition of the littoral** | Sediments | • Bottom made up mainly of fine particles and sands<br>• Heavy accumulation of sediments on the bottom of the two bays (especially at 2 m and 3 m) |
| | Aquatic plants | • High density of aquatic plants throughout this zone |
| | Periphyton | • Significant presence of green algae |

Environmental characteristics

These bays are naturally vulnerable to deposits of suspended solids and the development of aquatic plants because the water is calm and the slopes of the littoral are gentle.

The points are less vulnerable because they are more exposed to water currents and waves.

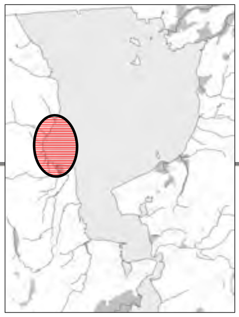
Principal anthropic causes (human activities)

Despite the natural vulnerability, the fact remains that the cause of degradation are human activities. A number of elements contribute to deterioration in this zone, including specifically:

- Certain **artificialized shores** in this zone hold neither sediments nor nutritive elements, and this contributes to the warming of shallow waters.
- **Agricultural, forestry and urban activities** in the watershed can cause a surplus of nutrients and sediments to be carried to the lake.
- The road network may promote the transportation of soil particles and pollutants to the lake, especially if **roadside ditches** are maintained in the conventional way (complete de-vegetation of the slopes).

This zone presents symptoms of erosion and premature eutrophication. Because its condition is a cause for concern, this zone should be a priority when drawing up an action plan to reduce the sources of degradation of Lake Memphremagog. Un-named creeks U and V appear to be carrying considerable quantities of sediments and nutrients; it is therefore recommended that they be studied in greater depth. The principal actions to take are, among others, re-naturalization of the shores and control of the use of fertilizers and erosion (See Appendix *8: General Solutions to Improve the Health of a Lake*).

# Holbrook Bay



Portrait (sections 35 to 59):

| | Parameters | Évaluation |
|---|---|---|
| **Condition of the Shore** | Degree of artificialization | • Most shores are very artificialized |
| **Condition of the littoral** | Sediments | • Bottom mainly composed of fine particles and sands<br>• Large accumulation of sediments at the mouth of un-named tributaries C to J |
| | Aquatic plants | • Very high density of aquatic plants throughout the zone<br>• Problem: beds of Eurasian watermilfoil |
| | Periphyton | • Moderate presence of green algae |

Environmental characteristics

In this bay, the littoral slopes gently and is favourable to the accumulation of sediments and the establishment of aquatic plants. This zone is also protected from the prevailing winds, which prevents the regular mixing of the bottom by the action of the waves.

This zone is fed by many water courses that can be the entry point for sediments and nutrients.

Principal anthropic causes (human activities)

Despite its natural vulnerability, the fact remains that human activities are the cause of the degradation. Several elements contribute to the deterioration of this zone, specifically:

- Several **artificialized shores** hold neither sediments nor nutritive elements and this contributes to the warming of shallow waters.
- **Agricultural, forestry** and **urban activities** in the watershed can carry a surplus of nutrients and sediments to the lake.
- The **road network** can promote the transport of soil particles and pollutants to the lake, especially if **roadside ditches** are maintained with the conventional method (complete de-vegetation of the sides).

This zone presents symptoms of erosion and premature eutrophication. Because its health appears to be cause for concern, this zone should be a priority in an action plan to reduce sources of degradation for Lake Memphremagog. Many streams appear to be carrying considerable quantities of sediments and nutrients; we recommend that their water quality (especially that of un-named creeks C, D, I and J) be further studied. The main courses of action include re-naturalization of the shores and control of the use of fertilizers and erosion (see Appendix 8: *General Solutions to Improve the Health of a Lake*).

## Bay South of Maxfield Point

Portrait (sections 21 to 25):

| | Parameters | Evaluation |
|---|---|---|
| **Condition of the shore** | Degree of artificialization | • North portion: natural shores<br>• South portion: very artificalized shores |
| **Condition of the littoral** | Sediments | • Bottom mainly composed of fine particles and sands<br>• Heavy accumulation of sediments at 3 m level |
| | Aquatic plants | • Very dense aquatic plants<br>• Abundance of Eurasian watermilfoil |
| | Periphyton | • Moderate presence of green algae |

Environmental characteristics

This small bay is naturally favourable to the deposit of suspended solids and the development of aquatic plants because the waters are calm and the slope of the littoral gentle.

Principal anthropic causes (human activities)

Despite its natural vulnerability, the fact remains that the cause of degradation is human activity. Several factors contribute to the deterioration of this zone, including, specifically:

- Several **artificialized shores** in this zone hold neither sediments nor nutritive elements; this contributes to the warming of shallow waters.
- **Agricultural, forestry** and **urban activities** in the watershed may carry a surplus of nutrients and sediments.
- The road network may promote the transport of soil particles and pollutants to the lake, especially if the **roadside ditches** are maintained in the conventional way.

This zone presents symptoms of erosion and premature eutrophication. Because its health appears to be of concern, this zone should be a priority in an action plan to reduce the sources of degradation of Lake Memphremagog. Un-named creek B appears to carry significant quantities of sediments and nutrients; it is recommended that it should be studied in greater depth. The principal actions to take include the re-naturalization of the shore and control of the use of fertilizers and erosion (See Appendix 8: *General Solutions to Improve the Health of a Lake*).

## 9.3 A few words on the lake as a whole
## (Synthesis of Phases 1 and Vermont)

This section deals with the overall condition of Lake Memphremagog (in both the Canadian and American parts). It covers, therefore, the principal conclusions of Phase 1 and the Vermont report of the project Operation Healthy Lake.

For the purposes of this analysis the Quebec part of the lake has been divided into 16 sectors that have different morphological and geological characteristics. The following figures present a report on the condition of the 16 sectors in Quebec and the American part. The highlights are as follows:

- The most artificialized sectors are: Baie Magog, Southière-sur-le-lac, Three Sisters, East part (Qc) and American part.
- The water's quality is similar on both sides of the border. However, when one looks more closely at the raw data, one sees that the situation improves as one goes north. This improvement, however, does not have a direct impact on the trophic level. Finally, the north-east part of Fitch Bay presents the most eutrophic waters in the entire lake.
- A number of watercourses carry quantities of sediments and nutritive elements which harm the health of the lake. The tributaries which are the most cause for concern are Oliver Creek, Rivière-aux-Cerises, Castle Brook, Black River, Barton River, John's River and the McCutcheon, Gale, Bunker and Fitch tributaries.
- Water quality in several streams on the American side was not analyzed.
- The lake shows signs of silting in several areas. Sedimentation is clearly a problem in the following sectors: American part and Fitch Bay (north-east).
- Threee Sisters, Southière-sur-le-lac, Cummins and Channel Bays, American part and Fitch Bay (north-east) sectors present a high density of aquatic plants.
- Green algae are particularly abundant in the following sectors: American part, Fitch Bay (north-east) and Georgeville.
- The American part of Lake Memphremagog is among the sectors that present the most symptoms of premature eutrophication.

**Figure 22**: The condition of the shore in each sector of Lake Memphremagog (median degree of artificialization)

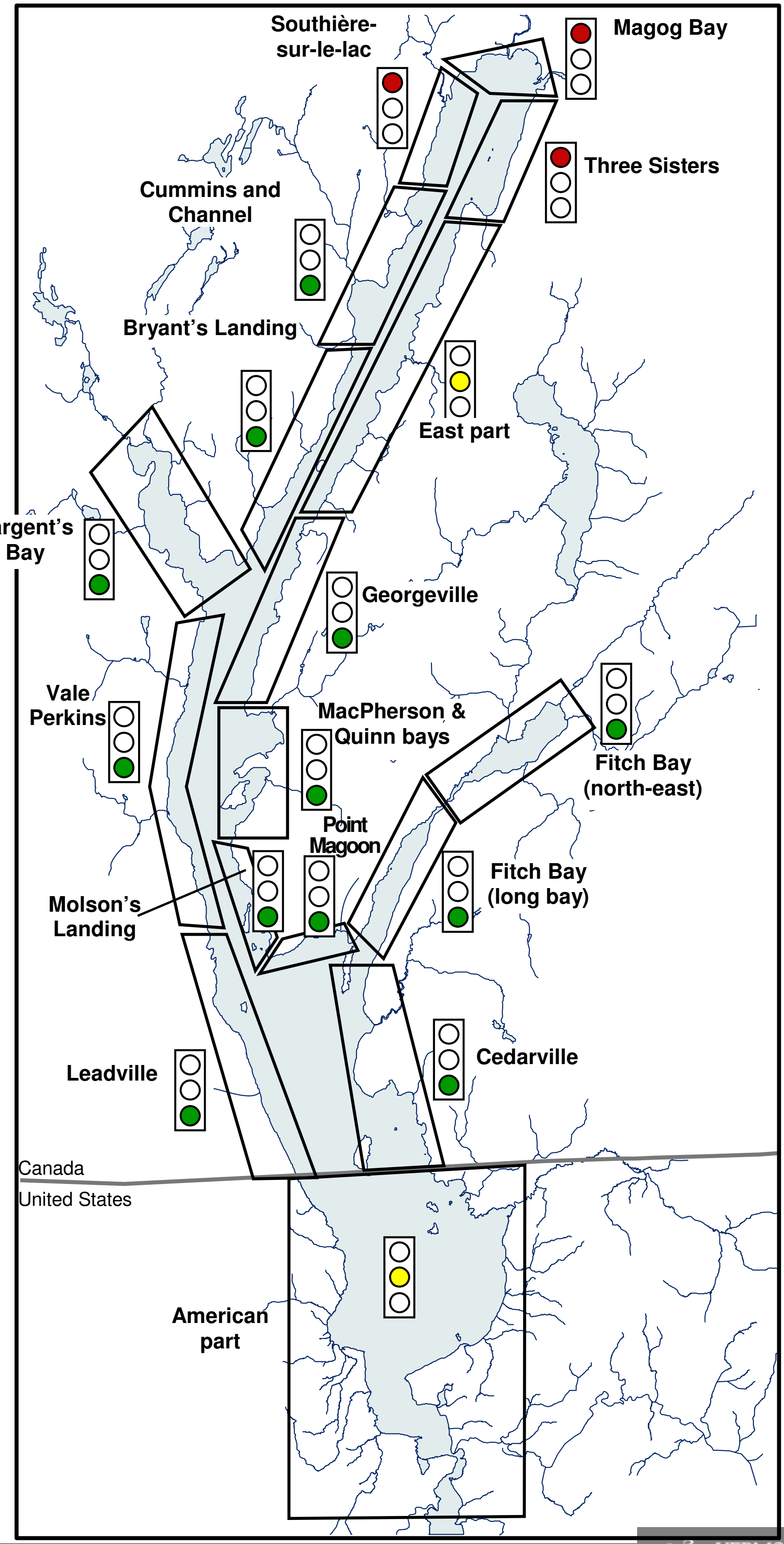


**Figure 23**: Water quality of Lake Memphremagog at the MDDEP stations
(Adapted from Simoneau, 2004 ; MENV, 2005 ; MDDEP, 2006)

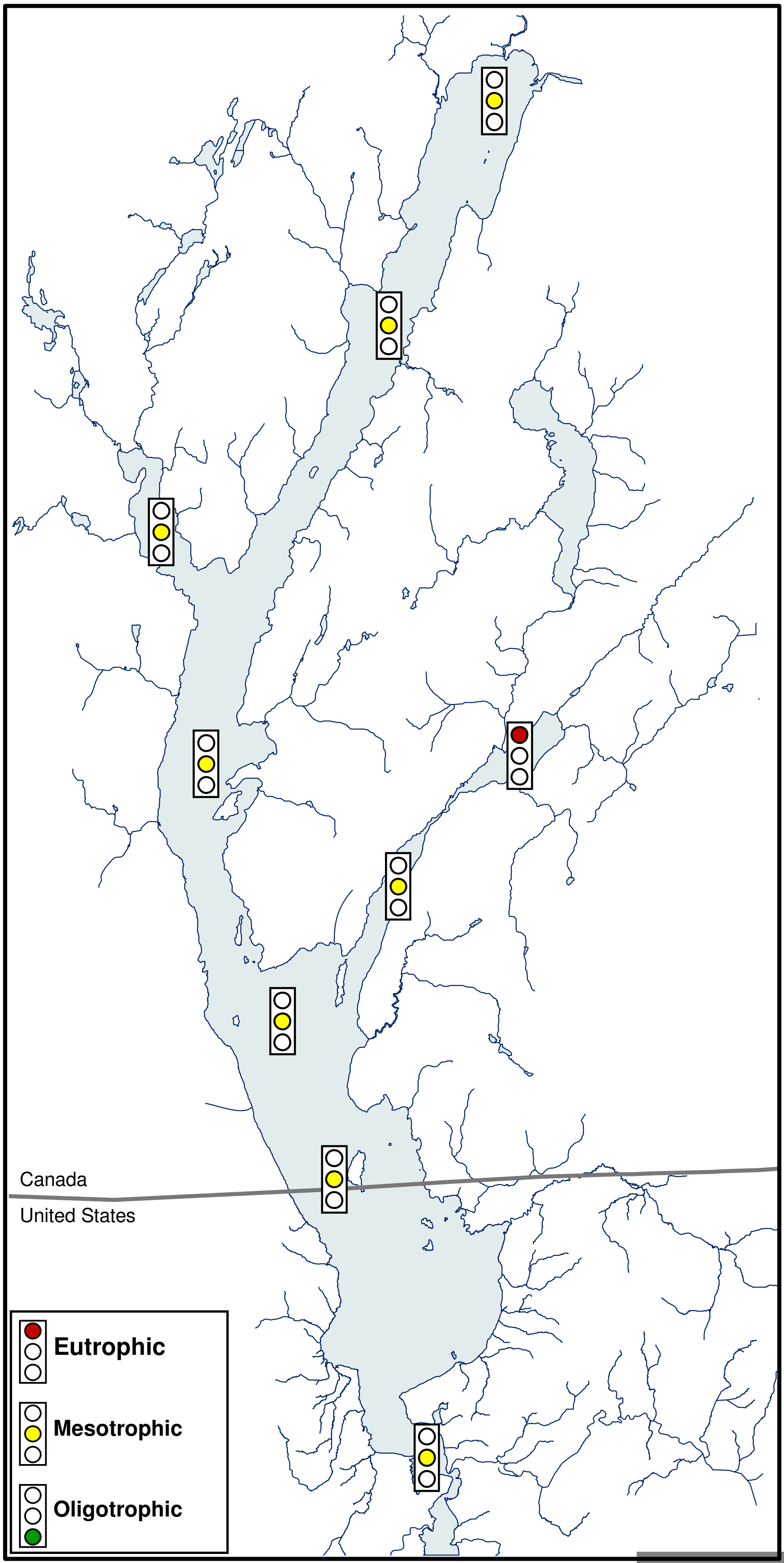
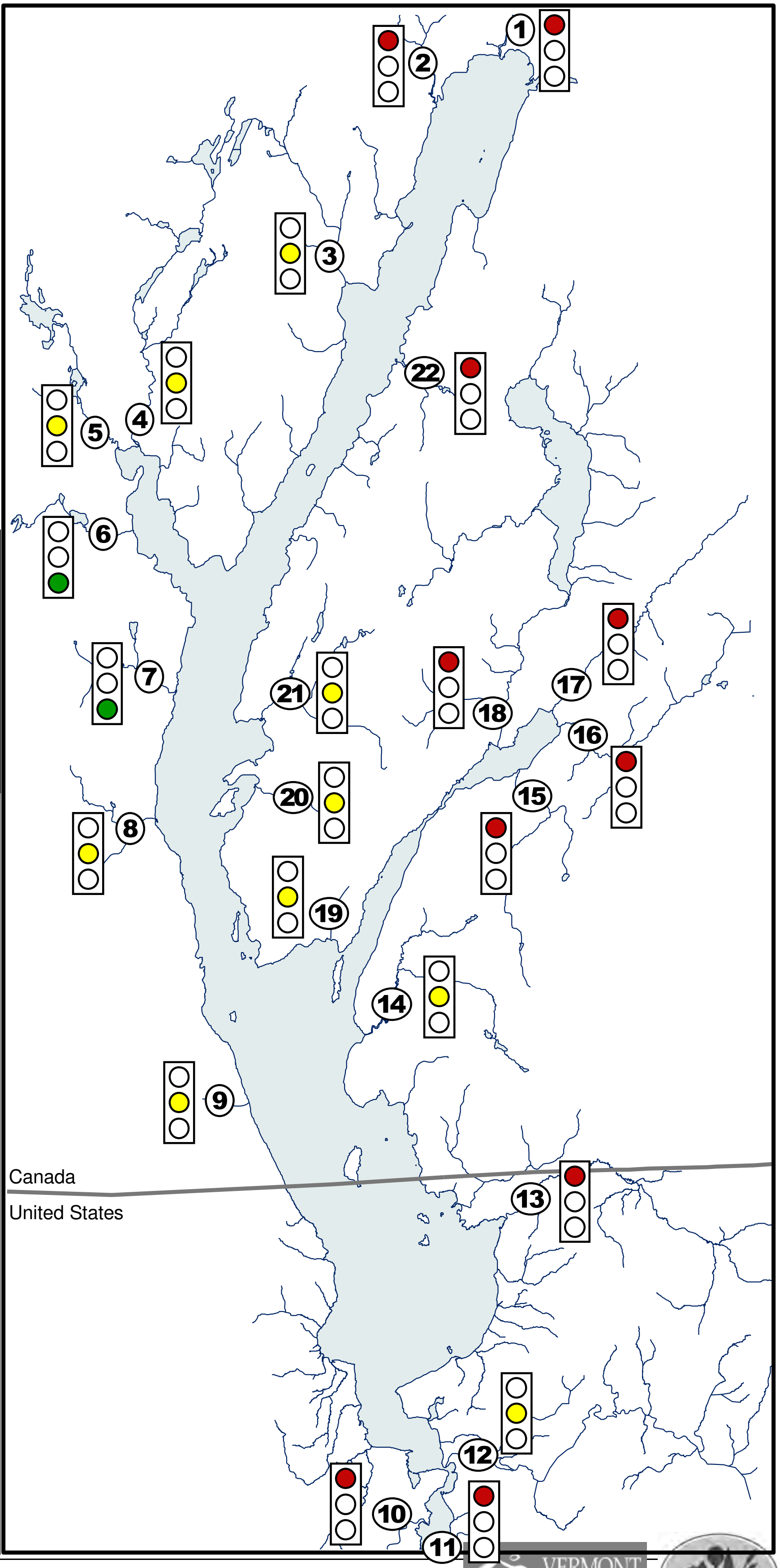


**Figure 24**: Water quality of the main tributaries of Lake Memphremagog
(Adapted from NWSC, 2006 and annual reports of the MRC de Memphrémagog)



🟥 **Poor quality**

🟨 **Questionable quality**

🟩 **Good quality**

**1**. Rivière-aux-Cerises
**2**. Castle Brook
**3**. MacIntosh Brook
**4**. Powell Brook
**5**. West Brook
**6**. Glen Brook
**7**. Château Brook
**8**. Vale Brook
**9**. Bear Brook
**10**. Black River
**11**. Barton River
**12**. Clyde River
**13**. John's River
**14**. Tompkin Brook
**15**. McCutcheon Brook
**16**. Gale Brook
**17**. Bunker Brook
**18**. Fitch Brook
**19**. Limekiln Brook
**20**. Boyton Brook
**21**. Taylor Brook
**22**. Oliver Brook

**Figure 25**: Sediments in the littoral zone of Lake Memphremagog

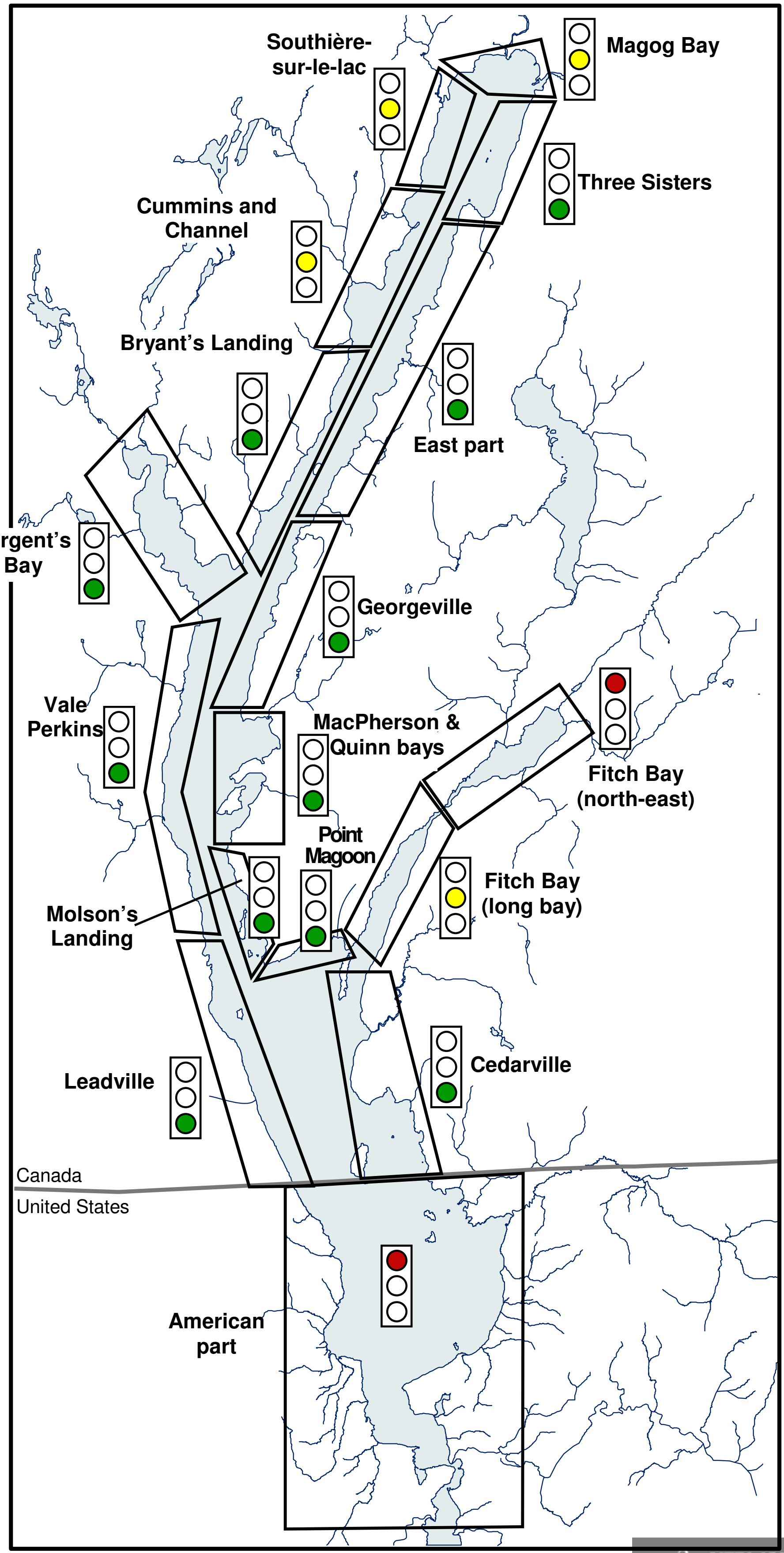


**Figure 26**: Aquatic plants in the littoral zone of Lake Memphremagog

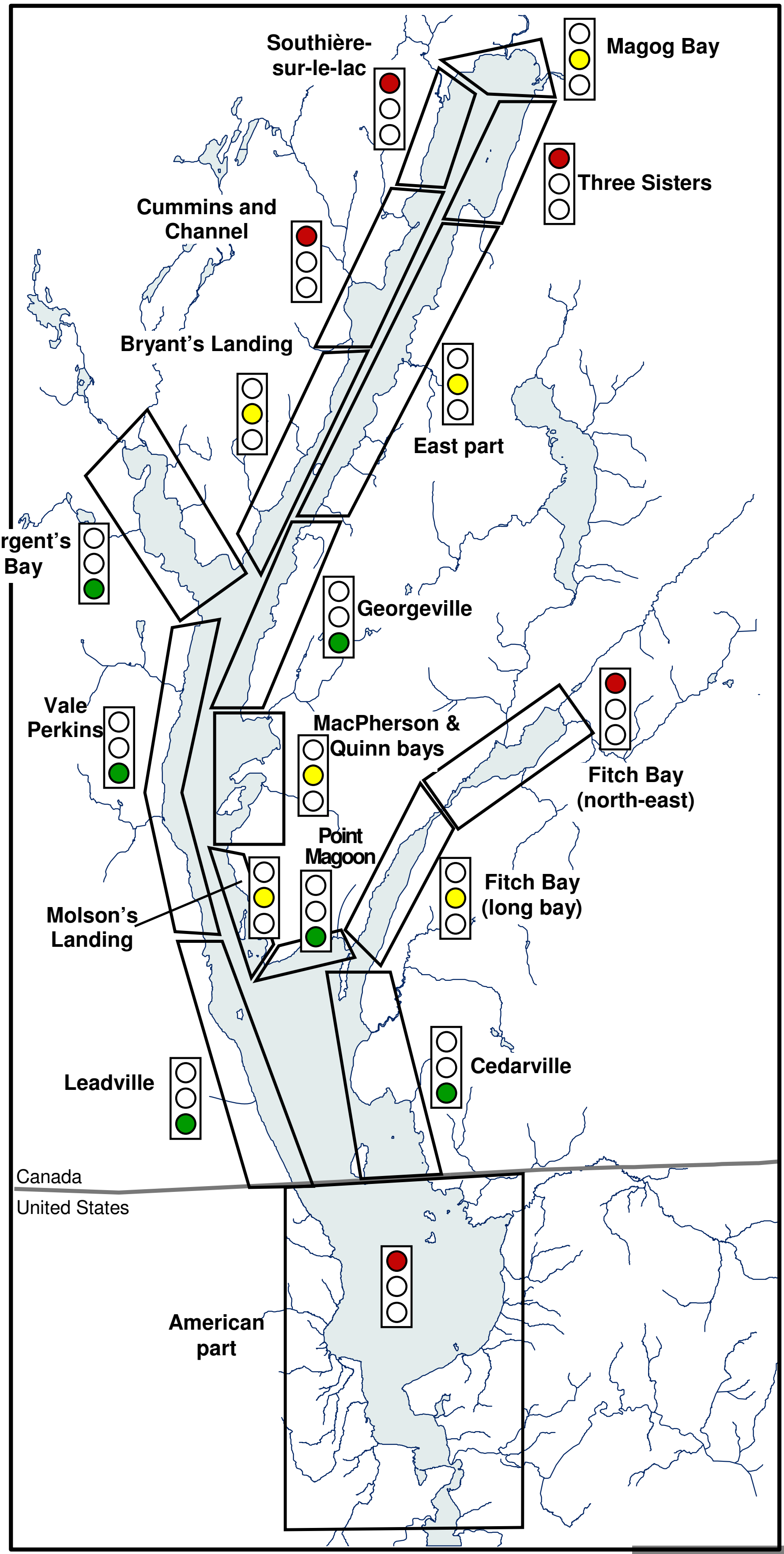
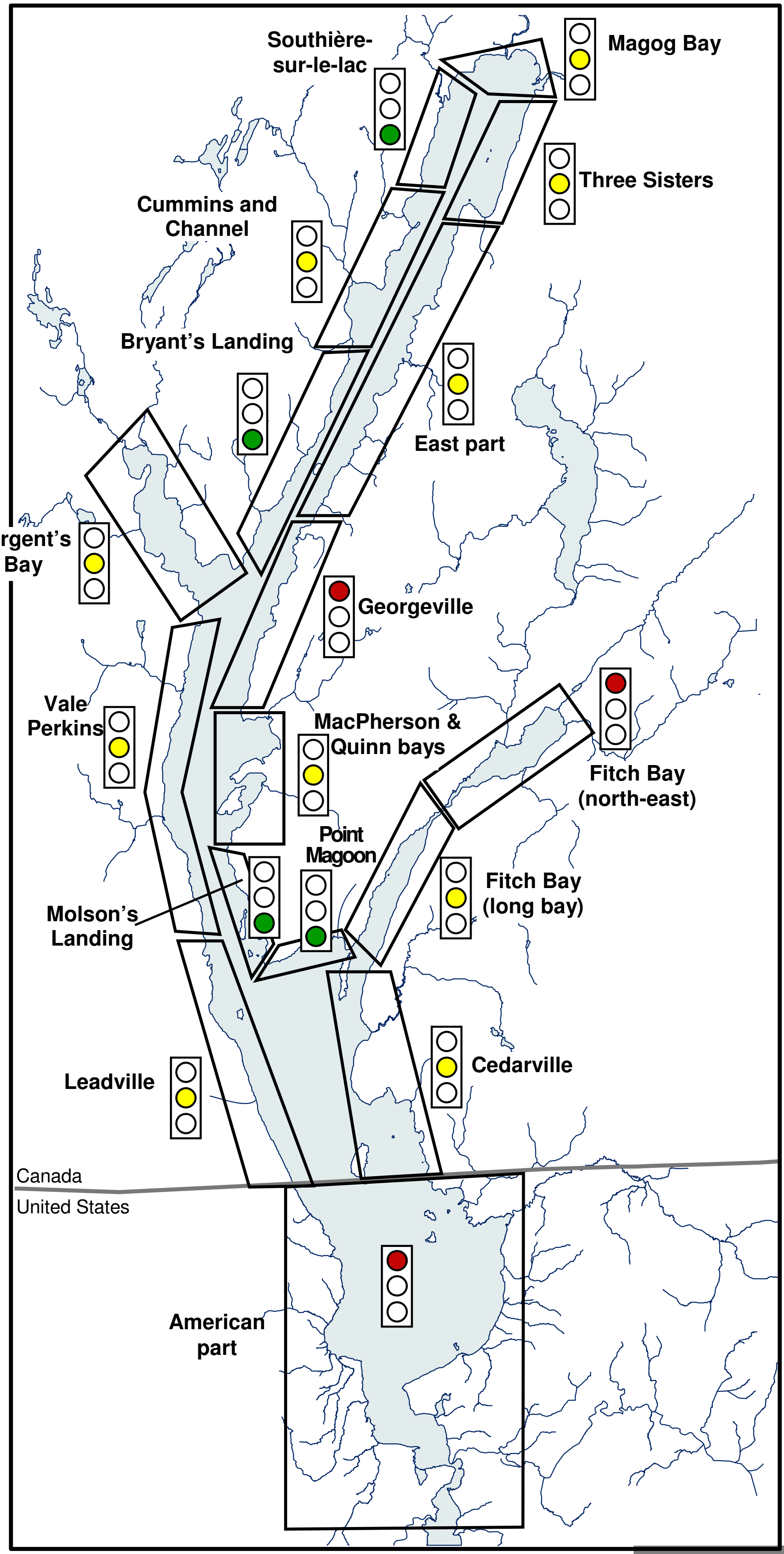


**Figure 27**: Green algae in the littoral zone of Lake Memphremagog



## 9.4 Overview and Recommendations

Our study of the American part of Lake Memphremagog has shown signs of both rapid eutrophication and erosion in the drainage basin. The lake's waters, on the one hand, are typical of the mesotrophic level. On the other hand, the accumulation of fine particles on the littoral, the proliferation of aquatic plants, the abundance of Eurasian watermilfoil and the growing presence of green algae reveal that this sector of the lake is being degraded. Finally, the four main tributaries carry worrisome quantities of phosphorus and suspended solids (SS).

These findings mean that it is important to take effective action to reduce soil erosion in the drainage basin (**control of sediments**) and the excessive loads of nutrients that result from human activities (**control of nutrients**). Every stakeholder in the local environment (shoreline property owners, managers of the territory, foresters, farmers and entrepreneurs) can put in place different control measures. The eight general solutions to improve the health of the lake are: to protect the shoreline buffer zones, protect soils from erosion, re-naturalize artificialized shorelines, avoid using lawn and garden and agricultural fertilizers and pesticides near the lake and its tributaries, and manage ditches in a more ecologically correct manner. These concrete actions would help to limit the degradation of Lake Memphremagog and would, in the long term, help to improve its health. It is important to act quickly; the longer we wait, the harder it will be.

In addition to encouraging the various stakeholders to take action, we also would like to suggest to MCI and to the American authorities to continue to refine the portrait of the condition of the lake and to draw up indicators to allow monitoring of corrective actions taken. Here is a list, which is by no means exhaustive, of the monitoring or studies that should be carried out:

- Regular monitoring of the degree of artificialization of the shores of the lake to assess improvements and to avoid degradation: the degree of artificialization is an easy indicator to put in place to track re-naturalization activities. Describe the condition of the banks of tributaries to further round out to the portrait.
- Annual monitoring of lake's water quality.
- Continue the analysis of the four tributary rivers and add testing for fecal coliform bacteria for eventual research on contamination from fecal contamination. Water quality monitoring in the tributaries, and using appropriate parameters will also indicate how successful corrective measures have been.
- Describe the condition of other tributaries to the lake, especially those that have been identified as being of concern in this report.
- Study the concentration of dissolved oxygen in the water column at different times of the year (oxygen profiles) to study changes in water quality in the lake and the habitat for fauna. At the same time regularly measure the water transparency (Secchi). These two indicators of water quality are easy to use.
- Map land use in the watershed and identify precisely one-time or identifiable and over-time or diffused sources of phosphorus, suspended solids and fecal coliform bacteria.
- Locate and quantify (dimensions, thickness, constitution, etc.) sedimentation deltas at the mouth of various tributaries to the lake to assess the size of the sediment load and to track the changes over the years.
- In the middle and long term, conduct the analysis of the condition of the littoral again by choosing certain reference stations to study changes there.

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# APPENDIX 1:

## PROTOCOL FOR THE INVENTORY OF THE LITTORAL AND SHORE

# Protocol for the Inventory of the Littoral and Shore

## GEO-REFERENCED SECTIONS

**Objective**:

- To geo-reference and locate, on a map of the lake, all sections studied to allow monitoring, in the medium and long term, of the evolution of the condition of the littoral in these sections.

**Method**:

- Take the geographical coordinates at the beginning and end of each section using a GPS (Global positioning system). Note that the end of one section corresponds with the beginning of the next.
- Situate the beginning and end of each section on one map of the lake.

**Measurement accuracy**:

- The geographical coordinates measured with the GPS are accurate to about 4 to 5 metres when the sky is clear. When it is overcast with a heavy cloud cover, the location becomes less precise and may go to about 10 or 11 metres.

**Remark**:

- Because the transects are situated above a water column of a predetermined height, their positioning depends on the water level. In fact, when the level is high, the transects are situated closer to the shore than during periods of low water, since the littoral becomes deeper.

# STUDY OF SEDIMENTS

## A) Sedimentary accumulation

**Objective**:

- To establish a baseline portrait of sedimentary accumulation (silting) in the littoral zone of the lake (at depths of 1 m, 2 m and 3 m).

**Method**:

- For each transect, take 5 measurements of sedimentary thickness using a graduated measuring stick.
- Calculate the median thickness of sediment for each transect.
- Map the sedimentary accumulation of each transect starting from the median just calculated and classified (0-5 cm / 5-10 cm / 10-50 cm / 50-100 cm / more than 100 cm).

**Measurement accuracy**:

- The accuracy of measurements of sedimentary accumulation is evaluated at ± 5 cm; the measuring sticks used for these measurements are graduated at every 10 cm.

**Comment**:

- The measurement of the thickness of the sediments makes no distinction between natural sedimentary accumulation and that attributable to human activities. However, a large accumulation of unconsolidated sediments on the littoral is usually related to significant soil erosion in the watershed, and thus to heavy human pressure.

## B) Types of lake bottom

**Objective**:

- To identify the dominant substrate in each transect studied to locate zones presently propitious for the spawning of certain fish, that is the zones where the bottom is made of sands, gravels, shingle or boulders and vegetal debris.

**Method**:

- For each transect, visually assess the type of dominant and sub-dominant substrate among the following classes: fine particulates (silt), vegetal debris, sands, gravels, shingle, boulders, rock.
- Map, using a colour system, the type of dominant substrate in each transect.

**Comment**:

- The determination of the dominant and sub-dominant substrate, is made visually from the size of the particles.

# STUDY OF AQUATIC PLANTS

## A) Density of aquatic plants

**Objective**:

- To establish a baseline portrait of invasion by aquatic plants in the littoral of the lake (at depths of 1 m, 2 m and 3 m).

**Method**:

- For each transect, visually evaluate the percentage of average cover by aquatic plants in the water column.
- Map the percentage of cover by aquatic plants in all transects according to groups of percentages (0-10 % / 10-25 % / 25-50 % / 50-75 % / + 75 %).

**Accuracy of measurements**:

- The accuracy of the assessment of the percentage of the area occupied by aquatic plants is considered to be ± 5 % starting from a calibration made between the divers. By grouping this measurement in one class, inter-individual variation can be eliminated.

**Comment**:

- Aquatic plants grow over the summer which affects the percentage of cover they occupy. At the time the inventory was carried out (August), they were at their peak.

## B) Diversity of aquatic plant species

**Objective**:

- To establish a baseline portrait of the distribution of dominant aquatic plant species in the littoral zone of the lake (at depths of 1 m, 2 m and 3 m) and to highlight the distribution of the dominant species and the aquatic plants considered to present the biggest problems, because of their high invasive potential.

**Method**:

- For each transect, determine the three species of dominant aquatic plants (dominance of a species is determined by the amount of area it occupies).
- To calculate, for each species of aquatic plant inventoried, the percentage of transects where they dominate and the percentage of transects where they are sub-dominant.
- Map, for each transect studied, the dominant aquatic plant species.
- Map, for each transect studied, the abundance of each species of aquatic plant considered problematic (*Myriophyllum spicatum*, *Potamogeton amplifolius*, *Elodea canadensis*, *Potamogeton crispus*).

## STUDY OF THE PERIPHYTON

**Objective**:

- Establish a baseline portrait of invasion by green algae of the littoral zone of the lake (at depths of 1 m, 2 m and 3 m).

**Method:**

- For each transect, visually assess the average percentage of coverage in the water column aquatic plants.
- Map the percentage of coverage by green algae in all transects according to groupings of percentages (0-10 % / 10-25 % / 25-50 % / 50-75 % / + 75 %).

**Accuracy of measurements**:

- The accuracy of the assessment of the area occupied by plants was assessed at ± 5 % from a calibration made among the divers. Grouping this measurement in one class makes it possible to eliminate inter-individual variations.

**Comment**:

- Green algae grow as summer progresses; this affects the percentage of coverage of area they occupy. When the inventory was carried out (August), these algae were at their most luxuriant.

## STUDY OF THE CONDITION OF THE SHORE

**Objective**:

- To establish an overview of the state of artificialization of the shore of the lake.

**Method**:

- For each section, to assess, with a simple matrix, the degree of artificialization of a buffer zone of 10 metres on the shore.
- Classify the state of artificialization of the shore for the entire Vermont shore according to the following classes:
    - natural (0-10 % artificial)
    - somewhat modified (10-25 % artificial)
    - quite modified (25-50 % artificial)
    - greatly modified (50-75 % artificial)
    - totally artificial (75-100 % artificial)

# Material Used for the Inventory of the Littoral and the Shore

### Materiel required for the inventory

- One (1) functional nautical craft, as ecological as possible, and fuel
- Safety equipment for the boat (including 5 floatation devices, 1 life ring safety device, 1 boarding ladder, 1 extinguisher, 1 flashlight, 1 baler, 1 whistle, 1 anchor, 2 oars, navigation lights)
- One (1) first aid kit
- One (1) GPS (global positioning system) unit
- Indelible pencils
- Data collection sheets on the ground (Zaurus pocket computer)
- Flippers, mask, snorkel, isothermic suit and lead belt (one set of equipment for each diver)
- Three (3) fibreglass measuring sticks, graduated at 10 cm and measuring at least 3 m
- Containers (plastic bags, pots), to preserve unknown plant samples
- One (1) whistle for communicating with the divers

### Human resources required

Five (5) persons are needed to carry out the land inventory of aquatic plants and sedimentary accumulation. The ground crew was made up of Camille Rivard-Sirois (B.Sc. Biology), coordinator of the project, assisted by Christian Desgagné (technician in applied ecology), Isabelle Nault and Josée Audet-Lecouffre (both undergraduate biology students). At the beginning of June 2005, members of the team were trained for a week by Camille Rivard-Sirois (RAPPEL) on aquatic plants, sediments and on the inventory protocol. During the data collection, three (3) researchers dove, while the other two (2) worked in the boat. They rotated roles so the divers could warm up and rest on occasion.

### Computer tools used

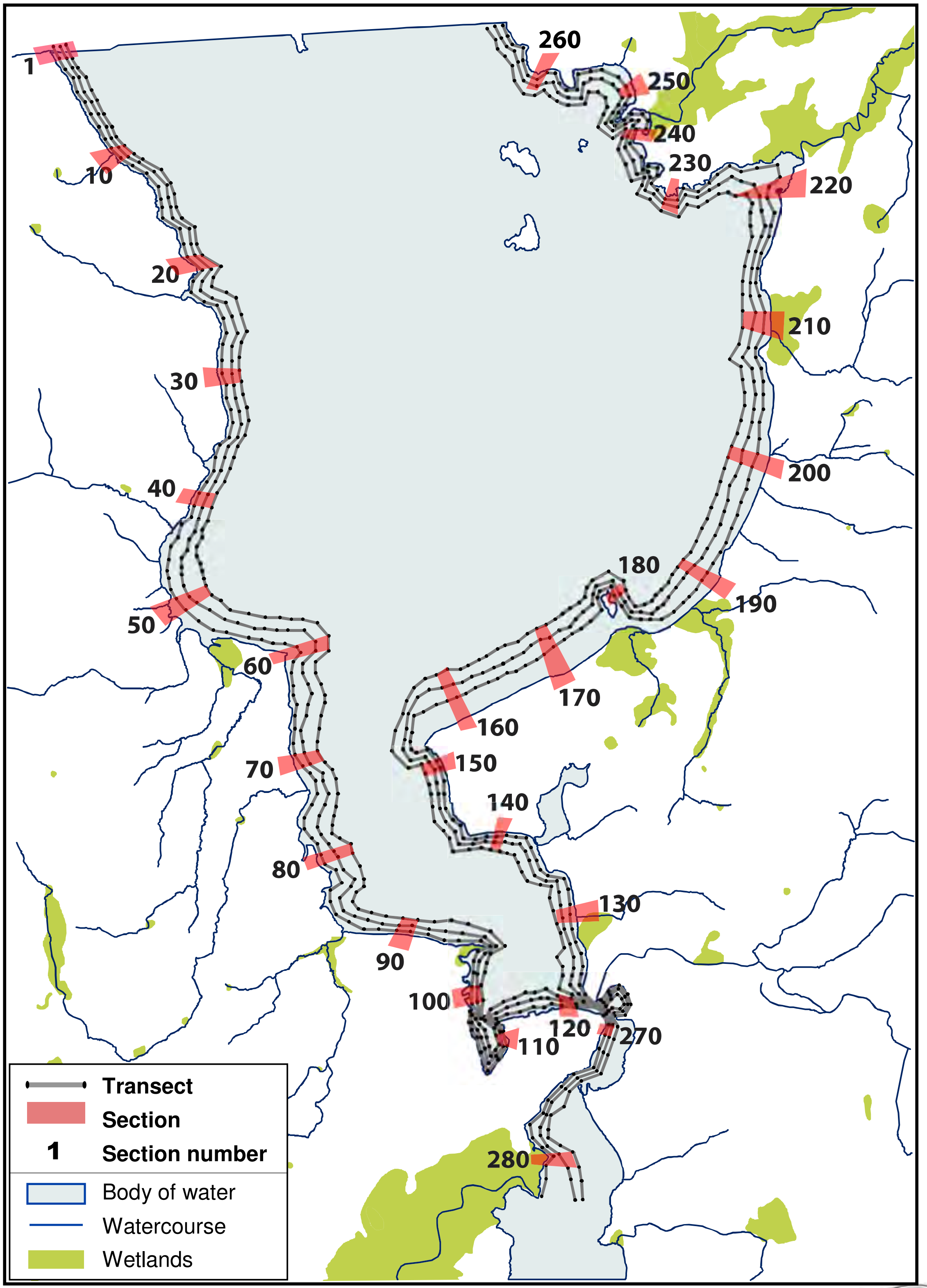
To manipulate information obtained during the inventory, various tools were used. The data obtained by the divers was entered and managed right on site by a Web application using a pocket computer (Zaurus). Then the data stored and centralized in the database were used to create tables and maps to show the condition of the lake.

**Technologies used**:
Apache, PHP, MySql, Java (2D API, J2SE, J2ME), Linux, OsX, Zaurus, SOAP, XML, GPS Garmin, RIA (Flash), Studio MX, Firefox, Apple G …

# APPENDIX 2:

## LOCATION OF TRANSECTS INVENTORIED

# Location of Sections and Transects



# Geographic Coordinates of each Transect

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 1 | 1 | 716295 | 4987144 | 716332 | 4987055 |
| | 2 | 716300 | 4987150 | 716339 | 4987056 |
| | 3 | 716307 | 4987154 | 716346 | 4987057 |
| 2 | 1 | 716332 | 4987055 | 716383 | 4986977 |
| | 2 | 716339 | 4987056 | 716386 | 4986981 |
| | 3 | 716346 | 4987057 | 716392 | 4986986 |
| 3 | 1 | 716383 | 4986977 | 716429 | 4986915 |
| | 2 | 716386 | 4986981 | 716434 | 4986913 |
| | 3 | 716392 | 4986986 | 716439 | 4986909 |
| 4 | 1 | 716429 | 4986915 | 716466 | 4986812 |
| | 2 | 716434 | 4986913 | 716478 | 4986808 |
| | 3 | 716439 | 4986909 | 716484 | 4986810 |
| 5 | 1 | 716466 | 4986812 | 716534 | 4986717 |
| | 2 | 716478 | 4986808 | 716536 | 4986719 |
| | 3 | 716484 | 4986810 | 716533 | 4986728 |
| 6 | 1 | 716534 | 4986717 | 716586 | 4986630 |
| | 2 | 716536 | 4986719 | 716586 | 4986630 |
| | 3 | 716533 | 4986728 | 716591 | 4986635 |
| 7 | 1 | 716586 | 4986630 | 716636 | 4986530 |
| | 2 | 716586 | 4986630 | 716641 | 4986536 |
| | 3 | 716591 | 4986635 | 716643 | 4986536 |
| 8 | 1 | 716636 | 4986530 | 716687 | 4986444 |
| | 2 | 716641 | 4986536 | 716685 | 4986441 |
| | 3 | 716643 | 4986536 | 716691 | 4986446 |
| 9 | 1 | 716687 | 4986444 | 716746 | 4986369 |
| | 2 | 716685 | 4986441 | 716750 | 4986370 |
| | 3 | 716691 | 4986446 | 716759 | 4986373 |
| 10 | 1 | 716746 | 4986369 | 716812 | 4986293 |
| | 2 | 716750 | 4986370 | 716821 | 4986299 |
| | 3 | 716759 | 4986373 | 716826 | 4986310 |
| 11 | 1 | 716812 | 4986293 | 716891 | 4986242 |
| | 2 | 716821 | 4986299 | 716894 | 4986248 |
| | 3 | 716826 | 4986310 | 716898 | 4986251 |
| 12 | 1 | 716891 | 4986242 | 717016 | 4986169 |
| | 2 | 716894 | 4986248 | 717020 | 4986180 |
| | 3 | 716898 | 4986251 | 717024 | 4986181 |
| 13 | 1 | 717016 | 4986169 | 717097 | 4986056 |
| | 2 | 717020 | 4986180 | 717096 | 4986062 |
| | 3 | 717024 | 4986181 | 717102 | 4986065 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 14 | 1 | 717097 | 4986056 | 717118 | 4985972 |
| | 2 | 717096 | 4986062 | 717123 | 4985975 |
| | 3 | 717102 | 4986065 | 717128 | 4985980 |
| 15 | 1 | 717118 | 4985972 | 717134 | 4985915 |
| | 2 | 717123 | 4985975 | 717134 | 4985912 |
| | 3 | 717128 | 4985980 | 717140 | 4985917 |
| 16 | 1 | 717134 | 4985915 | 717133 | 4985829 |
| | 2 | 717134 | 4985912 | 717139 | 4985831 |
| | 3 | 717140 | 4985917 | 717144 | 4985838 |
| 17 | 1 | 717133 | 4985829 | 717256 | 4985740 |
| | 2 | 717139 | 4985831 | 717265 | 4985747 |
| | 3 | 717144 | 4985838 | 717266 | 4985755 |
| 18 | 1 | 717256 | 4985740 | 717300 | 4985628 |
| | 2 | 717265 | 4985747 | 717306 | 4985627 |
| | 3 | 717266 | 4985755 | 717308 | 4985625 |
| 19 | 1 | 717300 | 4985628 | 717327 | 4985530 |
| | 2 | 717306 | 4985627 | 717336 | 4985537 |
| | 3 | 717308 | 4985625 | 717344 | 4985542 |
| 20 | 1 | 717327 | 4985530 | 717442 | 4985433 |
| | 2 | 717336 | 4985537 | 717446 | 4985435 |
| | 3 | 717344 | 4985542 | 717453 | 4985444 |
| 21 | 1 | 717442 | 4985433 | 717370 | 4985341 |
| | 2 | 717446 | 4985435 | 717389 | 4985343 |
| | 3 | 717453 | 4985444 | 717407 | 4985334 |
| 22 | 1 | 717370 | 4985341 | 717364 | 4985274 |
| | 2 | 717389 | 4985343 | 717386 | 4985270 |
| | 3 | 717407 | 4985334 | 717419 | 4985273 |
| 23 | 1 | 717364 | 4985274 | 717458 | 4985190 |
| | 2 | 717386 | 4985270 | 717459 | 4985198 |
| | 3 | 717419 | 4985273 | 717470 | 4985217 |
| 24 | 1 | 717458 | 4985190 | 717547 | 4985156 |
| | 2 | 717459 | 4985198 | 717450 | 4985162 |
| | 3 | 717470 | 4985217 | 717457 | 4985179 |
| 25 | 1 | 717547 | 4985156 | 717602 | 4985064 |
| | 2 | 717450 | 4985162 | 717623 | 4985074 |
| | 3 | 717457 | 4985179 | 717628 | 4985077 |
| 26 | 1 | 717602 | 4985064 | 717624 | 4984939 |
| | 2 | 717623 | 4985074 | 717655 | 4984944 |
| | 3 | 717628 | 4985077 | 717670 | 4984945 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 27 | 1 | 717624 | 4984939 | 717592 | 4984860 |
| | 2 | 717655 | 4984944 | 717606 | 4984860 |
| | 3 | 717670 | 4984945 | 717635 | 4984855 |
| 28 | 1 | 717592 | 4984860 | 717587 | 4984742 |
| | 2 | 717606 | 4984860 | 717602 | 4984737 |
| | 3 | 717635 | 4984855 | 717621 | 4984741 |
| 29 | 1 | 717587 | 4984742 | 717592 | 4984647 |
| | 2 | 717602 | 4984737 | 717606 | 4984649 |
| | 3 | 717621 | 4984741 | 717622 | 4984645 |
| 30 | 1 | 717592 | 4984647 | 717612 | 4984556 |
| | 2 | 717606 | 4984649 | 717620 | 4984565 |
| | 3 | 717622 | 4984645 | 717637 | 4984562 |
| 31 | 1 | 717612 | 4984556 | 717622 | 4984456 |
| | 2 | 717620 | 4984565 | 717633 | 4984457 |
| | 3 | 717637 | 4984562 | 717648 | 4984462 |
| 32 | 1 | 717622 | 4984456 | 717653 | 4984357 |
| | 2 | 717633 | 4984457 | 717665 | 4984356 |
| | 3 | 717648 | 4984462 | 717675 | 4984361 |
| 33 | 1 | 717653 | 4984357 | 717669 | 4984261 |
| | 2 | 717665 | 4984356 | 717679 | 4984265 |
| | 3 | 717675 | 4984361 | 717687 | 4984257 |
| 34 | 1 | 717669 | 4984261 | 717650 | 4984150 |
| | 2 | 717679 | 4984265 | 717652 | 4984161 |
| | 3 | 717687 | 4984257 | 717661 | 4984146 |
| 35 | 1 | 717650 | 4984150 | 717574 | 4984089 |
| | 2 | 717652 | 4984161 | 717584 | 4984078 |
| | 3 | 717661 | 4984146 | 717603 | 4984063 |
| 36 | 1 | 717574 | 4984089 | 717541 | 4983991 |
| | 2 | 717584 | 4984078 | 717556 | 4983981 |
| | 3 | 717603 | 4984063 | 717572 | 4983975 |
| 37 | 1 | 717541 | 4983991 | 717517 | 4983885 |
| | 2 | 717556 | 4983981 | 717533 | 4983880 |
| | 3 | 717572 | 4983975 | 717542 | 4983884 |
| 38 | 1 | 717517 | 4983885 | 717473 | 4983806 |
| | 2 | 717533 | 4983880 | 717484 | 4983799 |
| | 3 | 717542 | 4983884 | 717497 | 4983781 |
| 39 | 1 | 717473 | 4983806 | 717408 | 4983714 |
| | 2 | 717484 | 4983799 | 717431 | 4983700 |
| | 3 | 717497 | 4983781 | 717454 | 4983689 |
| 40 | 1 | 717408 | 4983714 | 717371 | 4983601 |
| | 2 | 717431 | 4983700 | 717388 | 4983596 |
| | 3 | 717454 | 4983689 | 717419 | 4983566 |
| 41 | 1 | 717371 | 4983601 | 717342 | 4983534 |
| | 2 | 717388 | 4983596 | 717362 | 4983518 |
| | 3 | 717419 | 4983566 | 717389 | 4983463 |
| 42 | 1 | 717342 | 4983534 | 717301 | 4983469 |
| | 2 | 717362 | 4983518 | 717346 | 4983416 |
| | 3 | 717389 | 4983463 | 717362 | 4983398 |
| 43 | 1 | 717301 | 4983469 | 717279 | 4983371 |
| | 2 | 717346 | 4983416 | 717308 | 4983352 |
| | 3 | 717362 | 4983398 | 717366 | 4983342 |
| 44 | 1 | 717279 | 4983371 | 717222 | 4983294 |
| | 2 | 717308 | 4983352 | 717282 | 4983273 |
| | 3 | 717366 | 4983342 | 717313 | 4983277 |
| 45 | 1 | 717222 | 4983294 | 717205 | 4983206 |
| | 2 | 717282 | 4983273 | 717241 | 4983196 |
| | 3 | 717313 | 4983277 | 717321 | 4983201 |
| 46 | 1 | 717205 | 4983206 | 717192 | 4983121 |
| | 2 | 717241 | 4983196 | 717243 | 4983130 |
| | 3 | 717321 | 4983201 | 717340 | 4983148 |
| 47 | 1 | 717192 | 4983121 | 717202 | 4983055 |
| | 2 | 717243 | 4983130 | 717239 | 4983066 |
| | 3 | 717340 | 4983148 | 717355 | 4983117 |
| 48 | 1 | 717202 | 4983055 | 717222 | 4982977 |
| | 2 | 717239 | 4983066 | 717257 | 4982987 |
| | 3 | 717355 | 4983117 | 717368 | 4983099 |
| 49 | 1 | 717222 | 4982977 | 717259 | 4982894 |
| | 2 | 717257 | 4982987 | 717308 | 4982906 |
| | 3 | 717368 | 4983099 | 717375 | 4983039 |
| 50 | 1 | 717259 | 4982894 | 717325 | 4982821 |
| | 2 | 717308 | 4982906 | 717364 | 4982857 |
| | 3 | 717375 | 4983039 | 717409 | 4982952 |
| 51 | 1 | 717325 | 4982821 | 717435 | 4982733 |
| | 2 | 717364 | 4982857 | 717461 | 4982795 |
| | 3 | 717409 | 4982952 | 717471 | 4982905 |
| 52 | 1 | 717435 | 4982733 | 717551 | 4982658 |
| | 2 | 717461 | 4982795 | 717567 | 4982733 |
| | 3 | 717471 | 4982905 | 717574 | 4982790 |
| 53 | 1 | 717551 | 4982658 | 717645 | 4982647 |
| | 2 | 717567 | 4982733 | 717680 | 4982700 |
| | 3 | 717574 | 4982790 | 717695 | 4982747 |
| 54 | 1 | 717645 | 4982647 | 717811 | 4982605 |
| | 2 | 717680 | 4982700 | 717826 | 4982658 |
| | 3 | 717695 | 4982747 | 717880 | 4982721 |
| 55 | 1 | 717811 | 4982605 | 717911 | 4982583 |
| | 2 | 717826 | 4982658 | 717940 | 4982653 |
| | 3 | 717880 | 4982721 | 717954 | 4982710 |
| 56 | 1 | 717911 | 4982583 | 717943 | 4982574 |
| | 2 | 717940 | 4982653 | 717955 | 4982639 |
| | 3 | 717954 | 4982710 | 717972 | 4982705 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 57 | 1 | 717943 | 4982574 | 718065 | 4982554 |
| | 2 | 717955 | 4982639 | 718086 | 4982655 |
| | 3 | 717972 | 4982705 | 718117 | 4982705 |
| 58 | 1 | 718065 | 4982554 | 718182 | 4982520 |
| | 2 | 718086 | 4982655 | 718219 | 4982659 |
| | 3 | 718117 | 4982705 | 718233 | 4982669 |
| 59 | 1 | 718182 | 4982520 | 718182 | 4982520 |
| | 2 | 718219 | 4982659 | 718336 | 4982578 |
| | 3 | 718233 | 4982669 | 718360 | 4982576 |
| 60 | 1 | 718182 | 4982520 | 718215 | 4982481 |
| | 2 | 718336 | 4982578 | 718334 | 4982498 |
| | 3 | 718360 | 4982576 | 718432 | 4982494 |
| 61 | 1 | 718215 | 4982481 | 718160 | 4982404 |
| | 2 | 718334 | 4982498 | 718202 | 4982404 |
| | 3 | 718432 | 4982494 | 718227 | 4982412 |
| 62 | 1 | 718160 | 4982404 | 718163 | 4982340 |
| | 2 | 718202 | 4982404 | 718205 | 4982335 |
| | 3 | 718227 | 4982412 | 718225 | 4982326 |
| 63 | 1 | 718163 | 4982340 | 718164 | 4982232 |
| | 2 | 718205 | 4982335 | 718246 | 4982239 |
| | 3 | 718225 | 4982326 | 718275 | 4982241 |
| 64 | 1 | 718164 | 4982232 | 718166 | 4982160 |
| | 2 | 718246 | 4982239 | 718270 | 4982168 |
| | 3 | 718275 | 4982241 | 718302 | 4982164 |
| 65 | 1 | 718166 | 4982160 | 718170 | 4982094 |
| | 2 | 718270 | 4982168 | 718252 | 4982088 |
| | 3 | 718302 | 4982164 | 718301 | 4982099 |
| 66 | 1 | 718170 | 4982094 | 718160 | 4982005 |
| | 2 | 718252 | 4982088 | 718224 | 4981996 |
| | 3 | 718301 | 4982099 | 718279 | 4982006 |
| 67 | 1 | 718160 | 4982005 | 718157 | 4981897 |
| | 2 | 718224 | 4981996 | 718188 | 4981884 |
| | 3 | 718279 | 4982006 | 718254 | 4981906 |
| 68 | 1 | 718157 | 4981897 | 718146 | 4981792 |
| | 2 | 718188 | 4981884 | 718196 | 4981795 |
| | 3 | 718254 | 4981906 | 718251 | 4981806 |
| 69 | 1 | 718146 | 4981792 | 718161 | 4981706 |
| | 2 | 718196 | 4981795 | 718210 | 4981714 |
| | 3 | 718251 | 4981806 | 718249 | 4981726 |
| 70 | 1 | 718161 | 4981706 | 718227 | 4981615 |
| | 2 | 718210 | 4981714 | 718287 | 4981624 |
| | 3 | 718249 | 4981726 | 718307 | 4981645 |
| 71 | 1 | 718227 | 4981615 | 718284 | 4981551 |
| | 2 | 718287 | 4981624 | 718350 | 4981563 |
| | 3 | 718307 | 4981645 | 718359 | 4981586 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 72 | 1 | 718284 | 4981551 | 718327 | 4981503 |
| | 2 | 718350 | 4981563 | 718339 | 4981508 |
| | 3 | 718359 | 4981586 | 718381 | 4981514 |
| 73 | 1 | 718327 | 4981503 | 718340 | 4981398 |
| | 2 | 718339 | 4981508 | 718387 | 4981398 |
| | 3 | 718381 | 4981514 | 718398 | 4981401 |
| 74 | 1 | 718340 | 4981398 | 718306 | 4981312 |
| | 2 | 718387 | 4981398 | 718357 | 4981309 |
| | 3 | 718398 | 4981401 | 718394 | 4981307 |
| 75 | 1 | 718306 | 4981312 | 718238 | 4981218 |
| | 2 | 718357 | 4981309 | 718311 | 4981223 |
| | 3 | 718394 | 4981307 | 718369 | 4981235 |
| 76 | 1 | 718238 | 4981218 | 718248 | 4981127 |
| | 2 | 718311 | 4981223 | 718305 | 4981145 |
| | 3 | 718369 | 4981235 | 718358 | 4981162 |
| 77 | 1 | 718248 | 4981127 | 718304 | 4981059 |
| | 2 | 718305 | 4981145 | 718325 | 4981086 |
| | 3 | 718358 | 4981162 | 718358 | 4981135 |
| 78 | 1 | 718304 | 4981059 | 718344 | 4981013 |
| | 2 | 718325 | 4981086 | 718382 | 4981012 |
| | 3 | 718358 | 4981135 | 718384 | 4981065 |
| 79 | 1 | 718344 | 4981013 | 718368 | 4980932 |
| | 2 | 718382 | 4981012 | 718429 | 4980952 |
| | 3 | 718384 | 4981065 | 718508 | 4980986 |
| 80 | 1 | 718368 | 4980932 | 718409 | 4980862 |
| | 2 | 718429 | 4980952 | 718457 | 4980917 |
| | 3 | 718508 | 4980986 | 718515 | 4980944 |
| 81 | 1 | 718409 | 4980862 | 718464 | 4980810 |
| | 2 | 718457 | 4980917 | 718504 | 4980820 |
| | 3 | 718515 | 4980944 | 718573 | 4980841 |
| 82 | 1 | 718464 | 4980810 | 718526 | 4980714 |
| | 2 | 718504 | 4980820 | 718586 | 4980741 |
| | 3 | 718573 | 4980841 | 718605 | 4980740 |
| 83 | 1 | 718526 | 4980714 | 718448 | 4980663 |
| | 2 | 718586 | 4980741 | 718587 | 4980685 |
| | 3 | 718605 | 4980740 | 718604 | 4980687 |
| 84 | 1 | 718448 | 4980663 | 718445 | 4980573 |
| | 2 | 718587 | 4980685 | 718489 | 4980602 |
| | 3 | 718604 | 4980687 | 718510 | 4980619 |
| 85 | 1 | 718445 | 4980573 | 718483 | 4980472 |
| | 2 | 718489 | 4980602 | 718512 | 4980501 |
| | 3 | 718510 | 4980619 | 718554 | 4980541 |
| 86 | 1 | 718483 | 4980472 | 718591 | 4980421 |
| | 2 | 718512 | 4980501 | 718595 | 4980446 |
| | 3 | 718554 | 4980541 | 718589 | 4980480 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 87 | 1 | 718591 | 4980421 | 718703 | 4980357 |
| | 2 | 718595 | 4980446 | 718702 | 4980394 |
| | 3 | 718589 | 4980480 | 718700 | 4980445 |
| 88 | 1 | 718703 | 4980357 | 718815 | 4980352 |
| | 2 | 718702 | 4980394 | 718819 | 4980373 |
| | 3 | 718700 | 4980445 | 718811 | 4980413 |
| 89 | 1 | 718815 | 4980352 | 718938 | 4980349 |
| | 2 | 718819 | 4980373 | 718942 | 4980360 |
| | 3 | 718811 | 4980413 | 718938 | 4980394 |
| 90 | 1 | 718938 | 4980349 | 719051 | 4980337 |
| | 2 | 718942 | 4980360 | 719056 | 4980352 |
| | 3 | 718938 | 4980394 | 719061 | 4980382 |
| 91 | 1 | 719051 | 4980337 | 719184 | 4980315 |
| | 2 | 719056 | 4980352 | 719197 | 4980333 |
| | 3 | 719061 | 4980382 | 719187 | 4980378 |
| 92 | 1 | 719184 | 4980315 | 719309 | 4980276 |
| | 2 | 719197 | 4980333 | 719325 | 4980313 |
| | 3 | 719187 | 4980378 | 719349 | 4980382 |
| 93 | 1 | 719309 | 4980276 | 719429 | 4980274 |
| | 2 | 719325 | 4980313 | 719428 | 4980319 |
| | 3 | 719349 | 4980382 | 719440 | 4980360 |
| 94 | 1 | 719429 | 4980274 | 719626 | 4980268 |
| | 2 | 719428 | 4980319 | 719612 | 4980291 |
| | 3 | 719440 | 4980360 | 719620 | 4980294 |
| 95 | 1 | 719626 | 4980268 | 719651 | 4980228 |
| | 2 | 719612 | 4980291 | 719663 | 4980227 |
| | 3 | 719620 | 4980294 | 719665 | 4980230 |
| 96 | 1 | 719651 | 4980228 | 719555 | 4980200 |
| | 2 | 719663 | 4980227 | 719593 | 4980176 |
| | 3 | 719665 | 4980230 | 719595 | 4980174 |
| 97 | 1 | 719555 | 4980200 | 719529 | 4980119 |
| | 2 | 719593 | 4980176 | 719568 | 4980123 |
| | 3 | 719595 | 4980174 | 719574 | 4980123 |
| 98 | 1 | 719529 | 4980119 | 719525 | 4980049 |
| | 2 | 719568 | 4980123 | 719549 | 4980053 |
| | 3 | 719574 | 4980123 | 719555 | 4980052 |
| 99 | 1 | 719525 | 4980049 | 719522 | 4989946 |
| | 2 | 719549 | 4980053 | 719528 | 4989947 |
| | 3 | 719555 | 4980052 | 719537 | 4989958 |
| 100 | 1 | 719522 | 4979946 | 719474 | 4979873 |
| | 2 | 719528 | 4979947 | 719498 | 4979886 |
| | 3 | 719537 | 4979958 | 719510 | 4979887 |
| 101 | 1 | 719518 | 4979778 | 719599 | 4979700 |
| | 2 | 719529 | 4979784 | 719601 | 4979702 |
| | 3 | 719541 | 4979796 | 719602 | 4979704 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 102 | 1 | 719599 | 4979700 | 719518 | 4979726 |
| | 2 | 719601 | 4979702 | 719520 | 4979726 |
| | 3 | 719602 | 4979704 | 719527 | 4979721 |
| 103 | 1 | 719518 | 4979726 | 719511 | 4979650 |
| | 2 | 719520 | 4979726 | 719515 | 4979652 |
| | 3 | 719527 | 4979721 | 719522 | 4979653 |
| 104 | 1 | 719511 | 4979650 | 719532 | 4979590 |
| | 2 | 719515 | 4979652 | 719552 | 4979594 |
| | 3 | 719522 | 4979653 | 719601 | 4979596 |
| 105 | 1 | 719532 | 4979590 | 719577 | 4979531 |
| | 2 | 719552 | 4979594 | 719587 | 4979533 |
| | 3 | 719601 | 4979596 | 719595 | 4979530 |
| 106 | 1 | 719577 | 4979531 | 719606 | 4979417 |
| | 2 | 719587 | 4979533 | 719612 | 4979416 |
| | 3 | 719595 | 4979530 | 719618 | 4979416 |
| 107 | 1 | 719606 | 4979417 | 719650 | 4979273 |
| | 2 | 719612 | 4979416 | 719650 | 4979274 |
| | 3 | 719618 | 4979416 | 719650 | 4979278 |
| 108 | 1 | 719650 | 4979273 | 719724 | 4979362 |
| | 2 | 719650 | 4979274 | 719717 | 4979360 |
| | 3 | 719650 | 4979278 | 719716 | 4979364 |
| 109 | 1 | 719724 | 4979362 | 719795 | 4979458 |
| | 2 | 719717 | 4979360 | 719795 | 4979455 |
| | 3 | 719716 | 4979364 | 719792 | 4979456 |
| 110 | 1 | 719795 | 4979458 | 719771 | 4979575 |
| | 2 | 719795 | 4979455 | 719771 | 4979570 |
| | 3 | 719792 | 4979456 | 719770 | 4979566 |
| 111 | 1 | 719771 | 4979575 | 719737 | 4979647 |
| | 2 | 719771 | 4979570 | 719735 | 4979645 |
| | 3 | 719770 | 4979566 | 719735 | 4979642 |
| 112 | 1 | 719737 | 4979647 | 719636 | 4979687 |
| | 2 | 719735 | 4979645 | 719635 | 4979687 |
| | 3 | 719735 | 4979642 | 719633 | 4979687 |
| 113 | 1 | 719636 | 4979682 | 719722 | 4979668 |
| | 2 | 719635 | 4979683 | 719719 | 4979690 |
| | 3 | 719633 | 4979684 | 719719 | 4979695 |
| 114 | 1 | 719722 | 4979668 | 719798 | 4979693 |
| | 2 | 719719 | 4979690 | 719795 | 4979714 |
| | 3 | 719719 | 4979695 | 719792 | 4979717 |
| 115 | 1 | 719798 | 4979693 | 719893 | 4979709 |
| | 2 | 719795 | 4979714 | 719886 | 4979746 |
| | 3 | 719792 | 4979717 | 719879 | 4979749 |
| 116 | 1 | 719893 | 4979709 | 719966 | 4979726 |
| | 2 | 719886 | 4979746 | 719990 | 4979769 |
| | 3 | 719879 | 4979749 | 720000 | 4979815 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 117 | 1 | 720030 | 4979730 | 720086 | 4979748 |
| | 2 | 719990 | 4979769 | 720062 | 4979795 |
| | 3 | 720000 | 4979815 | 720053 | 4979820 |
| 118 | 1 | 720086 | 4979748 | 720146 | 4979777 |
| | 2 | 720062 | 4979795 | 720122 | 4979809 |
| | 3 | 720053 | 4979820 | 720132 | 4979817 |
| 119 | 1 | 720146 | 4979777 | 720209 | 4979779 |
| | 2 | 720122 | 4979809 | 720224 | 4979799 |
| | 3 | 720132 | 4979817 | 720226 | 4979800 |
| 120 | 1 | 720209 | 4979779 | 720324 | 4979780 |
| | 2 | 720224 | 4979799 | 720324 | 4979781 |
| | 3 | 720226 | 4979800 | 720324 | 4979782 |
| 121 | 1 | 720324 | 4979780 | 720427 | 4979762 |
| | 2 | 720324 | 4979781 | 720423 | 4979762 |
| | 3 | 720324 | 4979782 | 720422 | 4979762 |
| 122 | 1 | 720429 | 4979808 | 720396 | 4979851 |
| | 2 | 720429 | 4979802 | 720320 | 4979842 |
| | 3 | 720425 | 4979798 | 720296 | 4979837 |
| 123 | 1 | 720396 | 4979851 | 720366 | 4979929 |
| | 2 | 720320 | 4979842 | 720349 | 49799 |
| | 3 | 720296 | 4979837 | 720193 | 4979897 |
| 124 | 1 | 720366 | 4979929 | 720387 | 4980010 |
| | 2 | 720349 | 4979978 | 720347 | 4980018 |
| | 3 | 720193 | 4979897 | 720259 | 4980010 |
| 125 | 1 | 720387 | 4980010 | 720398 | 4980075 |
| | 2 | 720347 | 4980018 | 720366 | 4980079 |
| | 3 | 720259 | 4980010 | 720260 | 4980075 |
| 126 | 1 | 720398 | 4980075 | 720387 | 4980170 |
| | 2 | 720366 | 4980079 | 720363 | 4980164 |
| | 3 | 720260 | 4980075 | 720223 | 4980148 |
| 127 | 1 | 720387 | 4980170 | 720343 | 4980258 |
| | 2 | 720363 | 4980164 | 720327 | 4980256 |
| | 3 | 720223 | 4980148 | 720309 | 4980257 |
| 128 | 1 | 720343 | 4980258 | 720315 | 4980365 |
| | 2 | 720327 | 4980256 | 720283 | 4980367 |
| | 3 | 720309 | 4980257 | 720272 | 4980367 |
| 129 | 1 | 720315 | 4980365 | 720300 | 4980468 |
| | 2 | 720283 | 4980367 | 720270 | 4980456 |
| | 3 | 720272 | 4980367 | 720238 | 4980449 |
| 130 | 1 | 720300 | 4980468 | 720296 | 4980562 |
| | 2 | 720270 | 4980456 | 720264 | 4980554 |
| | 3 | 720238 | 4980449 | 720210 | 4980550 |
| 131 | 1 | 720296 | 4980562 | 720283 | 4980674 |
| | 2 | 720264 | 4980554 | 720250 | 4980658 |
| | 3 | 720210 | 4980550 | 720187 | 4980641 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 132 | 1 | 720283 | 4980674 | 720256 | 4980753 |
| | 2 | 720250 | 4980658 | 720220 | 4980741 |
| | 3 | 720187 | 4980641 | 720203 | 4980735 |
| 133 | 1 | 720256 | 4980753 | 720127 | 4980781 |
| | 2 | 720220 | 4980741 | 720123 | 4980763 |
| | 3 | 720203 | 4980735 | 720122 | 4980756 |
| 134 | 1 | 720127 | 4980781 | 720064 | 4980821 |
| | 2 | 720123 | 4980763 | 720016 | 4980789 |
| | 3 | 720122 | 4980756 | 720000 | 4980779 |
| 135 | 1 | 720064 | 4980821 | 720027 | 4980892 |
| | 2 | 720016 | 4980789 | 719994 | 4980885 |
| | 3 | 720000 | 4980779 | 719964 | 4980872 |
| 136 | 1 | 720027 | 4980892 | 719988 | 4980981 |
| | 2 | 719994 | 4980885 | 719958 | 4980961 |
| | 3 | 719964 | 4980872 | 719929 | 4980945 |
| 137 | 1 | 719988 | 4980981 | 719930 | 4981055 |
| | 2 | 719958 | 4980961 | 719911 | 4981016 |
| | 3 | 719929 | 4980945 | 719897 | 4980999 |
| 138 | 1 | 719930 | 4981055 | 719876 | 4981087 |
| | 2 | 719911 | 4981016 | 719864 | 4981058 |
| | 3 | 719897 | 4980999 | 719835 | 4981026 |
| 139 | 1 | 719876 | 4981087 | 719796 | 4981094 |
| | 2 | 719864 | 4981058 | 719799 | 4981070 |
| | 3 | 719835 | 4981026 | 719797 | 4981046 |
| 140 | 1 | 719796 | 4981094 | 719718 | 4981090 |
| | 2 | 719799 | 4981070 | 719720 | 4981078 |
| | 3 | 719797 | 4981046 | 719730 | 4981064 |
| 141 | 1 | 719718 | 4981090 | 719652 | 4981093 |
| | 2 | 719720 | 4981078 | 719652 | 4981085 |
| | 3 | 719730 | 4981064 | 719651 | 4981078 |
| 142 | 1 | 719652 | 4981093 | 719566 | 4981082 |
| | 2 | 719652 | 4981085 | 719566 | 4981077 |
| | 3 | 719651 | 4981078 | 719566 | 4981069 |
| 143 | 1 | 719566 | 4981082 | 719447 | 4981056 |
| | 2 | 719566 | 4981077 | 719447 | 4981046 |
| | 3 | 719566 | 4981069 | 719450 | 4981033 |
| 144 | 1 | 719447 | 4981056 | 719460 | 4981163 |
| | 2 | 719447 | 4981046 | 719438 | 4981161 |
| | 3 | 719450 | 4981033 | 719434 | 4981149 |
| 145 | 1 | 719460 | 4981163 | 719392 | 4981207 |
| | 2 | 719438 | 4981161 | 719385 | 4981206 |
| | 3 | 719434 | 4981149 | 719388 | 4981203 |
| 146 | 1 | 719392 | 4981207 | 719324 | 4981292 |
| | 2 | 719385 | 4981206 | 719310 | 4981287 |
| | 3 | 719388 | 4981203 | 719302 | 4981277 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 147 | 1 | 719324 | 4981292 | 719318 | 4981402 |
| | 2 | 719310 | 4981287 | 719299 | 4981399 |
| | 3 | 719302 | 4981277 | 719290 | 4981393 |
| 148 | 1 | 719318 | 4981402 | 719315 | 4981495 |
| | 2 | 719299 | 4981399 | 719282 | 4981487 |
| | 3 | 719290 | 4981393 | 719273 | 4981487 |
| 149 | 1 | 719315 | 4981495 | 719283 | 4981595 |
| | 2 | 719282 | 4981487 | 719272 | 4981580 |
| | 3 | 719273 | 4981487 | 719259 | 4981563 |
| 150 | 1 | 719283 | 4981595 | 719258 | 4981653 |
| | 2 | 719272 | 4981580 | 719231 | 4981646 |
| | 3 | 719259 | 4981563 | 719226 | 4981643 |
| 151 | 1 | 719258 | 4981653 | 719207 | 4981711 |
| | 2 | 719231 | 4981646 | 719204 | 4981714 |
| | 3 | 719226 | 4981643 | 719198 | 4981712 |
| 152 | 1 | 719207 | 4981711 | 719108 | 4981688 |
| | 2 | 719204 | 4981714 | 719109 | 4981685 |
| | 3 | 719198 | 4981712 | 719102 | 4981682 |
| 153 | 1 | 719108 | 4981688 | 719057 | 4981729 |
| | 2 | 719109 | 4981685 | 719012 | 4981738 |
| | 3 | 719102 | 4981682 | 718916 | 4981730 |
| 154 | 1 | 719057 | 4981729 | 719061 | 4981795 |
| | 2 | 719012 | 4981738 | 719045 | 4981803 |
| | 3 | 718916 | 4981730 | 718944 | 4981887 |
| 155 | 1 | 719061 | 4981795 | 719072 | 4981870 |
| | 2 | 719045 | 4981803 | 719068 | 4981886 |
| | 3 | 718944 | 4981887 | 719054 | 4981974 |
| 156 | 1 | 719072 | 4981870 | 719091 | 4981997 |
| | 2 | 719068 | 4981886 | 719080 | 4982034 |
| | 3 | 719054 | 4981974 | 719076 | 4982065 |
| 157 | 1 | 719091 | 4981997 | 719161 | 4982034 |
| | 2 | 719080 | 4982034 | 719143 | 4982133 |
| | 3 | 719076 | 4982065 | 719132 | 4982165 |
| 158 | 1 | 719161 | 4982034 | 719258 | 4982083 |
| | 2 | 719143 | 4982133 | 719220 | 4982190 |
| | 3 | 719132 | 4982165 | 719211 | 4982228 |
| 159 | 1 | 719258 | 4982083 | 719342 | 4982118 |
| | 2 | 719220 | 4982190 | 719312 | 4982203 |
| | 3 | 719211 | 4982228 | 719300 | 4982264 |
| 160 | 1 | 719342 | 4982118 | 719421 | 4982148 |
| | 2 | 719312 | 4982203 | 719399 | 4982228 |
| | 3 | 719300 | 4982264 | 719388 | 4982303 |
| 161 | 1 | 719421 | 4982148 | 719488 | 4982178 |
| | 2 | 719399 | 4982228 | 719477 | 4982250 |
| | 3 | 719388 | 4982303 | 719484 | 4982303 |
| 162 | 1 | 719488 | 4982178 | 719565 | 4982218 |
| | 2 | 719477 | 4982250 | 719547 | 4982288 |
| | 3 | 719484 | 4982303 | 719544 | 4982328 |
| 163 | 1 | 719565 | 4982218 | 719656 | 4982256 |
| | 2 | 719547 | 4982288 | 719630 | 4982317 |
| | 3 | 719544 | 4982328 | 719624 | 4982369 |
| 164 | 1 | 719656 | 4982256 | 719736 | 4982292 |
| | 2 | 719630 | 4982317 | 719713 | 4982358 |
| | 3 | 719624 | 4982369 | 719689 | 4982403 |
| 165 | 1 | 719736 | 4982292 | 719804 | 4982324 |
| | 2 | 719713 | 4982358 | 719788 | 4982393 |
| | 3 | 719689 | 4982403 | 719773 | 4982457 |
| 166 | 1 | 719804 | 4982324 | 719869 | 4982350 |
| | 2 | 719788 | 4982393 | 719857 | 4982433 |
| | 3 | 719773 | 4982457 | 719835 | 4982491 |
| 167 | 1 | 719869 | 4982350 | 719949 | 4982387 |
| | 2 | 719857 | 4982433 | 719940 | 4982479 |
| | 3 | 719835 | 4982491 | 719927 | 4982522 |
| 168 | 1 | 719949 | 4982387 | 720025 | 4982429 |
| | 2 | 719940 | 4982479 | 720005 | 4982528 |
| | 3 | 719927 | 4982522 | 720007 | 4982570 |
| 169 | 1 | 720025 | 4982429 | 720086 | 4982479 |
| | 2 | 720005 | 4982528 | 720083 | 4982566 |
| | 3 | 720007 | 4982570 | 720082 | 4982616 |
| 170 | 1 | 720086 | 4982479 | 720144 | 4982534 |
| | 2 | 720083 | 4982566 | 720131 | 4982589 |
| | 3 | 720082 | 4982616 | 720130 | 4982645 |
| 171 | 1 | 720144 | 4982534 | 720241 | 4982590 |
| | 2 | 720131 | 4982589 | 720220 | 4982642 |
| | 3 | 720130 | 4982645 | 720214 | 4982692 |
| 172 | 1 | 720241 | 4982590 | 720301 | 4982628 |
| | 2 | 720220 | 4982642 | 720302 | 4982676 |
| | 3 | 720214 | 4982692 | 720276 | 4982732 |
| 173 | 1 | 720301 | 4982628 | 720379 | 4982675 |
| | 2 | 720302 | 4982676 | 720343 | 4982728 |
| | 3 | 720276 | 4982732 | 720331 | 4982770 |
| 174 | 1 | 720379 | 4982675 | 720443 | 4982726 |
| | 2 | 720343 | 4982728 | 720402 | 4982782 |
| | 3 | 720331 | 4982770 | 720399 | 4982814 |
| 175 | 1 | 720443 | 4982726 | 720524 | 4982810 |
| | 2 | 720402 | 4982782 | 720471 | 4982841 |
| | 3 | 720399 | 4982814 | 720448 | 4982861 |
| 176 | 1 | 720524 | 4982810 | 720526 | 4982896 |
| | 2 | 720471 | 4982841 | 720499 | 4982893 |
| | 3 | 720448 | 4982861 | 720474 | 4982891 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 177 | 1 | 720526 | 4982896 | 720530 | 4982948 |
| | 2 | 720499 | 4982893 | 720524 | 4982956 |
| | 3 | 720474 | 4982891 | 720512 | 4982970 |
| 178 | 1 | 720530 | 4982948 | 720581 | 4982965 |
| | 2 | 720524 | 4982956 | 720592 | 4982970 |
| | 3 | 720512 | 4982970 | 720615 | 4982985 |
| 179 | 1 | 720581 | 4982965 | 720610 | 4982896 |
| | 2 | 720592 | 4982970 | 720633 | 4982913 |
| | 3 | 720615 | 4982985 | 720658 | 4982916 |
| 180 | 1 | 720610 | 4982896 | 720639 | 4982818 |
| | 2 | 720633 | 4982913 | 720652 | 4982816 |
| | 3 | 720658 | 4982916 | 720714 | 4982821 |
| 181 | 1 | 720639 | 4982818 | 720738 | 4982758 |
| | 2 | 720652 | 4982816 | 720743 | 4982776 |
| | 3 | 720714 | 4982821 | 720744 | 4982804 |
| 182 | 1 | 720738 | 4982758 | 720825 | 4982749 |
| | 2 | 720743 | 4982776 | 720826 | 4982780 |
| | 3 | 720744 | 4982804 | 720831 | 4982808 |
| 183 | 1 | 720825 | 4982749 | 720900 | 4982750 |
| | 2 | 720826 | 4982780 | 720910 | 4982776 |
| | 3 | 720831 | 4982808 | 720912 | 4982844 |
| 184 | 1 | 720900 | 4982750 | 720994 | 4982739 |
| | 2 | 720910 | 4982776 | 720981 | 4982818 |
| | 3 | 720912 | 4982844 | 720968 | 4982880 |
| 185 | 1 | 720994 | 4982739 | 721089 | 4982807 |
| | 2 | 720981 | 4982818 | 721035 | 4982862 |
| | 3 | 720968 | 4982880 | 720997 | 4982903 |
| 186 | 1 | 721089 | 4982807 | 721155 | 4982877 |
| | 2 | 721035 | 4982862 | 721079 | 4982922 |
| | 3 | 720997 | 4982903 | 721047 | 4982954 |
| 187 | 1 | 721155 | 4982877 | 721195 | 4982921 |
| | 2 | 721079 | 4982922 | 721125 | 4982992 |
| | 3 | 721047 | 4982954 | 721096 | 4983016 |
| 188 | 1 | 721195 | 4982921 | 721255 | 4982979 |
| | 2 | 721125 | 4982992 | 721188 | 4983061 |
| | 3 | 721096 | 4983016 | 721154 | 4983099 |
| 189 | 1 | 721255 | 4982979 | 721300 | 4983038 |
| | 2 | 721188 | 4983061 | 721221 | 4983103 |
| | 3 | 721154 | 4983099 | 721179 | 4983134 |
| 190 | 1 | 721300 | 4983038 | 721342 | 4983096 |
| | 2 | 721221 | 4983103 | 721269 | 4983152 |
| | 3 | 721179 | 4983134 | 721211 | 4983180 |
| 191 | 1 | 721342 | 4983096 | 721388 | 4983169 |
| | 2 | 721269 | 4983152 | 721325 | 4983218 |
| | 3 | 721211 | 4983180 | 721260 | 4983229 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 192 | 1 | 721388 | 4983169 | 721439 | 4983251 |
| | 2 | 721325 | 4983218 | 721377 | 4983292 |
| | 3 | 721260 | 4983229 | 721310 | 4983325 |
| 193 | 1 | 721439 | 4983251 | 721487 | 4983335 |
| | 2 | 721377 | 4983292 | 721432 | 4983392 |
| | 3 | 721310 | 4983325 | 721363 | 4983429 |
| 194 | 1 | 721487 | 4983335 | 721536 | 4983443 |
| | 2 | 721432 | 4983392 | 721468 | 4983475 |
| | 3 | 721363 | 4983429 | 721402 | 4983505 |
| 195 | 1 | 721536 | 4983443 | 721575 | 4983550 |
| | 2 | 721468 | 4983475 | 721503 | 4983567 |
| | 3 | 721402 | 4983505 | 721431 | 4983588 |
| 196 | 1 | 721575 | 4983550 | 721599 | 4983639 |
| | 2 | 721503 | 4983567 | 721537 | 4983664 |
| | 3 | 721431 | 4983588 | 721470 | 4983689 |
| 197 | 1 | 721599 | 4983639 | 721639 | 4983742 |
| | 2 | 721537 | 4983664 | 721549 | 4983767 |
| | 3 | 721470 | 4983689 | 721499 | 4983787 |
| 198 | 1 | 721639 | 4983742 | 721660 | 4983818 |
| | 2 | 721549 | 4983767 | 721585 | 4983845 |
| | 3 | 721499 | 4983787 | 721537 | 4983885 |
| 199 | 1 | 721660 | 4983818 | 721690 | 4983911 |
| | 2 | 721585 | 4983845 | 721626 | 4983939 |
| | 3 | 721537 | 4983885 | 721560 | 4983971 |
| 200 | 1 | 721690 | 4983911 | 721731 | 4984015 |
| | 2 | 721626 | 4983939 | 721652 | 4984040 |
| | 3 | 721560 | 4983971 | 721583 | 4984051 |
| 201 | 1 | 721731 | 4984015 | 721741 | 4984132 |
| | 2 | 721652 | 4984040 | 721687 | 4984146 |
| | 3 | 721583 | 4984051 | 721627 | 4984163 |
| 202 | 1 | 721741 | 4984132 | 721750 | 4984252 |
| | 2 | 721687 | 4984146 | 721714 | 4984253 |
| | 3 | 721627 | 4984163 | 721657 | 4984257 |
| 203 | 1 | 721750 | 4984252 | 721774 | 4984361 |
| | 2 | 721714 | 4984253 | 721734 | 4984363 |
| | 3 | 721657 | 4984257 | 721685 | 4984368 |
| 204 | 1 | 721774 | 4984361 | 721778 | 4984467 |
| | 2 | 721734 | 4984363 | 721741 | 4984467 |
| | 3 | 721685 | 4984368 | 721689 | 4984473 |
| 205 | 1 | 721778 | 4984467 | 721770 | 4984579 |
| | 2 | 721741 | 4984467 | 721737 | 4984577 |
| | 3 | 721689 | 4984473 | 721677 | 4984571 |
| 206 | 1 | 721770 | 4984579 | 721756 | 4984674 |
| | 2 | 721737 | 4984577 | 721715 | 4984672 |
| | 3 | 721677 | 4984571 | 721658 | 4984667 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 207 | 1 | 721756 | 4984674 | 721710 | 4984765 |
| | 2 | 721715 | 4984672 | 721647 | 4984764 |
| | 3 | 721658 | 4984667 | 721573 | 4984736 |
| 208 | 1 | 721710 | 4984765 | 721718 | 4984819 |
| | 2 | 721647 | 4984764 | 721688 | 4984826 |
| | 3 | 721573 | 4984736 | 721641 | 4984837 |
| 209 | 1 | 721718 | 4984819 | 721771 | 4984938 |
| | 2 | 721688 | 4984826 | 721718 | 4984970 |
| | 3 | 721641 | 4984837 | 721677 | 4984974 |
| 210 | 1 | 721771 | 4984938 | 721783 | 4985098 |
| | 2 | 721718 | 4984970 | 721743 | 4985105 |
| | 3 | 721677 | 4984974 | 721670 | 4985097 |
| 211 | 1 | 721783 | 4985098 | 721739 | 4985229 |
| | 2 | 721743 | 4985105 | 721703 | 4985228 |
| | 3 | 721670 | 4985097 | 721680 | 4985228 |
| 212 | 1 | 721739 | 4985229 | 721734 | 4985328 |
| | 2 | 721703 | 4985228 | 721717 | 4985330 |
| | 3 | 721680 | 4985228 | 721686 | 4985336 |
| 213 | 1 | 721734 | 4985328 | 721745 | 4985450 |
| | 2 | 721717 | 4985330 | 721734 | 4985450 |
| | 3 | 721686 | 4985336 | 721713 | 4985461 |
| 214 | 1 | 721745 | 4985450 | 721772 | 4985558 |
| | 2 | 721734 | 4985450 | 721760 | 4985568 |
| | 3 | 721713 | 4985461 | 721747 | 4985579 |
| 215 | 1 | 721772 | 4985558 | 721816 | 4985680 |
| | 2 | 721760 | 4985568 | 721783 | 4985683 |
| | 3 | 721747 | 4985579 | 721759 | 4985685 |
| 216 | 1 | 721816 | 4985680 | 721836 | 4985766 |
| | 2 | 721783 | 4985683 | 721811 | 4985774 |
| | 3 | 721759 | 4985685 | 721764 | 4985782 |
| 217 | 1 | 721836 | 4985766 | 721864 | 4985874 |
| | 2 | 721811 | 4985774 | 721786 | 4985891 |
| | 3 | 721764 | 4985782 | 721723 | 4985915 |
| 218 | 1 | 721864 | 4985874 | 721808 | 4985982 |
| | 2 | - | - | - | - |
| | 3 | - | - | - | - |
| 219 | 1 | 721808 | 4985982 | 721818 | 4986066 |
| | 2 | 721786 | 4985891 | 721768 | 4985998 |
| | 3 | 721723 | 4985915 | 721717 | 4985973 |
| 220 | 1 | 721818 | 4986066 | 721896 | 4986139 |
| | 2 | 721768 | 4985998 | 721735 | 4986093 |
| | 3 | 721717 | 4985973 | 721685 | 4986051 |
| 221 | 1 | 721896 | 4986139 | 721903 | 4986209 |
| | 2 | - | - | - | - |
| | 3 | - | - | - | - |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 222 | 1 | 721903 | 4986209 | 721702 | 4986221 |
| | 2 | - | - | - | - |
| | 3 | - | - | - | - |
| 223 | 1 | 721702 | 4986221 | 721601 | 4986215 |
| | 2 | 721735 | 4986093 | 721609 | 4986178 |
| | 3 | 721685 | 4986051 | 721609 | 4986044 |
| 224 | 1 | 721601 | 4986215 | 721509 | 4986241 |
| | 2 | 721609 | 4986178 | 721533 | 4986201 |
| | 3 | 721609 | 4986044 | 721541 | 4986076 |
| 225 | 1 | 721509 | 4986241 | 721422 | 4986191 |
| | 2 | 721533 | 4986201 | 721431 | 4986142 |
| | 3 | 721541 | 4986076 | 721472 | 4986072 |
| 226 | 1 | 721422 | 4986191 | 721364 | 4986118 |
| | 2 | 721431 | 4986142 | 721361 | 4986102 |
| | 3 | 721472 | 4986072 | 721373 | 4986082 |
| 227 | 1 | 721364 | 4986118 | 721257 | 4986085 |
| | 2 | 721361 | 4986102 | 721267 | 4986067 |
| | 3 | 721373 | 4986082 | 721283 | 4986052 |
| 228 | 1 | 721257 | 4986085 | 721166 | 4986076 |
| | 2 | 721267 | 4986067 | 721178 | 4986055 |
| | 3 | 721283 | 4986052 | 721173 | 4986023 |
| 229 | 1 | 721166 | 4986076 | 721097 | 4985988 |
| | 2 | 721178 | 4986055 | 721097 | 4985976 |
| | 3 | 721173 | 4986023 | 721098 | 4985960 |
| 230 | 1 | 721097 | 4985988 | 721022 | 4986008 |
| | 2 | 721097 | 4985976 | 721015 | 4986010 |
| | 3 | 721098 | 4985960 | 721004 | 4986005 |
| 231 | 1 | 721022 | 4986008 | 720963 | 4986073 |
| | 2 | 721015 | 4986010 | 720961 | 4986066 |
| | 3 | 721004 | 4986005 | 720952 | 4986046 |
| 232 | 1 | 720963 | 4986073 | 720914 | 4986093 |
| | 2 | 720961 | 4986066 | 720906 | 4986086 |
| | 3 | 720952 | 4986046 | 720897 | 4986082 |
| 233 | 1 | 720914 | 4986093 | 720953 | 4986152 |
| | 2 | 720906 | 4986086 | 720929 | 4986163 |
| | 3 | 720897 | 4986082 | 720882 | 4986140 |
| 234 | 1 | 720953 | 4986152 | 720948 | 4986218 |
| | 2 | 720929 | 4986163 | 720901 | 4986190 |
| | 3 | 720882 | 4986140 | 720868 | 4986154 |
| 235 | 1 | 720948 | 4986218 | 720873 | 4986236 |
| | 2 | 720901 | 4986190 | 720838 | 4986201 |
| | 3 | 720868 | 4986154 | 720800 | 4986178 |
| 236 | 1 | 720873 | 4986236 | 720841 | 7206201 |
| | 2 | - | - | - | - |
| | 3 | - | - | - | - |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 237 | 1 | 720841 | 4986201 | 720826 | 4986280 |
| | 2 | 720838 | 4986201 | 720799 | 4986280 |
| | 3 | 720800 | 4986178 | 720767 | 4986278 |
| 238 | 1 | 720826 | 4986280 | 720774 | 4986409 |
| | 2 | 720799 | 4986280 | 720763 | 4986409 |
| | 3 | 720767 | 4986278 | 720743 | 4986400 |
| 239 | 1 | 720774 | 4986409 | 720780 | 4986475 |
| | 2 | 720763 | 4986409 | 720766 | 4986476 |
| | 3 | 720743 | 4986400 | 720754 | 4986481 |
| 240 | 1 | 720780 | 4986475 | 720818 | 4986534 |
| | 2 | 720766 | 4986476 | 720813 | 4986539 |
| | 3 | 720754 | 4986481 | 720727 | 4986542 |
| 241 | 1 | 720818 | 4986534 | 720895 | 4986580 |
| | 2 | 720813 | 4986539 | 720804 | 4986563 |
| | 3 | - | - | - | - |
| 242 | 1 | 720895 | 4986580 | 720837 | 4986612 |
| | 2 | - | - | - | - |
| | 3 | - | - | - | - |
| 243 | 1 | 720837 | 4986612 | 720737 | 4986632 |
| | 2 | 720804 | 4986563 | 720777 | 4986573 |
| | 3 | - | - | - | - |
| 244 | 1 | 720737 | 4986632 | 720702 | 4986591 |
| | 2 | 720777 | 4986573 | 720702 | 4986580 |
| | 3 | - | - | - | - |
| 245 | 1 | 720702 | 4986591 | 720632 | 4986564 |
| | 2 | 720702 | 4986580 | 720628 | 4986544 |
| | 3 | 720727 | 4986542 | 720638 | 4986505 |
| 246 | 1 | 720632 | 4986564 | 720625 | 4986583 |
| | 2 | 720628 | 4986544 | 720615 | 4986583 |
| | 3 | 720638 | 4986505 | 720595 | 4986584 |
| 247 | 1 | 720625 | 4986583 | 720666 | 4986638 |
| | 2 | 720615 | 4986583 | 720666 | 4986641 |
| | 3 | 720595 | 4986584 | 720639 | 4986664 |
| 248 | 1 | 720666 | 4986638 | 720725 | 4986704 |
| | 2 | 720666 | 4986641 | 720698 | 4986711 |
| | 3 | 720639 | 4986664 | 720622 | 4986735 |
| 249 | 1 | 720725 | 4986704 | 720744 | 4986767 |
| | 2 | 720698 | 4986711 | 720681 | 4986764 |
| | 3 | 720622 | 4986735 | 720614 | 4986775 |
| 250 | 1 | 720744 | 4986767 | 720715 | 4986838 |
| | 2 | 720681 | 4986764 | 720659 | 4986811 |
| | 3 | - | - | - | - |
| 251 | 1 | 720715 | 4986838 | 720661 | 4986922 |
| | 2 | 720659 | 4986811 | 720614 | 4986887 |
| | 3 | 720614 | 4986775 | 720553 | 4986835 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 252 | 1 | 720661 | 4986922 | 720537 | 4986972 |
| | 2 | 720614 | 4986887 | 720527 | 4986923 |
| | 3 | 720553 | 4986835 | 720498 | 4986847 |
| 253 | 1 | 720537 | 4986972 | 720442 | 4986979 |
| | 2 | 720527 | 4986923 | 720459 | 4986937 |
| | 3 | - | - | - | - |
| 254 | 1 | 720442 | 4986979 | 720332 | 4986939 |
| | 2 | 720459 | 4986937 | 720344 | 4986892 |
| | 3 | 720498 | 4986847 | 720431 | 4986798 |
| 255 | 1 | 720332 | 4986939 | 720321 | 4986846 |
| | 2 | 720344 | 4986892 | 720326 | 4986828 |
| | 3 | 720431 | 4986798 | 720336 | 4986789 |
| 256 | 1 | 720321 | 4986846 | 720255 | 4986834 |
| | 2 | 720326 | 4986828 | 720254 | 4986832 |
| | 3 | 720336 | 4986789 | 720243 | 4986815 |
| 257 | 1 | 720255 | 4986834 | 720213 | 4986918 |
| | 2 | 720254 | 4986832 | 720200 | 4986907 |
| | 3 | 720243 | 4986815 | 720160 | 4986884 |
| 258 | 1 | 720213 | 4986918 | 720173 | 4986957 |
| | 2 | 720200 | 4986907 | 720167 | 4986944 |
| | 3 | 720160 | 4986884 | 720139 | 4986900 |
| 259 | 1 | 720173 | 4986957 | 720106 | 4986972 |
| | 2 | 720167 | 4986944 | 720111 | 4986949 |
| | 3 | 720139 | 4986900 | 720107 | 4986885 |
| 260 | 1 | 720106 | 4986972 | 720059 | 4986940 |
| | 2 | 720111 | 4986949 | 720059 | 4986935 |
| | 3 | 720107 | 4986885 | 720041 | 4986887 |
| 261 | 1 | 720059 | 4986940 | 719985 | 4986958 |
| | 2 | 720059 | 4986935 | 719980 | 4986953 |
| | 3 | 720041 | 4986887 | 719945 | 4986948 |
| 262 | 1 | 719985 | 4986958 | 719945 | 4987050 |
| | 2 | 719980 | 4986953 | 719939 | 4987048 |
| | 3 | 719945 | 4986948 | 719924 | 4987044 |
| 263 | 1 | 719945 | 4987050 | 719940 | 4987136 |
| | 2 | 719939 | 4987048 | 719923 | 4987126 |
| | 3 | 719924 | 4987044 | 719873 | 4987110 |
| 264 | 1 | 719940 | 4987136 | 719865 | 4987166 |
| | 2 | 719923 | 4987126 | 719857 | 4987167 |
| | 3 | 719873 | 4987110 | 719832 | 4987146 |
| 265 | 1 | 719865 | 4987166 | 719829 | 4987234 |
| | 2 | 719857 | 4987167 | 719823 | 4987229 |
| | 3 | 719832 | 4987146 | 719811 | 4987220 |
| 266 | 1 | 719829 | 4987234 | 719792 | 4987317 |
| | 2 | 719823 | 4987229 | 719791 | 4987323 |
| | 3 | 719811 | 4987220 | 719684 | 4987322 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 267 | 1 | 720324 | 4979780 | 720546 | 4979715 |
| | 2 | 720324 | 4979781 | 720547 | 4979714 |
| | 3 | 720324 | 4979782 | 720548 | 4979713 |
| 268 | 1 | 720546 | 4979715 | 720566 | 4979631 |
| | 2 | 720547 | 4979714 | 720569 | 4979631 |
| | 3 | 720548 | 4979713 | 720569 | 4979631 |
| 269 | 1 | 720566 | 4979631 | 720519 | 4979556 |
| | 2 | 720569 | 4979631 | 720527 | 4979555 |
| | 3 | 720569 | 4979631 | 720533 | 4979553 |
| 270 | 1 | 720519 | 4979556 | 720484 | 4979449 |
| | 2 | 720527 | 4979555 | 720489 | 4979447 |
| | 3 | 720533 | 4979553 | 720492 | 4979447 |
| 271 | 1 | 720484 | 4979449 | 720437 | 4979311 |
| | 2 | 720489 | 4979447 | 720437 | 4979311 |
| | 3 | 720492 | 4979447 | 720442 | 4979310 |
| 272 | 1 | 720437 | 4979311 | 720310 | 4979268 |
| | 2 | 720437 | 4979311 | 720309 | 4979264 |
| | 3 | 720442 | 4979310 | 720313 | 4979264 |
| 273 | 1 | 720310 | 4979268 | 720204 | 4979177 |
| | 2 | 720309 | 4979264 | 720200 | 4979174 |
| | 3 | 720313 | 4979264 | 720205 | 4979173 |
| 274 | 1 | 720204 | 4979177 | 720099 | 4979075 |
| | 2 | 720200 | 4979174 | 720109 | 4979069 |
| | 3 | 720205 | 4979173 | 720120 | 4979064 |
| 275 | 1 | 720099 | 4979075 | 720039 | 4978954 |
| | 2 | 720109 | 4979069 | 720044 | 4978953 |
| | 3 | 720120 | 4979064 | 720041 | 4978951 |
| 276 | 1 | 720039 | 4978954 | 719991 | 4978905 |
| | 2 | 720044 | 4978953 | 720024 | 4978876 |
| | 3 | 720041 | 4978951 | 720038 | 4978862 |
| 277 | 1 | 719991 | 4978905 | 720003 | 4978800 |
| | 2 | 720024 | 4978876 | 720031 | 4978809 |
| | 3 | 720038 | 4978862 | 720045 | 4978802 |
| 278 | 1 | 720003 | 4978800 | 720056 | 4978724 |
| | 2 | 720031 | 4978809 | 720070 | 4978731 |
| | 3 | 720045 | 4978802 | 720083 | 4978735 |

| Section | Transect | Coordinates (UTM) | | | |
|---|---|---|---|---|---|
| | | Beginning | | End | |
| 279 | 1 | 720056 | 4978724 | 720132 | 4978662 |
| | 2 | 720070 | 4978731 | 720184 | 4978685 |
| | 3 | 720083 | 4978735 | 720305 | 4978625 |
| 280 | 1 | 720132 | 4978662 | 720109 | 4978589 |
| | 2 | 720184 | 4978685 | 720264 | 4978583 |
| | 3 | 720305 | 4978625 | 720318 | 4978580 |
| 281 | 1 | 720109 | 4978589 | 720101 | 4978497 |
| | 2 | 720264 | 4978583 | 720280 | 4978502 |
| | 3 | 720318 | 4978580 | 720307 | 4978501 |
| 282 | 1 | 720101 | 4978497 | 720112 | 4978433 |
| | 2 | 720280 | 4978502 | 720293 | 4978433 |
| | 3 | 720307 | 4978501 | 720302 | 4978436 |
| 283 | 1 | 720429 | 4979808 | 720505 | 4979825 |
| | 2 | 720429 | 4979802 | 720531 | 4979807 |
| | 3 | 720425 | 4979798 | 720539 | 4979800 |
| 284 | 1 | 720505 | 4979825 | 720567 | 4979884 |
| | 2 | 720531 | 4979807 | 720577 | 4979877 |
| | 3 | 720539 | 4979800 | 720585 | 4979873 |
| 285 | 1 | 720567 | 4979884 | 720644 | 4979930 |
| | 2 | 720577 | 4979877 | 720647 | 4979912 |
| | 3 | 720585 | 4979873 | 720646 | 4979903 |
| 286 | 1 | 720644 | 4979930 | 720712 | 4979864 |
| | 2 | 720647 | 4979912 | 720693 | 4979858 |
| | 3 | 720646 | 4979903 | 720687 | 4979858 |
| 287 | 1 | 720712 | 4979864 | 720724 | 4979775 |
| | 2 | 720693 | 4979858 | 720719 | 4979773 |
| | 3 | 720687 | 4979858 | 720712 | 4979773 |
| 288 | 1 | 720724 | 4979775 | 720714 | 4979720 |
| | 2 | 720719 | 4979773 | 720707 | 4979716 |
| | 3 | 720712 | 4979773 | 720685 | 4979726 |
| 289 | 1 | 720714 | 4979720 | 720644 | 4979710 |
| | 2 | 720707 | 4979716 | 720637 | 4979704 |
| | 3 | 720685 | 4979726 | 720633 | 4979706 |

# APPENDIX 3:

## RAW RESULTS OF TRANSECTS INVENTORIED

# Légende de l'annexe

**Sect.** : Section number
**Trans.** : Transects
**% artif.** : Degree of artificialization of the shore (%)
**dom.** : dominant
**s-dom.** : sub-dominant
**FP** : Fine particles (fine mineral particles + fine organic matter)
**DFP** : Thin deposit of fine particles
**S :** Sands
**B :** Boulders
**R :** Rock
**G** : Gravels
**FG** : Fine gravels
**VD** : Vegetal or plants debris
**% Cov.** : Percentage of area covered
**Dis.** : Dispersal in the transect
**U** : Uniform in the transect
**S** : Sporadic in the transect
**F** : More dense at the end of the transect
**D** : More dense at beginning of the transect
**M** : More dense at the middle of the transect
**E** : More dense at the extremities of the transect
**Potamogeton sp**. : *P. praelongus* ou *P. Richardsonii* ou *P. perfoliatus*

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 1 | 0-10 % | 1 | B | S | 0 | 0 | 5 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 25-50 | S | 0 | U |
| | | 2 | FP | B | 0 | 60 | 10 | 10 | 20 | N. flexilis | 25-50 | V. americana | 25-50 | Potamogeton sp. | 10-25 | 75-100 | U | 0-10 | U |
| | | 3 | FP | B | 110 | 40 | 20 | 20 | 20 | V. americana | 10-25 | H. dubia | 10-25 | Potamogeton sp. | 10-25 | 50-75 | S | 0 | U |
| 2 | 0-10 % | 1 | B | S | 0 | 0 | 0 | 0 | 20 | V. americana | 0-10 | Potamogeton sp. | 0-10 | aucun | 0 | 0-10 | D | 0 | U |
| | | 2 | FP | S | 20 | 20 | 10 | 10 | 0 | N. flexilis | 10-25 | V. americana | 0-10 | Potamogeton sp. | 0-10 | 10-25 | D | 0-10 | S |
| | | 3 | S | FP | 20 | 10 | 20 | 10 | 30 | V. americana | 10-25 | H. dubia | 0-10 | P. epihydrus | 0-10 | 10-25 | E | 0 | U |
| 3 | 0-10 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | P. foliosus/pusillus | 0-10 | N. flexilis | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | FG | 30 | 30 | 30 | 20 | 20 | N. flexilis | 0-10 | V. americana | 0-10 | aucun | 0 | 0-10 | D | 0 | U |
| | | 3 | S | FP | 30 | 20 | 10 | 20 | 10 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 4 | 0-10 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | N. flexilis | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | FG | 30 | 30 | 20 | 20 | 10 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| | | 3 | S | FP | 20 | 20 | 20 | 10 | 10 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 5 | 0-10 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | aucun | 0 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | FG | 20 | 20 | 20 | 20 | 40 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| | | 3 | S | G | 10 | 10 | 20 | 20 | 20 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 6 | 0-10 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0-10 | S |
| | | 2 | G | B | 10 | 10 | 10 | 0 | 0 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| | | 3 | S | B | 30 | 20 | 20 | 10 | 10 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 7 | 0-10 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | P. foliosus/pusillus | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | B | 0 | 20 | 10 | 10 | 10 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| | | 3 | S | G | 10 | 10 | 20 | 20 | 30 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 8 | 10-25 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0-10 | S |
| | | 2 | B | S | 0 | 20 | 10 | 10 | 0 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| | | 3 | S | B | 30 | 20 | 0 | 20 | 10 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 9 | 25-50 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| | | 2 | B | S | 0 | 0 | 0 | 0 | 0 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| | | 3 | S | B | 10 | 10 | 10 | 10 | 10 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 10 | 75-100 % | 1 | B | G | 0 | 0 | 0 | 10 | 0 | V. americana | 0-10 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 0-10 | F | 0 | U |
| | | 2 | FP | S | 0 | 0 | 50 | 30 | 40 | V. americana | 10-25 | M. spicatum | 10-25 | N. flexilis | 10-25 | 50-75 | F | 0 | U |
| | | 3 | FP | S | 20 | 60 | 50 | 30 | 40 | M. spicatum | 25-50 | V. americana | 25-50 | aucun | 0 | 50-75 | U | 0 | U |
| 11 | 10-25 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | Potamogeton sp. | 0-10 | P. foliosus/pusillus | 0-10 | 0-10 | D | 0 | U |
| | | 2 | FP | B | 0 | 20 | 20 | 10 | 10 | V. americana | 0-10 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 10-25 | D | 0 | U |
| | | 3 | S | FP | 40 | 20 | 30 | 20 | 20 | V. americana | 10-25 | aucun | 0 | aucun | 0 | 10-25 | D | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 12 | 0-10 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | M. spicatum | 0-10 | P. foliosus/pusillus | 0-10 | 0-10 | S | 0 | U |
| | | 2 | B | S | 20 | 0 | 0 | 0 | 0 | V. americana | 0-10 | M. spicatum | 0-10 | N. flexilis | 0-10 | 0-10 | D | 0 | U |
| | | 3 | S | B | 10 | 10 | 10 | 0 | 0 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 13 | 10-25 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | Potamogeton sp. | 0-10 | P. foliosus/pusillus | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | B | 0 | 50 | 30 | 0 | 0 | Potamogeton sp. | 10-25 | V. americana | 10-25 | M. spicatum | 0-10 | 25-50 | M | 0 | U |
| | | 3 | S | FP | 10 | 10 | 10 | 20 | 10 | V. americana | 10-25 | M. spicatum | 10-25 | Potamogeton sp. | 0-10 | 25-50 | M | 0 | U |
| 14 | 0-10 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | M. spicatum | 0-10 | P. foliosus/pusillus | 0-10 | 0-10 | S | 0 | U |
| | | 2 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | aucun | 0 | aucun | 0 | 10-25 | U | 0 | U |
| | | 3 | G | FP | 10 | 10 | 10 | 10 | 10 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| 15 | 10-25 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | P. foliosus/pusillus | 0-10 | aucun | 0 | 0-10 | S | 0-10 | S |
| | | 2 | B | DFP | 0 | 0 | 20 | 0 | 5 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| | | 3 | B | DFP | 10 | 20 | 10 | 10 | 0 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| 16 | 25-50 % | 1 | S | B | 0 | 10 | 10 | 60 | 5 | V. americana | 25-50 | Potamogeton sp. | 10-25 | N. flexilis | 0-10 | 50-75 | U | 0 | U |
| | | 2 | FP | B | 0 | 20 | 40 | 40 | 40 | H. dubia | 25-50 | M. spicatum | 10-25 | Potamogeton sp. | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | B | 5 | 10 | 30 | 40 | 50 | H. dubia | 10-25 | M. spicatum | 10-25 | V. americana | 0-10 | 25-50 | F | 0 | U |
| 17 | 0-10 % | 1 | B | DFP | 40 | 0 | 0 | 0 | 0 | N. flexilis | 0-10 | V. americana | 0-10 | aucun | 0 | 0-10 | D | 0-10 | S |
| | | 2 | B | VD | 30 | 0 | 0 | 0 | 0 | H. dubia | 0-10 | M. spicatum | 0-10 | aucun | 0 | 0-10 | D | 0 | U |
| | | 3 | S | B | 30 | 10 | 5 | 5 | 5 | M. spicatum | 0-10 | H. dubia | 0-10 | aucun | 0 | 0-10 | D | 0 | U |
| 18 | 0-10 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | M | 0 | U |
| | | 2 | B | S | 0 | 5 | 0 | 0 | 10 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| | | 3 | B | S | 0 | 0 | 5 | 0 | 0 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 19 | 25-50 % | 1 | B | DFP | 0 | 0 | 0 | 5 | 0 | V. americana | 25-50 | Potamogeton sp. | 10-25 | E. canadensis | 0-10 | 50-75 | M | 0 | U |
| | | 2 | B | FP | 0 | 0 | 20 | 10 | 10 | V. americana | 25-50 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 50-75 | M | 0 | U |
| | | 3 | FP | B | 5 | 10 | 20 | 5 | 5 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 20 | 10-25 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | P. foliosus/pusillus | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | FP | S | 0 | 0 | 20 | 20 | 20 | V. americana | 10-25 | H. dubia | 10-25 | Potamogeton sp. | 10-25 | 50-75 | U | 0 | U |
| | | 3 | FP | B | 0 | 0 | 5 | 5 | 5 | H. dubia | 10-25 | V. americana | 0-10 | M. spicatum | 0-10 | 25-50 | F | 0 | U |
| 21 | 50-75 % | 1 | G | S | 0 | 0 | 5 | 0 | 10 | V. americana | 10-25 | E. canadensis | 10-25 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 2 | FP | S | 0 | 10 | 40 | 40 | 60 | V. americana | 25-50 | H. dubia | 10-25 | M. spicatum | 10-25 | 50-75 | U | 0 | U |
| | | 3 | FP | VD | 5 | 20 | 200 | 100 | 140 | V. americana | 25-50 | M. spicatum | 25-50 | E. canadensis | 10-25 | 75-100 | F | 0 | U |
| 22 | 50-75 % | 1 | FP | B | 40 | 5 | 5 | 10 | 20 | V. americana | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 10-25 | 75-100 | E | 0-10 | S |
| | | 2 | FP | S | 70 | 80 | 130 | 70 | 50 | V. americana | 25-50 | H. dubia | 10-25 | M. spicatum | 10-25 | 75-100 | U | 0-10 | F |
| | | 3 | FP | VD | 120 | 300 | 140 | 290 | 300 | M. spicatum | 25-50 | E. canadensis | 10-25 | H. dubia | 0-10 | 50-75 | E | 10-25 | S |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 23 | 10-25 % | 1 | FP | S | 20 | 30 | 20 | 5 | 0 | V. americana | 25-50 | N. flexilis | 10-25 | Potamogeton sp. | 10-25 | 75-100 | D | 0-10 | D |
| | | 2 | S | FP | 50 | 140 | 50 | 20 | 20 | H. dubia | 25-50 | P. Robbinsii | 10-25 | V. americana | 10-25 | 75-100 | D | 0-10 | D |
| | | 3 | FP | VD | 140 | 300 | 300 | 300 | 40 | M. spicatum | 25-50 | E. canadensis | 25-50 | Potamogeton sp. | 10-25 | 75-100 | U | 10-25 | S |
| 24 | 0-10 % | 1 | B | S | 0 | 0 | 0 | 5 | 0 | V. americana | 10-25 | N. flexilis | 10-25 | P. amplifolius | 0-10 | 10-25 | D | 0 | U |
| | | 2 | S | B | 10 | 0 | 5 | 5 | 10 | Potamogeton sp. | 10-25 | H. dubia | 0-10 | N. flexilis | 0-10 | 25-50 | F | 0-10 | S |
| | | 3 | FP | B | 30 | 20 | 0 | 10 | 0 | M. spicatum | 25-50 | P. Robbinsii | 25-50 | V. americana | 10-25 | 75-100 | U | 0-10 | S |
| 25 | 0-10 % | 1 | B | S | 0 | 5 | 5 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 10-25 | U | 0 | U |
| | | 2 | S | FP | 20 | 5 | 20 | 30 | 20 | V. americana | 10-25 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 3 | FP | VD | 0 | 0 | 0 | 0 | 20 | M. spicatum | 25-50 | H. dubia | 10-25 | E. canadensis | 10-25 | 50-75 | D | 10-25 | S |
| 26 | 25-50 % | 1 | G | S | 0 | 5 | 5 | 0 | 0 | V. americana | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 2 | S | G | 50 | 20 | 10 | 5 | 5 | M. spicatum | 10-25 | V. americana | 0-10 | H. dubia | 0-10 | 25-50 | E | 0 | U |
| | | 3 | FP | VD | 20 | 10 | 170 | 300 | 100 | V. americana | 25-50 | P. Robbinsii | 10-25 | M. spicatum | 10-25 | 25-50 | S | 0-10 | S |
| 27 | 75-100 % | 1 | G | S | 0 | 0 | 0 | 5 | 5 | V. americana | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 25-50 | F | 0 | U |
| | | 2 | S | FP | 40 | 70 | 50 | 20 | 20 | H. dubia | 25-50 | V. americana | 10-25 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | VD | 300 | 140 | 20 | 10 | 10 | P. Robbinsii | 25-50 | V. americana | 10-25 | M. spicatum | 10-25 | 25-50 | U | 0 | U |
| 28 | 75-100 % | 1 | S | B | 50 | 10 | 10 | 0 | 0 | V. americana | 10-25 | Potamogeton sp. | 10-25 | P. gramineus | 0-10 | 25-50 | U | 0 | U |
| | | 2 | S | B | 20 | 20 | 20 | 10 | 5 | H. dubia | 25-50 | P. Robbinsii | 10-25 | N. flexilis | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | B | 20 | 10 | 0 | 0 | 10 | P. Robbinsii | 25-50 | V. americana | 10-25 | M. spicatum | 10-25 | 50-75 | D | 0 | U |
| 29 | 75-100 % | 1 | B | S | 5 | 0 | 5 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 10-25 | F | 0 | U |
| | | 2 | S | B | 20 | 5 | 5 | 10 | 5 | H. dubia | 25-50 | V. americana | 10-25 | P. Robbinsii | 10-25 | 50-75 | U | 0-10 | F |
| | | 3 | FP | B | 10 | 10 | 20 | 20 | 20 | P. Robbinsii | 25-50 | M. spicatum | 10-25 | V. americana | 10-25 | 50-75 | U | 0 | U |
| 30 | 10-25 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | P. spirillus | 0-10 | 10-25 | S | 0 | U |
| | | 2 | S | B | 5 | 5 | 0 | 5 | 10 | H. dubia | 25-50 | V. americana | 10-25 | N. flexilis | 10-25 | 50-75 | U | 0-10 | D |
| | | 3 | FP | B | 20 | 20 | 0 | 0 | 0 | P. Robbinsii | 25-50 | H. dubia | 10-25 | M. spicatum | 10-25 | 50-75 | D | 0-10 | S |
| 31 | 0-10 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 10-25 | F | 0-10 | S |
| | | 2 | S | B | 5 | 10 | 10 | 20 | 5 | H. dubia | 25-50 | P. Robbinsii | 10-25 | N. flexilis | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | VD | 20 | 30 | 30 | 40 | 50 | M. spicatum | 25-50 | P. Robbinsii | 25-50 | P. foliosus/pusillus | 10-25 | 75-100 | U | 0-10 | S |
| 32 | 0-10 % | 1 | S | B | 0 | 0 | 5 | 5 | 5 | V. americana | 25-50 | N. flexilis | 10-25 | Potamogeton sp. | 10-25 | 50-75 | F | 0 | U |
| | | 2 | S | FP | 20 | 30 | 40 | 40 | 20 | V. americana | 25-50 | H. dubia | 25-50 | Potamogeton sp. | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 40 | 30 | 40 | 30 | 40 | P. Robbinsii | 50-75 | E. canadensis | 10-25 | M. spicatum | 0-10 | 75-100 | U | 0-10 | S |
| 33 | 50-75 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 10-25 | H. dubia | 0-10 | 25-50 | D | 0 | U |
| | | 2 | S | B | 20 | 5 | 5 | 5 | 0 | H. dubia | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 50-75 | D | 0 | U |
| | | 3 | FP | B | 30 | 30 | 30 | 20 | 0 | P. Robbinsii | 25-50 | V. americana | 10-25 | M. spicatum | 0-10 | 50-75 | D | 0-10 | S |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 34 | 75-100 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | P. spirillus | 0-10 | 10-25 | S | 0 | U |
| | | 2 | S | B | 0 | 0 | 0 | 0 | 5 | H. dubia | 0-10 | V. americana | 0-10 | P. Robbinsii | 0-10 | 10-25 | F | 0 | U |
| | | 3 | B | FP | 0 | 0 | 0 | 0 | 10 | P. Robbinsii | 0-10 | V. americana | 0-10 | M. beckii | 0-10 | 10-25 | U | 0 | U |
| 35 | 50-75 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 5 | V. americana | 0-10 | N. flexilis | 0-10 | C. demersum | 0-10 | 10-25 | F | 0 | U |
| | | 2 | FP | B | 5 | 10 | 5 | 0 | 50 | H. dubia | 25-50 | V. americana | 25-50 | M. spicatum | 0-10 | 50-75 | F | 0 | U |
| | | 3 | FP | VD | 0 | 0 | 50 | 50 | 150 | M. spicatum | 25-50 | H. dubia | 25-50 | P. foliosus/pusillus | 10-25 | 75-100 | U | 0-10 | F |
| 36 | 25-50 % | 1 | S | B | 10 | 10 | 10 | 10 | 10 | V. americana | 10-25 | N. flexilis | 10-25 | H. dubia | 10-25 | 50-75 | D | 0 | U |
| | | 2 | FP | B | 40 | 70 | 50 | 70 | 80 | H. dubia | 50-75 | V. americana | 0-10 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | VD | 280 | 300 | 300 | 300 | 300 | M. spicatum | 50-75 | P. foliosus/pusillus | 10-25 | C. demersum | 10-25 | 75-100 | U | 0-10 | S |
| 37 | 25-50 % | 1 | FP | S | 20 | 30 | 20 | 20 | 10 | V. americana | 25-50 | N. flexilis | 10-25 | Potamogeton sp. | 10-25 | 75-100 | U | 0 | U |
| | | 2 | FP | S | 50 | 100 | 100 | 50 | 70 | H. dubia | 25-50 | V. americana | 10-25 | M. spicatum | 10-25 | 50-75 | U | 0-10 | M |
| | | 3 | FP | VD | 300 | 300 | 300 | 300 | 300 | C. demersum | 25-50 | M. spicatum | 25-50 | P. foliosus/pusillus | 10-25 | 75-100 | U | 0-10 | S |
| 38 | 25-50 % | 1 | B | DFP | 5 | 10 | 5 | 0 | 0 | V. americana | 10-25 | N. flexilis | 10-25 | H. dubia | 0-10 | 25-50 | U | 0 | U |
| | | 2 | FP | B | 20 | 0 | 30 | 10 | 5 | H. dubia | 25-50 | V. americana | 25-50 | M. spicatum | 10-25 | 75-100 | U | 0-10 | M |
| | | 3 | FP | VD | 170 | 180 | 180 | 130 | 100 | M. spicatum | 50-75 | C. demersum | 10-25 | P. foliosus/pusillus | 10-25 | 75-100 | U | 0-10 | S |
| 39 | 10-25 % | 1 | B | S | 5 | 5 | 0 | 5 | 0 | V. americana | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 25-50 | F | 0 | U |
| | | 2 | FP | S | 20 | 80 | 50 | 60 | 220 | H. dubia | 25-50 | M. spicatum | 10-25 | P. foliosus/pusillus | 0-10 | 50-75 | U | 0 | U |
| | | 3 | VD | FP | 160 | 90 | 300 | 280 | 260 | P. foliosus/pusillus | 50-75 | C. demersum | 10-25 | E. canadensis | 10-25 | 75-100 | U | 25-50 | S |
| 40 | 50-75 % | 1 | S | FP | 30 | 0 | 0 | 5 | 50 | N. flexilis | 10-25 | H. dubia | 10-25 | V. americana | 10-25 | 50-75 | U | 0 | U |
| | | 2 | FP | S | 160 | 60 | 50 | 50 | 50 | H. dubia | 25-50 | M. spicatum | 10-25 | Chara/Nitella | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 240 | 130 | 150 | 50 | 40 | M. spicatum | 25-50 | E. canadensis | 25-50 | P. foliosus/pusillus | 10-25 | 75-100 | U | 0 | U |
| 41 | 10-25 % | 1 | FP | S | 5 | 5 | 70 | 70 | 60 | N. flexilis | 25-50 | V. americana | 25-50 | Potamogeton sp. | 10-25 | 75-100 | U | 0-10 | M |
| | | 2 | FP | S | 50 | 60 | 70 | 100 | 160 | H. dubia | 25-50 | N. flexilis | 10-25 | P. foliosus/pusillus | 10-25 | 75-100 | U | 0-10 | F |
| | | 3 | FP | S | 30 | 70 | 300 | 300 | 300 | M. spicatum | 25-50 | P. Robbinsii | 10-25 | C. demersum | 0-10 | 50-75 | U | 0-10 | S |
| 42 | 25-50 % | 1 | FP | S | 60 | 40 | 30 | 60 | 40 | V. americana | 10-25 | N. flexilis | 10-25 | H. dubia | 10-25 | 50-75 | U | 0-10 | S |
| | | 2 | S | FP | 30 | 30 | 20 | 30 | 50 | Chara/Nitella | 25-50 | H. dubia | 10-25 | M. spicatum | 10-25 | 75-100 | U | 0-10 | D |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | M. spicatum | 25-50 | P. Robbinsii | 10-25 | C. demersum | 10-25 | 75-100 | U | 0-10 | S |
| 43 | 25-50 % | 1 | FP | S | 30 | 40 | 60 | 60 | 40 | V. americana | 50-75 | H. dubia | 10-25 | E. canadensis | 0-10 | 75-100 | U | 0-10 | D |
| | | 2 | FP | S | 90 | 50 | 60 | 60 | 100 | H. dubia | 25-50 | Chara/Nitella | 25-50 | M. spicatum | 10-25 | 75-100 | S | 0-10 | D |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | C. demersum | 25-50 | P. foliosus/pusillus | 10-25 | H. dubia | 0-10 | 75-100 | U | 0-10 | S |
| 44 | 25-50 % | 1 | FP | S | 50 | 60 | 60 | 30 | 30 | Chara/Nitella | 25-50 | V. americana | 25-50 | S. gramineus | 0-10 | 75-100 | U | 0 | U |
| | | 2 | FP | S | 300 | 300 | 300 | 300 | 300 | M. spicatum | 10-25 | H. dubia | 10-25 | P. Robbinsii | 10-25 | 75-100 | S | 0-10 | D |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | C. demersum | 50-75 | P. foliosus/pusillus | 10-25 | M. spicatum | 0-10 | 75-100 | U | 0-10 | S |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 45 | 50-75 % | 1 | FP | S | 130 | 80 | 90 | 60 | 200 | Chara/Nitella | 25-50 | V. americana | 25-50 | S. gramineus | 0-10 | 75-100 | U | 0 | U |
| | | 2 | FP | S | 300 | 300 | 300 | 300 | 150 | V. americana | 10-25 | M. spicatum | 10-25 | P. Robbinsii | 10-25 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | M. spicatum | 25-50 | P. foliosus/pusillus | 10-25 | C. demersum | 0-10 | 75-100 | U | 0-10 | S |
| 46 | 10-25 % | 1 | FP | S | 250 | 80 | 40 | 30 | 0 | Chara/Nitella | 25-50 | V. americana | 25-50 | N. flexilis | 10-25 | 75-100 | U | 0 | U |
| | | 2 | FP | ND | 300 | 300 | 300 | 300 | 160 | Chara/Nitella | 25-50 | E. canadensis | 10-25 | M. spicatum | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | M. spicatum | 25-50 | P. foliosus/pusillus | 0-10 | C. demersum | 0-10 | 50-75 | U | 0-10 | S |
| 47 | 50-75 % | 1 | FP | S | 150 | 30 | 150 | 200 | 200 | V. americana | 50-75 | Chara/Nitella | 10-25 | H. dubia | 0-10 | 75-100 | U | 0 | U |
| | | 2 | FP | ND | 300 | 300 | 300 | 300 | 300 | Chara/Nitella | 25-50 | E. canadensis | 10-25 | V. americana | 10-25 | 75-100 | U | 10-25 | F |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | P. amplifolius | 10-25 | M. spicatum | 10-25 | P. Robbinsii | 0-10 | 25-50 | U | 0-10 | S |
| 48 | 75-100 % | 1 | FP | S | 190 | 210 | 190 | 130 | 60 | Chara/Nitella | 25-50 | V. americana | 10-25 | Potamogeton sp. | 0-10 | 75-100 | U | 0 | U |
| | | 2 | FP | ND | 210 | 100 | 50 | 60 | 20 | Chara/Nitella | 25-50 | H. dubia | 25-50 | E. canadensis | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | P. amplifolius | 10-25 | M. spicatum | 10-25 | E. canadensis | 0-10 | 25-50 | U | 0-10 | S |
| 49 | 75-100 % | 1 | FP | S | 50 | 30 | 10 | 10 | 120 | Chara/Nitella | 25-50 | N. flexilis | 25-50 | V. americana | 10-25 | 75-100 | U | 0 | U |
| | | 2 | FP | S | 60 | 50 | 120 | 150 | 120 | H. dubia | 25-50 | Chara/Nitella | 25-50 | P. amplifolius | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | M. spicatum | 25-50 | P. amplifolius | 10-25 | E. canadensis | 0-10 | 50-75 | U | 10-25 | S |
| 50 | 75-100 % | 1 | FP | S | 60 | 30 | 300 | 110 | 80 | Chara/Nitella | 25-50 | V. americana | 10-25 | S. gramineus | 10-25 | 50-75 | U | 0 | U |
| | | 2 | FP | S | 220 | 110 | 230 | 220 | 300 | Chara/Nitella | 50-75 | V. americana | 10-25 | M. beckii | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | V. americana | 25-50 | P. foliosus/pusillus | 10-25 | P. Robbinsii | 0-10 | 50-75 | U | 10-25 | S |
| 51 | 75-100 % | 1 | FP | S | 60 | 100 | 150 | 30 | 110 | Chara/Nitella | 25-50 | S. gramineus | 25-50 | V. americana | 10-25 | 50-75 | U | 0-10 | D |
| | | 2 | FP | S | 200 | 280 | 220 | 300 | 200 | Chara/Nitella | 50-75 | V. americana | 10-25 | H. dubia | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 300 | 100 | 80 | 160 | 60 | M. spicatum | 25-50 | P. foliosus/pusillus | 0-10 | P. Robbinsii | 0-10 | 50-75 | U | 0-10 | S |
| 52 | 75-100 % | 1 | FP | S | 100 | 50 | 60 | 200 | 130 | Chara/Nitella | 25-50 | V. americana | 10-25 | H. dubia | 10-25 | 50-75 | U | 0 | U |
| | | 2 | FP | VD | 220 | 80 | 150 | 110 | 20 | Chara/Nitella | 50-75 | V. americana | 10-25 | P. foliosus/pusillus | 10-25 | 75-100 | F | 0 | U |
| | | 3 | FP | S | 10 | 20 | 0 | 30 | 70 | M. spicatum | 25-50 | P. amplifolius | 10-25 | P. foliosus/pusillus | 0-10 | 50-75 | U | 0-10 | S |
| 53 | 25-50 % | 1 | FP | S | 190 | 70 | 40 | 0 | 0 | Chara/Nitella | 10-25 | V. americana | 10-25 | H. dubia | 0-10 | 25-50 | D | 0-10 | D |
| | | 2 | FP | B | 50 | 20 | 10 | 10 | 5 | Chara/Nitella | 50-75 | V. americana | 10-25 | P. foliosus/pusillus | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 20 | 20 | 20 | 50 | 20 | M. spicatum | 25-50 | P. foliosus/pusillus | 25-50 | P. amplifolius | 10-25 | 75-100 | M | 0 | U |
| 54 | 10-25 % | 1 | B | FP | 0 | 0 | 0 | 0 | 0 | Chara/Nitella | 10-25 | V. americana | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| | | 2 | FP | G | 10 | 10 | 10 | 10 | 5 | Chara/Nitella | 50-75 | V. americana | 10-25 | N. flexilis | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | B | 10 | 20 | 10 | 20 | 10 | M. spicatum | 25-50 | P. foliosus/pusillus | 25-50 | P. amplifolius | 0-10 | 75-100 | U | 0 | U |
| 55 | 75-100 % | 1 | S | B | 10 | 5 | 0 | 0 | 0 | Chara/Nitella | 10-25 | V. americana | 10-25 | Potamogeton sp. | 0-10 | 25-50 | D | 0 | U |
| | | 2 | FP | B | 10 | 5 | 5 | 5 | 5 | Chara/Nitella | 25-50 | V. americana | 10-25 | P. foliosus/pusillus | 0-10 | 50-75 | S | 0 | U |
| | | 3 | FP | B | 5 | 5 | 5 | 5 | 5 | M. spicatum | 25-50 | P. foliosus/pusillus | 0-10 | C. demersum | 0-10 | 25-50 | M | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 56 | 75-100 % | 1 | FP | B | 0 | 0 | 5 | 5 | 0 | V. americana | 0-10 | Chara/Nitella | 0-10 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 2 | FP | ND | 10 | 5 | 5 | 5 | 5 | Chara/Nitella | 0-10 | V. americana | 0-10 | aucun | 0 | 0-10 | S | 0-10 | S |
| | | 3 | FP | ND | 20 | 20 | 20 | 10 | 10 | M. spicatum | 50-75 | P. foliosus/pusillus | 25-50 | E. canadensis | 0-10 | 75-100 | U | 0 | U |
| 57 | 75-100 % | 1 | FP | B | 0 | 50 | 20 | 0 | 5 | V. americana | 10-25 | N. flexilis | 10-25 | Chara/Nitella | 10-25 | 50-75 | S | 0 | U |
| | | 2 | FP | S | 5 | 10 | 0 | 0 | 5 | N. flexilis | 25-50 | V. americana | 10-25 | H. dubia | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | VD | 30 | 40 | 20 | 40 | 20 | M. spicatum | 50-75 | P. foliosus/pusillus | 10-25 | H. dubia | 10-25 | 75-100 | U | 0 | U |
| 58 | 50-75 % | 1 | FP | B | 0 | 5 | 5 | 5 | 5 | V. americana | 25-50 | Chara/Nitella | 25-50 | N. flexilis | 10-25 | 50-75 | U | 0 | U |
| | | 2 | S | FP | 0 | 5 | 5 | 5 | 5 | V. americana | 25-50 | H. dubia | 10-25 | N. flexilis | 10-25 | 75-100 | D | 0 | U |
| | | 3 | FP | VD | 40 | 40 | 20 | 10 | 10 | M. spicatum | 25-50 | P. foliosus/pusillus | 10-25 | Potamogeton sp. | 10-25 | 50-75 | U | 0 | U |
| 59 | 25-50 % | 1 | FP | B | 20 | 20 | 20 | 20 | 20 | V. americana | 25-50 | Chara/Nitella | 25-50 | N. flexilis | 10-25 | 50-75 | U | 0 | U |
| | | 2 | S | FP | 5 | 10 | 20 | 20 | 20 | V. americana | 25-50 | M. spicatum | 10-25 | N. flexilis | 10-25 | 50-75 | E | 0 | U |
| | | 3 | S | FP | 10 | 20 | 30 | 30 | 50 | V. americana | 25-50 | M. spicatum | 25-50 | N. flexilis | 10-25 | 75-100 | U | 0 | U |
| 60 | 25-50 % | 1 | S | VD | 20 | 20 | 20 | 20 | 20 | V. americana | 50-75 | N. flexilis | 10-25 | H. dubia | 10-25 | 75-100 | U | 10-25 | S |
| | | 2 | S | FP | 10 | 20 | 40 | 50 | 300 | V. americana | 50-75 | M. spicatum | 10-25 | N. flexilis | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 30 | 30 | 60 | 160 | 300 | V. americana | 25-50 | M. spicatum | 10-25 | N. flexilis | 10-25 | 50-75 | E | 10-25 | M |
| 61 | 10-25 % | 1 | FP | S | 30 | 30 | 30 | 30 | 110 | N. flexilis | 50-75 | V. americana | 10-25 | H. dubia | 10-25 | 75-100 | U | 0 | U |
| | | 2 | S | FP | 300 | 300 | 300 | 300 | 300 | H. dubia | 50-75 | M. spicatum | 0-10 | N. flexilis | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 300 | 220 | 220 | 250 | 250 | H. dubia | 25-50 | M. spicatum | 10-25 | E. canadensis | 10-25 | 50-75 | U | 0 | U |
| 62 | 0-10 % | 1 | FP | S | 100 | 100 | 100 | 100 | 100 | N. flexilis | 25-50 | V. americana | 25-50 | Chara/Nitella | 10-25 | 75-100 | U | 50-75 | F |
| | | 2 | FP | S | 300 | 300 | 300 | 260 | 260 | V. americana | 10-25 | H. dubia | 10-25 | P. foliosus/pusillus | 10-25 | 50-75 | U | 0-10 | S |
| | | 3 | FP | ND | 250 | 300 | 280 | 300 | 300 | H. dubia | 25-50 | C. demersum | 0-10 | E. canadensis | 0-10 | 25-50 | D | 0-10 | S |
| 63 | 10-25 % | 1 | FP | S | 100 | 100 | 40 | 10 | 10 | V. americana | 25-50 | N. flexilis | 25-50 | Chara/Nitella | 0-10 | 75-100 | U | 25-50 | D |
| | | 2 | FP | S | 260 | 260 | 70 | 70 | 70 | N. flexilis | 25-50 | V. americana | 25-50 | H. dubia | 10-25 | 75-100 | F | 0-10 | F |
| | | 3 | FP | VD | 300 | 300 | 300 | 200 | 160 | P. foliosus/pusillus | 50-75 | H. dubia | 10-25 | M. spicatum | 0-10 | 75-100 | U | 0-10 | F |
| 64 | 25-50 % | 1 | FP | S | 5 | 5 | 5 | 5 | 5 | V. americana | 25-50 | N. flexilis | 25-50 | Chara/Nitella | 10-25 | 75-100 | U | 25-50 | M |
| | | 2 | FP | S | 80 | 80 | 80 | 70 | 70 | N. flexilis | 10-25 | M. spicatum | 10-25 | V. americana | 10-25 | 50-75 | D | 0-10 | S |
| | | 3 | FP | VD | 150 | 150 | 110 | 60 | 60 | H. dubia | 25-50 | M. spicatum | 10-25 | M. beckii | 0-10 | 25-50 | S | 0 | U |
| 65 | 25-50 % | 1 | FP | S | 20 | 10 | 5 | 5 | 10 | V. americana | 50-75 | Chara/Nitella | 10-25 | S. gramineus | 0-10 | 75-100 | U | 10-25 | S |
| | | 2 | S | FP | 70 | 90 | 50 | 50 | 10 | M. spicatum | 25-50 | H. dubia | 0-10 | Potamogeton sp. | 0-10 | 50-75 | U | 10-25 | U |
| | | 3 | FP | S | 120 | 150 | 150 | 150 | 60 | H. dubia | 10-25 | E. canadensis | 0-10 | M. spicatum | 0-10 | 10-25 | D | 0 | U |
| 66 | 10-25 % | 1 | FP | S | 5 | 5 | 5 | 5 | 10 | V. americana | 50-75 | Chara/Nitella | 25-50 | N. flexilis | 10-25 | 75-100 | U | 25-50 | M |
| | | 2 | S | FP | 20 | 10 | 30 | 5 | 40 | H. dubia | 25-50 | M. spicatum | 10-25 | N. flexilis | 10-25 | 50-75 | U | 10-25 | U |
| | | 3 | FP | S | 180 | 180 | 200 | 200 | 200 | H. dubia | 10-25 | E. canadensis | 0-10 | M. spicatum | 0-10 | 10-25 | S | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 67 | 50-75 % | 1 | FP | S | 5 | 5 | 5 | 10 | 5 | H. dubia | 50-75 | V. americana | 25-50 | E. canadensis | 10-25 | 75-100 | U | 25-50 | M |
| | | 2 | S | FP | 70 | 30 | 200 | 180 | 50 | P. foliosus/pusillus | 25-50 | H. dubia | 10-25 | M. spicatum | 0-10 | 50-75 | U | 10-25 | F |
| | | 3 | FP | S | 300 | 300 | 60 | 50 | 40 | H. dubia | 10-25 | E. canadensis | 0-10 | M. spicatum | 0-10 | 10-25 | S | 0 | U |
| 68 | 50-75 % | 1 | FP | S | 20 | 10 | 20 | 10 | 20 | V. americana | 25-50 | H. dubia | 25-50 | Potamogeton sp. | 10-25 | 75-100 | U | 25-50 | S |
| | | 2 | S | FP | 40 | 10 | 60 | 70 | 50 | H. dubia | 25-50 | C. demersum | 10-25 | E. canadensis | 0-10 | 50-75 | U | 25-50 | U |
| | | 3 | FP | S | 40 | 50 | 50 | 50 | 50 | H. dubia | 10-25 | E. canadensis | 0-10 | P. foliosus/pusillus | 0-10 | 10-25 | S | 0 | U |
| 69 | 75-100 % | 1 | FP | S | 10 | 10 | 10 | 20 | 20 | H. dubia | 25-50 | V. americana | 25-50 | M. alterniflorum | 10-25 | 75-100 | U | 10-25 | S |
| | | 2 | FP | S | 50 | 40 | 150 | 90 | 50 | C. demersum | 25-50 | H. dubia | 10-25 | P. foliosus/pusillus | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | FP | S | 130 | 160 | 260 | 300 | 90 | H. dubia | 10-25 | E. canadensis | 0-10 | N. flexilis | 0-10 | 10-25 | S | 0 | U |
| 70 | 75-100 % | 1 | FP | S | 20 | 20 | 30 | 30 | 20 | V. americana | 25-50 | M. alterniflorum | 25-50 | H. dubia | 10-25 | 75-100 | U | 10-25 | S |
| | | 2 | S | FP | 50 | 50 | 50 | 50 | 60 | H. dubia | 25-50 | M. spicatum | 0-10 | N. flexilis | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | FP | ND | 50 | 50 | 30 | 30 | 60 | H. dubia | 10-25 | P. foliosus/pusillus | 0-10 | M. spicatum | 0-10 | 25-50 | F | 0 | U |
| 71 | 25-50 % | 1 | FP | S | 10 | 10 | 10 | 10 | 10 | M. alterniflorum | 25-50 | V. americana | 10-25 | H. dubia | 10-25 | 75-100 | U | 10-25 | S |
| | | 2 | S | FP | 200 | 90 | 110 | 80 | 40 | H. dubia | 25-50 | M. spicatum | 10-25 | N. flexilis | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | FP | ND | 140 | 70 | 60 | 210 | 220 | H. dubia | 10-25 | P. foliosus/pusillus | 10-25 | M. spicatum | 0-10 | 25-50 | S | 0 | U |
| 72 | 10-25 % | 1 | S | FP | 5 | 20 | 10 | 5 | 10 | V. americana | 25-50 | M. alterniflorum | 10-25 | Chara/Nitella | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 40 | 40 | 50 | 30 | 50 | H. dubia | 50-75 | M. spicatum | 0-10 | N. flexilis | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 300 | 300 | 260 | 220 | 20 | H. dubia | 10-25 | P. foliosus/pusillus | 10-25 | M. spicatum | 0-10 | 25-50 | S | 0 | U |
| 73 | 75-100 % | 1 | FG | S | 80 | 5 | 10 | 10 | 5 | V. americana | 25-50 | N. flexilis | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0-10 | S |
| | | 2 | FP | S | 20 | 20 | 20 | 200 | 180 | H. dubia | 25-50 | N. flexilis | 10-25 | M. spicatum | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 30 | 40 | 150 | 300 | 300 | H. dubia | 10-25 | P. foliosus/pusillus | 10-25 | M. spicatum | 0-10 | 25-50 | S | 0 | U |
| 74 | 50-75 % | 1 | FG | S | 10 | 10 | 30 | 20 | 40 | V. americana | 50-75 | M. alterniflorum | 0-10 | H. dubia | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 300 | 300 | 300 | 300 | 300 | H. dubia | 25-50 | N. flexilis | 25-50 | E. canadensis | 10-25 | 50-75 | U | 10-25 | U |
| | | 3 | FP | S | 240 | 260 | 250 | 260 | 210 | H. dubia | 25-50 | P. foliosus/pusillus | 0-10 | E. canadensis | 0-10 | 25-50 | S | 0 | U |
| 75 | 25-50 % | 1 | S | FP | 20 | 40 | 20 | 30 | 30 | H. dubia | 50-75 | Chara/Nitella | 10-25 | Nymphaea sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 300 | 300 | 300 | 300 | 150 | H. dubia | 25-50 | E. canadensis | 25-50 | M. spicatum | 0-10 | 50-75 | U | 25-50 | U |
| | | 3 | FP | ND | 200 | 300 | 300 | 300 | 200 | H. dubia | 10-25 | E. canadensis | 0-10 | M. spicatum | 0-10 | 10-25 | S | 0 | U |
| 76 | 10-25 % | 1 | FP | S | 60 | 20 | 30 | 40 | 40 | H. dubia | 50-75 | Nymphaea sp. | 10-25 | N. flexilis | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 80 | 80 | 100 | 150 | 60 | H. dubia | 25-50 | E. canadensis | 10-25 | P. crispus | 10-25 | 75-100 | U | 0-10 | S |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | H. dubia | 10-25 | E. canadensis | 0-10 | V. americana | 0-10 | 10-25 | S | 0 | U |
| 77 | 50-75 % | 1 | FP | S | 80 | 150 | 10 | 5 | 10 | V. americana | 25-50 | Nymphaea sp. | 25-50 | nenuphar | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 70 | 60 | 50 | 90 | 30 | H. dubia | 25-50 | E. canadensis | 10-25 | P. crispus | 10-25 | 50-75 | U | 0-10 | S |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | H. dubia | 0-10 | E. canadensis | 0-10 | M. spicatum | 0-10 | 10-25 | S | 0-10 | S |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 78 | 75-100 % | 1 | S | FP | 5 | 5 | 10 | 10 | 10 | N. flexilis | 25-50 | V. americana | 10-25 | M. alterniflorum | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | FP | B | 30 | 20 | 10 | 10 | 0 | H. dubia | 25-50 | M. spicatum | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | FP | B | 220 | 90 | 70 | 20 | 0 | H. dubia | 10-25 | M. spicatum | 0-10 | C. demersum | 0-10 | 10-25 | S | 0-10 | F |
| 79 | 25-50 % | 1 | S | FP | 5 | 5 | 10 | 5 | 5 | N. flexilis | 25-50 | M. alterniflorum | 10-25 | V. americana | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | B | FP | 0 | 0 | 0 | 0 | 0 | M. spicatum | 10-25 | H. dubia | 10-25 | E. canadensis | 0-10 | 25-50 | S | 10-25 | S |
| | | 3 | FP | B | 0 | 20 | 30 | 20 | 0 | H. dubia | 0-10 | M. spicatum | 0-10 | E. canadensis | 0-10 | 10-25 | S | 0-10 | D |
| 80 | 25-50 % | 1 | FP | S | 10 | 10 | 20 | 10 | 10 | V. americana | 25-50 | N. flexilis | 0-10 | M. alterniflorum | 0-10 | 50-75 | D | 0-10 | S |
| | | 2 | S | FP | 5 | 0 | 0 | 0 | 0 | M. spicatum | 10-25 | H. dubia | 10-25 | Chara/Nitella | 0-10 | 25-50 | U | 0 | U |
| | | 3 | FP | B | 50 | 50 | 100 | 100 | 140 | H. dubia | 10-25 | M. spicatum | 10-25 | V. americana | 0-10 | 10-25 | S | 0 | U |
| 81 | 50-75 % | 1 | FP | S | 10 | 10 | 5 | 5 | 5 | V. americana | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0-10 | S |
| | | 2 | B | FP | 0 | 0 | 5 | 0 | 0 | M. spicatum | 10-25 | H. dubia | 0-10 | Chara/Nitella | 0-10 | 25-50 | U | 10-25 | S |
| | | 3 | FP | ND | 180 | 200 | 220 | 230 | 240 | H. dubia | 10-25 | V. americana | 0-10 | M. spicatum | 0-10 | 10-25 | F | 0-10 | U |
| 82 | 75-100 % | 1 | S | FP | 10 | 10 | 10 | 60 | 40 | V. americana | 25-50 | N. flexilis | 10-25 | H. dubia | 0-10 | 50-75 | F | 0-10 | S |
| | | 2 | FP | B | 0 | 0 | 5 | 0 | 10 | M. spicatum | 10-25 | H. dubia | 10-25 | Chara/Nitella | 0-10 | 50-75 | U | 10-25 | S |
| | | 3 | FP | ND | 210 | 230 | 250 | 260 | 220 | H. dubia | 10-25 | M. spicatum | 0-10 | V. americana | 0-10 | 25-50 | S | 0-10 | S |
| 83 | 50-75 % | 1 | FP | S | 20 | 10 | 50 | 40 | 300 | V. americana | 25-50 | H. dubia | 25-50 | N. flexilis | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 300 | 300 | 300 | 300 | 260 | H. dubia | 25-50 | M. spicatum | 25-50 | Chara/Nitella | 0-10 | 50-75 | U | 25-50 | U |
| | | 3 | FP | ND | 300 | 260 | 260 | 300 | 300 | H. dubia | 25-50 | E. canadensis | 10-25 | M. spicatum | 0-10 | 25-50 | U | 10-25 | S |
| 84 | 25-50 % | 1 | FP | S | 300 | 300 | 140 | 100 | 90 | Sparganium sp. | 25-50 | Nymphaea sp. | 10-25 | H. dubia | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | FP | VD | 300 | 300 | 300 | 300 | 230 | H. dubia | 25-50 | M. spicatum | 25-50 | Chara/Nitella | 10-25 | 75-100 | U | 25-50 | U |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | H. dubia | 25-50 | C. demersum | 10-25 | M. spicatum | 0-10 | 50-75 | U | 10-25 | S |
| 85 | 10-25 % | 1 | FP | S | 120 | 100 | 90 | 90 | 60 | H. dubia | 50-75 | Sparganium sp. | 25-50 | V. americana | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | FP | VD | 150 | 130 | 120 | 100 | 80 | Chara/Nitella | 25-50 | H. dubia | 25-50 | M. spicatum | 10-25 | 75-100 | U | 0-10 | S |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | H. dubia | 10-25 | C. demersum | 10-25 | E. canadensis | 10-25 | 50-75 | U | 0-10 | S |
| 86 | 10-25 % | 1 | S | FP | 5 | 10 | 5 | 20 | 30 | V. americana | 25-50 | H. dubia | 25-50 | Potamogeton sp. | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | FP | VD | 30 | 30 | 30 | 120 | 90 | H. dubia | 25-50 | Chara/Nitella | 25-50 | M. spicatum | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | C. demersum | 25-50 | E. canadensis | 10-25 | P. amplifolius | 10-25 | 50-75 | U | 10-25 | U |
| 87 | 10-25 % | 1 | S | FP | 60 | 30 | 30 | 10 | 10 | H. dubia | 25-50 | V. americana | 10-25 | Potamogeton sp. | 0-10 | 75-100 | D | 0-10 | S |
| | | 2 | FP | S | 5 | 40 | 10 | 5 | 5 | H. dubia | 10-25 | V. americana | 10-25 | N. flexilis | 10-25 | 50-75 | U | 0-10 | S |
| | | 3 | FP | B | 300 | 300 | 250 | 20 | 20 | E. canadensis | 10-25 | P. foliosus/pusillus | 0-10 | C. demersum | 0-10 | 10-25 | S | 0-10 | S |
| 88 | 10-25 % | 1 | S | FP | 10 | 10 | 20 | 20 | 10 | Potamogeton sp. | 25-50 | V. americana | 10-25 | H. dubia | 0-10 | 50-75 | M | 0 | U |
| | | 2 | FP | B | 0 | 0 | 0 | 0 | 0 | H. dubia | 50-75 | M. spicatum | 0-10 | V. americana | 0-10 | 50-75 | U | 0-10 | M |
| | | 3 | FP | B | 5 | 5 | 10 | 20 | 20 | H. dubia | 0-10 | E. canadensis | 0-10 | P. foliosus/pusillus | 0-10 | 0-10 | S | 0-10 | S |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 89 | 10-25 % | 1 | S | B | 10 | 10 | 10 | 0 | 5 | V. americana | 10-25 | Potamogeton sp. | 10-25 | N. flexilis | 0-10 | 25-50 | D | 0 | U |
| | | 2 | FP | S | 5 | 10 | 20 | 0 | 10 | H. dubia | 25-50 | V. americana | 0-10 | Chara/Nitella | 0-10 | 50-75 | M | 0-10 | D |
| | | 3 | FP | B | 50 | 50 | 50 | 50 | 30 | H. dubia | 10-25 | C. demersum | 0-10 | M. spicatum | 0-10 | 10-25 | S | 0 | U |
| 90 | 10-25 % | 1 | B | S | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 10-25 | U | 0 | U |
| | | 2 | FP | B | 0 | 5 | 5 | 0 | 5 | H. dubia | 10-25 | V. americana | 10-25 | N. flexilis | 0-10 | 25-50 | U | 0-10 | S |
| | | 3 | S | B | 40 | 20 | 0 | 40 | 5 | H. dubia | 0-10 | M. spicatum | 0-10 | E. canadensis | 0-10 | 0-10 | S | 0-10 | S |
| 91 | 10-25 % | 1 | S | B | 0 | 0 | 10 | 10 | 10 | V. americana | 10-25 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 25-50 | U | 0 | U |
| | | 2 | FP | B | 20 | 20 | 20 | 0 | 10 | H. dubia | 25-50 | N. flexilis | 10-25 | V. americana | 0-10 | 50-75 | F | 0 | U |
| | | 3 | FP | B | 0 | 0 | 5 | 5 | 20 | H. dubia | 0-10 | E. canadensis | 0-10 | M. spicatum | 0-10 | 10-25 | S | 10-25 | S |
| 92 | 10-25 % | 1 | S | FP | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | Potamogeton sp. | 10-25 | N. flexilis | 0-10 | 50-75 | F | 0 | U |
| | | 2 | FP | G | 10 | 10 | 10 | 0 | 0 | M. spicatum | 25-50 | V. americana | 10-25 | H. dubia | 0-10 | 50-75 | F | 10-25 | F |
| | | 3 | FP | S | 50 | 50 | 60 | 110 | 100 | M. spicatum | 10-25 | C. demersum | 10-25 | H. dubia | 10-25 | 50-75 | F | 10-25 | U |
| 93 | 50-75 % | 1 | B | S | 0 | 0 | 0 | 0 | 0 | V. americana | 25-50 | M. alterniflorum | 0-10 | Potamogeton sp. | 0-10 | 25-50 | D | 0-10 | F |
| | | 2 | FP | B | 0 | 0 | 0 | 0 | 0 | M. spicatum | 25-50 | H. dubia | 25-50 | M. beckii | 0-10 | 50-75 | U | 50-75 | U |
| | | 3 | FP | ND | 120 | 210 | 250 | 300 | 300 | H. dubia | 10-25 | M. spicatum | 10-25 | C. demersum | 0-10 | 50-75 | S | 0-10 | S |
| 94 | 0-10 % | 1 | S | B | 0 | 5 | 5 | 10 | 10 | V. americana | 25-50 | M. alterniflorum | 0-10 | isoete | 0-10 | 50-75 | F | 25-50 | F |
| | | 2 | FP | S | 40 | 300 | 300 | 300 | 300 | H. dubia | 25-50 | M. spicatum | 25-50 | M. beckii | 0-10 | 75-100 | U | 50-75 | U |
| | | 3 | FP | ND | 300 | 300 | 140 | 260 | 300 | H. dubia | 25-50 | M. spicatum | 0-10 | E. canadensis | 0-10 | 50-75 | U | 25-50 | F |
| 95 | 0-10 % | 1 | S | FP | 10 | 20 | 30 | 20 | 10 | Chara/Nitella | 50-75 | V. americana | 10-25 | N. flexilis | 10-25 | 75-100 | U | 10-25 | U |
| | | 2 | FP | VD | 210 | 150 | 160 | 210 | 70 | H. dubia | 50-75 | V. americana | 10-25 | M. spicatum | 0-10 | 50-75 | U | 10-25 | D |
| | | 3 | FP | VD | 260 | 300 | 300 | 300 | 100 | H. dubia | 10-25 | C. demersum | 0-10 | Chara/Nitella | 0-10 | 10-25 | D | 0-10 | D |
| 96 | 0-10 % | 1 | FP | VD | 60 | 160 | 140 | 80 | 60 | H. dubia | 75-100 | Chara/Nitella | 25-50 | V. americana | 10-25 | 75-100 | U | 10-25 | S |
| | | 2 | FP | VD | 70 | 300 | 300 | 300 | 300 | H. dubia | 50-75 | Chara/Nitella | 10-25 | C. demersum | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | FP | VD | 300 | 120 | 300 | 300 | 300 | H. dubia | 0-10 | C. demersum | 0-10 | Chara/Nitella | 0-10 | 0-10 | S | 0-10 | S |
| 97 | 10-25 % | 1 | FP | S | 100 | 10 | 60 | 50 | 110 | Chara/Nitella | 50-75 | H. dubia | 10-25 | E. canadensis | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | FP | VD | 200 | 250 | 150 | 120 | 120 | H. dubia | 25-50 | V. americana | 10-25 | M. beckii | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | VD | 20 | 300 | 300 | 270 | 300 | Chara/Nitella | 0-10 | H. dubia | 0-10 | E. canadensis | 0-10 | 0-10 | S | 0-10 | S |
| 98 | 0-10 % | 1 | FP | S | 50 | 40 | 30 | 40 | 50 | H. dubia | 50-75 | Chara/Nitella | 10-25 | V. americana | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | FP | VD | 100 | 80 | 70 | 50 | 60 | H. dubia | 25-50 | V. americana | 10-25 | M. spicatum | 0-10 | 25-50 | U | 0 | U |
| | | 3 | FP | VD | 150 | 180 | 150 | 150 | 150 | H. dubia | 0-10 | Chara/Nitella | 0-10 | E. canadensis | 0-10 | 0-10 | S | 0-10 | D |
| 99 | 0-10 % | 1 | FP | S | 80 | 50 | 60 | 50 | 60 | H. dubia | 50-75 | V. americana | 10-25 | Chara/Nitella | 10-25 | 75-100 | U | 10-25 | S |
| | | 2 | FP | B | 70 | 300 | 300 | 50 | 50 | H. dubia | 10-25 | V. americana | 10-25 | M. spicatum | 0-10 | 25-50 | S | 0 | U |
| | | 3 | FP | S | 210 | 210 | 200 | 60 | 60 | Chara/Nitella | 0-10 | H. dubia | 0-10 | C. demersum | 0-10 | 0-10 | S | 25-50 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 100 | 10-25 % | 1 | FP | S | 50 | 100 | 110 | 180 | 60 | E. canadensis | 25-50 | H. dubia | 25-50 | Chara/Nitella | 10-25 | 75-100 | U | 50-75 | F |
| | | 2 | FP | S | 50 | 70 | 110 | 300 | 150 | H. dubia | 0-10 | V. americana | 0-10 | M. spicatum | 0-10 | 10-25 | D | 0 | U |
| | | 3 | FP | S | 190 | 150 | 120 | 100 | 100 | H. dubia | 0-10 | E. canadensis | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| 101 | 75-100 % | 1 | B | DFP | 50 | 50 | 0 | 0 | 0 | E. canadensis | 10-25 | M. spicatum | 0-10 | H. dubia | 0-10 | 10-25 | D | 25-50 | U |
| | | 2 | S | B | 60 | 20 | 300 | 50 | 150 | H. dubia | 0-10 | C. demersum | 0-10 | M. spicatum | 0-10 | 0-10 | D | 0 | U |
| | | 3 | FP | B | 100 | 300 | 300 | 300 | 300 | H. dubia | 0-10 | Chara/Nitella | 0-10 | aucun | 0 | 0-10 | S | 25-50 | U |
| 102 | 75-100 % | 1 | G | B | 0 | 40 | 60 | 60 | 0 | H. dubia | 0-10 | M. spicatum | 0-10 | V. americana | 0-10 | 0-10 | F | 0-10 | S |
| | | 2 | G | B | 0 | 60 | 70 | 60 | 50 | M. spicatum | 0-10 | H. dubia | 0-10 | M. beckii | 0-10 | 0-10 | F | 0 | U |
| | | 3 | G | FP | 0 | 0 | 10 | 60 | 90 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 10-25 | D |
| 103 | 75-100 % | 1 | FP | B | 10 | 10 | 10 | 20 | 10 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | V. americana | 0-10 | 25-50 | S | 25-50 | D |
| | | 2 | FP | B | 50 | 60 | 20 | 30 | 40 | E. canadensis | 0-10 | M. spicatum | 0-10 | H. dubia | 0-10 | 0-10 | S | 0-10 | S |
| | | 3 | FP | B | 0 | 10 | 40 | 40 | 150 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 10-25 | D |
| 104 | 75-100 % | 1 | G | B | 50 | 50 | 10 | 10 | 50 | Potamogeton sp. | 25-50 | H. dubia | 10-25 | V. americana | 0-10 | 50-75 | U | 25-50 | S |
| | | 2 | FP | B | 50 | 60 | 0 | 250 | 300 | Potamogeton sp. | 0-10 | M. beckii | 0-10 | M. spicatum | 0-10 | 10-25 | S | 0 | U |
| | | 3 | FP | B | 40 | 80 | 280 | 300 | 300 | H. dubia | 0-10 | M. spicatum | 0-10 | M. beckii | 0-10 | 0-10 | F | 10-25 | S |
| 105 | 50-75 % | 1 | FP | G | 5 | 100 | 10 | 40 | 50 | Potamogeton sp. | 25-50 | nenuphar | 25-50 | H. dubia | 10-25 | 75-100 | U | 50-75 | U |
| | | 2 | FP | B | 50 | 50 | 40 | 20 | 40 | H. dubia | 10-25 | M. beckii | 0-10 | Potamogeton sp. | 0-10 | 25-50 | D | 10-25 | S |
| | | 3 | FP | S | 50 | 50 | 100 | 140 | 240 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0-10 | S |
| 106 | 50-75 % | 1 | FP | G | 50 | 60 | 100 | 90 | 70 | Potamogeton sp. | 25-50 | E. canadensis | 25-50 | H. dubia | 10-25 | 75-100 | U | 25-50 | U |
| | | 2 | FP | FG | 40 | 70 | 140 | 200 | 70 | E. canadensis | 50-75 | M. spicatum | 0-10 | H. dubia | 0-10 | 50-75 | D | 10-25 | S |
| | | 3 | FP | B | 180 | 150 | 140 | 30 | 70 | V. americana | 0-10 | E. canadensis | 0-10 | aucun | 0 | 0-10 | S | 10-25 | F |
| 107 | 50-75 % | 1 | G | FP | 0 | 40 | 100 | 40 | 30 | Potamogeton sp. | 25-50 | E. canadensis | 10-25 | H. dubia | 0-10 | 50-75 | U | 50-75 | U |
| | | 2 | FP | ND | 40 | 40 | 120 | 70 | 70 | E. canadensis | 10-25 | M. spicatum | 0-10 | H. dubia | 0-10 | 25-50 | M | 10-25 | S |
| | | 3 | FP | B | 50 | 130 | 80 | 0 | 150 | V. americana | 0-10 | M. spicatum | 0-10 | aucun | 0 | 0-10 | S | 10-25 | F |
| 108 | 25-50 % | 1 | G | FP | 100 | 110 | 70 | 90 | 40 | V. americana | 10-25 | H. dubia | 0-10 | M. spicatum | 0-10 | 25-50 | S | 10-25 | S |
| | | 2 | FP | FG | 20 | 120 | 40 | 30 | 100 | H. dubia | 0-10 | M. spicatum | 0-10 | V. americana | 0-10 | 10-25 | F | 10-25 | S |
| | | 3 | G | FP | 30 | 10 | 30 | 100 | 40 | M. spicatum | 0-10 | H. dubia | 0-10 | aucun | 0 | 0-10 | S | 0-10 | S |
| 109 | 50-75 % | 1 | FP | G | 70 | 50 | 140 | 60 | 70 | E. canadensis | 25-50 | H. dubia | 10-25 | M. spicatum | 0-10 | 50-75 | M | 25-50 | F |
| | | 2 | G | FP | 50 | 90 | 210 | 170 | 20 | E. canadensis | 25-50 | M. spicatum | 0-10 | H. dubia | 0-10 | 25-50 | M | 10-25 | S |
| | | 3 | FP | FG | 100 | 110 | 90 | 110 | 100 | M. spicatum | 0-10 | E. canadensis | 0-10 | aucun | 0 | 0-10 | S | 10-25 | S |
| 110 | 75-100 % | 1 | FP | G | 70 | 60 | 40 | 40 | 60 | E. canadensis | 25-50 | H. dubia | 25-50 | M. beckii | 10-25 | 75-100 | S | 50-75 | U |
| | | 2 | FP | B | 40 | 40 | 110 | 60 | 60 | E. canadensis | 25-50 | C. demersum | 10-25 | M. spicatum | 10-25 | 50-75 | F | 10-25 | D |
| | | 3 | VD | FP | 0 | 300 | 250 | 300 | 300 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 25-50 | S |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 111 | 75-100 % | 1 | FP | VD | 20 | 40 | 110 | 40 | 60 | M. spicatum | 10-25 | E. canadensis | 10-25 | H. dubia | 0-10 | 25-50 | S | 25-50 | U |
| | | 2 | FG | VD | 40 | 100 | 70 | 150 | 150 | M. spicatum | 25-50 | H. dubia | 10-25 | E. canadensis | 0-10 | 50-75 | U | 25-50 | U |
| | | 3 | FP | G | 100 | 30 | 50 | 100 | 110 | H. dubia | 0-10 | aucun | 0 | aucun | 0 | 0 | S | 10-25 | S |
| 112 | 75-100 % | 1 | G | B | 120 | 0 | 0 | 30 | 0 | M. spicatum | 0-10 | H. dubia | 0-10 | E. canadensis | 0-10 | 0-10 | S | 50-75 | U |
| | | 2 | G | B | 0 | 70 | 90 | 0 | 0 | M. spicatum | 0-10 | H. dubia | 0-10 | V. americana | 0-10 | 0-10 | S | 10-25 | S |
| | | 3 | G | DFP | 140 | 110 | 60 | 0 | 0 | M. spicatum | 0-10 | aucun | 0 | aucun | 0 | 0 | S | 25-50 | S |
| 113 | 75-100 % | 1 | B | DFP | 0 | 0 | 10 | 20 | 20 | V. americana | 0-10 | H. dubia | 0-10 | N. flexilis | 0-10 | 10-25 | F | 10-25 | S |
| | | 2 | B | FP | 20 | 50 | 110 | 10 | 300 | H. dubia | 0-10 | C. demersum | 0-10 | M. spicatum | 0-10 | 10-25 | F | 0 | U |
| | | 3 | FP | B | 300 | 300 | 300 | 300 | 300 | C. demersum | 0-10 | H. dubia | 0-10 | aucun | 0 | 0-10 | S | 0-10 | D |
| 114 | 75-100 % | 1 | B | DFP | 20 | 300 | 10 | 0 | 0 | V. americana | 10-25 | H. dubia | 0-10 | E. canadensis | 0-10 | 10-25 | D | 10-25 | U |
| | | 2 | FP | B | 120 | 30 | 0 | 160 | 50 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 25-50 | U |
| | | 3 | FP | B | 60 | 100 | 300 | 300 | 250 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0-10 | S |
| 115 | 75-100 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | H. dubia | 0-10 | E. canadensis | 0-10 | 10-25 | S | 25-50 | S |
| | | 2 | FP | B | 50 | 20 | 150 | 50 | 100 | H. dubia | 0-10 | M. spicatum | 0-10 | V. americana | 0-10 | 10-25 | M | 10-25 | E |
| | | 3 | FP | B | 80 | 300 | 260 | 50 | 170 | H. dubia | 0-10 | C. demersum | 0-10 | aucun | 0 | 0-10 | S | 0-10 | S |
| 116 | 75-100 % | 1 | B | VD | 0 | 0 | 10 | 20 | 10 | V. americana | 10-25 | H. dubia | 0-10 | E. canadensis | 0-10 | 10-25 | S | 10-25 | S |
| | | 2 | FP | B | 70 | 70 | 20 | 20 | 70 | E. Nuttallii | 0-10 | V. americana | 0-10 | Chara/Nitella | 0-10 | 0-10 | F | 0-10 | D |
| | | 3 | FP | B | 30 | 70 | 70 | 150 | 170 | Chara/Nitella | 25-50 | H. dubia | 0-10 | C. demersum | 0-10 | 50-75 | F | 0-10 | S |
| 117 | 75-100 % | 1 | FP | B | 50 | 70 | 40 | 20 | 0 | V. americana | 10-25 | E. canadensis | 10-25 | H. dubia | 10-25 | 50-75 | D | 0-10 | S |
| | | 2 | FP | ND | 50 | 50 | 30 | 90 | 100 | E. Nuttallii | 50-75 | M. spicatum | 10-25 | V. americana | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 180 | 150 | 90 | 150 | 150 | Chara/Nitella | 75-100 | H. dubia | 0-10 | aucun | 0 | 75-100 | U | 0-10 | S |
| 118 | 75-100 % | 1 | B | FP | 20 | 10 | 10 | 0 | 0 | V. americana | 10-25 | N. flexilis | 10-25 | H. dubia | 0-10 | 25-50 | D | 0-10 | S |
| | | 2 | FP | ND | 100 | 100 | 100 | 90 | 150 | H. dubia | 50-75 | E. canadensis | 10-25 | Chara/Nitella | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 190 | 150 | 200 | 200 | 300 | Chara/Nitella | 50-75 | H. dubia | 0-10 | aucun | 0 | 50-75 | U | 0-10 | S |
| 119 | 75-100 % | 1 | B | DFP | 0 | 0 | 5 | 5 | 5 | V. americana | 10-25 | H. dubia | 0-10 | Potamogeton sp. | 0-10 | 25-50 | S | 0-10 | S |
| | | 2 | FP | ND | 270 | 250 | 200 | 170 | 150 | H. dubia | 25-50 | E. canadensis | 10-25 | M. spicatum | 10-25 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 150 | Chara/Nitella | 25-50 | H. dubia | 0-10 | V. americana | 0-10 | 25-50 | D | 0-10 | S |
| 120 | 75-100 % | 1 | FP | B | 5 | 10 | 0 | 100 | 0 | V. americana | 10-25 | P. spirillus | 0-10 | H. dubia | 0-10 | 10-25 | D | 25-50 | U |
| | | 2 | S | B | 10 | 250 | 120 | 30 | 20 | H. dubia | 10-25 | V. americana | 0-10 | aucun | 0 | 10-25 | D | 25-50 | U |
| | | 3 | FG | FP | 20 | 300 | 20 | 10 | 10 | V. americana | 0-10 | H. dubia | 0-10 | aucun | 0 | 0-10 | S | 25-50 | U |
| 121 | 75-100 % | 1 | B | FP | 0 | 0 | 20 | 0 | 0 | V. americana | 0-10 | H. dubia | 0-10 | aucun | 0 | 0-10 | S | 25-50 | U |
| | | 2 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | H. dubia | 0-10 | N. flexilis | 0-10 | 0-10 | D | 50-75 | U |
| | | 3 | B | G | 0 | 0 | 0 | 0 | 0 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 25-50 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 122 | 75-100 % | 1 | FP | S | 100 | 50 | 10 | 100 | 100 | N. flexilis | 25-50 | V. americana | 25-50 | H. dubia | 25-50 | 75-100 | U | 10-25 | S |
| | | 2 | S | FP | 50 | 70 | 90 | 110 | 300 | V. americana | 25-50 | P. spirillus | 10-25 | H. dubia | 10-25 | 50-75 | U | 10-25 | S |
| | | 3 | S | FG | 80 | 180 | 170 | 280 | 270 | V. americana | 10-25 | Chara/Nitella | 0-10 | aucun | 0 | 10-25 | S | 0 | U |
| 123 | 75-100 % | 1 | FP | S | 100 | 60 | 50 | 30 | 30 | N. flexilis | 50-75 | Chara/Nitella | 25-50 | V. americana | 10-25 | 75-100 | U | 0 | U |
| | | 2 | FP | S | 300 | 300 | 300 | 100 | 40 | V. americana | 25-50 | E. canadensis | 10-25 | C. demersum | 0-10 | 25-50 | S | 25-50 | U |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | Chara/Nitella | 50-75 | V. americana | 0-10 | H. dubia | 0-10 | 75-100 | U | 0 | U |
| 124 | 75-100 % | 1 | FP | S | 5 | 10 | 5 | 20 | 30 | N. flexilis | 25-50 | H. dubia | 25-50 | V. americana | 0-10 | 50-75 | U | 0-10 | S |
| | | 2 | FP | S | 40 | 40 | 130 | 100 | 10 | Chara/Nitella | 75-100 | C. demersum | 0-10 | E. canadensis | 0-10 | 75-100 | U | 0-10 | D |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | Chara/Nitella | 50-75 | C. demersum | 10-25 | V. americana | 0-10 | 50-75 | D | 0 | U |
| 125 | 75-100 % | 1 | FP | ND | 10 | 10 | 0 | 40 | 5 | V. americana | 25-50 | Chara/Nitella | 10-25 | N. flexilis | 0-10 | 25-50 | U | 0-10 | S |
| | | 2 | FP | S | 20 | 20 | 20 | 20 | 20 | Chara/Nitella | 50-75 | C. demersum | 10-25 | E. canadensis | 10-25 | 75-100 | U | 0-10 | S |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | C. demersum | 10-25 | Chara/Nitella | 10-25 | H. dubia | 10-25 | 25-50 | U | 0-10 | S |
| 126 | 75-100 % | 1 | FP | S | 5 | 20 | 10 | 10 | 20 | Chara/Nitella | 25-50 | V. americana | 10-25 | N. flexilis | 0-10 | 50-75 | U | 0-10 | S |
| | | 2 | FP | S | 40 | 40 | 40 | 40 | 10 | Chara/Nitella | 25-50 | C. demersum | 25-50 | M. beckii | 0-10 | 75-100 | U | 10-25 | S |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 10 | Chara/Nitella | 25-50 | C. demersum | 10-25 | H. dubia | 10-25 | 50-75 | U | 10-25 | S |
| 127 | 50-75 % | 1 | FP | S | 10 | 10 | 10 | 20 | 20 | V. americana | 25-50 | H. dubia | 25-50 | E. canadensis | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 40 | 40 | 160 | 40 | 40 | H. dubia | 25-50 | C. demersum | 10-25 | M. beckii | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 0 | 10 | 50 | 300 | 300 | Chara/Nitella | 75-100 | M. spicatum | 0-10 | E. Nuttallii | 0-10 | 75-100 | U | 10-25 | S |
| 128 | 75-100 % | 1 | FP | S | 10 | 50 | 40 | 60 | 40 | V. americana | 25-50 | H. dubia | 0-10 | N. flexilis | 0-10 | 25-50 | D | 0-10 | M |
| | | 2 | FP | S | 300 | 110 | 40 | 30 | 40 | H. dubia | 50-75 | M. spicatum | 10-25 | V. americana | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | FP | S | 10 | 40 | 40 | 50 | 300 | Chara/Nitella | 10-25 | H. dubia | 0-10 | N. flexilis | 0-10 | 10-25 | U | 0-10 | S |
| 129 | 50-75 % | 1 | FP | S | 10 | 10 | 10 | 10 | 10 | H. dubia | 25-50 | V. americana | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0-10 | S |
| | | 2 | FP | S | 50 | 60 | 70 | 50 | 60 | H. dubia | 50-75 | M. spicatum | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | FP | S | 80 | 70 | 50 | 40 | 20 | V. americana | 0-10 | C. demersum | 0-10 | H. dubia | 0-10 | 0-10 | S | 0 | U |
| 130 | 50-75 % | 1 | FP | S | 10 | 0 | 0 | 40 | 10 | H. dubia | 25-50 | V. americana | 25-50 | Potamogeton sp. | 0-10 | 50-75 | U | 0-10 | M |
| | | 2 | FP | S | 30 | 30 | 40 | 30 | 10 | H. dubia | 50-75 | M. spicatum | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | FP | VD | 50 | 50 | 50 | 50 | 80 | M. spicatum | 0-10 | H. dubia | 0-10 | Chara/Nitella | 0-10 | 0-10 | U | 0-10 | S |
| 131 | 0-10 % | 1 | FP | S | 20 | 10 | 10 | 5 | 5 | V. americana | 25-50 | H. dubia | 10-25 | Potamogeton sp. | 10-25 | 50-75 | U | 0-10 | S |
| | | 2 | FP | S | 30 | 30 | 20 | 20 | 40 | H. dubia | 25-50 | E. canadensis | 10-25 | M. spicatum | 10-25 | 50-75 | D | 0-10 | S |
| | | 3 | FP | VD | 130 | 150 | 150 | 160 | 210 | Chara/Nitella | 0-10 | M. spicatum | 0-10 | H. dubia | 0-10 | 0-10 | U | 0-10 | S |
| 132 | 0-10 % | 1 | FP | S | 10 | 20 | 10 | 10 | 40 | V. americana | 25-50 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 10-25 | F |
| | | 2 | FP | S | 40 | 40 | 40 | 40 | 40 | H. dubia | 25-50 | M. spicatum | 10-25 | M. beckii | 0-10 | 50-75 | U | 10-25 | S |
| | | 3 | FP | S | 170 | 130 | 100 | 70 | 70 | H. dubia | 0-10 | M. spicatum | 0-10 | E. canadensis | 0-10 | 0-10 | U | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 133 | 75-100 % | 1 | FP | S | 40 | 50 | 100 | 10 | 10 | V. americana | 25-50 | H. dubia | 10-25 | N. flexilis | 10-25 | 50-75 | U | 25-50 | D |
| | | 2 | FP | S | 130 | 300 | 300 | 120 | 250 | H. dubia | 50-75 | V. americana | 10-25 | M. spicatum | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 20 | 40 | 190 | 20 | 20 | H. dubia | 0-10 | C. demersum | 0-10 | M. spicatum | 0-10 | 10-25 | U | 10-25 | U |
| 134 | 50-75 % | 1 | FP | S | 20 | 10 | 10 | 10 | 10 | H. dubia | 50-75 | V. americana | 10-25 | Potamogeton sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 100 | 60 | 40 | 50 | 60 | H. dubia | 75-100 | M. spicatum | 0-10 | E. canadensis | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | H. dubia | 0-10 | E. canadensis | 0-10 | M. spicatum | 0-10 | 10-25 | U | 25-50 | U |
| 135 | 50-75 % | 1 | FP | S | 20 | 10 | 10 | 10 | 10 | V. americana | 25-50 | H. dubia | 25-50 | Potamogeton sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 40 | 40 | 30 | 20 | 20 | H. dubia | 50-75 | E. canadensis | 10-25 | M. spicatum | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 150 | 200 | 210 | 210 | 230 | H. dubia | 0-10 | V. americana | 0-10 | M. spicatum | 0-10 | 0-10 | S | 0 | U |
| 136 | 50-75 % | 1 | FP | S | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | H. dubia | 10-25 | Potamogeton sp. | 10-25 | 50-75 | U | 0-10 | S |
| | | 2 | FP | S | 40 | 40 | 50 | 60 | 90 | E. canadensis | 25-50 | V. americana | 10-25 | M. spicatum | 10-25 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 240 | 240 | 240 | 250 | 250 | H. dubia | 0-10 | V. americana | 0-10 | M. spicatum | 0-10 | 0-10 | S | 0-10 | S |
| 137 | 0-10 % | 1 | FP | S | 10 | 10 | 10 | 10 | 20 | H. dubia | 25-50 | V. americana | 10-25 | E. canadensis | 0-10 | 75-100 | U | 0 | U |
| | | 2 | FP | S | 90 | 170 | 130 | 60 | 200 | V. americana | 10-25 | H. dubia | 10-25 | M. beckii | 10-25 | 50-75 | U | 0-10 | S |
| | | 3 | FP | S | 240 | 280 | 280 | 280 | 300 | C. demersum | 0-10 | H. dubia | 0-10 | M. beckii | 0-10 | 0-10 | S | 0-10 | S |
| 138 | 0-10 % | 1 | S | FP | 10 | 10 | 10 | 10 | 10 | H. dubia | 25-50 | V. americana | 25-50 | Potamogeton sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 170 | 170 | 220 | 60 | 40 | H. dubia | 25-50 | M. spicatum | 10-25 | V. americana | 10-25 | 50-75 | U | 10-25 | S |
| | | 3 | FP | S | 280 | 280 | 240 | 240 | 220 | V. americana | 0-10 | H. dubia | 0-10 | M. spicatum | 0-10 | 0-10 | S | 0-10 | S |
| 139 | 0-10 % | 1 | S | FP | 10 | 5 | 10 | 5 | 5 | V. americana | 50-75 | Potamogeton sp. | 10-25 | H. dubia | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 40 | 50 | 50 | 60 | 60 | H. dubia | 25-50 | M. beckii | 10-25 | V. americana | 0-10 | 50-75 | U | 0-10 | D |
| | | 3 | FP | S | 220 | 220 | 220 | 220 | 220 | V. americana | 0-10 | H. dubia | 0-10 | E. canadensis | 0-10 | 0-10 | S | 0-10 | S |
| 140 | 0-10 % | 1 | S | FP | 5 | 5 | 10 | 10 | 10 | V. americana | 10-25 | H. dubia | 10-25 | Potamogeton sp. | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 130 | 220 | 200 | 260 | 270 | H. dubia | 25-50 | M. beckii | 10-25 | E. canadensis | 10-25 | 50-75 | U | 25-50 | S |
| | | 3 | FP | S | 250 | 260 | 260 | 80 | 270 | V. americana | 0-10 | E. canadensis | 0-10 | H. dubia | 0-10 | 0-10 | S | 0-10 | S |
| 141 | 0-10 % | 1 | S | FP | 0 | 5 | 5 | 0 | 10 | H. dubia | 25-50 | V. americana | 10-25 | Potamogeton sp. | 10-25 | 75-100 | U | 0 | U |
| | | 2 | FP | S | 280 | 280 | 300 | 300 | 300 | H. dubia | 50-75 | M. spicatum | 10-25 | E. canadensis | 0-10 | 75-100 | U | 10-25 | S |
| | | 3 | FP | S | 120 | 250 | 260 | 270 | 280 | V. americana | 0-10 | H. dubia | 0-10 | C. demersum | 0-10 | 10-25 | S | 0-10 | S |
| 142 | 0-10 % | 1 | S | FP | 0 | 5 | 5 | 10 | 10 | H. dubia | 50-75 | V. americana | 0-10 | Potamogeton sp. | 0-10 | 75-100 | U | 10-25 | F |
| | | 2 | FP | S | 40 | 200 | 70 | 80 | 130 | H. dubia | 75-100 | E. canadensis | 0-10 | M. beckii | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 60 | 300 | 60 | 80 | 60 | H. dubia | 25-50 | V. americana | 0-10 | C. demersum | 0-10 | 25-50 | U | 0-10 | S |
| 143 | 0-10 % | 1 | S | FG | 10 | 10 | 10 | 5 | 20 | H. dubia | 25-50 | V. americana | 10-25 | Potamogeton sp. | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | S | FP | 40 | 230 | 30 | 60 | 230 | H. dubia | 75-100 | E. canadensis | 0-10 | M. spicatum | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | S | FP | 300 | 60 | 90 | 270 | 300 | H. dubia | 25-50 | V. americana | 0-10 | E. canadensis | 0-10 | 25-50 | U | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 144 | 0-10 % | 1 | S | VD | 70 | 5 | 50 | 5 | 20 | H. dubia | 25-50 | V. americana | 25-50 | Sparganium sp. | 0-10 | 50-75 | U | 10-25 | S |
| | | 2 | FP | S | 200 | 60 | 80 | 190 | 250 | H. dubia | 50-75 | V. americana | 0-10 | M. spicatum | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 300 | 240 | 300 | 240 | 230 | H. dubia | 25-50 | V. americana | 0-10 | E. canadensis | 0-10 | 25-50 | U | 0-10 | S |
| 145 | 0-10 % | 1 | S | FP | 110 | 10 | 140 | 140 | 140 | V. americana | 25-50 | H. dubia | 25-50 | Sparganium sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | VD | 260 | 60 | 200 | 120 | 120 | H. dubia | 25-50 | V. americana | 10-25 | M. beckii | 0-10 | 25-50 | U | 0 | U |
| | | 3 | S | FP | 230 | 260 | 250 | 120 | 90 | H. dubia | 0-10 | V. americana | 0-10 | E. canadensis | 0-10 | 10-25 | S | 0-10 | S |
| 146 | 0-10 % | 1 | S | FP | 300 | 20 | 20 | 10 | 10 | V. americana | 25-50 | H. dubia | 25-50 | Sparganium sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 150 | 260 | 200 | 30 | 50 | H. dubia | 50-75 | M. spicatum | 0-10 | V. americana | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | S | FP | 100 | 200 | 300 | 270 | 150 | H. dubia | 25-50 | V. americana | 0-10 | E. canadensis | 0-10 | 25-50 | M | 10-25 | U |
| 147 | 0-10 % | 1 | S | FP | 5 | 10 | 10 | 10 | 10 | H. dubia | 50-75 | V. americana | 10-25 | Sparganium sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | VD | 230 | 300 | 300 | 300 | 300 | H. dubia | 75-100 | M. spicatum | 0-10 | E. Nuttallii | 0-10 | 75-100 | U | 0 | U |
| | | 3 | S | FP | 300 | 300 | 300 | 300 | 280 | H. dubia | 10-25 | V. americana | 0-10 | P. foliosus/pusillus | 0-10 | 10-25 | U | 10-25 | U |
| 148 | 10-25 % | 1 | S | ND | 10 | 10 | 10 | 10 | 10 | H. dubia | 25-50 | V. americana | 25-50 | Potamogeton sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | VD | 300 | 300 | 300 | 250 | 230 | H. dubia | 75-100 | M. spicatum | 0-10 | V. americana | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | S | FP | 300 | 300 | 300 | 300 | 270 | H. dubia | 10-25 | V. americana | 0-10 | P. foliosus/pusillus | 0-10 | 10-25 | U | 10-25 | U |
| 149 | 10-25 % | 1 | S | ND | 10 | 10 | 5 | 10 | 10 | V. americana | 25-50 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0-10 | S |
| | | 2 | FP | VD | 50 | 30 | 190 | 200 | 40 | H. dubia | 75-100 | M. spicatum | 0-10 | E. canadensis | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | S | FP | 230 | 200 | 210 | 190 | 190 | H. dubia | 25-50 | V. americana | 0-10 | M. spicatum | 0-10 | 25-50 | S | 10-25 | U |
| 150 | 0-10 % | 1 | S | ND | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | H. dubia | 10-25 | N. flexilis | 0-10 | 50-75 | U | 0-10 | S |
| | | 2 | FP | VD | 260 | 250 | 240 | 300 | 300 | H. dubia | 75-100 | M. spicatum | 0-10 | E. canadensis | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | S | FP | 210 | 220 | 230 | 250 | 280 | H. dubia | 10-25 | V. americana | 0-10 | M. spicatum | 0-10 | 10-25 | S | 10-25 | U |
| 151 | 10-25 % | 1 | S | FP | 10 | 20 | 10 | 20 | 20 | H. dubia | 25-50 | V. americana | 25-50 | N. flexilis | 10-25 | 75-100 | U | 0-10 | S |
| | | 2 | FP | VD | 300 | 300 | 300 | 150 | 110 | H. dubia | 75-100 | M. spicatum | 0-10 | E. canadensis | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | S | FP | 300 | 300 | 300 | 300 | 300 | H. dubia | 10-25 | V. americana | 0-10 | M. spicatum | 0-10 | 10-25 | S | 10-25 | U |
| 152 | 10-25 % | 1 | S | FP | 10 | 10 | 10 | 10 | 20 | V. americana | 25-50 | H. dubia | 25-50 | N. flexilis | 10-25 | 75-100 | U | 0 | U |
| | | 2 | S | FP | 300 | 300 | 300 | 300 | 230 | H. dubia | 75-100 | V. americana | 10-25 | E. canadensis | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | S | 300 | 300 | 300 | 300 | 300 | H. dubia | 50-75 | V. americana | 10-25 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| 153 | 10-25 % | 1 | S | FP | 150 | 150 | 150 | 50 | 60 | V. americana | 50-75 | H. dubia | 10-25 | N. flexilis | 0-10 | 75-100 | U | 0 | U |
| | | 2 | S | VD | 230 | 300 | 300 | 250 | 10 | H. dubia | 25-50 | E. canadensis | 25-50 | V. americana | 10-25 | 75-100 | U | 0-10 | S |
| | | 3 | FP | VD | 130 | 270 | 300 | 300 | 300 | H. dubia | 25-50 | E. canadensis | 0-10 | V. americana | 0-10 | 25-50 | M | 0-10 | F |
| 154 | 0-10 % | 1 | S | ND | 50 | 50 | 60 | 60 | 110 | V. americana | 10-25 | H. dubia | 10-25 | N. flexilis | 0-10 | 25-50 | U | 0-10 | S |
| | | 2 | S | FG | 10 | 0 | 0 | 0 | 0 | H. dubia | 25-50 | V. americana | 25-50 | M. spicatum | 10-25 | 75-100 | U | 0 | U |
| | | 3 | S | FP | 300 | 300 | 260 | 250 | 240 | H. dubia | 10-25 | Potamogeton sp. | 10-25 | M. spicatum | 0-10 | 25-50 | S | 0-10 | S |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 155 | 10-25 % | 1 | S | ND | 60 | 30 | 60 | 60 | 60 | V. americana | 10-25 | H. dubia | 10-25 | E. canadensis | 0-10 | 25-50 | U | 0-10 | S |
| | | 2 | S | FG | 0 | 10 | 30 | 30 | 0 | H. dubia | 25-50 | V. americana | 25-50 | M. spicatum | 10-25 | 75-100 | U | 0 | U |
| | | 3 | S | DFP | 300 | 300 | 300 | 300 | 30 | H. dubia | 10-25 | P. Robbinsii | 0-10 | P. foliosus/pusillus | 0-10 | 10-25 | S | 0 | U |
| 156 | 10-25 % | 1 | S | ND | 20 | 60 | 40 | 60 | 200 | V. americana | 25-50 | H. dubia | 10-25 | Sparganium sp. | 0-10 | 50-75 | D | 0-10 | S |
| | | 2 | S | ND | 70 | 80 | 140 | 150 | 160 | H. dubia | 75-100 | V. americana | 0-10 | M. spicatum | 0-10 | 75-100 | U | 0 | U |
| | | 3 | S | DFP | 60 | 80 | 100 | 200 | 300 | Chara/Nitella | 10-25 | V. americana | 10-25 | P. Robbinsii | 0-10 | 25-50 | S | 0 | U |
| 157 | 50-75 % | 1 | S | ND | 200 | 110 | 80 | 50 | 80 | V. americana | 10-25 | N. flexilis | 0-10 | Joncus sp. | 0-10 | 10-25 | D | 0-10 | S |
| | | 2 | S | ND | 170 | 220 | 220 | 210 | 200 | M. spicatum | 25-50 | H. dubia | 25-50 | V. americana | 10-25 | 75-100 | U | 0 | U |
| | | 3 | S | DFP | 300 | 220 | 220 | 250 | 240 | H. dubia | 10-25 | E. canadensis | 10-25 | M. spicatum | 0-10 | 25-50 | S | 0 | U |
| 158 | 25-50 % | 1 | S | ND | 100 | 50 | 20 | 20 | 20 | V. americana | 10-25 | S. gramineus | 0-10 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 2 | S | FP | 50 | 190 | 190 | 30 | 20 | V. americana | 25-50 | M. spicatum | 10-25 | H. dubia | 10-25 | 50-75 | F | 0 | U |
| | | 3 | S | FP | 250 | 210 | 260 | 250 | 200 | H. dubia | 25-50 | M. spicatum | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0 | U |
| 159 | 50-75 % | 1 | S | ND | 20 | 20 | 10 | 20 | 20 | V. americana | 0-10 | Potamogeton sp. | 0-10 | Chara/Nitella | 0-10 | 10-25 | U | 0 | U |
| | | 2 | S | FP | 20 | 10 | 10 | 20 | 20 | V. americana | 10-25 | Potamogeton sp. | 10-25 | M. spicatum | 10-25 | 25-50 | U | 10-25 | U |
| | | 3 | S | DFP | 170 | 170 | 100 | 60 | 40 | H. dubia | 10-25 | E. canadensis | 10-25 | P. foliosus/pusillus | 0-10 | 25-50 | S | 0 | U |
| 160 | 75-100 % | 1 | S | ND | 20 | 20 | 20 | 20 | 20 | V. americana | 0-10 | Potamogeton sp. | 0-10 | Chara/Nitella | 0-10 | 0-10 | D | 0 | U |
| | | 2 | S | FP | 10 | 5 | 0 | 10 | 10 | V. americana | 10-25 | Potamogeton sp. | 0-10 | M. spicatum | 0-10 | 10-25 | U | 0-10 | S |
| | | 3 | S | FG | 10 | 90 | 60 | 40 | 30 | M. spicatum | 10-25 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 25-50 | S | 0 | U |
| 161 | 75-100 % | 1 | S | ND | 20 | 20 | 30 | 30 | 20 | V. americana | 0-10 | Potamogeton sp. | 0-10 | E. canadensis | 0-10 | 10-25 | F | 0 | U |
| | | 2 | S | B | 10 | 5 | 5 | 5 | 0 | V. americana | 10-25 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 25-50 | U | 0 | U |
| | | 3 | S | FG | 10 | 90 | 20 | 30 | 5 | E. canadensis | 10-25 | M. spicatum | 0-10 | H. dubia | 0-10 | 10-25 | D | 0 | U |
| 162 | 75-100 % | 1 | S | ND | 20 | 20 | 20 | 20 | 20 | V. americana | 0-10 | Potamogeton sp. | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | B | 10 | 20 | 20 | 10 | 20 | V. americana | 10-25 | Potamogeton sp. | 0-10 | H. dubia | 0-10 | 25-50 | S | 0 | U |
| | | 3 | S | FG | 20 | 5 | 20 | 5 | 20 | M. spicatum | 10-25 | H. dubia | 10-25 | H. dubia | 0-10 | 25-50 | U | 0 | U |
| 163 | 50-75 % | 1 | S | ND | 20 | 20 | 20 | 20 | 20 | V. americana | 0-10 | Potamogeton sp. | 0-10 | Chara/Nitella | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | FP | 30 | 60 | 100 | 70 | 40 | Potamogeton sp. | 0-10 | V. americana | 0-10 | M. spicatum | 0-10 | 0-10 | D | 0-10 | S |
| | | 3 | S | DFP | 20 | 10 | 20 | 10 | 20 | M. spicatum | 10-25 | H. dubia | 0-10 | Potamogeton sp. | 0-10 | 25-50 | S | 0-10 | D |
| 164 | 10-25 % | 1 | S | ND | 20 | 20 | 20 | 20 | 20 | V. americana | 0-10 | Potamogeton sp. | 0-10 | Chara/Nitella | 0-10 | 10-25 | U | 0 | U |
| | | 2 | S | FP | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | Potamogeton sp. | 10-25 | M. spicatum | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | S | DFP | 70 | 40 | 30 | 20 | 10 | M. spicatum | 25-50 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| 165 | 10-25 % | 1 | S | ND | 20 | 20 | 20 | 20 | 30 | V. americana | 0-10 | Potamogeton sp. | 0-10 | Chara/Nitella | 0-10 | 10-25 | U | 0 | U |
| | | 2 | S | FP | 10 | 5 | 5 | 5 | 5 | Potamogeton sp. | 10-25 | V. americana | 10-25 | N. flexilis | 0-10 | 25-50 | E | 0 | U |
| | | 3 | S | FG | 30 | 20 | 10 | 10 | 20 | M. spicatum | 25-50 | H. dubia | 10-25 | E. canadensis | 0-10 | 25-50 | U | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 166 | 10-25 % | 1 | S | ND | 20 | 20 | 20 | 20 | 20 | V. americana | 0-10 | Potamogeton sp. | 0-10 | aucun | 0 | 0-10 | D | 0 | U |
| | | 2 | S | FP | 5 | 10 | 10 | 20 | 20 | Potamogeton sp. | 10-25 | V. americana | 10-25 | N. flexilis | 0-10 | 25-50 | U | 0 | U |
| | | 3 | S | ND | 30 | 250 | 150 | 160 | 110 | M. spicatum | 10-25 | H. dubia | 0-10 | P. Robbinsii | 0-10 | 25-50 | U | 0 | U |
| 167 | 10-25 % | 1 | S | ND | 20 | 20 | 20 | 20 | 20 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| | | 2 | S | FP | 10 | 40 | 10 | 30 | 30 | V. americana | 0-10 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 10-25 | U | 0 | U |
| | | 3 | S | ND | 70 | 80 | 100 | 120 | 120 | M. spicatum | 25-50 | H. dubia | 0-10 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| 168 | 10-25 % | 1 | S | ND | 20 | 20 | 20 | 20 | 20 | N. flexilis | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | FP | 40 | 100 | 20 | 20 | 10 | V. americana | 10-25 | P. illinoensis | 0-10 | Potamogeton sp. | 0-10 | 25-50 | U | 0-10 | S |
| | | 3 | S | FP | 160 | 170 | 170 | 190 | 160 | M. spicatum | 25-50 | H. dubia | 10-25 | E. canadensis | 0-10 | 25-50 | U | 0 | U |
| 169 | 50-75 % | 1 | S | ND | 20 | 20 | 20 | 20 | 20 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| | | 2 | S | FP | 20 | 170 | 80 | 30 | 20 | V. americana | 10-25 | N. flexilis | 0-10 | P. illinoensis | 0-10 | 10-25 | F | 0 | U |
| | | 3 | S | FP | 190 | 190 | 190 | 180 | 180 | M. spicatum | 25-50 | H. dubia | 25-50 | Potamogeton sp. | 0-10 | 50-75 | U | 0-10 | S |
| 170 | 50-75 % | 1 | S | ND | 20 | 10 | 10 | 10 | 10 | V. americana | 0-10 | N. flexilis | 0-10 | E. canadensis | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | FP | 210 | 170 | 50 | 220 | 250 | V. americana | 0-10 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 25-50 | U | 0 | U |
| | | 3 | S | FP | 200 | 220 | 200 | 220 | 220 | M. spicatum | 10-25 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 25-50 | U | 0-10 | S |
| 171 | 75-100 % | 1 | S | ND | 10 | 20 | 10 | 10 | 10 | N. flexilis | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | FP | 200 | 200 | 240 | 240 | 200 | V. americana | 10-25 | N. flexilis | 0-10 | P. illinoensis | 0-10 | 25-50 | U | 0 | U |
| | | 3 | S | FP | 190 | 200 | 300 | 210 | 210 | H. dubia | 10-25 | M. spicatum | 10-25 | E. canadensis | 10-25 | 50-75 | F | 0-10 | S |
| 172 | 75-100 % | 1 | S | ND | 10 | 30 | 30 | 10 | 80 | V. americana | 0-10 | N. flexilis | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | FP | 300 | 210 | 250 | 250 | 20 | V. americana | 0-10 | N. flexilis | 0-10 | P. illinoensis | 0-10 | 25-50 | D | 0 | U |
| | | 3 | S | FP | 230 | 220 | 200 | 190 | 210 | H. dubia | 10-25 | M. spicatum | 10-25 | E. canadensis | 10-25 | 50-75 | U | 0 | U |
| 173 | 75-100 % | 1 | S | ND | 10 | 30 | 100 | 100 | 100 | V. americana | 0-10 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 10-25 | S | 0 | U |
| | | 2 | S | FP | 220 | 200 | 200 | 210 | 210 | V. americana | 0-10 | Potamogeton sp. | 0-10 | M. spicatum | 0-10 | 10-25 | S | 0 | U |
| | | 3 | S | FP | 170 | 160 | 170 | 170 | 210 | M. spicatum | 10-25 | H. dubia | 10-25 | E. canadensis | 10-25 | 50-75 | U | 0 | U |
| 174 | 10-25 % | 1 | S | FP | 10 | 30 | 30 | 90 | 70 | V. americana | 0-10 | Potamogeton sp. | 0-10 | S. gramineus | 0-10 | 10-25 | S | 0 | U |
| | | 2 | S | FP | 210 | 170 | 190 | 200 | 170 | V. americana | 10-25 | Potamogeton sp. | 0-10 | M. spicatum | 0-10 | 25-50 | F | 0 | U |
| | | 3 | FP | S | 140 | 130 | 160 | 130 | 160 | H. dubia | 25-50 | E. canadensis | 10-25 | M. spicatum | 10-25 | 75-100 | U | 0 | U |
| 175 | 0-10 % | 1 | S | VD | 60 | 80 | 70 | 60 | 70 | V. americana | 10-25 | Potamogeton sp. | 0-10 | S. gramineus | 0-10 | 10-25 | S | 0 | U |
| | | 2 | S | FP | 250 | 210 | 170 | 160 | 200 | M. spicatum | 10-25 | H. dubia | 0-10 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 180 | 170 | 190 | 200 | 190 | H. dubia | 25-50 | M. spicatum | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0 | U |
| 176 | 0-10 % | 1 | S | B | 80 | 50 | 50 | 60 | 0 | V. americana | 25-50 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 25-50 | F | 0 | U |
| | | 2 | S | FP | 190 | 190 | 180 | 160 | 0 | M. spicatum | 25-50 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 210 | 190 | 190 | 180 | 180 | H. dubia | 25-50 | V. americana | 10-25 | M. spicatum | 0-10 | 50-75 | U | 0-10 | S |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 177 | 0-10 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | D | 0 | U |
| | | 2 | R | S | 90 | 160 | 0 | 0 | 0 | M. spicatum | 0-10 | H. dubia | 0-10 | V. americana | 0-10 | 25-50 | U | 0 | U |
| | | 3 | FP | S | 140 | 160 | 40 | 40 | 40 | H. dubia | 10-25 | V. americana | 10-25 | M. spicatum | 10-25 | 50-75 | U | 0 | U |
| 178 | 0-10 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | H. dubia | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | B | 0 | 0 | 100 | 5 | 0 | V. americana | 50-75 | M. spicatum | 0-10 | Potamogeton sp. | 0-10 | 50-75 | D | 0 | U |
| | | 3 | FP | S | 60 | 70 | 50 | 60 | 60 | M. spicatum | 25-50 | V. americana | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0 | U |
| 179 | 10-25 % | 1 | B | FP | 0 | 0 | 5 | 40 | 10 | V. americana | 10-25 | H. dubia | 10-25 | N. flexilis | 0-10 | 25-50 | F | 0-10 | U |
| | | 2 | S | R | 0 | 0 | 50 | 70 | 30 | H. dubia | 10-25 | V. americana | 0-10 | M. spicatum | 0-10 | 25-50 | F | 0 | U |
| | | 3 | FP | S | 20 | 10 | 30 | 70 | 70 | H. dubia | 25-50 | M. spicatum | 10-25 | M. beckii | 0-10 | 75-100 | U | 0-10 | U |
| 180 | 0-10 % | 1 | FP | B | 20 | 0 | 0 | 10 | 30 | V. americana | 25-50 | H. dubia | 0-10 | N. flexilis | 0-10 | 25-50 | E | 0-10 | M |
| | | 2 | S | B | 30 | 50 | 10 | 0 | 50 | H. dubia | 25-50 | V. americana | 10-25 | M. spicatum | 0-10 | 50-75 | U | 0-10 | M |
| | | 3 | FP | S | 40 | 10 | 50 | 60 | 30 | H. dubia | 50-75 | M. spicatum | 10-25 | M. beckii | 0-10 | 75-100 | U | 0 | U |
| 181 | 0-10 % | 1 | S | FP | 0 | 10 | 50 | 160 | 160 | V. americana | 50-75 | H. dubia | 10-25 | N. flexilis | 0-10 | 50-75 | U | 0 | U |
| | | 2 | FP | S | 60 | 60 | 70 | 80 | 90 | H. dubia | 50-75 | V. americana | 10-25 | M. spicatum | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 40 | 40 | 30 | 30 | 30 | H. dubia | 25-50 | P. foliosus/pusillus | 10-25 | M. beckii | 0-10 | 50-75 | U | 0 | U |
| 182 | 0-10 % | 1 | S | FP | 10 | 10 | 160 | 20 | 20 | V. americana | 50-75 | S. gramineus | 25-50 | H. dubia | 0-10 | 75-100 | U | 0 | U |
| | | 2 | FP | S | 210 | 220 | 220 | 220 | 250 | H. dubia | 50-75 | V. americana | 10-25 | M. beckii | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 200 | 190 | 260 | 230 | 220 | M. spicatum | 25-50 | H. dubia | 10-25 | P. amplifolius | 0-10 | 50-75 | U | 0-10 | S |
| 183 | 0-10 % | 1 | S | FP | 10 | 10 | 20 | 10 | 10 | V. americana | 10-25 | H. dubia | 10-25 | Joncus sp. | 10-25 | 50-75 | U | 0 | U |
| | | 2 | FP | S | 180 | 210 | 110 | 100 | 100 | H. dubia | 25-50 | V. americana | 10-25 | Chara/Nitella | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 180 | 200 | 150 | 210 | 210 | H. dubia | 25-50 | M. spicatum | 10-25 | M. beckii | 0-10 | 50-75 | D | 0-10 | S |
| 184 | 50-75 % | 1 | S | FP | 10 | 20 | 40 | 20 | 5 | V. americana | 50-75 | N. flexilis | 25-50 | Joncus sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | S | 160 | 170 | 150 | 90 | 100 | V. americana | 10-25 | H. dubia | 10-25 | M. spicatum | 10-25 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 200 | 160 | 210 | 210 | 210 | H. dubia | 25-50 | M. spicatum | 10-25 | M. beckii | 0-10 | 50-75 | U | 0 | U |
| 185 | 25-50 % | 1 | S | FP | 10 | 20 | 20 | 10 | 10 | V. americana | 25-50 | N. flexilis | 10-25 | S. gramineus | 0-10 | 50-75 | D | 0-10 | S |
| | | 2 | FP | S | 170 | 150 | 100 | 50 | 150 | V. americana | 25-50 | M. spicatum | 10-25 | N. flexilis | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 210 | 210 | 230 | 230 | 200 | H. dubia | 25-50 | M. spicatum | 10-25 | M. beckii | 0-10 | 50-75 | U | 0 | U |
| 186 | 0-10 % | 1 | S | ND | 20 | 20 | 20 | 20 | 20 | V. americana | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 2 | FP | S | 180 | 160 | 150 | 180 | 150 | M. spicatum | 10-25 | V. americana | 10-25 | H. dubia | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 210 | 220 | 210 | 200 | 200 | H. dubia | 25-50 | V. americana | 10-25 | M. spicatum | 10-25 | 50-75 | U | 0 | U |
| 187 | 0-10 % | 1 | S | ND | 80 | 40 | 30 | 60 | 60 | Joncus sp. | 10-25 | V. americana | 0-10 | N. flexilis | 0-10 | 25-50 | U | 0 | U |
| | | 2 | S | FP | 20 | 30 | 30 | 20 | 20 | V. americana | 50-75 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 250 | 250 | 250 | 220 | 220 | H. dubia | 50-75 | M. spicatum | 10-25 | V. americana | 10-25 | 75-100 | U | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 188 | 0-10 % | 1 | S | ND | 40 | 30 | 50 | 60 | 60 | Joncus sp. | 10-25 | V. americana | 0-10 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 2 | S | FP | 120 | 30 | 30 | 180 | 180 | V. americana | 25-50 | N. flexilis | 10-25 | Potamogeton sp. | 10-25 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 300 | 300 | 250 | 250 | 300 | V. americana | 25-50 | H. dubia | 10-25 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| 189 | 10-25 % | 1 | S | FP | 60 | 50 | 40 | 50 | 60 | V. americana | 0-10 | N. flexilis | 0-10 | S. gramineus | 0-10 | 10-25 | D | 0 | U |
| | | 2 | S | FP | 20 | 30 | 40 | 20 | 30 | V. americana | 25-50 | N. flexilis | 10-25 | Potamogeton sp. | 10-25 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 250 | 250 | 230 | 220 | 220 | V. americana | 50-75 | H. dubia | 0-10 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| 190 | 25-50 % | 1 | S | FP | 60 | 50 | 50 | 60 | 50 | V. americana | 0-10 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | FP | 10 | 20 | 50 | 50 | 50 | V. americana | 25-50 | P. gramineus | 10-25 | Potamogeton sp. | 10-25 | 50-75 | U | 0 | U |
| | | 3 | S | FP | 220 | 220 | 220 | 220 | 220 | V. americana | 25-50 | N. flexilis | 10-25 | M. spicatum | 0-10 | 50-75 | U | 10-25 | U |
| 191 | 10-25 % | 1 | S | FP | 60 | 60 | 50 | 60 | 50 | V. americana | 0-10 | Potamogeton sp. | 0-10 | S. gramineus | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | FP | 50 | 20 | 20 | 10 | 20 | V. americana | 10-25 | Potamogeton sp. | 10-25 | N. flexilis | 0-10 | 25-50 | D | 0 | U |
| | | 3 | S | FP | 220 | 220 | 210 | 200 | 190 | V. americana | 50-75 | E. canadensis | 0-10 | M. spicatum | 0-10 | 75-100 | U | 0-10 | S |
| 192 | 0-10 % | 1 | S | ND | 50 | 50 | 20 | 50 | 60 | V. americana | 0-10 | S. gramineus | 0-10 | Potamogeton sp. | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | ND | 10 | 20 | 40 | 50 | 40 | V. americana | 10-25 | P. illinoensis | 0-10 | H. dubia | 0-10 | 10-25 | U | 0 | U |
| | | 3 | S | FP | 170 | 160 | 170 | 160 | 170 | V. americana | 25-50 | M. spicatum | 0-10 | H. dubia | 0-10 | 50-75 | U | 0 | U |
| 193 | 25-50 % | 1 | S | ND | 20 | 10 | 20 | 30 | 20 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | ND | 20 | 20 | 20 | 20 | 20 | V. americana | 10-25 | Potamogeton sp. | 0-10 | S. gramineus | 0-10 | 10-25 | U | 0 | U |
| | | 3 | S | FP | 140 | 120 | 120 | 120 | 120 | V. americana | 25-50 | M. spicatum | 10-25 | H. dubia | 0-10 | 50-75 | U | 0 | U |
| 194 | 50-75 % | 1 | S | ND | 20 | 20 | 10 | 10 | 10 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | D | 0 | U |
| | | 2 | S | ND | 20 | 10 | 10 | 20 | 20 | V. americana | 10-25 | Potamogeton sp. | 0-10 | S. gramineus | 0-10 | 10-25 | U | 0 | U |
| | | 3 | S | FP | 110 | 120 | 110 | 100 | 110 | V. americana | 25-50 | M. spicatum | 10-25 | H. dubia | 0-10 | 50-75 | U | 0-10 | S |
| 195 | 75-100 % | 1 | S | ND | 20 | 20 | 10 | 10 | 60 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | D | 0 | U |
| | | 2 | S | ND | 20 | 20 | 20 | 20 | 20 | V. americana | 10-25 | Potamogeton sp. | 0-10 | S. gramineus | 0-10 | 10-25 | U | 0 | U |
| | | 3 | S | FP | 10 | 90 | 90 | 90 | 90 | V. americana | 50-75 | M. spicatum | 0-10 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| 196 | 50-75 % | 1 | S | ND | 50 | 50 | 50 | 70 | 60 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | D | 0 | U |
| | | 2 | S | ND | 10 | 10 | 10 | 10 | 20 | V. americana | 10-25 | Potamogeton sp. | 0-10 | H. dubia | 0-10 | 10-25 | U | 0 | U |
| | | 3 | S | FP | 90 | 90 | 90 | 90 | 100 | V. americana | 25-50 | N. flexilis | 10-25 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| 197 | 25-50 % | 1 | S | ND | 60 | 60 | 50 | 50 | 50 | V. americana | 0-10 | Potamogeton sp. | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | ND | 10 | 10 | 10 | 10 | 20 | V. americana | 10-25 | Potamogeton sp. | 0-10 | H. dubia | 0-10 | 25-50 | U | 0 | U |
| | | 3 | S | FP | 90 | 110 | 120 | 120 | 130 | V. americana | 25-50 | M. spicatum | 0-10 | E. canadensis | 0-10 | 50-75 | U | 0 | U |
| 198 | 25-50 % | 1 | S | ND | 60 | 70 | 70 | 50 | 50 | V. americana | 0-10 | Potamogeton sp. | 0-10 | P. spirillus | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | ND | 10 | 20 | 20 | 20 | 20 | V. americana | 10-25 | H. dubia | 10-25 | P. illinoensis | 0-10 | 25-50 | U | 0 | U |
| | | 3 | FP | S | 130 | 120 | 110 | 90 | 70 | V. americana | 50-75 | M. spicatum | 0-10 | P. illinoensis | 0-10 | 50-75 | U | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 199 | 10-25 % | 1 | S | ND | 40 | 50 | 10 | 20 | 10 | V. americana | 0-10 | Potamogeton sp. | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| | | 2 | S | ND | 10 | 10 | 20 | 20 | 10 | V. americana | 10-25 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 3 | S | FP | 50 | 40 | 40 | 10 | 30 | V. americana | 50-75 | H. dubia | 10-25 | M. spicatum | 0-10 | 75-100 | U | 0 | U |
| 200 | 25-50 % | 1 | S | ND | 10 | 10 | 10 | 10 | 10 | V. americana | 10-25 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 10-25 | U | 0 | U |
| | | 2 | S | ND | 10 | 10 | 10 | 10 | 10 | V. americana | 10-25 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 3 | S | FP | 20 | 20 | 20 | 30 | 20 | V. americana | 50-75 | H. dubia | 0-10 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| 201 | 10-25 % | 1 | S | ND | 20 | 20 | 10 | 40 | 50 | V. americana | 10-25 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 10-25 | U | 0 | U |
| | | 2 | S | FP | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | H. dubia | 10-25 | Potamogeton sp. | 10-25 | 50-75 | F | 0 | U |
| | | 3 | FP | S | 30 | 20 | 10 | 20 | 10 | V. americana | 50-75 | H. dubia | 10-25 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| 202 | 0-10 % | 1 | S | ND | 10 | 10 | 10 | 30 | 60 | V. americana | 0-10 | Potamogeton sp. | 0-10 | Chara/Nitella | 0-10 | 0-10 | D | 0 | U |
| | | 2 | S | FP | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | H. dubia | 10-25 | Potamogeton sp. | 10-25 | 50-75 | F | 0 | U |
| | | 3 | FP | S | 20 | 20 | 20 | 20 | 20 | V. americana | 50-75 | H. dubia | 10-25 | M. spicatum | 0-10 | 75-100 | U | 0 | U |
| 203 | 10-25 % | 1 | S | ND | 20 | 10 | 10 | 20 | 30 | V. americana | 0-10 | Chara/Nitella | 0-10 | Potamogeton sp. | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | FP | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | M. spicatum | 10-25 | N. flexilis | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 20 | 30 | 20 | 30 | 20 | V. americana | 50-75 | H. dubia | 10-25 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| 204 | 10-25 % | 1 | S | ND | 20 | 20 | 10 | 30 | 10 | V. americana | 0-10 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | FP | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | M. spicatum | 10-25 | N. flexilis | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 40 | 40 | 40 | 40 | 20 | V. americana | 50-75 | H. dubia | 10-25 | M. spicatum | 10-25 | 75-100 | U | 0-10 | S |
| 205 | 10-25 % | 1 | S | ND | 20 | 10 | 10 | 10 | 20 | V. americana | 0-10 | N. flexilis | 0-10 | Chara/Nitella | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | FP | 10 | 10 | 10 | 10 | 5 | V. americana | 75-100 | M. spicatum | 0-10 | N. flexilis | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 30 | 20 | 20 | 30 | 40 | V. americana | 50-75 | H. dubia | 10-25 | M. spicatum | 10-25 | 75-100 | U | 0-10 | S |
| 206 | 0-10 % | 1 | S | ND | 10 | 10 | 20 | 10 | 20 | V. americana | 0-10 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 10-25 | S | 0 | U |
| | | 2 | S | FP | 5 | 5 | 5 | 5 | 0 | V. americana | 50-75 | N. flexilis | 25-50 | Potamogeton sp. | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 20 | 20 | 10 | 10 | 10 | V. americana | 50-75 | H. dubia | 10-25 | M. beckii | 0-10 | 50-75 | U | 0-10 | S |
| 207 | 25-50 % | 1 | S | B | 10 | 10 | 10 | 5 | 0 | V. americana | 25-50 | Potamogeton sp. | 0-10 | Chara/Nitella | 0-10 | 25-50 | D | 0 | U |
| | | 2 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 50-75 | M. spicatum | 25-50 | N. flexilis | 0-10 | 75-100 | U | 0 | U |
| | | 3 | B | DFP | 10 | 5 | 5 | 5 | 5 | V. americana | 25-50 | H. dubia | 10-25 | M. spicatum | 10-25 | 50-75 | U | 0-10 | M |
| 208 | 0-10 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | Chara/Nitella | 0-10 | Potamogeton sp. | 0-10 | 10-25 | E | 0 | U |
| | | 2 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 25-50 | M. spicatum | 25-50 | N. flexilis | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | B | 0 | 40 | 120 | 220 | 240 | V. americana | 25-50 | H. dubia | 10-25 | P. gramineus | 0-10 | 50-75 | U | 0-10 | S |
| 209 | 0-10 % | 1 | S | B | 0 | 10 | 10 | 5 | 5 | V. americana | 25-50 | Chara/Nitella | 10-25 | N. flexilis | 0-10 | 25-50 | F | 0 | U |
| | | 2 | S | B | 20 | 20 | 5 | 5 | 5 | V. americana | 25-50 | N. flexilis | 10-25 | H. dubia | 10-25 | 75-100 | U | 0 | U |
| | | 3 | S | FP | 10 | 20 | 10 | 10 | 0 | V. americana | 25-50 | H. dubia | 25-50 | M. spicatum | 0-10 | 75-100 | U | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 210 | 25-50 % | 1 | S | ND | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | Chara/Nitella | 10-25 | N. flexilis | 0-10 | 25-50 | S | 0 | U |
| | | 2 | FP | B | 5 | 5 | 0 | 5 | 10 | N. flexilis | 25-50 | V. americana | 10-25 | H. dubia | 0-10 | 50-75 | U | 0 | U |
| | | 3 | B | FP | 0 | 0 | 0 | 0 | 10 | V. americana | 0-10 | H. dubia | 0-10 | M. spicatum | 0-10 | 0-10 | S | 10-25 | S |
| 211 | 50-75 % | 1 | S | B | 5 | 5 | 5 | 0 | 0 | V. americana | 25-50 | Chara/Nitella | 10-25 | N. flexilis | 0-10 | 25-50 | M | 0 | U |
| | | 2 | B | FP | 10 | 5 | 0 | 0 | 0 | N. flexilis | 10-25 | V. americana | 0-10 | H. dubia | 0-10 | 25-50 | D | 0-10 | S |
| | | 3 | FP | B | 0 | 10 | 20 | 20 | 20 | V. americana | 25-50 | H. dubia | 10-25 | M. spicatum | 10-25 | 50-75 | U | 0-10 | S |
| 212 | 25-50 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | Chara/Nitella | 0-10 | 10-25 | F | 0 | U |
| | | 2 | B | DFP | 0 | 10 | 0 | 0 | 0 | V. americana | 25-50 | H. dubia | 0-10 | M. spicatum | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | FP | B | 50 | 40 | 50 | 40 | 20 | V. americana | 25-50 | H. dubia | 10-25 | P. Robbinsii | 10-25 | 50-75 | U | 0 | U |
| 213 | 50-75 % | 1 | B | DFP | 5 | 0 | 0 | 0 | 0 | V. americana | 25-50 | N. flexilis | 0-10 | P. gramineus | 0-10 | 25-50 | U | 0-10 | D |
| | | 2 | S | B | 5 | 30 | 30 | 30 | 40 | V. americana | 10-25 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | B | 30 | 30 | 40 | 40 | 20 | H. dubia | 25-50 | V. americana | 10-25 | M. beckii | 0-10 | 50-75 | U | 0 | U |
| 214 | 0-10 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 25-50 | N. flexilis | 10-25 | P. gramineus | 0-10 | 25-50 | F | 10-25 | U |
| | | 2 | S | B | 50 | 50 | 50 | 40 | 0 | V. americana | 50-75 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | B | 50 | 50 | 40 | 40 | 20 | H. dubia | 25-50 | V. americana | 10-25 | M. beckii | 0-10 | 50-75 | U | 0 | U |
| 215 | 25-50 % | 1 | S | B | 0 | 0 | 5 | 5 | 5 | V. americana | 25-50 | N. flexilis | 0-10 | Chara/Nitella | 0-10 | 25-50 | E | 0-10 | D |
| | | 2 | S | B | 20 | 30 | 20 | 40 | 50 | V. americana | 25-50 | H. dubia | 25-50 | P. Robbinsii | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | B | 20 | 20 | 40 | 20 | 20 | H. dubia | 25-50 | V. americana | 10-25 | M. beckii | 0-10 | 50-75 | U | 0 | U |
| 216 | 50-75 % | 1 | S | ND | 10 | 10 | 10 | 5 | 5 | V. americana | 25-50 | S. gramineus | 0-10 | N. flexilis | 0-10 | 25-50 | U | 0 | U |
| | | 2 | S | FP | 50 | 50 | 40 | 50 | 40 | V. americana | 25-50 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 10 | 10 | 5 | 5 | 0 | H. dubia | 25-50 | V. americana | 25-50 | N. flexilis | 0-10 | 75-100 | U | 0 | U |
| 217 | 25-50 % | 1 | S | ND | 10 | 10 | 10 | 10 | 10 | V. americana | 50-75 | H. dubia | 0-10 | S. gramineus | 0-10 | 50-75 | F | 10-25 | S |
| | | 2 | S | FG | 10 | 10 | 10 | 10 | 20 | H. dubia | 25-50 | V. americana | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| | | 3 | S | FP | 50 | 50 | 50 | 210 | 260 | H. dubia | 25-50 | V. americana | 25-50 | M. spicatum | 0-10 | 75-100 | U | 0 | U |
| 218 | 25-50 % | 1 | S | FP | 10 | 40 | 30 | 30 | 140 | V. americana | 50-75 | S. gramineus | 10-25 | Joncus sp. | 0-10 | 75-100 | U | 0-10 | S |
| 219 | 0-10 % | 1 | S | FP | 20 | 20 | 20 | 20 | 20 | V. americana | 75-100 | Joncus sp. | 10-25 | P. gramineus | 10-25 | 75-100 | U | 10-25 | S |
| | | 2 | FP | S | 180 | 180 | 240 | 240 | 120 | V. americana | 50-75 | H. dubia | 10-25 | Potamogeton sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 3 | FP | VD | 200 | 300 | 300 | 300 | 300 | V. americana | 25-50 | H. dubia | 10-25 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| 220 | 50-75 % | 1 | FP | S | 40 | 100 | 250 | 150 | 140 | V. americana | 75-100 | E. canadensis | 10-25 | P. foliosus/pusillus | 0-10 | 75-100 | U | 50-75 | U |
| | | 2 | FP | S | 110 | 150 | 200 | 250 | 300 | V. americana | 50-75 | E. canadensis | 10-25 | H. dubia | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | VD | 300 | 300 | 150 | 70 | 70 | V. americana | 25-50 | M. spicatum | 25-50 | H. dubia | 10-25 | 50-75 | U | 10-25 | S |
| 221 | 75-100 % | 1 | FP | S | 180 | 170 | 20 | 170 | 170 | V. americana | 75-100 | E. canadensis | 10-25 | P. foliosus/pusillus | 0-10 | 75-100 | U | 75-100 | U |
| 222 | 50-75 % | 1 | FP | S | 300 | 250 | 200 | 300 | 30 | V. americana | 75-100 | H. dubia | 10-25 | E. canadensis | 0-10 | 75-100 | U | 25-50 | D |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 223 | 75-100 % | 1 | FP | B | 10 | 10 | 10 | 5 | 0 | V. americana | 50-75 | H. dubia | 10-25 | E. canadensis | 0-10 | 75-100 | D | 25-50 | F |
| | | 2 | FP | S | 100 | 110 | 110 | 90 | 90 | V. americana | 50-75 | H. dubia | 25-50 | E. canadensis | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 60 | 90 | 100 | 130 | 120 | E. canadensis | 25-50 | V. americana | 10-25 | C. demersum | 0-10 | 50-75 | U | 0 | U |
| 224 | 75-100 % | 1 | FP | B | 0 | 5 | 10 | 5 | 10 | V. americana | 50-75 | H. dubia | 10-25 | E. canadensis | 0-10 | 75-100 | F | 10-25 | D |
| | | 2 | FP | S | 100 | 60 | 80 | 60 | 50 | E. canadensis | 25-50 | V. americana | 25-50 | C. demersum | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 120 | 150 | 210 | 280 | 210 | E. canadensis | 25-50 | H. dubia | 10-25 | C. demersum | 0-10 | 50-75 | U | 0 | U |
| 225 | 75-100 % | 1 | R | DFP | 5 | 0 | 0 | 0 | 0 | V. americana | 25-50 | N. flexilis | 10-25 | H. dubia | 0-10 | 50-75 | E | 25-50 | M |
| | | 2 | S | R | 10 | 40 | 0 | 0 | 10 | H. dubia | 10-25 | E. canadensis | 10-25 | V. americana | 10-25 | 25-50 | E | 0-10 | S |
| | | 3 | FP | S | 140 | 80 | 80 | 70 | 70 | E. canadensis | 25-50 | V. americana | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| 226 | 75-100 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 10-25 | S. subterminalis | 0-10 | 50-75 | S | 25-50 | S |
| | | 2 | S | B | 50 | 40 | 50 | 30 | 10 | H. dubia | 25-50 | E. canadensis | 10-25 | V. americana | 0-10 | 50-75 | D | 0-10 | S |
| | | 3 | FP | S | 70 | 70 | 70 | 70 | 80 | E. canadensis | 25-50 | V. americana | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| 227 | 75-100 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 25-50 | S | 10-25 | S |
| | | 2 | B | S | 0 | 0 | 10 | 40 | 0 | H. dubia | 25-50 | V. americana | 10-25 | P. Robbinsii | 0-10 | 50-75 | M | 0-10 | S |
| | | 3 | FP | FG | 20 | 40 | 40 | 20 | 40 | V. americana | 10-25 | P. amplifolius | 0-10 | P. Robbinsii | 0-10 | 25-50 | F | 0 | U |
| 228 | 75-100 % | 1 | R | S | 0 | 0 | 0 | 0 | 5 | V. americana | 10-25 | N. flexilis | 0-10 | P. gramineus | 0-10 | 10-25 | E | 0-10 | D |
| | | 2 | S | R | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | H. dubia | 0-10 | P. Robbinsii | 0-10 | 25-50 | F | 0-10 | S |
| | | 3 | FP | B | 10 | 10 | 10 | 20 | 30 | P. Robbinsii | 10-25 | E. canadensis | 10-25 | H. dubia | 0-10 | 50-75 | F | 0 | U |
| 229 | 75-100 % | 1 | FP | R | 10 | 20 | 20 | 10 | 0 | V. americana | 25-50 | H. dubia | 10-25 | P. amplifolius | 0-10 | 50-75 | M | 10-25 | M |
| | | 2 | FP | R | 50 | 0 | 40 | 10 | 10 | V. americana | 10-25 | H. dubia | 10-25 | M. spicatum | 0-10 | 50-75 | D | 0 | U |
| | | 3 | FP | B | 100 | 30 | 5 | 20 | 5 | V. americana | 10-25 | E. canadensis | 0-10 | H. dubia | 0-10 | 25-50 | D | 0-10 | U |
| 230 | 50-75 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | N. flexilis | 0-10 | V. americana | 0-10 | Potamogeton sp. | 0-10 | 0-10 | M | 0-10 | M |
| | | 2 | B | S | 0 | 0 | 10 | 0 | 0 | H. dubia | 0-10 | V. americana | 0-10 | N. flexilis | 0-10 | 10-25 | D | 0 | U |
| | | 3 | R | FP | 10 | 0 | 0 | 0 | 10 | V. americana | 0-10 | M. spicatum | 0-10 | P. Robbinsii | 0-10 | 0-10 | S | 0-10 | U |
| 231 | 75-100 % | 1 | B | G | 5 | 10 | 5 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | H. dubia | 0-10 | 10-25 | M | 0-10 | M |
| | | 2 | S | B | 0 | 10 | 10 | 0 | 0 | V. americana | 10-25 | H. dubia | 10-25 | N. flexilis | 0-10 | 25-50 | F | 0-10 | S |
| | | 3 | FP | B | 10 | 0 | 0 | 5 | 10 | H. dubia | 0-10 | P. Robbinsii | 0-10 | V. americana | 0-10 | 10-25 | U | 0-10 | S |
| 232 | 75-100 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | N. flexilis | 0-10 | P. spirillus | 0-10 | 0-10 | S | 0 | U |
| | | 2 | R | S | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | N. flexilis | 0-10 | H. dubia | 0-10 | 10-25 | D | 0 | U |
| | | 3 | FP | B | 5 | 10 | 5 | 0 | 0 | P. Robbinsii | 0-10 | E. canadensis | 0-10 | H. dubia | 0-10 | 10-25 | U | 0-10 | S |
| 233 | 75-100 % | 1 | G | FP | 0 | 0 | 5 | 60 | 50 | V. americana | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 25-50 | F | 10-25 | S |
| | | 2 | R | S | 0 | 10 | 5 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | H. dubia | 0-10 | 25-50 | S | 0 | U |
| | | 3 | FP | B | 0 | 100 | 80 | 80 | 150 | V. americana | 25-50 | H. dubia | 10-25 | P. Robbinsii | 0-10 | 50-75 | F | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 234 | 75-100 % | 1 | S | FP | 20 | 10 | 10 | 10 | 5 | V. americana | 50-75 | S. subterminalis | 10-25 | H. dubia | 10-25 | 75-100 | D | 25-50 | F |
| | | 2 | S | FP | 10 | 20 | 20 | 10 | 20 | H. dubia | 25-50 | V. americana | 10-25 | N. flexilis | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 30 | 30 | 30 | 20 | 20 | V. americana | 50-75 | Potamogeton sp. | 0-10 | E. canadensis | 0-10 | 50-75 | U | 0 | U |
| 235 | 75-100 % | 1 | S | FP | 5 | 5 | 5 | 5 | 5 | V. americana | 25-50 | N. flexilis | 10-25 | M. tenellum | 10-25 | 50-75 | U | 10-25 | D |
| | | 2 | R | S | 110 | 0 | 0 | 0 | 0 | V. americana | 0-10 | H. dubia | 0-10 | N. flexilis | 0-10 | 0-10 | D | 0 | U |
| | | 3 | R | FP | 100 | 10 | 0 | 0 | 0 | H. dubia | 0-10 | M. spicatum | 0-10 | V. americana | 0-10 | 10-25 | D | 0-10 | S |
| 236 | 0-10 % | 1 | R | DFP | 20 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 10-25 | M | 0-10 | D |
| 237 | 75-100 % | 1 | R | FG | 0 | 0 | 10 | 0 | 0 | N. flexilis | 10-25 | V. americana | 0-10 | Potamogeton sp. | 0-10 | 10-25 | S | 0-10 | S |
| | | 2 | R | S | 20 | 0 | 0 | 0 | 110 | N. flexilis | 10-25 | H. dubia | 0-10 | V. americana | 0-10 | 25-50 | E | 0 | U |
| | | 3 | FP | S | 10 | 10 | 40 | 240 | 100 | V. americana | 25-50 | H. dubia | 25-50 | P. Robbinsii | 10-25 | 50-75 | F | 0 | U |
| 238 | 75-100 % | 1 | S | B | 0 | 10 | 0 | 5 | 0 | N. flexilis | 10-25 | V. americana | 10-25 | Potamogeton sp. | 0-10 | 25-50 | S | 0-10 | S |
| | | 2 | B | S | 40 | 10 | 20 | 20 | 0 | N. flexilis | 10-25 | H. dubia | 10-25 | V. americana | 10-25 | 25-50 | S | 0 | U |
| | | 3 | FP | R | 130 | 30 | 10 | 0 | 190 | P. Robbinsii | 25-50 | H. dubia | 10-25 | E. canadensis | 10-25 | 50-75 | D | 0-10 | M |
| 239 | 75-100 % | 1 | R | B | 0 | 0 | 0 | 0 | 0 | N. flexilis | 0-10 | V. americana | 0-10 | Potamogeton sp. | 0-10 | 0-10 | S | 0 | U |
| | | 2 | S | B | 20 | 20 | 10 | 10 | 10 | N. flexilis | 10-25 | H. dubia | 10-25 | V. americana | 10-25 | 25-50 | S | 0 | U |
| | | 3 | FP | S | 120 | 30 | 10 | 10 | 20 | P. Robbinsii | 10-25 | V. americana | 10-25 | H. dubia | 10-25 | 50-75 | U | 0 | U |
| 240 | 75-100 % | 1 | B | G | 0 | 0 | 10 | 0 | 0 | V. americana | 0-10 | N. flexilis | 0-10 | aucun | 0 | 0-10 | S | 0-10 | F |
| | | 2 | FP | B | 50 | 20 | 50 | 20 | 0 | N. flexilis | 10-25 | V. americana | 10-25 | H. dubia | 0-10 | 50-75 | U | 0-10 | F |
| | | 3 | FP | S | 80 | 40 | 20 | 30 | 20 | P. Robbinsii | 10-25 | H. dubia | 10-25 | E. canadensis | 10-25 | 75-100 | F | 0 | U |
| 241 | 25-50 % | 1 | FP | S | 100 | 90 | 200 | 300 | 300 | P. foliosus/pusillus | 25-50 | V. americana | 25-50 | P. amplifolius | 0-10 | 75-100 | U | 25-50 | F |
| | | 2 | FP | B | 0 | 300 | 300 | 120 | 50 | N. flexilis | 50-75 | V. americana | 0-10 | M. spicatum | 0-10 | 50-75 | U | 0-10 | S |
| 242 | 25-50 % | 1 | FP | S | 300 | 300 | 140 | 200 | 10 | Sparganium sp. | 50-75 | V. americana | 10-25 | E. canadensis | 0-10 | 75-100 | U | 10-25 | E |
| 243 | 0-10 % | 1 | FP | B | 10 | 10 | 10 | 0 | 0 | H. dubia | 25-50 | V. americana | 25-50 | N. flexilis | 0-10 | 75-100 | U | 50-75 | U |
| | | 2 | FP | ND | 110 | 130 | 120 | 120 | 110 | N. flexilis | 50-75 | V. americana | 0-10 | E. canadensis | 0-10 | 50-75 | U | 0 | U |
| 244 | 25-50 % | 1 | B | G | 0 | 10 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | isoete | 0-10 | 25-50 | U | 10-25 | D |
| | | 2 | FP | B | 110 | 140 | 0 | 10 | 50 | H. dubia | 50-75 | V. americana | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0 | U |
| 245 | 10-25 % | 1 | B | G | 0 | 0 | 0 | 10 | 0 | N. flexilis | 10-25 | V. americana | 0-10 | M. alterniflorum | 0-10 | 25-50 | S | 0-10 | S |
| | | 2 | B | FG | 0 | 10 | 20 | 0 | 0 | N. flexilis | 10-25 | V. americana | 0-10 | M. spicatum | 0-10 | 25-50 | E | 0 | U |
| | | 3 | FP | S | 210 | 230 | 100 | 10 | 10 | H. dubia | 10-25 | E. canadensis | 10-25 | V. americana | 10-25 | 50-75 | D | 0 | U |
| 246 | 75-100 % | 1 | B | R | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | N. flexilis | 0-10 | H. dubia | 0-10 | 0-10 | S | 0 | U |
| | | 2 | B | FG | 10 | 10 | 10 | 0 | 0 | N. flexilis | 0-10 | V. americana | 0-10 | H. dubia | 0-10 | 10-25 | D | 0 | U |
| | | 3 | G | DFP | 0 | 0 | 0 | 20 | 20 | P. Robbinsii | 10-25 | H. dubia | 10-25 | V. americana | 0-10 | 25-50 | U | 10-25 | D |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 247 | 10-25 % | 1 | B | G | 0 | 0 | 0 | 10 | 0 | V. americana | 0-10 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 10-25 | S | 0-10 | S |
| | | 2 | B | S | 0 | 0 | 0 | 0 | 10 | H. dubia | 10-25 | N. flexilis | 0-10 | V. americana | 0-10 | 10-25 | F | 0 | U |
| | | 3 | FP | S | 20 | 20 | 20 | 40 | 50 | P. Robbinsii | 25-50 | V. americana | 10-25 | P. foliosus/pusillus | 10-25 | 75-100 | F | 0 | U |
| 248 | 50-75 % | 1 | B | G | 0 | 0 | 5 | 5 | 0 | V. americana | 0-10 | N. flexilis | 0-10 | M. spicatum | 0-10 | 0-10 | S | 0 | U |
| | | 2 | FP | S | 10 | 40 | 70 | 60 | 20 | N. flexilis | 25-50 | V. americana | 25-50 | P. foliosus/pusillus | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 50 | 50 | 40 | 40 | 40 | P. Robbinsii | 50-75 | P. foliosus/pusillus | 10-25 | V. americana | 10-25 | 75-100 | U | 0 | U |
| 249 | 0-10 % | 1 | FP | S | 10 | 10 | 10 | 5 | 5 | V. americana | 50-75 | M. tenellum | 10-25 | H. dubia | 0-10 | 75-100 | U | 50-75 | U |
| | | 2 | FP | S | 70 | 90 | 90 | 70 | 80 | H. dubia | 25-50 | N. flexilis | 25-50 | Potamogeton sp. | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 40 | 40 | 40 | 40 | 40 | P. Robbinsii | 50-75 | P. foliosus/pusillus | 10-25 | V. americana | 10-25 | 75-100 | U | 0 | U |
| 250 | 0-10 % | 1 | FP | S | 0 | 10 | 10 | 10 | 10 | V. americana | 25-50 | M. tenellum | 10-25 | M. alterniflorum | 0-10 | 50-75 | U | 10-25 | U |
| | | 2 | FP | S | 60 | 60 | 50 | 50 | 50 | V. americana | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 75-100 | U | 0 | U |
| 251 | 0-10 % | 1 | FP | S | 10 | 20 | 10 | 140 | 10 | V. americana | 25-50 | M. tenellum | 10-25 | S. gramineus | 10-25 | 50-75 | U | 0-10 | U |
| | | 2 | FP | S | 50 | 50 | 60 | 60 | 110 | V. americana | 10-25 | M. spicatum | 10-25 | Potamogeton sp. | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 40 | 40 | 180 | 40 | 40 | P. Robbinsii | 50-75 | V. americana | 10-25 | N. flexilis | 0-10 | 75-100 | D | 0 | U |
| 252 | 0-10 % | 1 | FP | S | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | M. tenellum | 0-10 | Chara/Nitella | 0-10 | 50-75 | U | 25-50 | F |
| | | 2 | FP | S | 210 | 220 | 180 | 60 | 40 | V. americana | 25-50 | N. flexilis | 10-25 | P. foliosus/pusillus | 10-25 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 40 | 40 | 40 | 40 | 40 | P. Robbinsii | 50-75 | V. americana | 10-25 | P. amplifolius | 0-10 | 75-100 | U | 0 | U |
| 253 | 25-50 % | 1 | FP | S | 10 | 10 | 10 | 10 | 10 | V. americana | 25-50 | S. subterminalis | 0-10 | M. alterniflorum | 0-10 | 25-50 | U | 10-25 | D |
| | | 2 | FP | S | 50 | 50 | 50 | 50 | 50 | V. americana | 25-50 | P. Robbinsii | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0 | U |
| 254 | 75-100 % | 1 | FP | S | 10 | 20 | 10 | 10 | 40 | V. americana | 25-50 | S. subterminalis | 10-25 | N. flexilis | 10-25 | 75-100 | U | 0-10 | U |
| | | 2 | FP | S | 50 | 60 | 50 | 50 | 50 | P. Robbinsii | 50-75 | V. americana | 0-10 | P. amplifolius | 0-10 | 50-75 | U | 0-10 | S |
| | | 3 | FP | S | 210 | 200 | 180 | 300 | 300 | P. Robbinsii | 50-75 | P. foliosus/pusillus | 10-25 | H. dubia | 10-25 | 75-100 | U | 0 | U |
| 255 | 75-100 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | N. flexilis | 10-25 | V. americana | 0-10 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 2 | FP | S | 20 | 0 | 40 | 10 | 10 | P. Robbinsii | 25-50 | N. flexilis | 10-25 | V. americana | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | S | 300 | 250 | 180 | 60 | 40 | P. Robbinsii | 50-75 | N. flexilis | 10-25 | P. foliosus/pusillus | 0-10 | 75-100 | D | 0 | U |
| 256 | 75-100 % | 1 | B | R | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | P. Robbinsii | 0-10 | 10-25 | S | 0 | U |
| | | 2 | R | FG | 30 | 0 | 0 | 30 | 10 | H. dubia | 10-25 | N. flexilis | 10-25 | V. americana | 0-10 | 25-50 | S | 0 | U |
| | | 3 | S | B | 10 | 10 | 0 | 10 | 60 | P. Robbinsii | 10-25 | N. flexilis | 10-25 | H. dubia | 0-10 | 50-75 | M | 0 | U |
| 257 | 75-100 % | 1 | B | R | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | Potamogeton sp. | 0-10 | P. gramineus | 0-10 | 0-10 | S | 0 | U |
| | | 2 | FG | B | 20 | 20 | 0 | 0 | 30 | N. flexilis | 25-50 | H. dubia | 0-10 | Potamogeton sp. | 0-10 | 25-50 | U | 0 | U |
| | | 3 | S | FP | 60 | 20 | 20 | 30 | 20 | P. Robbinsii | 10-25 | N. flexilis | 10-25 | H. dubia | 10-25 | 50-75 | U | 0 | U |
| 258 | 75-100 % | 1 | G | S | 0 | 0 | 5 | 10 | 10 | V. americana | 10-25 | Potamogeton sp. | 0-10 | P. gramineus | 0-10 | 10-25 | F | 0 | U |
| | | 2 | S | FP | 30 | 40 | 30 | 20 | 10 | N. flexilis | 10-25 | V. americana | 10-25 | P. gramineus | 10-25 | 50-75 | U | 0 | U |
| | | 3 | S | FP | 20 | 20 | 20 | 20 | 20 | V. americana | 10-25 | P. gramineus | 10-25 | H. dubia | 0-10 | 50-75 | U | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 259 | 25-50 % | 1 | S | FG | 10 | 10 | 10 | 10 | 10 | V. americana | 10-25 | P. gramineus | 0-10 | Potamogeton sp. | 0-10 | 25-50 | F | 0 | U |
| | | 2 | S | B | 40 | 20 | 10 | 40 | 20 | N. flexilis | 25-50 | V. americana | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| | | 3 | S | FP | 30 | 20 | 10 | 10 | 10 | P. Robbinsii | 25-50 | H. dubia | 10-25 | P. gramineus | 10-25 | 75-100 | U | 10-25 | S |
| 260 | 50-75 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | P. gramineus | 0-10 | V. americana | 0-10 | N. flexilis | 0-10 | 10-25 | D | 0-10 | S |
| | | 2 | FP | S | 70 | 50 | 10 | 20 | 30 | V. americana | 10-25 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 25-50 | D | 0 | U |
| | | 3 | S | FP | 5 | 10 | 10 | 30 | 10 | P. Robbinsii | 25-50 | H. dubia | 10-25 | V. americana | 0-10 | 75-100 | U | 10-25 | U |
| 261 | 75-100 % | 1 | G | B | 0 | 5 | 5 | 0 | 0 | V. americana | 10-25 | P. gramineus | 0-10 | N. flexilis | 0-10 | 10-25 | M | 0 | U |
| | | 2 | S | B | 0 | 20 | 30 | 10 | 10 | H. dubia | 10-25 | N. flexilis | 10-25 | Potamogeton sp. | 0-10 | 25-50 | S | 0 | U |
| | | 3 | R | DFP | 0 | 0 | 0 | 0 | 0 | P. Robbinsii | 0-10 | H. dubia | 0-10 | V. americana | 0-10 | 10-25 | E | 10-25 | S |
| 262 | 50-75 % | 1 | B | R | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | N. flexilis | 0-10 | P. gramineus | 0-10 | 0-10 | S | 0 | U |
| | | 2 | B | S | 0 | 0 | 20 | 20 | 0 | H. dubia | 10-25 | N. flexilis | 0-10 | V. americana | 0-10 | 25-50 | S | 0 | U |
| | | 3 | FP | S | 0 | 10 | 30 | 50 | 80 | H. dubia | 10-25 | P. Robbinsii | 10-25 | V. americana | 0-10 | 25-50 | D | 0-10 | F |
| 263 | 0-10 % | 1 | B | S | 0 | 0 | 0 | 0 | 10 | V. americana | 0-10 | Potamogeton sp. | 0-10 | N. flexilis | 0-10 | 10-25 | F | 0 | U |
| | | 2 | S | B | 20 | 20 | 30 | 0 | 20 | H. dubia | 10-25 | V. americana | 0-10 | Potamogeton sp. | 0-10 | 25-50 | S | 0 | U |
| | | 3 | FP | S | 70 | 50 | 30 | 10 | 0 | V. americana | 50-75 | H. dubia | 0-10 | M. spicatum | 0-10 | 50-75 | U | 0 | U |
| 264 | 0-10 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | N. flexilis | 0-10 | P. gramineus | 0-10 | 10-25 | D | 0 | U |
| | | 2 | FG | B | 0 | 30 | 10 | 5 | 5 | N. flexilis | 10-25 | H. dubia | 0-10 | V. americana | 0-10 | 25-50 | S | 0 | U |
| | | 3 | B | DFP | 0 | 0 | 0 | 0 | 0 | H. dubia | 0-10 | V. americana | 0-10 | M. spicatum | 0-10 | 10-25 | F | 0 | U |
| 265 | 0-10 % | 1 | G | B | 0 | 0 | 0 | 0 | 0 | V. americana | 10-25 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 25-50 | S | 0 | U |
| | | 2 | FG | B | 10 | 5 | 0 | 10 | 20 | N. flexilis | 10-25 | H. dubia | 0-10 | V. americana | 0-10 | 25-50 | S | 0 | U |
| | | 3 | G | DFP | 0 | 0 | 5 | 5 | 5 | V. americana | 0-10 | H. dubia | 0-10 | M. spicatum | 0-10 | 0-10 | S | 0 | U |
| 266 | 0-10 % | 1 | B | G | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | N. flexilis | 0-10 | Potamogeton sp. | 0-10 | 0-10 | S | 0 | U |
| | | 2 | FG | B | 20 | 20 | 30 | 0 | 10 | H. dubia | 0-10 | N. flexilis | 0-10 | V. americana | 0-10 | 10-25 | S | 0 | U |
| | | 3 | G | DFP | 5 | 10 | 10 | 20 | 20 | V. americana | 10-25 | H. dubia | 10-25 | M. spicatum | 0-10 | 10-25 | S | 0 | U |
| 267 | 75-100 % | 1 | B | DFP | 0 | 0 | 0 | 0 | 0 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 25-50 | U |
| | | 2 | B | G | 90 | 70 | 0 | 0 | 0 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 10-25 | U |
| | | 3 | B | FP | 120 | 0 | 50 | 0 | 50 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 268 | 75-100 % | 1 | B | DFP | 0 | 0 | 0 | 20 | 20 | V. americana | 10-25 | H. dubia | 0-10 | E. canadensis | 0-10 | 25-50 | F | 10-25 | D |
| | | 2 | B | G | 20 | 40 | 0 | 0 | 110 | H. dubia | 0-10 | V. americana | 0-10 | aucun | 0 | 0-10 | S | 25-50 | U |
| | | 3 | B | G | 0 | 50 | 60 | 70 | 300 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 269 | 50-75 % | 1 | FP | S | 30 | 20 | 80 | 100 | 210 | V. americana | 50-75 | H. dubia | 10-25 | E. canadensis | 10-25 | 75-100 | U | 10-25 | U |
| | | 2 | FP | B | 300 | 300 | 160 | 60 | 100 | V. americana | 10-25 | M. spicatum | 10-25 | Potamogeton sp. | 0-10 | 25-50 | D | 0 | U |
| | | 3 | FP | S | 250 | 160 | 160 | 160 | 300 | V. americana | 0-10 | M. spicatum | 0-10 | aucun | 0 | 0-10 | S | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 270 | 75-100 % | 1 | FP | S | 20 | 30 | 210 | 250 | 300 | V. americana | 25-50 | H. dubia | 10-25 | E. canadensis | 10-25 | 75-100 | U | 10-25 | S |
| | | 2 | FP | B | 300 | 300 | 300 | 300 | 200 | V. americana | 10-25 | M. spicatum | 10-25 | H. dubia | 0-10 | 25-50 | D | 0 | U |
| | | 3 | FP | S | 240 | 190 | 200 | 70 | 300 | H. dubia | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| 271 | 75-100 % | 1 | G | FP | 10 | 0 | 20 | 120 | 0 | V. americana | 25-50 | H. dubia | 0-10 | P. amplifolius | 0-10 | 50-75 | D | 0-10 | D |
| | | 2 | FP | B | 300 | 170 | 200 | 300 | 0 | M. spicatum | 10-25 | V. americana | 10-25 | P. amplifolius | 0-10 | 25-50 | S | 0 | U |
| | | 3 | FP | B | 50 | 160 | 300 | 20 | 150 | H. dubia | 0-10 | V. americana | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| 272 | 75-100 % | 1 | G | VD | 10 | 20 | 10 | 210 | 100 | M. spicatum | 0-10 | V. americana | 0-10 | E. canadensis | 0-10 | 0-10 | S | 0 | U |
| | | 2 | FG | B | 100 | 120 | 200 | 80 | 30 | V. americana | 0-10 | M. spicatum | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| | | 3 | FP | B | 50 | 20 | 120 | 200 | 300 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 273 | 50-75 % | 1 | G | DFP | 10 | 10 | 10 | 10 | 10 | V. americana | 50-75 | E. canadensis | 0-10 | H. dubia | 0-10 | 50-75 | U | 0 | U |
| | | 2 | FP | FG | 200 | 220 | 100 | 70 | 70 | V. americana | 0-10 | H. dubia | 0-10 | M. spicatum | 0-10 | 10-25 | S | 0 | U |
| | | 3 | FP | B | 250 | 250 | 160 | 40 | 280 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 0 | U |
| 274 | 75-100 % | 1 | G | DFP | 5 | 5 | 5 | 5 | 5 | V. americana | 50-75 | E. canadensis | 0-10 | H. dubia | 0-10 | 50-75 | F | 0 | U |
| | | 2 | FP | S | 220 | 120 | 110 | 50 | 70 | Potamogeton sp. | 10-25 | M. spicatum | 0-10 | H. dubia | 0-10 | 10-25 | S | 0 | U |
| | | 3 | FP | S | 280 | 220 | 200 | 200 | 100 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 275 | 75-100 % | 1 | G | DFP | 5 | 5 | 5 | 5 | 5 | V. americana | 50-75 | M. spicatum | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| | | 2 | FP | FG | 50 | 60 | 110 | 250 | 40 | V. americana | 0-10 | C. demersum | 0-10 | M. spicatum | 0-10 | 10-25 | S | 0 | U |
| | | 3 | FP | S | 280 | 200 | 50 | 20 | 100 | aucun | 0 | aucun | 0-10 | aucun | 0 | 0 | U | 0 | U |
| 276 | 75-100 % | 1 | G | DFP | 5 | 5 | 5 | 10 | 300 | V. americana | 50-75 | H. dubia | 10-25 | E. canadensis | 0-10 | 50-75 | U | 0 | U |
| | | 2 | FP | ND | 120 | 50 | 60 | 300 | 300 | V. americana | 10-25 | M. spicatum | 10-25 | Potamogeton sp. | 0-10 | 25-50 | F | 0 | U |
| | | 3 | FP | ND | 60 | 50 | 300 | 300 | 300 | V. americana | 0-10 | H. dubia | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| 277 | 50-75 % | 1 | FP | ND | 300 | 300 | 300 | 300 | 300 | E. canadensis | 25-50 | Chara/Nitella | 25-50 | V. americana | 10-25 | 75-100 | U | 25-50 | D |
| | | 2 | FP | ND | 300 | 300 | 300 | 300 | 300 | V. americana | 10-25 | M. spicatum | 10-25 | Potamogeton sp. | 0-10 | 25-50 | S | 0 | U |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 278 | 50-75 % | 1 | FP | ND | 300 | 300 | 300 | 300 | 300 | E. canadensis | 25-50 | P. natans | 25-50 | M. spicatum | 10-25 | 75-100 | U | 10-25 | S |
| | | 2 | FP | ND | 300 | 300 | 300 | 300 | 300 | V. americana | 10-25 | M. spicatum | 0-10 | H. dubia | 0-10 | 10-25 | S | 0 | U |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 279 | 25-50 % | 1 | FP | VD | 300 | 300 | 300 | 300 | 160 | V. americana | 50-75 | E. canadensis | 25-50 | M. spicatum | 0-10 | 75-100 | D | 50-75 | D |
| | | 2 | FP | ND | 300 | 300 | 300 | 300 | 300 | V. americana | 25-50 | M. spicatum | 10-25 | Potamogeton sp. | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | ND | 300 | 270 | 300 | 300 | 300 | V. americana | 0-10 | E. canadensis | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| 280 | 0-10 % | 1 | VD | FP | 250 | 200 | 160 | 40 | 40 | V. americana | 25-50 | E. canadensis | 10-25 | H. dubia | 10-25 | 75-100 | U | 25-50 | U |
| | | 2 | FP | ND | 300 | 300 | 300 | 300 | 300 | Chara/Nitella | 75-100 | V. americana | 0-10 | E. canadensis | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | Chara/Nitella | 75-100 | E. canadensis | 0-10 | V. americana | 0-10 | 75-100 | U | 0 | U |

| Sect. | Shore (% artifi.) | Trans. | Type of substrata | | Thickness of Sediments (cm) | | | | | Aquatic plants | | | | | | | | Green algae | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Species 1 | | Species 2 | | Species | | Total | | | |
| | | | dom. | s-dom. | 1 | 2 | 3 | 4 | 5 | Name | % Cov. | Name | % Cov. | Name | % Cov. | % Cov. | Dis. | % Cov. | Dis. |
| 281 | 0-10 % | 1 | FP | S | 140 | 110 | 200 | 210 | 210 | Chara/Nitella | 50-75 | E. canadensis | 10-25 | H. dubia | 10-25 | 75-100 | F | 25-50 | D |
| | | 2 | FP | ND | 300 | 300 | 300 | 300 | 300 | Chara/Nitella | 75-100 | V. americana | 0-10 | E. canadensis | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | Chara/Nitella | 75-100 | H. dubia | 0-10 | M. spicatum | 0-10 | 75-100 | U | 0 | U |
| 282 | 0-10 % | 1 | FP | S | 140 | 160 | 160 | 170 | 250 | Chara/Nitella | 75-100 | E. canadensis | 10-25 | Joncus sp. | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | FP | ND | 300 | 300 | 300 | 300 | 300 | Chara/Nitella | 75-100 | M. spicatum | 0-10 | V. americana | 0-10 | 75-100 | U | 0 | U |
| | | 3 | FP | ND | 300 | 300 | 300 | 300 | 300 | Chara/Nitella | 75-100 | V. americana | 0-10 | M. spicatum | 0-10 | 75-100 | U | 0 | U |
| 283 | 75-100 % | 1 | FP | B | 0 | 10 | 0 | 0 | 60 | V. americana | 10-25 | H. dubia | 10-25 | aucun | 0 | 25-50 | E | 0-10 | D |
| | | 2 | FP | B | 0 | 0 | 170 | 180 | 180 | V. americana | 10-25 | H. dubia | 0-10 | Potamogeton sp. | 0-10 | 25-50 | F | 0 | U |
| | | 3 | FG | DFP | 50 | 100 | 110 | 140 | 140 | V. americana | 10-25 | aucun | 0 | aucun | 0 | 10-25 | S | 0-10 | S |
| 284 | 25-50 % | 1 | FP | ND | 110 | 130 | 120 | 70 | 70 | V. americana | 25-50 | H. dubia | 25-50 | Potamogeton sp. | 0-10 | 75-100 | U | 0 | U |
| | | 2 | FP | S | 200 | 200 | 200 | 240 | 210 | V. americana | 25-50 | M. spicatum | 10-25 | P. amplifolius | 0-10 | 50-75 | D | 0 | U |
| | | 3 | FP | S | 140 | 150 | 160 | 230 | 200 | V. americana | 0-10 | M. spicatum | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| 285 | 25-50 % | 1 | FP | ND | 110 | 150 | 150 | 140 | 150 | V. americana | 25-50 | Potamogeton sp. | 10-25 | H. dubia | 10-25 | 50-75 | U | 0-10 | S |
| | | 2 | FP | S | 180 | 270 | 300 | 300 | 200 | M. spicatum | 25-50 | P. amplifolius | 0-10 | V. americana | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | S | 250 | 290 | 250 | 190 | 210 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0-10 | S |
| 286 | 75-100 % | 1 | FP | ND | 160 | 300 | 300 | 300 | 300 | V. americana | 25-50 | E. canadensis | 25-50 | Potamogeton sp. | 10-25 | 75-100 | U | 10-25 | S |
| | | 2 | FP | S | 300 | 300 | 240 | 300 | 300 | M. spicatum | 25-50 | P. amplifolius | 10-25 | V. americana | 0-10 | 50-75 | U | 0 | U |
| | | 3 | FP | ND | 250 | 260 | 290 | 300 | 300 | V. americana | 0-10 | M. spicatum | 0-10 | C. demersum | 0-10 | 0-10 | S | 0-10 | S |
| 287 | 50-75 % | 1 | FP | B | 200 | 160 | 50 | 20 | 170 | Potamogeton sp. | 25-50 | M. spicatum | 10-25 | V. americana | 10-25 | 75-100 | U | 25-50 | U |
| | | 2 | FP | S | 300 | 220 | 180 | 150 | 150 | V. americana | 10-25 | M. spicatum | 10-25 | C. demersum | 0-10 | 25-50 | U | 0 | U |
| | | 3 | FP | S | 240 | 230 | 210 | 190 | 150 | M. spicatum | 0-10 | V. americana | 0-10 | aucun | 0 | 0-10 | S | 0 | U |
| 288 | 75-100 % | 1 | FG | S | 160 | 200 | 70 | 60 | 70 | Potamogeton sp. | 10-25 | V. americana | 10-25 | Potamogeton sp. | 10-25 | 25-50 | D | 10-25 | S |
| | | 2 | G | B | 210 | 70 | 30 | 20 | 30 | V. americana | 10-25 | H. dubia | 0-10 | M. spicatum | 0-10 | 25-50 | S | 0 | U |
| | | 3 | FP | G | 110 | 20 | 20 | 210 | 230 | aucun | 0 | aucun | 0 | aucun | 0 | 0 | U | 0 | U |
| 289 | 75-100 % | 1 | S | FG | 10 | 50 | 100 | 100 | 70 | H. dubia | 50-75 | V. americana | 25-50 | M. spicatum | 0-10 | 75-100 | U | 0-10 | S |
| | | 2 | G | B | 0 | 40 | 180 | 200 | 30 | C. demersum | 0-10 | V. americana | 0-10 | M. spicatum | 0-10 | 10-25 | S | 0 | U |
| | | 3 | FP | VD | 250 | 300 | 300 | 300 | 300 | V. americana | 0-10 | aucun | 0 | aucun | 0 | 0-10 | S | 10-25 | S |

# APPENDIX 4:

## RAW DATA ON THE QUALITY OF THE LAKE'S WATERS

## (DATA OF MDDEP)

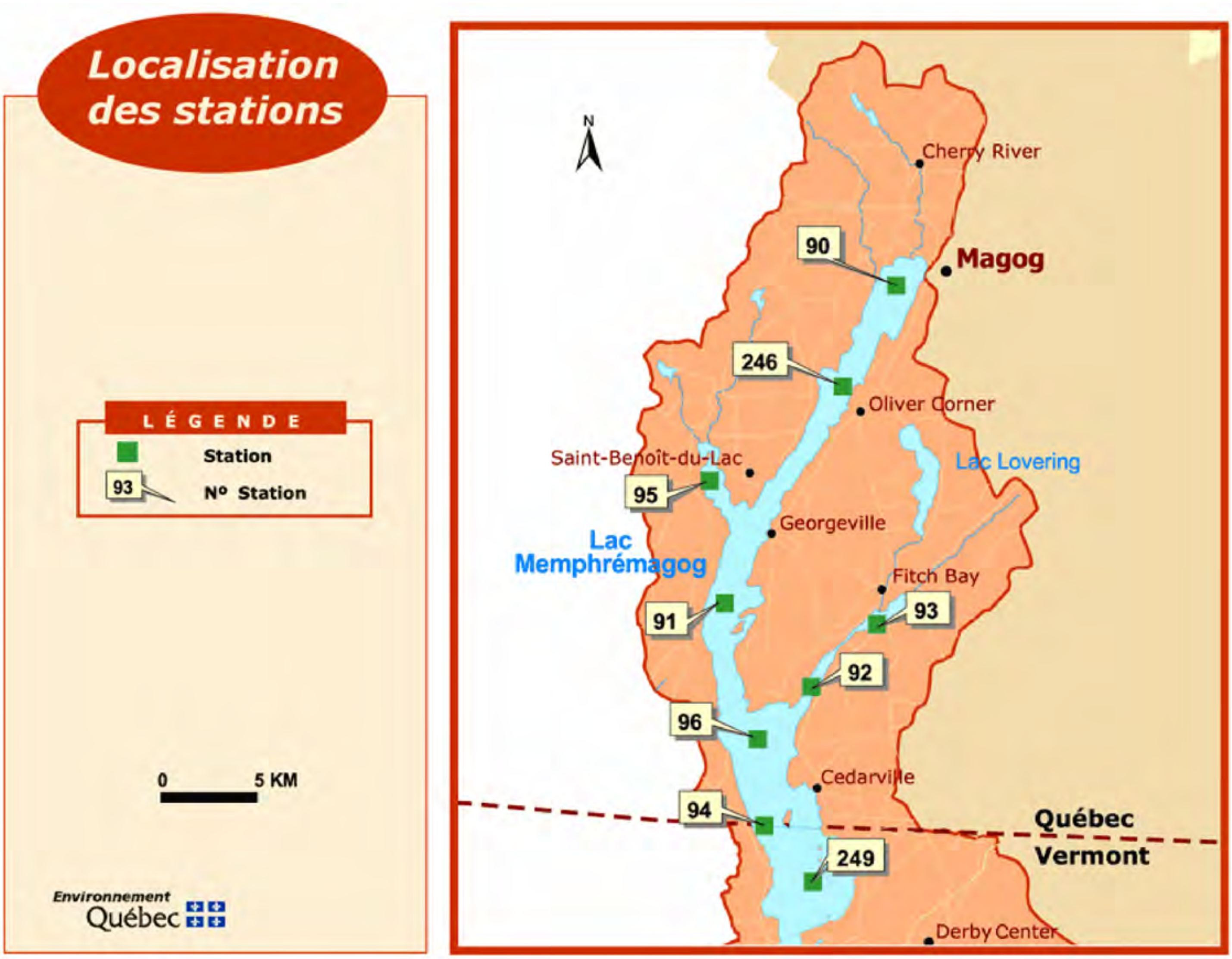
MDDEP (2006) *Banque de données sur la qualité du milieu aquatique. Québec.* Ministère du Développement durable, de l'Environnement et des Parcs. Direction du suivi de l'état de l'environnement.

MENV (2005) *Banque de données sur la qualité du milieu aquatique. Québec.* Ministère du Développement durable, de l'Environnement et des Parcs. Direction du suivi de l'état de l'environnement.

SIMONEAU, M. (2004) *Qualité des eaux du lac Memphrémagog, 1996-2002.* Québec, ministère de l'Environnement, Direction du suivi de l'état de l'environnement, envirodoq no ENV/2004/0265, rapport no QE/149, 17 p.
Disponible au http://www.mddep.gouv.qc.ca/eau/eco_aqua/memphremagog/index.htm

# Raw Data on the Quality of the Lake's Waters

(Data of **MDDEP**)



| Station Number | Date | Time | Chl-aa (mg/m$^3$) | Pheo (mg/m$^3$) | Total Chlorophyll *a* (mg/m$^3$) | Total Phosphorus (µg/l) | Temp. (℃) | Secchi (m) |
|---|---|---|---|---|---|---|---|---|
| 94 | 6/5/1996 | 9:40 | 3.35 | 0.97 | 4.32 | 14.0 | | |
| 94 | 7/9/1996 | 8:27 | 3.62 | 0.88 | 4.50 | 10.0 | 20.0 | 6.1 |
| 94 | 8/7/1996 | 8:56 | 3.52 | 0.65 | 4.17 | 14.0 | 24.0 | |
| 94 | 9/18/1996 | 9:40 | 4.87 | 0.81 | 5.68 | 13.0 | 19.5 | |
| 94 | 6/18/1997 | 11:45 | 3.93 | 0.52 | 4.45 | 205.0 * | 18.0 | 4.5 |
| 94 | 7/8/1997 | 12:20 | 5.46 | 0.34 | 5.80 | 13.0 | 20.2 | 3.7 |
| 94 | 8/19/1997 | 10:17 | 10.03 | 1.89 | 11.92 | 16.0 | 20.3 | 4.0 |
| 94 | 9/22/1997 | 22:22 | 4.59 | 1.00 | 5.59 | 13.0 | 17.0 | 3.5 |
| 94 | 6/29/1998 | 10:15 | 5.02 | 0.50 | 5.52 | 11.0 | 23.3 | 3.4 |
| 94 | 8/12/1998 | 9:15 | 4.20 | 0.89 | 5.09 | 12.0 | 23.8 | 3.5 |
| 94 | 8/12/1998 | 8:30 | 4.99 | 1.24 | 6.23 | 13.0 | 23.4 | 4.0 |
| 94 | 6/13/1999 | 12:40 | | | 5.23 | | 20.0 | 4.5 |
| 94 | 7/13/1999 | 10:50 | | | | | 23.0 | 3.0 |
| 94 | 8/10/1999 | 12:18 | | | 6.56 | | 23.0 | 2.5 |
| 94 | 7/10/2000 | 15:45 | | | | | 20.5 | 4.0 |
| 94 | 8/22/2000 | 12:05 | | | | | 21.0 | 4.5 |
| 94 | 7/9/2001 | 14:00 | 6.10 | 0.90 | 7.00 | | 21.0 | 4.0 |
| 94 | 8/6/2001 | 13:45 | 6.31 | 0.88 | 7.19 | | 25.0 | 4.5 |
| 94 | 8/6/2001 | 14:00 | 7.71 | 0.01 | 7.72 | | 25.0 | 4.5 |
| 94 | 8/28/2001 | 13:15 | 3.11 | 0.26 | 3.37 | | 22.0 | 4.0 |
| 94 | 7/3/2002 | 12:19 | 2.90 | 1.20 | 4.10 | | 26.0 | 4.0 |
| 94 | 7/17/2002 | 13:35 | 3.60 | 1.10 | 4.70 | | 22.0 | 4.3 |
| 94 | 8/5/2002 | 14:35 | 3.30 | 0.94 | 4.24 | | 25.0 | 4.3 |
| 94 | 8/19/2002 | 15:12 | 1.40 | 4.70 | 6.10 | | 26.0 | 4.0 |
| 94 | 7/14/2003 | 10:07 | | | | 7.0 * | 21.0 * | 6.2 * |
| 94 | 7/14/2003 | 10:08 | | | | 8.0 * | | |
| 94 | 7/14/2003 | 10:09 | | | | 9.0 * | | |
| 94 | 8/5/2003 | 9:34 | 2.40 * | 0.06 * | 2.46 * | 8.0 * | 23.0 * | 7.8 * |
| 94 | 6/29/2004 | 15:45 | 4.50 | 1.80 | 6.30 | 14.0 | 19.0 | 5.1 |
| 94 | 7/21/2004 | 9:50 | 4.00 | 1.60 | 5.60 | 11.0 | 22.0 | 5.8 |
| 94 | 8/10/2004 | 10:10 | 5.00 | 5.20 | 10.20 | 8.0 | 19.0 | 3.8 |
| 94 | 8/31/2004 | 12:05 | 7.10 | 1.30 | 8.40 | 12.0 | 20.0 | 3.9 |
| 94 | 6/22/2005 | 10:40 | 3.80 | 0.26 | 4.06 | 11.0 | 15.0 | 3.5 |
| 94 | 7/11/2005 | 11:50 | 4.80 | 1.10 | 5.90 | 9.7 | 19.0 | 3.8 |
| 94 | 8/3/2005 | 11:25 | 2.30 | 0.67 | 2.97 | 12.0 | 22.0 | 4.6 |
| 94 | 8/17/2005 | 10:45 | 4.00 | 0.83 | 4.83 | 15.0 | 20.0 | 3.9 |
| 249 | 6/29/2004 | 11:45 | 0.64 | 3.70 | 4.34 | 13.2 | 15.0 | 4.5 |
| 249 | 7/21/2004 | 9:30 | 4.10 | 2.60 | 6.70 | 9.7 | 22.0 | 5.0 |
| 249 | 8/10/2004 | 9:55 | 5.90 | 0.86 | 6.76 | 12.9 | 19.0 | 3.9 |
| 249 | 8/31/2004 | 11:50 | 6.90 | 1.40 | 8.30 | 9.9 | 20.0 | 4.1 |
| 49 | 6/22/2005 | 10:10 | 4.10 | 0.42 | 4.52 | 16.0 | 16.0 | 2.7 |
| 249 | 7/11/2005 | 11:20 | 4.50 | 1.20 | 5.70 | 9.0 | 19.5 | 3.6 |
| 249 | 8/3/2005 | 11:10 | 3.00 | 0.70 | 3.70 | 30.0 | 22.0 | 3.7 |
| 249 | 8/17/2005 | 10:35 | 4.40 | 1.10 | 5.50 | 21.0 | 20.0 | 3.5 |

* This data have not been included in our synthesis.

# APPENDIX 5:

## RAW DATA ON THE CONDITION OF THE TRIBUTARIES (DATA OF NWSC)

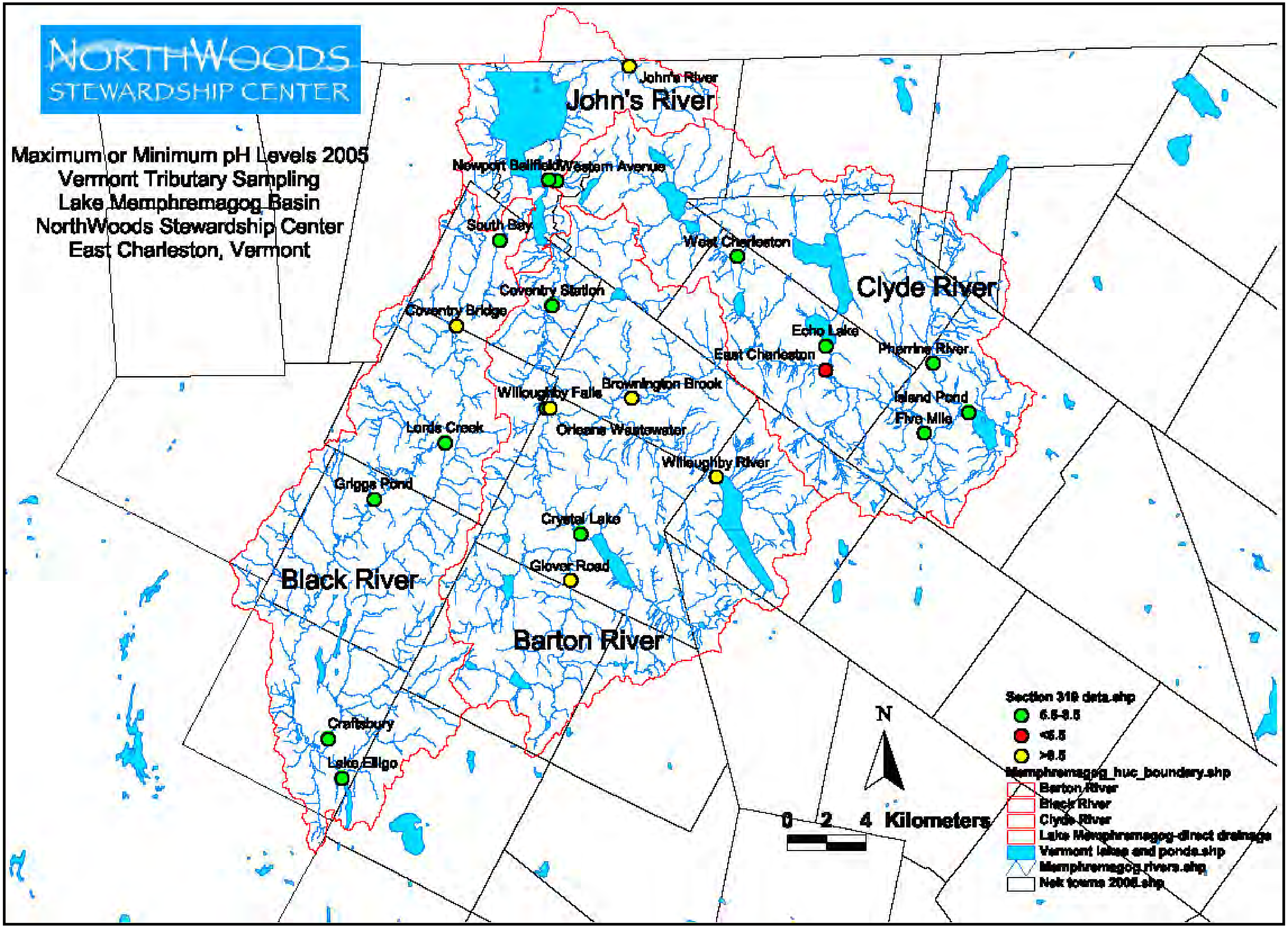
## Lake Memphremagog Watershed
## Vermont Tributary Sampling Results - Summer 2005
## Data collected by the NorthWoods Stewardship Center

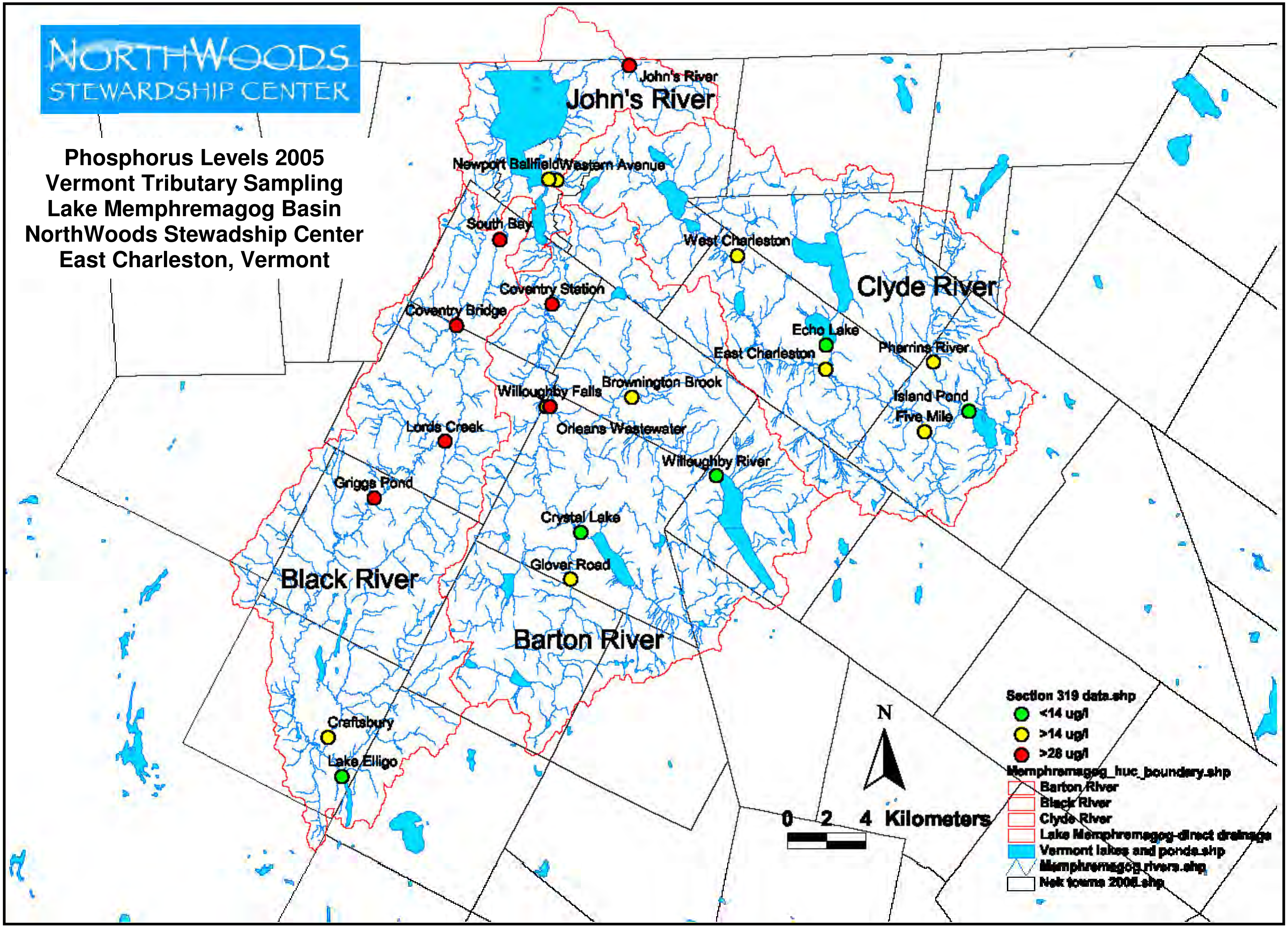
| Tributary | Site | Month | Alkalinity (mg $CaCO_3$/l) | Electroconductivity (µs) | Total Nitrogen (mg/l) | Total Phosphorus (µg/l) | pH | Total Suspended Solids (mg/l) |
|---|---|---|---|---|---|---|---|---|
| Barton | Brownington | May | 46.6 | 96 | 0.29 | 7.65 | 7.9 | 1 |
| | | June | 46.2 | 109 | 0.37 | 19.5 | 7.45 | **6.5** |
| | | July | 64.3 | - | 0.47 | **21.7** | - | - |
| | | August | 101 | 194 | 0.2 | 9.59 | **8.53** | 1 |
| | | September | 76 | 153 | 0.28 | 9.11 | **8.54** | 1 |
| | | October | 36.2 | 76 | 0.28 | 9.5 | 7.71 | 1 |
| Barton | Coventry Station | May | 59.5 | 173 | 0.3 | 14.9 | 7.84 | **5.67** |
| | | June | 64.5 | 183 | 0.35 | **37.3** | 7.47 | **27.7** |
| | | July | 90.9 | 236 | 0.32 | 18.7 | 7.55 | - |
| | | August | 99.2 | 252 | 0.34 | 18.2 | 7.88 | **5.62** |
| | | September | 95.5 | 242 | 0.3 | 19.5 | 8.06 | 2.3 |
| | | October | 50 | 122 | 0.32 | **27.7** | 7.7 | **17.3** |
| Barton | Crystal Lake | May | 32 | 115 | 0.2 | 5 | 7.91 | 1 |
| | | June | 32.8 | 113 | 0.18 | 7.51 | 7.69 | 1 |
| | | July | 35.4 | - | 0.16 | 7.72 | - | - |
| | | August | 37.8 | 118 | 0.11 | 7.38 | 8.07 | 1 |
| | | September | 36.6 | 111 | 0.12 | 7.04 | 8.04 | 1 |
| | | October | 32.1 | 96 | 0.19 | 6.62 | 7.81 | 1 |
| Barton | Glover Road | May | 72.1 | 191 | 0.26 | 6.06 | 8.28 | 2.06 |
| | | June | 67.8 | 184 | 0.31 | 14.7 | 7.98 | **7.69** |
| | | July | 93.1 | - | 0.33 | 11.9 | - | - |
| | | August | 109 | 251 | 0.33 | 9.45 | **8.52** | 1.71 |
| | | September | 116 | 258 | 0.3 | 5 | 8.32 | 1 |
| | | October | 62.3 | 134 | 0.24 | 9.27 | 8.02 | 3.2 |
| Barton | Orleans Wastewater | May | 66.3 | 200 | 0.28 | 10.8 | 8.15 | 2.99 |
| | | June | 68.3 | 197 | 0.3 | **24.9** | 7.87 | **10.6** |
| | | July | 94.9 | - | 0.6 | - | - | - |
| | | August | 114 | 314 | 0.38 | 16.2 | 8.24 | **6.13** |
| | | September | 84.2 | 247 | 0.27 | 8.9 | 8.36 | 1 |
| | | October | 57.9 | 141 | 0.32 | 18.7 | 7.98 | **11.7** |
| Barton | Willoughby Falls | May | 46.8 | 129 | 0.24 | 10.8 | 8.15 | 3.27 |
| | | June | 57 | 131 | 0.35 | **28.5** | 7.83 | **24.3** |
| | | July | 71.3 | 328 | 0.46 | - | 7.71 | - |
| | | August | 71.3 | 161 | 0.15 | 11.6 | 8.33 | 1.98 |
| | | September | 80.8 | 189 | 0.18 | 9.91 | **8.65** | 1 |
| | | October | 38.9 | 89 | 0.24 | 14.5 | 7.91 | **6.33** |
| Barton | Willoughby River | May | 36.3 | 84 | 0.24 | 5.32 | 7.89 | 1 |
| | | June | 37.3 | 100 | 0.23 | 6.1 | 7.87 | 1 |
| | | July | 38.3 | - | 0.2 | 6.18 | - | - |
| | | August | 38.4 | 93 | 0.17 | 5.02 | **8.53** | 1.7 |
| | | September | 42 | 90 | 0.15 | 6.32 | 8.13 | 1.01 |
| | | October | 36.4 | 87 | 0.18 | 5.72 | 7.85 | 1.81 |

| Tributary | Site | Month | Alkalinity (mg $CaCO_3$/l) | Electroconductivity (µs) | Total Nitrogen (mg/l) | Total Phosphorus (µg/l) | pH | Total Suspended Solids (mg/l) |
|---|---|---|---|---|---|---|---|---|
| Black | Coventry Bridge | May | 69.7 | 159 | 0.31 | 14.2 | 8.37 | 2.5 |
| | | June | 75.8 | 195 | 0.38 | **28.9** | 8.05 | **7.5** |
| | | July | 86.8 | - | 0.47 | **61.7** | - | - |
| | | August | 104 | 245 | 0.25 | 15.3 | **8.58** | 2.02 |
| | | September | 97.6 | 230 | 0.3 | 14.3 | 8.27 | 1.2 |
| | | October | 52.5 | 119 | 0.37 | **22.7** | 7.85 | **8.14** |
| Black | Craftsbury | May | 94 | 208 | 0.42 | 7.6 | 8.37 | 1.7 |
| | | June | 103 | 201 | 0.41 | 11.4 | 8.29 | 2.21 |
| | | July | 111 | - | 0.42 | 15.4 | - | - |
| | | August | 138 | 277 | 0.38 | 17.6 | 8.2 | **6.23** |
| | | September | 131 | 258 | 0.24 | 7.76 | 8.44 | 1 |
| | | October | 79.3 | 157 | 0.51 | 10.8 | 8.21 | 3.55 |
| Black | Lake Elligo | May | 81 | 189 | 0.16 | 6.6 | 8.02 | 1 |
| | | June | 80.5 | 181 | 0.15 | 9.09 | 7.89 | 1.06 |
| | | July | 85.2 | - | 0.21 | 9.16 | - | - |
| | | August | 107 | 218 | 0.17 | 6.63 | 7.57 | 1 |
| | | September | 108 | 272 | 0.18 | 12.3 | 7.43 | 1 |
| | | October | 74.7 | 162 | 0.16 | 6.26 | 7.97 | 1 |
| Black | Griggs Pond | May | 69.9 | 175 | 0.34 | 15.5 | 7.92 | 2.48 |
| | | June | 81.2 | 190 | 0.38 | **30** | 7.61 | **9.06** |
| | | July | 49 | - | 0.72 | **46.1** | - | **18** |
| | | August | 103 | 238 | 0.29 | **26.4** | 7.96 | **7.38** |
| | | September | 91.7 | 212 | 0.22 | **21.3** | 7.99 | 2.1 |
| | | October | 56.3 | 144 | 0.4 | **20.6** | 7.55 | **8** |
| Black | Lord's Creek | May | 80.8 | 158 | 0.19 | 7.39 | 8.21 | 1.3 |
| | | June | 95.8 | 207 | 0.26 | 15.9 | 7.86 | 2.16 |
| | | July | 101 | - | 0.41 | **36.1** | - | **6.48** |
| | | August | 126 | 240 | 0.2 | **24.9** | 8.13 | **15.9** |
| | | September | 120 | 225 | 0.18 | 15.4 | 8.19 | 1.17 |
| | | October | 71.9 | 142 | 0.24 | 17.6 | 7.87 | **6.9** |
| Black | South Bay | May | 68.2 | 161 | 0.36 | 15.6 | 7.92 | 2 |
| | | June | 74.1 | 199 | 0.49 | **34.3** | 7.47 | **10** |
| | | July | 92.5 | - | 0.47 | **39.4** | - | **12.6** |
| | | August | 105 | 256 | 0.44 | **25.9** | 8.25 | 3.85 |
| | | September | 85 | 208 | 0.4 | **24.7** | 7.85 | 4.02 |
| | | October | 52.4 | 111 | 0.36 | **23.5** | 7.74 | **7.6** |
| Clyde | Newport Ballfield | May | 40.8 | 127 | 0.41 | 12.9 | 8 | 1.8 |
| | | June | 47 | 119 | 0.38 | 18.5 | 7.78 | 2.25 |
| | | July | 50.4 | 157 | 0.41 | **24.7** | 7.73 | **12.5** |
| | | August | 60.3 | 167 | 0.65 | **22.1** | 8 | **7.24** |
| | | September | 55.4 | 145 | 0.23 | 13.7 | 8.3 | 1.62 |
| | | October | 37.4 | 98 | 0.43 | 18 | 7.7 | 1.7 |
| Clyde | Island Pond | May | 16 | 60 | 0.19 | 5.42 | 7.35 | 1.18 |
| | | June | 16.7 | 64 | 0.16 | 9.21 | 7.03 | 2.52 |
| | | July | 39.1 | 66 | 0.15 | 7.3 | 7.065 | 1 |
| | | August | - | 61 | - | - | 7.61 | - |
| | | September | 20.2 | 57 | 0.1 | 6.22 | 7.53 | 1 |
| | | October | 20 | 54 | 0.21 | 12 | 7.12 | 1.41 |

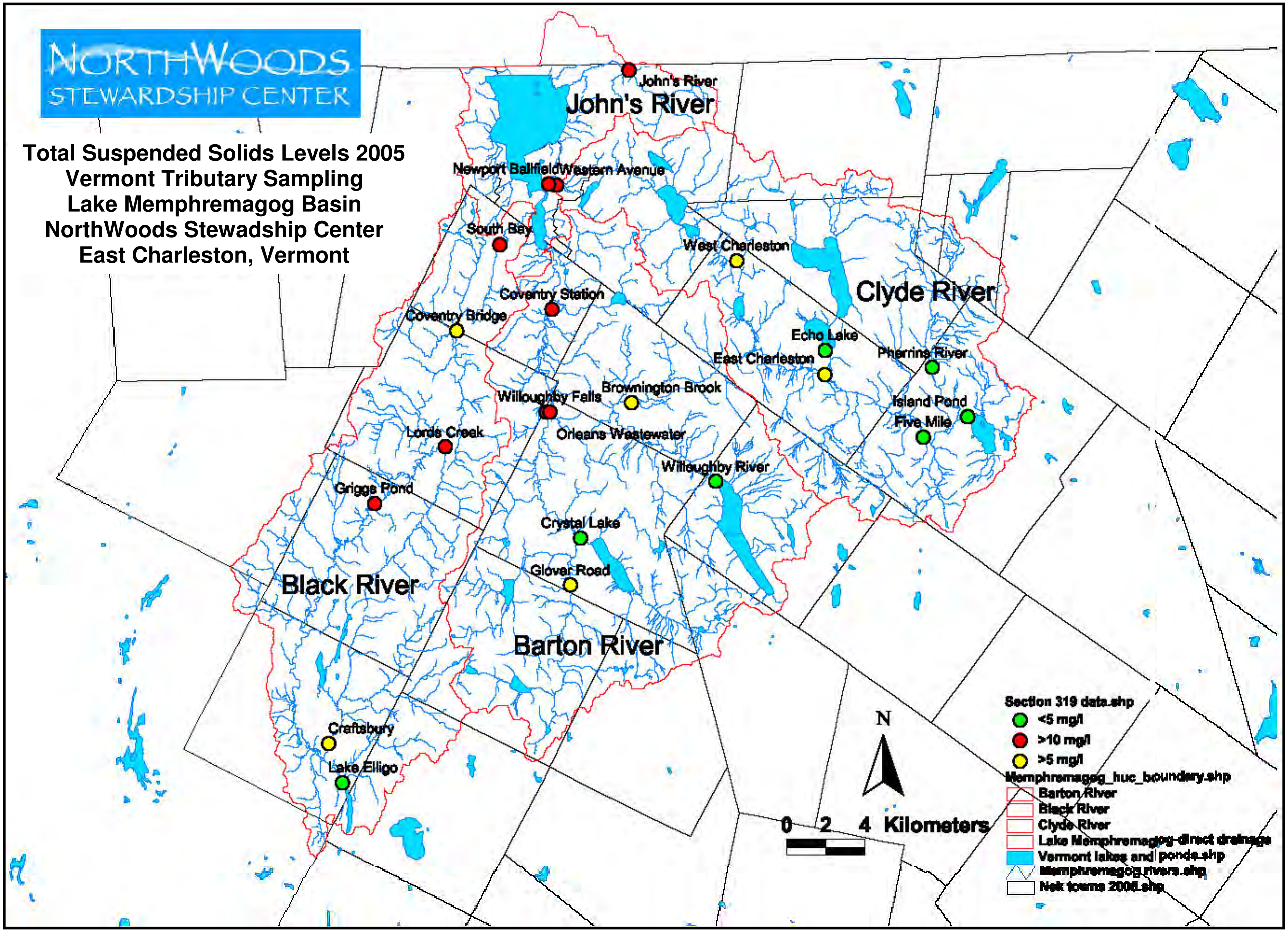
| Tributary | Site | Month | Alkalinity (mg $CaCO_3$/l) | Electroconductivity (µs) | Total Nitrogen (mg/l) | Total Phosphorus (µg/l) | pH | Total Suspended Solids (mg/l) |
|---|---|---|---|---|---|---|---|---|
| Clyde | Five Mile | May | 20.6 | 68 | 0.23 | 12.2 | 7.18 | 2.16 |
| | | June | 25.5 | 83 | 0.27 | 17.6 | 6.8 | 3.5 |
| | | July | 35.6 | 122 | 0.25 | 16.2 | 6.535 | 1.7 |
| | | August | 41.4 | 123 | 0.26 | 17.3 | 7.43 | 1.73 |
| | | September | 40.4 | 114 | 0.17 | 16.6 | 7.48 | 1 |
| | | October | 11.4 | 34 | 0.22 | 13.8 | 6.93 | 3.76 |
| Clyde | East Charleston | May | 26.3 | 74 | 0.31 | 17 | 7.03 | **6.5** |
| | | June | 27.3 | 76 | 0.3 | 19.5 | **6.49** | **5.94** |
| | | July | 43 | 126 | 0.24 | 15.9 | 6.84 | 3.5 |
| | | August | 44 | 121 | 0.21 | 11.9 | 7.38 | 1.52 |
| | | September | 43.9 | 114 | 0.18 | 12.7 | 7.43 | 1 |
| | | October | 23 | 55 | 0.24 | 10.5 | 7.1 | 1.74 |
| Clyde | Echo Lake | May | 32.7 | 91 | 0.18 | 5 | 7.8 | 1 |
| | | June | 32.1 | 97 | 0.23 | 5.55 | 7.39 | 1 |
| | | July | 34.1 | 98 | 0.13 | 6.59 | 7.535 | 1 |
| | | August | 34.6 | 86 | 0.11 | 5 | 8.01 | 1 |
| | | September | 33.4 | 83 | 0.1 | 5.35 | 8.09 | 1 |
| | | October | 33.8 | 82 | 0.14 | 8.09 | 7.62 | 1.27 |
| Clyde | Pherrins River | May | 16.9 | 53 | 0.2 | 6.69 | 7.27 | 1 |
| | | June | 21.5 | 65 | 0.26 | 10.7 | 6.93 | 2.7 |
| | | July | 40.5 | 112 | 0.25 | 9.61 | 6.85 | 1 |
| | | August | 45.1 | 122 | 0.18 | 17.6 | 7.58 | 1 |
| | | September | 37 | 101 | 0.12 | 7.27 | 7.5 | 1 |
| | | October | 7.8 | 19 | 0.23 | 10.6 | 7 | 3.88 |
| Clyde | West Charleston | May | 35.3 | 105 | 0.28 | 10.6 | 7.78 | 1.55 |
| | | June | 30.3 | 86 | 0.58 | 16.2 | 7.21 | 2.12 |
| | | July | 43 | 131 | 0.28 | **20.9** | 7.45 | **6.67** |
| | | August | 43.5 | 114 | 0.27 | 9.13 | 7.98 | 1 |
| | | September | 42.3 | 108 | 0.25 | 11.4 | 8.04 | 1 |
| | | October | 29.7 | 70 | 0.23 | 10.8 | 7.53 | 1.24 |
| Clyde | Western Avenue | May | 40.7 | 125 | 0.32 | 13.3 | 8.14 | 2.04 |
| | | June | 47.9 | 120 | 0.34 | 13.9 | 7.82 | 2.2 |
| | | July | 51.7 | 149 | 0.34 | 19.1 | 8.19 | 1.33 |
| | | August | 65.9 | 176 | 0.43 | - | 8.25 | **10.1** |
| | | September | 56.3 | 145 | 0.23 | 13.7 | 8.33 | 1.46 |
| | | October | 37.4 | 90 | 0.35 | 17.2 | 7.76 | 1.86 |
| John's | John's River | May | 132 | 400 | 2.5 | 16.6 | **8.55** | 1.76 |
| | | June | 117 | 304 | 1.39 | **49.7** | 7.92 | **21.6** |
| | | July | 144 | 426 | 2.94 | **81.5** | 7.8 | **12.1** |
| | | August | 167 | 478 | 6.06 | **51.9** | 8.24 | **17** |
| | | September | 173 | 485 | 5.12 | **29.9** | **8.51** | 1 |
| | | October | 124 | 300 | 1.49 | **27.9** | 8.23 | 4.65 |

**Bold values indicate those that exceed *both* Quebec and Vermont Water Quality Criteria:**
**Total phosphorus > 14 ug/l**
**Total suspended solids > 5 mg/l**
**pH < 6.5 or > 8.5**


NorthWoods Stewardship Center
Maximum or Minimum pH Levels 2005
Vermont Tributary Sampling
Lake Memphremagog Basin
NorthWoods Stewardship Center
East Charleston, Vermont
John's River
John's River
Newport Bellfield
Western Avenue
South Bay
West Charleston
Clyde River
Coventry Station
Coventry Bridge
Echo Lake
East Charleston
Pherrins River
Brownington Brook
Willoughby Falls
Orleans Wastewater
Island Pond
Five Mile
Lords Creek
Willoughby River
Griggs Pond
Crystal Lake
Glover Road
Black River
Barton River
Craftsbury
Lake Eligo
N
0 2 4 Kilometers
Section 319 data.shp
6.5-8.5
<6.5
>8.5
Memphremagog_huc_boundary.shp
Barton River
Black River
Clyde River
Lake Memphremagog-direct drainage
Vermont lakes and ponds.shp
Memphremagog rivers.shp
Nek towns 2005.shp



Phosphorus Levels 2005
Vermont Tributary Sampling
Lake Memphremagog Basin
NorthWoods Stewadship Center
East Charleston, Vermont



**Total Suspended Solids Levels 2005**
**Vermont Tributary Sampling**
**Lake Memphremagog Basin**
**NorthWoods Stewadship Center**
**East Charleston, Vermont**

# APPENDIX 6:

## DESCRIPTION OF SPECIES OF AQUATIC PLANTS

AGRICULTURE ET AGROALIMENTAIRE CANADA (2004) *Zostéracées - pondweed family*
http://res2.agr.ca/ecorc/weeds_herbes/fam07_f.htm

CARIGNAN, R. (2003) Département de Sciences biologiques de l'Université de Montréal. Communication personnelle.

ENVIRONNEMENT CANADA (2003) M*yriophylle à épi (Myriophyllum spicatum). Plantes envahissantes de milieux naturels du Canada.*
http://www.cws-scf.ec.gc.ca/publications/inv/p1_f.cfm

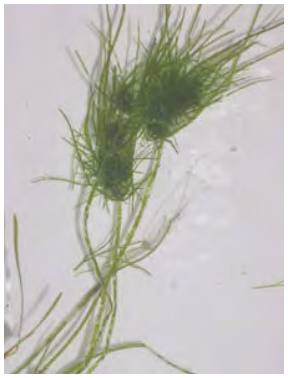
FLEURBEC (1987) *Plantes sauvages des lacs, rivières et tourbières*. Fleurbec éditeur, Saint-Augustin (Port-neuf), 399 p.

MARIE-VICTORIN, F. (1995) *Flore laurentienne*. Troisième édition, éditions Les Presses de l'Université de Montréal. 1093 p.

MINISTÈRE DE L'ENVIRONNEMENT DU QUÉBEC (MENV) (2002) *Myriophylle à épi, fiche synthèse pour information*. Direction du patrimoine écologique et du développement durable, Service de la conservation de la flore et des milieux naturels, Québec, 4 p.

# Description of Species of Aquatic Plants

## *CHARA* & *NITELLA* ALGAE



The algae Chara (muskgrass) and Nitella (stoneworts) are indeed algae although they resemble aquatic plants. In spite of their size, about 30 cm, species of the Chara and Nitella groups have no real roots, veins, stems or leaves like all other algae. These algae do not form real flowers, and they reproduce from yellow spores. They can be recognized by the typical skunk-like odour that many of them give off. Identification of Chara and Nitella usually requires examination in a laboratory setting, which is why we describe them together. These algae look like small, spindly, much-divided branches. According to our observations, these algae may form a fluorescent green to black carpet at different depths.

## BECK'S WATER-MARIGOLD *(MEGALODONTA BECKII)*

Beck's water-marigold is mainly found in marshes and, more rarely, in lakes and rivers where it grows by itself or in very small colonies (Marie-Victorin, 1995). In appearance, it is similar to a water-milfoil, and it has fooled more than one amateur botanist. This species has submerged leaves as finely cut as hair that fans out like the water-milfoils. However, it is easily distinguished when its leaves, triangular, waxy and fleshy to the touch, are present. Its very rare small yellow flowers are daisy-like and give off a fruity scent. Beck's water marigold is found only in waters rich in nutritive elements (mesotrophic or eutrophic) where it is only very rarely one of the dominant species (Fleurbec, 1987). It can reach a size of one metre in height, and prefers to grow on a silty bottom at a depth of one to three metres.

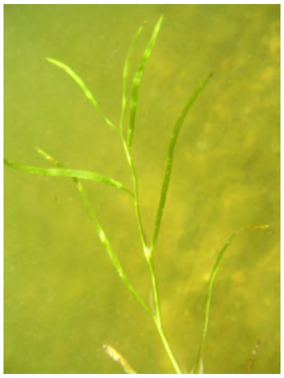
## HORNWORT *(CERATOPHYLLUM DEMERSUM)*

The hornwort is a submerged aquatic plant without roots, formed of rampant streamers (around one metre long) similar to those of the Eurasian watermilfoil. However, its threadlike leaves, stiff and terminating in two or three forks are very characteristic. In addition to its sexual reproduction, the hornwort produces buds (hibernacles) that come away at the end of the season of growth and develop the following spring into a new plant. This species colonizes the silty bottom of stagnant waters of marshes and quiet lakes. It can be found up to a depth of eight metres, but they are found particularly in sectors from two to four metres (Marie-Victorin, 1995).

### CANADA WATERWEED & NUTTALL'S WATERWEED *(ELODEA CANADENSIS & E. NUTTALLII)*

The Canada waterweed is a common submerged aquatic plant in our region. It generally measures less than one metre and grows in colonies that are often very dense and large. It has many small, dark green leaves and tiny, off-white flowers that float on the surface of the water at the end of a long stalk. Nuttall's waterweed has pale, more pointed leaves. Its male flowers have no stalk, and flower under water in the leaf axil (Marie-Victorin, 1995). These two waterweeds colonize calm waters of lakes and ponds. They root preferentially in one to three metres of water, but also adapt to deeper sectors. They settle in various substrata, mainly on silt or sand. They tolerate various degrees of eutrophication. The Canada waterweed, generally considered somewhat limiting to human activities, is potentially highly invasive, given that it can multiply by suckering and by budding (Fleurbec, 1987).

### WATER STAR GRASS *(HETERANTHERA DUBIA)* & ZOSTERA-LIKE PONDWEED *(POTAMOT ZOSTERIFORMIS)*



Water star grass is a perennial aquatic plant with long, flattened stems and leaves like straight, supple ribbons. It produces little yellow flowers that float on the surface of the water. In the absence of flowers, this species is often confused with the Zostera-like pondweed (*Potamogeton zosteriformis*) which is also indigenous. The botanist's trained eye can distinguish the central veins and the sharp tip of the leaves of the flat-stemmed pondweed. The two species are found growing with Canada waterweed in the calm zones of mesotrophic or eutrophic waters at a depth of from one to three metres (Fleurbec, 1987). Both are common in our region, and both prefer the silty bottoms of calm zones in lakes, ponds and rivers (Agriculture Canada, 2004).

### SPINY-SPORED QUILLWORT *(ISOETES ECHINOSPORA)*

Quillwort is a submerged aquatic plant, common in our region, which measures barely ten centimetres. Its linear leaves are gathered on the surface of the ground, giving it the appearance of a little tuft of grass. Its minuscule off-white spores at the base of each leaf are also identifying marks. Quillwort lives, typically, in oligotrophic lakes where it grows on various substrata at different depths (Marie-Victorin, 1995).

### RUSHES *(JUNCUS SP.)* & BULRUSHES *(SCIRPUS SP.)*

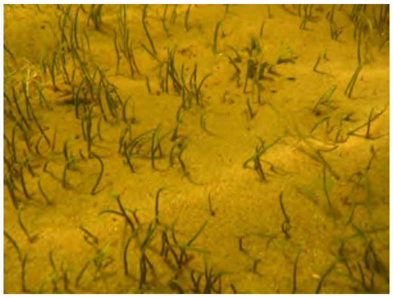
These families include a number of species that are widely distributed in our region (Marie-Victorin, 1995). They are herbaceous plants that grow in colonies on land or in the littoral zone of lakes and wetlands. They are usually found at a depth of less than one metre where they help to stabilize the shore. They are recognized by their cylindrical stem and their flowers gathered in a bouquet that looks as though it were attached to the side of the stem. Bulrushes have tiny brown spikelets.

### EURASIAN WATERMILFOIL *(MYRIOPHYLLUM SPICATUM)*

Eurasian watermilfoil is a large submerged aquatic plant that is very common in Quebec and Vermont. It grows in colonies that are often very dense (Fleurbec, 1987). This is one of five non-native plants that have caused the most environmental damage and have most greatly impacted use of the water in Canada (MENV, 2002). It resembles long streamers with finely cut, feather-like leaves encircling the stems. Once it takes root in the lake bottom, this species grows right to the surface where it branches out luxuriantly creating dense mats. Its little white or red flowers and its dark brown fruit come together in a spike that rises out of the water. The Eurasian watermilfoil is potentially very invasive given its rapid growth and diversity of means of reproduction. This species can reproduce by forming seeds and buds (hibernacles). The new individuals may develop from roots (the phenomenon of suckering). Also, every time a fragment of the stem breaks off, it can take root and generate another specimen (the phenomenon of buddring). Budding, its main means of multiplication, explains why it presents such a high risk of becoming invasive. Suckering happens naturally, caused by the action of wind and waves, but it is greatly increased by the passage of boats. Eurasian watermilfoil can grow in various types of sediments (gravels, sand, silt and plant debris) and at depths varying from a few centimetres to several metres (Fleurbec, 1987). This plant supports the highest levels of eutrophication. Because of its rapid growth habit, from the first spring day, Eurasian watermilfoil creates shade for other submerged plant species and thus limits their growth. Beds of Eurasian Water Milfoil have been known to become so dense that they crowd out all other species (Environment Canada, 2003). The invasion of this plant reduces the diversity of vegetation, and, therefore, the diversity of the fauna, especially the fish that are of interest for sports fishing.

### ALTERNATE WATERMILFOIL *(MYRIOPHYLLUM ALTERNIFLORUM)*

Alternate watermilfoil resembles its relative the Eurasian watermilfoil. However, it is smaller and much less invasive. It is found in several Quebec lakes, especially in colder regions. This submerged aquatic plant forms little streamers that usually cover the bottom in deep, dark zones of lakes and rivers where little natural light penetrates (Marie-Victorin, 1995). As a result of our observations, we consider this plant has little impact on limiting human enjoyment of watercourses where it is found.



### SLENDER WATERMILFOIL *(MYRIOPHYLLUM TENELLUM)*

Slender watermilfoil is a submerged aquatic plant found occasionally in the Eastern Townships. This water-milfoil is characterized by small, fine stems almost without leaves. This plant, which is not very invasive, is found on shallow sandy shores and banks of lakes, rivers and ponds.

### SLENDER NAIAS *(NAJAS FLEXILIS)*

Slender Naias is a small, submerged aquatic plant, 2-10 cm in height, which is very common in the fresh waters of our region (Marie-Victorin, 1995). This species is recognized by its bushy appearance and dense arrangement of small, triangular leaves. The flowers and fruit are hardly visible. According to our observations, Slender Naias roots in sandy, gravel or silt substrata at different depths. It can root in only a few centimetres to several metres of water, as long as the light can penetrate.

### POND LILIES OR COW LILIES *(N. MICROPHYLLUM, N. VARIEGATUM & N. RUBRODISCUM)*

Pond lilies are floating aquatic plants frequently seen in quiet waters of lakes, rivers and peat bogs. The three Quebec species are very large and all live in colonies. The yellow cow lily or variegated pond lily has larger leaves and flowers than its less abundant relative, the small pond lily. The red-disk pond lily is considered by many as a hybrid of the other two. The huge heart-shaped leaves and the magnificent yellow flowers floating on the water are very noticeable. Pond lilies also have submerged leaves arranged in a rosette at the base of the plant. They are usually found at a depth of 0.5 to 1.5 metres. They are particularly at home in the silty bottom of oligotrophic waters, and eutrophic waters (Fleurbec, 1987).

### WATERLILIES *(NYMPHAEA ODORATA & NYMPHAEA TUBEROSA)*

Anyone who has seen the beautiful white water lily is sure to admire it. The common water lily is abundant in our region, while the tuberous water lily is found less frequently. Both are around 50 cm in height and have large circular, waxy, floating leaves cut almost in half. Their huge white flowers with yellow centres float among the leaves. The two species can be told apart by the colouration of the underside of the leaves: wine-red for the common water lily and pale green for the tuberous water lily. As its name indicates, and in contrast to the tuberous waterlily, the common water lily has a sweet perfume. Water lilies root in the shallow silt (less than one metre deep) of sheltered sectors of lakes, ponds and peat bogs where they create a magnificent floating carpet. Colonies, sometimes very large, can sometimes be invasive.

## PONDWEEDS *(POTAMOGETON SP.)*

Identifying pondweeds can be a real challenge for both beginning and experienced botanists. This group includes a large number of species with miniscule and variable structures within a single species. In general, pondweeds have two types of leaves, tough, floating leaves and submerged, pellucid leaves and minuscule flowers grouped together on a spike. The main species of pondweed surveyed in our inventory include:

### LARGE-LEAVED PONDWEED *(POTAMOGETON AMPLIFOLIUS)*

Large-leaved pondweed is, without doubt, one of the most invasive of the indigenous plants in our region (Carignan, 2003). This perennial plant multiplies abundantly by suckering and by stem budding in many of our lakes and rivers (Agriculture Canada, 2004). It is easily distinguished by its big, submerged, reddish curved leaves that resemble an upside-down saddle. Its floating oval leaves and spikes that rise out of the water are visible from far away. According to our observations, this species of pondweed colonizes mainly the silty bottom at depth of two to four metres where it grows to the surface.

### CURLY PONDWEED *(POTAMOGETON CRISPUS)*

In some lakes in the region, this species of pondweed, introduced from Europe, is considered very invasive (Agriculture Canada, 2004). In addition to producing seeds, it multiplies rapidly by forming propagules (buds that form new individuals) and by suckering. Curlyleaf pondweed is easily identified by its stiff leaves rippled like lasagna. It grows at a depth of two to four metres in lakes and watercourses. It can adapt to different water qualities, even the dirtiest and most polluted, and can even penetrate the toughest geotextiles.

### ILLINOIS PONDWEED *(POTAMOGETON ILLINOENSIS)*

This species is also difficult to identify because of the great variability of its forms. Furthermore, it particularly resembles variable-leaved pondweed except that it has larger leaves usually without petiole (leafstalk). This indigenous pondweed is found in many of our lakes and rivers (Agriculture Canada, 2004).

### RICHARDSON'S PONDWEED *(P.RICHARDSONII)*, CLASPING PONDWEED *(P.PERFOLIATUS)* & LONG-PEDUNCLED PONDWEED *(P. PRAELONGUS)*

These three species, frequently seen in our region, are grouped together because of the similarity of their form and the hybrids they form among themselves. The most common of the three is Richardson's pondweed which forms dense and extended colonies. These three indigenous species are found in the slow-moving or calm waters of lakes, rivers and ponds (Agriculture Canada, 2004). These pondweeds can be identified by their many circular or oval apple green leaves that encircle the off-white stem. According to our observations, they are found at depths of two or three metres on fine sediments.

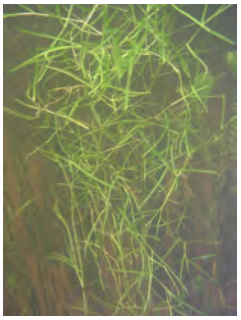
## ROBBINS'PONDWEED *(POTAMOGETON ROBBINSII)*

Dense colonies of this pondweed cover the soil of many of our lakes (Marie-Victorin, 1995). The rigid, linear brownish leaves are arranged in two rows on either side of the stem. This plant, which looks like a feather, measures about 50 cm. Its leaves provide food for a number of aquatic organisms. Robbins' pondweed lives mainly on the silty bottom at various depths. It poses a high invasion threat.

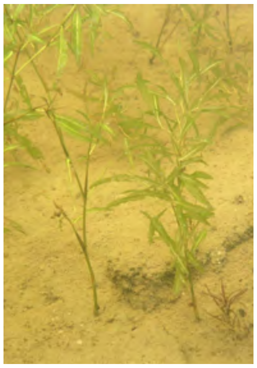
## EMERSED PONDWEED *(POTAMOGETON EPIHYDRUS)*

This pondweed is characterized by long, linear submerged leaves with a central, clearer strip. It is one of the most common pondweeds in our lakes and rivers. Colonies generally grow in shallow silt and sand (0.5 to 1.5 m) (Marie-Victorin, 1995). However, during our inventory, we noted it at greater depths. This species tolerates a wide range of water qualities (Fleurbec, 1987). Because of its great size and high reproduction potential, this species could invade a large part of the water column.

## LEAFY PONDWEED *(P. FOLIOSUS)* & SMALL PONDWEED *(P. PUSILLUS)*



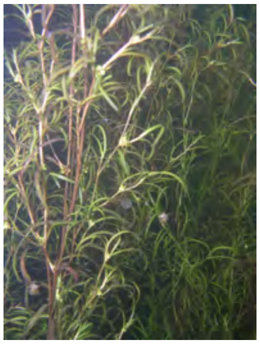
We describe these two species of pondweeds together because they are so similar, and when they vary, it is sometimes impossible to tell them apart. In a general way, they are recognized by their small, submerged leaves and their tubular branched stems. These two common species of our lakes are usually less than one metre high and they colonize calm, shallow waters (Marie-Victorin, 1995).



## GRASS-LEAVED PONDWEED *(POTAMOGETON GRAMINEUS)*

Because of their extremely variable forms, identification of the Grass-leaved pondweed is quite difficult. There are several varieties and hybrids of this indigenous pondweed related by their intermediate forms. To simplify, we recognize them by their translucent, submerged, lanceolate reddish leaves. Grass-leaved pondweed is widely distributed in calm waters of lakes, rivers and marshes (Marie-Victorin, 1995). It seems to have adapted to different substrata and depths of water.

## DIMORPHOUS PONDWEED *(P. SPIRILLUS)*

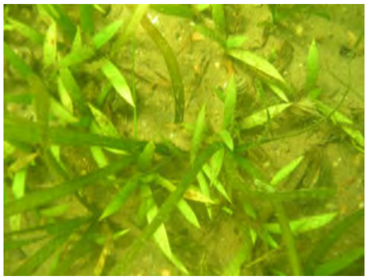


Dimorphous pondweed closely resembles leafy pondweed and small pondweed. In a general way, it is recognized by its small, linear, submerged leaves and its tubular branched stem, and by the many spikes situated directly on the stem. This species is usually less than one metre high and colonizes calm, shallow waters (Marie-Victorin, 1995).

### BUR REEDS *(SPARGANIUM SP.)*

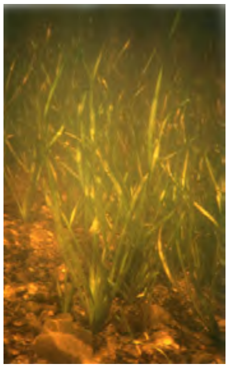
These long fettuccini-like plants (but not edible), which are found often in our regions, are quite noticeable. Bur reeds, moderately limiting in terms of aquatic activities, can form dense, widespread colonies. Bur reeds have long leaves, one to two metres long, that float on the water. They are also recognized by their fruit shaped like a spiny egg that rises out of the water. Bur reeds can live in a wide variety of habitats. They grow on different substrata in calm sectors of lakes, streams and rivers. They root generally in shallow water at less than two metres

### GRASS-LIKE ARROWLEAF *(SAGITTARIA GRAMINEUS)*



Grass-like arrowleaf is a submerged aquatic plant of about ten centimetres found frequently in our lakes. This species of arrowleaf is formed of a cluster of submerged triangular, curved back leaves that look like pineapple leaves. It grows in shallow water, essentially at less than 50 cm, although it may be found in deeper water. It also adapts to fluctuations in water level. It grows mainly in sandy and sometimes silty substrata where it can form huge colonies. This plant adapts to different water qualities, but grows particularly well in oligotrophic waters (Fleurbec, 1987).

### AMERICAN EEL-GRASS *(VALLISNERIA AMERICANA)*



American eel-grass is a submerged aquatic plant found more and more often in our region. It is easily distinguished by its long supple, ribbon-like leaves that grow at the base of the plant and can reach a size of one metre and a half in length. Its small female flowers, which float on the surface of the water at the end of a stem twisted like a corkscrew, are specific to this plant. American eel-grass can root in various substrata (silt, sand, gravel) at variable depths and sometimes up to five or six metres (Marie-Victorin, 1995).

# APPENDIX 7:

## PRINCIPAL SOURCES OF DEGRADATION OF A LAKE

# Principal sources of degradation of a lake

Principal sources of sediments and nutrients by various stakeholders in the surrounding environment

| Intervenants | Sources of nutrients and sediments |
|---|---|
| Shorefront | • Non-conforming septic systems<br>• Fertilizers used on lawns and flower beds<br>• Human changes, activities on the shore (artificialization)<br>• Residential construction sites<br>• Leakage from sewage collectors or illegal hook-ups of domestic sewage to outfall sewers and storm sewers |
| Farmers | • Excessive spreading of manure, liquid manure, compost or chemical fertilizers<br>• Erosion of soils left unplanted<br>• Human changes on the shore (artificialization)<br>• Agricultural ditches stripped of vegetation<br>• Access by animals to watercourses<br>• Improper storage<br>• Runoff from exercise yards |
| Forestry | • Erosion of soils left bare<br>• Human changes on the shore (artificialization)<br>• Forest ditches left bare |
| Managers of the territory | • Road ditches scraped and left bare<br>• Human changes on the shore (artificialization)<br>• Fertilizer spread near a body of water |
| Contractors | • Human changes on the shore (artificialization)<br>• Erosion of soils left bare<br>• Leachates |

**Human activities on the shores of lakes and tributaries**
Cutting of vegetation on the shore buffer zone and installation of artificial structures (walls, riprap or rock fill, etc.) prevents the shores from holding sediments and nutritive elements and contribute to warming shallow waters.

**The use of pesticides and chemical fertilizers near lakes and their tributaries**
These products contaminate the water and enrich it with nutritive elements.

**Municipal wastes, over-burdened water treatment plants, and urban run-off**
These inputs contribute specifically to the load of materials in suspension, nutrients and organic matter.

**Poorly maintained road and forest ditches**
Removal of vegetation from ditches causes deterioration in the quality of the water travelling through them before it reaches watercourses and bodies of water. (This causes these bodies of water to be 'asphyxiated' because they have less oxygen, are warmer and carry more soil particles, nutrients, etc.).

**High residential density on certain parts of the lake**
Human presence may cause more inputs (sediments and nutrients), because of some practices (poor maintenance of septic systems, the use of fertilizers and pesticides, etc...)

**Certain seasonal-recreational activities**
Some nautical activities lead to a disposal of a variety of pollutants in the water (hydrocarbons, nutrients, etc.) and contribute to increasing the erosion on the shore.

**Certain recreational and tourism activities in the drainage basin**
Some golf courses, ski stations, marinas and camp grounds are the source of considerable quantities of sediments and nutrients.

**Certain agricultural practices in the drainage basin**
Runoff from agricultural lands can carry a surplus of nutrients, suspended solids and fecal coliform to the lake, particularly if the shore buffer zones are not wide enough, if drainage ditches are not replanted or if farm animals have access to watercourses. Furthermore, spreading of liquid manure, manure and chemical fertilizer may cause a significant increase in the nutrient load.

**Certain forestry practices in the drainage basin**
Abusive wood cuts and some kinds of passages and water-crossings allow sediments and/or nutrients to enter the lake.

**Certain construction activities**
Construction practices that leave the ground bare increase erosion.

**Certain industrial activities**
A number of companies, mining sites or landfill sites are likely to produce large quantities of pollutants that must be disposed of.

# APPENDIX 8:

## GENERAL SOLUTIONS TO IMPROVE THE HEALTH OF A LAKE

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# General Solutions to Improve the Health of a Lake

The type of activities carried out in the catchment basin of a lake are of crucial importance for the health of the lake. All the stakeholders in the area are responsible for its health, whether they are managers of the territory, shorefront residents or citizens, farmers, foresters or entrepreneurs. They may - and they must - take concrete action to limit the sources of degradation and protect and preserve this irreplaceable resource for future generations. To act, in a precise and effective way, the following basic principles must be respected:

**1- Reduce the sediment load by controlling soil erosion**
(Control soil stability and reduce the amount of vegetation removed)

**2- Reduce the nutrient load (phosphorus and nitrogen)**
(Reduce use of fertilizers near the lake and its tributaries and control waste water and sewage)

This appendix contains the main solutions we propose for different stakeholders. This list was drawn up by RAPPEL in collaboration with MCI, the Mininstère du Développement durable, de l'Environnement et des Parcs du Québec (MDDEP), the MRC de Memphrémagog and the Comité de gestion de la rivière Saint-François (COGESAF). These solutions should be prioritized according to the needs and limitations of each lake.

## Associations of Shorefront Residents

**Bring in managers of the territory when setting up a management committee for the lake and take part in joint action meetings**
In collaboration with the managers involved, create a committee that will act as a political authority and management organization for the lake and its tributaries. In the committee, draw up and implement a global action plan to protect the lake including a template contract for the catchment area (see the section for managers).

**Support managers of the territory in protecting the shoreline buffer zone and controlling soil erosion and the nutrient load**
Encourage managers to apply various concrete measures to reduce the sediment and nutrient load (lower-third method, anti-erosion structures in steep slopes, ban the use of pesticides, herbicides and fertilizers for aesthetic purposes near a body of water, etc.). Report problems and special cases to the managers so corrective measures can be taken.

**Organize, in collaboration with managers, a major public information and awareness campaign concerning ecological lawn maintenance**
Explain by talks and workshops onsite, the harmful impacts of using pesticides and chemical fertilizers and the alternatives for lawns and flower beds, particularly in the shoreline environment.

**Organize a campaign to re-naturalize the shores**
Make people aware of the importance of having adequate vegetation on the shore line (3 strata) as the last line of protection for the lake, through workshops for shorefront owners that will provide information and explanations and concrete demonstrations of how to re-naturalize the shores.

**Participate with territorial managers in monitoring the lake and drainage basin**
Participate in precisely identifying the causes of degradation of the tributaries of the lake on the ground. Put in place a regular water quality monitoring program for the lake and its tributaries, the condition of the shore and the condition of the littoral.

# Managers of the Territory

(municipalities and government)

Territorial managers play a key role in protecting lakes because theirs is the primary responsibility for citizen education, promotion of the desire to protect the lakes, supervising land use planning in the territory, and developing and applying the laws. We propose solutions at these different levels to be prioritized according to the need.

## EDUCATION

Prevention remains an excellent method of assuring the quality of a lake. It appears that certain users of the territory act or behave in ways that harm the aquatic ecosystem simply through ignorance about the impact of their actions. We recommend, therefore, that users be made aware of the reasons for and methods of protecting the shore zone and keeping it in its natural state and restoring zones that have been perturbed.

**Provide an information kit for new residents about good practice and harmful acts and behaviour, and the by-laws and regulations protecting aquatic ecosystems**
To prevent much of the damage to aquatic ecosystems, it is important to make new shorefront owners aware of the laws and regulations, the harmful impact of certain practices on the shore and the concrete actions they can take to protect their lake.

**Inform and make the various actors (shorefront owners, foresters, farmers) aware of the pressing need to protect the shoreline buffer zone of the lake and its tributaries**
The shoreline buffer zones is a biological, economic and legal necessity which is still not well known, understood or respected by many of the stakeholders.

**Develop and launch, in collaboration with lakefront property owners, a far-reaching awareness and public information campaign targeting ecological lawn maintenance**
Explain the harmful impact of using pesticides and chemical fertilizers, with pamphlets, talks and/or workshops on the ground, and promote the alternatives for ecological lawn and flower bed maintenance, particularly in the shoreline environment.

**Inform and make citizens more aware about the health of the lake and its tributaries, its evolution and the sources of its degradation**
To mobilize citizens, they must be informed about the health of the lake and the consequences of its health on the ecosystem, on consumption, swimming, fishing and the regional economy.

**Organize information meetings with professionals (experts from the various ministries and groups concerned) about the health of the lake and the sources of degradation**
Empower citizens to become more aware users of the territory and better protectors of the environment.

## PROMOTION OF ENVIRONMENTAL PROTECTION

Management of ditches is a key strategy for territorial managers. Around 50 % of the waters that drain into the lake get there via ditches (RAPPEL, 2004). Poorly maintained ditches (where the vegetation has been totally removed) erode quickly and cause the water flowing through to deteriorate. These warmer waters, with less oxygen, loaded with suspended solids and various pollutants “asphyxiate” the bodies of water. To effectively manage ditches:

**Systematically apply the lower-third method when cleaning ditches**
This economical and ecological technique makes it possible to reduce the load of suspended materials (particles) in the water, keep the water cleaner and more oxygenated, and, as a result, reduce the silting up of bodies of water. It also makes it possible to reduce by 20 % the costs of cleaning road ditches by decreasing the volume of excavation and the frequency of intervention (MTQ,1998).

To learn more: Le fossé écologique…et économique (video, in French) (RAPPEL, 1999)
Environmental protection sheet FPE-01 from the Quebec Ministère des Transports (MTQ, 2000)

**Systematically install anti-erosion structures (berms or sills) in road ditches with a slope greater than 7 degrees**
This will prevent water from becoming an agent of erosion by reducing the speed of run-off.

To learn more: The Battle Against Erosion on Construction Sites and Soils Stripped of Vegetation (RAPPEL, 2003)

Management of municipal effluents that pollute is an important part of the work of managers of the territory. For effective control of effluents :

**Respect the capacity of the water treatment network**
The capacity of treatment facilities should always make it possible to properly treat all grey water and sewage from residences and industries to prevent overflow. This will make it possible to limit the proliferation of aquatic plants and pathogenic micro-organisms that affect the safety of water in the drainage system.

**Eliminate overflows**
Eliminate combined systems of rains sewers and domestic sewers or by putting in retention basins for overflow structures.

**Store road salt and ploughed snow on an impermeable soil**
Ensure that there is a proper distance between a storage site for ploughed snow and watch for sedimentation of water that runs off before it enters the drainage system. Manage storage sites according to protection regulations.

**Choose the road salt that is the least toxic for the environment**

## SUPERVISION OF ACTIVITIES

Environmental protection in the watershed of the lake involves various levels of government. It is essential for them to act together, for each to play his role and for citizens to get involved. To do this:

**Citizens and groups must get more involved in environmental protection**
Citizens are excellent guardians of the environment and can help protect the health of the lake. It would be useful to provide tools to delegate powers and responsibilities to citizens' groups (e.g. education for newcomers related to laws and regulations in force on the shore of a body of water).

**Simplify the process of making a complaint when there is an environmental problem**
Citizens are the eyes and ears of managers. Thus, problems must be effectively dealt with when citizens bring them to their attention, and there must be a clear follow-up and procedure for all complaints.

**Continue programs to monitor water quality of the lake and its tributaries**
Continue to collect data on the health of the lake and sources of degradation to provide a precise picture of the current situation of the lake and its drainage basin, and put in place indicators to allow an assessment of the impact of decisions taken. Disseminate the results obtained as widely as possible.

**Establish a clear and specific portrait of land uses in the watershed of the lake**
The condition of the terrestrial environment plays a very important role in the health of the lake because the waters that flow through it flow into the lake. A picture of land use makes it possible to identify potential sources of pollution and to determine intervention priorities.

**Create a management committee and draw up a global action plan to protect the lake**
Form a management committee (political authority) charged with protecting the lake, involving the municipalities concerned and the stakeholders from the milieu. This committee would draw up a short-, medium- and long-term strategic plan by setting priorities (taking into account the seriousness of the disbenefits encountered, the ease of application, the availability of interveners and the financial resources available), set specific deadlines, draw-up a contract (drainage basin-type contract) and then take action! It is necessary to follow a concrete action plan to assure water quality in lakes (MEF, 2002).

**Organize joint action meetings to protect the health of the lake**
Bring together representatives of all players (local managers, professional groups concerned, experts from the regional ministries, association of shoreline property owners, RAPPEL, etc.).

# REGULATION

Existing legislation is intended to ensure overall protection of water quality, but unfortunately there are gaps. In addition to adopting by-laws that conform with the regional land use and development plan (the *Schéma d'aménagement*), municipalities can also adopt additional protection measures to deal with special situations and to fill these gaps (MEF, 2002):

**Protect vulnerable, fragile and sensitive sites and bodies of water**
To ensure that they will be protected into the future and that their roles in the ecology is protected, certain exceptional forest sites, spawning grounds, wetlands and shoreline buffer zones must be protected. Before adopting a subdivision plan and issuing building permits, the presence of all watercourses and wetlands that could be affected should be checked, and their protection assured.

**Ensure that the list of watercourses to protect is complete, and add to it, if necessary**
For example, in Quebec, all bodies of water identified on a map at a scale of 1 :20,000 in the 1978 toponymic list are protected. However, it is likely that some permanent or ephemeral watercourses and certain major wetlands that drain into the lake are not included. The first step in protecting them would be to include them on this list.

**Regulate the use of chemical fertilizers for aesthetic purposes on residential lawns, especially in wooded areas in the 300 metres surrounding the lake**
Taking account of the clearly harmful effects of these pesticides on aquatic ecosystems, certain municipalities in Quebec have adopted a by-law to regulate pesticide use. Also, as is the case for public and para-public lawns since 2003, starting April 2006, it is forbidden to apply some of the most harmful pesticides on private lawns.

**Adopt a by-law to control sediments at construction sites**
In one year alone, from 10 to 100 tonnes of soil per acre may be carried away from construction sites or from stripped ground (ODNR, 1996). There are, however, many techniques to reduce this excessive erosion (see the section dealing with building contractors).

To learn more: The Battle Against Erosion on Construction Sites and Soils Stripped of Vegetation (RAPPEL, 2003)
Model By-law to control erosion (RAPPEL, 2002)

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## CONTROL

In many cases, the legislation will be adequate to ensure the protection of the lake, but it is not always respected. For example, in spite of clear laws that require that the buffer zone at the edge of the lake be respected, it is often non-existent or very greatly disturbed. Better control and respect for environmental norms is necessary.

**Make sure that the by-laws concerning the buffer zone on the edge of lake and tributaries are respected**
Given the essential role it plays, the shoreline buffer zone of 10 to 15 metres (depending on the slope) around lakes and bodies of water in Quebec (MEF, 2002) must be respected. It is recommended the municipal inspectors receive ongoing training to allow them to properly enforce the by-laws.

To learn more: Guide des bonnes pratiques pour la protection des rives, du littoral et des plaines inondables (MEF, 2002).

**Make sure that septic systems of private residences are in compliance**
Keeping track of the type of septic tank and field and its condition, and checking that they are in working order are excellent ways to prevent pollution spills of effluent. Municipalities are responsible for periodically checking that the septic facilities on their territory comply with the law.

To learn more: Regulation respecting waste water disposal systems for isolated dwellings

**Require that septic systems be emptied as required**
To do this, the municipality must set up a register to assess the need to empty tanks, in which contractors must put a copy of their bill for emptying the tank.

**Ensure that companies respect the environmental norms and regulations**
Ensure that building contractors, industries, landfill sites, golf courses, marinas, camp grounds and all other contractors and entrepreneurs respect government norms and municipal by-laws.

**Make sure a rehabilitation plan is enforced for extraction sites that have ceased activities**
These sites can be major sources of sediments and pollutants.

**Ensure that lands that are sold are sufficiently large**
In Quebec, to allow each lot to have forestry cover of at least 50 %, lots that are sold must have a minimum area of 3,716 $m^2$ (40 000 ft.$^2$) as part of the forested areas around lakes, according to the *Act respecting Land Use Planning and Development* (Act 125).

When a person settles on the shore of a lake, he is looking for a special setting, perhaps a place where he can fish or swim. To maintain this high environmental quality, shorefront owners on the lake and its tributaries must pay particular attention to the impact of their own activities. By conserving the lake in its natural state, maintaining the lawn in an ecological way, ensuring that the septic tank is in compliance with the various regulations and by-laws, and by behaving respectfully toward the lake, the shorefront owner can avoid causing harm to the ecosystem, and over the longer term, continue to improve the health of the lake.

## THE NATURAL ATTRACTION OF THE LAKE

When a lake remains beautiful, natural and healthy it maintains its value and attractiveness for Quebecers. However, the shores of some lakes in the region have suffered disquieting transformations of their natural characteristics (RAPPEL, 2000). It cannot be denied that the artificialization of shores has a negative impact on aquatic ecosystems: erosion and leaching of soils, warmer water temperatures, silting on the bottom, proliferation of aquatic plants and premature eutrophication . Moreover, artificialized shores have a lower real estate value than those which are natural (Dubé, 1998). Here are a few ways to preserve the natural beauty of the shore which is so important to preserving the lake and all it contributes to the ecology, biology and economics of the lake:

To learn more : Stratégies pour la protection de l'environnement des lacs (McNeil, 2004)
Guide des bonnes pratiques pour la protection des rives, du littoral et des plaines inondables (MEF, 2002)
Nature and Shorelines (RAPPEL, 2001)

**Respect the integrity of the shoreline buffer zone**
The strip of vegetation surrounding the lake or body of water is of vital importance for aquatic ecosystems because it slows erosion, filters nutrients, cools the water and provides habitat for fauna. This buffer zone must be at least **10 to 15 metres in depth** (as a function of the slope), starting from the high water line (MEF, 2002). The shore zone usually has three strata of natural vegetation (**herbaceous plants, shrubs and trees)**. It is important to restore the shoreline zone, when it is damaged, by discontinuing the practice of cutting the grass (thereby allowing nature to take its courses) or by planting various indigenous species.

**When it is necessary to stabilize the shore, use the most natural technique possible**
A heavily sloping property, greatly eroded, or where the shoreline is very exposed to waves, may require additional stabilization. When this is the case, it is better to choose the technique that is most likely to facilitate the introduction of vegetation, to re-establish the natural condition of the shore. Various bioengineering structures can also be used, including fascine planting, bundles of sticks, and brush mattresses.

**Re-vegetation of artificial developments on the shore**
Covering of walls, low walls and gabions (made of wood, concrete or stones) with plants and shrubs makes it possible to limit excessive heating of the water caused by these developments or facilities, better stabilize the shore and offer a more natural transition between the terrestrial and aquatic milieus, and the economic advantages mentioned above.

**Integrate the lawn into the natural surroundings and make sure there is vegetation covering at least 60 % of shoreline property**
A lawn integrated into the natural surroundings, a small lawn arranged behind the shoreline buffer zone, makes an agreeable place where sitting out in the sun does less harm to the body of water than the kind of lawns seen in the city. To buffer the presence of human activity, maintain natural vegetation on at least 50 % of the area of each property smaller than 3,716 m$^2$ and on at least 60 % of the area of a property larger than 3,716 m$^2$. Encourage biodiversity on your lawn – sow a mixture of graminaceae and clovers.

**To give access to the lake, make a *green window***
When the slope is lower than 30 %, make a path 5 metres wide at a maximum angle of 60 degrees to the shore. When the slope is greater than 30 %, put in a stair or a path, keeping the shrub and herbaceous strata (MEF, 2002). This *green window* allows access to the lake without interfering with the integrity of the shoreline buffer zone and without creating erosion.

**Construct and adequately renovate docks, wharves , landing stage and boat houses**
To ensure the free circulation of water, protect spawning grounds and prevent the build-up of sediments and the proliferation of aquatic plants, structures must be built on pilings or posts. It is preferable to build or renovate them with inert materials such as untreated wood (tamarack, cedar, etc …), aluminium or plastic.

To learn more: Guide des bonnes pratiques pour la protection des rives, du littoral et des plaines inondables (MEF, 2002)
The Dock Primer (Burns, 2002)

**Never fill or dredge in the littoral or build right in the bed of the lake**
Make sure that the laws on the books to protect spawning grounds situated in the littoral zone are enforced to avoid destroying the aquatic ecosystem.

## LOOKING AFTER LAWNS AND FLOWER BEDS

Maintenance of lawns and flower beds is one of the biggest sources of degradation of a lake (RAPPEL, 2000). A lawn cannot check erosion, nor filter out nutritive elements, nor prevent warming of water. Moreover, much of the fertilizers, herbicides and pesticides used on a lawn is carried into the water. The negative impacts of these products on the environment (e.g. on fish and batrachian species ) is incontestable. It is possible, however, to keep a lawn healthy and green without degrading the lake. To do this :

To learn more: Pelouses et couvre-sols (Smeesters, 2000)
Trousse d'action de la Coalition pour une alternative aux pesticides (CAP, 2004)
The Shore Primer (Ford, 2002)

**Abolish the use of chemical fertilizers in the forest environment (300 m)**
To avoid the abnormal proliferation of aquatic vegetation, the spreading of fertilizers and chemical fertilizers must be banned in the first 300 metres around the lake, because they are liberated quickly and easily washed into the watercourse by the rain.

**The use of organic fertilizers must be limited as much as possible**
Because they hold nutritive elements, vegetal compost is preferred to chemical fertilizers but it must still be moderately used.

**Ban the use of chemical pesticides in the forest environment (300 m)**
The integrated approach to pest control, where the basic principle is regular inspection of the environment, makes it easy to spot the presence of vermin early. If all prevention methods have been tried and it is necessary to use pesticides, choose a product that has the least possible impact on the environment and human health. In Quebec, starting April 2006, as is the case for public and parapublic lawns since 2003, certain of the most dangerous pesticides will be banned on private green spaces.

## SEPTIC SYSTEMS AND TREATMENT OF SEWAGE

For many years, water pollution by septic systems has been a serious problem in Quebec. Our thinking and practices have changed over the years, and today sewage must be treated by a septic system that is in compliance by virtue of the *Regulation respecting waste water disposal systems for isolated dwellings.* It is important, however, to remain vigilant and to pay attention to certain aspects:

To learn more: Regulation respecting waste water disposal systems for isolated dwellings
L'installation septique traditionnelle (Le Sauteur, 2004)

**Make sure the septic tank is the appropriate capacity and efficiency, and check the level regularly and have it emptied as required**
Maintain the efficiency of the drainage field, avoid costs related to unblocking it and prevent overflows that could contaminate a body of water.

**Do not put anything into the septic tank that cannot decompose**
To avoid obstruction of the septic tank, avoid putting any wastes that are not quickly biodegradable (e.g. cigarette butts, sanitary napkins, hair, etc.).

**Protect and avoid overloading the septic system**
Do not channel rainwater toward the septic system. Avoid having cars and trucks drive on top of the drainage field. Plant herbaceous plants on the drainage field. Avoid using cleaning products containing phosphates and other pollutants.

## ATTITUDES AND BEHAVIOUR

Be a good citizen and behave as you would wish others to behave toward the lake. The following are ways a good steward of the lake would behave:

**Use your boat safely and be respectful to others, especially near the shoreline**
Drive slowly near the shore to minimize waves because they can cause erosion.

To learn more: Rapport Boucher (Boucher, 1999)
Safe Boating Guide (POC, 2003)
The Code of ethics for water activities on lake Memphremagog (MCI, 2006)

**Avoid the kind of craft that are likely to damage the lake**
Certain kinds of boats and craft (e.g. cigar boats and personal watercraft) cause more damage to a lake than others, so this should be taken into account when buying or renting a boat.

**Don't feed ducks or other migratory birds**
Feeding the ducks brings larger numbers of migratory birds than there would normally be, and they remain longer than they normally would. Their excrement causes deterioration of water quality and adds phosphorous and fecal coliform bacteria.

**Get involved in groups working to protect the lake**
The participation of more and more people ensures that groups of volunteers will be well run, effective and legitimate.

To learn more: Contact associations of shorefront property owners or groups to protect the lake, RAPPEL or other environmental groups.

**Become an environmental watchdog on the ground**
Support managers by speaking out against those who harm the environment and act abusively. Disseminate information to other property owners on the lake about ecologically friendly ways to behave to protect the lake.

To learn more: Speak to your local municipal inspector
Contact property owners' associations, RAPPEL , or other environmental groups

# Farmers

Agricultural pollution, pollution related to agricultural activities has become a serious problem in Quebec. Certain agricultural practices promote erosion and lead to nutrients finding their way into bodies of water. Studies show that one acre of agricultural soil without vegetative protection on a gentle slope can lose up to 7 tonnes of soil per year; this lost soil ends up in the drainage basin (ODNR, 1996). The following are some concrete ways to reduce agricultural pollution.

## THE SHORELINE BUFFER ZONE

Many studies have shown that when cattle have free access to water courses, they contribute to degradation of the shore, to sedimentation of the bottom and contamination of water by pathogenic micro-organisms. On the other hand, preventing cattle from gaining access to watercourses will ensure better health and safety for the cattle which translates into better productivity for the farm.

- Respect, at the very least, the by-laws governing the shoreline or river buffer zone for all watercourses (including redirected streams) and all other runoff ditches.
- Remove cattle from near the watercourse and the buffer zone by developing a controlled drinking site, by fencing the shore or riverside, and developing ecological sensitive water-crossings.

To learn more: Aménagement de sites d'abreuvement contrôlé pour le bétail au pâturage (Laroche, 2002)

## CULTURAL PRACTICES

When fertilizers are not absorbed by cultivated plants, they are carried by water and help to accelerate eutrophication of bodies of water. This happens particularly when excessive quantities are spread, when fertilizers are spread too near a watercourse, or during a period of dormancy or when the soil is not permeable (that is when it is frozen or snow-covered). Drainage of agricultural soils may contribute to major losses of arable soil and to heavy loads of suspended solids in the hydrologic system. Finally, soil left bare, such as soil that has been tilled, is particularly susceptible to erosion. Runoff from storage structures, livestock facilities or dairies is loaded with phosphorus, SS, bacteria and other pollutants and can thus contaminate surface and underground waters. To reduce the harmful impacts on the environment, it would be useful to:

- Set up an agro-environmental plan for fertilizing, that takes account of the real needs of plants and the soil's capacity to support them, calculate the optimal quantity of fertilizer to use, and use no more than this amount.
- It is better to use solid rather than liquid manure, because the phosphorus in manure leaches much less and is distributed to plants in a more sustained manner than through liquid wastes and dairy manure.
- Spread fertilizers well away from a watercourse, lake, ditch or wetland. (In Europe, for example, a buffer zone 30 metres wide is recommended around lakes).
- Spread only when the plants and soil are able to absorb the fertilizers (when the plants are not dormant and when the soil is not frozen or snow-covered).
- Dig wide, shallow drainage ditches, make sure they are always planted, maintain them using the lower-third method and allow water to rest and be filtered through a marsh before it is sent to a natural watercourse.
- Work the ground as little as possible, follow the contours of the land, and leave the ground without vegetal cover as short a time as possible (e.g. fall seeding, use of vegetal wastes).
- Favour perennial crops.
- Confine manure, dairy effluent, and runoff waters from exercise areas within a watertight storage structure.

To learn more: Lisier ou fumier (Desautels et Gravel, 2003)
Regulations respecting agricultural operations
Consult an agricultural advisor (MAPAQ)

# Forestry Activities

Some forest activities degrade the health of the soil and cause erosion. They leave the surface of the ground more susceptible to the impact of rain which negatively affects aquatic ecosystems. Nevertheless, it is quite possible to carry on forestry operations and protect water quality in nearby watercourses. There are a variety of proven techniques and methods to make it possible to limit the amount of sediments and nutritive elements carried to watercourses.

## SOUND HARVESTING PRACTICES

To prevent leaching and soil compaction, and to maintain soil structure and health:

- Avoid cutting on slopes of 30 % or more.
- Carry out thinning, pre-commercial, sanitation or salvage cutting only. Always keep at least 50 % of the forest cover.
- Take as little as possible in the 20-metre buffer zone (maximum of 30 % of standing timber) and do not use heavy equipment.
- Depending on the sector, work on frozen ground and use only light machinery.
- Select machinery of average size.
- Level ruts.

To learn more: Guide des pratiques forestières sur terrain privé (MRC de Memphrémagog, 2004)
*Guide d'achat de l'équipement sylvicole au Québec* (AFCE, 2004)

## SITE OF CUTTING

The proximity of the cutting site to the surface hydrographic network is a very important factor in how much impact a forestry cut has. Maintaining a protective buffer zone around the sites under operation make it possible to significantly limit the impacts. To do this:

- Respect a buffer zone of 20 metres around watercourses.
- Be particularly careful in the 300 m of forest surrounding lakes.
- Do not cut in protected environments such as wetlands, wildlife habitats and zones designated as natural landscapes.

To learn more : Politique de protection des rives, du littoral et des plaines inondables (c. Q-2, r.17.2)

## FOREST ROADS

To limit obstruction of bridges and culverts, floods, landslides, the loss of productive lands as well as the creation of ruts, all of which cause erosion of ditches and forest roads, it is useful to:

- Divert water in ditches at least 20 m before they reach a watercourse.
- Construct stable forest roads, paying close attention to the topography
- Construct stable ditches, help re-vegetate by reseeding with graminae species and install anti-erosion structures (microsills and berms) when the slope exceeds 7°.
- Clarify drainage water by diverting water from runoff whenever possible toward zones of vegetation.
- Develop water crossings and stable culverts to cross watercourses.

To learn more: Le fossé écologique… et économique (video, in French) (RAPPEL, 1999)

## BUILDING CONTRACTORS

A construction site that has been left bare can lose 10 to 100 tonnes of soil per acre per year to erosion, which is equal to a rate of erosion 10 times greater than that on agricultural soils, 200 times greater than on pasture land and 2000 times greater than the normal rate of erosion in a forest (ODNR, 1996 ). These losses of material to the drainage system could be avoided by respecting the following basic principles:

**Prevent water from becoming erosive**

- Remove as little vegetation as possible – a 3-5 metre buffer zone around a construction is sufficient.
- Protect piles of earth that have been excavated by covering them.
- Quickly cover bare soils with mulch, a vegetal carpet, or turf.
- Intercept and disperse water with obstacles (e.g. holding berms or microsills).
- Catch sediments in sedimentation basins or with barriers made of bales of straw or with geotextile.
- Be sure that a plan to protect the ground has been approved for all construction and follow it.

To learn more: Maudits sédiments! (video, in French) (RAPPEL, 2001)
The Battle Against Erosion on Construction Sites and Soils Stripped of Vegetation (RAPPEL, 2003)

## GOLF COURSES

A vast quantity of fertilizers and pesticides used on golf courses ends up in watercourses and affects water quality. Using these products increases the risk of harming human health. Here are some suggestions to reduce the harmful environmental impact of golf course maintenance:

**Set up a plan to reduce the use of pesticides**

- Calculate the optimal amount of pesticides and fertilizers to use and only spread that amount.
- First try other solutions, then if there is no other choice, choose the least harmful and the least persistent pesticides.
- Advise other interested parties when you will be spreading (be responsible and consider public health).

**Make sure that residues do not find their way into the drainage system**

- Respect a 20-metre buffer zone around lakes and watercourses, and a 10-metre zone along drainage channels, ephemeral streams and wetlands.
- Purify drainage waters by allowing them to rest in a settling basin, a holding pond or a treatment system that uses phragmites (reeds) or bulrushes.

**Works towards environmental certification**

To learn more: « *Cooperative sanctuary* », program of the Audubon Society

## INDUSTRIES, LANDFILL SITES, EXTRACTION SITES AND RESORT/HOLIDAY SITES

Even today, some industries, landfill, mining and quarrying and resort sites dispose of or allow large quantities of pollutants to enter bodies of water, even while they are subject to tightened regulations. Industries such as agro-food and pisciculture businesses have toxic materials and harmful organic wastes to dispose of. Without effective control measures, landfill sites may allow very harmful materials to escape. Marinas are often places where aquatic vegetation proliferates because boats there still sometimes dispose of their sewage into the watercourse. The hills at ski centres are severely eroded during the spring thaw and suffer massive erosion when new trails are opened. Camp grounds may also be significant sources of phosphorus and sediments if water treatment is not adequate. To limit these impacts:

**Reduce the amounts of sediments, nutrients and toxic substances**

- Respect a buffer zone wide enough to be effective.
- Respect government regulations and standards.
- Provide adequate waste water holding facilities.
- Provide adequate treatment of waste waters.
- Ensure that no gas or fuel is ever allowed to leak into the water (marinas).
- Devise an effective restoration and rehabilitation plan for extraction sites.
- Require effective erosion control measures when work that lays bare the ground is being done.

To learn more: The Battle Against Erosion on Construction Sites and Soils Stripped of Vegetation (RAPPEL, 2003)

# APPENDIX 9:

## GLOSSARY

# Glossary

## A

**Accumulation of sediments**
Deposit of organic or mineral materials on the bottom of a lake or watercourse. Sedimentary accumulation, a natural process, is very important in the trench of a lake. The erosion of soils from the watershed accentuates the inputs of sediments and thus the sedimentary accumulation in bodies of water.

**Algae**
Aquatic vegetation, generally microscopic, with chlorophyll, but without real stems, roots, leaves or vessels. Nevertheless, a few algae (macro algae), such as *Chara* and *Nitella*, are macroscopic.

**Anoxia**
Lack of oxygen that characterises the interface between the sediments and the deeper waters in certain lakes.

**Aquatic plants**
Aquatic vegetation with chlorophyll, having real stems, roots and leaves.

**Artificialization of the shore**
Cutting vegetation (trees, shrubs, herbaceous plants) and artificial structures and developments (walls, patios, riprap, etc.) created by different human activities.

**Average**
A statistical term that represents the average value of certain data, derived by dividing the sum of the values observed by their number.

## B

**Blue algae** *see* **Cyanobacteria**

**Boulder**
The coarsest type of sediment found in bodies of water, measuring more than 20 cm in diameter. Boulders may be several metres in size.

## C

**Chemical fertilizer** *see* **Fertilizer**

**Chlorophyll *a***
The green pigment in the cells of plants and algae that plays an essential role in photosynthesis.

**Cobbles or shingle** (in French: Galet)
Stones from 2 to 20 cm in diameter, often smoothed and rounded by the currents.

**Coliform, fecal**
Intestinal bacteria from the excrement of warm-blooded animals, including humans and birds. The presence of these bacteria in water is an indicator of fecal contamination and the potential presence of pathogenic micro-organisms that could affect animal and human health.

**Concentration**
The quantity of a given product or element present in a water column.

**Cyanobacteria – Blue algae**
Cyanobacteria, also called blue algae or blue-green algae, greatly resemble water algae, but they are bacteria. They are pigmented, usually a blue-green colour. A number of cyanobacteria can use nitrogen gas and therefore grow well in phosphorus-rich waters. Furthermore, certain species produce toxins and can make the water toxic.

## D

**Diversity of species**
The relative variety and abundance of species in their milieu. For example, in Quebec, there are 31,650 animal species and 8,800 plant species.

**Drainage basin (watershed)** (In French, the bassin versant)
The territory drained into one body of water by surface runoff and underground waters. The drainage basin for a body of water thus covers all the land and the entire drainage system (lake, watercourses, wetlands) the waters from which all flow into this body of water. Sometimes referred to as the watershed.

## E

**Ecosystem**
An ecosystem includes the organisms and the natural environments in which they live. In an ecosystem, there are living organisms (animals, plants, bacteria) and non-living elements. Each part of the ecosystem is related to the others. A forest, a lake or a river are examples of ecosystems.

**Effluent**
Fluid residues, treated or not, of agricultural, industrial or urban origin, disposed of directly or indirectly into the environment.

**Excrement**
The residues of the digestion process in animals or humans

**Environment**
All the natural conditions (biological, physical and geographic) and the other conditions that arise from land use planning and development decisions which have an impact on living organisms, such as plants, animals and humans.

**Erosion**
The mechanism by which soil particles are detached and displaced from their point of origin by the action of water or wind.

**Eutrophic**
In Greek, it means well-nourished (eu = well and troph = nourishment). A body of water rich in nutrients (nitrogen and especially phosphorus) and vegetal matter is said to be eutrophic. This advanced stage of eutrophication leads, among other consequences, to a modification of animal communities, to the growth of organic matter and a lack of oxygen in deep waters.

**Eutrophication**
Eutrophication, also referred to as the aging of a body of water, refers to the enrichment in organic materials and nutritive elements that leads to the proliferation of aquatic vegetation. The multiplication and decomposition of these plants leads to more changes in water quality, including oxygen impoverishment in deep waters and biological changes such as the mortality of certain species of fish. Eutrophication is a process which, when it occurs naturally, takes centuries or even thousands of years, but it can be very greatly speeded up by exterior inputs of nutrients from various human activities (agricultural, forestry, shoreline, municipal, and industrial).

## F

**Fauna**
All the animal species that live in a specific region.

**Fecal coliform** *see* **Coliform, fecal**

**Fertilizer, including chemical fertilizer**
Products, made up of nutritive elements which are not widely available in nature, which are spread on the soil to increase the production of vegetation. A large number of these products are carried by run-off to bodies of water where they promote the growth of algae and aquatic plants.

**Flora**
All plants that live in a specific region.

## G

**Grass bed or plant bed**
A stand of aquatic plants in a body of water.

**Gravel**
Small stones measuring 2 mm and less than 2 cm in diameter that are transported by strong currents.

**Ground waters** *see* ***Underground waters***

## H

**Habitat**
All the living conditions needed by an organism or group of organisms.

**High water line**
The line that indicates the boundary between the shore and the littoral of lakes and watercourses.

## I

**Indigenous**
Refers to a species that occurs naturally in a region, without any intervention by man.

**Inorganic material**
A substance derived from the erosion of bed rock, such as minerals.

**Invasive plant**
An aquatic plant with the ability to reproduce rapidly, to extend its distribution easily and to displace other species.

## L

**Lake**
A relatively calm fresh water milieu where aquatic plants grow around the periphery.

**Leaching**
The transportation by water of certain materials from the ground (minerals, pollutants, etc.).

**Liquid manure, slurry**
A mixture of animal excrement containing a large amount of water, held in open tanks and used as fertilizer.

**Littoral – Littoral zone**
The relatively narrow strip of land near the bank or shores of a body of water. This is where aquatic plants with roots grow in the bottom and where a number of aquatic animals begin their lives.

**Low water**
Low water is the lowest level that a body of water reaches during the course of a year. In Quebec, this level is usually reached in summer, following a period of drought.

## M

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**Macrophyte**
Aquatic vegetation big enough to be seen. Included are aquatic plants and the algae *Chara* and *Nitella* in contrast to phytoplancton and periphyton.

**Manure** *see* **Fertilizer, Liquid manure or slurry**

**MCI**
Memphrémagog Conservation Incorporé

**Median**
A statistical term that refers to the intermediate value of (a set of) data. It represents the value of a variable that is situated in the middle of a series of values classed by order of increase. Thus, 50 % of the elements in the sample have a value less than the median, and 50 % have a value above the median.

**MDDEP**
Ministère du Développement durable de l'Environnement et des Parcs du Québec. The Quebec Ministry of Sustainable Development, the Environment and Parks (formerly the Ministère de l'Environnement or MENV).

**MENV**
Ministère de l'Environnement du Québec, now the Ministère du Développement durable de l'Environnement et des Parcs du Québec (MDDEP)

**Mesotrophic**
In Greek, this means well-nourished (meso = quite or fairly and troph = nourishment). A transitory state, the intermediate stage of a lake between the oligotrophic stage and the eutrophic stage. Mesotrophic lakes are characterized by enrichment in organic materials, an average quantity of plants and some oxygen deficit.

**Mouth** (in French, aval)
In French, comes from the expression "à val", which means "towards the valley". The mouth of a watercourse is the part situated towards the valley. The current, therefore, descends toward the mouth.

**Mouth** (in French, embouchure)
The opening by which a watercourse enters a sea, a lake or any other watercourse.

## N

**Nitrites and Nitrates**
Chemical forms of nitrogen that can be assimilated by aquatic vegetation and that are essential to their growth. Nitrites and nitrates come from chemical fertilizers and from human and animal excrement.

**Nitrogen**
A nutritive element that is essential to the development of aquatic plants.

**Nutrient – Nutritive element or substance**
A substance that can be directly assimilated that is necessary, in small or large amounts, for the existence and development of plants and animals. Phosphorus and nitrogen are nutrients that are relatively unavailable in natural waters in comparison with the needs of plants. Thus when these nutritive elements are very abundant in the aquatic environment, there is excessive growth of plants which causes accelerated eutrophication of the environment

**Nutriment** *see Nutrient*

**Nutritive pollution** *see* Pollution caused by nutritive materials.

**NWSC**
NorthWoods Stewardship Center

## O

**Oligotrophic**
In Greek, this means little nourished (oligo = little and troph = nourishment)
A body of water which is poor in terms of nutrients (nitrogen and especially phosphorus) where there is little production of aquatic vegetation. The waters of an oligotrophic lake are clear and well oxygenated.

**Organic material**
A substance made up of molecules from living things.

**Outlet, Outflow, Discharge** (In French, exutoire – emissaire –décharge)
The opening or passage by which the water flows out of a lake or body of water.

**Periphyton**
Microscopic algae attached to a solid substrate (rocks, sediments, aquatic plants, docks or wharves, boats, etc.) in the littoral zone of a body of water.

**Pesticides**
Chemical substances used to fight against organisms considered harmful to humans. These substances can be carried by run-off to aquatic environments where they cause harm to the organisms that live there.

**Phosphates**
Chemical forms of phosphorus that can be assimilated by aquatic vegetation and are essential to their growth. Phosphates come from chemical fertilizers, certain detergents and from human and animal wastes.

**Phosporus**
Phosphorus is one of the essential nutritive elements for vegetation. In Quebec, we can usually control the growth of algae and aquatic plants by limiting the quantities of phosphorus disposed of in watercourses.

**Photosynthesis**
The phenomenon by which plants with chlorophyll transform carbon dioxide into more complex organic compounds, thanks to solar energy.

**Phytoplancton**
Microscopic algae that float freely in the water of a body of water.

**Pollution, diffuse (non-point source)**
Pollution caused by a widespread spill or disposal in the environment, including atmospheric fallout, the spreading of pesticides and fertilizers that get into the water by run-off or infiltration.

**Pollution, specific (point source)**
Pollution caused by a clearly identified source, such as household or industrial disposal or a spill of sewage or the effluent from and agricultural or fish culture operation.

**Pollution caused by poisonous or toxic substances** - Pollution par les substances toxiques
Pollution associated with the presence of substances that could cause death, genetic mutations or any other kind of abnormality among organisms or their progeny. Disposal of or spills in the environment of heavy metals, PCBs, pesticides, PAH and petroleum residues that pollute aquatic environments.

**Pollution caused by nutritive materials**
Pollution from the over-abundance in aquatic ecosystems of nutritive elements such as phosphorus and nitrogen. Waste waters and agricultural and household fertilizers are the main sources. This form of pollution causes premature eutrophication of aquatic milieus.

**Pollution caused by micro-organisms**
Pollution associated with the presence in water of bacteria and viruses from fecal material. This kind of pollution presents a risk for human and animal health.

**Prevailing winds**
Winds from a specific direction that most frequently occur at a given place.

**Proliferation of algae and aquatic plants**
The abnormal growth of aquatic vegetation caused by added nutrients of human origin, such as chemical, domestic or agricultural fertilizers, waste water, leaks from septic tanks and agricultural and forestry wastes.

## R

**RAPPEL**
Regroupement des associations pour la protection de l'environnement des lacs et des cours d'eau de l'Estrie et du haut bassin de la rivière Saint-François (an umbrella group for lake and watercourse protection associations in the St. Francis River drainage basin).

**Re-naturalization, replanting**
The technique of planting herbaceous plants and shrubs on the shore or bank to correct problems of erosion or to recreate a more natural environment.

**Rising water (in spate)** ( in French, crue)
The rising of the level of the river above its usual level. The spring rise occurs when the snow and ice melt in the spring. The river can also rise in summer during heavy rains; it is then called a flash flood.

**Run-off**
A portion of the precipitation that, because it is not captured by either the vegetation or absorbed by the soil, runs instantly and temporarily on the surface on a slope before spilling into a body of water.

## S

**Sand**
A type of sediment made up of particles that measure between 0.05 mm and 2 mm and that roll between the fingers when handled.

**Sectors that are a cause for concern**
In this project, the lake zone presenting symptoms of premature eutrophication where restoration and rehabilitation measures should be taken as a top priority.

**Shingle** *see* **Cobble or shingle**

**Shore or bank** (in French, rive)
A strip of land that borders a watercourse and extends toward the interior of the property starting from the spring high water mark.

**Shoreline or riparian (along the bank)** (in French, riverain)
Anything that is on the edge of a body of water or watercourse.

**Shoreline buffer zone**
The zone of vegetation that borders on lakes and watercourses and extends towards the interior of the land starting from the high water line. The shoreline buffer zone must be preserved (a minimum of 10 to 15 metres depending on the slope), because it ensures the health of lakes and watercourses. It helps to slow erosion, filter nutrients, keep the shallow waters cool and provide habitat for fauna.

**Silt**
A type of sediment, having the appearance of mud, composed of very small particles (having a diameter of less than 0.05 mm) including clays, alluvium, and decomposing organic particles.

**Silting**
The covering of the bottom or bed with silt. A river or a lake silts up when water loaded with fine particles deposits its load on the bottom where the currents slows.

Slurry *see* **Liquid manure or slurry**

**Spawning grounds**
The place where fish reproduce and deposit their eggs.

**Species**
The grouping of living beings that resemble each other and reproduce among each other.

Species diversity *see* **Diversity of species**

**Surface water**
Stagnant and running waters found on the surface of the ground, forming oceans, seas, lakes, rivers, brooks, streams and creeks, ponds, marshes, etc. They are distinguished from underground waters and water in the atmosphere.

**Suspended solids (SS) –** (in French, matières en suspension or MES)
Small inert or living solid particles, that may be able to maintain themselves for a time in the water column. Included are soil particles, decomposing organic materials, and microscopic organisms.

## T

**Total phosphorus**
A measure of all forms of phosphorus in water.

**Transect**
An imaginary line along which observations are made as part of an inventory.

**Trench or fosse**
The zone where the water is deepest in the body of water.

**Tributary** (in French, affluent)
One watercourse that enters another. For example, the Ottawa, Chaudière, Saguenay and St. Charles Rivers are some of the many tributaries of the St. Lawrence River, because their waters empty into the St. Lawrence.

## U

**Underground waters**
Waters contained underground. They occupy empty spaces in the ground, and run toward lakes and rivers.

**Upstream**
In French, comes from the expression “à mont”, meaning toward the mountain. The upstream of a river is the part of a watercourse situated near the source. The current flows from farther “upstream”, that is from the source.

**Urbanization**
Development of cities and towns. Transformation of rural areas into urbanized spaces

## V

**Vegetal or plant debris**
A type of sediment made up of dead leaves, branches, pieces of bark and all other debris of plant origin.

## W

**Watercourse**
Any mass of water that flows in a bed, having a regular or ephemeral flow. Included are streams, and rivers.

**Watershed** *see* **Drainage basin**

**Wetlands** (in French milieu humide)
A flooded or saturated milieu that remains this way for long enough to characterize the kinds of flora and fauna found there. Ponds, marshes, swamps, bogs and peat bogs are wetlands.

## Z

**Zone of erosion**
A zone of erosion is where soil, when waterlogged, is dislodged and crumbles. The sediments are then transported in water to the aquatic milieu.