

Human improved machine translation of the FYTO report: “STRATÉGIE DE LUTTE CONTRE LE MYRIOPHYLLE À ÉPIS – 2025 – Lac Gauvreau, La Pêche”

# STRATEGY FOR CONTROLLING EURASIAN MILFOIL IN LAC GAUVREAU - 2025



---

This is a human improved machine translation, not verified by the authors, of the original document:

*“STRATÉGIE DE LUTTE CONTRE LE MYRIOPHYLLE À ÉPIS – 2025 – Lac Gauvreau, La Pêche”* and may not be accurate.

***Editorial Team:***

*Maude Keyser, biologist, B.Sc., M.Env.*  
*Maude Provost, geomatics specialist, B.Sc.*  
*Rosalie Laberge, Bioecology Technician*  
*Justine Nadeau, Biologist, B.Sc.*  
*Charlotte Bergeron, B.Sc., M.ATDR, Biologist*

***Field team:***

*Rosalie Laberge, Bioecologist*  
*Maude Provost, Geomatics Specialist, B.S.*

***Reviewed by:***

*Vincent Gagné, B.Sc., M.ATDR, professional diver*  
*December 18, 2025*

***For:***



[www.lacgauvreau.ca](http://www.lacgauvreau.ca)  
[info@lacgauvreau.ca](mailto:info@lacgauvreau.ca)



*Consultants in Invasive Aquatic Plant Management*  
*3 Érables Street Saint-Thomas,*  
*Quebec J0K 3L0 Phone: 866*  
*263-E433 [info@fyto.ca](mailto:info@fyto.ca)*

[www.fyto.ca](http://www.fyto.ca)

## Table of Contents

---

List of Figures.....	ii
List of Tables.....	iii
List of Graphs.....	iv
List of Maps.....	iv
1. Background.....	1
2. Eurasian water milfoil (EWM).....	7
2.1 The Ecology of Eurasian Watermilfoil.....	7
2.2 The Impacts of Eurasian Watermilfoil.....	10
2.3 Control Methods.....	11
3. Lake Gauvreau.....	17
3.1 Morphometry, connectivity, and the watershed of the lake.....	17
3.2 Water Quality.....	23
3.3 Wildlife.....	26
3.4 Wetlands.....	28
3.5 The Gauvreau Lake Association.....	28
3.6 Historical and Cultural Description.....	29
3.7 Land Use Planning.....	30
3.8 Human Disturbances and Pressures.....	31
4. Current Status.....	32
4.1 Characterization Methodology.....	32
4.2 Characterization Results.....	33
4.2.1 Aquatic plant beds.....	33
4.2.2 Eurasian watermilfoil beds to be d.....	44
5. Control Strategy.....	51
5.1 Project Rationale.....	51
5.2 The Strategy.....	52
6. Description of Activities.....	55

---

This is a machine translation, not verified by the authors of the original document:

**“STRATÉGIE DE LUTTE CONTRE LE MYRIOPHYLLE À ÉPIS – 2025 – Lac Gauvreau, La Pêche”** and may not be accurate.

6.1 Covering/Tarpolins .....	55
6.2 Manual removal .....	56
6.3 Conditions for carrying out the work.....	57
7. Action Plan.....	59
7.1 Timeline .....	59
7.2 Scenario 1: Optimal.....	59
7.3 Scenario 2: Moderate.....	64
7.4 Scenario 3: Limited.....	65
7.5 The Timeline .....	67
Scenario 1 .....	67
Scenario 2 .....	67
8. Impact of the work .....	68
8.1 Threatened, vulnerable, or potentially designated plant and animal species.....	68
8.2 Impacts on Wildlife .....	70
8.3 The Spread of Invasive Alien Species .....	70
9. Citizen Participation .....	72
10. Conclusion .....	74
References.....	76
Appendix A.....	83
Appendix B.....	84

## List of Figures

---

Figure1 : Distribution of the main aquatic plant beds in Lake Gauvreau in 2016 (ABV des 7, 2016). .....	2
Figure2 : Distribution of aquatic plant beds in Lake Gauvreau in 2018 (ABV des 7, 2018). .....	3
Figure3 : Installation of jute/tarp fabric at Lac Gauvreau (Enviro Lac Gauvreau, 2025). .....	4
Figure4 : Guidelines for responsible boating on Lac Gauvreau (Enviro Lac Gauvreau, 2023). .....	5
Figure5 : A carpet of spiked water milfoil on the water’s surface. ....	8
Figure6 : A whorl of spiked water milfoil. ....	8
Figure7 : Flowering spiked water milfoil. ....	9
Figure8 : Fragments of Eurasian watermilfoil with roots ready to detach. ....	10
Figure9 : Table of the suction lift system used to bring water milfoil to the surface. ....	13
Figure10 : Installation of a synthetic net by two divers. ....	14
Figure11 : Removal of synthetic nets. ....	14
Figure12 : Installation of jute covering/tarp at Lake Sergent. Photo credit: Stéphane Pelletier (Pelletier, 2021). ....	15
Figure13 : Land use on LakaGauvreau (ABV des 7, 2021). ....	18
Figure 14: Field team during the characterization of aquatic plant beds at Lake Gauvreau in 2025. ....	33
Figure15 : Unidentified milfoil plant at Lac Gauvreau in 2025. ....	37
Figure16 : Robbins’ pondweed bed at Lac Gauvreau in 2025. ....	38
Figure17 : Large-leaved pondweed plants in the foreground at Lac Gauvreau in 2025. ....	38
Figure18 : Herbarium of sweet water lilies at Lac Gauvreau in 2025. ....	39
Figure19 : A plant of <i>Zostera marina</i> at Lac Gauvreau in 2025. ....	39
Figure20 : Pectinated pondweed plants at LakaGauvreau in 2025. ....	40
Figure 21: Plant community #104, in the center of the image, consisting of common pondweed at Lac Gauvreau in 2025. ....	40
Figure22 : Crested waterweed plant at Lac Gauvreau in 2025. ....	42
Figure23 : Sample plot #140 with a density of 90% of undetermined Eurasian watermilfoil at Lac Gauvreau in 2025. ....	45
Figure24 : Plot #97 with a density of 75% of undetermined Eurasian watermilfoil at Lac Gauvreau in 2025. ....	45

Figure25 : Herbarium #26 of native plants mixed with Eurasian watermilfoil to be determined at Lake Gauvreau in 2025. ....	46
Figure26 : Herbarium #45 of native plants mixed with Eurasian watermilfoil to be determined at Lake Gauvreau in 2025. ....	46
Figure 27: Herbarium #60 with a water milfoil density of 75–100% to be determined at Lac Gauvreau in 2025. ....	47
Figure 28: Herbarium #72 with a density of 75–100% of undetermined water milfoil at Lac Gauvreau in 2025. ....	47
Figure 29: Survey site #43 with a density of 50–75% of water milfoil to be determined at Lac Gauvreau in 2025. ....	48
Figure 30: Survey plot #123 with a density of 50–75% of undetermined waterweed at LacGauvreau in 2025. ....	48
Figure 31: Transect #45, near the shore, with a density of 25–50% of unidentified water milfoil at Lac Gauvreau in 2025. ....	49
Figure 32: Plant community #73, near the shore, with a density of 25–50% of Eurasian watermilfoil to be determined at Lac Gauvreau in 2025. ....	49
Figure33 : Example of a buoy that can be installed around covered spiked water milfoil beds. ....	73

## List of Tables

---

Table 1: Physical characteristics of Lake Gauvreau (Mailhot and St-Onge, 2001; ABV des 7, 2021a). ....	19
Table 2: Results of microbiological analyses of LacGauvreau in 2023, by month (Enviro Lac Gauvreau, 2025) ....	25
Table 3: Results of microbiological analyses of Lac Gauvreau in 2024, by month (Enviro Lac Gauvreau, 2025) ....	26
Table 4: Results of microbiological analyses of LacGauvreau in 2025, by month (Enviro Lac Gauvreau, 2025) ....	26
Table 5: List of fish species observed in Lac Gauvreau. ....	27
Table 6: List of native species observed at Lac Gauvreau in 2025. ....	34
Table 7: Classification and area of undetermined Eurasian watermilfoil beds observed at Lac Gauvreau in 2025. ....	44
Table 8: Wetlands and aquatic habitats that will be temporarily affected by the covering work*. ....	56
Table 9: Submerged plant communities to be covered by a tarp at Lake Gauvreau between XX and XX*..	56

Table 10: Submerged plant communities to be removed by hand from Lake Gauvreau between XX and XX*. .....	57
Table 11: Water quality classification for the protection of recreational activities (MELCCFP, n.d.).	58
Table 12: Work schedule for summer 2027.	60
Table 13: Work schedule for summer 2028.	61
Table 14: Work schedule for summer 2029.	62
Table 15: Work schedule for summer 2027.	64
Table 16: Schedule of Eurasian watermilfoil control activities at Lac Gauvreau from 2027 to 2029.	67
Table 17: Schedule of activities to control Eurasian watermilfoil at LacGauvreau in 2027.	67
Table 18: Aquatic plant species that are susceptible or potential candidates for presence in a habitat such as that of Lac Gauvreau.....	69
Table 19: Habitats impacted by the use of tarp covering of Eurasian watermilfoil beds at Lac Gauvreau. .	70
Table 20: Risks of Eurasian watermilfoil spread during covering and removal work, and measures to mitigate these risks.....	71

## List of Graphs

---

Figure 1: Changes in dissolved organic carbon concentration (mg/L) and water transparency for the years 2022 and 2023 at Lake Gauvreau. ....	24
Figure 2: Trends in chlorophyll a (mg/L) and total phosphorus (mg/L) concentrations in the water for the years 2022 and 2023 at Lake Gauvreau.....	24

## List of Maps

---

Map 1: Bathymetry of Lake Gauvreau based on the location of Eurasian watermilfoil beds in 2025.....	20
Map 2: LacGauvreau watershed .....	21
Map 3: Connectivity of Lac Gauvreau.....	22
Map 4: Location of aquatic plant beds by % coverage in 2025.....	35
Map 5: Location of aquatic plant beds based on dominant species in 2025.....	41
Map 6: Location of aquatic plant beds based on the presence of curly pondweed .....	44
Map 7: Location of Eurasian watermilfoil beds in 2025.....	50

## 1. Background

---

The presence of spiked water milfoil (MAE; *Myriophyllum spicatum*) in Lake Gauvreau was detected by local residents well before 2015, raising concerns about its impact on the aquatic ecosystem. In 2015, a survey of aquatic vegetation was conducted in collaboration with the Agence de bassin versant des 7 (ABV des 7) to document the extent of the phenomenon. This study revealed that aquatic plants covered more than 20% of the lake's surface, among which Eurasian water milfoil (*Myriophyllum exalbescens*), a species very similar to spiked water milfoil, could be found. The report highlights a lake with low biodiversity and water quality that is sometimes considered a cause for concern (ABV 7, 2016).

Five monospecific Eurasian watermilfoil beds were identified, covering a total area of 11,043 m<sup>2</sup>, mainly concentrated in the southern part of the lake (Figure 1). Eurasian watermilfoil was also present elsewhere in the form of mixed beds or small, scattered clusters. In total, these beds covered approximately 103,000 m<sup>2</sup>, representing 55% of all aquatic vegetation and 11.4% of the lake's total surface area. Considering only Eurasian watermilfoil beds, these covered nearly 1.2% of the lake, demonstrating its significant potential for spread (ABV des 7, 2016).

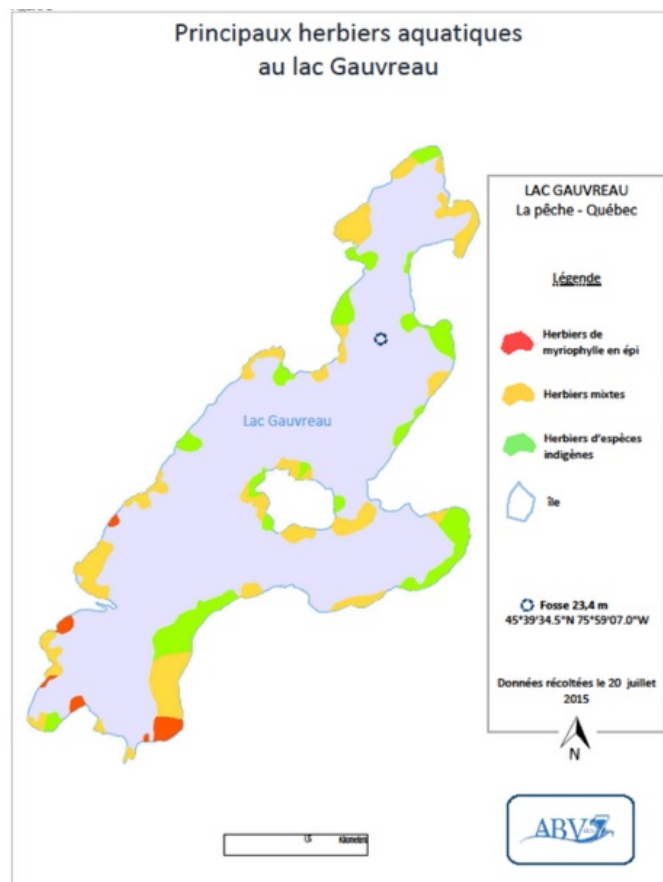


Figure1 : Distribution of the main aquatic plant beds in Lake Gauvreau in 2016 (ABV des 7, 2016).

A second survey was conducted in 2018, again by ABV des 7, to more accurately assess the spatial distribution of the beds and determine their composition—whether they were native, mixed, or composed primarily of Eurasian watermilfoil (Figure 2; ABV des 7, 2018). This study identified areas particularly vulnerable to colonization.



In 2017, control methods began to be evaluated. This led to requests for provincial and municipal permits to install jute mats over five monospecific Eurasian watermilfoil beds, covering a total area of 11,000 m<sup>2</sup> (Figure 3). Despite this control effort, no decrease in the density of Eurasian watermilfoil beds was observed.



Figure3 : Installation of jute fabric at Lake Gauvreau (Enviro Lac Gauvreau, 2025).

These measures also included reducing the traffic of propeller-driven boats to limit plant fragmentation, one of the main vectors for the spread of Eurasian watermilfoil. Guidelines for responsible boating were then established, defining four zones with speed limits adjusted according to the presence of Eurasian watermilfoil (Figure 4).

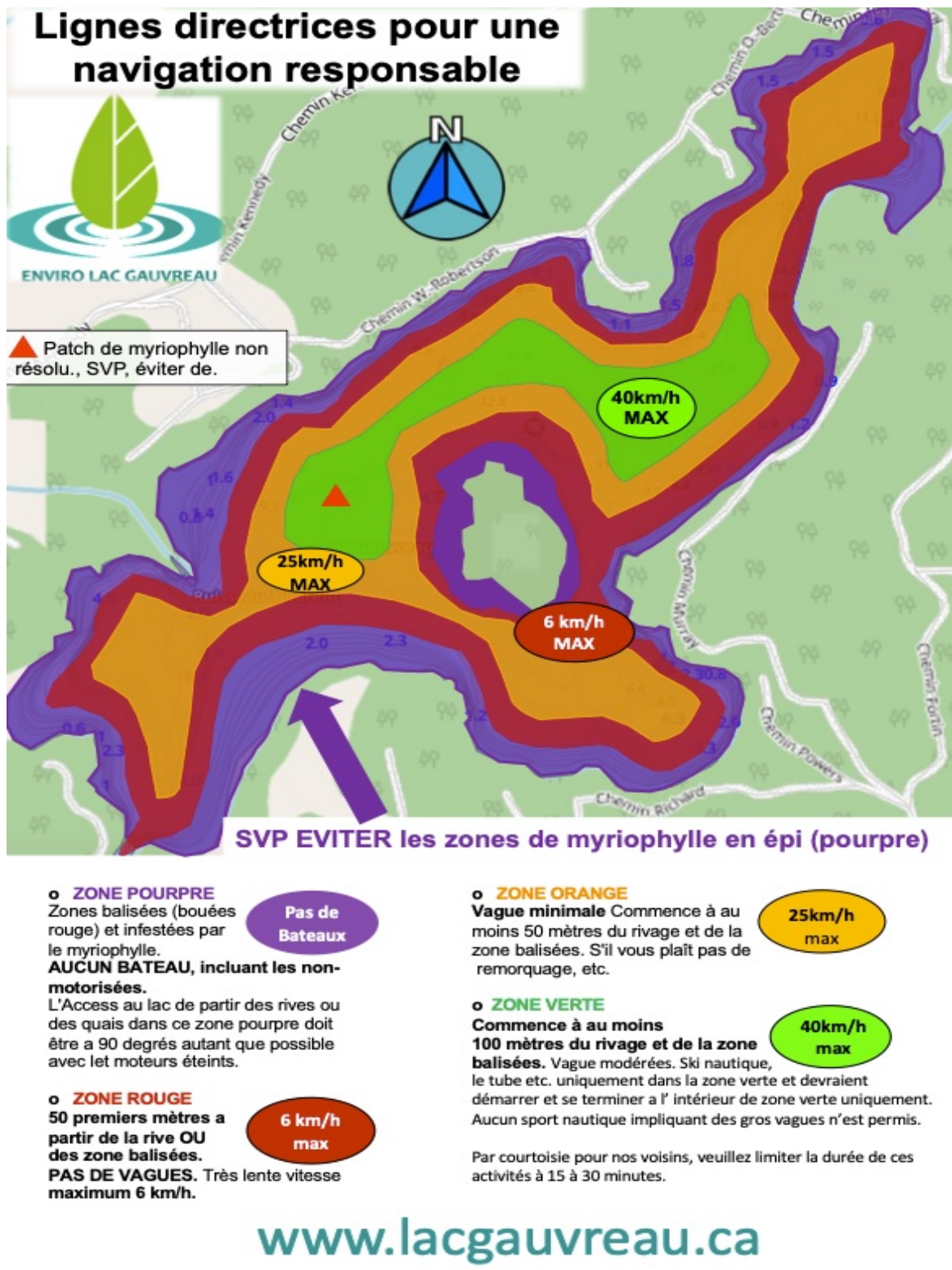


Figure4 : Guidelines for responsible boating on Lake Gauvreau (Enviro Lac Gauvreau, 2023).

In this context, Fyto was commissioned in 2024 to update the characterization and develop a strategy to control Eurasian Water Milfoil beds. The plan includes an intensive phase aimed at controlling beds dominated by Eurasian Water Milfoil according to three distinct scenarios. The first scenario involves the use of tarps to cover beds with a density greater than 50% and an area less than 100 m<sup>2</sup> (totaling 13,660 m<sup>2</sup>), as well as the removal by hand of EWM beds with a density greater than 25% (22,057 m<sup>2</sup>) over a three-year period. The objective is to reduce the area where EWM density exceeds 25% down to 0 m<sup>2</sup>, promoting recolonization by native plants, the restoration of natural habitats, and the maximization of short- and long-term impacts.

The second scenario, which is more conservative in terms of control measures, is limited to covering with tarps EWM beds with a density exceeding 75% (6,273 m<sup>2</sup>). Its objective is to reduce the area of monospecific EWM beds to 0 m<sup>2</sup>, thereby limiting the risk of invasion without completely eliminating the species. This approach targets the most heavily infested areas to provide new colonization spaces for native plants, generating significant short-term impacts but more limited long-term effects. In both scenarios, annual monitoring is planned to quickly detect and remove plants that may become problematic again. This maintenance control is essential to ensure the sustainability of the interventions.

Finally, the third scenario does not include an intensive phase. It relies solely on monitoring and limiting spread, allowing for an assessment of the risks associated with the absence of intensive intervention. These three options are presented so that the Enviro Lac Gauvreau association can make an informed decision regarding EWM management, taking into account a variety of factors.

This report outlines the proposed strategy, the results of the updated characterization, and the recommended action plan. It aims to define the next steps for intervention based on the new data and to establish an optimal plan to protect the health of this important aquatic ecosystem.

## 2. Eurasian water milfoil (EWM)

---

Spiked water milfoil is a vascular aquatic plant belonging to the Haloragaceae family. In North America, it is recognized as an invasive alien aquatic plant (IAAP) due to its high reproductive capacity and its tendency to form dense, monospecific beds. Native to Eurasia, it is believed to have been introduced to the United States in the 1940s as an ornamental aquarium plant (Lavoie, 2019).

In Quebec, the first sighting was reported in 1958 in Lake Saint-Pierre, a widening of the St. Lawrence River. By the 1970s, the growth of tourism and vacationing had contributed to its spread to new regions, notably in Lanaudière (1966), the Eastern Townships (1971), the Laurentians (1979), and the Outaouais (1971). During the 2000s, the species was detected in more northern and remote areas, such as Abitibi-Témiscamingue (2001) and the North Shore (2016; Jacob-Racine and Lavoie, 2018), and more recently in Saguenay (Fyto, 2024).

### 2.1 The Ecology of Eurasian Watermilfoil

Eurasian water milfoil is a submerged aquatic plant whose root system anchors superficially in fine-textured inorganic sediments (Smith and Barko, 1990; Hussner et al., 2017). It is generally found at depths between 1 and 4 m, although it can colonize greater depths in oligotrophic water bodies characterized by high water transparency. Light penetration is the primary factor determining the maximum depth of colonization.

The growth of EWM is limited more by nitrogen availability than by phosphorus, although it is capable of growing in relatively nutrient-poor environments (Anderson and Kalff, 1986). Growth resumes early in the spring: the stems, anchored in the sediments, rapidly elongate toward the surface. Under certain conditions, particularly in turbid waters and shallow areas, the stems reach the surface and continue growing horizontally, forming dense vegetation mats (Figure 5). The leaves, arranged in whorls of 4 to 5 around the stem, have a feathery morphology. Each leaf is subdivided into 5 to 24 pairs of thread-like leaflets (Aiken et al., 1979; Figure 6). The small flowers are grouped in racemes that emerge above the water surface to a height of 4 to 10 cm (Figure 7).



Figure5 : A carpet of spiked water milfoil on the water's surface.



Figure6 : A whorl of spiked water milfoil.



Figure7 : Flowering spiked water milfoil.

Eurasian watermilfoil reproduces both sexually and vegetatively. Sexual reproduction, which is relatively rare, results in the formation of globular fruits that float temporarily before settling to the bottom and germinating (Lavoie, 2019). In North America, propagation relies primarily on vegetative reproduction: the plant develops rhizomes and, most importantly, multiplies through fragmentation, a mechanism considered its most effective mode of dispersal (Grace and Wetzel, 1978; Madsen et al., 1988).

As early as mid-July, vegetative fragments can produce adventitious roots and take root when environmental conditions are favorable (Figure 8). A small number of plants are capable of generating several thousand fragments during a single growing season (Gagné, 2021). Human activities, particularly boat traffic, contribute to increased fragmentation and, consequently, the spread of the species.



Figure8 : Fragments of Eurasian watermilfoil with roots ready to detach.

Fragmentation also promotes dispersal between water bodies via boats or trailers (Bruckerhoff et al., 2015). The presence of a boat ramp is a key risk indicator (Tamayo and Olden, 2014). Hence the importance of cleaning equipment before and after boating.

## 2.2 The Impacts of Eurasian Watermilfoil

Eurasian water milfoil can cause multiple ecological and socioeconomic impacts in the water bodies it colonizes, although these effects remain relatively poorly documented. Its potential impacts include the physicochemical characteristics of the water, faunal and floral communities, as well as recreational uses and the value of riparian properties (MELCCFP, 2023).

The effects of EWM on aquatic fauna are not yet fully understood. However, studies have highlighted marked differences between invertebrate communities associated with EWM beds and those of native macrophyte beds (Strimaitis and Sheldon, 2011). Eurasian watermilfoil beds generally host lower diversity, density, and biomass of invertebrates than beds composed of native species. Among fish, some species appear to avoid these beds, while others use them as refuge and feeding habitats (Keast, 1984). Field observations by Fyto divers confirm the frequent presence of several fish species in EWM beds, including bass, sunfish, and pike.

EWM can also alter the physicochemical characteristics of the water. Dense seagrass beds accelerate the sedimentation of suspended particles, at rates reaching up to twenty times those observed in native plant

beds (Benoy and Kalff, 1999). Furthermore, dissolved oxygen dynamics can be altered. During the summer, photosynthesis associated with EWM growth contributes to oxygenation of the environment. In contrast, in the fall, the senescence and decomposition of stems lead to high oxygen consumption due to bacterial activity. In heavily colonized areas, this phenomenon can lead to deep hypoxia (Kistritz, 1978). The accumulation and decomposition of large biomasses of EWM could thus contribute to the acceleration of eutrophication processes.

Experimental studies have shown that the decomposition of Eurasian water milfoil leads to the release of fatty acids and polyphenols that have a potentially toxic effect on cyanobacteria (Nakai, 2012). Although these compounds have been detected under natural conditions in some water bodies invaded by EWM, the measured concentrations were insufficient to induce a measurable effect on cyanobacteria (Bergeron, 2024).

The EWM also exerts pressure on native aquatic flora. The formation of dense mats limits light penetration into the water column, leading to a gradual decline of competing species (Boylen et al., 1996, 1999). However, some species appear to exhibit varying tolerance to this intense shading (Smith et al., 2021).

The impacts of the EWM on human uses are among the best documented. By altering the aesthetic quality of water bodies, dense seagrass beds hinder recreational activities such as sport fishing, boating, and swimming (Nichols and Lathrop, 1994). This reduction in recreational use can also lead to a decrease in the value of waterfront properties (Horsch and Lewis, 2009; Zhang and Boyle, 2010; Liao et al., 2016; Zipp et al., 2019).

## 2.3 Control Methods

Given the multiple impacts of EWM on human uses and its high invasive potential, various control methods have been developed to limit its spread.

In the United States, where the environmental regulatory framework is more permissive, the use of herbicides is a commonly employed approach for controlling invasive alien aquatic plants, including the EWM. Conversely, in Canada, only two herbicides are currently registered for this species. In Quebec, the application of herbicides in lake environments is strictly regulated, and, to our knowledge, no project to control EWM using chemical methods has been authorized. It also remains uncertain whether the MELCCFP would authorize the use of these products in aquatic environments.

The first herbicide registered in Canada uses diquat as its active ingredient. It is a contact herbicide that does not reach the root systems of the EWM, which limits its long-term effectiveness. Its non-selective nature also poses a risk of collateral impacts on non-target organisms (MELCCFP, 2023).

A second product was recently registered in Canada (Health Canada's Pest Management Regulatory Agency, 2023). Its active ingredient, florpyrauxifen-benzyl, gives this herbicide a systemic mode of action, allowing

it to translocate throughout plant tissues. After spraying, the product is rapidly absorbed by the leaves, stems, and roots, causing the death of the target plants (SePro Corporation, 2018). Its mode of action involves mimicking a plant growth hormone, inducing abnormal growth that leads to plant mortality (Wisconsin Department of Natural Resources, 2018).

However, independent scientific literature remains limited, and available studies raise doubts about the long-term effectiveness of this product (MELCCFP, 2023). Furthermore, according to the label, the herbicide is likely to affect certain native aquatic species in Quebec, including Schreber's waterweed, floating watermilfoil, variegated water-milfoil, and heart-leaved water-lily (SePro Corporation, 2018). Due to these uncertainties and the risks of disrupting aquatic ecosystems, Fyto does not use any herbicides in its efforts to control EWM.

Mowing is another control method. This technique involves mechanically cutting the stems and harvesting the biomass. Although it does not eradicate EWM, it can temporarily mitigate impacts on recreational uses by reducing above-water biomass. However, this method has significant limitations, including increased production of viable fragments and the risk of fish mortality, making it an unsustainable option in the medium and long term (MELCCFP, 2023).

Other approaches have been tested, such as aeration, exposure to ultraviolet radiation, or the addition of bacteria, without demonstrating conclusive effectiveness. In the Quebec context, manual removal and the use of tarps remain the most effective and safest methods, provided they are properly implemented and integrated into a structured management strategy (Lavoie, 2019; Gagné, 2021).

Manual removal is a selective method that has a low impact on native aquatic plants, as it specifically targets the invasive aquatic plant (Nicholson, 1981; Bailey and Calhoun, 2008; Hussner et al., 2017). It is primarily used in mixed plant communities, small areas, or for isolated plants. The operation is carried out by divers who manually extract the stems and root systems. The removed plants are then transported to the surface using mesh bags or a Venturi-effect suction lift system (SRS), which allows for the efficient transfer of large quantities of biomass without requiring frequent surface returns by divers, making it particularly suitable for dense, large-area beds (Figure 9).



Figure9 : Table of the suction lift system used to bring the water milfoil to the surface.

Removal operations can, however, incur high costs, particularly when treating extensive and dense beds. Although this method alone can provide local control of Eurasian water milfoil, the combined use of tarps on larger beds is recommended to reduce long-term costs while maximizing the effectiveness of interventions.

Covering with tarps is a non-selective method. All plant species located under the cover are affected. This technique should therefore be prioritized in monospecific EWM seagrass beds to limit impacts on native plant communities. It is particularly advantageous for treating large seagrass beds (>500 m<sup>2</sup>) where hand removal would be logistically or financially prohibitive. Tarps can be made from various materials, including fiberglass or jute; the choice of material influences costs, durability, and operational requirements.

Synthetic tarps are generally expensive (up to \$8/m<sup>2</sup>), but can be reused, allowing the investment to pay for itself over the medium term. These are woven fabrics that allow gases to escape and limit uplift. Their installation usually requires a team of about four people, including two divers. It is carried out in early spring, when the stems of the aquatic plants are still underdeveloped, to ensure adequate contact with the sediment. The mats are unrolled on the lake bottom, layered to prevent seedlings from escaping, and then weighted down with metal bars to ensure stability. At the end of the season, they are removed, cleaned, repaired as needed, and stored, which involves additional operational costs (Figures 10 and 11).



Figure10 : Installation of a synthetic tarp by two divers.



Figure11 : Removal of synthetic tarps.

Jute tarps, which are more economical (about \$3/m<sup>2</sup>), can be sewn together to cover large areas (Figure 12). However, their installation requires larger teams (10 to 15 people). Unlike synthetic tarps, they are not reusable, but they are biodegradable and can be left in place. Their decomposition, which takes 3 to 5 years, is generally sufficient to ensure the mortality of the invasive alien species. Although it is not necessary to recover the fabric, the ballast material (bags of rocks or sand) must be removed.



Figure12 : Installation of jute tarps at Lake Sergent. Photo credit: Stéphane Pelletier (Pelletier, 2021).

## 2.4 Strategy for Controlling Eurasian Watermilfoil (EWM)

When EWM is detected early in a body of water and populations remain spatially limited, rapid intervention is essential. This approach relies on the immediate hand removal of plants, followed by a monitoring and follow-up program to prevent recolonization. Conversely, when seaweeds beds are numerous and cover a large area, strategic planning becomes essential. Although hand removal and tarp covering are effective methods on a local scale, their application across an entire body of water requires prior consideration of management objectives, prioritization of methods, ranking of seaweeds beds to be treated, and allocation of available resources.

At Lake Gauvreau, Eurasian watermilfoil has been present for over a decade, which has facilitated the colonization of a significant portion of the shoreline. The species also exhibited a marked growth rate there between 2015 and 2018. In this context, the implementation of a comprehensive, structured, and sustained

control strategy is essential to preserve the integrity of the aquatic ecosystem and native plant communities.

The first step in a EWM management strategy is the mapping of seagrass beds. This process involves surveying, by boat, the entire area potentially colonizable by aquatic plants. EWM seagrass beds are then delineated using a global positioning system (GPS), and data is collected for each site, including floristic composition, relative macrophyte density, and coverage percentage. The area of the beds and the density of EWM are key parameters for developing the management strategy. This step was already completed at Lake Gauvreau in July 2025.

Following the mapping, and based on the lake's ecological context and available resources, it is necessary to define control objectives, prioritize the seagrass beds to be treated, select the most appropriate intervention methods, and develop a multi-year action plan. This planning phase is critical to maximizing the effectiveness of interventions.

Implementation of control measures generally consists of two complementary phases. The intensive control phase, typically lasting three to five years, requires a significant initial investment aimed at rapidly reducing the extent of Eurasian watermilfoil beds to a target threshold. Once these objectives are achieved, a maintenance phase begins to keep the abundance of EWM below this threshold. This phase relies on annual monitoring of the colonizable area of the water body to quickly detect any recolonization and allow for targeted intervention by divers, through manual removal, before the species regains momentum.

## 3. Lake Gauvreau

---

### 3.1 Morphometry, connectivity, and the watershed of the lake

Lake Gauvreau (45.656200; -75.991541), with a surface area of 0.910 km<sup>2</sup>, is located in the municipality of La Pêche, within the MRC des Collines-de-l'Outaouais. It is a relatively shallow lake, with an average depth of 7.2 m and a maximum depth of 23.4 m located in a depression in the northeast of the lake, in a narrower section (Ministry of Natural Resources, n.d.; Table 1, Map 1). The southern portion of the lake, located south of île Sainte-Anne, is characterized by shallow depths, generally less than 3 m over large areas, which provides an environment conducive to the growth of aquatic macrophytes (Ministry of Natural Resources, n.d.). Its morphology is irregular, featuring several bays and an island.

Lake Gauvreau, located in the La Pêche River sub-basin, is fed by two tributaries and drained by a single outlet (Map 2). Its main tributary, Parent Creek (approximately 12 km), is a significant source of sediments and nutrients due to the drainage of agricultural and livestock areas upstream (ABV des 7, 2016).

The lake's riparian zone consists mainly of natural vegetation (74.3%). However, a significant portion is occupied by ornamental vegetation (14.6%, mainly grass) and inert materials (11.1%). Residential areas account for 61.1% of the lake's perimeter and are mainly concentrated in the north, northeast, and southeast. In these areas, more than 40% of the shoreline has a non-natural riparian zone (ABV des 7, 2021a).

Ecologically, these artificial shoreline developments promote soil erosion and increase the transport of sediments and nutrients into the lake. This situation contributes to water enrichment, the proliferation of aquatic vegetation and algae, and increases the risk of eutrophication and cyanobacterial blooms. Classified as mesotrophic to meso-eutrophic, it has high biological productivity, low water transparency, and excessive nutrient enrichment. To this end, the restoration and naturalization of riparian zones, particularly in populated areas, is essential to improve the health of Lake Gauvreau (ABV des 7, 2021a).

The local hydrographic network comprises more than 59 interconnected lakes. Among these, Lake Kennedy feeds directly into Lake Gauvreau via a stream flowing northward, while other bodies of water, such as Lakes Anderson, Wiggins, and Jean-Venne, drain into Parent Creek located southwest of the lake (Ministry of Natural Resources and Forests, 2024). Lake Gauvreau then flows into the La Pêche River, and subsequently into the Gatineau River (Map 3). The Gatineau River then joins the Ottawa River approximately 22 km to the south, near the city of Gatineau (Figure 16; ABV, July 2016). The flow generally follows a north-south axis.

In 2020, the area had 183 permanent or seasonal residents around the lake, as well as 64 motorboats and 4 personal jetskis, reflecting a moderate level of recreational activity (Enviro Lac Gauvreau, n.d.). Land use

was also predominantly forested (66.07%), followed by agricultural areas (18.18%), wetlands (8.26%), aquatic areas (3.98%), and anthropized areas (3.35%) (Government of Quebec, 2019; Figure 13).

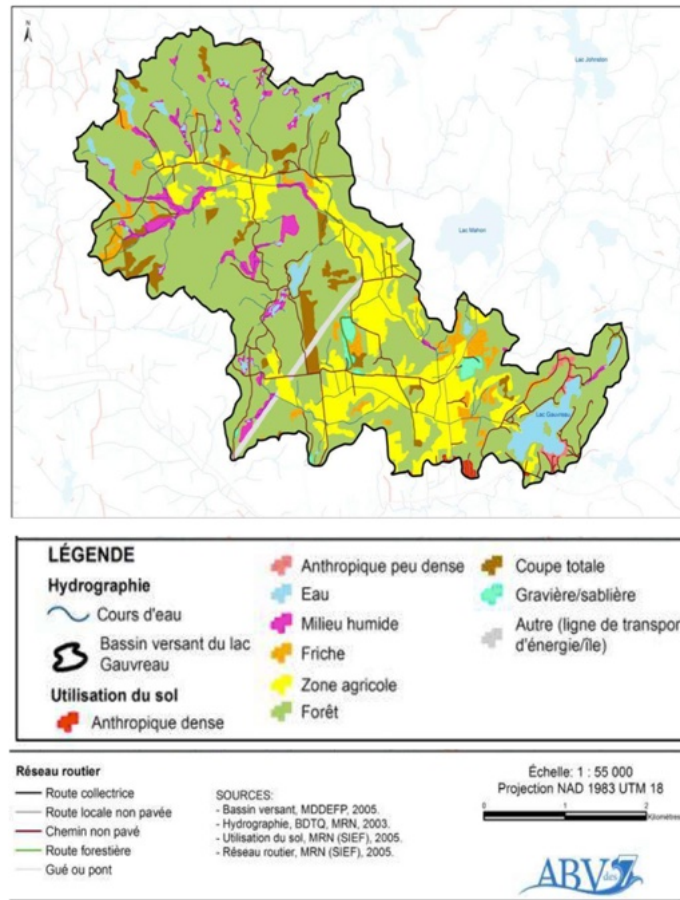


Figure13 : Land use on Lake Gauvreau (ABV des 7, 2021).

The road network totals 66.7 km of roads across the watershed (Ministry of Natural Resources and Forests, 2024). This network contributes to the fragmentation of the hydrographic and terrestrial networks and is likely to influence water flows. The direct hydraulic connection between Lake Kennedy and Lake Gauvreau, via a stream, facilitates hydrological exchange between these bodies of water. However, the presence of 66.7 km of roads in the watershed suggests the presence of artificial features that can interrupt or alter water flows, create barriers for aquatic wildlife, increase runoff, or affect water quality.

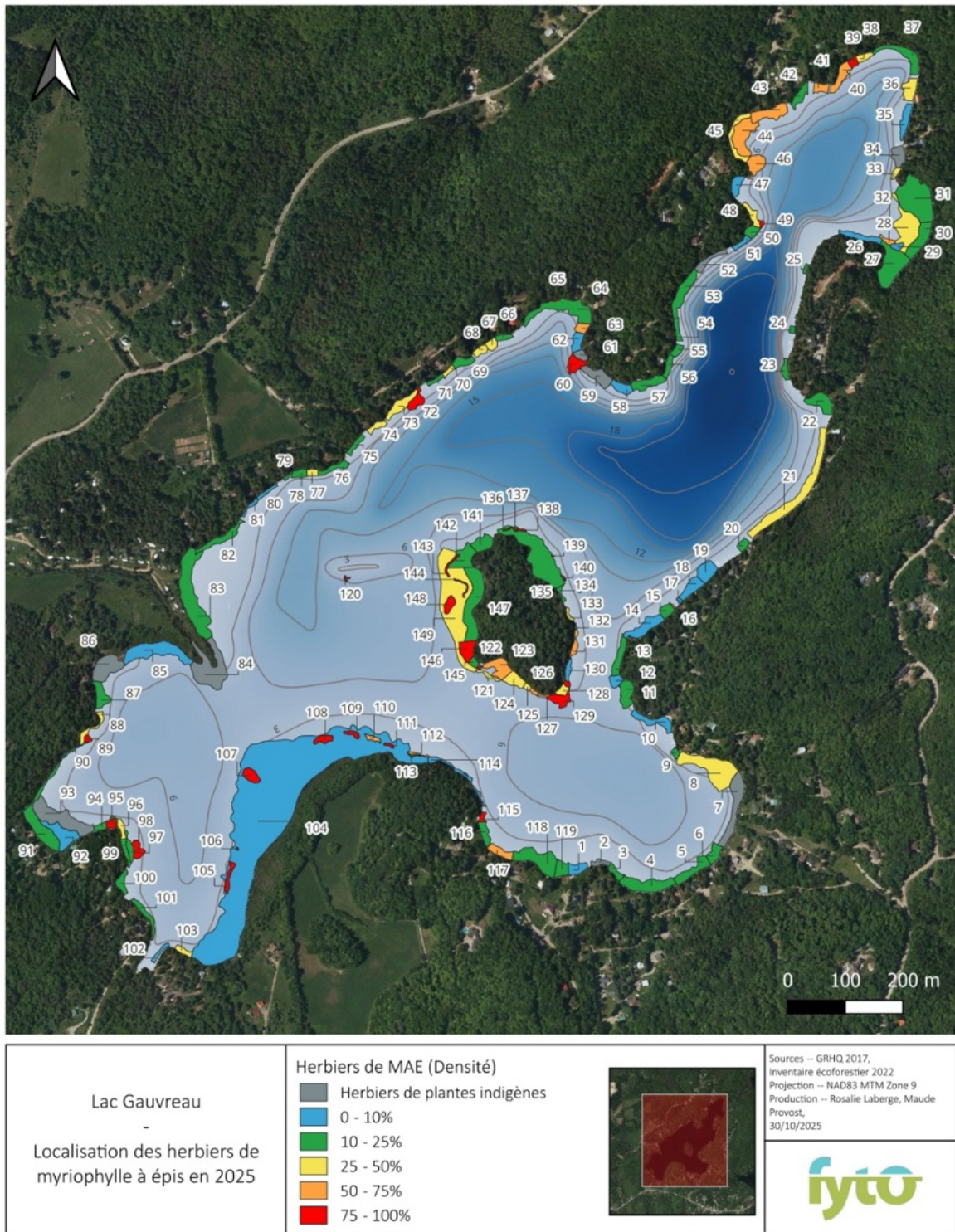
Lake Gauvreau fulfills several essential ecological functions, including the filtration of pollutants and carbon sequestration in sediments. It plays a key role in the hydrological cycle by regulating runoff and promoting groundwater recharge. It also serves as a vital habitat for aquatic biodiversity, supporting a diverse array of organisms, including fish, in , macrophytes, algae, amphibians, and invertebrates. Species associated with

this body of water include the pearl mullet, the black minnow, the green frog, the leopard frog, the green newt, and the painted turtle (ABV des 7, 2015).

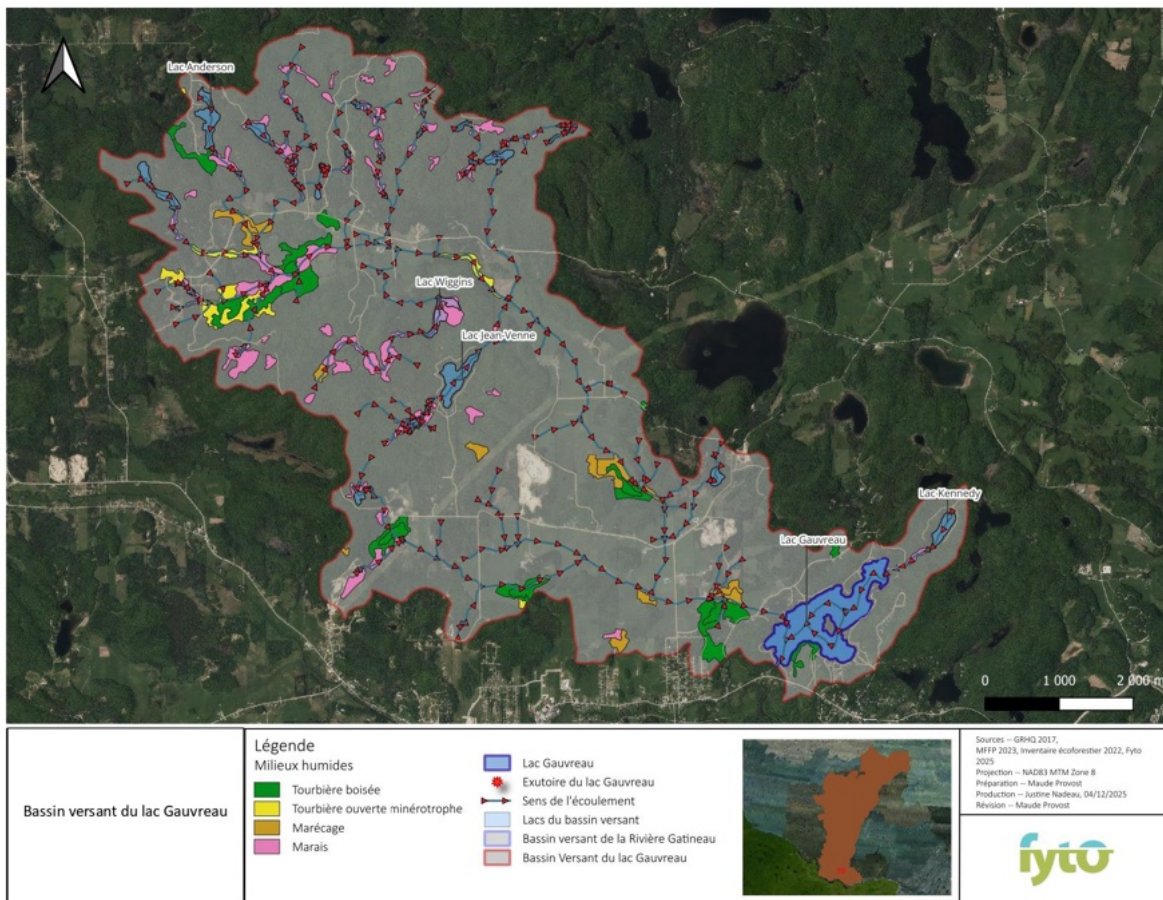
Access to Lake Gauvreau is primarily from the city of Gatineau via Highway 5 northbound, then Exit 28 leading to Route 366 toward La Pêche (Sainte-Cécile-de-Masham area). After about 5.5 km, several secondary roads on the right-hand side provide access to the lake's shores, including Murray, Richard, Gervais, Pilon, Charlevoix, de la Baie-Sainte-Anne, and Kennedy Roads, which serve the various vacation areas (ABV des 7, 2016). There are no public boat launches on the lake.

Table1 : Physical characteristics of Lake Gauvreau (Mailhot and St-Onge, 2001; ABV des 7, 2021a) .

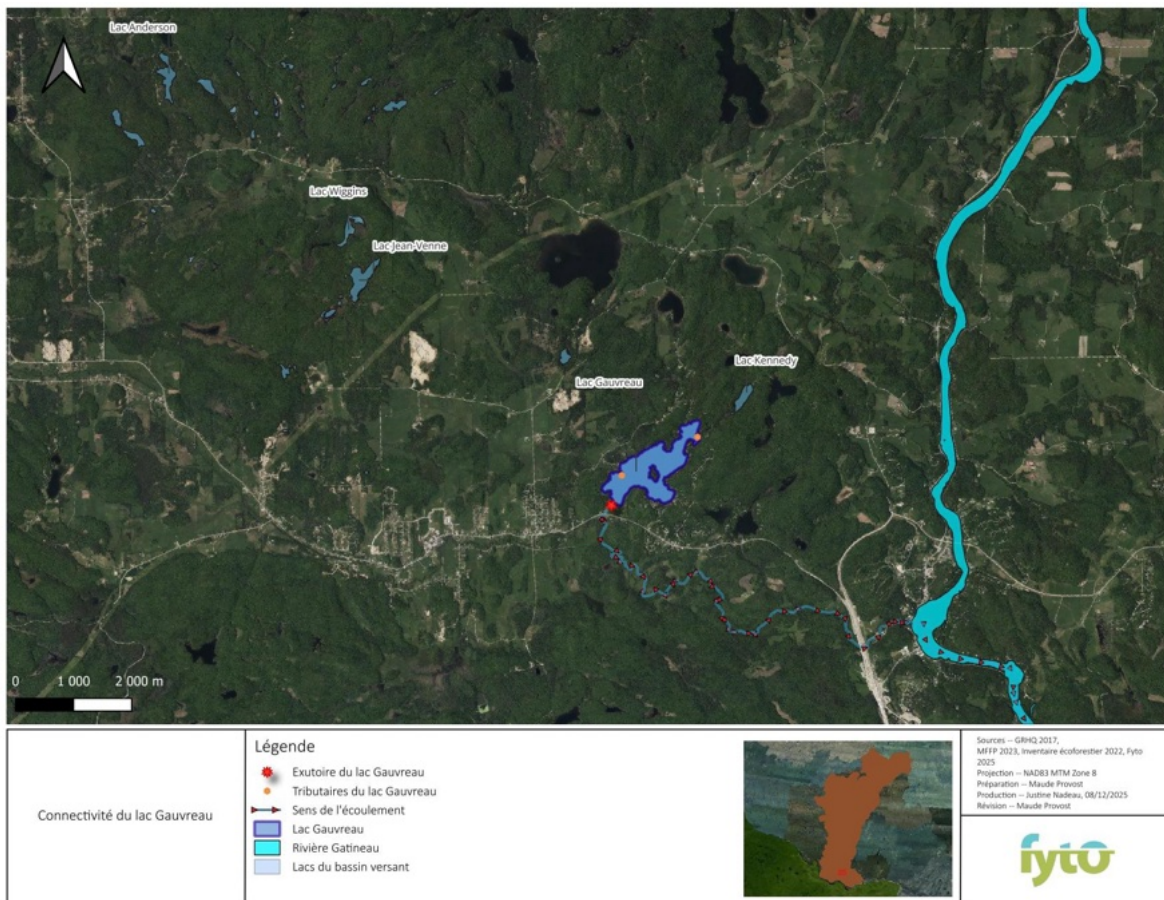
Characteristic	Value
Area	0.910 km <sup>2</sup>
Volume	6.664583 m <sup>3</sup>
Maximum depth	23.4 m
Average depth	7.2 m
Elevation	165.0 m
Watershed area	45.68 km <sup>2</sup>
Recharge time	0.33 years
Drainage ratio	50.20



Map1: Bathymetry of Lake Gauvreau based on the location of Eurasian watermilfoil beds in 2025



Map2: Lake Gauvreau watershed



Map3: Connectivity of Lake Gauvreau

### 3.2 Water Quality

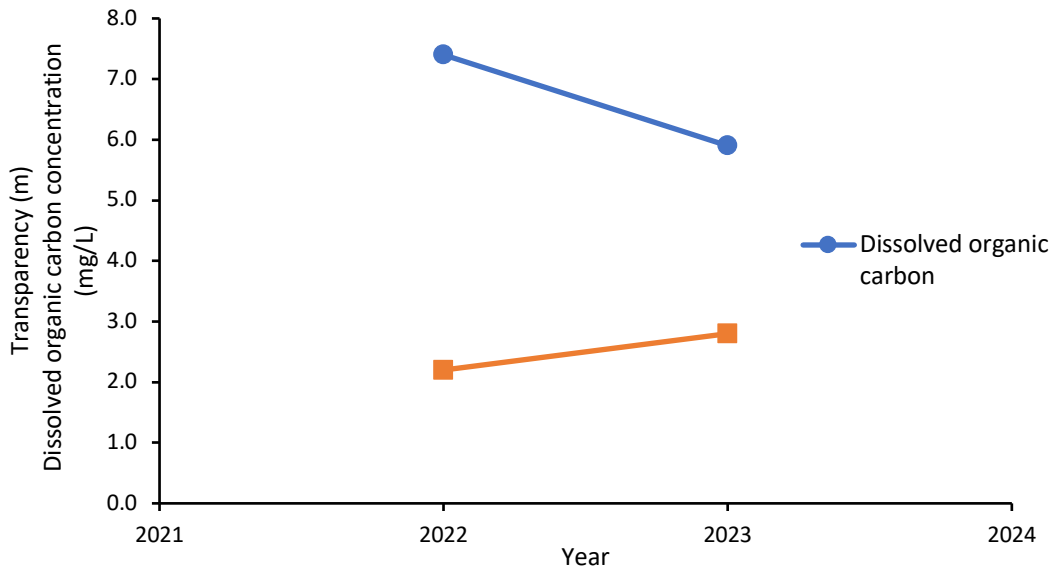
The Municipality of La Pêche (2015), the Association for the Protection of the Environment of Lake Gauvreau (APELG, 2015), the ABV des 7 (2013), and the M.R.C. des Collines de l'Outaouais (2013) analyzed water samples for fecal coliforms and other water quality parameters at various locations in the lake. According to these data, Lake Gauvreau falls into the mesotrophic to meso-eutrophic category, but the parameters are often inconsistent, and water quality is frequently lower when samples are collected near the mouths of streams rather than in the center of the lake. There are therefore notable differences depending on the area of the lake. It is a recreational lake with a high proportion of shoreline occupied by a majority of seasonal and permanent residences (ABV des 7, 2016).

According to the voluntary lake monitoring network, Lake Gauvreau was classified as mesotrophic in 2023. This indicates that the lake shows some signs of eutrophication. At this level, the MELCCFP recommends limiting the input of nutrients from human activities. The average water transparency was 2.8 meters, indicating relatively turbid water. Total phosphorus concentrations remained low, averaging 11 µg/L in 2023. The slightly elevated chlorophyll  $\alpha$  concentration (3.8 µg/L) reflects the presence of algal biomass. Finally, the water was discolored, with a dissolved organic carbon level of 5.9 mg/l, which also affects its transparency (MELCCFP, 2024).

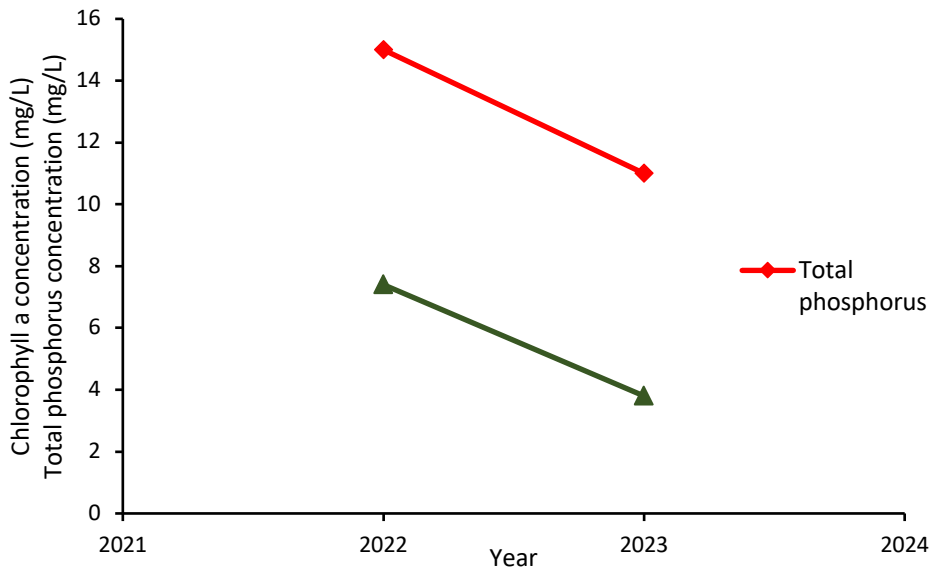
When examining the trends in the various parameters from 2022 to 2023—the years in which the samples were collected—several observations can be made. First, transparency appears to depend on the concentration of organic carbon, and thus on the color of the water (Graph 1). A lower concentration of dissolved organic carbon in 2023 seems to promote greater transparency. It was also in 2023 that navigation guidelines were implemented.

Second, algal biomass, measured by chlorophyll  $a$ , appears to depend on total phosphorus concentration (Figure 2). Indeed, both parameters show a similar decrease in 2023. Conversely, the parameters appear to improve slightly.

Graph1: Changes in dissolved organic carbon concentration (mg/L) in the water and water transparency for the years 2022 and 2023 at Lake Gauvreau.



Graph2: Trends in chlorophyll a concentration (mg/L) and total phosphorus concentration (mg/L) in the water for the years 2022 and 2023 at Lake Gauvreau.



At Lake Gauvreau, the presence of fecal coliforms, particularly *Escherichia coli* (*E. coli*), indicates fecal contamination. Parent Creek is a major source of fecal coliforms. This watercourse runs alongside several agricultural lands before flowing into Lake Gauvreau. Runoff from these lands may contain fecal matter, particularly from the application of animal manure, which is then carried into the streams and subsequently into the lake (Pro Faune, 2008). To mitigate these inputs, it is recommended to increase water filtration through natural habitats. This objective can be achieved by increasing the length and complexity of the path the water must take before reaching the lake, particularly through the restoration or creation of wetlands. Increasing the coverage of these habitats improves sediment and nutrient retention, which contributes to more effective filtration of runoff and, ultimately, to the protection of the lake’s water quality. These concentrations can vary considerably from one region to another, so it is important to analyze the tables carefully before drawing conclusions.

Table2: Results of microbiological analyses of Lake Gauvreau in 2023, by month (Enviro Lac Gauvreau, 2025)

Site	1	2	3	4	5	6
<u>E.coli (CFU/100ml)</u>	3	3	5	8	9	1900*
<u>Dissolved Organic Carbon (mg/L)</u>		5.6				
<u>Chlorophyll a (µg/L)</u>		2.4 1				
<u>Total Phosphorous (µg/L)</u>		10. 4		20		90
<u>Transparency (metres)</u>	3.5	3.1				
<b>Re-Test E.Coli Done 25 July</b>					730	69 0

Table3: Results of microbiological analyses of Lake Gauvreau in 2024, by month (Enviro Lac Gauvreau, 2025)

Sample site	June 16, 2024		July 22, 2024		August 19, 2024		August 26, 2024	
	E.coli (CFU/100ml)	Swim safety rating	E.coli CFU/100ml	Swim safety rating	E.coli (CFU/100ml)	Swim safety rating	E.coli (CFU/100ml)	Swim safety rating
Site 1: North end	4	A (excellent)	2	A (excellent)	35	B (good)	21	B (good)
Site 2: deepest point	5	A (excellent)	0	A (excellent)	130	C (Acceptable)	26	B (good)
Site 3: Baie Murray	3	A (excellent)	5	A (excellent)	140	C (Acceptable)	15	A (excellent)
Site 4: Baie St Anne	10	A (excellent)	1	A (excellent)	670	D (not recommended)	10	A (excellent)
Site 5: mouth of Parent Creek	85	B (good)	330	D (not recommended)	2900	D (not recommended)	360	D (not recommended)
Site 6: Parent Creek at Chemin Kennedy	80	B (good)	280	D (not recommended)	1300	D (not recommended)	510	D (not recommended)

Table4: Results of microbiological analyses of Lake Gauvreau in 2024, by month (Enviro Lac Gauvreau, 2025)

Sample site	June 16, 2024		July 22, 2024		August 19, 2024		August 26, 2024	
	E.coli (CFU/100ml)	Swim safety rating	E.coli CFU/100ml	Swim safety rating	E.coli (CFU/100ml)	Swim safety rating	E.coli (CFU/100ml)	Swim safety rating
Site 1: North end	4	A (excellent)	2	A (excellent)	35	B (good)	21	B (good)
Site 2: deepest point	5	A (excellent)	0	A (excellent)	130	C (Acceptable)	26	B (good)
Site 3: Baie Murray	3	A (excellent)	5	A (excellent)	140	C (Acceptable)	15	A (excellent)
Site 4: Baie St Anne	10	A (excellent)	1	A (excellent)	670	D (not recommended)	10	A (excellent)
Site 5: mouth of Parent Creek	85	B (good)	330	D (not recommended)	2900	D (not recommended)	360	D (not recommended)
Site 6: Parent Creek at Chemin Kennedy	80	B (good)	280	D (not recommended)	1300	D (not recommended)	510	D (not recommended)

Table5: Results of microbiological analyses of Lake Gauvreau in 2025, by month (Enviro Lac Gauvreau, 2025)

Sample site	June 25, 2025		July 2025		August 2025	
	E.coli (CFU/100ml)	Swim safety rating	E.coli CFU/100ml	Swim safety rating	E.coli (CFU/100ml)	Swim safety rating
Site 1: North end	2	A (excellent)	7	A (excellent)	1	A (excellent)
Site 2: deepest point	1	A (excellent)	4	A (excellent)	2	A (excellent)
Site 3: Baie Murray	2	A (excellent)	1	A (excellent)	7	A (excellent)
Site 4: Baie St Anne	6	A (excellent)	3	A (excellent)	1	A (excellent)
Site 5: mouth of Parent Creek	420	D (not recommended)	530	D (not recommended)	430	D (not recommended)
Site 6: Parent Creek at Chemin Kennedy	770	D (not recommended)	380	D (not recommended)	310	D (not recommended)

### 3.3 Wildlife

According to the Enviro Lac Gauvreau Portal, the following fish species are found in this lake: northern pike, muskellunge, smallmouth bass, yellow perch, sunfish, and rock bass (formal and informal sources; Enviro Lac Gauvreau, 2024). In addition, 27 fish species have been recorded in Lake Gauvreau (Table 5; formal and informal sources). In 2015, a survey of the riparian zone of Parent Creek, the main tributary of Lake Gauvreau, identified several additional aquatic species such as the pearl mullet, the black mudminnow, the green frog, the leopard frog, the green newt, and the painted turtle (ABV des 7, 2015). In addition, residents reported the presence of speckled trout, loons, and herons (Groupe D'Études Interdisciplinaires en Géographie et Environnement Régional, 2001). The report on the identification and characterization of ecological corridors adjacent to Gatineau Park also presents the various species at risk, target species, and species of interest observed in the area (National Capital Commission, 2012).

The map of occurrences of species at risk, accessed on March 2, 2025, showed that several species at risk were likely present within a 2-km radius of Lake Gauvreau, 5 wildlife occurrences and 4 plant occurrences. Faunal occurrences include the yellow loach, the spotted snake, the green snake, the golden-winged

warbler, and another masked species. They were reportedly observed in 2007 southeast of Lake Gauvreau, in 1982 around the lake, in 2021 south of the lake, and in 2013 also south of the lake. According to plant records, American conopholis was last observed in 2022, along with three other masked species (Appendix A).

Table6: List of fish species observed in Lake Gauvreau.

English	Latin
Smallmouth bass	<i>Micropterus dolomieu</i>
Brown bullhead	<i>Ameiurus nebulosus</i>
River catfish	<i>Spotted catfish</i>
Spotted sculpin	<i>Cottus bairdii</i>
Brown mudminnow	<i>Spotted mudminnow</i>
Striped mudminnow	<i>Noturus insignis</i>
White snout	<i>Moxostoma anisurum</i>
River dragonfly	<i>Moxostoma carinatum</i>
Red sandpiper	<i>Moxostoma macrolepidotum</i>
Ducktail	<i>Carpionodes cyprinus</i>
Rock minnow	<i>Rock bluegill</i>
Sunfish	<i>Lepomis gibbosus</i>
Walleye	<i>Stizostedion vitreum</i>
Zebra sunfish	<i>Caprodes</i>
Northern pike	<i>Esox lucius</i>
Round-snouted minnow	<i>Pimephales notatus</i>
Redfin minnow	<i>Notropis cornutus</i>
Emerald minnow	<i>Notropis antherinoides</i>
Black minnow	<i>Commerson's catfish</i>
Horned mullet	<i>Semotilus atromaculatus</i>
Rapid-river catfish	<i>Rhinichthys cataractae</i>
Eastern black nose	<i>Rhinichthys atratulus</i>
Brook trout	<i>Salvelinus fontinalis</i>
Ouitouche	<i>Semotilus corporalis</i>
Yellow perch	<i>Yellow perch</i>
Black-spotted minnow	<i>Hudson minnow</i>

Lake trout	<i>Lake trout</i>
------------	-------------------

### 3.4 Wetlands

The Lake Gauvreau watershed contains numerous wetlands of various types. These include “ombrotrophic bog” (16.95 ha), “shallow water” (76.11 ha), “minerotrophic fen” (163.15 ha), “marsh” (26.55 ha), “swamp” (97.78 ha), “wooded bog” (192.41 ha), and “wet meadow” (20.53 ha), distributed throughout the watershed (Map 2) (Ducks Unlimited Canada and MELCC, 2023).

The “shallow water” habitat is an area where the water level is less than two meters. It contains floating and submerged aquatic plants, as well as emergent plants that cover at least 25% of the habitat’s surface area. The “marsh” habitat is a wetland located near a lake, river, or stream. It contains more than 25% herbaceous vegetation but less than 25% trees and shrubs. Marshes can be divided into permanently, semi-permanently, or temporarily flooded sections, which influences the type of vegetation. The “wet meadow” habitat is a subclass of marshes, but it remains above water for most of the season and is dominated by dense, grass-like vegetation. The “swamp” habitat is a wetland, often located on the edge of a lake. Swamps are often flooded by high water or high groundwater levels. They feature woody, shrubby, or tree-like vegetation covering more than 25% of their area, and their soil has poor drainage and signs of oxidation (Ducks Unlimited Canada and MELCC, 2023).

Peatlands are sites where the production of organic matter outpaces its decomposition, leading to the formation of peat that constitutes the soil (at least 30 cm thick). The “open fen (minerotrophic) peatland” habitat is a peatland fed by groundwater and surface runoff. It is therefore nutrient-rich, unlike ombrotrophic peatlands, which are nutrient-poor. Finally, the “wooded peatland” habitat is a subclass of peatland that has tree vegetation covering at least 25% of the habitat’s area.

### 3.5 The Gauvreau Lake Association

The Association for the Protection of the Environment of Lake Gauvreau (APELG) was founded in 2000. Also known as Enviro Lac Gauvreau, its mission is to monitor and improve the preservation of Lake Gauvreau. Enviro Lac Gauvreau has been a nonprofit organization since 2002. Its main objectives are to raise awareness among residents about conservation, conduct studies and collect data on the lake’s health, and undertake projects to restore vegetation along the shoreline (Enviro Lac Gauvreau, 2025a)

The association was founded following an outbreak of blue-green algae that covered the lake. Since then, the association has commissioned several studies on Lake Gauvreau, its watershed, and Parent Creek.

In 2008, the organization Pro Fauna developed a plan to enhance the aquatic and riparian habitats of Parent Creek. The main recommendations were therefore to improve water quality through revegetation, habitat restoration, bank stabilization, and the installation of physical infrastructure, such as sedimentation basins.

In 2015, the Agence de bassin versant des 7 (ABV des 7, 2015) conducted a characterization of the riparian zone of the Parent Creek. A second characterization of the riparian zone of Lake Gauvreau was conducted in 2021, also by the ABV des 7 (ABV des 7, 2021a). Additionally, in 2021, RAPPEL conducted a water quality monitoring study of the lake. In 2022, Enviro Lac Gauvreau launched a project to renaturalize Parent Creek and began creating wetlands, thanks to the participation of a farmer whose property includes a long section of Parent Creek. A partnership was then formed with CREDDO for project management and ACRE for land conservation. The feasibility studies and design, carried out in 2024 and 2025 by Terre et Habitats, received provincial funding under the “PRCMHH” program. The project is currently in the land acquisition phase along the stream, with several options under consideration and in negotiation. A funding application for Phase 2 of the “PRCMHH” will be submitted once these steps are finalized. Additionally, an in-depth water quality study, commissioned by the organization and the municipality, was conducted in 2006 to identify the causes of cyanobacterial blooms.

Enviro Lac Gauvreau maintains a comprehensive website containing information about the association, the lake’s history, environmental studies conducted, and educational articles to raise residents’ awareness. APELG is a very active association; the current board of directors consists of 12 members. Its mission remains to educate lake users to ensure the lake’s health, to better understand the lake’s environmental challenges in order to preserve it, and to foster connections among lake residents by organizing numerous social activities.

### 3.6 Historical and Cultural Description

Development of the area surrounding Lake Gauvreau began around 1825. The municipality’s first inhabitants lived primarily from the forestry industry. The Francophones came mainly from Lower Canada, while the Anglophones were originally from England, Scotland, and Ireland (La Pêche, 2025b).

The municipality of La Pêche officially adopted its name on June 27, 1975. It comprises the municipalities of Wakefield Township, Aldfield, Sainte-Cécile-de-Masham, and the village of Wakefield. Wakefield experienced a sudden boom in the 19th century with the opening of a grain mill, a sawmill, and a general store. The village had several hotels and churches, a school, a blacksmith, a tinsmith, a cooper, a shoemaker, and even a tailor (La Pêche, 2025b).

The Gauvreau family, who lived around the lake and owned several properties, donated these assets to the church. As a result, a priest came to settle in the municipality, making it possible for local residents to get married. The family collected mail for the lake’s residents, who could then come to pick it up by crossing the lake (McRobert and Decelles, n.d.).

Today, the municipality of La Pêche is known for its active community life. Cultural life there is particularly vibrant regardless of the season. Several events, festivals, and markets take place there each year (La Pêche, 2025a).

### 3.7 Land Use Planning

Lake Gauvreau is located outside the urbanization perimeter of the MRC des Collines-de-l'Outaouais. According to the MRC's land use plan, the primary land use designation for Lake Gauvreau is rural. Several other land uses are found within its watershed, including forest and natural areas, sustainable agriculture, dynamic agriculture, and multifunctional agriculture (MRC des Collines-de-l'Outaouais, 2019).

The rural land use designation refers to an area primarily used for residential purposes near the main road network and close to bodies of water. Its density is, however, limited due to increased control over urban expansion in rural areas. In recent years, additional standards have been implemented to ensure the protection of lakes and waterways, such as controls on the installation of septic tanks and their emptying. The rural land use designation has no specific purpose associated with it. Several types of activities are therefore permitted there, including forestry, agriculture, industry, commerce, and residential use (MRC des Collines-de-l'Outaouais, 2019). However, to promote the densification of urbanized areas as part of integrated projects, an amendment request was submitted in 2025 to create a new multifunctional zoning area in the municipality of Chelsea and to modify the recreational and tourism zoning area of the village of Chelsea (MRC des Collines-de-l'Outaouais, 2025).

The town of La Pêche's urban plan also designates a rural zone around Lake Gauvreau. This zone is characterized by residential developments and vacation properties. The purpose of this designation is to prohibit the creation of new streets and to limit the establishment of new businesses and services to those serving local needs (Municipality of La Pêche, 2025).

The Regional Wetland and Water Environment Plan (PRMHH) of the MRC des Collines-de-l'Outaouais highlights the diversity of wetlands found within the MRC's territory. Indeed, it includes 12 types of wetlands, while there are 17 possible types in Quebec. A large proportion (87.58%) of these wetlands are located on private land (MRC des Collines-de-l'Outaouais, 2023). The PRMHH does not mention Lake Gauvreau.

Furthermore, the development of the Masham Corridor, located in the Sainte-Cécile-de-Masham region, aims to preserve ecological integrity by limiting habitat fragmentation caused by highways and regional commercial development. This initiative is carried out in collaboration with local municipalities to ensure that zoning protects the corridor from development across its entire area (SNAP, 2012).

The water management plan of the Agence de Bassin Versant des 7 mentions Lake Gauvreau. It is one of 39 lakes where episodes of blue-green algae blooms were confirmed by the Ministry of the Environment between 2004 and 2017 inclusive. Sampling from 2015 to 2018 identifies Lake Gauvreau as being affected by Eurasian water milfoil (ABV des 7, 2021b).

The ABV des 7 Water Master Plan aims to improve the health of the Gatineau River watershed, with a particular focus on issues related to bank erosion and water quality degradation (eutrophication) in its lower

reaches. For a body of water such as Lake Gauvreau, this translates into priority actions for the restoration of riparian environments and the management of nutrient inputs from agricultural and residential sectors to reduce algal blooms (ABV des 7, 2021b).

### 3.8 Human Disturbances and Pressures

The three main anthropogenic pressures on Lake Gauvreau:

1. Residential pressure

The Lake Gauvreau watershed contains several homes equipped with on-site septic systems, which are one of the major sources of contamination in water bodies. Although these systems comply with regulations, they cannot completely filter out contaminants, as the soil acts as a secondary filter. However, the proximity of septic systems to the lake, the non-compliance of certain systems, and the high density of systems in the area reduce their effectiveness and increase the risk of surface water contamination. The main contaminants discharged are nutrients, primarily in the form of phosphorus and nitrogen.

2. Pressure from the transportation network

The watershed includes nearly 66.7 kilometers of roads. These can be a source of pollution for Lake Gauvreau, particularly through the use of products such as dust suppressants and de-icing salts. These substances can end up in the lake, thereby disrupting the balance of the aquatic ecosystem.

3. Recreational pressure

Lake Gauvreau is used for swimming and various water sports. Unfortunately, improper use of watercraft, especially motorboats, can cause damage to the lake's ecosystem. To limit the impact of boats, Enviro Lac Gauvreau has developed a best-practices guide to encourage respectful use of the lake, thereby limiting the spread of Eurasian watermilfoil and preserving the lake's shorelines (Enviro Lac Gauvreau, 2025b). This initiative aims to reduce nutrient input from the depths. Following its implementation, residents have observed an improvement in water clarity.

## 4. Current Status

---

### 4.1 Characterization Methodology

The characterization took place from July 7 to 9, 2025. Two people in a boat surveyed the lake's shoreline (Figure 14). One operator steered the boat while an observer identified and quantified the presence of aquatic plants using an aquascope. This instrument allows one to look underwater from the surface while eliminating reflections and distortions caused by waves and light refraction. To supplement this boat-based characterization, aerial images of certain aquatic plant beds were captured using the DJI Mini 3 Pro microdrone. These images provide an overview of the observed aquatic plant densities and enable monitoring of the evolution of Milfoil beds. An interactive map was created using geolocated photos from the microdrone as well as data from the characterization team (Fyto, 2025).

Inspired by the method used by the MELCCFP's Voluntary Lake Monitoring Network, round trips were carried out between the shore and the center of the lake maintaining a constant distance between each route. These round trips were conducted in the 1–3 m depth zone, where aquatic plants grow (Map 4). Using a Garmin GPSMAP 66s GPS device, the aquatic plant beds were delineated by geolocating their boundaries. The dominant species of the bed and three co-dominant species were identified, and their coverage percentage was estimated relative to all plants (the sum of the percentages for each plant equals 100%). Additionally, the coverage percentage of the bed was estimated (plant coverage relative to the total area of the bed). The density of the EWM was calculated by multiplying the coverage percentage of the milfoil by the coverage percentage of the bed.

All field observations were compiled using the Qfield application. QGIS software was used to visualize this data. Aquatic plant beds are represented according to their dominant species and the percentage of bed coverage (Map 4, Map 5). Eurasian watermilfoil beds are represented according to the density of the EWM in 5 classes (Map 7). Data with a coverage of 0–10% are shown in blue, 10–25% in green, 25–50% in yellow, 50–75% in orange, and 75–100% in red. A descriptive table of the surveyed plant communities is also available (Appendix B).



Figure14: Field team during the characterization of aquatic plant beds at Lake Gauvreau in 2025.

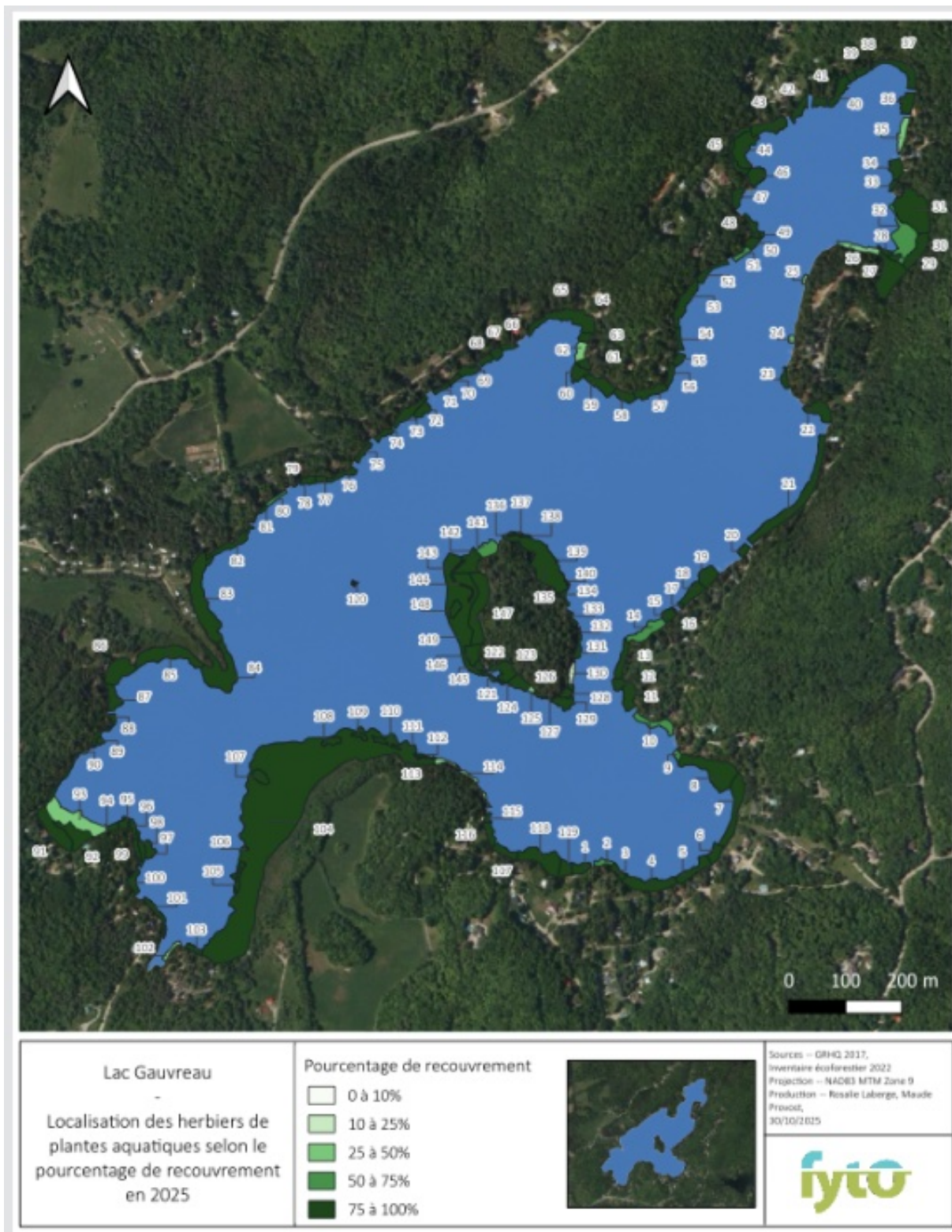
## 4.2 Characterization Results

### 4.2.1 Aquatic plant beds

The characterization of Lake Gauvreau revealed the presence of 149 aquatic plant beds, covering an area of 146,182 m<sup>2</sup>, which represents 16.1% of the lake's total area (Map 4; Table 6). The entire southern part of Lake Gauvreau has a maximum depth of 6 meters, which could allow aquatic plants to grow over a large area. However, the beds are found exclusively in areas 3 meters deep or shallower. The low water transparency (2.8 meters) prevents light rays from reaching greater depths, thereby limiting the growth of aquatic plants across the vast majority of the lake.

Table7: List of native species observed in Lake Gauvreau in 2025

French	Latin	Type of macrophyte
Schreber's brasenia	<i>Brasenia schreberi</i>	Floating
Submerged/floating hornwort	<i>Ceratophyllum demersum</i>	Submerged
Yellow water lily	<i>Nuphar variegata</i>	Floating
Rush family	<i>Juncaceae</i>	Emergent
Myriophyllum sp.	<i>Myriophyllum sp.</i>	Submerged
Scented Water Lily	<i>Scented Water Lily</i>	Floating
Heart-leaved pondweed	<i>Pontederia cordata</i>	Emergent
Linear-leaved pondweed	<i>Potamogeton sp.</i>	Submerged
Large-leaved pondweed	<i>Potamogeton amplifolius</i>	Submerged
Curly pondweed	<i>Curly pondweed</i>	Submerged
Emergent pondweed	<i>Potamogeton epihydrus</i>	Submerged
Dwarf pondweed	<i>Dwarf pondweed</i>	Submerged
Richardson's pondweed	<i>Potamogeton richardsonii</i>	Submerged
Robbins' pondweed	<i>Potamogeton robbinsii</i>	Submerged
Vasey's pondweed	<i>Vasey's pondweed</i>	Submerged
Zosteriform pondweed	<i>Zosteriform pondweed</i>	Submerged
Comb-leaved pondweed	<i>Stuckenia pectinata</i>	Submerged
Cattail	<i>Typha sp.</i>	Emergent
Common reed	<i>Common reed</i>	Emergent
Emergent bur-reed	<i>Sparganium emersum</i>	Emergent
Floating bur-reed	<i>Sparganium fluctuans</i>	Floating
Scirpus sp.	<i>Scirpus sp.</i>	Emergent
American Vallisneria	<i>Vallisneria americana</i>	Submerged



Map4: Location of aquatic plant beds based on % coverage in 2025



Twenty-three species or groups of aquatic plants were observed (Map 5). The majority of the plant communities (56 communities) are dominated by an **to be determined** species of **water milfoil** (Figure 15). The remaining beds are dominated by Robbins' pondweed (33 beds; *Potamogeton robbinsii*; Figure 16) and broad-leaved pondweed (24 beds; *Potamogeton amplifolius*; Figure 17). Six other species dominate or co-dominate the beds (Map 5; Appendix B), including fragrant water lily, zosteriform pondweed, and comb-leaved pondweed (Figures 18–21). Half of the beds are dominated by pondweed species with linear or non-linear submerged leaves (Appendix B). These plants groups appear to be very well established in Lake Gauvreau, as a wide variety of species are found there. Robbins's pondweed, which dominates one-quarter of the beds, is known for forming dense beds in deep areas. Since other aquatic plants do not grow at these depths, this allows it to occupy larger areas without competition.



Figure15 : **To be determined species of milfoil** plant at Lake Gauvreau in 2025.



Figure16 : Robbins' pondweed bed at Lake Gauvreau in 2025.

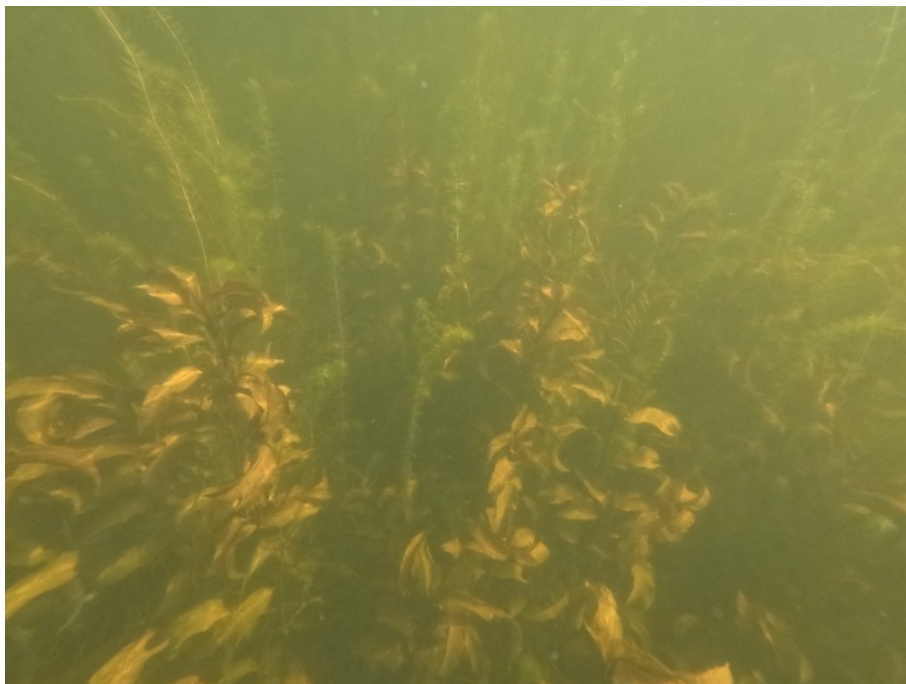


Figure17 : Large-leaved pondweed plants in the foreground at Lake Gauvreau in 2025.



Figure18 : Herbarium of sweet water lilies at Lake Gauvreau in 2025.



Figure19 : A plant of *Zostera marina* at Lake Gauvreau in 2025.

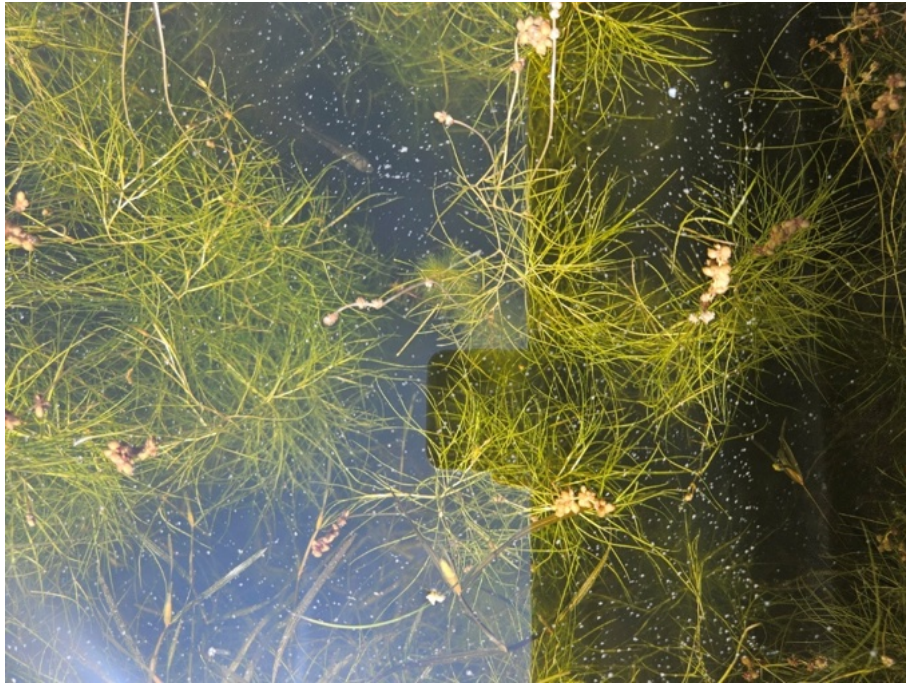
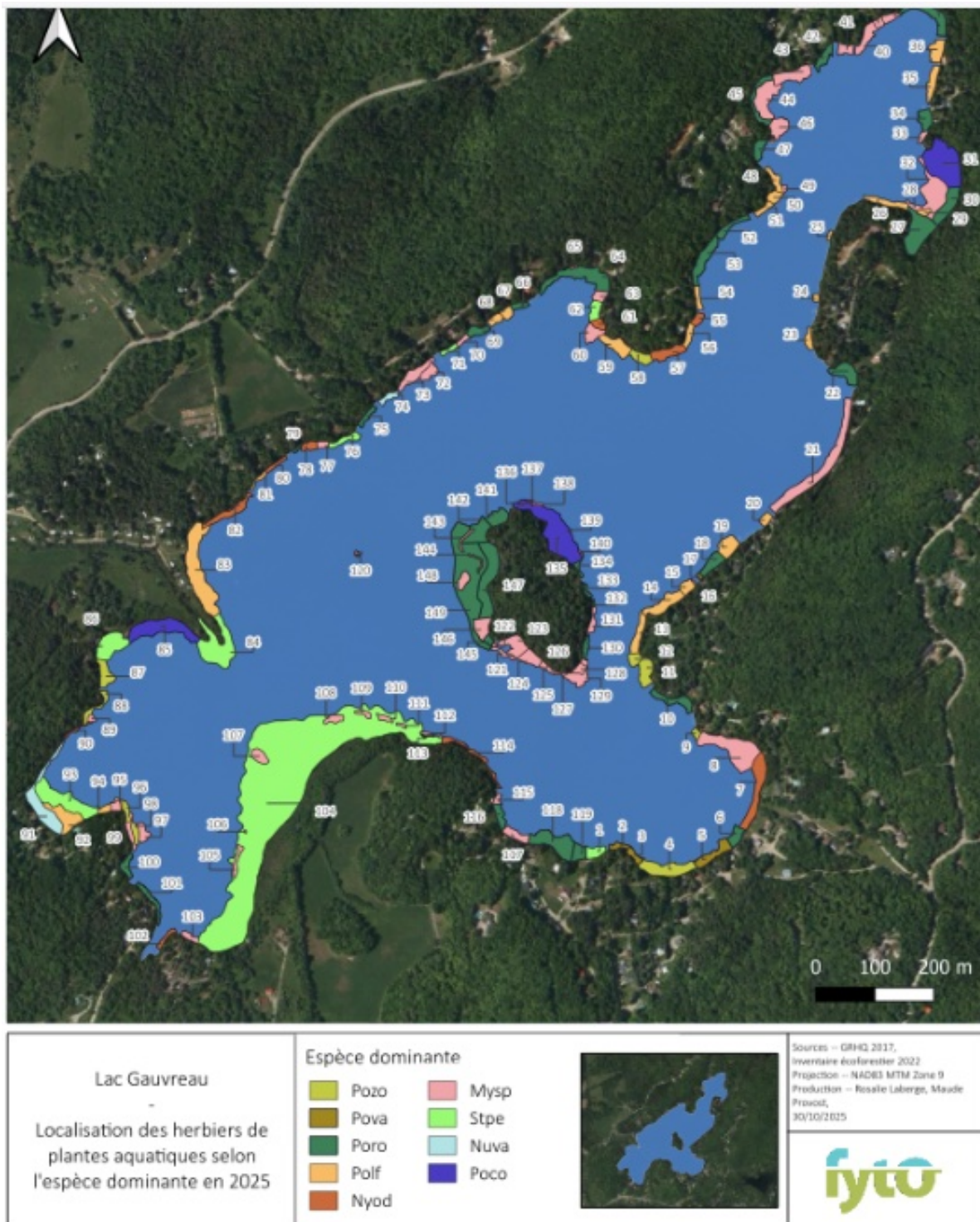


Figure20 : Pectinated pondweed plants at Lake Gauvreau in 2025.



Figure21: Plant community #104, in the center of the image, consisting of common pondweed at Lake Gauvreau in 2025.

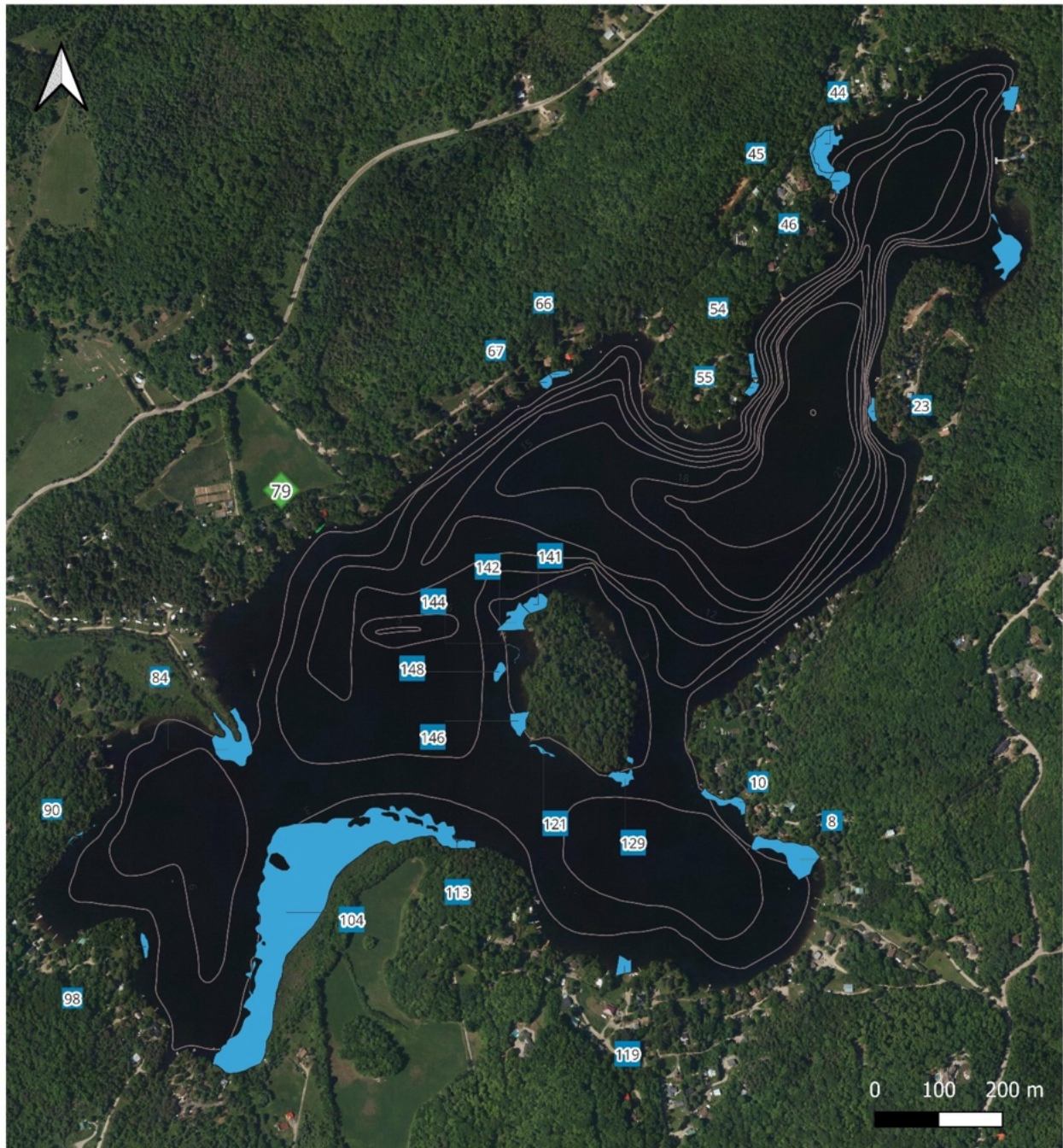




Map5: Location of aquatic plant beds by dominant species in 2025

During the characterization of the macrophytes in Lake Gauvreau, a second invasive alien species was observed. Indeed, curly pondweed is present in 26 beds scattered across different sections of the lake (Map 6). Curly pondweed is native to Eurasia. It is a submerged perennial plant with slightly wavy and toothed leaves (Figure 22). It can reproduce both sexually and asexually through vegetative propagation. The stems can reach a length of 1 meter. Furthermore, curly pondweed plants that germinate in the fall survive the winter under the ice (Lavoie, 2022). Curly pondweed thrives in loose substrates (sand, silt, clay) and nutrient-rich waters. It can tolerate turbid and shaded waters (Corporation de l'Aménagement de la Rivière l'Assomption, 2021). The curly pondweed present in Lake Gauvreau may have originated from watercraft that came into contact with another lake containing the plant in question. In fact, the asexually produced turions can survive up to 28 days out of water (Lavoie, 2022). Washing this equipment before launching it into the water is an effective way to reduce the spread of this invasive alien plant.



Figure22 : Crested waterweed plant at Lake Gauvreau in 2025.



<p>Lac Gauvreau</p> <p>-</p> <p>Localisation des herbiers de plantes aquatiques selon la présence de potamot crépu en 2025</p>	<p>Herbiers de potamot crépu (Densité)</p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #4682B4; margin-right: 5px;"></span> 1 à 10%</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #32CD32; margin-right: 5px;"></span> 10 à 25%</li> </ul>	<p>Sources -- GRHQ 2017, Inventaire écoforestier 2022 Projection -- NAD83 MTM Zone 9 Production -- Rosalie Laberge, Maude Provost, 30/10/2025</p>  
--	--	--

Map6: Location of aquatic plant beds based on the presence of curly pondweed

4.2.2 Eurasian **watermilfoil** beds **to be d**

**To be determined** Eurasian **watermilfoil** was identified in 140 beds covering an area of 134,136 m<sup>2</sup>, representing 14.7% of the total area of Lake Gauvreau (Table 7). Considering only beds in the (75–100%) class, the area is 6,316 m<sup>2</sup> and represents less than 1% of the lake. Since beds with a water milfoil abundance of 0–10% can cover large areas without being problematic, we can consider the beds in the higher density classes (10–100%) to estimate a treatment area of approximately 82,859 m<sup>2</sup>.

Eurasian **water milfoil** is found along nearly the entire perimeter of the lake, with the exception of just nine native plant beds. Although it is present throughout Lake Gauvreau, the largest and densest beds are concentrated in the northern part of the lake and around Île Sainte-Anne (Map 7). The southern part of the lake also contains a few red-leafed plant beds (Figure 23). Collectively, the Eurasian watermilfoil beds at Lake Gauvreau colonize nearly all areas with a depth of 3 meters or less. The shorelines are therefore heavily affected, as is the shallow area west of the island.

The main **Eurasian Water Milfoil** beds identified on the ABV des 7 in 2018 (Figure 2) were also observed by the Fyto field team. Most of the monospecific beds occupy a smaller area, meaning they are more localized according to the Fyto inventory (Map 7). However, the number of beds consisting exclusively of native plants has decreased. In fact, in 2018, 19.4% of the beds were composed of native species only, whereas this figure drops to just 6% in 2025 (ABV des 7, 2018).

The plant beds of Lake Gauvreau are particularly diverse and dense. In fact, nearly 60% of the plant communities have 100% coverage and contain **Eurasian water milfoil** of all densities. Among these, native species, particularly pondweeds, appear to intermingle with **undetermined milfoil** (Figures 23–32).

Table8: Classification and area of **undetermined milfoil** beds observed at Lake Gauvreau in 2025.

Density class MAE	Number of beds	Area (m <sup>2</sup> )
A (0–10%)	22	51,277
B (10–25%)	53	47,099
C (25–50%)	23	21,610
D (50–75%)	16	7,834
E (75–100%)	26	6,316
<b>TOTAL</b>	<b>140</b>	<b>134 136</b>

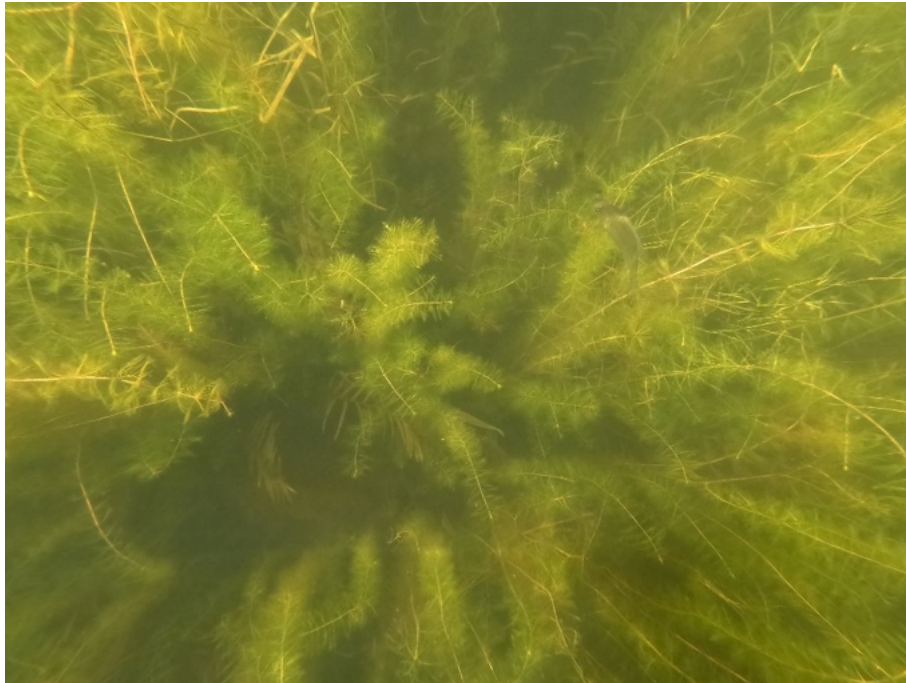


Figure23 : Sample plot #140 with a density of 90% of **undetermined Eurasian watermilfoil** at Lake Gauvreau in 2025.

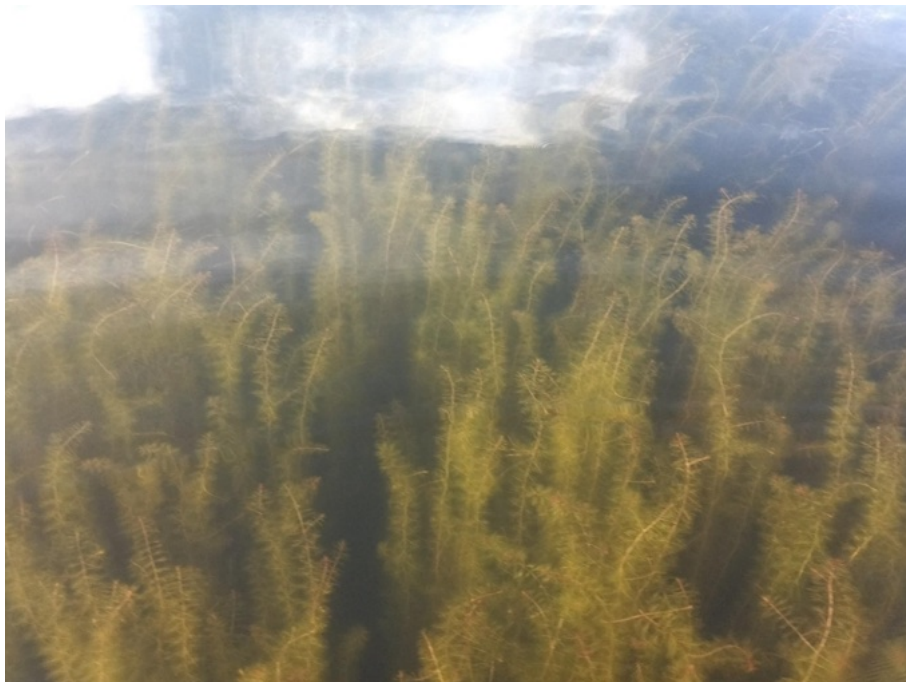


Figure24 : Plot #97 with a density of 75% of **undetermined Eurasian watermilfoil** at Lake Gauvreau in 2025.



Figure25 : Herbarium #26 of native plants mixed with **Eurasian watermilfoil to be determined** at Lake Gauvreau in 2025.



Figure26 : Herbarium #45 of native plants mixed with **Eurasian watermilfoil to be determined** at Lake Gauvreau in 2025.



Figure27: Herbarium #60 with a **water milfoil to be determined** density of 75–100% at Lake Gauvreau in 2025.



Figure28: Herbarium #72 with a density of 75–100% of **undetermined water milfoil** at Lake Gauvreau in 2025.



Figure29: Survey site #43 with a density of 50–75% of **water milfoil to be determined** at Lake Gauvreau in 2025.



Figure30: Survey plot #123 with a density of 50–75% of **water milfoil to be determined** at Lake Gauvreau in 2025

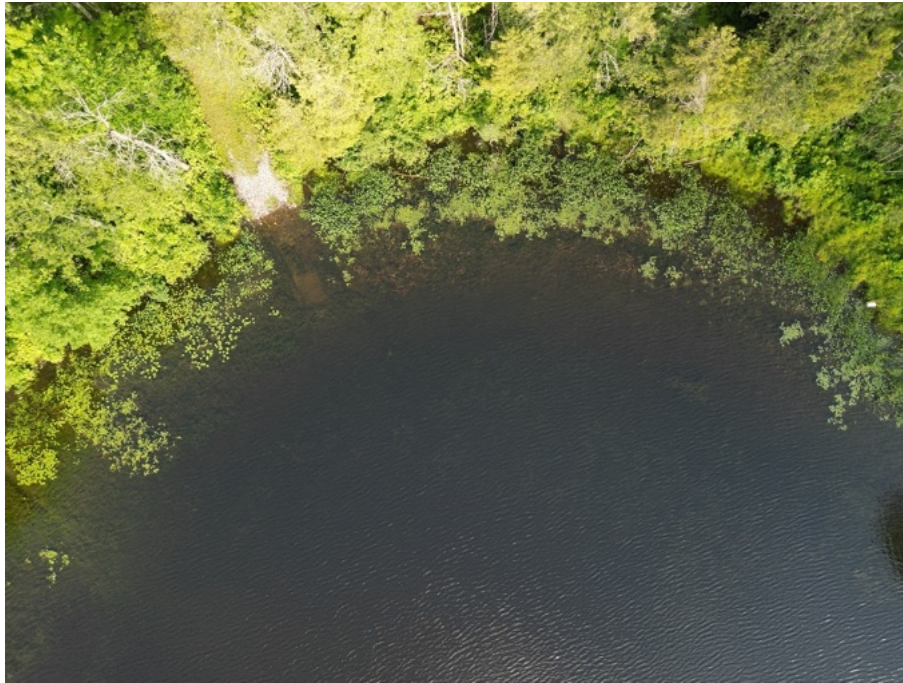
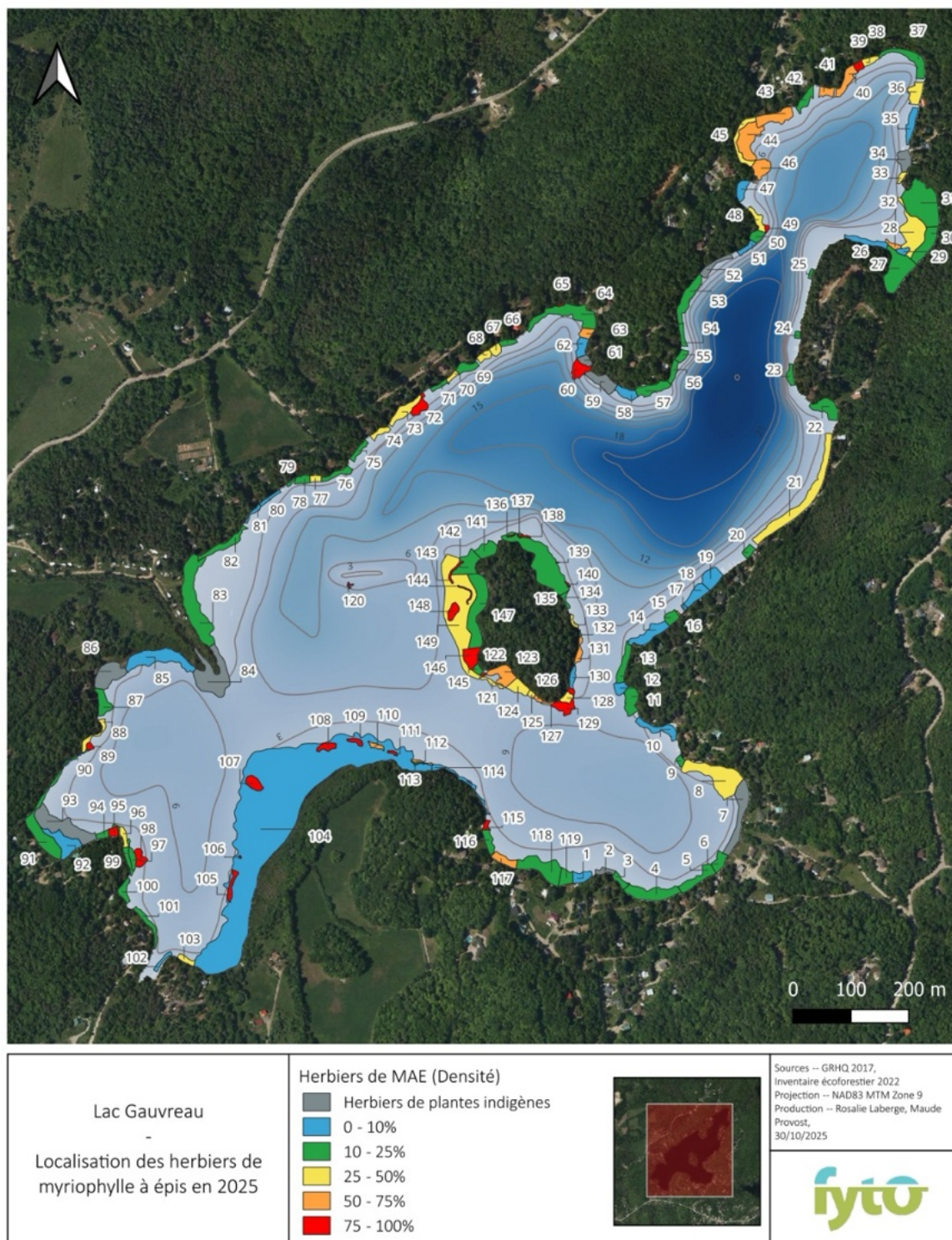


Figure31: Transect #45, near the shore, with a density of 25–50% of **water milfoil to be determined** at Lake Gauvreau in 2025.



Figure32: Plant community #73, near the shore, with a density of 25–50% of **Eurasian watermilfoil to be determined** at Lake Gauvreau in 2025.



Map7: Location of Eurasian watermilfoil beds in 2025

## 5. Control Strategy

---

### 5.1 Project Rationale

Eurasian watermilfoil has been present in Lake Gauvreau for over ten years. Since 2016, several actions have been carried out, including floristic inventories, awareness initiatives, and the installation of burlap. However, these techniques have not reduced the density of Eurasian watermilfoil, and no comprehensive control strategy aimed at eliminating Eurasian watermilfoil had yet been implemented. Today, in 2025, nearly ten years later, the area covered by EWM is cause for concern: it covers almost the entire shoreline of Lake Gauvreau, or 134,136 m<sup>2</sup>, representing 14.7% of the aquatic plant beds.

Enviro Lac Gauvreau wishes to begin controlling EWM beds to achieve sustainable results. To this end, it has commissioned Fyto to develop a strategy to combat EWM at Lake Gauvreau. This strategy is based on a multi-year action plan, presented in three scenarios. It aims to control EWM beds (through intensive control measures) and ensure that dense EWM beds do not reappear by implementing maintenance control in subsequent years. By adopting a well-thought-out plan, Enviro Lac Gauvreau maximizes the project's chances of success.

The primary objective is to reduce the area where the EWM density exceeds 25% to 0 m<sup>2</sup> for Scenario 1 and 75% to 0 m<sup>2</sup> for Scenario 2. These two scenarios thus allow native plants to recolonize the treated sites and recreate natural ecosystems conducive to aquatic life. The secondary objective is to ensure that monospecific EWM beds do not re-establish themselves, which requires annual monitoring of remaining plants, to detect them and remove them. To achieve this objective, depending on the scenario, it will be necessary to cover 13,660 m<sup>2</sup> and remove 22,057 m<sup>2</sup> over a three-year period (Scenario 1) or install tarps over a total area of 6,273 m<sup>2</sup> in one year.

Enviro Lac Gauvreau aims to manage the EWM plant beds in order to limit their impact, protect the health of the lake, preserve its flora and fauna, and, consequently, maintain property values and facilitate recreational activities. The goal is to ensure the long-term sustainability of Lake Gauvreau and maintain its optimal health. The effects of EWM on flora and fauna are still poorly documented, but it is highly likely that its establishment alters aquatic ecosystems. For example, it has been demonstrated that competition from EWM leads to a decrease in the abundance and diversity of native plant species, which are essential for the diet of many species (Boylen, 1999). Furthermore, changes in or the emergence of aquatic plant beds could impact fish, although few studies exist on this topic. Controlling Eurasian water milfoil beds and replacing them with native plant beds can only improve biodiversity and provide optimal habitat for the lake's wildlife.

Finally, EWM can form dense beds that restrict navigation and swimming. The passage of boats near these beds promotes fragmentation and, consequently, the spread of EWM. Control measures will therefore slow its spread while maintaining the recreational uses of Lake Gauvreau.

## 5.2 The Strategy

Combating Eurasian water milfoil is complex, costly, and must be well-planned to be successful. The strategy does not aim to eradicate the water milfoil, but rather to achieve a biomass, density, or coverage threshold that is acceptable to residents, while also taking into account the resources available to carry out the work and the current state of the situation. Once this threshold is reached, the goal is to maintain these results using more modest resources. The greater the initial investment, the better the chances of success, and the less effort will be required in subsequent years. The longer the delay between the species' introduction and the implementation of control measures, the more unpredictable the growth of Eurasian water milfoil becomes and the greater the risk of invasion increases.

It is not possible to guarantee the success of a control campaign due to several factors, such as significant year-to-year population fluctuations, unpredictable fragmentation, and the characteristics of the lake. A good strategy nevertheless requires:

1. A thorough understanding of the lake's characteristics;
2. A thorough understanding of the extent of the invasion, supported by recent mapping;
3. A realistic objective (complete eradication is not possible);
4. A significant and ongoing investment;
5. A concentration of efforts aimed at the near-complete elimination of targeted sites.

It is important to note that the area and density of Eurasian watermilfoil beds can fluctuate significantly, sometimes over short periods. The choice of methods, cost estimates, and the proposed action plan may be affected by this. For this reason, we recommend an annual assessment of the watermilfoil.

The strategy for Lake Gauvreau was planned based on:

- Dominant wind
- Tributary, outflow, current direction
- Lake shape
- Level of invasion, size of beds, density of beds
- Depth
- Water clarity

Depending on the scenario, the choice of control methods will obviously involve a combination of covering monospecific beds (with synthetic netting) and manual removal. Efforts will be concentrated on specific areas with the goal of achieving near-complete or partial elimination of water milfoil from the targeted beds each year. An annual assessment of the aquatic plant beds will allow us to monitor population trends and operations in order to adjust the strategy. For the first scenario, the strategy's objectives will be divided among the three sectors, as the level of invasion varies.

The action plan was developed in three scenarios, defined according to the magnitude of the expected impacts: optimal, moderate, and limited. The selected scenario will be determined by Enviro Lac Gauvreau based on the funding allocated to the project.

**PHASE 1** – Intensive interventions over 1 to 3 years (depending on the chosen scenario)

Depending on the selected scenario, the intensive interventions period should last one to three years (or less if resources and conditions permit). During this phase, manual pulling and tarp covering techniques—or covering alone—will be used intensively to significantly reduce the invasion to a minimal threshold, which will be maintained through ongoing control efforts.

During this phase, to reduce costs, it is recommended to organize volunteer weeding work with local residents to remove less dense beds of EWM near the shoreline. This will be a great opportunity to raise local awareness of issues related to EWM and to optimize the control techniques being implemented. However, these activities must be supervised by specialized biologists.

**PHASE 2** – Maintenance Interventions following the end of intensive control

Maintenance interventions must be carried out annually to preserve the gains made during the intensive interventions phase. We plan to begin this phase immediately upon completion of the first phase, implementing significant removal efforts to reduce the presence of Eurasian water milfoil in beds with a density below 25% under Scenario 1, or to prevent the development of new monospecific beds under Scenario 2. Subsequently, annual assessments will determine the scope of the interventions to be carried out each year.

The recommended method for maintenance interventions is monitoring with targeted removal. To proceed, the following must be provided:

1. A boat capable of navigating the shoreline;
2. An aquascope to identify aquatic plants at depth;
3. Two to three people capable of distinguishing Eurasian watermilfoil from other aquatic plants;
4. A sufficient number of marker buoys (50–100).

Maintenance Interventions are divided into two main phases:

**1. Surveillance**

This involves surveying the lake's shoreline by boat, much like conducting a plant inventory. However, instead of geotagging Eurasian watermilfoil plants, they are marked with a small buoy (they can also be geotagged). Once a sufficient number of plants have been marked, targeted removal begins.

## 2. Targeted Removal

A diving team travels to each buoy (or GPS coordinate) to remove the marked plants. Once the removal is complete, the buoys are retrieved so the process can be repeated to cover the entire shoreline. Depending on the abundance of spiked water milfoil, the shoreline may be surveyed multiple times during a season.

During the first few years of the maintenance effort, the work required will likely be more extensive than in subsequent years. We should see an annual decrease in the amount of spiked water milfoil removed from the lake.

## 6. Description of Activities

---

For Phase 1 (intensive interventions), activities consist of the following steps each year:

1. Confirm the action plan for the beds to be covered and removed for the year
2. Installation of tarps over dense beds
3. Uprooting around the tarps
4. Removing small seagrass beds, mixed seagrass beds, and seagrass beds that were not covered by tarps  
(scenario 1 only)
5. Characterization of aquatic plant beds and EWM
6. Updating the action plan based on the new characterization
7. Repeat steps 2 through 6

### 6.1 Covering/Tarpolins

Covering is carried out in the spring and early summer, when the aquatic plant seedlings are small. In short, this involves installing tarps over dense aquatic plant beds—and thus over the lake bottom—on the beds targeted in the action plan. It is performed by divers who are skilled at identifying aquatic plants. In fact, all divers have training in environmental science, bioecology, or biology and have received comprehensive training in the identification of aquatic plants. Covering is supervised by an environmental or biological specialist, who ensures that the covered beds are indeed EWM beds with a density of over 75%.

Before covering begins, a characterization of the Eurasian watermilfoil bed is conducted during a dive. The dominant species of the bed and three co-dominant species are identified, and their coverage percentage is estimated relative to all plants (the sum of the percentages for each plant equals 100%). Additionally, the coverage percentage of the bed is estimated (plant coverage relative to the total surface area of the bed). This characterization allows for comparison of the Eurasian watermilfoil bed before and after covering.

The tarps used for covering are 8 feet wide by 60 feet long. They are mesh, which allows for gas exchange. At one end of the tarp and every 10 feet along the tarp, steel rods are attached directly to the tarp (6 rods). The attached rods provide optimal ballast and also ensure that all rods are removed when the tarps are taken down. A galvanized steel tube is attached to the other end of the tarp with rivets, and the tarp is rolled around this tube. The addition of this tube makes it easier to remove the tarps.

The nets are transported over the water by pontoon and are unrolled directly onto the riverbed by two divers and layered on top of each other to prevent plants from passing between the nets. The nets are removed at the end of summer and cleaned before storage. Removal is carried out by a diver who attaches two ropes to the net to pull it out of the water from the pontoon. Removing the nets allows native aquatic plants ( ) to recolonize the bare sites. Additionally, removing the nets allows fish to spawn in the treated sites.

The pontoon and all equipment that has come into contact with the water (diving equipment, anchors, buoys, etc.) are cleaned using a hot water pressure washer before and after each activity on the lake.

Based on the 2025 EWM beds map, it is possible to determine the list of seagrass beds to be treated by covering at Lake Gauvreau, as well as the areas that will be affected (Tables 8 and 9). However, it is important to understand that the list of these seagrass beds will change over the course of the control efforts, either through the densification of certain beds, the formation of new beds, the merging of two beds, or simply through the growth of existing beds. This list therefore provides an overview of the areas that will be covered with tarps, but will be updated after each year of work on the lake.

Table9: Wetlands and aquatic habitats that will be temporarily affected by the covering work\*.

Identification/type of wetlands and aquatic habitats	Main characteristics of the habitats	Area of the habitat (m <sup>2</sup> )	Data source	Areas temporarily affected

\*To be determined upon selection of the scenario and submission of ministerial authorizations.

Table10: Seagrass beds to be covered at Lake Gauvreau between XX and XX\*.

Number	Area (m <sup>2</sup> )	MAE Density (%)	Longitude	Latitude	Year of processing

\*To be determined upon selection of the scenario and submission of ministerial permits.

## 6.2 Manual removal

Manual removal allows for the treatment of mixed seagrass beds (EWM and native plants) as well as smaller seagrass beds. It is therefore carried out on the lake bed and is a temporary activity. Removal is performed by divers who are skilled at identifying EWM. In fact, all divers have training in environmental science, bioecology, or biology and have received comprehensive training in the identification of aquatic plants. Additionally, the activities are supervised by an environmental or biological specialist to ensure that it is indeed Eurasian watermilfoil that is being removed and to ensure the smooth conduct of the removal activities.

Before starting the removal, a characterization of the Eurasian watermilfoil bed is conducted during a dive. The dominant species of the bed and three co-dominant species are identified, and their coverage percentage is estimated relative to all plants (the sum of the percentages for each plant, equals 100%). Additionally, the coverage percentage of the bed is estimated (plant coverage relative to the total surface area of the bed).

Divers uproot the EWM by hand, taking care to remove not only the stem but also the root system. The plants are brought to the surface in mesh bags or using a suction recovery system (SRS) with a Venturi effect. On the pontoon, one or two people are responsible for collecting the plants brought up by the basin (SRS) and the nets. When a milfoil bed is removed, divers ensure that all plants in that bed are removed to prevent the bed from regenerating.

The SRS is a system consisting of a pump, hoses, a Venturi system, and a suction table. It is cleaned between each lake using a hot water pressure washer. All hoses are also rinsed with clean water to ensure the system is free of plants and sediment. The SRS is installed on a floating platform, all parts of which (engine, keel, etc.) are cleaned using a hot water pressure washer between each use on different lakes. During operations, the SRS is frequently inspected to ensure that the suction table adequately filters out all aquatic plant fragments, and that the discharged water is thus free of plants.

To limit the spread of the few fragments generated during manual removal by divers, several volunteers assist by collecting EWM fragments by hand or with a net from aboard a non-motorized boat. The team operating the SRS collects the fragments to dispose of them in the same manner as the uprooted EWM. The presence of volunteers is essential to ensure that the spread of EWM around the sites where work is being carried out is not exacerbated.

Based on the 2025 map of EWM beds, it is possible to determine the list of beds to be treated by removal at Lake Gauvreau (Table 10). However, it is important to understand that this list of beds may change during the control years, either through the formation of new beds, the merging of two beds, or simply through the growth of existing beds. This list therefore provides an overview of the areas to be removed but will be updated after each year of work on the lake.

Table11: Submerged vegetation beds to be removed at Lake Gauvreau between XX and XX\*.

Number	Area (m <sup>2</sup> )	MAE Density (%)	Longitude	Latitude	Year of processing

\*To be determined upon selection of the scenario and submission of ministerial permits.

### 6.3 Conditions for carrying out the work

At Lake Gauvreau, the presence of fecal coliforms such as *E. coli* is possible. If present, several studies have established clear links between the presence of *E. coli* and the onset of gastrointestinal illnesses as well as other health issues related to swimming, such as respiratory and skin diseases (Health Canada, 2024).

In Quebec, standards for fecal coliforms permit recreational use only when water quality is rated between excellent and fair, meaning the sample contains fewer than 200 CFU per 100 ml (Table 11). To ensure the

safety and health of divers, no diving operations will be conducted in areas considered high-risk. Enviro Lac Gauvreau must therefore conduct annual water quality monitoring.

Table12: Water quality classification for the protection of recreational activities (MELCCFP, n.d.).

Water quality classification for recreational uses		
Water quality	Fecal coliforms per 100 ml	Permitted use
Excellent	0–20	All recreational uses permitted
Good	21-100	All recreational uses permitted
Fair	101-200	All recreational uses permitted
Poor	Over 200	Including swimming and other direct contact with water
Very poor	Over 1,000	All recreational uses compromised

## 7. Action Plan

---

### 7.1 Timeline

The 2027–2029 action plan is based on the 2025 MAE aquatic plant map. However, the action plan will need to be revised annually based on monitoring results to account for progress and changes in Eurasian watermilfoil populations. In fact, between each year of work, the beds will expand, become denser, and develop. The action plan therefore attempts to estimate this growth and factor it into the estimation of the areas to be treated. Actual figures will only be available after each characterization.

The action plan was developed in three scenarios, defined according to the magnitude of the expected impacts: optimal, moderate, and limited. The selected scenario will be determined by Enviro Lac Gauvreau based on the funding allocated to the project.

### 7.2 Scenario 1: Optimal

This first scenario aims to achieve optimal results in combating EWM. It calls for the covering of all EWM-dominated beds identified during the 2025 characterization, with a density of over 50% and an area greater than 100 m<sup>2</sup>. This threshold was selected because seagrass beds reaching or exceeding this coverage rate are generally in transition toward a monospecific composition, meaning that Eurasian water milfoil is already beginning to outcompete native plants. This situation poses a high risk of spread and loss for native species. It is important to note that several native plants, including Robbins' pondweed and American water-crowfoot, have demonstrated their ability to persist under the mats. It is therefore estimated that the negative impact of nets used at an EWM density exceeding 50% will have less severe consequences on the local flora compared to the expected effect following the removal of spiked water milfoil in these regions. Removal will then be carried out in seagrass beds smaller than 100 m<sup>2</sup> and with a density of 25–50% (Tables 12, 13, and 14).

**2029 Target:** Reduce the area where Eurasian watermilfoil abundance exceeds 25% to 0 m<sup>2</sup>.

Table13: Work schedule for summer 2027.

Activities	Period	Seagrass beds	Area of beds
Installation of tarps	April 1 to July 31, 2027	39, 40, 41, 43, 44, 46, 28.	220 + 5,060 = <b>5,280 m<sup>2</sup></b>
Weeding around the tarps	May 1 to July 31, 2027	See tarps installation.	Around the perimeter of 5,280 m <sup>2</sup> .
Weeding of EWM grasslands 25–100%	May 1 to September 30, 2027	38, 36, 45, 33, 32, 48, 49, 21.	<b>7,959 m<sup>2</sup></b>
Removal of tarps	Before September 30, 2027	See tarps installation.	5,280 m <sup>2</sup>
<b>Total</b>	April 1 to September 30, 2027	39, 40, 41, 43, 44, 46, 28, 38, 36, 45, 33, 32, 48, 49, 21.	<b>13,239 m<sup>2</sup></b>
Description	September 2027	All lake seagrass beds.	

\*Seagrass beds with 50–75% density.

For the summer of 2027, covering will be carried out on the seagrass beds located on the northern shores of Lake Gauvreau. In 2025, these beds cover 5,280 m<sup>2</sup>. Additionally, all beds with lower density in 2025 that will have a EWM density > 50% in 2027 will also be covered under this scenario.

We estimate the maximum area to be 7,000 m<sup>2</sup>, which corresponds to 4.8% of the aquatic plant beds in Lake Gauvreau. We do not consider this growth to be significant, given that a wide variety of native plants are already present in the colonizable areas. Several years, as well as the development of a better understanding of the lake's dynamics during the work, are necessary to evaluate these assumptions.

For hand removal, the less dense plant communities remaining on the northern shores of the lake will be treated, covering an area of 7,959 m<sup>2</sup> by 2025. We estimate that these beds will cover 10,000 m<sup>2</sup> by 2027, which also corresponds to 6.8% of the aquatic plant beds in Lake Gauvreau.

Table14: Work Schedule for Summer 2028.

Activities	Period	Seagrass beds	Seagrass bed area
Installation of tarps	April 1 to July 31, 2028	60, 63, 72, 143, 148, 146, 123, 126, 127, 129, 131.	3,238 + 1,876 = 5,114 m <sup>2</sup>
Weeding around the tarps	May 1 to July 31, 2028	See tarps installation.	Around the perimeter of 5,114 m <sup>2</sup> .
Weeding of EWM beds 25–100%	May 1 to September 30, 2028	65, 67, 68, 70, 73, 74, 138, 137, 136, 16, 144, 149, 122, 121, 124, 125, 128, 133, 140, 139.	9,761 m <sup>2</sup>
Removal of tarps	Before September 30, 2028	See tarps installation.	5,114 m <sup>2</sup>
<b>Total (excluding maintenance)</b>	April 1 to September 30, 2028	60, 63, 72, 143, 148, 146, 123, 126, 127, 129, 131, 65, 67, 68, 70, 73, 74, 138, 137, 136, 16, 144, 149, 122, 121, 124, 125, 128, 133, 140, 139.	<b>14,875 m<sup>2</sup></b>
Maintenance of the 2027 works	May 1 to September 30, 2028	39, 40, 41, 43, 44, 46, 28, 38, 36, 45, 33, 32, 48, 49, 21.	13,239 m <sup>2</sup>
Characterization	September 2028	All lake seagrass beds.	

\*Seagrass beds with 50–75% density.

The same measures will be implemented in 2028 as in 2027, with 5,114 m<sup>2</sup> of seagrass beds covered and 9,761 m<sup>2</sup> hand removed, for a total of 14,875 m<sup>2</sup>, this time carried out on Sainte-Anne Island.

In 2028, we estimate that the area of covered seagrass beds will be 9,000 m<sup>2</sup> and that of removed seagrass beds 12,000 m<sup>2</sup>, corresponding to 6.2% and 8.2% of the aquatic plant beds in Lake Gauvreau, respectively.

This year will also mark the start of maintenance management in the seagrass beds treated in 2027. At that time, more than 14,875 m<sup>2</sup> will be monitored to prevent potential regrowth at densities exceeding 25%. The intensity of this management will be determined following the characterization of the seagrass beds in 2027.

Table15: Work Schedule for Summer 2029.

Activities	Duration	Seagrass beds	Seagrass bed area
Installation of tarps	April 1 to July 31, 2029	107, 105, 97, 95, 89, 111, 112, 110, 109, 108, 115, 117.	2,407 + 859 = 3,266 m <sup>2</sup>
Weeding around the tarps	May 1 to July 31, 2029	See tarps installation.	Around the perimeter of 3,266 m <sup>2</sup> .
Weeding of EWM grasslands 25–100%	May 1 to September 30, 2029	8, 103, 96, 106, 88, 77.	4,337 m <sup>2</sup>
Removal of netting	Before September 30, 2029	See tarps installation.	3,266 m <sup>2</sup>
<b>Total (excluding maintenance)</b>	April 1 to September 30, 2029	107, 105, 97, 95, 89, 111, 112, 110, 109, 108, 115, 117, 8, 103, 96, 106, 88, 77.	<b>7,603 m<sup>2</sup></b>
Maintenance of work from 2027 and 2028	May 1 to September 30, 2029	39, 40, 41, 43, 44, 46, 28, 38, 36, 45, 33, 32, 48, 49, 21, 60, 63, 72, 143, 148, 146, 123, 126, 127, 129, 131, 65, 67, 68, 70, 73, 74, 138, 137, 136, 16, 144, 149, 122, 121, 124, 125, 128, 133, 140, 139.	28,114 m <sup>2</sup>
Characterization	September 2029	All lake seagrass beds.	

\*Seagrass beds with 50–75% density.

In 2029, interventions will continue in the southern sector following a similar approach to previous years, but over slightly different areas: approximately 3,266 m<sup>2</sup> will be covered with tarps and 4,337 m<sup>2</sup> will be removed, for a total of 7,603 m<sup>2</sup>.

That year, the cumulative area of covered aquatic plant beds is expected to reach 7,000 m<sup>2</sup>, while that of removed aquatic plant beds will be around 11,000 m<sup>2</sup>, representing approximately 4.8% and 7.5% of the total aquatic plant beds in Lake Gauvreau, respectively.

Furthermore, 2029 will see the continuation of maintenance operations in the areas treated in 2027 and 2028. More than 28,114 m<sup>2</sup> will be monitored to prevent regrowth at densities exceeding 25%.

### 7.3 Scenario 2: Moderate

This second scenario aims to achieve moderate results in the fight against EWM by focusing efforts on the most effective interventions while limiting costs and workload. It calls for the covering, over the course of one year, of all monospecific seagrass beds infested with EWM—identified during the 2025 characterization—that have a density exceeding 75%. No uprooting is planned under this plan (Table 15).

To complement these interventions and optimize results, it would be advisable to organize workshops on removal techniques led by a biologist. Conducted in collaboration with local residents, this activity aims to train volunteers in the identification, control, and removal of low-density MAE seagrass beds located near the shoreline. These seagrass beds, accessible due to their shallow depth, are easier to remove. This is a simple action to implement, complementing intensive control efforts.

**2027 Goal:** Reduce the area of monospecific EWM seagrass beds (with a density of over 75%) to 0 m<sup>2</sup>.

Table16: Work schedule for summer 2027.

Activities	Duration	Seagrass beds	Seagrass bed area
Installation of tarps	April 1 to July 31, 2027	39, 49, 60, 65, 136, 137, 138, 143, 144, 148, 146, 122, 129, 140, 115, 111, 109, 108, 107, 106, 105, 72, 89, 97, 95.	6 273 m <sup>2</sup>
Weeding around the tarps	May 1 to July 31, 2027	See installation of tarps.	Around the perimeter of 6 273 m <sup>2</sup> .
Removal of tarps	May 1 to September 30, 2027	See installation of the tarps.	6 273 m <sup>2</sup>
Characterization	September 2027	All lake beds.	

Under this scenario, by the summer of 2027, tarping will be carried out on the seagrass beds covering the entire Lake Gauvreau, which in 2025 occupied an area of 6 273 m<sup>2</sup>. In addition, all seagrass beds with lower density in 2025 that will have a EWM density > 75% in 2027 will also be covered. We estimate the total area

to be 8 000 m<sup>2</sup>, which corresponds to 5.5% of the aquatic plant beds in Lake Gauvreau. This approach follows the logic established in Scenario 1.

Maintenance management will begin in 2028 and will aim to monitor the development of new monospecific EWM beds. The intensity of this management will be determined following the characterization of the beds in 2027.

#### 7.4 Scenario 3: Limited

This third scenario does not aim to implement control measures with specific objectives. Instead, it seeks to assess what would happen to the lake without any control measures. It would rely more on awareness-raising activities, monitoring, and small-scale, low-cost citizen-led interventions. It therefore does not include any covering or removal activities.

**2027 Goal:** Limit and monitor the spread of EIA beds without conducting intensive control work.

Assuming no intervention is carried out at Lake Gauvreau to control EWM beds, other actions could be implemented to slow down and monitor the spread of EWM and improve the lake's health. These actions fall into three categories:

1. Monitor the evolution of EWM beds
2. Reducing the amount of nutrients available to EWM and other aquatic plants
3. Limiting the reproduction of EWM

##### 1. Evolution of EWM

In the coming years, if no measures are implemented to control EWM, it is highly likely that its density within aquatic plant beds will increase. Indeed, given that a wide variety of native plants is already present in areas susceptible to colonization by Eurasian water milfoil, it is likely that this species will tend to increase in density rather than expand into new areas. However, it is important to note that the ecology of EWM can be influenced by numerous factors (e.g., season length and temperature), making its progression unpredictable from one year to the next. In the event of exponential growth, EWM may colonize all areas currently occupied by native plants. Thus, delaying control efforts significantly increases the risk of a larger-scale intervention, proportional to the associated costs.

Annual or biannual monitoring helps assess the densification of EWM beds and detect potential impacts on native plants. This monitoring provides additional justification for the need for immediate action. However, at this stage, controlling EWM may require additional resources. It also allows for the identification of new problem areas or the assessment of the effects of reduced nutrient inputs into the lake.

##### 2. Reducing Nutrients

At Lake Gauvreau, it is evident that the primary issue affecting the lake's health is nutrient input. Furthermore, a very high density of aquatic plants (EWM and native) is present throughout the lake, indicating symptoms of eutrophication (Appendix A). To address this issue, it is essential to identify sources of contamination (non-compliant septic systems, agricultural runoff, residential fertilizers, bare riparian zones, etc.) and implement solutions (improving riparian zones and soil drainage areas, limiting discharges into aquatic environments).

A nutrient input management plan for Lake Gauvreau would help identify clear and appropriate solutions to implement. It is also important to continue monitoring nutrient concentrations in the water through the Voluntary Lake Monitoring Network (RSVL) in order to assess the impact of these interventions. Other monitoring efforts, such as those of aquatic plant beds and periphyton, can also be conducted to track the lake's health.

By reducing nutrient inputs, we slow the growth of aquatic plants and the eutrophication of the lake. Although the growth of Eurasian water milfoil would be slowed, this invasive aquatic plant still spreads rapidly, even in a low-nutrient environment. It is therefore a beneficial measure for the lake's health, but it is not sufficient for the complete control of Eurasian water milfoil.

### 3. Limiting reproduction

Next, to limit the spread of EWM, the following actions can be taken:

- Raising awareness about preserving lake health.
- Collecting fragments of EWM naturally shed by the plant.
- Get training to become a Lake Sentinel.
- Limit traffic in the densest EWMbeds and establish traffic corridors.
- Weeding activities carried out by residents in collaboration with a specialist.
- Seeking funding to secure the necessary resources for an intensive control effort.

Since EWM fragments play a major role in its spread, it is essential to limit their fragmentation and collect them to slow the species' dispersal. Additionally, targeted removal by local residents in certain key areas can help curb this spread. However, it is possible that over the years, the EWM will continue to become denser. Seeking funding for intensive control measures remains the best option for effectively managing EWM stands.

## 7.5 The Timeline

### Scenario 1

Table17: Timeline of control activities for Eurasian water milfoil at Lake Gauvreau from 2027 to 2029.

2027	Activities	Period
	Tarping/Covering	April 1 to July 31, 2027
	Hand removal	May 1 to July 31, 2027
	Removal of tarps	May <sup>1</sup> to September 30, 2027
	Characterization	September 2027
2028	Activities	Period
	Tarping/Covering	April 1 to July 31, 2028
	Hand removal	May 1 to July 31, 2028
	Removal of tarps	May1 to September 30, 2028
	Characterization	September 2028
2029	Activities	Period
	Tarping/covering	April 1 to July 31, 2029
	Hand removal	May 1 to July 31, 2029
	Removal of tarps	May <sup>1</sup> to September 30, 2029
	Characterization	September 2029

### Scenario 2

Table18: Schedule of activities to control Eurasian watermilfoil at Lake Gauvreau in 2027.

2027	Activities	Approximate date
	Tarping/Covering	April 1 to July 31, 2027
	Removal of tarps	May <sup>1</sup> to September 30, 2027
	Characterization	September 2027

## 8. Impact of the work

---

### 8.1 Threatened, vulnerable, or potentially designated plant and animal species

The Ministère du développement durable, de l'environnement et de la lutte contre les changements climatiques (MDDELCC's) interactive map of data on species in a precarious situation, accessed on March 2, 2025, showed that several species in a precarious situation are found within a 2-km radius of Lake Gauvreau, including 5 wildlife occurrences and 4 plant occurrences. Faunal occurrences include the yellow loach, the spotted snake, the green snake, the golden-winged warbler, etc. They were reportedly observed in 2007 southeast of Lake Gauvreau, in 1982 around the lake, and in 2021 south of the lake. There is a single occurrence at the construction site. Since 1925, this has been a threatened species observed more than 5,000 times within Lake Gauvreau. Regarding plant species, the American conopholis was last observed in 2022, along with three other plant species (Appendix A). These species are not found at the project site. No data is available on wildlife sites of interest for spawning grounds.

Additionally, the southern part of Lake Gauvreau is part of the range of a threatened reptile species. Although egg-laying occurs outside the water, it is possible that the diving team may encounter some individuals during underwater work. It will therefore be important to ensure that no individuals are covered during the installation of the nets. The nesting period for this species begins in late May and continues through early July. The juveniles then hatch between early August and late October. Subsequently, between late August and early November, the adults migrate to their hibernation sites (ECCC, 2017).

Specifically, the tarping work will be carried out solely in the shoreline area of Lake Gauvreau. The work will therefore have no impact on threatened, vulnerable, or potentially designated wildlife and plant species found around Lake Gauvreau that are located outside the work zone.

Lake Gauvreau, in the Outaouais region, could be a potential habitat for six susceptible aquatic plant species: olive-leaved pondweed, Illinois pondweed, gem pondweed, stiff-leaved pondweed, Vasey's pondweed, and slender pondweed (Table 19). Of these plants, only Vasey's pondweed was observed during the characterization of aquatic plant beds conducted in the summer of 2025, which is the best time to observe these aquatic plants (Section 4.2).

Table19: Aquatic plant species that are susceptible or potential candidates for occurrence in a habitat such as that of Lake Gauvreau.

English name	Latin name	Status in Quebec	Habitat
Olive-leaved waterweed	<i>Najas guadalupensis</i> subsp. <i>olivacea</i>	Vulnerable	Submerged seagrass beds in shallow waters, in the St. Lawrence River and certain lakes in the Outaouais region; a plant restricted to wetland habitats.
Illinois pondweed	<i>Potamogeton illinoensis</i>	Susceptible	Lakes and rivers, deep waters up to 3 m, often with sandy bottoms; a calcareous plant and a wetland-dependent species.
Gem-bearing pondweed	<i>Potamogeton berchtoldii</i> subsp. <i>gemmiparus</i>	Susceptible	Acidic, shallow waters of lakes, rivers, ponds, and streams; a plant that requires wetland habitats.
Stiff-leaved pondweed	<i>Potamogeton strictifolius</i>	Susceptible	Alkaline waters of lakes and rivers; a calcareous plant that is strictly confined to wetlands.
Vasey's pondweed	<i>Vasey's pondweed</i>	Susceptible	Still, shallow waters (less than 1.5 m) along the shores of lakes, rivers, and marshes; a plant that is strictly dependent on wetlands.
Slender waterweed	<i>Najas gracillima</i>	Susceptible	Shallow waters of oligotrophic lakes, on sandy substrate; a plant restricted to wetland environments.

As a precaution, during the pre-characterization phase prior to covering operations, divers—all of whom are trained in biology or environmental science—will pay particular attention to detecting the presence of these six plants in dense EWM seagrass beds. If the plant is detected, the EWM seagrass bed will instead be manually removed to ensure that native aquatic plants are not killed.

## 8.2 Impacts on Wildlife

The use of tarps will have a temporary effect on certain fish habitats, namely aquatic plant beds (Table 20). Indeed, after the tarps are installed, what was previously an aquatic plant bed on sediments will instead be a collection of synthetic tarps devoid of plants and without access to the sediments. Aquatic plant beds will no longer be available to wildlife species for feeding, reproduction, or to provide habitat and hiding places.

Several measures are being implemented to mitigate the impact of the use of tarps on aquatic wildlife. First, the tarps will be installed between April 1 and July 31, allowing several fish species to reproduce before or after the tarps are installed. Next, the tarps will be removed at the end of the season to allow native aquatic plant beds to recolonize the treated site, thereby quickly re-establishing habitat for aquatic wildlife.

The area covered each year is not expected to exceed 10 000 m<sup>2</sup>, which represents only 6.8% of the aquatic plant beds. There will therefore be ample aquatic plant beds remaining for wildlife during the work.

Finally, the divers conducting the EWM monitoring work all have training in biology or environmental science and have been trained to identify fish spawning sites. Thus, if a spawning site is observed during the covering process, the deployment of the tarps is halted and the spawning site is bypassed.

Table 20: Habitats affected by the covering of Eurasian watermilfoil beds at Lake Gauvreau.

Affected species	Affected habitats	Location
All fish, amphibian, reptile, and insect species present in the aquatic plant beds at Lake Gauvreau	Aquatic plant beds, specifically dense beds of Eurasian water milfoil	Shoreline area of Lake Gauvreau (see Section 6.1 for more details).

## 8.3 The Spread of Invasive Alien Species

The hand removal and the use of tarps work will take place directly within the EWM beds, an invasive alien species (see Section 6 for the exact location of the beds). There are two potential risks of EWM spread during the work, but measures are proposed to limit these risks (Table 21). The same methods will be used to limit the risks of spreading other invasive alien species.

Table21: Risks of spreading Eurasian water milfoil during covering and removal work and measures to mitigate these risks.

Invasive species	Location	Spread risks	Mitigation measures
Eurasian water milfoil (EWM)	See Section 6	Fragmentation of Eurasian watermilfoil during covering and removal, and dispersal of these fragments into the lake	Volunteers can patrol the shorelines by kayak or canoe to collect EWM fragments during and after the work, as well as around divers during the work
		Transport EWM fragments from lake to lake via watercraft equipment	The pontoon and all equipment that has come into contact with the water (diving equipment, anchors, buoys, suction lift system, etc.) are cleaned using a hot water pressure washer before and after each activity on the lake

## 9. Citizen Participation

---

The Enviro Lac Gauvreau Association, its members, and all involved citizens can play an essential role in the strategy to combat Eurasian water milfoil in Lake Gauvreau, thereby increasing the strategy's chances of success and ensuring its long-term sustainability. Stakeholders can contribute to both intensive control efforts and maintenance efforts.

### 1. Communication with lakeshore residents

It is recommended to organize an information session for residents and users of Lake Gauvreau to present the strategy for combating Eurasian watermilfoil (EWM). This meeting should provide an overview of the entire project, explain the characteristics and challenges associated with EWM, and emphasize the importance of cleaning boats to prevent its spread.

It is also recommended to inform participants about the impacts of the work on lake use, particularly restrictions on boating near the installed nets and the need to maintain a safe distance from diving activities. This session could also be used to recruit volunteers interested in contributing to both intensive control activities and maintenance efforts.

### 2. Navigation Control

To maximize the effectiveness of the tarpaulins, it is recommended to limit boat traffic on and around the treated areas. Boat traffic, fishing, or anchoring can damage or displace the nets, thereby compromising their effectiveness. To this end, the installation of buoys marking the boundaries of the covered seagrass beds is recommended, accompanied by explanatory signs indicating navigation restrictions (Figure 26).

During diving operations, it is mandatory to maintain a minimum distance of 100 meters around the dive boat and to suspend all fishing activities in the vicinity, in accordance with Transport Canada's requirements (2014). The use of a flag and a diving buoy is also recommended to clearly signal the presence of divers. These measures should be communicated to residents and users of Lake Gauvreau during the information session.

### 3. Volunteer Support

The active participation of volunteers during EWM control efforts can greatly increase the likelihood of success. Indeed, during covering and hand removal, the waterweed can fragment. Although divers collect most of these fragments during the work, some may escape and contribute to the spread of the EWM. The role of volunteers is therefore to collect EWM fragments around the divers and along the lake's shores using a non-motorized boat and a landing net. Volunteers can also assist with managing the EWM removed during the hand removal work. Bags filled with the removed EWM must be transported to a designated container, which is provided, one to two times per day. If this work is performed by divers, it limits dive time and the efficiency of the work. If it is performed by volunteers, divers can spend more time underwater carrying out the work. Finally, the search for aquatic plant beds and invasive aquatic plant seedlings during maintenance

efforts can be carried out by volunteers trained in the identification and characterization of invasive aquatic plants. Users of Lake Gauvreau are best positioned to patrol the lake and monitor the spread of invasive aquatic plants.



Figure33 : Example of a buoy that can be installed around covered spiked water milfoil beds.

## 10. Conclusion

---

The presence of Eurasian water milfoil in Lake Gauvreau represents a major ecological challenge within an environmental context already weakened by multiple anthropogenic pressures, including nutrient enrichment, shoreline development, and intensive recreational use. Historical data and the characterization conducted in 2025 clearly demonstrate that this invasive exotic aquatic plant is now well established along a significant portion of the shoreline, particularly in shallow areas conducive to its growth and spread. The rapid increase in its coverage observed between 2015 and 2018, combined with the decline of native aquatic vegetation, confirms the need for structured, sustained, and proactive intervention.

Despite this concerning situation, the overall analysis of the lake highlights some encouraging signs. The lake retains a rich and varied aquatic biodiversity, including wildlife species of interest and native plant communities that are still well-established in certain areas. These findings underscore that rapid and well-targeted action would not only limit the spread of Eurasian watermilfoil but also promote the resilience and restoration of natural habitats.

Water clarity and total phosphorus concentrations have improved, suggesting a positive long-term trend. This development has also allowed Lake Gauvreau to transition from an eutrophic to a mesotrophic state according to the RSVL classification. This improvement could potentially be attributed to the implementation, in 2022, of guidelines regulating boating, which have contributed to a reduction in boat traffic in the area.

The proposed control strategy is based on an integrated approach, combining proven methods— tarpaulin covering and manual removal—applied in a differentiated manner depending on the density, area, and composition of the aquatic vegetation. This prioritization of interventions maximizes ecological effectiveness while optimizing financial and human resources. The three scenarios presented offer the Enviro Lac Gauvreau Association flexibility in decision-making, depending on available financial resources and the desired level of ambition regarding EWM control.

A central element of this strategy lies in the clear distinction between the intensive control phase and the maintenance phase. The first years of the project are critical and require a greater financial investment. It is during this period that the most significant gains can be achieved, by rapidly reducing the area and density of the beds dominated by Eurasian watermilfoil. Sustained intervention from the outset substantially reduces long-term costs by preventing rapid recolonization, which is costly to control. Conversely, initial underfunding risks compromising the achievement of objectives, leading to prolonged dependence on repeated and less effective interventions.

Securing funding is therefore essential to the project's success. It must be prioritized in the early years and rely on a diversification of sources, including government- programs, municipal contributions, regional partnerships, and citizen engagement. The commitment demonstrated by Enviro Lac Gauvreau, combined

with the existence of a clear, costed action plan supported by proven control techniques, represents a major asset in securing this funding.

Finally, the success of the control strategy also depends on continued efforts in public awareness, monitoring, and citizen participation. Preventing the spread of the weed—through adherence to proper boating practices and the washing of boats—remains a fundamental pillar of Eurasian watermilfoil management. In the long term, the restoration of riparian zones and the reduction of nutrient inputs into the watershed must be integrated into control measures in order to address the underlying causes that promote invasion.

## References

---

Agence de bassin versant des 7 (ABV des 7). (2015). *Characterization of the riparian zone of Parent Creek* [technical report]. Report submitted to the Municipality of La Pêche, 26 p. + 15 appendices.

Agence de bassin versant des 7 (ABV des 7). (2016). *Delimitation of Eurasian watermilfoil beds in Lake Gauvreau: Identification of Eurasian watermilfoil beds (September 2015)*. Association for the Protection of the Environment of Lake Gauvreau (APELG). <https://www.lacgauvreau.ca/resources/2016-Eurasian-Milfoil-Lac-Gauvreau.pdf>

Agence de bassin versant des 7 (ABV des 7). (2018). Update on Eurasian watermilfoil beds at Lake Gauvreau. Association for the Protection of the Environment of Lake Gauvreau (APELG). <https://lacgauvreau.ca/resources/2018-update-Eurasian-Milfoil-Lac-Gauvreau.pdf>

Agence de bassin versant des 7 (ABV des 7). (2021a). *Characterization of the shores of Lake Gauvreau, Municipality of La Pêche (Outaouais)*. Presented to the Association for the Protection of the Environment of Lake Gauvreau. <https://www.lacgauvreau.ca/resources/2021-Lac-Gauvreau-characterisation-RPF3-2.pdf>

Agence de bassin versant des 7 (ABV des 7). (2021b). *Water Master Plan*. [https://abv7.org/wp-content/uploads/2023/05/PDE\\_2021\\_ABV7.pdf](https://abv7.org/wp-content/uploads/2023/05/PDE_2021_ABV7.pdf)

Health Canada Pest Management Regulatory Agency. (2023). Florpyrauxifen-benzyl, Milestone NXT herbicide, Restore NXT herbicide, GF 3206 herbicide, GF 3301 herbicide for aquatic environments, and ProcellaCOR FX herbicide. <https://www.canada.ca/content/dam/hc-sc/documents/services/consumer-product-safety/reports-publications/pesticides-pest-management/decisions-updates/registration-decision/2023/florpyrauxifen-benzyl/florpyrauxifen-benzyl-fr.pdf>

Aiken, S. G., Newroth, P. R., & Wile, I. (1979). The biology of Canadian Weeds.: 34. *Myriophyllum spicatum* L. *Canadian Journal of Plant Science*, 59(1), 201-215. <https://doi.org/10.4141/cjps79-028>

Anderson, M. R., & Kalff, J. (1986). Nutrient limitation of *Myriophyllum spicatum* growth in situ. *Freshwater Biology*, 16(6), 735-743. <https://doi.org/10.1111/j.1365-2427.1986.tb01014.x>

Bailey, J. E. and Calhoun, A. J. (2008). Comparison of three physical management techniques for controlling variable-leaf milfoil in Maine lakes. *Journal of Aquatic Plant Management*, 46(2), 163–167.

Benoy, G. A. and Kalff, J. (1999). Sediment accumulation and Pb burdens in submerged macrophyte beds. *Limnology and Oceanography*, 44(4), 1081-1090. <https://doi.org/10.4319/lo.1999.44.4.1081>

Bergeron, C. (2024). Effect of spiked water milfoil (*Myriophyllum spicatum*) on cyanobacteria in a lacustrine environment [master's thesis]. <https://corpus.ulaval.ca/server/api/core/bitstreams/549c6d93-8f5d-40d3-aa0b-3f145f13c0d4/content>

Boylen, C. W., Eichler, L. W., & Madsen, J. D. (1999). Loss of native aquatic plant species in a community dominated by Eurasian watermilfoil. *Hydrobiologia*, 415, 207–211. <https://doi.org/10.1023/A:1003804612998>

Boylen, C. W., Eichler, L. W., and Sutherland, J. W. (1996). Physical control of Eurasian watermilfoil in an oligotrophic lake. *Hydrobiologia*, 340, 213-218. <https://doi.org/10.1007/BF00012757>

Bruckerhoff, L., Havel, J., and Knight, S. (2015). Survival of invasive aquatic plants after air exposure and implications for dispersal by recreational boats. *Hydrobiologia*, 746, 113-121. <https://doi.org/10.1007/s10750-014-1947-9>

Canada. National Capital Commission. (2012). Identification and characterization of ecological corridors adjacent to Gatineau Park: final report. [https://publications.gc.ca/collections/collection\\_2022/ccn-ccc/W93-63-2012-fra.pdf](https://publications.gc.ca/collections/collection_2022/ccn-ccc/W93-63-2012-fra.pdf)

Ducks Unlimited Canada and Ministry of the Environment and Climate Change. (2023). Detailed Wetland Mapping. <https://www.donneesquebec.ca/recherche/dataset/milieux-humides-du-quebec>

Corporation de l'Aménagement de la Rivière l'Assomption. (2021). *Aquatic Plants and Other Organisms in the Lanaudière Lakes*. Quebec. 116 p. <https://apelnrn.ca/wp-content/uploads/2022/07/Guide-Plantes-Aquatiques-version-CARA.pdf>

Enviro Lac Gauvreau. (2024). *Newsletter*. [https://www.lacgauvreau.ca/News/News\\_2024/](https://www.lacgauvreau.ca/News/News_2024/)

Enviro Lac Gauvreau. (2025). *Enviro Lac Gauvreau*. <https://www.lacgauvreau.ca/>

Enviro Lac Gauvreau. (2023). *Responsible Boating*. <https://www.lacgauvreau.ca/Boating/>

Enviro Lac Gauvreau. (n.d.). *Eurasian Watermilfoil*. [https://www.lacgauvreau.ca/Protect\\_Lake/Milfoil/](https://www.lacgauvreau.ca/Protect_Lake/Milfoil/)

Fyto. (2024). Effect of Eurasian watermilfoil (*Myriophyllum spicatum*) on cyanobacteria in a lake environment [master's thesis]. <https://corpus.ulaval.ca/server/api/core/bitstreams/549c6d93-8f5d-40d3-aa0b-3f145f13c0d4/content>

Fyto. (2025). *Interactive Map – Gauvreau 2025*. NextGIS. <https://fytosolutions.nextgis.com/resource/270/display?panel=layers>

Gagné, V. (2021). *Planning a strategy to combat spiked water milfoil (Myriophyllum spicatum)* [master's thesis]. <https://www.phragmites.crad.ulaval.ca/wp-content/uploads/2022/06/37819.pdf>

Government of Quebec. (2019). *Lake watersheds* [dataset]. Données Québec. <https://www.donneesquebec.ca/recherche/dataset/aires-de-drainage-de-lacs/resource/a726f61a-ebae-45c4-ba09-3e38099f3f02>

Grace, J. B. and Wetzel, R. G. (1978). The production biology of Eurasian watermilfoil (*Myriophyllum spicatum* L.): a review. *J. Aquat. Plant Manage*, 16(1), 1-11.

Interdisciplinary Study Group on Geography and Regional Environment. (2001). *Detailed technical description of the Lake Gauvreau watershed*. Université du Québec à Montréal.

Horsch, E. J. and Lewis, D. J. (2009). The effects of aquatic invasive species on property values: evidence from a quasi-experiment. *Land Economics*, 85(3), 391-409. <https://doi.org/10.3368/le.85.3.391>

Hussner, A., Stiers, I., Verhofstad, M. J. J. M., Bakker, E. S., Grutters, B. M. C., Haury, J., & Hofstra, D. (2017). Management and control methods of invasive alien freshwater aquatic plants: a review. *Aquatic Botany*, 136, 112-137. <https://doi.org/10.1016/j.aquabot.2016.08.002>

Jacob-Racine, R., & Lavoie, C. (2018). Historical reconstruction of the invasion of Quebec by spiked water milfoil (*Myriophyllum spicatum*). *The Canadian Naturalist*, 142(3), 40–46. <https://doi.org/10.7202/1050997ar>

Keast, A. (1984). The introduced aquatic macrophyte, *Myriophyllum spicatum*, as habitat for fish and their invertebrate prey. *Canadian Journal of Zoology*, 62(7), 1289-1303. <https://doi.org/10.1139/z84-186>

Kistritz, R. U. (1978). Recycling of nutrients in an enclosed aquatic community of decomposing macrophytes (*Myriophyllum spicatum*). *Oikos*, 561-569. <https://doi.org/10.2307/3543352>

La Pêche. (2025a). *Municipality – About*. City of La Pêche. <https://www.villelapeche.qc.ca/municipalite/a-propos/>

La Pêche. (2025b). *A Bit of History*. City of La Pêche. <https://www.villelapeche.qc.ca/municipalite/a-propos/histoire/>

Lavoie, C. (2019). *50 Invasive Plants. Protecting Nature and Agriculture*. Les Publications du Québec.

Lavoie, C. (2022). *40 More Invasive Plants. Protecting Nature and Agriculture*. Les Publications du Québec, Quebec City.

Liao, F. H., Wilhelm, F. M., & Solomon, M. (2016). The effects of ambient water quality and Eurasian watermilfoil on lakefront property values in the Coeur d'Alene area of northern Idaho, USA. *Sustainability*, 8(1), 44. <https://doi.org/10.3390/su8010044>

Act respecting the conservation and development of wildlife. RLRQ c. C-61.1 <https://www.legisquebec.gouv.qc.ca/fr/document/lc/c-61.1>

*Environmental Quality Act*. RLRQ c. Q-2, Art. 22. <https://www.legisquebec.gouv.qc.ca/fr/document/lc/q-2>

Madsen, J. D., Eichler, L. W., and Boylen, C. W. (1988). Vegetative spread of Eurasian watermilfoil in Lake George, New York.

Mailhot, R. and St-Onge, B. (2001). *Detailed technical description of the Lac Gauvreau watershed*. Interdisciplinary Study Group in Geography and Regional Environment, Université du Québec à Montréal. <https://www.lacgauvreau.ca/resources/2001-Description-technique-detaillee--du-bassin-versant-du-Lac-Gauvreau.pdf>

McRobert, J., and Decelles, S. (n.d.). *Stories of Lac Gauvreau – Part 1*. <https://www.lacgauvreau.ca/resources/Stories-of-Gauvreau-Lake---Part-I.pdf>

Quebec Ministry of the Environment, Climate Change, Wildlife, and Parks (MELCCFP). (2023). *Prevention and Control of Eurasian Watermilfoil – Companion Guide*. <https://www.environnement.gouv.qc.ca/biodiversite/especes-exotiques-envahissantes/myriophylle-epi/prevention-lutte-myriophylle-epis-guide-accompagnement.pdf>

Ministry of the Environment, Climate Change, Wildlife, and Parks (MELCCFP). (2024). *Voluntary Lake Monitoring Network: Lake Connelly*. Government of Quebec. [https://www.environnement.gouv.qc.ca/Eau/rsvl/relais/fiches-bilans/2021/Connelly,%20Lac\\_0664A\\_2021\\_SA\\_SU.html](https://www.environnement.gouv.qc.ca/Eau/rsvl/relais/fiches-bilans/2021/Connelly,%20Lac_0664A_2021_SA_SU.html) (Accessed November 6, 2024).

Ministry of the Environment, Climate Change, Wildlife, and Parks (MELCCFP). (n.d.). *Water Quality and Recreational Uses*. Government of Quebec. <https://www.environnement.gouv.qc.ca/eau/recreative/qualite.htm>

Ministry of Natural Resources and Forests. (2024). *Quebec Hydrographic Network Geodatabase* (GRHQ) [dataset]. Quebec Data. <https://www.donneesquebec.ca/recherche/dataset/grhq>

Ministry of Natural Resources. (n.d.). *Bathymetric curves of Lake Gauvreau*. <http://admpubcehq:Ne19ette@ftp.mddep.gouv.qc.ca>

MRC des Collines-de-l'Outaouais. (2019). *Revised Land Use and Development Plan – Second Revision*. <https://mrcdescollinesdeloutaouais.qc.ca/wp-content/uploads/2022/03/schema-damenagement-et-de-developpement-revise-deuxieme-remplacement.pdf>

MRC des Collines-de-l'Outaouais. (2023). *Regional Plan for Wetlands and Water Bodies*. [https://mrcdescollinesdeloutaouais.qc.ca/wp-content/uploads/2023/11/PRMHH-Outaouais\\_Final\\_Mrc\\_Collines\\_CREDDO\\_042023\\_HD.pdf](https://mrcdescollinesdeloutaouais.qc.ca/wp-content/uploads/2023/11/PRMHH-Outaouais_Final_Mrc_Collines_CREDDO_042023_HD.pdf)

MRC des Collines-de-l'Outaouais. (2025). Supporting Document – Amendment to the Land Use and Development Plan of the MRC des Collines-de-l'Outaouais. <https://mrcdescollinesdeloutaouais.qc.ca/wp-content/uploads/2025/05/Document-justificatif-Modifications-SAD-version-mai-2025.pdf>

Municipality of La Pêche. (2025). *Urban Plan* [Administrative No. 81-2025]. Municipality of La Pêche. [https://www.villelapeche.qc.ca/wp-content/uploads/2024/01/20250407-ANNEXE-001\\_PR-revise\\_PR-Plan-durbanisme-81-2025-1.pdf](https://www.villelapeche.qc.ca/wp-content/uploads/2024/01/20250407-ANNEXE-001_PR-revise_PR-Plan-durbanisme-81-2025-1.pdf)

Nakai, S., Zou, G., Okuda, T., Nishijima, W., Hosomi, M., & Okada, M. (2012). Polyphenols and fatty acids responsible for anti-cyanobacterial allelopathic effects of submerged macrophyte *Myriophyllum spicatum*. *Water Science and Technology*, 66(5), 993-999.

Nichols, S. A., & Lathrop, R. C. (1994). Cultural impacts on macrophytes in the Yahara lakes since the late 1800s. *Aquatic Botany*, 47(3-4), 225-247. [https://doi.org/10.1016/0304-3770\(94\)90055-8](https://doi.org/10.1016/0304-3770(94)90055-8)

Nicholson, S. A. (1981). Effects of uprooting on Eurasian watermilfoil. *J. Aquat. Plant Manage*, 19, 57-59.

Pelletier, S. (June 9, 2021). Citizens unite to save Lake Sergent. InfoPortneuf. <https://infoportneuf.com/2021/06/09/des-citoyens-sunissent-pour-sauver-le-lac-sergent/>

Pro Faune. 2008. *Plan for the enhancement of aquatic and riparian habitats along Parent Creek*. Report presented by Pro Faune to the Association for the Protection of the Environment of Lake Gauvreau. 34 pages and 2 appendices.

*Regulation on the Regulation of Activities Based on Their Impact on the Environment*. RLRQ c. Q-2, r. 17.1, s. 320. <https://www.legisquebec.gouv.qc.ca/fr/document/rc/Q-2,%20r.%2017.1>

Health Canada. (2024). *Recommendations Regarding the Quality of Water Used for Recreational Purposes in Canada: Indicators of Fecal Contamination: Development of Updated Recommendations*. Government of Canada <https://www.canada.ca/content/dam/hc-sc/documents/services/publications/healthy-living/recreational-water-quality-guidelines-indicators-fecal-contamination/recommandations-sujet-qualite-eaux-utilisees-fins-recreatives-indicateurs-contamination-fecale.pdf>

SePRO Corporation. (2018). *ProcellaCOR EC specimen label*. <https://extension.rwfm.tamu.edu/wp-content/uploads/sites/7/2020/06/ProcellaCOR-EC-Label.pdf>

Smith, C. S. and Barko, J. W. (1990). Ecology of Eurasian watermilfoil. *Journal of Aquatic Plant Management*, 28: 55–64.

Smith, S., Küpper, F. C., Trinder, C., and Louca, V. (2021). Assessing watermilfoil invasion effects on native macrophyte communities in North American lakes using a novel approach for macrophyte- sampling. *Knowledge & Management of Aquatic Ecosystems*, (422), 1. <https://doi.org/10.1051/kmae/2020043>

Canadian Parks and Wilderness Society – Ottawa Valley Chapter (CPWS-OV). (February 17, 2012). Submission by the Ottawa Valley Chapter of the Canadian Parks and Wilderness Society on the draft report “Identification and Characterization of Ecological Corridors Adjacent to Gatineau Park” November 2011. [https://cpaws-ov-vo.org/wp-content/uploads/2018/06/Submission\\_NCC\\_Ecological\\_Corridors\\_Feb\\_2012.pdf](https://cpaws-ov-vo.org/wp-content/uploads/2018/06/Submission_NCC_Ecological_Corridors_Feb_2012.pdf)

Strimaitis, A. M. and Sheldon, S. P. (2011). A comparison of macroinvertebrate and epiphyte density and diversity on native and exotic complex macrophytes in three Vermont lakes. *Northeastern Naturalist*, 18(2), 149–160. <https://doi.org/10.1656/045.018.0202>

Tamayo, M. and Olden, J. D. (2014). Forecasting the vulnerability of lakes to aquatic plant invasions. *Invasive Plant Science and Management*, 7(1), 32-45. <https://doi.org/10.1614/IPSM-D-13-00036.1>

Transport Canada. (2014). *Boating Safety Guide (TP 511F)*. [https://tc.canada.ca/sites/default/files/migrated/tp\\_511f.pdf](https://tc.canada.ca/sites/default/files/migrated/tp_511f.pdf)

Wisconsin Department of Natural Resources (2018). Florpyrauxifen-benzyl chemical fact sheet. <https://legislature.vermont.gov/Documents/2024/WorkGroups/House%20Environment/Bills/H.31/Witness%20Documents/H.31~David%20Weaver~Florpyrauxifen-Benzyl%20Chemical%20Fact%20Sheet~3-16-2023.pdf>

Zhang, C. and Boyle, K. J. (2010). The effect of an aquatic invasive species (Eurasian watermilfoil) on lakefront property values. *Ecological Economics*, 70(2), 394-404. <https://doi.org/10.1016/j.ecolecon.2010.09.011>

Zipp, K. Y., Lewis, D. J., Provencher, B., & Vander Zanden, M. J. (2019). The spatial dynamics of the economic impacts of an aquatic invasive species: an empirical analysis. *Land Economics*, 95(1), 1-18. <https://doi.org/10.3368/le.95.1.1>



## Appendix A

---

### Occurrences of Faunal and Floral Species

## Appendix B

Table 19: Legend for the names of aquatic plants found in Lake Gauvreau in July 2025.

Code	Latin name	Code	Latin name
Brsc	<i>Brasenia schreberi</i>	Popu	<i>Potamogeton pusillus</i>
Cede	<i>Ceratophyllum demersum</i>	Pori	<i>Potamogeton richardsonii</i>
Jusp	<i>Juncaceae (family)</i>	Poro	<i>Potamogeton robbinsii</i>
Mysi	<i>Unknown Myriophyllum (to be determined)</i>	Pova	<i>Potamogeton vaseyi</i>
Nuva	<i>Nuphar variegata</i>	Pozo	<i>Potamogeton zosteriformis</i>
Nyod	<i>Nymphaea odorata</i>	Scsp	<i>Scirpus sp.</i>
Pfsl	<i>Potamogeton sp.</i>	Stpe	<i>Stuckenia pectinata</i>
Phau	<i>Phragmites australis</i>	Spem	<i>Sparganium emersum</i>
Poco	<i>Pontederia cordata</i>	Spfl	<i>Sparganium fluctuans</i>
Pocr	<i>Curly pondweed</i>	Tysp	<i>Typha sp.</i>
Poep	<i>Potamogeton epihydrus</i>	Vaam	<i>Vallisneria americana</i>
Polf	<i>Potamogeton amplifolius</i>		

Table 20: Aquatic plant beds at Lake Gauvreau in July 2025.

Sector	Coverage by the bed (%)	Dominant species	Density (%)	Co-dominant species	Density (%)	Co-dominant species	Density (%)	Area
1	90	Stpe	45	Pozo	18	Polf	14	534
2	70	Pova	24	Pozo	24	Poro	10	266
3	95	Pova	38	Pozo	19	Mysi	14	326
4	90	Pozo	32	Mysi	18	Pova	9	1716
5	90	Pova	22	Stpe	22	Pozo	18	1007
6	100	Poro	20	Mysi	15	Nyod	15	562
7	100	Nyod	35	Poco	35	Tysp	10	1883
8	90	Mysi	36	Pozo	18	Poro	18	3080
9	60	Pozo	30	Mysi	18	Polf	6	183
10	70	Poro	18	Nyod	18	Pozo	10	885
11	100	Pozo	35	Polf	25	Nuva	15	948
12	90	Pozo	22	Poro	22	Stpe	22	396
13	80	Polf	36	Pozo	28	Mysi	12	793
14	65	Polf	20	Stpe	20	Pozo	10	1172
15	85	Polf	30	Poro	26	Mysi	13	443

16	100	Mysi	70	Pova	25	Poro	5	29
Area	Coverage by vegetation (%)	Dominant species	Density (%)	Co-dominant species	Density (%)	Co-dominant species	Density (%)	Area
17	90	Pova	63	Poep	9	Poro	4	74
18	85	Poro	34	Nuva	30	Polf	8	792
19	90	Polf	50	Poro	18	Poco	9	887
20	90	Polf	45	Mysi	18	Pova	14	303
21	85	Mysi	30	Pova	17	Poro	13	3,194
22	100	Poro	50	Nyod	20	Poco	15	1056
23	80	Polf	32	Poro	24	Mysi	16	339
24	40	Polf	24	Mysi	10	Nyod	2	116
25	30	Polf	12	Mysi	10	Stpe	3	90
26	30	Polf	12	Mysi	8	Nyod	6	637
27	100	Poro	30	Mysi	20	Poco	15	2,365
28	90	Mysi	54	Poro	22	Polf	9	194
29	90	Polf	68	Poro	14	Mysi	9	222
30	100	Poro	40	Pozo	25	Mysi	20	1288
31	100	Poco	35	Mysi	15	Nyod	15	3557
32	60	Mysi	42	Polf	11	Stpe	6	2190
33	90	Mysi	36	Pozo	27	Poro	18	177
34	90	Poro	27	Polf	18	Pova	14	681
35	30	Polf	9	Mysi	8	Pozo	3	685
36	100	Polf	35	Mysi	30	Pozo	15	756
37	100	Poro	30	Mysi	15	Polf	10	1159
38	100	Mysi	30	Poro	15	Nuva	15	307
39	100	Mysi	75	Poro	10	Scsp	10	220
40	100	Mysi	50	Poro	25	Polf	5	764
41	100	Mysi	55	Poro	15	Polf	10	378
42	80	Poro	32	Polf	14	Nyod	12	570
43	100	Mysi	70	Nyod	10	Stpe	10	1148
44	100	Mysi	55	Pozo	40	Pocr	5	1775
45	100	Poro	40	Mysi	30	Poco	10	781
46	100	Mysi	60	Poro	15	Polf	10	801
47	100	Poro	60	Nuva	15	Nyod	10	516

48	75	Polf	30	Mysi	26	Stpe	15	476
49	100	Mysi	95	Pozo	5			78
<b>Area</b>	<b>Seagrass coverage (%)</b>	<b>Dominant species</b>	<b>Density (%)</b>	<b>Co-dominant species</b>	<b>Density (%)</b>	<b>Co-dominant species</b>	<b>Density (%)</b>	<b>Area</b>
50	100	Polf	60	Poro	20	Mysi	10	388
51	70	Polf	56	Pozo	7	Mysi	4	291
52	100	Poro	55	Nyod	25	Cede	10	538
53	100	Poro	35	Polf	30	Mysi	10	1229
54	100	Polf	50	Mysi	10	Cede	10	307
55	100	Nyod	80	Mysi	15	Pocr	5	302
56	100	Polf	70	Mysi	15	Cede	10	383
57	100	Nyod	40	Poro	20	Stpe	20	882
58	100	Pozo	50	Stpe	20	Polf	10	553
59	100	Polf	30	Poro	30	Pozo	25	977
60	100	Mysi	80	Poro	20			661
61	100	Nyod	40	Poco	30	Poro	20	329
62	30	Stpe	15	Polf	6	Pozo	6	531
63	100	Mysi	70	Poro	15	Nyod	15	345
64	100	Poro	30	Mysi	30	Nyod	15	2,271
65	100	Mysi	85	Polf	5	Pozo	5	40
66	100	Poro	40	Polf	25	Mysi	15	267
67	100	Polf	45	Mysi	40	Nyod	10	310
68	100	Polf	30	Pozo	30	Mysi	30	315
69	100	Poro	40	Pozo	20	Poco	20	495
70	100	Mysi	40	Pova	25	Nyod	15	178
71	100	Stpe	50	Polf	20	Pozo	20	209
72	100	Mysi	75	Pozo	15	Polf	5	542
73	100	Mysi	45	Poco	15	Nyod	10	855
74	100	Nuva	40	Mysi	25	Stpe	15	319
75	100	Poro	30	Pozo	25	Mysi	20	337
76	85	Stpe	51	Pozo	21	Mysi	13	467
77	100	Mysi	40	Nyod	20	Poro	15	215
78	100	Nyod	50	Poco	15	Polf	10	330
79	100	Poro	50	Mysi	15	Pocr	15	85

80	60	Nyod	36	Pozo	6	Poro	6	223
81	100	Polf	40	Pozo	20	Poro	15	180
82	100	Nyod	20	Pozo	15	Poro	15	880
Area	Coverage by vegetation (%)	Dominant species	Density (%)	Co-dominant species	Density (%)	Co-dominant species	Density (%)	Area
83	100	Polf	35	Mysi	15	Nuva	15	3933
84	100	Stpe	35	Nuva	20	Poco	15	3020
85	100	Poco	45	Nuva	30	Pozo	10	2446
86	80	Stpe	40	Poco	24	Nuva	12	1656
87	90	Pozo	45	Mysi	22	Poco	14	778
88	95	Pozo	38	Mysi	28	Pova	10	440
89	95	Mysi	90	Pozo	5			126
90	50	Nyod	20	Mysi	12	Pozo	10	128
91	100	Nuva	30	Nyod	25	Mysi	15	2216
92	100	Polf	80	Pozo	10	Mysi	5	1370
93	30	Stpe	24	Mysp	3	Polf	3	2696
94	100	Polf	35	Poro	25	Nyod	25	332
95	100	Mysi	75	Pova	15	Polf	10	238
96	75	Pozo	38	Mysi	30	Polf	8	299
97	100	Mysi	75	Pova	15	Pozo	10	453
98	75	Pozo	22	Poro	19	Mysi	15	330
99	90	Mysi	18	Nyod	18	Pozo	14	381
100	100	Poro	20	Mysi	20	Nuva	20	461
101	90	Poro	22	Nyod	22	Mysi	14	542
102	40	Nyod	20	Pova	8	Mysi	4	243
103	80	Mysi	36	Pova	20	Nyod	12	283
104	100	Stpe	40	Poco	19	Nuva	15	37,775
105	100	Mysi	75	Pozo	10	Pova	10	336
106	100	Mysi	95	Stpe	5			20
107	100	Mysi	85	Stpe	15			518
108	100	Mysi	85	Pozo	11	Stpe	3	329
109	100	Mysi	75	Pozo	10	Pova	10	185
110	100	Mysi	60	Pova	15	Poro	10	179
111	100	Mysi	90	Pozo	5	Cede	5	77

112	90	Mysi	72	Poro	14	Cede	4	117
113	100	Poro	45	Polf	20	Pozo	10	43
114	40	Nyod	10	Pova	6	Mysi	6	579
115	100	Mysi	75	Pova	10	Poro	10	145
<b>Area</b>	<b>Coverage by vegetation (%)</b>	<b>Dominant species</b>	<b>Density (%)</b>	<b>Co-dominant species</b>	<b>Density (%)</b>	<b>Co-dominant species</b>	<b>Density (%)</b>	<b>Area</b>
116	100	Poro	20	Nuva	20	Mysi	15	516
117	100	Mysi	50	Poro	20	Stpe	10	563
118	95	Poro	19	Mysi	19	Stpe	14	2016
119	90	Poro	22	Mysi	18	Polf	9	560
120	100	Mysi	100					43
121	90	Mysi	48	Poro	27	Pozo	9	213
122	100	Mysi	95	Pozo	5			36
123	100	Mysi	50	Poro	20	Nyod	15	1035
124	100	Mysi	40	Stpe	40	Nyod	10	653
125	40	Mysi	34	Nyod	4	Cede	2	117
126	100	Mysi	65	Poro	15	Pozo	5	105
127	80	Mysi	64	Pozo	4	Pova	4	85
128	95	Mysi	38	Poro	24	Nuva	24	288
129	95	Mysi	81	Poro	12	Pocr	2	724
96	75	Pozo	38	Mysi	30	Polf	8	299
97	100	Mysi	75	Pova	15	Pozo	10	453
98	75	Pozo	22	Poro	19	Mysi	15	330
99	90	Mysi	18	Nyod	18	Pozo	14	381
100	100	Poro	20	Mysi	20	Nuva	20	461
101	90	Poro	22	Nyod	22	Mysi	14	542
102	40	Nyod	20	Pova	8	Mysi	4	243
103	80	Mysi	36	Pova	20	Nyod	12	283
104	100	Stpe	40	Poco	19	Nuva	15	37,775
105	100	Mysi	75	Pozo	10	Pova	10	336
106	100	Mysi	95	Stpe	5			20
107	100	Mysi	85	Stpe	15			518
108	100	Mysi	85	Pozo	11	Stpe	3	329
109	100	Mysi	75	Pozo	10	Pova	10	185

110	100	Mysi	60	Pova	15	Poro	10	179
111	100	Mysi	90	Pozo	5	Cede	5	77
112	90	Mysi	72	Poro	14	Cede	4	117
113	100	Poro	45	Polf	20	Pozo	10	43
114	40	Nyod	10	Pova	6	Mysi	6	579
<b>Area</b>	<b>Coverage by vegetation (%)</b>	<b>Dominant species</b>	<b>Density (%)</b>	<b>Co-dominant species</b>	<b>Density (%)</b>	<b>Co-dominant species</b>	<b>Density (%)</b>	<b>Area</b>
115	100	Mysi	75	Pova	10	Poro	10	145
116	100	Poro	20	Nuva	20	Mysi	15	516
117	100	Mysi	50	Poro	20	Stpe	10	563
118	95	Poro	19	Mysi	19	Stpe	14	2016
119	90	Poro	22	Mysi	18	Polf	9	560
120	100	Mysi	100					43
121	90	Mysi	48	Poro	27	Pozo	9	213
122	100	Mysi	95	Pozo	5			36
123	100	Mysi	50	Poro	20	Nyod	15	1035
124	100	Mysi	40	Stpe	40	Nyod	10	653
125	40	Mysi	34	Nyod	4	Cede	2	117
126	100	Mysi	65	Poro	15	Pozo	5	105
127	80	Mysi	64	Pozo	4	Pova	4	85
128	95	Mysi	38	Poro	24	Nuva	24	288
129	95	Mysi	81	Poro	12	Pocr	2	724
130	20	Poro	5	Polf	4	Nyod	4	286
131	100	Mysi	70	Nuva	20	Nyod	5	306
132	90	Poro	54	Mysi	22	Polf	9	27
133	100	Poro	40	Mysi	25	Polf	10	129
134	85	Poro	38	Mysi	17	Nyod	13	164
135	100	Poco	28	Nuva	18	Poro	15	4,127
136	100	Mysi	90	Poro	10			33
137	100	Mysi	75	Polf	10	Poro	10	17
138	100	Mysi	75	Pozo	20	Poro	5	61
139	80	Mysi	64	Poro	16	Polf	0	10
140	100	Mysi	90	Pozo	8	Cede	2	30
141	60	Poro	24	Mysi	18	Nyod	9	774

142	100	Poro	32	Nyod	30	Mysi	12	1,168
143	95	Mysi	81	Poro	10	Cede	5	148
144	100	Mysi	75	Poro	15	Polf	3	93
145	100	Poro	50	Mysi	20	Pozo	15	204
146	100	Mysi	90	Pozo	5	Polf	3	784
147	100	Poro	50	Polf	15	Pozo	15	2746
<b>Area</b>	<b>Coverage by vegetation (%)</b>	<b>Dominant species</b>	<b>Density (%)</b>	<b>Co-dominant species</b>	<b>Density (%)</b>	<b>Co-dominant species</b>	<b>Density (%)</b>	<b>Area</b>
148	100	Mysi	93	Polf	5	Pocr	2	379
149	100	Poro	60	Mysi	40			6035