Eurasian Water Milfoil (EWM) Strategic Management Plan (SMP 2025)

1. Introduction

This Strategic Management Plan (SMP) provides a detailed set of actions to mitigate and prevent the Eurasian Water Milfoil (EWM) spread on Lac Bernard. It was developed by the volunteers who make up the Environment Committee, which reports to the Owners and Residents Association of Lac Bernard (ORALB). The SMP summarizes the background, the current status, and the proposed actions/plans for operationalizing the proactive management plan to mitigate the spread of EWM in our lake. Under the direction of ORALB, the EC will make this SMP a 'living' plan that continues to be informed by research and by investigating the evolving mitigation methods being trialed internationally, nationally, provincially, and locally. The SMP will be reviewed annually for approval of associated actions/budget at the ORALB Annual General Meeting as part of the budgetary review process. This first version will be presented to the ORALB AGM in May 2025 for endorsement by the membership.

The overwhelming consensus from our research is that there is no 'silver bullet' from Lac Bernard to mitigate EWM or eliminate it. Instead, a series of actions is required that are detailed in this 'living' SMP that will be updated annually and developed, together with the membership of the ORALB. Most of our research pointed toward a comprehensive and adaptive action plan to prevent and mitigate the impacts of EWM.

This SMP is based on the following Principles:Transparency: All significant SMP actions/investments will be reviewed/discussed with ORALB's membership at the Annual General Meeting.

a. Financial Due Diligence: all significant investments will be understood by the members as well as the financial impact/risk associated with the intervention (e.g. environment risk, habitat risk, etc);
b. Adaptability: the SMP will remain a 'living' document that is adaptable to changes in the evolving research/methodologies or changing circumstances associated with the effective mitigation/elimination of EWM;
c. Operationalized: the SMP will outline proactive actions to 'operationalize' the EWM mitigation strategy. These actions will be reviewed annually by the ORALB membership.
d. Understanding/Communications: the SMP will describe actions in a manner that is easily understood, precise, memorable and easily communicated to, and expressed by, all members of ORALB so all members can speak clearly to our SMP and associated yearly programs/actions;
e. Consequence: EWM poses a significant threat to our lake's water quality, wildlife, leisure activities, and land value. As such, violators who conduct any unlawful activity, willingly or otherwise, could be reported to the appropriate authorities at the discretion of ORALB.

2. Land Acknowledgement:

We acknowledge that Lac Bernard is located on the traditional unceded territory of the Anishinaabeg People. We are committed to responsible stewardship of this land and the lake and will seek input and knowledge from the Kitigan Zibi First Nation.

3. Background and Literature Review

A thorough literature review was conducted to inform the development of this SMP. We would like to thank the many volunteers who supported this extensive research review both in the EC and from our members of the ORALB over the summer and fall. The EC review focused on:

a. Identification, spread, and current state of EWM in Lac Bernard
b. Costs and impacts of various EWM management methods being leveraged nationally and internationally (herbicides, benthic mats, hand pulling, oxygenators, burlap, cutting, UV light, underwater vacuuming, etc).
c. Issues at lake tributaries (inlets/outlets) and their contribution to EWM spread.
d. EWM management plans of other lakes with over 10 years of experience, particularly those in similar climates and with similar watershed characteristics.

The details/research, and websites are available in Annex A to this report. The EC is committed to continuing to monitor progress in this area. We encourage members of ORALB to also contribute to this research section, such that we can all continue to learn and be informed of the various methodologies/approaches, successes and failures of EWM treatment and EWM spread mitigation.

4. Status of EWM in Lac Bernard

Data collected by ABV-7 indicates a significant increase in EWM coverage in Lac Bernard over the past decade:

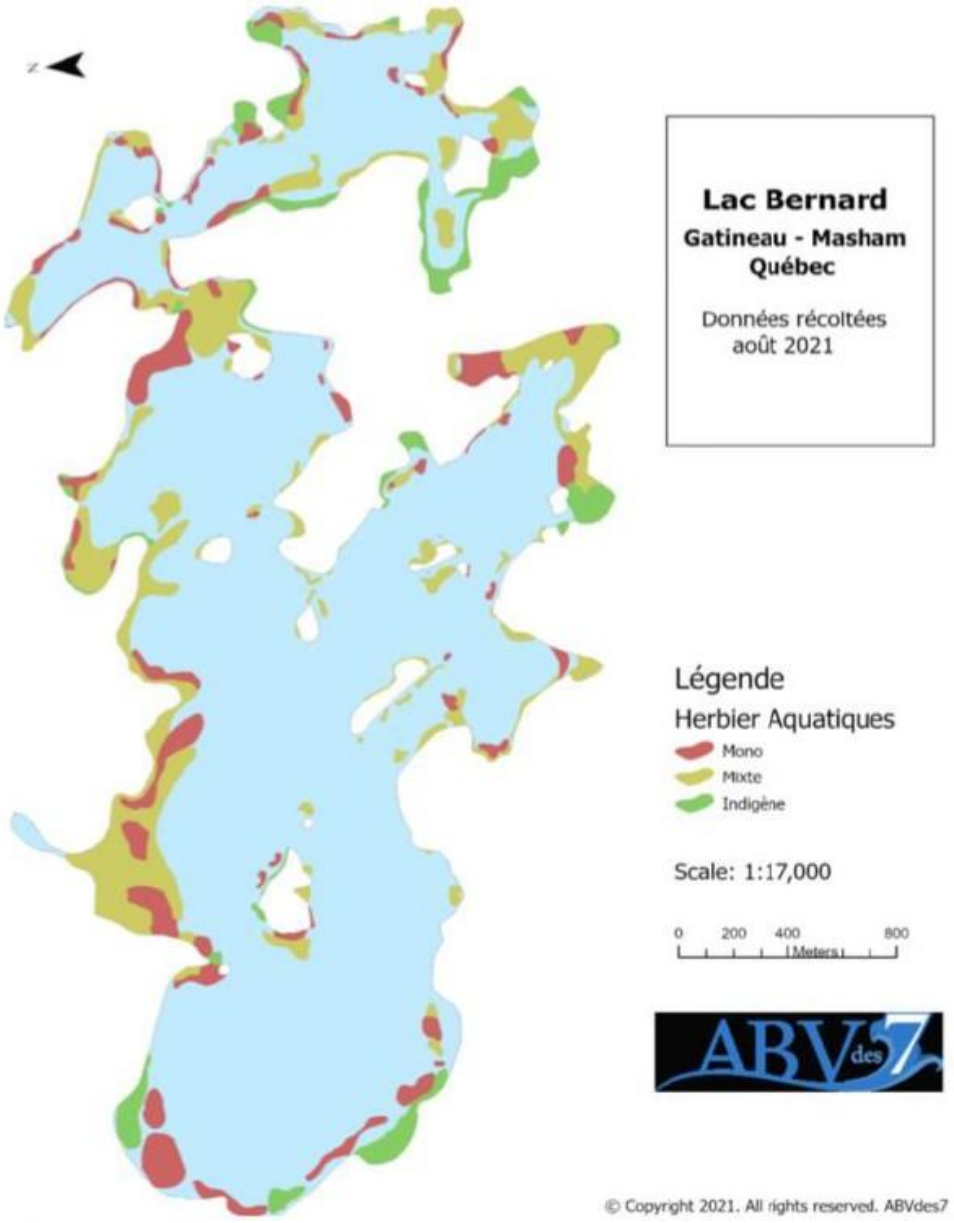
2011: 185,000 m2

2015: 525,000 m2

2021: 1,100,000 m2

Without intervention, EWM will continue to spread, leading to denser growth and a reduction in usable lake area. Studies show lakes can experience losses of 19-25% due to milfoil and more where lake depths are 5m and below. The Lac Bernard ecosystem will be severely impacted if this growth trajectory continues. In 2023, extremely low water levels allowed significant expansion and densification of EWM along the north shore, particularly the northwest bay, the outlet area, the area leading up to the narrows and Paddy's Bay. The south shore is also particularly dense in the south end of Mitchell's Bay, the south shore near the inlet and Little Lake. In the diagram below, you could effectively recolour all 'yellow' areas red and add new areas of yellow where the lake's depth is less than 5m. While readers may not be in complete agreement, I provide the below photos, taken in September 2024, to provide evidence. I did not have my GPS, but I estimate I was 200-300m offshore, removing yellow buoys in the sparsely populated north/west end of the lake. The first two photos (from left) are taken from the exact location. The 3rd is from about 200m offshore.

Photos taken by Kevin Radford summer/fall 2024.



4. EWM Control Method Comparison (based on research)

See Annex B for a detailed breakdown and comparison of methodologies.

The EWM control methods described in Annex B are meant to inform the ORALB, the EC and the broader membership. As this is a living document, we will update this table annually with additional research, application methodology, new costing information and environmental impacts of solutions. We also encourage ORALB members to share any research and/or findings they have to support EWM mitigation/control. All research will be provided on the ORALB Website under the EC page at (insert link).

5. Action Plan for 2025

Communications Plan: The ORALB will host a Special General Meeting in accordance with Section 5.6 of our bylaws that will focus on the Environment SMP, its contents, and will have a panel of leaders from the Environment Field to participate in this summer in August 2025. This meeting will either be virtual, or ‘live’ and held on the Regatta Bay property.

5.1 Benthic Matting and Hand Pulling

In the fall of 2024, the EC received ORALB permission to purchase 5 Benthic Mats (BMs) and associated REBAR to lay the BMs in the spring of 2025. BMs have been effective in conjunction with hand pulling EWM. Unlike burlap, BMs are reusable and may effectively mitigate small swimming areas around docks and for larger applications in high-traffic areas. 5 x BMs were purchased from Canadian Pond in fall 2024 for trials/use in spring/summer 2025. Benthic Matting is usually accompanied by installing ‘organic pucks’ underneath the mats. These organic pucks slowly release bacteria that help to reduce the silt/organic material that the EWM will root in. Some of our study review indicated that the level of silt/organic material at the bottom of the lake along the shoreline progressively grows with the EWM plant decomposition in the fall/winter/spring, also contributing to the spread, re-rooting of cut plants from boats, and an excellent area for the seeds to get established and grow. Further, oxygenation is recommended for treated areas to reduce lakes' silt/organic material. Oxygen also helps to protect lakes from algae blooms. With the BM trial planned for spring 2025, organic pucks and oxygenators will also be purchased and utilized for trial purposes around Lac Bernard, including Regatta Bay, Paddy’s Bay and South Mitchell’s Bay areas.

Action 2025: (EC)

a. install 3 BMs in Regatta Bay at the swimming area to support regatta (directly in front of Regatta property) in June 2025;
b. install 2 BMs in test areas TBD (e.g. Paddy's Bay, South Mitchell Bay)
c. install aeration systems at each test site, including Muck bacterial pellets under the mat.
d. Assess the effectiveness of BMs, Aeration and Bacterius at Regatta (early Aug) – demonstrate removal of BMs at Regatta and assess effectiveness and re-usability;
e. Demonstrate movement of BMs and REBAR in Regatta Bay at Regatta to extend EWM remediation footprint in Regatta Bay;
f. Organize a removal team to remove BMs and REBAR in Regatta Bay mid-September;

g. Arrange a demand list for ORALB members to acquire BMs and REBAR from suppliers at discounted prices. Coordinate and assess the best price for ORALB members and finalize the list of purchasers by September 2025;
h. Coordinate the delivery of BMs and REBAR for ORALB members in the fall of 2025. Store BMs in the shed and REBAR on the site of the Regatta Bay property for bulk delivery savings.

Action 2026: (EC)

a. Consider purchase of additional, larger BMs and REBAR for application in high traffic areas, e.g. Narrows, Laneways for cottagers in EWM high-density areas;
b. Organize committee members/volunteers to lay larger BMs and REBAR in high-traffic areas in early June;
c. Select two dates in early June to distribute new BMs and REBAR to purchasers (for their cottage) at the Regatta Bay site;
d. Continue to monitor the effectiveness, condition and re-usability of BMs and REBAR;
e. Select date in Aug to 'move' larger BMs and REBAR to new location in high traffic areas to ensure maximum coverage during the summer months;
f. Organize removal team to remove BMs and REBAR in high traffic areas mid-September;

Action 2027, 28, 29 Repeat actions of 2027 (EC)

5.2 Herbicide Treatment

The EC reviewed several studies of Herbicide treatments in the summer of 2024. All reports indicate that when treated early, herbicides could be effective at controlling EWM; however, the effectiveness of herbicides can vary. ProcellaCOR has received much interest in the Province of ON, but its use has not been approved in QC. Concerns include the potential impact on native aquatic plants and fish/fauna.

Action 2025: (EC)

a. Organize discussion with ProcellaCOR to determine when/if applicability/approvals will be available for distribution/application in QC;
b. Continue to research the applicability and effectiveness of herbicides in NA; and
c. Invite ProcellaCOR rep to Special General Meeting, Aug 2025.

Action 2026-29: (EC) depends on advancements of approval for herbicide application in QC.

5.3 Burlap Treatment

Burlap application methodologies are familiar to ORALB and the membership. The following is a summary of EWM mitigation actions used on Lac Bernard:

a. Approximately 200, 75m2 pieces of burlap have been purchased/ordered by and delivered to ORALB members and installed around docks to enhance swimming

areas/lake front during the summers of 2022 and 2023. Outcomes have been varied:

a. Challenging and can be dangerous to place burlap manually in deep water;
b. Requires placing rocks on burlap to hold burlap down and in place;
c. As EWM dies (cannot access sunlight and is pushed down by burlap), it produces methane gas, causing the burlap to 'bubble' or rise to the surface of the lake, which can get caught in boat motors;
d. Remnants of EWM that are floating in the lake can sink and land on burlap-treated areas, and grow on top of burlap where silt has collected (all treatments are impacted by EWM remnants);
e. And currently, the QC Ministry of Environment, Fight Against Climate Change, Wildlife and Parks (in French: Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs or **MELCCFP**) does not allow the use of sand and/or pea stone gravel to 'weigh' the burlap down. Recommendation from MELCCFP is to use 'removable weights' which are expensive to place and remove (labour intensive).

b. Volunteers installed several hundred of square feet of burlap at the boat launches over several weekends in summer 2023. In Sawmill Bay, large pieces were removed after being destroyed/caught in an outboard motor from someone pulling out their boat.
    a. Placing burlap in high-traffic, shallow areas was not effective using rocks as weights, and
    b. The burlap deteriorated at the boat launch in Paddy's Bay, and the EWM appears to be returning, so there is minimal impact.
c. In fall 2023, ORALB EC applied for $2.25M of funding ($750K from DFO, $750K from QC and $750K from the municipality) over 3 years from DFO to support a Proof of Concept for laying burlap on Lac Bernard.

Without broad application, the effectiveness of burlap (or any treatment) is significantly limited, and the organic material from the degraded burlap adds to the 'silt' on the lake bottom. If applied broadly for large-scale application using mechanical means (barge) and leveraging sand/gravel to weigh it down properly, burlap appears to be an excellent solution to mitigate/control EWM. Still, it is temporary unless burlap is applied on a large scale.

ORALB EC is meeting with ABVdes7 to review an application and garner support for large-scale application of burlap on Lac Bernard as a test case for 'how' to treat lakes in QC for EWM infestation as a viable option to chemical treatment.

Action 2025 (EC):

a. Find a source for burlap and provide it as an option to purchase for members of ORALB. Note that the ORALB has three poles with ropes to support laying burlap.
b. Strike a subcommittee of the ORALB EC to research and lobby the Government of Canada Department of Fisheries and Oceans to understand the feasibility of Lac Bernard receiving a Ministerial waiver to leverage local sand and/or gravel for an extensive, mechanized application of burlap on Lac Bernard over 3 years;
c. If a waiver is obtained, formulate a plan and solicit funding for a Proof of Value on Lac Bernard for the mechanized application of large-scale burlap in high-traffic areas and significant areas of affected areas on Lac Bernard.

Action 2026-29 (EC): continue with Action 2025 (a) unless waiver achieved per Action 2025 (b and c).

5.4 Yellow Buoy Program

The ORALB has been leveraging 50 Yellow Buoys and a group of volunteers to mark EWM on Lac Bernard to alert boaters so the EWM infestations can be avoided. Boat propellers chop EWM into fragments, which can float to different parts of the lake, sink to the bottom and re-root. ORALB approved the purchase of an additional 50 yellow buoys this fall. The invoice was submitted to the Ministry of La Peche Green Fund for reimbursement, which was approved; however, funds had not been released at this date.

For 2025, the yellow buoys will be distributed on Lac Bernard as follows: the yellow regions on the lake map below indicate areas for boaters to avoid and will be marked/identified:

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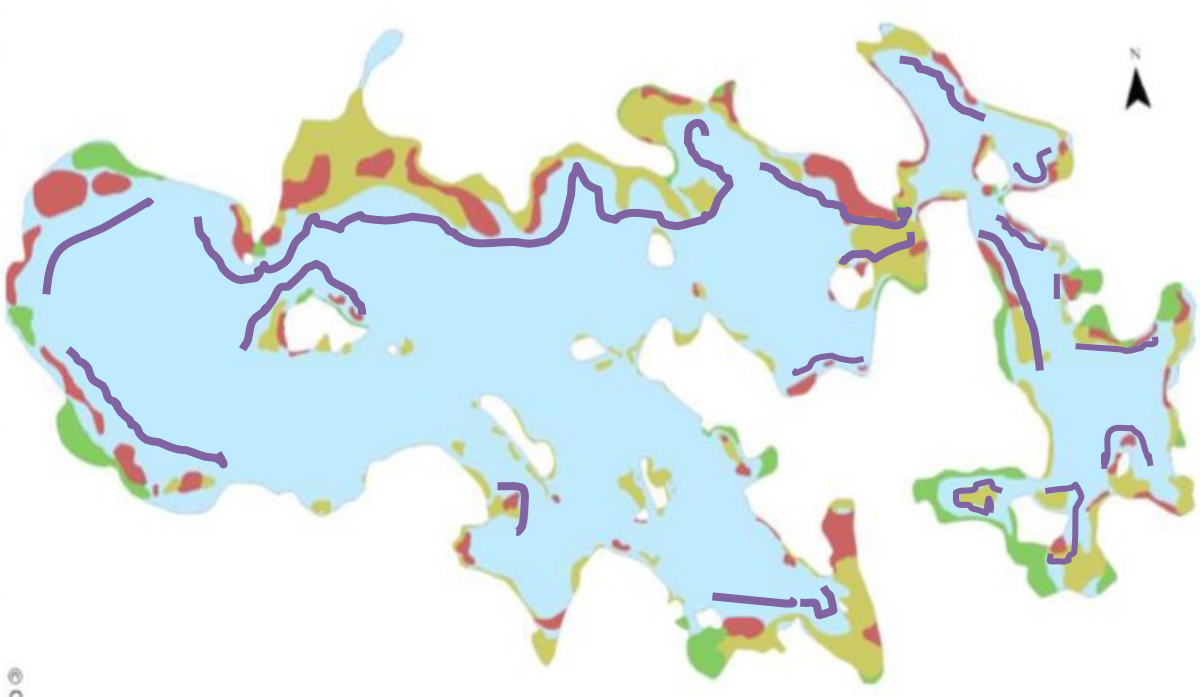

depict yellow buoy placement.

Cottagers in areas of heavy milfoil are encouraged to work together to purchase benthic mats/screen to allow safe boat passage through heavy areas of EWM

Cottagers in heavy areas can work with vendors in

5.5. Tributaries

a. Inlet:
    a. Tributaries can contribute to the influx of EWM into the lake. There is limited research on how to control EWM entering from tributaries.
    b. ORALB knows Lac Notre Dame, which feeds Lac Bernard, conducts ‘threshing’ activities to cut and collect EWM. Our research indicates that it is both feasible and

documented that both cuttings and seeds from ‘cut’ EWM can travel down tributaries and enter adjacent lakes.

c. The heaviest infestations of EWM are along the northwest shore of Lac Bernard up to and including the outlet.
d. Working with Lac Notre Dam and collaborating on EWM mitigation and control measures will be essential.
e. The relationship with Lac Notre Dam has been strained due to their ‘control’ of water levels on their lake. The Board at Lac Notre Dam has made it clear that they will control the level of water at their lake and they will not tolerate any intervention on our part (ORALB) to work with them to ensure a steady flow of water;
f. In 2024, ORALB presented an option to the municipality, Lac Notre Dam and the land-owner to bypass the beaver dam on Lac Notre Dam and ensure a steady flow into Lac Bernard. This opportunity to work together was rejected by the owner of the lands where the beaver dam is located and by the Board at Lac Notre Dam.

b. Outlet:
    a. The outlet is a key determinator of water levels on Lac Bernard.
    b. Heavy rains in the summer of 2024 led to higher-than-normal water levels in the lake.
    c. Each month, the EC of ORALB recorded the outflow at the outlet, demonstrating that water was still flowing out of the lake rapidly. It was reported on ListServe, and pictures were included to validate the outflow.
    d. Note that at the start of the season in 2024, Lac Notre Dame was at low water levels and restricted any outflow to Lac Bernard until late Jul 2024;
    e. Regardless, in the fall of 2024, someone deliberately cleared out rocks and debris from the outlet to lower lake levels.
    f. ORALB members have varying preferences for lake levels. However, it is illegal to remove any debris from the outlet.

Action 2025 (EC)

a. Investigate and consider options for a ‘net’ to be installed at the inlet entrance to trap milfoil clippings/seeds at the inlet;
b. Work closely with the Lac Notre Dam to ensure that their practice of threshing does not interfere with our EWM mitigation program on Lac Bernard or does not put it at risk. Consider the appropriateness of legal action;
c. Work with the owners of the outlet property to seek permission for four members (EC) of the ORALB to enter the property as ‘guardians’.
d. Install cameras at the outlet to monitor trespassing and capture unauthorized movement of debris/rocks, etc, from the outlet;
e. Send video evidence and notice to the government QC of any violations to ‘d’ above.
f. Purchase and install lake level indicators at key points of the lake so residents/members can track levels.

Action 2026-29

TBD

5.6 Wash stations at Boat launches

Most research indicates that lakes investing in EWM mitigation also ensure that boats coming into and leaving the lake are EWM-free. Lac Sinclair has installed a washing station at their boat launch. Their lake is EWM-free. Wash stations could also prevent other invasive species from entering the lake.

Action 2025 (EC)

Investigate the costs and effectiveness of installing Wash Stations at Boat Launches

Action 2026-29

TBD

This action plan, as denoted above, will be monitored by the EC, and progress against the plan will be provided twice annually through Progress Reports:

1. AGM (usually May)
2. Fall General Meeting

5.7 Oxygenators

Oxygenators have had some success in lakes. EC recommends the purchase of 3-5 oxygenators to be distributed around the lake to test the effectiveness of this natural solution to EWM mitigation. It is suggested that oxygenators be purchased and placed by June in 3 key areas to assess their effectiveness:

a. Paddy's Bay
b. South Mitchells Bay
c. North West Bay

Action 2025 (EC)

Purchase and distribute 3 (up to 5) oxygenators from 2 suppliers to test the effectiveness of this solution.

Action 2026-29

TBD

6. Opportunities for Volunteers:

The EC is looking for volunteers and has the immediate need for the following:

a. Yellow Buoy Management
b. Outlet Monitoring
c. Inlet Monitoring

7. Resources:

Professional Assistance:

The EC is working with ABVdes7 currently at no cost to pursue funding for a large-scale burlap application on Lac Bernard. The EC will update at the AGM and Fall General Meeting on Progress. In addition, several academic professionals will participate in this 'EWM mitigation Pilot' on Lac Bernard.

Funding:

$10,000 is requested in the Budget to support the purchase of cinderblock anchors for Yellow Buoy distribution, benthic mat rebar and 3-5 oxygenators for the EWM trial.

8. Conclusion

Eurasian Water Milfoil poses a significant threat to the health and recreational value of Lac Bernard. This management plan outlines a comprehensive approach to control and mitigate the spread of EWM, based on scientific research and the experiences of other lakes. With the active participation of lake association members, we can protect and preserve Lac Bernard for future generations.

Annex A
Annex B

Appendix A

Literature Review For ORALB EC

Research and Reports: Eurasian Water Milfoil and Management Strategy and Plan

1. Effects of herbicides on EWM & native plants E.R. Kujawa et al. (2017)
2. Placing invasive species management in a spatiotemporal context Baker and Bode 2016
3. Management and control methods of invasive alien freshwater aquatic plants: A review, Hussner et al. 2014
4. Spatial Economic Analysis of Early Detection and Rapid Response Strategies for an Invasive Species, Brooks Kaiser and Kimberly Burnett 2010
5. Efficient and rapid control of Eurasian watermilfoil (Myriophyllum spicatum) by combining benthic mats and hand pulling Vincent Gagné and Claude Lavoie 2023 (Lac des Abénaquis)
6. Lessons from a decade of lake management: effects of herbicides on Eurasian watermilfoil and native plant communities, ELLEN RUTH KUJAWA , PAUL FRATER, ALISON MIKULYUK, MARTHA BARTON, MICHELLE E. NAULT, SCOTT VAN EGEREN, AND JENNIFER HAUXWELL 2017
7. Lake Geroge Annual Report 2022
8. Lake George Milfoil Project Annual Report 2023
9. HAND HARVESTING EURASIAN WATERMILFOIL IN LAKE GEORGE by John D. Madsen James W. Sutherland Lawrence W. Eichler Robert T. Bombard June 1991
10. Lake George Association, (LGA) Announces Initial Results from ProcellaCOR Monitoring, September 3, 2024
11. A REVIEW OF PHYSICAL AQUATIC PLANT MANAGEMENT EFFORTS FOR LAKE GEORGE, NEW YORK IN 2002 Prepared By Lawrence Eichler Research Scientist & Charles Boylen Associate Director Darrin Fresh Water Institute
12. Water Education Foundation, Tributaries, 2024
13. Incentivizing the Public to Support Invasive Species Management: Eurasian Milfoil Reduces Lakefront Property Values, Julian D. Olden Mariana Tamayo Published: October 15, 2014
14. Boylen CW, Mueller N, Kishbaugh SA (2001) The costs of aquatic plant management in New York State. 51st Annual Meeting of the Aquatic Plant Management Society, Baltimore, MD.
15. Newroth, P.R. (1985). A review of Eurasian water milfoil impacts and management in British Colombia. L. W. J. Anderson (ed), Proceedings of the First International Symposium on the watermilfoil and related Haloragaceae species. Aquat. Plant Manage. Soc. Washington, D.C. pp. 139-153
16. A Review of the Science and Management of Eurasian Watermilfoil: Recommendations for Future Action in New York State Holly Menninger, PhD Coordinator, New York Invasive Species Research Institute Cornell University August 8, 2011 Revised: November 11, 2011
17. The effects of aquatic invasive species on property values: evidence from a quasi-experiment. Horsch EJ, Lewis DJ , Land Economics 2009