The Green Shovels Collaborative presents:

PHRAGMITES SUMMARY REPORT

GREEN SHOVELS COLLABORATIVE

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ABOUT THE GREEN SHOVELS COLLABORATIVE

We are an informal coalition of conservation organizations, including Ducks Unlimited Canada (DUC), Federation of Ontario Cottagers' Associations (FOCA), Invasive Species Centre (ISC), the Nature Conservancy of Canada (NCC), Ontario Federation of Anglers and Hunters (OFAH), and Ontario Turtle Conservation Centre (OTCC).

Together we represent millions of people, with members and supporters who are nature lovers, cottagers, outdoor recreationists, anglers and hunters. We are also land managers, with many hectares of land under ownership or management. We came together to offer a list of shovel ready projects which would achieve the government's objectives of job creation and economic recovery, along with important benefits to local communities and the environment.

This the Green Shovels Collaborative (GSC) project was led by Eric Cleland and Mhairi McFarlane (NCC), coordinated by Colin Cassin (ISC), and reviewed by Erling Armson (DUC), Terry Rees (FOCA), and Sophie Monfette (OFAH).

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Ducks Unlimited Canada

FOCA Federation of Ontario Cottagers' Associations

Invasive Species Centre

NATURE CONSERVANCY CANADA

ONTARIO FEDERATION OF ANGLERS AND HUNTERS

ONTARIO TURTLE CONSERVATION CENTRE

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CHAPTER 1

Invasive *Phragmites* – A Strategic Framework for Coordinated Management in Ontario

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INTRODUCTION

In early 2020, a group of conservation organizations formed the Green Shovels Collaborative (GSC) with a shared interest in protecting nature through advancing the management of invasive species in Ontario. With this goal in mind, the Green Shovels team prepared a suite of economic stimulus projects for consideration by provincial and federal governments that would enhance job creation and infrastructure sustainability while benefiting society and the environment.

As Canada's worst invasive plant, non-native *Phragmites australis* (Cav.) Trin. Ex Steud (hereafter *Phragmites*) is impacting social, economic and environmental values across the province. In November 2020, the Ontario Ministry of Natural Resources and Forestry (OMNRF) expressed interest in a strategic framework that would enhance coordination and collaboration of *Phragmites* management using a regional implementation model. To support the development of this framework, the GSC, under the leadership of The Nature Conservancy of Canada (NCC), engaged the Invasive *Phragmites* Control Centre (IPCC), the Ontario Invasive Plant Council (OIPC) and the Ontario *Phragmites* Working Group (OPWG) to provide technical expertise and assistance in approaching *Phragmites* management practitioners across Ontario. Collaboratively this team's efforts resulted in the goals, objectives and important actions that provide strategic guidance towards a coordinated response to *Phragmites* management.

In January 2021, a survey was distributed to *Phragmites* practitioners in Ontario requesting information about *Phragmites* management, including the techniques and tools, partners, costs and volunteer involvement that is supporting these projects. A workshop was held to explore the strengths and weaknesses of current control methods, and to identify obstacles and opportunities to more effective and coordinated management. In addition, five case studies (Appendix B) were assembled that demonstrate varied approaches to *Phragmites* management. The information collected as part of these efforts is summarized here.

ACKNOWLEDGEMENTS

The Green Shovels Collaborative would like to acknowledge that the development of this strategy would not have been possible without the generous funding support provided by the Ontario Ministry of Natural Resources and Forestry. This support allowed the GSC team to capture the wealth of knowledge and expertise of Ontario's *Phragmites* practitioners. A special thanks to survey respondents, workshop attendees, case study participants, technical advisors and *Phragmites* managers who provided input along the way. Your dedication to the management of this invasive plant is unparalleled and greatly appreciated.

Developing a picture of the current status of *Phragmites* management in Ontario would not have been possible without the support of the Ontario Invasive Plant Council, and the Ontario *Phragmites* Working Group. Their role in delivering the practitioner survey and workshops and assisting to summarize the case studies and input was invaluable.

This framework also benefited greatly from the input of *Phragmites* practitioners across Ontario who invested substantial time in sharing detailed information about their management projects. This substantial dataset has helped to develop a cost-benefit analysis supporting the need for *Phragmites* management and further illustrates the dedication and effort of many volunteers that can be leveraged to implement this framework.

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BIOLOGY OF *PHRAGMITES*

The Invasive *Phragmites* Best Management Practices in Ontario guide (OMNRF 2011) was updated in 2020 by the OIPC in and provides a comprehensive current reference on the biology, impacts and control methods. Extracts are presented here.

"Invasive Phragmites australis *(hereafter referred to as Phragmites), pronounced "frag-MY-tees", is a perennial wetland grass which forms dense, near monoculture stands. It is a member of the* Poaceae *(grass) family and is also known as European common reed, common reed, or common reed grass. The name Phragmites is derived from the Greek term phragma, meaning fence, hedge, or screen. It is native to Eurasia and was likely introduced more than once to North America in the 1800s along the Atlantic coast, as both a seed contaminant in soil ballast and intentionally introduced through the horticulture trade. Phragmites is an aggressively spreading grass that can reach heights of more than 5 m and densities of over 200 stems/m2. In 2005, it was recognized as Canada's worst invasive plant by scientists at Agriculture and Agri-food Canada. Rapid expansion of this plant occurred during the 1990s and it has since spread throughout Ontario and become one of the most significant threats to Great Lakes coastal habitats, where it has drastically reduced plant and wildlife diversity, as well as threatened a high number of species at risk. It is also a common sight along Ontario's major highways and secondary roads"…* as well as rail and hydro corridors *.." which act as vectors to spread the species."* Nichols 2020.

Phragmites also impacts human access to water bodies for recreation, impairs road sightlines, blocks water courses, and can increase the fire hazard around infrastructure.

IMPACTS OF *PHRAGMITES*

Phragmites has a wide range of impacts to environmental, cultural and economic values. Fifty-nine percent of 43 respondents to a 2020 *Phragmites* survey rated environmental impacts (identified as habitat and species protection) as the top reason for taking action in their respective jurisdictions. The remaining respondents cited infrastructure considerations, impact to recreational activities and property values/aesthetics as primary motivation for initiating control efforts.

It comes as no surprise the emphasis that practitioners and professionals place on environmental impacts aligns well with existing literature; it is well documented that *Phragmites* changes hydrological and nutrient cycling patterns, degrades wildlife habitat (Nichols 2020) and threatens at least 25% of Ontario's Species at Risk (SAR) (Bickerton 2015).

Further cultural and economic impacts include (Nichols 2020):

- Damage to infrastructure
- Human safety hazards (e.g. dead stands create fire hazards and block sightlines along roadways, etc.)
- Delays and increased cost in construction activities
- Aesthetic degradation and blocking of property views
- Reduced property values
- Loss of traditional medicines
- Loss of productivity in woodlots and agriculture
- Impeding access to important infrastructure and utilities (e.g. fire hydrants, hydro corridors, storm water management infrastructure)
- Recreational values

The invasion and spread of *Phragmites* affects many different sectors of society, in both direct and indirect ways. A coordinated regional response will bring together all stakeholders and organizations to leverage efficiencies in addressing these impacts.

CURRENT MANAGEMENT TECHNIQUES IN ONTARIO

In order to present a framework for managing *Phragmites* in Ontario, it is necessary to first understand the current state of management from *Phragmites* practitioners. *Phragmites* management projects in Ontario vary greatly by site, scale and available tools and techniques. Currently, these projects range from small, grassroots, largely volunteer-driven projects, through to large-scale, highly mechanized projects led by invasive species professionals. Regardless of scale, most projects require a multi-year plan using combination of tools and techniques, know as an integrated pest management approach.

One of the most important influencing factors on project feasibility and ultimately success, are water levels, particularly in the Great Lakes Basin. Between 2018 and 2021, water levels have been at record highs; making the feasibility of the cut-to-drown (see Table 1) method higher than average. To date, with the absence of an aquatic herbicide in Ontario this has been beneficial. However, with water levels forecasted to drop in the coming years, this method may have significantly less applicability going forward. This limitation, and others associated with climate change means the opportunity for re-invasion and expansion of existing populations is high without access to an aquatic herbicide.

***Phragmites* practitioners say...**

70%

of projects use herbicide as a primary control method, where feasible on dry land.

56%

of projects are using the cut-to-drown method, where feasible.

26%

of projects are using the cut-to-drown method for over half of their control needs due to a lack of aquatic herbicide.

30%

of projects are using the spading technique.

Table 1. Current *Phragmites* control methods in Ontario

Method	Site Type	Strengths	Limitations
Spading	Dry land, non-rocky	Easy to implement, cost effective for small sites; easy to engage volunteers	Labour intensive, must be soft substrate, efficacy variable and requires repeat treatments, time consuming, slow progress towards restoration objectives, biomass must be disposed of responsibly.
Cut-to-drown (Manual)	30 cm or deeper water, relatively flat bottom of waterbody	Only option available for aquatic sites to date. Reasonably effective in deep water; easy to engage volunteers; most suitable for small sites	Labour intensive. Not effective in less than 30 cm water. Water level must stay high throughout growing season to be effective. Subject to water level fluctuations; may require repeat treatments. Time consuming, slow progress towards restoration objectives, biomass must be disposed of appropriately per BMP.
Cut-to-drown (Mechanized Equipment)	30 cm or deeper water, relatively flat bottom of waterbody	Only option available for larger aquatic sites to date. Reasonably effective in deep water	Requires specialized cutting equipment with trained operators that can be expensive. Not effective in less than 30 cm water. Water level must stay high throughout growing season to be effective. Subject to water level fluctuations; may require repeat treatments. Time consuming to deliver; biomass must be disposed of appropriately per BMP.

Herbicide Application	Dry land only	Very high efficacy, covers large areas quickly, less labour intensive than mechanical methods, and requires less physical disturbance	Public perceptions of herbicides, multiple authorizations, requires trained exterminators. Best management practices recommend rolling and/or burning of biomass after 3 weeks. Narrow biological windows for application (fall).
Herbicide Application*	Aquatic sites	Very high efficacy, covers large areas quickly	Has not been available in Canada, may become available 2021. Herbicides have different active ingredients and modes of action meaning not all herbicides are appropriate for a given site. Public perceptions of herbicides and complex licencing. Best management practices recommend rolling and/or burning of biomass after 3 weeks. Narrow biological windows for application.

*To date, there have been no herbicides registered for use on *Phragmites* in aquatic sites in Canada outside of the emergency registration pilot program in the Long Point region and Rondeau Provincial Park. A product with the active ingredient imazapyr may become available in 2021. This potential tool will help address the aquatic herbicide gap however it will have limited application in some sites, particularly those intermixed with woody vegetation, or in some agricultural settings where sites are close to water used for irrigation/food production. Similar to other jurisdictions, both glyphosate and imazapyr-based products are needed to achieve effective and efficient management of *Phragmites* at most sites in Ontario.

Regardless of the combination of techniques used, on dry land or in water, the removal of plant biomass is important. This improves access to the site for follow-up control and expedites the establishment of native plants. However, biomass removal that ensures the adequate containment of seeds, stolons and rhizomes during transportation and disposal is logistically challenging. Disposal sites must be secure, designed for the purpose, and managed to prevent further establishment and spread.

Prescribed burning may be suitable for some sites during the dormant season, but in most instances removal and disposal of cut material is necessary.

Biocontrol may become a promising additional tool in *Phragmites* management. Two noctuid moths (*Archanara neurica* and *Lenisa geminipuncta*) have been approved for release in Canada and are currently being trialed in Ontario. Although biocontrol may not replace the need for substantial

management via the techniques described in Table #1 it could complement current control efforts in the longterm.

CURRENT STATUS OF MANAGEMENT IN ONTARIO

Phragmites management in Ontario today consists of a wide range of delivery styles from volunteer-driven, community-based grass roots projects to large government-led landscape scale programs (see Appendix A). This variability is driven by many factors including capacity to deliver and funding, and often results in uncoordinated control efforts across the province. While these efforts are helping, they have wide-ranging results that are not achieving the efficiency and collaboration potential that exists.

A final summary question in the January 2021 practitioners survey asked respondents what top three resources or tools would most improve their efficiency, collaboration and safety.

Survey responses showed two clear priorities:

1. Access to aquatic herbicides
2. Coordinated multi-year funding and timing of funding

and then a near tie for third place:

1. Development of new management tools/equipment or improved access to existing tools/equipment
2. Local municipal government participation
3. A public education campaign
4. Increased availability of qualified contractors

MANAGEMENT CHALLENGES

Coordination and Funding

Ontario is fortunate to have benefited from the efforts of many organizations, landowners and volunteers working to control *Phragmites* across the province. Their efforts are

60% of the 43 *Phragmites* control projects who responded to the survey in January 2021 involved many partners including: Conservation Authorities (60%), local municipalities (35%), provincial and federal government, NGOs, volunteer organizations and various associations (30 – 40%). Across all surveyed projects, 130 partners were involved, with some projects having eight or more collaborators.

having some success; however, the same survey respondents identified the need for better regional coordination and opportunities to collaborate and share lessons learned. **To successfully control *Phragmites*, an integrated, landscape-scale implementation plan that includes all necessary partners and stakeholders within a region is needed.** These plans require sustained, multi-year funding to match the realities of *Phragmites* control.

Currently, funding for this work comes from a mix of sources including government and foundation grants, municipal budgets and private donations, most often based on a single fiscal year. Increased and sustained multi-year funding commitments would significantly improve the efficacy and scale of *Phragmites* management and further leverage the significant volunteer efforts already occurring.

42% of survey respondents stated that longer-term, multi-year funding would significantly improve the efficacy and scale of their projects by reducing volunteer fatigue and allow more time to be spent on control work.

While volunteer efforts are impressive in the *Phragmites* management community, the survey showed that 72% of projects have paid staff and contractors delivering a large proportion of the work. Some of these projects have substantial annual expenses that directly support Ontario's economy through the protection and enhancement of green infrastructure.

25 projects that hired between 1 and 6 contractors reported annual expenses between $150,000 and $650,000. The overall combined annual expenses of those 25 projects that rely on contract work is over $2.18 million. This knowledge combined with the oft-cited need for more contractors and wage-funding highlights a key area of job creation and economic-benefit that *Phragmites* management has the potential to fill.

Public and Sector Awareness

There remains a significant gap in public and sector knowledge regarding invasive *Phragmites* management techniques as well as its impacts to the environment, economy and society. Most practitioners in Ontario reported a lack of public awareness and understanding of

Lack of public awareness and understanding was identified as a key obstacle to many *Phragmites* control projects.

Phragmites management as a key obstacle to their projects. Gaps in knowledge in public and other sectors (e.g. industrial, development and resource extraction) results in human-induced spread of the plant via a variety of intentional (e.g. planting) and unintentional (e.g. seeds on recreational vehicles and equipment) means. A comprehensive public awareness campaign as well as sector-specific outreach are required. The OIPC produced a clean equipment protocol for industry (Halloran 2016) that should be promoted and applied to limit the spread of *Phragmites*.

Rate of Expansion

Invasive *Phragmites* is known to be widespread however there is a lack of accurate mapping to inform regional control programs. One reason for the lack of accurate mapping is the ongoing spread across Ontario via several pathways. Examples include recreational activities, infrastructure projects, highway and utility corridor construction and maintenance, and industrial expansion. Slowing this spread will require enhanced use of OIPC's clean equipment protocol on all infrastructure projects as well as the establishment of an Early Detection and Rapid Response (EDRR) program. Priority regions such as Northern Ontario, where populations are low and along major highways and pathways should be the EDRR focus areas.

Local, site-level expansion is also a concern for existing projects. Due to the aggressive growth rates of *Phragmites* and the complex nature of infestations, no single control technique is entirely effective on its own. The most appropriate combination of timing and techniques varies by site, the scale of the problem, and with project goals. Even relatively small stands are unlikely to be fully controlled in a single year, however, follow-up management is generally less onerous and costly than initial control. Follow-up work is essential to protect the original investment in control efforts, as *Phragmites* can expand quickly to re-populate areas previously cleared. Continuing to support the efforts of ongoing control projects will maintain existing momentum and minimize the opportunity for re-invasion due to lapse years in funding.

The widespread distribution of *Phragmites* in Ontario and the complexity of its management provides a significant economic stimulus opportunity. Implementation of this strategy will create a substantial number of long-term jobs in the small business sector, while protecting, enhancing and restoring green infrastructure.

72% of survey respondents stated their project will need three or more years to achieve full control via current methods. More than 23% of respondents stated full control will take more than five years.

Land Ownership

While *Phragmites* shows a preference for wet natural and man-made habitats, it readily colonizes dry areas and is often found in disturbed sites and urban settings. It's ability to occupy a variety of sites and moisture regimes presents challenges to management and often necessitates an integrated pest management approach to control. Related to this, *Phragmites* may straddle property boundaries meaning that permissions from multiple landowners are often required. A detailed regional implementation plan that identifies landowner outreach considerations and methods would maximize the opportunity for comprehensive control o of *Phragmites* populations and landowner engagement.

Permits and Authorizations

For a single project location, *Phragmites* management often requires several permissions from a variety of agencies. Site-specific authorizations may be required such as access permits for federal and provincial lands (e.g. Canada Wildlife Act, Public Lands Act, Provincial Parks and Conservations Reserve Act), exemptions from municipal by-laws, and written permissions from individual private landowners. Working in sensitive habitats may require further authorizations from several agencies under federal (e.g. Fisheries Act, Species At Risk Act and Migratory Birds Convention Act) and provincial (e.g. Endangered Species Act, 2007) legislation.

Where herbicides are used as part of control efforts, authorizations under the Pesticides Act such as Extermination permits from MECP for aquatic herbicide application and a Letter of Opinion regarding the Natural Resources Exception and MNRF may be required for certain terrestrial herbicide applications. Permits may be subject to conditions such as public notification and monitoring that further impact control programs. Practitioners report that delays in receiving authorizations can cause substantial challenges in implementing projects and introduces uncertainty to project delivery. Licenced exterminators are required for all herbicide applications in Ontario, and four different types of licences (Landscape, Forestry, Industrial, Aquatic) are required to manage *Phragmites* across the suite of sites where it occurs. Streamlining and modernizing authorization processes, while maintaining important precautions, would significantly improve invasive plant management in Ontario.

Lack of Registered Aquatic Herbicide

It is widely recognized that the most effective and efficient technique for controlling *Phragmites* involves the use of an herbicide as part of an integrated pest management program. For several years, two herbicides with different modes of action have been registered and available for *Phragmites* control on terrestrial sites in Canada. These can only

be applied on dry land, and as per label requirements, may require a buffer from other non-target values. This proves to be a major challenge for practitioners as *Phragmites* populations often cross the boundary between aquatic and terrestrial sites resulting in only part of a stand receiving herbicide control. Further complicating this challenge is that other aquatic methods such as the cut-to-drown technique, that could be employed in unison with herbicides, are only effective where the water is deep enough (30 cm or greater) to drown the plant following cutting. This often leaves an untreated area that extends from where water is too shallow to effectively drown the plant to the point where terrestrial herbicides may be applied.

In March 2021, the *Phragmites* community was made aware that the registration of an aquatic herbicide with the active ingredient imazapyr is pending approval with the Pest Management Regulatory Agency and may be available for the 2021 control season. This new tool will help address the aquatic herbicide gap, but only partially. According to the label, it will only be appropriate for some sites (e.g. sites without intermixed woody vegetation). Both glyphosate and imazapyr-based products are needed to achieve effective and efficient management of *Phragmites* at all sites in Ontario.

72% of survey respondents said that access to an aquatic herbicide would have made their projects faster, cheaper and safer as this would be less labour-intensive, and require less people working in potentially hazardous environments.

Leveraging Regional Success

In each case study (Appendix B), the formation of a defined group and partnership with other existing entities, allowed for access to grants and other funding as well as logistical support. Funding invariably led to rapid increases in the scale of control work which could be undertaken, which in turn generated opportunities for further collaboration and increases of scale, efficiency and safety.

A common theme found in all case studies, which was further supported by feedback from the practitioner survey, was the demonstrated benefit of a strong partnership role from the local municipality. Municipalities maintain a significant amount of infrastructure that is often colonized by *Phragmites* (e.g. ditches, drains, industrial lands, stormwater management areas etc.) and accordingly are positioned and equipped to provide a key role in managing these 'pathways' of invasion to nearby potential host sites. Likewise, several projects identified the value of conservation authorities, as willing and able partners to help deliver landscape scale conservation programs with in-house technical and regulatory expertise.

While some local-scale collaboration is already occurring, there are many parts of the province where projects have not yet started or are just being initiated. **The greatest opportunity to forward landscape-scale *Phragmites* management in Ontario lies with the need for centralized coordination.** A lead organization with dedicated support staff is required to guide existing projects and initiate new ones through the development and delivery of standardized regional implementation plans.

Regional implementation of *Phragmites* management needs to be flexible, reflecting local geographies and incorporating current projects while working in collaboration across jurisdictional boundaries where appropriate. This collaborative, coordinated 'Big Picture' approach will leverage local, grassroots efforts to achieve greater success across Ontario.

STRATEGIC GOALS AND ACTIONS

The *Phragmites* community has come together to prepare the following set of goals, objectives and actions to improve *Phragmites* management throughout Ontario. Bolded actions are those recommended for urgent, priority implementation in the 2021 – 2022 fiscal year, while the remaining actions are considered important and necessary to achieve the goals of this strategy. As progress is made towards achieving the goals within this strategy, updating and revisions may be required.

Our Vision: Invasive *Phragmites* no longer impacts social, economic and environmental values in Ontario. Vibrant, diverse ecosystems support fish and other wildlife, healthy people and communities.

Goal 1: Coordinate *Phragmites* control across Ontario

Objective A: Strategic guidance, coordination and oversight is provided

Due to the variety of habitats occupied by *Phragmites*, and the diversity of its impacts, even relatively small infestations can involve substantial coordination challenges between multiple jurisdictions, organizations and individuals. The status of *Phragmites* management changes annually on an ad-hoc basis, driven by funding uncertainties and changing priorities, and is delivered by a wide range of practitioner and contractor skill sets.

Urgent Actions

1. Partner with an organization or dedicated group of organizations, (hereafter referred to as "The Organization") with extensive *Phragmites* control experience to seed fund the development of a clear governance structure and help direct regional implementation of the *Phragmites* strategic framework.

2. Ensure The Organization is staffed appropriately to support the development of new projects and provide strategic direction to existing projects including prioritization of sites, identification of new funding, facilitation of information sharing and reporting/auditing of projects.

3. Establish a committee of applicable ministries (e.g. MECP, MNRF, MTO, OMAFRA), to work with The Organization to achieve the goals of this strategy as well as provide guidance and financial support. The committee works with The Organization to engage with Indigenous communities, stakeholders and industry as necessary.

4. Establish regular communication with Indigenous communities across Ontario to share knowledge regarding *Phragmites* management.

Important Actions

5. Develop a scorecard or tracking mechanism to measure progress in *Phragmites* management, possibly modelled after the conservation authorities' Watershed Report Cards concept.

6. Develop standards for contractors to ensure consistent, high quality workmanship and adherence to best practices, possibly via a training certification system and integrated with existing training modules (e.g. OIPC programming). Include particular reference to considerations when working in sensitive and Species at Risk habitat and being respectful of the cultural values of Indigenous Peoples.

Goal 1: Coordinate *Phragmites* control across Ontario

Objective B: Awareness of *Phragmites* among the general public increased

Phragmites is identified as Canada's worst invasive plant yet the general public are unaware of its impacts or existence. Despite existing efforts, public knowledge is limited and would benefit from collation and coordination of current resources, including Traditional Ecological Knowledge, to broaden their impact.

Urgent Actions

7. Update and implement the Ontario *Phragmites* Working Group Communications Strategy and other communication documents to collectively initiate a large-scale media campaign. Expand social media activity to target the general public and other key audiences specifically.

Important Actions

8. Maintain a standardized *Phragmites* fact sheet, based on the Best Management Practices, suitable for the general public. Ensure the concept of native vs non-native species, and the harm non-native species can cause to Species at Risk and other values, is well captured.

9. Conduct specific outreach and education around the responsible use of herbicides, and other control tools as necessary. Share research findings in accessible language to key audiences.

10. Consider tailored products, including signs in public places, and materials which go out with other municipal mailings. Focus on special interest groups to leverage support e.g. anglers and hunters, recreational boaters, ATV clubs etc.

11. Develop demonstration *Phragmites* control projects in targeted, high-visibility areas to raise awareness of the challenge and highlight successes.

Goal 1: Coordinate Phragmites control across Ontario

Objective C: Knowledge sharing among practitioners is increased to improve consistency, continuity and efficacy of control

Phragmites control occurs at all scales in Ontario with a wide range of experiences and techniques that are not shared broadly. Improved collaboration opportunities and use of existing resources and best management practices is required.

Urgent Actions

12. Promote awareness of existing resources and enhance them as necessary, in particular Ontario *Phragmites* Working Group and other websites. Develop a platform for Ontario projects to share ideas and experiences. Use project champions to showcase successes.

Important Actions

13. Ensure the Best Management Practices guide remains readily available and current and includes all of the necessary information practitioners need to implement control, including technical, regulatory and mitigation considerations.

14. Explore existing resources (e.g. Great Lakes *Phragmites* Collaborative/*Phragmites* Adaptive Management Framework) to emphasize Ontario content and improve landscape coordination.

Goal 2: Prevention, Control, and Monitoring

Objective D: New introductions of *Phragmites* are prevented and existing infestations are contained

Phragmites is spread readily through well-known vectors across Ontario. Existing prevention approaches lack coordination and are not implemented broadly. New infestations are overlooked until they expand, becoming costly and difficult to manage. This is likely to be exacerbated by climate and land use changes.

Urgent Actions

15. Identify significant sources of *Phragmites* spread (both local and more broadly) and causes of establishment via a "highways and pathways" approach (e.g. roads, right of ways, utility corridors, agricultural drains and their maintenance).

16. Develop an early detection and rapid response program for uninvaded and early infestation areas, in particular northern Ontario.

Important Actions

17. Work with appropriate responsible authorities and industry leaders to support and incentivize adherence to clean equipment protocols and associated best practices, and ensure they become fully integrated with regular work practices.

18. Support municipalities to develop secure, effective invasive plant biomass disposal systems.

19. Consider pathways of *Phragmites* spread to and from adjacent jurisdictions such as other provinces and countries as part of implementation of this strategy.

Goal 2: Prevention, Control, and Monitoring

Objective E: More control of *Phragmites* is achieved at a landscape scale

Effective *Phragmites* management requires a wide range of partnerships, planning, techniques and analysis over a multi-year period to achieve eradication. Landscape-scale

planning is not yet the standard for *Phragmites* control programs, meaning efficacy and sustainability is limited. Opportunities for leveraging and sharing resources and knowledge are missed.

Urgent Actions

20. The Organization supports the development and delivery of regional collaborative implementation plans with municipalities or groups of municipalities and other partners to manage *Phragmites* in partnership with existing projects and broader landscape approaches. This collaborative regional implementation plan approach will increase our collective impact and is the key to stepping up and scaling up our local efforts into the required landscape level progress.

Important Actions

21. The Organization guides proponents to use the Ontario *Phragmites* Working Group decision support tool and the Ontario Invasive Plant Council's Best Management Practices for their projects, focusing efforts on projects in sensitive habitats.

22. Improve mapping and understanding of *Phragmites* distribution by encouraging standardization of inventory methods with the best current techniques available to support prompt and prioritized control (e.g. remote sensing, EDDMaps, iNaturalist. Mapping includes native *Phragmites*).

23. Improve access to specialized tools and equipment (funding their purchase, maintenance and storage, exploring sharing models) and expertise.

24. Demonstrate to manufacturers the existence of practitioner support and market opportunity for aquatic herbicides in controlling of *Phragmites* and other invasive plants in Canada.

Goal 2: Prevention, Control, and Monitoring

Objective F: Monitoring programs are standardized and inform future direction

Monitoring effort and methods can be overwhelming and vary greatly by project resulting in uncertain outcomes and differing levels of information to guide next steps and management actions. Variability results in challenges to reporting on province-wide *Phragmites* management.

Important Actions

25. The Organization should create a simple monitoring protocol which ensures consistency across projects and provides data, including costs, for regional and provincial reporting on *Phragmites* management. Partner with the Phragmites Adaptive Management Framework.

26. The Organization provides *Phragmites* management expertise to review projects and provide suggestions to define and achieve success. Review considers secondary invasion issues and ongoing management needs.

Goal 3: Program Sustainability

Objective G: A sustainable funding model for *Phragmites* control is developed

Currently *Phragmites* management is delivered through a variety of ways, from grassroots community fundraising to accessing large grants. Given the aggressive nature of *Phragmites* expansion, loss of a single year of funding significantly hampers forward momentum, which is particularly detrimental to morale and engagement in volunteer-based projects.

Urgent Actions

27. Establish an Invasive Species Fund (potentially involving the Fish and Wildlife Special Purpose Account or Species at Risk Conservation Fund or other mechanisms) which enables The Organization to leverage traditional and non-traditional funding sources that highlight the importance of *Phragmites* management in achieving social, cultural, economic, environmental priorities.

Important Actions

28. Identify The Organization as responsible for reporting on the contributions of this strategy towards meeting Ontario's provincial and bi-national commitments (e.g. Ontario Invasive Species Strategic Plan, Lakewide Management Plans, Canada-Ontario Agreement, Great Lakes Water Quality Agreement).

29. Investigate innovative, long-term finance mechanisms e.g. conservation finance models, infrastructure and training funding, to increase non-traditional investment in *Phragmites* control.

Goal 4: Policy and Regulatory Enhancements

Objective H: Policy and regulations are modernized and supportive to achieving *Phragmites* management

Despite being designated as Canada's worst invasive plant, current public policy does not support a streamlined and efficient approach to control.

Urgent Actions

30. Enhance current regulatory framework to enable herbicide application for invasive plant management on terrestrial/dry sites more broadly, in a safe and efficient manner. Modernize current MNRF/MECP Letter of Opinion process via one or more of the following:
    a) Remove entirely and identify The Organization as an auditor/approver;
    b) Move to rules-in-regulation model or create an online registry;
    c) Amend existing Pesticide Act Regulation to (a) include species regulated under the Invasive Species Act under the Natural Resources Exception; and/or (b) include additional exempted entities (municipalities, conservation organizations, etc.).

31. Consider a Natural Resources Extermination licence and training module under the Pesticides Act and Endangered Species Act, 2007 (ESA). This would streamline the current requirement of 4 different exterminator licences to treat all sites and multiple ESA authorizations.

Important Actions

32. While maintaining appropriate safety precautions, harmonize and streamline municipal herbicide application by-laws with provincial rules to minimize discrepancy amongst jurisdictions.

33. To support alternative mechanisms of achieving landscape control, list *Phragmites* on the Noxious Weeds List under the Weed Control Act.

Goal 5: Research and Innovation

Objective I: *Phragmites* management remains current and science-based

Phragmites control in Ontario is limited by available approaches and inefficient tools; an ongoing investment in research, in combination with existing cultural knowledge, is needed to ensure responsible and sustainable outcomes at a provincial scale.

Urgent Actions

34. Support research and development of new and emerging identification and control techniques (native vs. non-native, chemical, mechanical, biological), and the sharing of Traditional Ecological Knowledge.

Important Actions

35. Support research and development of innovative mapping techniques (remote sensing, LiDAR, etc.) in a collaborative way.

36. Investigate the use of Unmanned Aerial Vehicles (UAV) for herbicide application.

37. Use the data collected from project monitoring to assess the ongoing needs for post-management restoration.

38. Use social science to develop innovative ways to engage more broadly, including Indigenous Peoples, youth, rural and urban populations alike.

CONCLUSION

Currently, *Phragmites* management in Ontario is delivered by dedicated, hard-working volunteers and professionals navigating complex regulatory processes and employing techniques and tools which vary in efficacy. The complexities of *Phragmites* control combined with a lack of central coordination, guidance and sustainable funding means that many of these practitioners have learned and adapted using trial and error approaches.

Despite these challenges, *Phragmites* management partners have demonstrated their willingness to help position Ontario at the forefront of invasive plant management through the delivery of the actions found in this framework.

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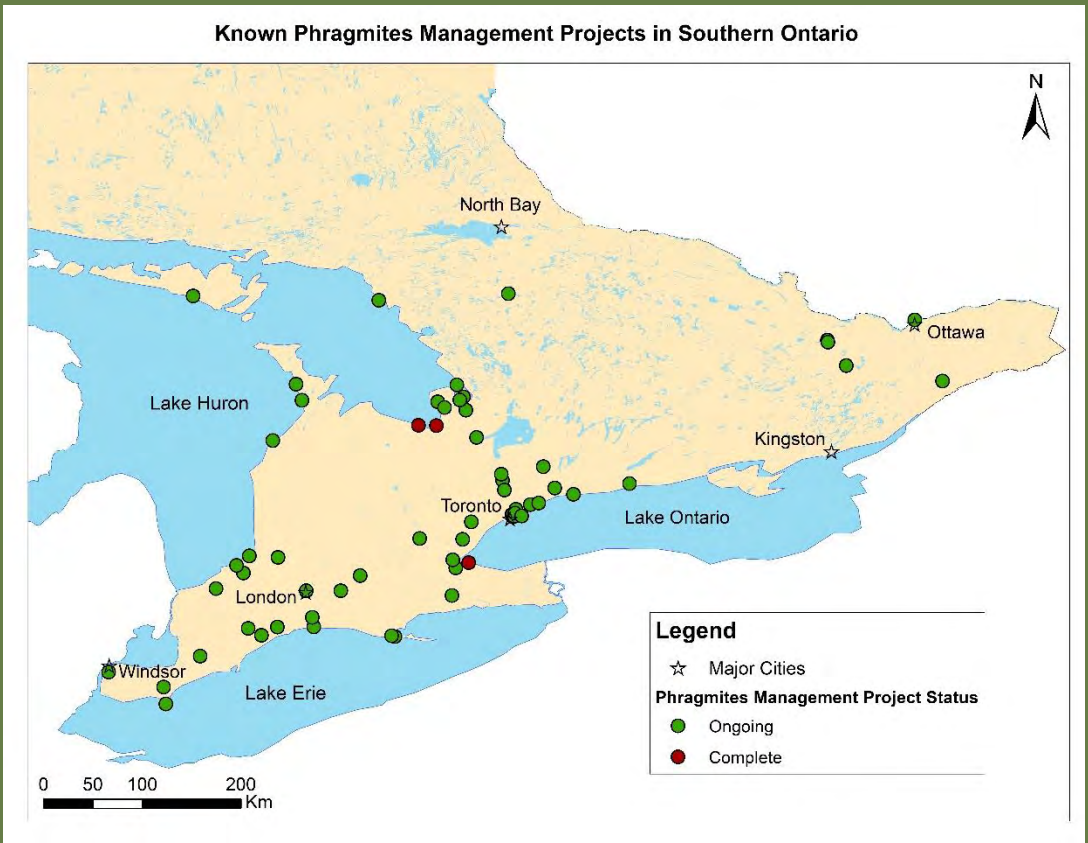
Page 4 photo: Mhairi McFarlane

Page 5 photo: Nature Conservancy of Canada

APPENDIX A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Ottawa
Lake Huron
Kingston
Toronto
Lake Ontario
London
Windsor
Lake Erie
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Km
Legend
Major Cities
Phragmites Management Project Status
Ongoing
Complete


Known Phragmites Management Projects in Southwestern Ontario
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Lake Huron
Kitchener
Sarnia
London
Long Point
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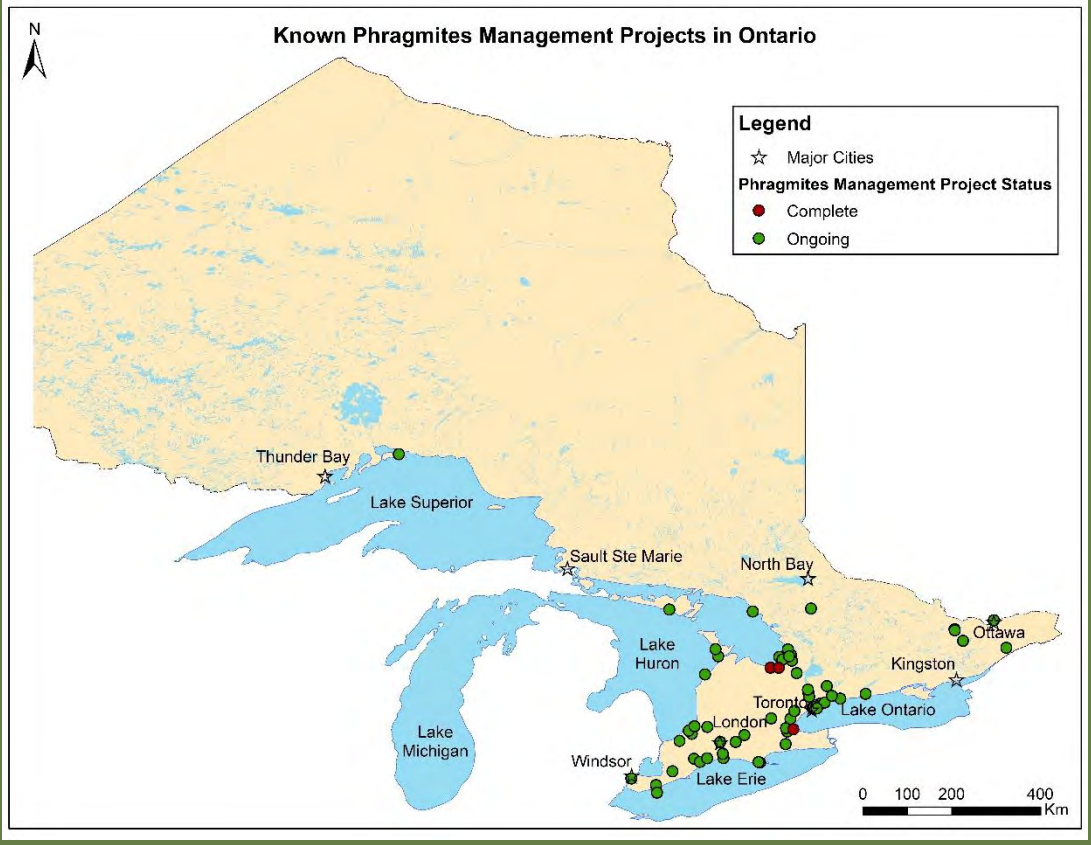
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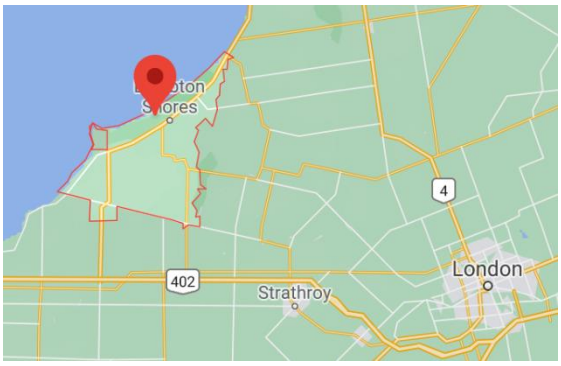
APPENDIX B

B.1 CASE STUDY: Lambton Shores *Phragmites* Community Group (LSPCG)



Project Location and Mobilization

The Lambton Shores *Phragmites* Community Group (LSPCG) was formed in 2009, after members of the Port Franks Beach Homeowners Association and the Windsor Park Association became increasingly concerned about the growing stands of *Phragmites* appearing on Port Franks beach and elsewhere in the watershed.

Outreach

After experiencing success in their initial treatment of Port Franks, the group expanded and began mapping and dividing the entirety of the Municipality of Lambton Shores into five different *Phragmites* Management Areas (PMA), with smaller block divisions in each.

LSPCG held well-advertised and highly attended information sessions for people to sign-up their properties or local beaches for management. This allowed LSPCG to gain contact information for those interested in joining and supporting the restoration programs in PMAs 1 through 5. They have since expanded their community information sessions to other municipalities, regions and industries like agriculture, golfing and recreation as well as wind turbine development.

Partnerships and Coordination

Phragmites management for each PMA began in 2012, with the project growing larger each year. The management plan has proven essential and has attracted over 20 different partners, from conservation authorities to local cottagers, who benefit in different ways from *Phragmites* management.

The increased collaboration and coordination allowed for LSPCG to apply for grants, a milestone that allowed for further expansion of their work compared to the initial years. Access to more funding has allowed work to be started in all five PMAs.

Partners and Collaborators

- Great Lakes Guardian Fund Grant
- Grand Bend Horticultural Society
- Ducks Unlimited Canada
- National Wetland Conservation Fund
- Invasive *Phragmites* Control Centre
- Ipperwash Phrag Fighters
- Grand Bend Rotary Club
- Grand Bend Vegetable Growers
- Federation of Ontario Cottages' Association
- Centre Ipperwash Community Association
- Port Franks Beach Homeowners Association
- Landowners, community members
- Lake Huron Centre for Coastal Conservation
- Ausable Bayfield Conservation Authority
- St. Clair Region Conservation Authority
- Municipality of Lambton Shores
- Nature Conservancy of Canada
- Rural Lambton Stewardship Network
- Ministry of Natural Resources and Forestry
- Ministry of Transportation
- Ontario Federation of Agriculture
- Lambton Wildlife

Management Techniques

- Cut-to-drown method
- Stihl power saws, cane cutters
- Contracting Dover-Agri Serve for herbicide spraying in dry sites
- Truxors from IPCC
- Biomass removal involves municipal vehicles and equipment
- Bobcat excavators

Photos: LSPCG Website

Year(s)	Area Managed (acres)	Volunteers	Hours	Total Grants
2011-13	95	90	1500+	$35,000
2014-20	223.4	90+	4000+	$368,000

COVID-19 Impact

LSPCG continued its work during the 2020 summer season, taking the necessary precautions including physical distancing, PPE and sanitization. With their work being done outdoors, they were still able to hold volunteer events, although without the usual food and washroom facilities.

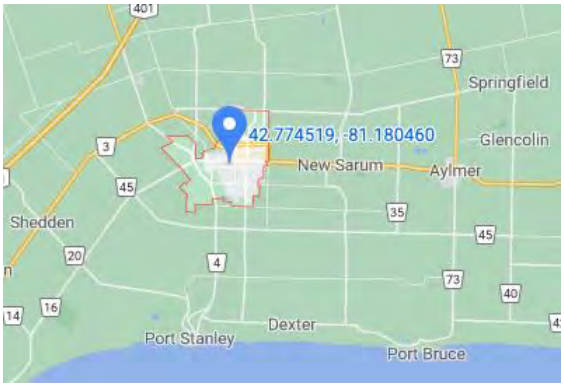
In addition, LSPCG was fortunate to have the Invasive *Phragmites* Control Centre provide them with bright T-shirts that had a social distancing reminder on them, which were highly visible at all times. Port Franks and Ipperwash volunteers wore these shirts and kept their numbers to a COVID-19-acceptable level.

Also, during 2020, LSPCG held a Director's Meeting outdoors, with 10 members. Subsequently, all meetings were hosted through video calls to keep the project moving forward.

Successes	Obstacles to Address
• Mapping out the *Phragmites* and creating a comprehensive plan, while also getting partners and community members involved from inception • Continued work has increased public awareness and stewardship, many will inquire about project and then get involved • Ingenuity – focus on HOW instead of WHY NOT	• Success of programs depends on multi-year funding, it is not a one-year problem – losing funding for one year will set projects back, especially in eyes of the public • Managing large *Phragmites* sites on land not tied to engaged landowners or public use – this makes garnering community and municipal support more difficult

B.2 CASE STUDY: City of St. Thomas *Phragmites* Control Committee

City of St. Thomas Phragmites Control Committee



Project Location and Mobilization

In 2014, St. Thomas local resident David Collins approached City Council with other residents whose properties either faced or backed on to Lake Margaret in the city.

Residents and visitors alike were concerned about the effect that *Phragmites* was having on the lake and its wildlife. *Phragmites* was growing along the shoreline encroaching on surrounding properties. The initial vision for the Lake Margaret development was that of a "natural, environmental sanctuary," but the impact of *Phragmites* was detrimental to both the enjoyment of the space, and the health of native species. Collins presented his "*Phrag* Free City 2020" plan to Council, and it was approved.

Following the initial meeting, Collins and Council formed the City of St. Thomas *Phragmites* Control Committee, consisting of residents around Lake Margaret, a retired horticulturalist, the director of Parks and Recreation, and a representative from Kettle Creek Conservation Authority. Together, they devised a *Phragmites* management plan to account for all 37 km^2 of land within the city's boundaries.

The plan began with members of the committee dividing the city's total area into thirds and mapping each *Phragmites* site from their vehicles. More than five hectares of *Phragmites* were mapped in addition to the initial sites around Lake Margaret. Ultimately, their effective approach in pre-mapping increased awareness and in turn, led to management of all *Phragmites* in the City of St. Thomas.

Partners and Outreach

The success of the St. Thomas *Phragmites* Control Committee was due to the emphasis on collaboration and coordination right from inception. In addition to the key stakeholders on the committee itself, the plan involved multiple directors and chiefs of the fire department, the department of roads, drainage and sewage, and the police department as well. To each member, it was known simply as "the partnership". Collins and the concerned residents knew that for such a project to be successful, many different partners would have to be involved from the beginning, to educate them on the value of progress to their programs and thus prevent obstacles that might impede forward motion as the project gets underway.

After initial mapping of the City of St. Thomas' *Phragmites* stands was complete, Collins contacted the Tax Department to get information about who owned the plots of land where *Phragmites* was mapped. He then personally went to each business and landowner, described the problem, and attained their consent to allow them to spray and manage the *Phragmites* on their property, at no cost. Collins' outreach was so successful, one landowner ended up making part of their unused land a wildlife meadow once the *Phragmites* was eradicated.

The plan that the City of St. Thomas *Phragmites* Control Committee and Collins devised is transferrable to other municipalities, however implementation support is needed. Funding, coordination and collaboration are needed to ensure the success of implementation, as seen in the City of St. Thomas. Even for Collins, an increased budget would have shortened his project timeline even more, eradicating *Phragmites* in only a year or two, compared to the 4-year timeline of the project.

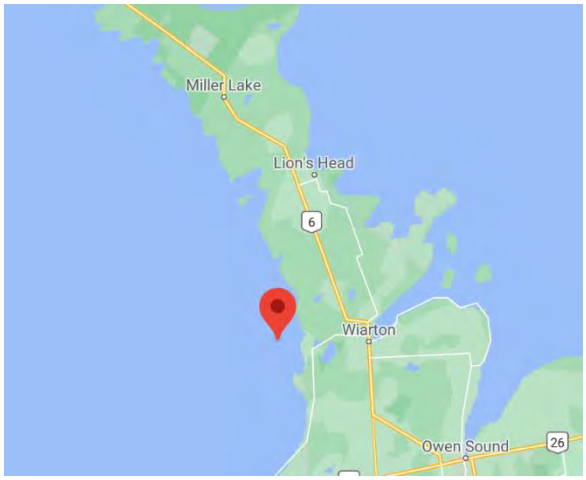
Management Techniques

- Mapping the city for *Phragmites* management sites, ensuring the public can contact to report
- Contacting landowners where *Phragmites* was present, explaining the project and its importance
- Herbicide spraying – done by contractor, guided by mapping team
- Cut and removal of dead sprayed stalks, completed by City workers of Roads department
- Maintenance through spot-spraying of initial mass-sprayed areas
- City of St. Thomas *Phragmites* Control Committee work completed in 2018, City Weed Technician does further maintenance

Year	Plan Details
2014	• Initial mapping completed, 6 people in vehicles mapped the entirety of the City of St. Thomas • Janice Gilbert and IPCC hired for consultation • Spraying of Lake Margaret shorelines, cutting of dead stalks 30 days post-spray
2015-17	• Spraying of mapped sites and road corridors • Cutting of dead stalks 30 days post-spraying by city-bought arm mower and tractor • Spot-spraying consequent years of new growth, performed by City Weed Technician
2018	• *Phragmites* Free St. Thomas achieved, two years ahead of initial 2020 goal • Designated City Weed Technician to spot-spray new growth • City Council and Parks and Rec now responsible for new sightings and control, importance of initial partnerships to ensure continuation of project

Successes	Obstacles to Address
• A coordinated and collaborative effort between contractors, city departments and City Council – no volunteers were needed as funding and planning allowed for contractors and city workers to do the work • The general eradication of *Phragmites* within the City of St. Thomas, and a designated City Weed Technician to maintain the project going forward	• The costs of implementing a similar plan in other cities and municipalities to ensure an Ontario-wide effort of *Phragmites* management and control • Lack of coordinated protocol to address the potential of *Phragmites* re-introduction or spread during land development processes within St. Thomas and between other municipalities

B.3 CASE STUDY: Oliphant Fishing Islands *Phragmites* Community Group



Project Location and Mobilization

In 2017, Leslie Wood and a team of local volunteers, comprised mainly of cottagers, came together to take action on *Phragmites,* forming the Oliphant Fishing Islands *Phragmites* Community Group (OFIPCG). Known for its bright blue waters, soft sand and summer tourism, the area's diverse wildlife and rich habitat was being overtaken by a monoculture of invasive *Phragmites*. Wood also stresses that this area also has a rich history supporting Indigenous Peoples and *Phragmites* impacts some of their traditions. It is also a treasured space to fish, hunt, swim, boat, birdwatch and connect to nature.

Many members of the OFIPCG have been in the area for generations, allowing them to witness the introduction, growth and ongoing impacts of *Phragmites*. Other cottagers shared OFIPCG's distress over the effect this growing invasive was having on native wildlife, indigenous land use, and wetland habitat. They also saw firsthand the multitude of safety hazards caused by *Phragmites*, including reduced visibility in high-traffic boating channels, and in its dormant stage the stalks pose a serious fire hazard. In addition, *Phragmites* greatly impacts the recreation and tourism use of these lands, blocking shorelines and views with patches 20 to 30 feet deep, and 15 feet tall.

Partners and Outreach

Over the years, the OFIPCG has seen huge expansion in partnerships, funding and volunteers. Critical partners include the Town of South Bruce Peninsula, who have provided them with crew and equipment to dispose of the tonnes of biomass, the Grey Sauble Conservation Authority, the Invasive *Phragmites* Control Centre, as well as the Nature Conservancy of Canada with the wider Saugeen Peninsula Invasive Species Collaborative. Each partner has assisted the project at various stages, with in-kind donations or funding, acting as partners for grant applications, and providing equipment and expertise.

They also have the Oliphant Campers Association, Friends of the Oliphant Coastal Environment, the Ontario *Phragmites* Working Group and Ontario Invasive Plant Council to thank for providing the project with a platform to network, educate and recruit new partners and volunteers. Before the cutting season begins, Wood meets with project volunteers to discuss the upcoming plans and provides any updates, she also gives presentations to local groups and at conferences. In addition, Wood also takes every opportunity to spread information about the project to the Mayor and Council members who have been supporting the project.

Management Techniques

- Cut-to-drown
- Raspberry cane cutters
- Stihl power saws
- Contracting IPCC with Truxors
- Mapping/monitoring by canoe
- Herbicide where applicable
- Creation of rafts and biomass removal floats
- Various watercraft to reach *Phragmites* sites

Photo: OFIPCG Facebook Group

Year	Area	Volunteers	Hours of Work	Cost ($)
2017	14	46	600 volunteer hours	$15,000 in volunteer time OFIPCG volunteers bought 3 Stihl cutters @ $1200= $3,600
2018	14	50+	600+ volunteer hours Truxors hired for 2 days	Truxors: $18,080.00 OFIPCG (boat + motor): $5,000.00 Total: $23,080.00
	19	51	1,666 volunteer hours Truxors hired for 4 days	Truxors: $36,160.00 OFIPCG raft: $4,500.00 TSBP "in kind": $25,000.00 Total: $65,660.00
2020	97	67+ ages 7-73	1,202.5 volunteer hours Truxors hired for 15 days	Truxors $145,400.00 TSBP "in kind": 50,000.00 OFIPCG raft motor: $1,300.00 OFIPCG other expenses: $4,850.00 Total: 201,550.00

COVID-19 Impact

Despite the impact of COVID-19 on many industries, Wood thinks that the increased use of cottage season, the influx of new cottagers and homeowners leaving the city, and the general state of people being at home, helped in making 2020 their most successful year yet.

This increased interest and knowledge of the project was amplified in the 2020 cottage season. When out cutting, which the team was able to do successfully with physical-distancing measures and wearing proper PPE, many tourists and residents alike would stop to inquire about the work. In 2017, Wood knew that many people thought the project was too large. However, by 2020, the first skeptics had joined the team and enthusiasm for their efforts spread across the islands onto the mainland.

Successes	Obstacles to Address
• A large number of partners and sponsors made the work possible, without them the small volunteer group would not have had the benefit of coordination or large-scale fundraising • The OFIPCG's hard work has not gone unnoticed, and the public knowledge of *Phragmites* has increased	• The majority of work requires access to robust, expensive equipment • The manual, labour-intensive work is exhausting for the predominantly retirement-age volunteers; sustaining this when volunteers are no longer able to carry on is a challenge. Focus needs to shift to more efficient methods

Photos: OFIPCG Facebook Group

B.4 CASE STUDY: Long Point Emergency Registration *Phragmites* Project

Eric Giles in tall *Phragmites.* Credit: Giles Restoration Services Inc.

The Long Point *Phragmites* Project is a unique case. It seemed like an insurmountable task due to the sheer extent of *Phragmites*, but with the right tools, coordination and collaboration between stakeholders, it became achievable. From 2014 to 2020, this project experienced huge success with access to an aquatic herbicide, consistent funding, and coordination through partnerships with private, municipal, provincial and federal landowners and managers.

2014

The project began in 2014 with the MNRF and their Crown Marsh property, which had experienced rapid change since the 1990s due to the emergence and spread of *Phragmites*. Working with local waterfowl associations, the MNRF set out to restore the Crown Marsh to its previous state as a functional wetland ecosystem. However, they quickly realized the size of the task at hand. Local researchers and biologists had observed a 30% annual expansion in some *Phragmites* patches, due to the Marsh's location at the mouth of a watershed carrying high nutrient loads from the agricultural-based land use in Norfolk County. This, combined with the low water levels of the Great Lakes, created the perfect opportunity for *Phragmites* to thrive. While some *Phragmites* was growing in accessible and visible areas, much of the nearly 40 km-long peninsula was largely inaccessible and *Phragmites* was expanding rapidly, meaning rigorous planning and management was required.

2015

After reviewing the extent of the problem, the Nature Conservancy of Canada (NCC) expressed interest in supporting the work at Long Point and held a forum in January for local resource managers, landowners, waterfowl hunt clubs and others to talk about *Phragmites* and discuss practical solutions for management and control. Over 80 people attended, including representatives from various ministries. Key to the efforts was the presence of representatives from Health Canada's Pest Management Regulatory Agency (PMRA), which oversees the regulation of herbicides.

At that time, the cut-to-drown method was not popularized among *Phragmites* practitioners and would be impractical to address the scale of the problem, so the partners at Long Point decided to advocate for an Emergency Registration approval from PMRA for the use of an aquatic herbicide to spray using aerial and ground techniques.

Throughout 2015, the MNRF and NCC, along with various other partners, conducted studies and researched the area, including examining the ways that over 20 Species at Risk (SAR) were being affected by the expansion of *Phragmites*. They also undertook a mapping exercise that estimated that the Long Point peninsula alone contained over 1,300 hectares of *Phragmites.*

That year, Long Point *Phragmites* Action Alliance (LPPAA), a consortium of over 25 organizations, was formed. All partners have a vested interest in the effective, efficient and environmentally responsible management of *Phragmites*, which impacts each group in different ways. This alliance aids in the engagement and education of the local community, ensuring that everyone is aware and knowledgeable about the *Phragmites* projects in the area.

2016

The MNRF, with partners NCC and the Long Point Company in support, applied for the Emergency Registration Approval in early 2016, as a result of the preparatory discussions and research of 2015. The approval brought with it two Canadian firsts for this significant project: the first use of aquatic herbicide to treat *Phragmites*, and the first aquatic application by helicopter.

Prior to project initiation, the team realized that, to support an ongoing solution to *Phragmites,* a full understanding of the impacts of herbicide use would be needed. Accordingly, the MNRF struck a partnership with Dr. Rebecca Rooney and students at the University of Waterloo who commenced a monitoring program, studying the site before, during and after application.

In its first season, 400 ha of dense *Phragmites* was sprayed using a glyphosate-based aquatic herbicide. This included 100 ha at Crown Marsh and 300 ha at the Long Point Company property, whose land encompasses part of the inaccessible, undeveloped peninsula at Long Point.

Eric Giles walking to spray *Phragmites*. Credit: Nature Conservancy of Canada.

2017

By 2017, a key organizer of the project, Eric Cleland, left the MNRF and joined NCC,

building capacity within the organization to support expanding the project. From that point forward, NCC led all ground-based work, while MNRF continued to lead aerial operations and the enormous task of applying for the annual Emergency Use Registration.

NCC invested in specialized equipment including an amphibious, lightweight tracked machine called a Marsh Master and GPS-enabled spray systems to deal with the remote nature of the work. The project team contracted Giles Restoration Services Inc. (GRS), who had also purchased a Marsh Master, for much of the surveying re-treatment of aerial sites, and groundwork where aerial spraying could not occur. GRS employs educated and experienced natural resource professionals their careful and thorough approach to the work has been integral to the success of the project.

The intent of the project was to have a landscape-scale impact, which meant the continued expansion of management efforts across private, municipal, provincial and federal lands in the area. In 2017, the project expanded to include several more

Phragmites Marsh Master rolling *Phragmites*. Credit: Nature Conservancy of Canada.

privately-owned waterfowl hunt clubs, including nearby Turkey Point. During this application season, seven hunt clubs contributed upwards of $150,000 towards the project. The final new and re-treated sites were: Turkey Point, Big Creek, Long Point Provincial Park, Crown Marsh and Rondeau Provincial Park. However, the true landscape-scale impact of the project would not be achieved until federal lands, owned by the Canadian Wildlife Services (CWS), also partnered in the larger program.

2018

The management season of 2018 focused mainly on re-treatment, now covering over 1000 ha. The project team realized that doing the job right meant surveying the initially treated sites and finding the 'needle in the haystack' or the single stems and small clusters of plants that escaped initial treatment. This was done using ground-based methods by NCC and GRS with their respective Marsh Masters. Each year of re-treatment, private landowners contributed significant funds to cover the costs, sometimes as much as a 50% match to the donations received through various NCC channels.

The project partners had seen huge success up to this point in their treated areas, including very few new stem growths surveyed across the wetlands. At this point, about two thirds of all land with *Phragmites* in the Long Point area was included in management plans, leaving just the CWS federal lands out. However, each year CWS became more involved in the project, by providing funding support and planning for their own management

activities. In early 2019, the CWS agreed to conduct a control trial on their remaining National Wildlife Area (NWA) lands. This became a turning point in truly achieving a landscape-scale control program.

2019

Similar to 2018, the management season of 2019 was committed to surveying, monitoring and re-treatment of previously treated areas using predominantly ground-based methods. With higher lake levels, a sprayer-equipped jon boat became a very valuable tool. In 2019 the program grew in two ways - 1) the three new CWS pilot sites and 2) Phase One of the new LPPAA/NCC-led Big Creek Watershed Project, which aims to control *Phragmites* in the watersheds feeding into the Long Point wetlands.

This watershed project began with included over 1,200 properties to survey. LPPAA then conducted roadside surveys to map *Phragmites* on properties where it was visible, creating a plan for engagement involving different outreach tools including mailouts, a website, newspaper ads and doorhangers. Most integral to the project were the door-to-door visits where NCC staff and other volunteers would discuss the *Phragmites* project with homeowners and ask for consent to remove the plant from their property, free of charge.

Crown Marsh after *Phragmites* treatment 2019. Credit: Nature Conservancy of Canada.

2020 and the COVID-19 Impact

The 2020 season continued with re-treatment, and expansion to phases 2 and 3 of the Big Creek Watershed Project. The impact of COVID-19 made outreach and community connection much more difficult, since the highly successful door-to-door visits were not permitted. However, the team found new success with lawn signs and digital outreach.

Another 2020 highlight was the initiation of management on CWS lands, helping bring the total to over 1,450 ha of *Phragmites* control since the project started in 2016. The plan for 2021 and onwards is to continue progressing through phases 1 to 8 of the Big Creek Watershed Project, re-treatment and monitoring of sites, and continue expansion on CWS lands using a staged approach that will tackle the remote nature of their NWAs.

Management Techniques

- Aquatic herbicide application by air and ground
- Marsh Master and Jon boat sprayers
- Spot-treatment of previously treated areas
- Winter rolling and prescribed burns
- Herbicide application in upper watershed
- Rigorous monitoring and research reports

Photo: Gregor Beck

Partners and Funding

The project has raised over 3 million dollars in funding between 2016 and 2020.

- Private donations and fundraising through NCC
- MNRF heading Emergency Registration Approval applications annually and contracting the extensive environmental monitoring (water, sediment, vegetation communities) by Dr. Rebecca Rooney's laboratory, at the University of Waterloo.Environment and Climate Change Canada via CWS major funding supporter
- Substantial funding of the project by key private partners including waterfowl hunt clubs
- Long Point Ratepayers Association is a key partner for the Long Point *Phragmites* Action Alliance, as fundraiser, volunteer recruiter and coordinator of outreach efforts including herbicide application notification and public information sessions
- US Fish and Wildlife Service – vested interest in the success of *Phragmites* management for habitat restoration
- Ontario Trillium Fund and Wildlife Habitat Canada grants

Successes	Obstacles to Address
• For the first time in years, sightings Species at Risk at restored sites have been recorded. Examples include the first Fowler's Toad recorded at Crown Marsh in 16 years, new populations of Bent Spike Rush in areas formerly inundated by *Phragmites* and Spiny Softshell Turtle observed using historic sites where they have not been seen for years • Community engagement and support has been incredible and integral for raising awareness and reaching a landscape-scale impact • Strength via involvement of diverse partners, with a shared interest to see *Phragmites* eradicated working together towards a common solution	• Emergency Registration approval must be applied for every year. If the application is unsuccessful, much of the project will be impacted – every year *Phragmites* goes untreated is a huge setback • Having resources and tools to access the large section of land of the Long Point peninsula, which is currently only observable by boat along the shore o Will involve a phased multi-year management plan of the area, section-by-section – focussing on the protection of Species at Risk o Relies on continued funding, innovative tools

B.5 CASE STUDY: Georgian Bay Forever (GBF)

GEORGIAN BAY FOREVER

Protecting your water.

PHRAGBUSTERS

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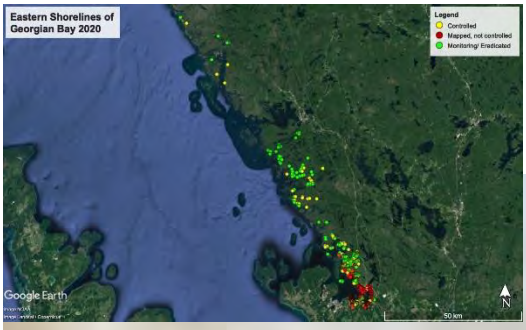

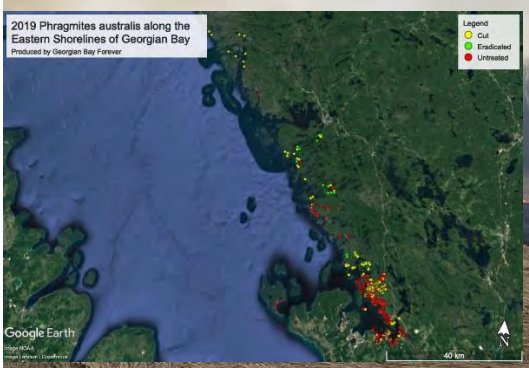

Photos: Nature Conservancy of Canada

Project Location and Mobilization

Georgian Bay Forever (GBF) has been working with *Phragmites* along the eastern shorelines of Georgian Bay for the past eight years. GBF focuses in Township of the Archipelago, Township of Georgian Bay, and Tay Township with several removal efforts in neighbouring communities from Collingwood to the Key River. The summer student Phragbusters use GBF's Baykeeper vessel out of Honey Harbour to access and control stands that are only accessible by boat.

In 2019 an eradication plan was developed for the 711 sites that GBF maps and manages. Individual site plans were developed and are crucial for successful

eradication. Sites have different

characteristics such as density, size, water depth, and neighbouring vegetation and also substrate from sandy to Canadian Shield. By year end 2020, GBF brought 275 stands, or 39%, to the monitoring or eradicated stage and cut 170 stands, which means 445 (63%) of *Phragmites* stands are under management by GBF. Our goal is to see over 90% of sites eradicated by 2025. To reach this goal, we require a second boat, that will allow two crews to work at different sites at the same times.

In 2020, staff and volunteers dedicated over 2,075 hours to *Phragmites* eradication. Thank you to municipalities, cottage associations and donors for making the project successful.

Partners and Outreach

Georgian Bay Forever works very closely with many partners across Georgian Bay. We work together with detailed plans to bring us all one step closer to achieving the common goal of *Phragmites* eradication. Our partners include Parks Canada, Ontario Parks, Township of the Archipelago, Township of Georgian Bay, and Tay Township, Honey Harbour Cottage Association, Cognashene Cottage Association, Talpines, Georgian Bay Biosphere, Severn Sound Environmental Association, Georgian Bay Association, and many cottage associations along the coast.

In a typical summer, GBF would host community cuts every Saturday to encourage local property owners to come learn about *Phragmites* and participate in a cut so they have all the tools and knowledge to control stands near them. Additionally, Phragbusters attend farmers markets, Canada Day events, cottage associations AGMs, Bike Days, Art on the Rocks- any events in local communities to spread awareness and educate on *Phragmites*.

Management Techniques and Schedule

- June: Map every single stand on the Eastern shorelines recording water depth, density, height, square meters, SAR, mixed in vegetation, etc. Once mapped, make a plan for the year of who to control, prioritize sites using our priority matrix, and what tools will be needed to control
- July/ August: Control, control, control. Staff and volunteers are in the field controlling *Phragmites* using Stihl cutters or raspberry cane cutters. Control before seed heads come out. Attend outreach events to educate and host community cuts.
- September: Bring IPCC truxors to the massive stands to control
- Winter: Update maps, update management plans, apply for funding, attend conferences, and prepare the program for the following year to execute as smooth as possible in the field.

Year	Plan Details
2011 - 2012	• In 2011 GBF identified *Phragmites* being a growing issue. GBF hosted workshops, attended cottage association meetings, attended conferences, and brought attention to the invasive species degrading our terrain. • 2012 was the first year on the ground physically removing *Phragmites* while continuing educating coastal communities about *Phragmites*
2013 - 2018	• Focusing on cut to drown method, 2-5 phragbusters for 3 months to educate, map, control, and monitor stands • Work with cottage associations, municipalities, and organizations to control all stands along the eastern shorelines • Attend events, workshops, host informational sessions, and many community cuts to educate the public

Successes	Obstacles to Address
• A detailed eradication plan for stands, each ranked by priority, to have an efficient successful field season • Each community has a community lead for the volunteer group. This helps us get information across and ensures clear communication for control plans • Engaged community members and volunteers • Municipalities supporting our efforts • Staff retention	• Eastern shoreline of Georgian Bay is a vast area. Having an additional boat will cut travel time and allow two crews cutting in different areas at the same time • Funding to guarantee a successful program year after year • Disposal of biomass • Our work focuses in the water. GBF works with MTO and other groups to control the roads and land leading to Georgian Bay