Invasive *Phragmites australis* management within the Big Creek and Long Point National Wildlife Areas, and adjacent private land

2022 Implementation Plan

Environment and Climate Change Canada - Canadian Wildlife Service
The Nature Conservancy of Canada

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Contents

1.0 Background Information

The Long Point region is internationally recognized for its ecological importance and unique geophysical attributes. Extending 40 km into Lake Erie in southern Ontario, Long Point is the largest freshwater sand spit in the world. The region is recognized as a UNESCO World Biosphere Reserve and an internationally important wetland under the Ramsar Convention. Long Point is a globally significant Important Bird Area for threatened and congregatory species, waterfowl, and migratory land birds. These ecological values are protected by a diversity of conservation landowners, including two National Wildlife Areas (NWA), a provincial park and provincial crown land, and thousands of additional hectares protected in conservation agreements. Finally, the Long Point area provides many recreational and tourism opportunities, including fishing, birding and hiking.

European Common Reed, *Phragmites australis* subsp. *australis* (Phragmites) is an invasive perennial grass, transported from Eurasia in the early 1900s. Phragmites has caused severe degradation to coastal wetlands and beaches in North America by outcompeting diverse native vegetation and replacing it with dense, monotypic stands with limited ecological value. In 2005, Agriculture and Agri-Food Canada identified it as the nation's "worst" invasive plant species (Catling, 2005). Growing up to 6m in height, and up to 1m below ground, Phragmites outcompetes native vegetation and changes the very nature of wetland systems. Once established, Phragmites forms extensive monocultures that displace native plant and animal species, decreasing biodiversity, and threatening the habitats of numerous provincially and federally listed Species at Risk (SAR). Phragmites is listed as a threat in the Recovery Strategies for 15 federally listed SAR found at the two NWAs and management of Phragmites is specifically noted as an action for 9 SAR.

In the ecologically significant Long Point region, the spread of Phragmites has been increasing since the 1960s, but became exponential in the early 2000s. Expansion is predicted to continue at a rate of 14-37% annually (Jung et al., 2017). Since 2016, provincial agencies and non-profit partners have implemented a management program using chemical and mechanical methods to treat approximately 1,300 ha of Phragmites in the Long Point region. However, little management has occurred on federal land. While the province of Ontario has largely completed their management program, additional management is required on federal lands. In 2018, it was estimated that more than 800 ha of the 4,000 ha of National Wildlife Area lands were dominated by Phragmites. Wetland ecosystems, hydrology and numerous SAR have been impacted by Phragmites and will be increasingly threatened as this plant continues to spread. As a result, Phragmites has been identified as the primary threat within Canadian Wildlife Service -Ontario's (CWS-ON) Long Point Walsingham Forest (LPWF) Priority Place and in the management plans of the Big Creek and Long Point NWAs. The LPWF Integrated Conservation Action Plan and the management plans for the Big Creek and Long Point NWAs have a goal to reduce the extent of Phragmites to less than 10% of its 2018 extent by 2025. Between 2019 and 2021, approximately 360 ha of Phragmites were treated by aerial and ground herbicide application on Federal lands. Approximately 300 ha of Phragmites remain to be managed in 2022 on Federal and adjacent private lands.

2.0 Purpose and Rationale

The purpose of this project is to manage invasive Phragmites in the Long Point region to reduce or remove its threat to SAR, and to the biodiversity and ecological integrity of these areas. Landowners surrounding the BCNWA and LPNWA are also managing Phragmites; since 2016, more than 1,300 ha, or virtually all of the Phragmites on non-federal land, has been managed. The NWAs are now not only a threat to SAR on federal lands but are also a source for reinvasion of adjacent properties. Inaction increases the threat to several SAR within the Long Point region, through the degradation and alteration of available habitat, and the reduction in species' recruitment. Without management, Phragmites will continue to spread, further jeopardizing SAR, critical wetlands and other wildlife populations.

A comprehensive program to manage Phragmites and restore natural wetland communities is necessary to:

1. avoid further risks to SAR
2. implement recovery actions for SAR, and
3. achieve the goals of conservation plans and the mandate of CWS-ON

In 2022, CWS-ON and the Nature Conservancy of Canada (NCC) will be implementing year 4 of a multi-year, adaptive, integrated pest management approach to manage Phragmites at the NWAs and on private lands in the area. This approach is based on best practices, sound science and five years of expertise gained in a pilot project led by the Ontario Ministry of Northern Development, Mining, Natural Resources and Forestry (NDMNRF). This approach will include a variety of management tools, including the combination of chemical and mechanical techniques to kill the Phragmites and facilitate the restoration of native plant communities. A rigorous ecological monitoring plan is also be implemented to evaluate the impacts of the project on Phragmites, SAR and other ecological and physical conditions.

Management of Phragmites has been ongoing on non-federal lands within the Long Point region since 2016. While it is too soon to quantify the impacts of Phragmites management on SAR at the population level, monitoring indicates a positive response by several species and habitats after Phragmites management. For example, Blanding's turtles and other turtle species have been found basking in treated areas, previously dominated by Phragmites. In addition, Blanding's turtles have been found traversing areas where dead Phragmites had been rolled over winter, which previously would have been too dense to migrate through (Markle & Chow-Fraser, 2018). Winter management to knock down (roll) dead Phragmites enables the turtles to travel more direct routes, decreasing migration distance and possibly increasing survival rates. Research has also demonstrated a significant positive impact of Phragmites management on the abundance of breeding marsh birds (*Botaurus* sp. and *Rallus* sp.) within the Long Point area (Tozer & Mackenzie, 2019). Further, aerial insectivores have been observed preferentially foraging over areas where Phragmites management has occurred, as compared to untreated sites (Rooney & Robichaud, 2019). In addition, Fowler's Toads (*Anaxyrus fowleri*) have been heard calling for the first time in seventeen years in areas where Phragmites has been managed (Eric Cleland, pers. comm., 2020). The NDMNRF reported considerable increases in both open water and

water/aquatic vegetation classes, primarily attributed to removal of Phragmites, which likely translates to increased diversity of wetland habitats and available fish habitat. Long-term vegetation monitoring conducted by the University of Waterloo suggests that native vegetation species tend to recolonize treated areas and reflect conditions found in reference areas, following an initial invasion by non-Phragmites non-native species (Bolding, 2020). Populations of Bent Spike-rush (Eleocharis geniculate) have also shown signs of recovery in areas that have undergone Phragmites management (Rooney, pers. comm., 2019).

3.0 Project Description

In 2022, approximately 250 ha of Phragmites is planned for management by CWS-ON on Federal lands, and a few small areas (approximately 20 ha) are planned for management by NCC on private lands in the lower Big Creek watershed. The proposed management will commence in early September 2022 and is comprised of three key activities:

1) Herbicide application to Phragmites between September and October, to kill the plant and its roots
2) Cutting or rolling of dead stems, commencing in the winter after herbicide treatment to remove dead standing stalks and improve light penetration to the ground, and
3) Prescribed burns when the ground is frozen, to remove recalcitrant litter in dense stands, as appropriate and operationally possible (note: this is only possible on occasions where topography and appropriate weather conditions are suitable).

This approach follows best management practices for Phragmites developed based on more than two decades of research in the U.S. (Hazelton et al., 2014; MDEQ, 2014; IOPC, 2020) and the experience of five years of Phragmites management and research within the LPWF region conducted by the NDMNRF, NCC, University of Waterloo. All permits and authorizations required for this project have been approved.

3.1 Herbicide Application

CWS-ON has received approval from the Pest Management Regulatory Agency (PMRA) to use the glyphosate-based herbicide Roundup® Custom for Aquatic & Terrestrial Use (active ingredient: glyphosate) for this project. Application will be conducted by licensed herbicide applicators following all requirements of the *Ontario Pesticides Act*, the federal *Pest Control Products Act*, and all other relevant legislation. Glyphosate, found in Roundup® Custom, is one of only two herbicides that effectively manages Phragmites, and was selected due to its well-documented and monitored use in the U.S., as well its use in the Long Point area since 2016. Glyphosate has been shown to be extremely effective in killing Phragmites (>90%), while minimizing impacts to non-target wildlife (Rooney 2017; Breckles and Kilgour, 2018). In addition, the formulation of herbicide being used for this project (Roundup® Custom) does not include a surfactant pre-mixed into the container. Surfactants help the herbicide adhere to the plant surface, however many commonly used surfactants can negatively affect aquatic organisms. Instead, the aquatic-safe surfactant Aquasurf® from Norac Concepts Inc. will be added to the herbicide. This product has been approved by PMRA and is safe for use in aquatic environments. Use of a safe and effective herbicide, in combination with an approved aquatic surfactant, and applied in

accordance with label rates by qualified herbicide applicators, will achieve project objectives while minimizing potential harm to SAR and other biota.

Herbicide will be applied by an applicator licensed by the province of Ontario. The applicator conducting all herbicide work will be qualified and specialized in both Phragmites management and in the restoration of native wetland habitats. The applicator who has conducted the Phragmites management to date is a professional biologist, trained in SAR identification in the Long Point region.

Where there are large, dense stands of Phragmites (greater than 7m), herbicide application by helicopter is the preferred method. Aerial application is highly efficient for treatment over a large area with high efficacy while minimizing landscape impacts to SAR and other non-target attributes. Buffer zones will be established adjacent to Phragmites to prevent harm to non-target species and herbicide is not applied aerially near locations where individual SAR, hibernacula or other sensitive areas have been documented. Non-target, non-SAR vegetation existing within dense Phragmites stands would be negatively impacted by application, of herbicide; however, it is uncommon to find native vegetation in these areas and during this time of year. Glyphosate is absorbed by the leaves of the plant, and therefore underground native seeds are not impacted, preserving the native seedbank. Strict weather and wind conditions are required for aerial application and only contractors experienced with this technique will be used.

In areas where aerial application is not appropriate (i.e. buffer zones such as property lines and near SAR habitat), herbicide will be applied by hydraulic sprayer affixed to an aquatic track vehicle known as a Marsh Master. A Marsh Master is a lightweight, amphibious vehicle, specialized for use in wetland environments. It is slow moving (1-5km/hour) and has minimal landscape impacts, reducing the likelihood of non-target impacts. Sprayers may also be from Jon boats to treat Phragmites located in areas adjacent to waterbodies, particularly if there are SAR occurrences preventing aerial application. They are also beneficial in accessing sites that are considered too sensitive for land-based vehicle use. Herbicide can be sprayed from the boat if the Phragmites is within reach, or staff can treat on foot using the hose and spray wand. Finally, backpack sprayers may be used when Phragmites patches are sparse, or near SAR and/or sensitive habitats. This enables highly targeted application, avoiding potential impacts to non-target species.

3.2 Mechanical Management

Mechanical management of Phragmites used for this project include cutting and/or rolling of recalcitrant stalks after being treated with herbicide. Cutting and rolling of Phragmites is not an effective management strategy on its own, as it leaves roots and rhizomes intact, and regrowth will occur the following spring. However, when used in combination with herbicide, cutting and rolling is very effective. These methods could be conducted as soon as shoots emerge in spring; however, this coincides with sensitive SAR life stages. Therefore, cutting and rolling will only occur between November and March. Marsh Masters with appropriate attachments are the most efficient tool for rolling. A rolling attachment knocks over and flattens plants killed by herbicide, which would otherwise remain standing. Rolling of dead stalks opens the area to increase light penetration and facilitate the establishment of native vegetation and reduces physical barriers to species such as turtles. It also increases the visibility of new Phragmites growth, making

retreatment easier and more effective. Cutting/mowing of dead Phragmites using gas operated trimmers (weed wacker) may be conducted in areas where travel by a Marsh Master is not possible, or in areas near SAR or sensitive habitats.

Following rolling, prescribed burns are an effective method to remove excess biomass and help enable recolonization of native vegetation the following spring. To reduce impacts to SAR, burns would only be conducted during the winter, as appropriate and operationally feasible, by trained and licensed professionals after obtaining appropriate permits. In 2020 and 2021, water levels in the Long Point region were too high to conduct burns, but it is possible that this could change in 2022; water levels continue to decline within the Long Point Region.

4.0 Site-Specific Management Approaches

4.1 Long Point Unit, Long Point National Wildlife Area

Where dense patches of Phragmites are of significant size (>7m), herbicide will be applied aerially via helicopter with a boom-sprayer. There is a helicopter launch pad on the north side of the Long Point Unit, which will be used for staging. Herbicide will be delivered by truck, and all helicopter activities (take off, landing, fueling) will occur at the launch. A helicopter will treat a significant amount of Phragmites at LPNWA; however, different strategies will be used in aerial buffer zones to avoid potential herbicide drift into non-target areas, such as the areas adjacent to trees and SAR plants, and along property lines. In these areas, herbicide will be applied with a Marsh Master, Jon Boat or Backpack Sprayer to minimize non-target impacts.

4.2 Thoroughfare Unit, Long Point National Wildlife Area

A small area of Phragmites in the Thoroughfare Unit (TU), which had be reserved for now inactive research control sites, requires treatment. Should time and resources allow in 2022, this area will be treated by ground application methods, including a hydraulic sprayer affixed to a Marsh Master and a backpack sprayer. Compared to areas nearer the tip of Long Point, TU is considered fairly accessible. Roads to the west of the unit and beaches along the southern border mean that supplies can be delivered by vehicle and enable easier access for monitoring. The southern and northern borders and the edges of the channels in this unit are also accessible by boat, which could be used to both deliver supplies and treat buffer areas.

4.3 Big Creek National Wildlife Area

A desktop evaluation will occur to determine whether any large, dense stands of Phragmites remain for treatment. If appropriate, and should time and resources allow, these stands will be treated aerially via helicopter with a boom-sprayer. A helicopter launch pad has been established on adjacent property in coordination with Nature Conservancy of Canada. Herbicide will be delivered by truck, and all helicopter activities (take off, landing, fueling) will occur at the launch. In areas where aerial herbicide application is not appropriate, such as areas adjacent to SAR plants and property boundaries, ground herbicide application via hydraulic sprayer or backpack will occur. However, ground application will only occur if time and resources allow and upon the completion of all or most of the Phragmites management at Long Point Unit.

4.4 Private Lands, Lower Big Creek Watershed

NCC will apply herbicide by ground methods, using a hydraulic sprayer affixed to a Marsh Master or a Jon boat, and backpack sprayers.

5.0 Environmental Mitigation

5.1 Permits

CWS-ON and its contractors have received a number of permits to conduct this work, including:

- A Species at Risk Act permit, issued by Environment and Climate Change Canada
- A Fisheries Act Authorization, issues by the Department of Fisheries and Oceans
- A Canada Wildlife Act permit, issued by the Canadian Wildlife Service
- An Emergency Registration Authorization for the use of RoundUp Custom, issued by the Pest Management Regulatory Agency of Health Canada
- A Permit to Perform a Water Extermination, issued by the Ministry of Environment, Conservation and Parks, and held in partnership with NCC

These permits involved a thorough review of the project plans, environmental mitigations and impacts to species and habitats, and allow for the execution of the work outlined in this Implementation Plan.

5.2 Chemical Control

An herbicide (Roundup® Custom for Aquatic & Terrestrial Use) will be used in this project under the terms of an Emergency Registration granted by the PMRA. This use will follow all requirements of the *Ontario Pesticides Act*, the federal *Pest Control Products Act*, and all other relevant legislation. Use of this pesticide will be done following Integrated Pest Management principles including:

1. Focusing control actions to vulnerable stages of the target plant;
2. Using appropriate application technology to reduce non-target impacts;
3. Monitoring weather and only applying when off-target deposition can be minimized;
4. Integrating herbicide control with other physical methods (rolling, burning) to maximize effectiveness;
5. Associated monitoring of effects on soil, water and wildlife;
6. Monitoring, evaluation and reporting of the results of this spray program.

5.2 Reducing Non-target Impacts to Wildlife and Plants

5.2.1 Herbicide Application Area

The herbicide is only effective on plants. Herbicide application will target Phragmites plants and will not be sprayed in open water areas. All efforts will be undertaken to minimize non-target impacts to other plant species. The timing of herbicide application will also assist to avoid impacts to most native plants as they will be entering dormancy for the winter, although it is rare to find native plants intermixed with dense stands of Phragmites. Therefore risk to non-target vegetation is unlikely.

5.2.2 Herbicide Application Timing

Herbicide application may occur any time between August 15 and October 31, 2022; however, most aerial and ground treatment will most likely occur from September 6 to 31. This timing window is ideal for reducing indirect impacts, as most bird breeding/nesting seasons are completed, amphibians and reptiles will be staging (preparation stages for hibernation), most native plants have senesced, insects have completed the majority of their life stages, and Phragmites is at its most vulnerable.

5.2.3 Mechanical Management Timing

Once treated, mechanical management is an important component of an integrated management plan for Phragmites. Rolling and/or cutting of dead stalks of Phragmites may occur any time between November 1, 2022 and March 15, 2023. Mechanical management occurs when the ground is frozen, enabling access by equipment with reduced landscape impacts, and local species have migrated or are hibernating. Therefore, there are no significant non-target impacts predicted from mechanical management. Minor disturbances may occur, but are not expected to have significant impacts on species, and are outweighed by the overall benefits of the project.

Prescribed burns for Phragmites may be undertaken between November 1, 2022 and March 15, 2023, but is dependent on several environmental factors, including weather, water levels and topography.

5.2.4 Weather Contingencies

Herbicide application will be guided based on the herbicide and surfactant product labels, as prescribed by the PMRA; herbicide will only be applied when winds are below 16 km/hr, there is no forecasted precipitation in the 24 hours following application, and temperatures are moderate.

Winter ground management will only occur within restricted weather windows, to reduce the likelihood of harm to non-target species. In particular, rolling will only occur once the ground has frozen, and when the air temperature has been below 5°C for more than 24 hours; if the temperature rises above 5°C, all work will cease. Further, if conditions allow for controlled burns to occur, wind direction and precipitation will greatly impact the timing of these activities. CWS-ON and NCC will work with prescribed burning experts to determine the optimal timing.

5.2.5 Motorized Access

In order to reduce impacts to wildlife, any motorized access within unroaded plant communities for the purpose of Phragmites control will be limited to:

- Lightweight, slow-moving vehicles (i.e. Marsh Master), or
- Boats

6.0 Monitoring

To assess the efficacy of treatment and the associated ecological impacts in the Big Creek and Long Point NWAs, a monitoring plan was developed by CWS-ON and Dr. Rebecca Rooney of the University of Waterloo. Dr. Rooney has worked with CWS-ON in the past, drafting much of the 2019 monitoring plan, and has conducted monitoring associated with the OMNRF's Phragmites management program in the Long Point Region since 2015. Monitoring efforts will be implemented prior to and following management, such that a baseline is established, and the impacts of management can be analyzed over subsequent years. The use of reference sites will enable an assessment of habitat restoration following management; reference sites will represent a "goal state" to which outcomes in treatment areas can be compared. Habitat restoration is the primary objective of this project and will be the focus of monitoring efforts.

The following monitoring objectives have been established for management at the treatment sites, to assess immediate (efficacy of treatment, non-target impacts) and long term (habitat restoration, impacts to native biota) outcomes:

1. Mapping of key SAR habitat features and SAR plants
2. Assessment of effects of herbicide application
3. Vegetation recovery capacity
4. Maximum exposure risk of the surfactant (alcohol ethoxylate homologue (AEH)) and herbicide (glyphosate and its primary breakdown product AMPA) in water and sediment
5. Effects of treatment on wetland biota habitat use
6. Assessing fish habitat

In addition to the monitoring protocol to be implemented within the 2022 sites, CWS-ON will continue to implement the 2019 monitoring plan at the established treatment, control and reference plots.

To address the objectives outlined in the 2022 monitoring plan, several protocols will be implemented, as outlined in Sections 6.1 to 6.5. Note that this is a brief summary of the overall monitoring plan.

6.1 Vegetation Surveys

Control, treatment and reference plots established at the 2019 pilot project sites will be surveyed by CWS-ON staff in July or August to assess control efficacy and native vegetation recovery. Within the Big Creek NWA and Long Point Unit, Long Point NWA, Dr. Rooney's team will do semi-systematic surveys within SAR candidate habitats; any SAR plant encountered will be censused and mapped. These surveys will occur between August and September, to enable identification of target species during peak flowering windows.

A field experiment using marsh organs is being conducted to predict vegetation community recovery following Phragmites removal from Big Creek and Long Point NWAs at varying water levels. Marsh organs are devices consisting of a series of graduated pipes filled with sediment and allow researchers to manipulate water levels. Marsh organs have been established at 40 sites across the coastal marshes of Long Point and will be filled with sediment gathered from

areas of dense Phragmites and from areas that were recently herbicide-treated. The density and diversity of viable seeds in the seedbank in the marsh organs will be measured regularly over a 2-5 year period.

Vegetation surveys at a regional scale will occur using high-resolution satellite imagery. CWS-ON has acquired pre-treatment WorldView-3 satellite imagery from July 2020 for the Big Creek and Long Point NWAs, which will provide a baseline for comparison with satellite imagery acquired post-treatment in 2022. The Science and Technology branch of ECCC will use this imagery to analyse the change in vegetation cover and open water pre and post treatment.

6.2 Water and Sediment Sampling

To test for the presence of surfactant (alcohol ethoxylates), and herbicide (glyphosate) and its derivatives (AMPA) in the water and sediment, CWS-ON will sample the locations of highest exposure to herbicide by aerial application. At the nine 2021 sites (Big Creek Unit, Thoroughfare Unit, Squires Ridge), CWS-ON will collect 1 year post treatment samples. At the new 2022 sites (Long Point Unit), samples will be taken prior to herbicide application, 24 hours post-application and 30 days post-application. Samples will then be sent to a laboratory at the University of Guelph for analysis.

6.3 Phragmites Mapping

CWS-ON has acquired WorldView-3 imagery from July 2020 covering the Big Creek and Long Point NWAs, and has tasked the satellite to acquire similar imagery in 2022. Phragmites within the Big Creek NWA and Long Point NWA have been delineated and mapped by Dr. Pat Chow-Fraser's team at McMaster University. This mapping, in addition to some ground truthing data and hand-delineation, will be used to inform management actions; CWS-ON will incorporate herbicide buffer zones into the mapping, differentiating areas to be treated by ground versus aerial herbicide application. For Phragmites patches to be treated aerially, CWS-ON will create bounding boxes around the polygons; irregular shaped polygons cannot be treated effectively using aerial application, and so must be converted into rectangular polygons, which allow the helicopter pilot to fly in consistent, straight swaths.

Post-treatment WorldView-3 imagery collection in summer of 2020 and 2022 will be analysed and compared to pre-treatment imagery to assess the efficacy of management at the 2019, 2020 and 2021 sites. Post-treatment imagery will also highlight areas which may require re-treatment in subsequent years.

CWS-ON will work with the Science and Technology branch of ECCC to refine and implement a vegetation classification model using this satellite imagery. This model will distinguish between treated areas, Phragmites, native vegetation, and other land classifications. CWS-ON will help test and refine this model by validating results from this model on the ground through visual observations.

6.4 Wildlife Monitoring

6.4.1 Breeding Bird Point Count Surveys

CWS-ON and Birds Canada will perform marsh bird surveys along a total of 11 survey routes following the Great Lakes Marsh Monitoring Program (MMP) sampling protocol in Hahn Unit, Big Creek Unit, Thoroughfare Unit, and Long Point Unit. Each plot will be surveyed three times at least 10 days apart between June 1st and July 5th. All species seen or heard and the number of individuals for each species will be recorded. Additionally, CWS-ON will repeat the 2019 surveys at a total of 10 survey stations the Brown's Marsh and Long Pond treatment and control sites that were part of the pilot project. Results will be compared to the historic baseline, to provide insight into changes in marsh bird diversity and abundance following Phragmites management.

6.4.2 Automated Recording Units

The CWS-ON team deployed a total of 38 Automated Recording Units (ARUs) in vegetation stands within the Big Creek Unit, Thoroughfare Unit and Long Point Unit in April to survey marsh birds and calling anurans. All species heard will be recorded, the number of individuals will be estimated, and the intensity of calling activity for anurans will be categorized. Post-treatment recordings collected in 2022 and beyond will be compared to a baseline, established through recordings collected in 2019, 2021 and historic ARU recordings, to assess changes in species diversity and abundance following Phragmites management.

6.4.3 Turtle Visual Encounter Surveys

To assess the impact of non-native Phragmites management on turtle and snake relative abundance and habitat use, CWS-ON is working with a contractor to plan and conduct visual encounter surveys (VES), mark-recapture (MR), and radio-telemetry based on two previous long-term SAR turtle monitoring projects conducted by Scott Gillingwater and Dr. Chantel Markle. VES will be completed in accordance with the methods implemented by Markle (2019) and turtle measurements will be completed following methods provided by Scott Gillingwater to ensure consistency. Turtles and snakes will be monitored in patches where Phragmites has undergone or will undergo management, patches where Phragmites occurs but no management activities are planned, and patches where Phragmites is not the dominant vegetation type and no management is scheduled.

In 2022, post-treatment VES and MR of turtles and snakes will be conducted in the Big Creek Unit and Long Point Unit. Each site will be surveyed a minimum of three times, with the goal of completing one survey in each of April, May and June. Finally, radio-telemetry, in which small radio-transmitters are attached to individuals for tracking, will be used for a minimum of five months to assess habitat use of turtles following the management of Phragmites within the Big Creek Unit of BCNWA. All turtles captured for marking and attaching radio-transmitters will be handled in accordance with the Ontario Species at Risk Handling Manual: for Endangered Species Act Authorization Holders (OMNRF n.d.) and the approved wildlife animal care protocol.

6.4.6 Fish sampling

CWS-ON will use WorldView-3 satellite imagery to quantify the amount of fish habitat (i.e. shallow open water or areas with floating and/or submersed aquatic vegetation) present in the 2020 treatment areas and in the surrounding buffer zone prior to herbicide application. To assess the effects of treatment on fish, the amount of fish habitat in the same area will be quantified using satellite imagery from 2022 (post-treatment) and compared to pre-treatment.

CWS-ON will also conduct fish kill surveys to assess the potential impacts of herbicide application on fish mortality. Fish mortality will be assessed using three paired of untreated and treated sites in the Long Point Unit. These sites will be monitored at baseline before treatment, 24 hours after treatment, and 30 days after treatment. During each survey, all fish encountered will have their species recorded and dead fish will be collected and preserved.

6.5 Surface Water Monitoring

In addition to the monitoring plan described above, CWS-ON and NCC have developed a surface water monitoring plan, which may be found on the Long Point Phragmites Action Alliance webpage. The purpose of this sampling is:

1. To provide confidence in the safety of the project for residents in the Long Point region
2. To ensure that, following treatment, glyphosate concentrations in the surface waters adjacent to the municipal water intake and private water intakes are less than the Ontario Drinking Water Quality Standard (ODWQS) for glyphosate

Surface water sampling will only occur if herbicide is applied within 800m of a surface water intake; otherwise, there is no risk to residents. Therefore, this monitoring will only proceed should treatment occur at the Big Creek Unit.

Should this work be required, surface water samples will be collected at baseline (prior to herbicide application) and then at 24 hour intervals following herbicide application, until the concentration of herbicide in the water remains below the ODWQS and shows a declining trend. Contingency plans are in place in the event that the concentration of herbicide falls above the ODWQS; however, the concentration has always been orders of magnitude below the ODWQS since the start of the project in 2016.

7.0 Adaptive Management Framework

Through transparency of outcomes and the implementation of adaptive management, this project will lay the foundation for future management and monitoring efforts. In addition to directly addressing the objectives of the monitoring plan, these monitoring activities will increase our understanding of SAR and other wildlife within the NWAs, including abundance, distribution and habitat use. This information will help to inform future species assessments, recovery strategies and designation of Critical Habitat.

The adaptive management framework also allows for the annual integration of lessons learned into the management and monitoring program. In the event that monitoring reveals unintended or unanticipated impacts, such as negative effects on non-target species, the approach would be reconsidered and altered accordingly. Internal and external partners and experts would be consulted, such that the best alternative approach would be adopted.

8.0 Communications and Notification

Pesticide use notification plans for the Long Point region are prepared in accordance with the requirements of the Ontario Pesticides Act, 1990. All notification actions are designed to meet the public's general right to know about herbicide applications made to outdoor public places that are owned or controlled by public authorities, and allow members of the public to take action to avoid potential contact with herbicides, if they wish. CWS-ON and NCC will ensure that herbicides are applied to public places in a safe, responsible manner, minimizing harm to the community and the environment. CWS-ON and NCC will notify members of the public and the following stakeholder groups about herbicide applications made for the purpose of controlling Phragmites in aquatic areas within the Long Point region prior to the commencement of any work:

1. Residents within 800 m of an herbicide application area that may have a surface water intake – if deemed possible and necessary by CWS-ON door-to-door notices will be delivered to nearby residents to alert them of the timing and extent of herbicide application.
2. Boaters, hunters, daily park users – signage will be posted prior to herbicide application to alert the public. Hunters will not be permitted to hunt within the herbicide application window.
3. Municipality, Health Unit, Ontario Provincial Police, Fire Department, local hospitals
4. Birds Canada
5. Long Point Provincial Park staff, day users and campers
6. Long Point Phragmites Action Alliance
7. The Ministry of Northern Development, Mines, Natural Resources and Forestry

Notification will occur using a variety of methods, which aim to inform all impacted parties listed above. These methods may include:

- Signage at NWA access points, general information areas, and high traffic areas
- Roadside signage on the causeway
- Public notice, distributed to major newspaper outlets
- Verbal information relay at the Big Creek NWA office
- Email and phone contact information, to be listed in public signage and available for questions and concerns
- Website postings, including the implementation and sampling plans, on relevant websites, including Long Point Phragmites Action Alliance (longpointphragmites.ca) and the Long Point Ratepayers' Association (longpointrpa.com).
- If necessary, where possible and barring any restrictions due to COVID-19, door-to-door notices will be delivered to residences along the causeway and Hastings Drive,

and will include information about the herbicide, application window, and project contacts.

8.1 Public and Indigenous Engagement

2022 is the fourth year that CWS-ON has been engaged in Phragmites management in the Long Point region; however, a larger, regional program has been ongoing since 2016. During this period, the Project Team (originally composed of CWS-ON, NDMNRF, NCC and Ontario Parks; now composed of CWS-ON and NCC) have consulted and continued to engage with multiple parties, including:

- Norfolk County
- Haldimand-Norfolk Health Unit
- Long Point Phragmites Action Alliance
- Long Point Ratepayers' Association
- Long Point Waterfowlers' Association
- Private organizations, including Birds Canada, Ducks Unlimited Canada and the Long Point Company
- Indigenous groups in the region (10 communities)
- Residents of the Long Point region

Each year (typically in June or July), the Project Team hosts three meetings with various partners including:

1. A meeting with the Haldimand-Norfolk Health Unit, Norfolk County and the Ministry of the Environment, Conservation and Parks to discuss surface water monitoring and public notification;
2. A public engagement session with local residents to provide an overview of the proposed work and the use of an herbicide; and,
3. An Indigenous engagement session with first nation communities in the region.

The objectives of these meetings are to inform, engage and seek input. In 2021, due to restrictions associated with COVID-19, the project team has conducted virtual engagement sessions, including a webinar with the Haldimand-Norfolk Health Unit and Norfolk County on June 8, and a public and Indigenous engagement webinar on July 30. Typically, the public and Indigenous engagement sessions would be held separately and in-person, but were adapted accordingly. The 2021 engagement sessions, as well as those run in the past, have been positively received.

In July 2021, CWS-ON sent letters to First Nations communities with interest in the Big Creek and Long Point NWAs that outlined the Phragmites management on Federal land, and invited the communities to attend the public information or engage in one-on-one discussions. Ten communities were contacted, including: Aamjiwnaang First Nation, Chippewas of the Thames First Nation, Delaware Nation at Moraviantown, Chippewas of Kettle and Stony Point First Nation, Mississaugas of the Credit First Nation, Munsee-Delaware Nation, Oneida Nation of the Thames, Six Nations of the Grand River, and Walpole Island First Nation – Bkejwanong Territory. CWS-ON remains engaged with these communities in 2022 and will extend invitations

for a meeting with Indigenous communities to provide an overiew of Phragmites managmenet efforts at this site and others in the region.

9.0 Mapping

9.1 Long Point Walsingham Forest

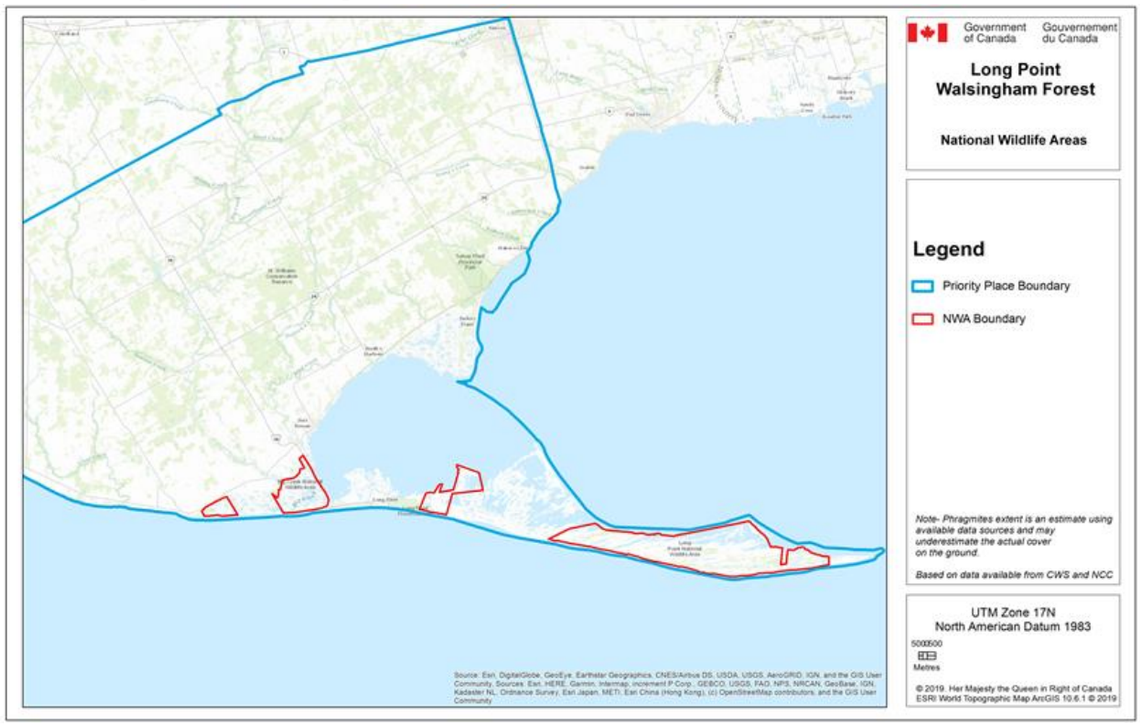

Figure 1. The National Wildlife Areas where Phragmites management is being proposed between 2020 and 2025 in relation to the CWS-ON Priority Place, Long Point Walsingham Forest.

9.2 Long Point National Wildlife Area

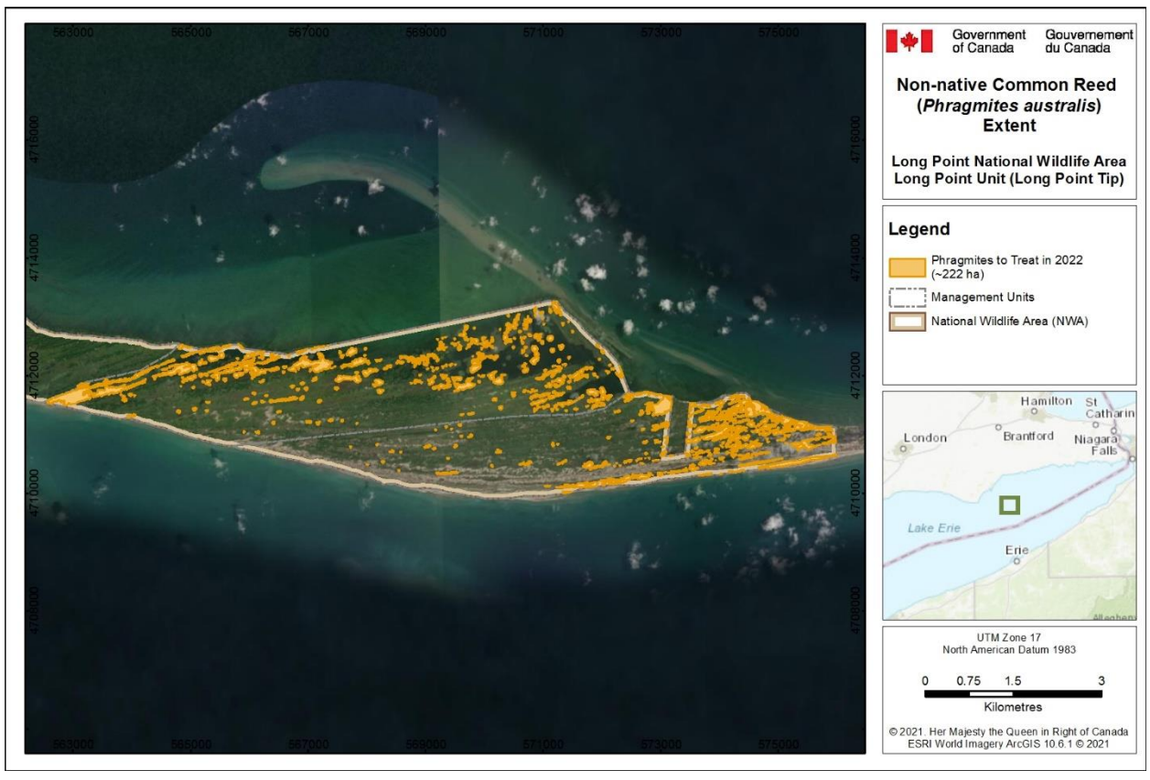

Figure 2. Anticipated new treatment areas (orange) at the Long Point Unit of the Long Point National Wildlife Area, to occur between August 15 and October 31, 2022.

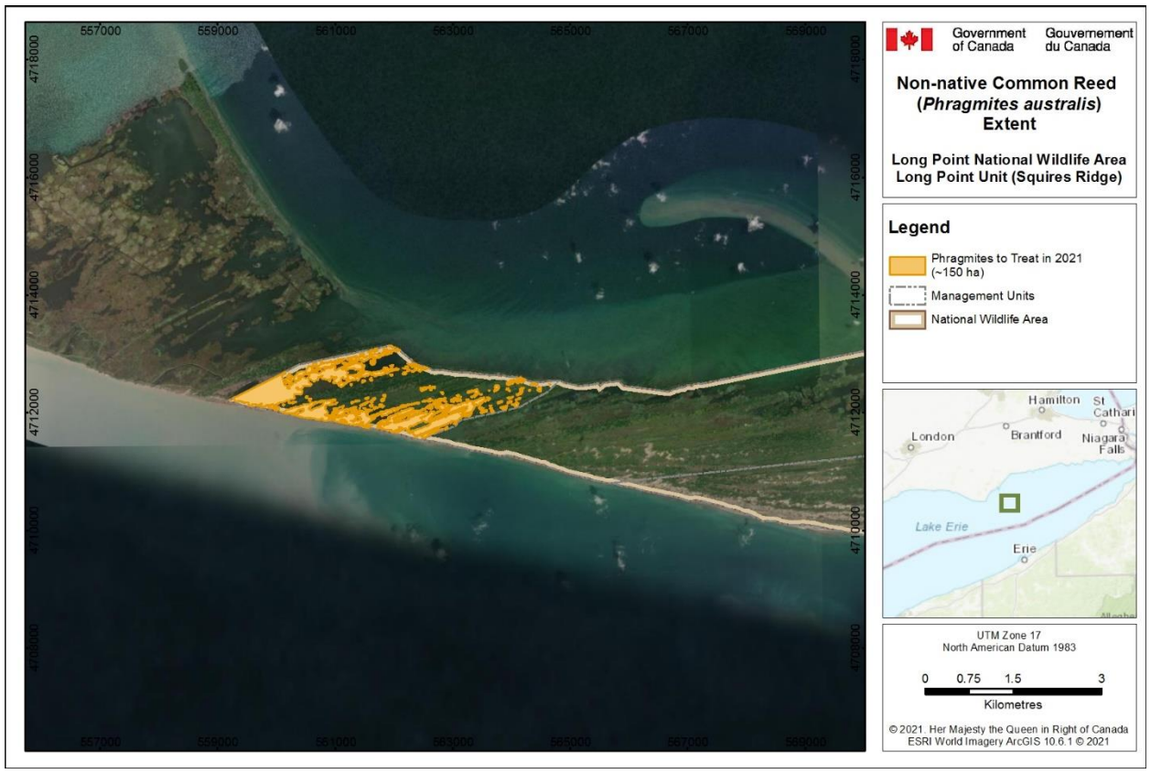

Figure 3. Potential retreatment treatment sites at the Squire's Ridge section of the Long Point National Wildlife Area, to occur as needed between August 15 and October 31, 2022.

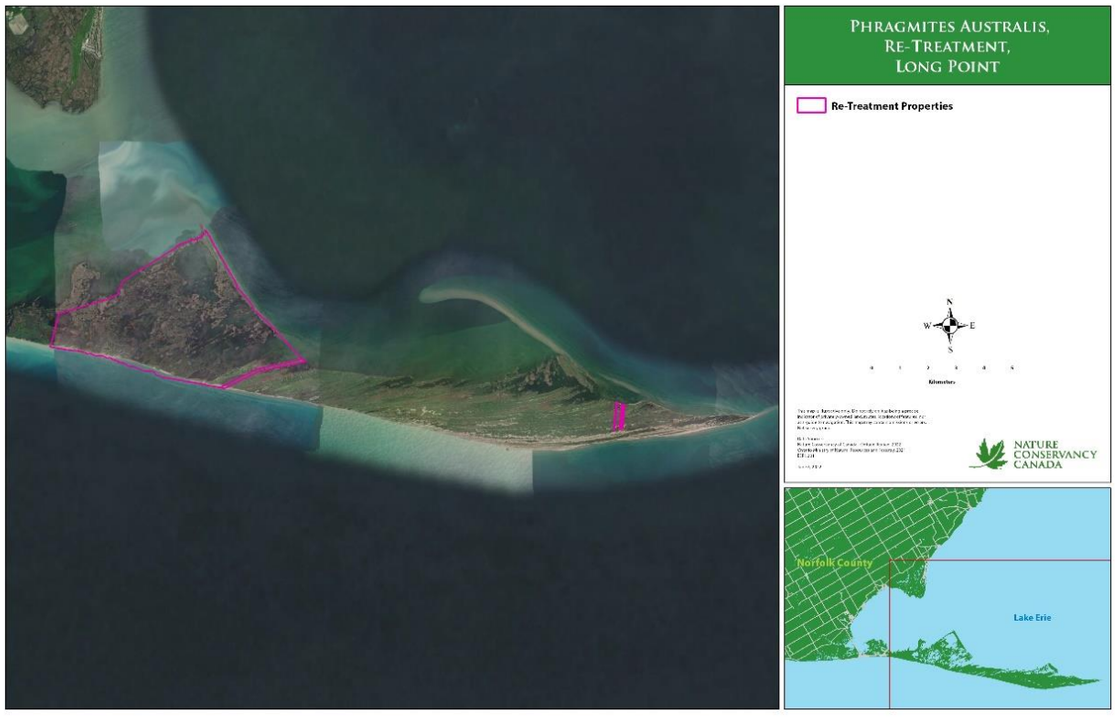

Figure 4. Anticipated re-treatment sites on private lands at Long Point. Application of a very low volume of herbicide application is expected to occur between August 15 and October 31, 2022.

9.3 Big Creek National Wildlife Area and adjacent private lands

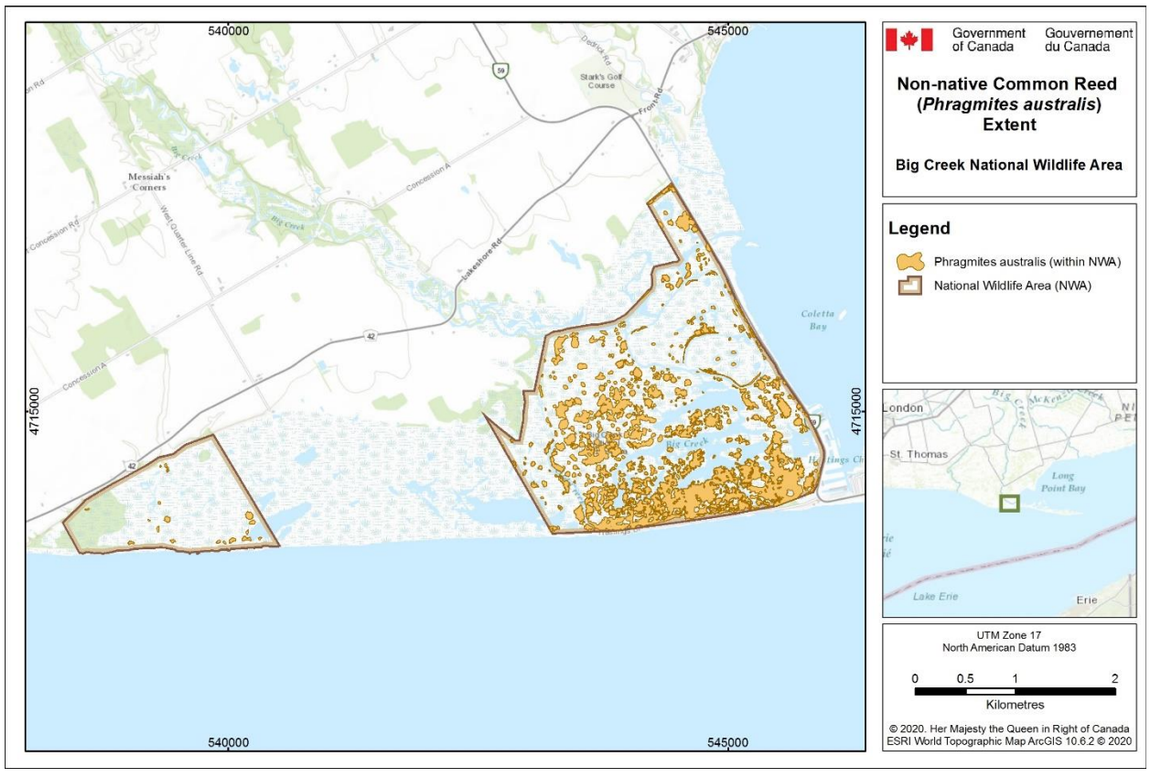

Figure 5. Phragmites extent in 2020. Management of up to 20ha of Phragmites may occur in the Big Creek and Hahn Units of the Big Creek NWA between August 15 and October 31, 2022.

Figure 6. Anticipated re-treatment areas within the inland portion of the Big Creek Watershed. Application of a very small amount of herbicide to sites in Phases 1 – 4 may occur between August 15 and October 31, 2022.

Figure 7. 2021 map showing potential 2022 re-treatment sites in the Lower Big Creek wetland complex, to occur between August 15 and October 31st, 2022. New treatment planned for this area in 2022 has been indicated.

10.0 Contact Information

Further information on the project and herbicide use can be obtained by visiting the Long Point Phragmites Action Alliance website at www.longpointphragmites.ca. Questions regarding the project and activities on federal and private lands can by directed to the following contacts:

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11.0 References

Breckles, R.D. & Kilgour, B.W. 2018. Aquatic herbicide applications for the control of aquatic plants in Canada: Effects to nontarget aquatic organisms. *Environmental Reviews*, 26: 333-338.

Bolding, M., Leven, C. Rooney, R. 2020. Deliverable H.2 – Final Report Summarizing Monitoring Results 2020. *Ontario Ministry of Natural Resources and Forestry*, Peterborough, ON.

Catling, P.M. 2005. New "top of the list" invasive plants of natural habitats in Canada. BEN - Botanical Electronic News. 345.

Hazelton, E.L., Mozdzer, T.J., Burdick, D.M., Kettenring, K.M., & Whigham, D.F. 2014. Phragmites australis management in the United States: 40 years of methods and outcomes. *AoB PLANTS,* 6(0): 1-19.

Jung, J.A., Rokitnicki-Wojcik, D., & Midwood, J.D. 2017. Characterizing Past and Modelling Future Spread of Phragmites australis ssp. australis at Long Point Peninsula, Ontario, Canada. *Wetlands*, 37(5): 961-973.

Markle, C.E. & Chow-Fraser, P. 2018. Effects of European Common Reed on Blanding's Turtle Spatial Ecology. *Journal of Wildlife Management*, 82(4):857-864.

Markle C.E. 2019. Effect of Phragmites australis management on turtle abundance:
Turtle visual encounter surveys at Big Creek and Long Point National Wildlife Areas before Phragmites australis treatment. *McMaster University*, Hamilton, ON.

Michigan Department of Environmental Quality (MDEQ). 2014. Guide to the control and management of Invasive Phragmites, 3rd Edition.

Ontario Invasive Plant Council. 2020. Invasive *Phragmites* Best Management Practices in Ontario. Peterborough, ON.

Ontario Ministry of Natural Resources and Forestry (OMNRF). n.d. Ontario Species at Risk Handling Manual: for Endangered Species Act Authorization Holders.

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015. Survey protocol for Blanding's turtle (Emydoidea blandingii) in Ontario. *Species Conservation Policy Branch*. Peterborough, Ontario.Ontario Ministry of Natural Resources (OMNR). 2011. Invasive Phragmites – Best Management Practices, Ontario Ministry of Natural Resources, Peterborough, Ontario.

Rooney R. 2017. Deliverable Fb – Report on alcohol ethoxylate concentrations in water and sediment samples. *Ministry of Natural Resources*.

Rooney, R. & Robichaud, C. 2019. The effect of invasive Common Reed and large-scale wetland restoration on Barn Swallow (*Hirundo rustica*) foraging habitat: final report. *University of Waterloo,* Waterloo, ON.

Tozer, D.C. & MacKenzie S.A. 2019. Control of invasive Phragmites increases marsh birds but not frogs. *Canadian Wildlife Biology and Management*, 8(2): 66-82.