Wood Drive Coastal Wetland
Invasive *Phragmites australis* Control and Assessment
Summary Report
2014 - 2016

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Cover Photo: Invasive *Phragmites australis* stolon with numerous new shoots, Wood Drive Coastal Wetland, August 27, 2016.

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1. Introduction

The Wood Drive Coastal Wetland is located along the Lake Huron shoreline within the Municipality of Lambton Shores (Figure 1). This ~59 ha (146 ac) coastal wetland is part of a larger system which extends north of the Shawshawanda Creek along the Kettle and Stony Point First Nation (KSPFN) shoreline (Figure 2). The entire wetland complex has Provincially Significant and Globally Rare designations and includes the only meadow marsh community on Lake Huron within the Carolinian Zone. The meadow marsh, emergent marsh and shallow open water communities throughout this wetland provide critical habitat for a number of species at risk including turtles, snakes, birds and plants (Appendix A). These species are currently under significant threat due to the expansive, high density coverage of invasive *Phragmites australis* (Phragmites). Additional impacts include an overall decrease in native plants and wildlife, reduced recreational opportunities and diminished aesthetic enjoyment of the lakeshore.

Figure 1. Location of the Wood Drive Coastal Wetland, Lambton Shores, Ontario.

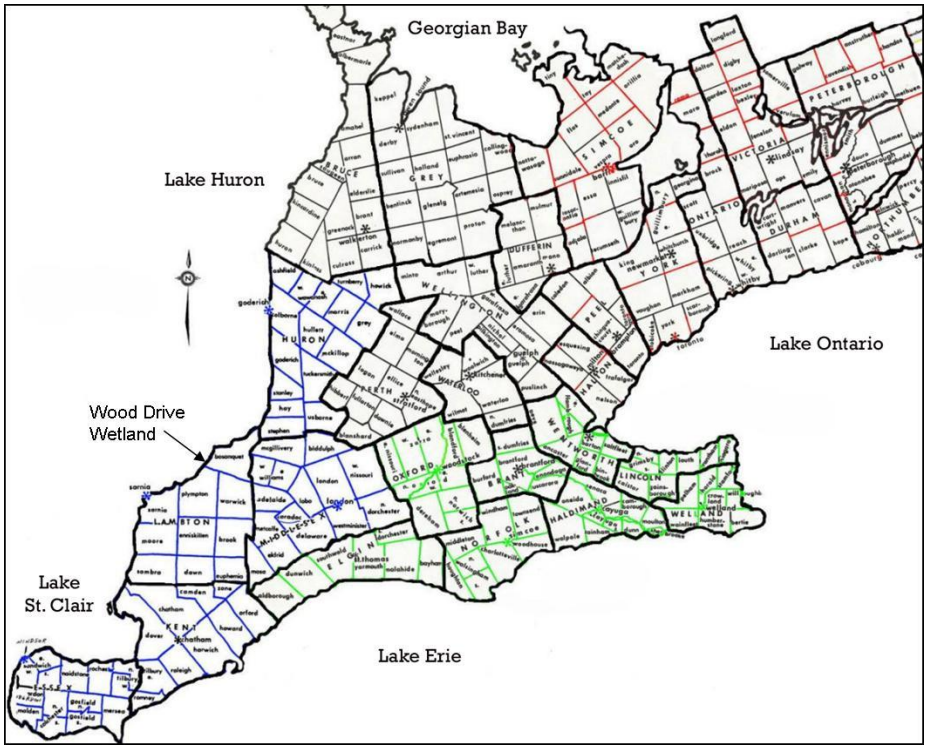


Figure 2. Location of the wetland complex along the Wood Drive and Kettle Point and Stony Point First Nation shoreline, Lake Huron.

The shallow gradient along this shoreline results in significant lake effects annually, seasonally and even daily, due to seiche and storm events. The presence of water greatly restricts control options since the herbicides currently available to manage Phragmites cannot be applied in wet sites. Lake Huron water levels have been steadily increasing since 2011 resulting in much wetter conditions throughout this system and significantly smaller areas that can be treated. Mild and unpredictable winter weather has also hampered annual efforts to undertake prescribed burns to enhance control efforts and system response. Despite these challenges, the control activities that have occurred are resulting in noticeable improvements in habitat quality.

Phragmites control activities commenced in the Wood Drive Coastal Wetland in the fall of 2014 and have been ongoing. This restoration effort is a joint project between the Lambton Shores Phragmites Community Group (LSPCG) and the St. Clair Region Conservation Authority (SCRCA). Initial financial support was provided through a three year Great Lake Guardian Community Fund (GLGCF) grant which allowed for a portion of the required work to take place. In 2016, the LSPCG were successful in leveraging these funds to acquire National Wetland Conservation Fund (NWCF) support for another three years. These additional funds are being used to support ongoing control actions, equipment acquisition, monitoring, public education and outreach and other required

activities. This report, made possible through the NWCF, summarizes the control activities that have occurred since 2014 and results of the assessment work undertaken to date.

2. Control Activities

2.1 Background Information

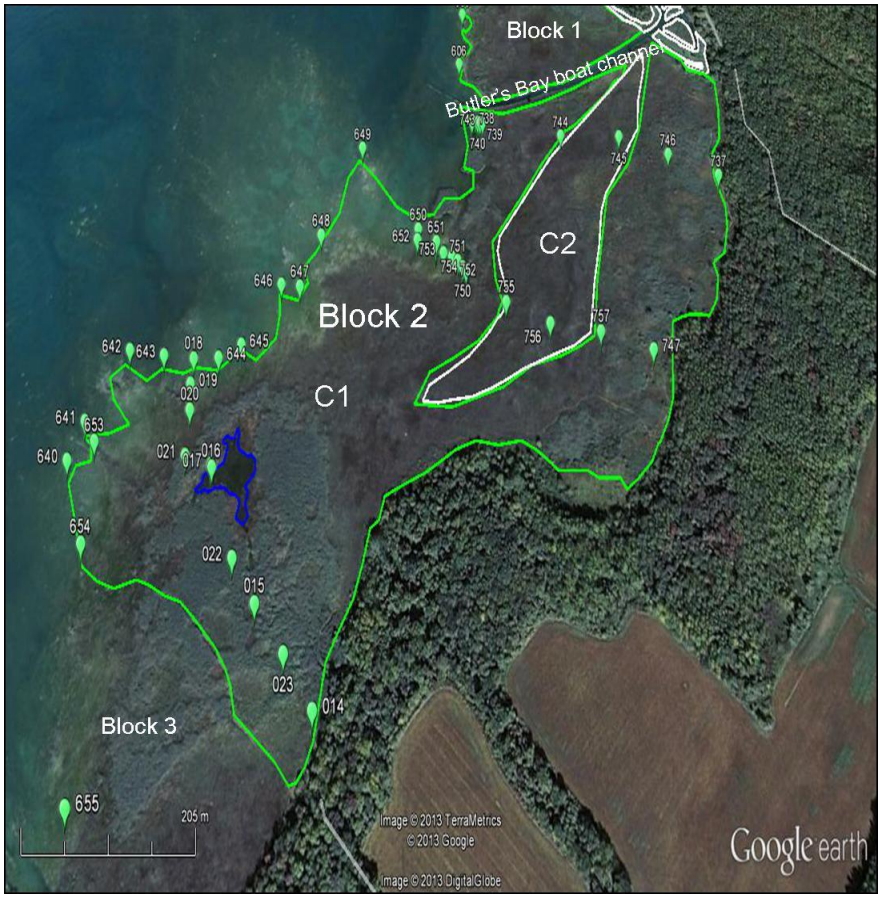
In 2013, the Invasive Phragmites Management Plan for the Municipality of Lambton Shores, Ontario (Gilbert and Vidler, 2013) was created to help guide required initiatives. The Wood Drive Wetland was covered within the Phragmites Management Area (PMA) V: West Bosanquet section of this plan. The wetland had been assessed during the summers of 2012 and 2013 at which time the extent and density of invasive Phragmites was determined. To facilitate management and tracking of control activities the wetland was divided into three large sections or Blocks. Block 1 encompasses the northern section between the Shawshawanda Creek and the Butler's Bay boat channel (Figure 3). Nine individual cells were identified in this Block totaling ~10.6 ha (26 ac) of which ~85% was high density Phragmites.

Figure 3. Satellite image showing areas requiring Phragmites control in Block 1.

The section outlined in green (C1) encompasses high density Phragmites which could be controlled using track vehicles or similar equipment; the areas demarcated by white lines (C2-C8) could be controlled using backpack spray units; cells along the boat channel (C9) and on the small island (C2) require boat access.

Block 2 is bordered by the Butler's Bay boat channel in the north and a trail running from the end of Fuller Road out to the shoreline in the south (Figure 4). This block encompasses ~39 ha (~97 ac) of which ~85% had dense Phragmites (C1) and ~6 ha (~14.7 ac) had sparse Phragmites (C2) in 2012/13.

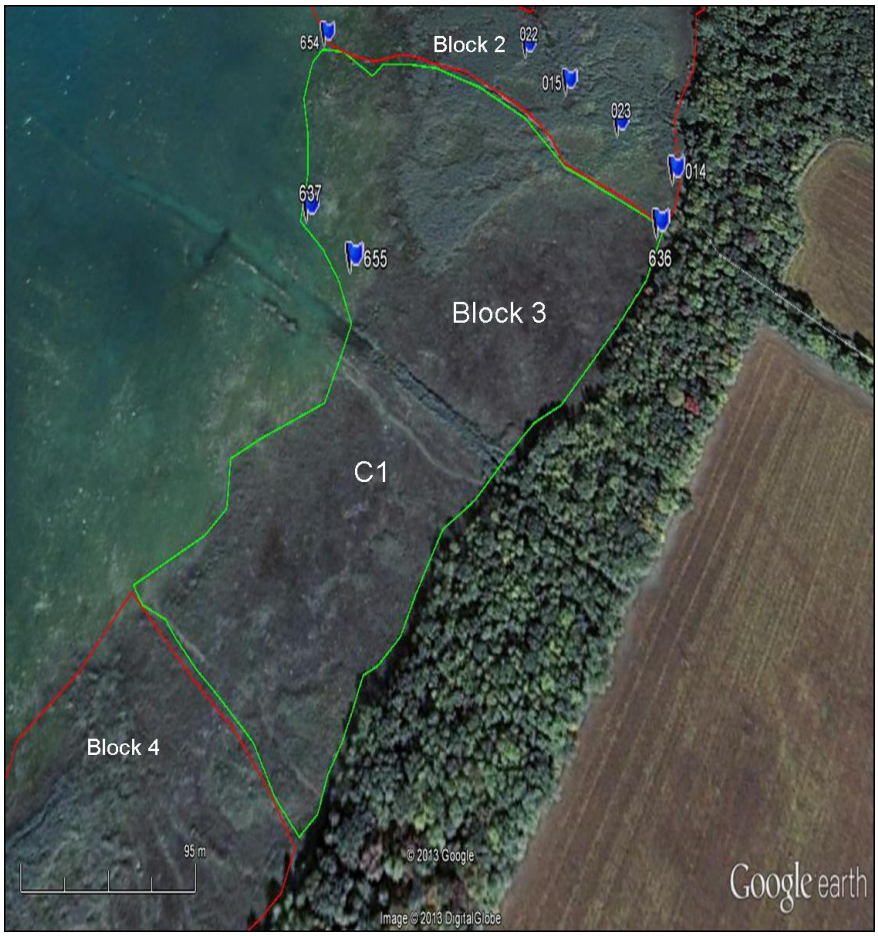
Figure 4. Satellite image showing areas requiring Phragmites control in Block 2.



The section outlined in green (C1) has dense Phragmites, the area demarcated by a white line (C2) has sparse Phragmites, and the area outlined in blue is a wet depression.

Block 3 covers the wetland portion located between the southern boundary of Block 2 southward to the property boundary shared with the Lambton United Church Centre (Figure 5). Phragmites control efforts on the United Church property have been ongoing since 2014. Block 3 covers ~9 ha (~23 ac) and at the time of the initial assessments in 2012/13 had medium to high Phragmites densities throughout.

Figure 5. Satellite image showing areas requiring Phragmites control in Block 3.

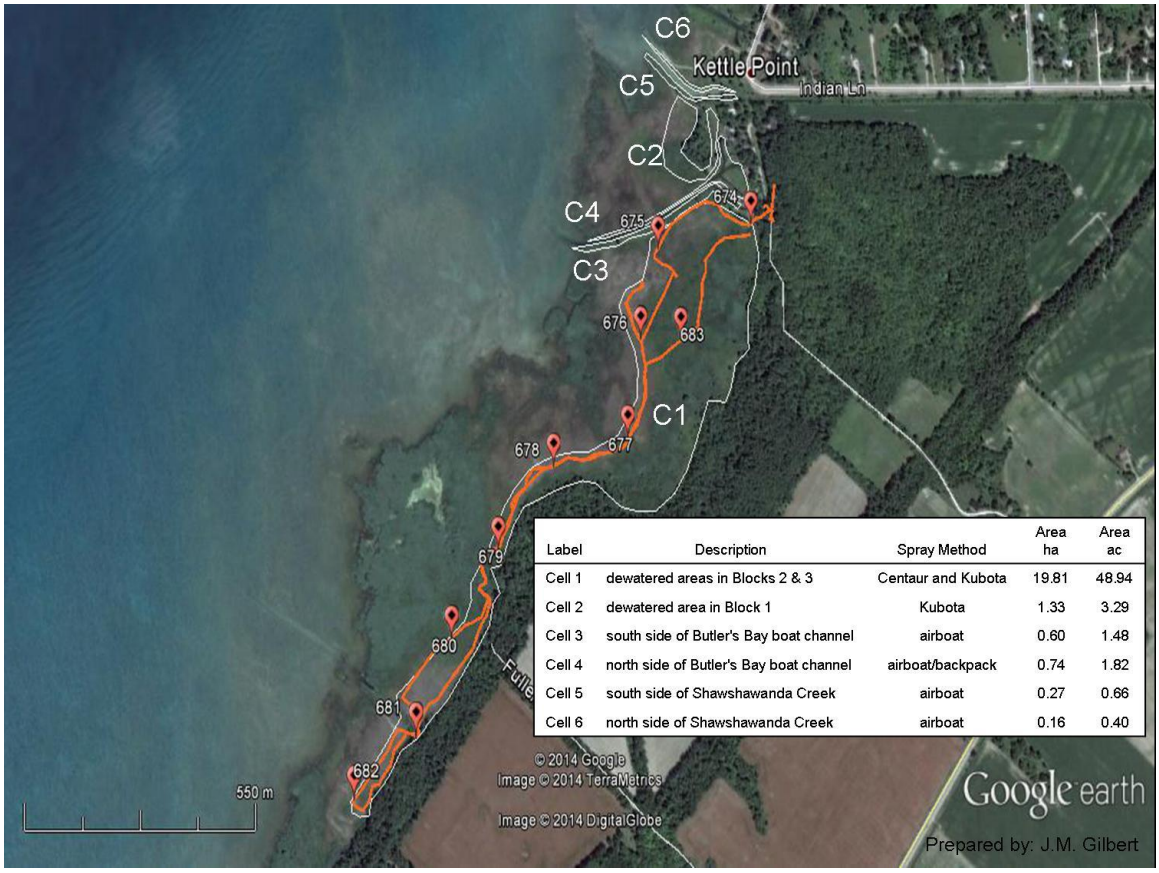


The section outlined in green (C1) has dense Phragmites. Block 4 encompasses the Lambton United Church Centre property.

2.2 Control activities undertaken in 2014

Phragmites located within dry sections in Blocks 1, 2 and 3 of the Wood Drive Coastal wetland were treated using an appropriate herbicide during the last week in September 2014 (Figure 6). This work was undertaken by a licensed contractor (Dover Agri-Serve) using a variety of equipment. An industrial track vehicle (Centaur) retrofitted with a spray deck, tank, pump and spray wand was used to treat high density cells. A light weight track vehicle (Kubota) equipped with a tank, pump and spray boom was used to treat intermediate density areas. An airboat equipped with tank, pump and spray wand was used to treat the dredge spoil ridges along the Shawshawanda Creek and Butler's Bay boat channel. And, a crew on foot used backpack spray units to target Phragmites in low density areas. In total ~23 ha (~50 ac) were treated.

Figure 6. Areas where invasive Phragmites were treated with herbicide within the Wood Drive Coastal Wetland, fall 2014.



Label	Description	Spray Method	Area ha	Area ac
Cell 1	dewatered areas in Blocks 2 & 3	Centaur and Kubota	19.81	48.94
Cell 2	dewatered area in Block 1	Kubota	1.33	3.29
Cell 3	south side of Butler's Bay boat channel	airboat	0.60	1.48
Cell 4	north side of Butler's Bay boat channel	airboat/backpack	0.74	1.82
Cell 5	south side of Shawshawanda Creek	airboat	0.27	0.66
Cell 6	north side of Shawshawanda Creek	airboat	0.16	0.40

2.3 Control activities undertaken in 2015

On March 24, 2015 standing dead Phragmites was rolled and then burned within the drier sections of Blocks 1 and 2. This work was undertaken to reduce the amount of biomass in the high density sections where Phragmites had been sprayed the previous fall in order to improve native plant recovery. Prior to burning, the Phragmites was flattened using industrial grade rollers pulled behind track machines (Figure 7). This allowed for a more controlled fire and complete incineration of the seed heads (Figures 8 and 9). High Lake Huron water levels significantly reduced the amount of acreage that could be rolled and burned but ~ 22 ha (55 ac) was able to be targeted. The work was undertaken by Dover Agri-Serve and Wildfire Specialists Inc.

Figure 7. Track machine and rollers used to flatten standing dead Phragmites prior to a prescribed burn being undertaken, Wood Drive Coastal Wetland, March, 2015.

Figure 8. Crew monitoring Phragmites fire in the Wood Drive Coastal Wetland, March 2015.

Figure 9. Section of the Wood Drive Coastal Wetland where Phragmites had just been burned, March 2015.

In early October (6th - 9th) 2015 dry sections within Blocks 1, 2 and 3 were treated with herbicide (Figure 10). Due to the high lake levels only ~6 ha (~15 ac) could be targeted. This work was undertaken by Dover Agri-Serve employees using an industrial grade track vehicle (Centaur) that had been retrofitted with a spray deck and equipped with commercial grade spray equipment.

Figure 10. Dry areas within the Wood Drive Coastal Wetland where invasive Phragmites had been treated with herbicide, October 2015.

Lake Huron water levels were higher in 2015 resulting in a significant portion of the wetland being flooded. Since Phragmites growing in these areas could not be controlled using herbicide an alternative cutting program was undertaken to stress or drown the plants. The removal of stalks may cause mortality in sufficient water depths by depriving the belowground structures of oxygen. Cutting in shallower water does not achieve this same result but it does reduce spread, plant stature, and seed production.

The cutting occurred in Block 1 using gas powered brush cutters (Figure 11). Areas where Phragmites densities exceeded ~90% were too hard on the equipment and crew and therefore only areas with intermediate to low Phragmites densities were targeted (Figure 12). The work was slow and arduous as the cut material also had to be removed from the water to reduce sprouting and further spread. Approximately ~2 ha (5 ac) were able to be cleared by a three person crew working 10 days beginning August 22 and ending October 9, 2015. The following growing season Phragmites densities were found to have decreased by ~93% (Figure 13). More details about the cutting program can be found in the Wood Drive Coastal Wetland Invasive Phragmites Cutting Program 2015 - 2016 Summary Report (Gilbert, 2017).

Figure 11. Cutting Phragmites in the Wood Drive Coastal Wetland, August 26, 2015.

Figure 12. Phragmites areas cut within the Wood Drive Coastal Wetland in 2015.

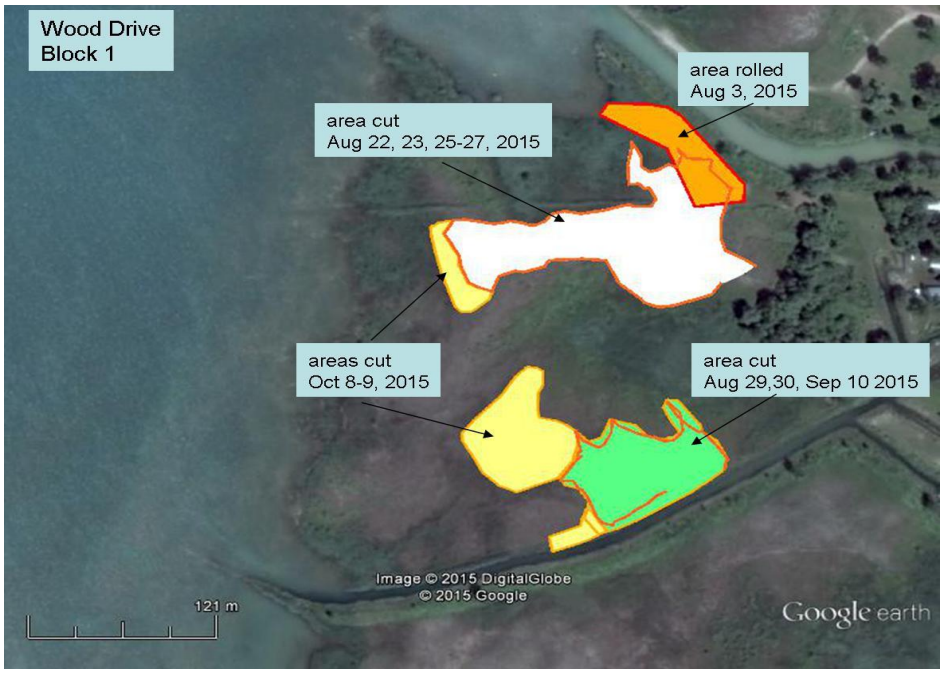
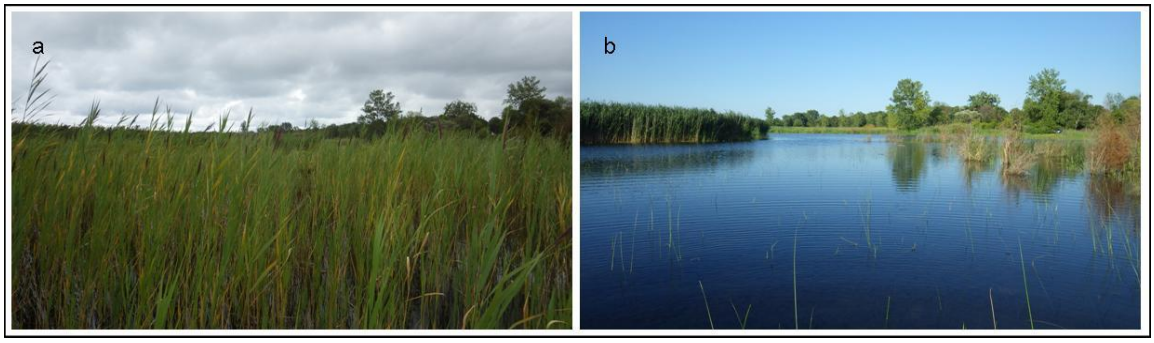


Figure 13. Phragmites within Block 1, Wood Drive Coastal Wetland: a) prior to cutting on August 26, 2015 and, b) after two cutting events, August 23, 2016.



2.4 Control activities undertaken in 2016

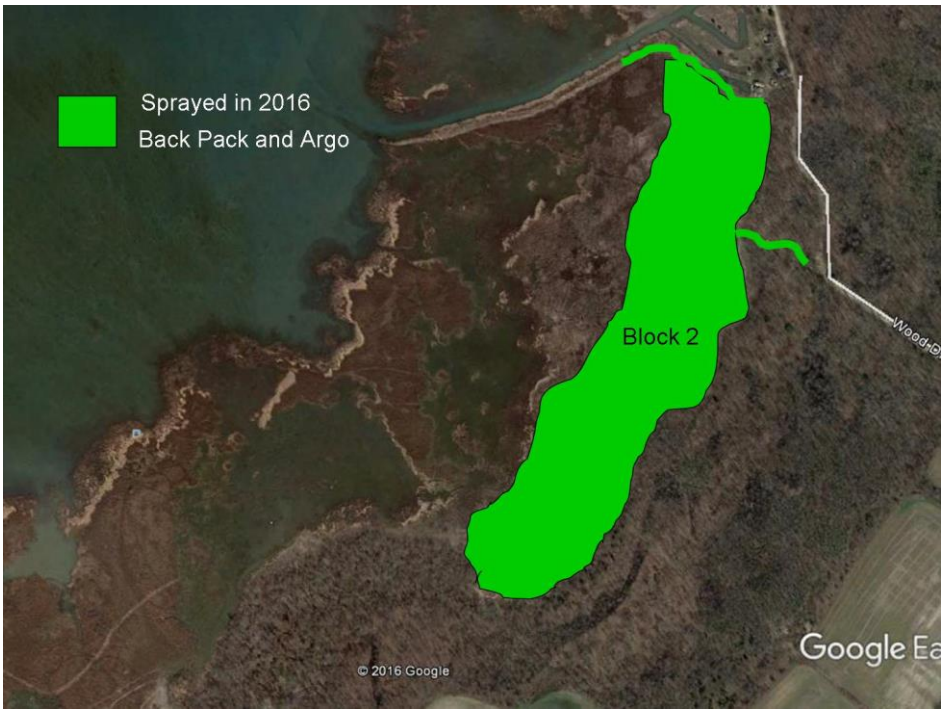
Phragmites cutting continued within Block 1 on 11 days between June and November, 2016. A 5-8 person crew cut and removed Phragmites from a ~3.7 ha (9.2 ac) area. This included the same area cut the previous year to remove any remnant Phragmites that had survived the cutting in 2015 (Figure 14). The majority of these plants were located in shallower water.

Figure 14. Phragmites areas cut within the Wood Drive Coastal Wetland in 2016.

Herbicide application took place in dry sections of Blocks 1 and 2 on September 24 and 25 and October 4, 2016 (Figures 15 and 16). This work was undertaken by a 4 person crew working for Green Stream. The herbicide was applied using backpack spray units and a light weight, eight wheeled, ARGO equipped with spray tank, pump and hand wand.

Figure 15. Areas in Block 1 where Phragmites was treated with herbicide in 2016.

Figure 16. Areas in Block 2 where Phragmites was treated with herbicide in 2016.



2.5 Control activities undertaken around the residential areas

Phragmites around the residential areas has been controlled over the years by some of the property owners. This has been mainly through manual cutting which needed to occur frequently to maintain low plant stature. As one cottager noted, the plants would grow back ~ 0.30 m in just one week after cutting (Hay, 2015; Appendix B). This same cottager started manually cutting the Phragmites in her boat channel in the summer of 2013. At that time the Phragmites was so thick and tall that she could not see the water and her view out toward the lake was severely restricted (Figure 17). With the help of friends, and after significant effort, they had managed to cut and remove all but a few of the plants by late summer 2015. Plants growing on dry ground around the perimeter of the boat channels and on the islands were treated by the backpack crew in 2015.

Figure 17. The Hay Cottage boat channel a) choked with invasive Phragmites, June 6, 2013 and, b) three years after manually cutting Phragmites, August 23, 2015.

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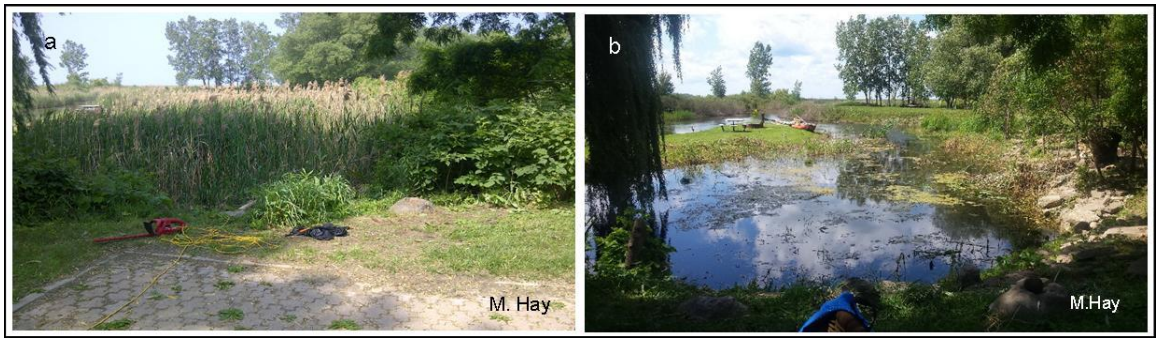


3. Assessment

3.1 Background

The majority of the assessment plots were located in Blocks 1 and 2 within a narrow, drier zone in the meadow marsh community between the tree line and the water's edge. Phragmites within this area had been treated with herbicide in 2014 and 2015 resulting in significantly reduced densities. The assessment occurred during the peak biomass period prior to herbicide control activities being undertaken in 2016. Additional plots were also assessed across a water depth gradient, in areas that had undergone treatment in either 2014 or 2015 but were wet in 2016 and in areas that have not undergone control activities (Figure 18). All plots will be re-assessed in 2017. Phragmites control efficacy and native plant response to herbicide treatments will be used to inform control activities to be undertaken in 2017. Data collected in areas that could not be treated in 2016 will be used to track Phragmites expansion and vegetation response relative to site specific conditions such as water levels.

Figure 18. Locations of areas assessed within Blocks 1 and 2 of the Wood Drive Coastal, 2016.

3.2 Methods

All plots were assessed in Blocks 1 and 2 between August 23 and September 22, 2016. Thirty-three 1 m^2 plots were located within areas where Phragmites was to be treated with the herbicide WeatherMax. Each plot location was selected to include Phragmites plants growing amongst native plants (Figure 19). The plots were geo-referenced using a Garmin handheld global positioning system unit (GPSMap76) and flagged. In addition, 16 x 1 m^2 plots were established within an area to be treated with a tank mix of WeatherMax (glyphosate) and Arsenal Powerline (imazapyr). Data collected in these 16 plots will allow for comparisons in control efficacy and native vegetation response between conventional herbicide treatment (WeatherMax) and the tank mix. Thirty-one Plots were also assessed across a water depth gradient from the tree line out to the lakeside edge of the emergent zone where Phragmites density was very high (Figure 20). Sixteen plots were also randomly placed throughout the flooded section of the meadow marsh. Within all of the plots, the following information was collected: water depth or sediment depth to water, percent detritus, number of live Phragmites, minimum and maximum Phragmites heights, number of Phragmites with seed heads, percent coverage of Phragmites, percent coverage of other plant species, and percent open area. In addition, wildlife observations and other pertinent information were also recorded.

Figure 19. Assessment plot with invasive Phragmites growing among native plants, Wood Drive Coastal Wetland, September 2016.

Figure 20. Dense Phragmites along the lakeside edge of the Wood Drive Coastal Wetland, August 2016.

Plant species were either identified in the field or voucher samples were collected for later identification. Scientific nomenclature followed Crow and Hellquist (Aquatic and Wetland Plants of Northeastern North America, 2000) and Gleason and Cronquist (Manual of Vascular Plants of Northeastern United States and Adjacent Canada, 1991). Species identification was confirmed through Crow and Hellquist (2000), Gleason and Cronquist (1991), Newcomb (Wildflower Guide, 1977), Dickinson *et al.* (The ROM Field Guide to Wildflowers of Ontario), and Newmaster *et al.* (Wetland Plants of Ontario, 1997).

Species diversity and evenness were determined using Shannon-Wiener (H', E) and Simpson's (D, E_D) diversity indexes. The Shannon-Wiener diversity index is sensitive to species richness and abundance of individuals, including rare species. Species diversity (H') can vary from 0, which represents only 1 species present, up to ~5 (this value is rarely exceeded in most biological communities). Evenness (E) is a measure of the equitability of species within the community and ranges between 0 (one species) and 1 (all species present in equal dominance). The Simpson's diversity index gives less weight to the rarer species. Simpson's D ranges from 0 (low diversity) to almost 1 (high diversity) while evenness (E_D) ranges from 0 (one dominant species) to 1 (equal dominance among all species present).

Vegetation data were also analyzed using metrics from Ohio EPA's Field Manual for the Vegetation Index of Biotic Integrity for Wetlands (Mack 2004) and Floristic quality assessment index (FQAI) for vascular plants and mosses for the State of Ohio (Andreas *et al*. 2004). The Floristic Quality Index (FQAI) is based on assignment of a numeric score for each species, called the coefficient of conservatism (C of C). The scores range from 0 to 10 and are an ordinal weighting factor based upon the degree of conservatism (fidelity) of a species compared to all other species within the same region. Unlike other indexes which assign a high coefficient to rare or endangered species, this index is related strictly to habitat requirements.

The formula used to calculate the FQAI scores was:
$I = \Sigma (CC_i)/\sqrt{(N_{native})}$ where I = the FQAI score, CC_i = the coefficient of conservatism of plant species I, and N_{native} = the total number of native species occurring in the community being evaluated.

3.3 Results

There were 84 plant species observed within the assessed plots in the meadow marsh community (Appendix C). Of these, 74 were native with a combined relative coverage of ~42%. The 10 invasive plant species had a combined relative coverage of 25% (Table 1). About one third (~33%) of the area was not vegetated and these open areas mainly occurred where there was a thick layer of dead Phragmites (Figures 21 and 22). The dead Phragmites was a remnant of the control efforts undertaken in 2014/15 whereby

Phragmites treated with herbicide had been rolled but could not be burned due to wet site conditions.

Table 1. Invasive plant species observed in the meadow marsh community, Wood Drive Coastal Wetland, 2016.

Common Name	Scientific Name	% Plots Observed	Relative % coverage
European Reed	Phragmites australis	98	17.4
Purple Loosestrife	Lythrum salicaria	43	4.7
Narrow-leaved Cattail	Typha angustifolia	31	1.7
Queen Anne's Lace	Daucus carota	10	1.1
Hybrid Cattail	Typha glauca	8	<1
Canada Thistle	Cirsium arvense	8	<1
Field Sow Thistle	Sonchus avensis	4	<1
Barnyard Grass	Echinochloa crusgalli	2	<1
Black Medick	Medicaqo lupulina	2	<1
White clover	Trifolium repens	2	<1

Figure 21. Thick layer of dead, prostrate Phragmites stalks prevent native plant growth within the meadow marsh community, Wood Drive Coastal Wetland, August 2016.

Figure 22. Native plants re-colonizing an area where dense Phragmites had been treated with herbicide and rolled, Wood Drive Coastal Wetland, August 2016.

As a result of the control efforts that had been undertaken in 2014 and 2015 within the narrow, dry section of the meadow marsh, Phragmites had been reduced from a high density monoculture to ~17% coverage. Plant stature was also lower at < 2.5 m compared to the untreated areas where heights exceeded 3 m. Within the majority of the plots, Phragmites densities ranged between <1% and 35% with the highest coverage at 60%. Despite the control efforts, Phragmites remained, by far the most abundant plant. *Chara sp.* (Stonewort) was the next most abundant species with a relative coverage of ~13% and a presence in 31% of the plots. However, while *Chara* has plant-like features, it is actually a colony of algae and was not included in the FQAI scores. Another invasive, *Lythrum salicaria* (Purple Loosestrife), was the second most abundant plant with a relative percent coverage of ~4.7% and a presence in 43% of the plots. Many of the *L. salicaria* appeared to be stressed and all of the plants observed had eaten leaves (Figure 23).

Figure 23. Stressed *Lythrum salicaria* (Purple Loosestrife) with eaten leaves, Wood Drive Coastal Wetland, August 2016.

Two rushes, *Juncus brevicaudatus* (Short-tailed Rush) and *J. canadensis* (Canada Rush), were the most widely distributed native species with a presence in 49% and 41% of the plots respectively. Despite their common occurrence, their relative percent coverage was low at ~4% for *J. brevicaudatus* and ~2% for *J. canadensis*. *J. brevicaudatus* had the highest relative percent coverage of the native species followed by *Scirpus atrovirens* (Black Bulrush) with 2.3% coverage, *Eleocharis elliptica* (Spike Rush) with 2.1%, *J. canadensis*, *Cyperus bipartitus* (Shining Flatsedge) and *Utricularia vulgaris* (Common Bladderwort) each with 1.9%, *Cornus stolonifera* (Red Osier Dogwood) with 1.7%, *Agrostis scabra* (Tickle Grass) with 1.3% and *Carex lacustris* (Lakebank Sedge) and *Juncus effusus* (Soft Rush) each with ~1%. The remaining native species all had <1% coverage.

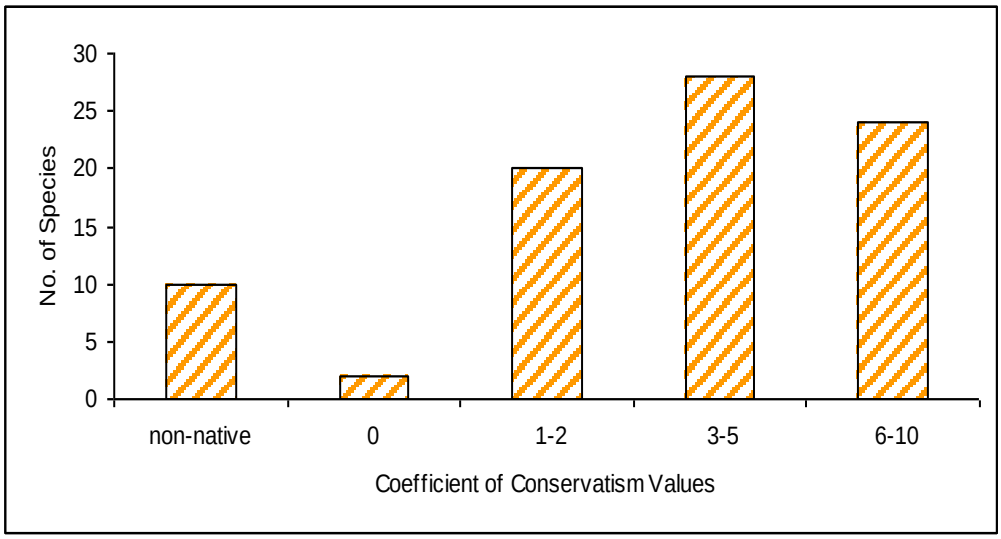
Species diversity and richness as expressed by the Shannon-Wiener diversity (H') value of 2.09 and evenness (E) value of 0.47 were indicative of the low abundance for the majority of the species (Table 2). By contrast, the Simpson's diversity (D) value of 0.95 and evenness (ED) value of 0.96 reflected the high overall number of species observed. The combination of low abundance of native species and the higher percentage of generalist species (60%) were reflected in the FQAI value of 37.4. Both the Shannon-Wiener and FQAI indices are anticipated to increase as native plants re-colonize and expand across the areas previously dominated by Phragmites.

Table 2. Habitat quality indices for the meadow marsh community, Wood Drive Coastal Wetland, 2016.

Quality Index	All Species	Sensitive Species
Sum Relative Cover	67	11
Sum of A*W	123	72
Sum C of C	322	185
FQAI N	74	27
Mean C of C	4.4	7.7
FQAI Score	37.4	—
No. Non-native Species	10	—
Sum Relative Cover Non-Native	25	—
Shannon-Wiener H'	2.09	—
Shannon-Wiener E	0.47	—
Simpson's D	0.95	—
Simpson's E_D	0.96	—

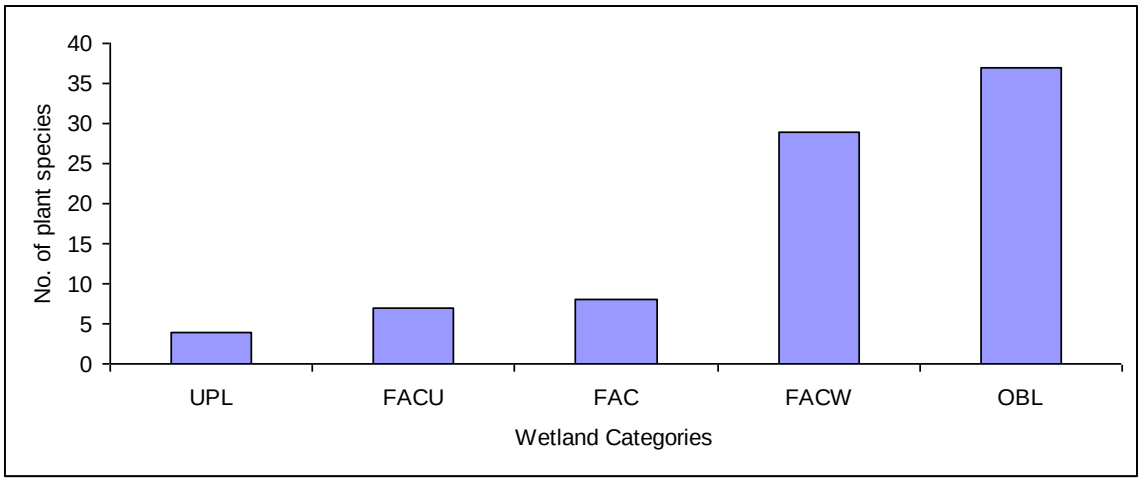
The twenty-four species with coefficient of conservatism (C of C) values between 6 and 10 had a combined relative coverage of ~11% (Figure 24). Species in these categories require specific site conditions making them more sensitive to habitat changes compared to the species which are generalists. There were 50 generalist species (C of C values between 0 and 5) with a combined relative coverage of ~18%.

Figure 24. Number of vegetation species within each coefficient of conservatism category for the Wood Drive Coastal Wetland, 2016.



The majority of the species observed were either obligate wetland (37 spp.) or facultative wetland (29 spp.; Figure 25). The high number of obligate wetland species was indicative of the wetter conditions which occurred in 2015 and 2016 as a result of increased lake levels (Figure 26). During the growing season (May through August) Lake Huron was on average 0.29 m higher in 2015 compared to 2014 and 0.15 m higher in 2016 compared to 2015. This increase resulted in flooded conditions throughout much of the meadow marsh and in many areas the sustained flooding was sufficient to kill trees (Figure 27). There was also a noticeable decline in facultative species including asters, goldenrods and grasses which had been observed throughout the meadow marsh in 2014 when conditions were much drier. Native plant recovery was also low in flooded areas where dense Phragmites had been treated in 2014, (Figure 28). This dampened response is attributed to permanently flooded conditions and the thick layer of dead Phragmites. For various viable seeds in a seed bank to germinate a draw down period is required and until the thick layer of Phragmites sufficiently decays it will remain a barrier to plant colonization.

Figure 25. Number of species within each wetland category, Wood Drive Coastal Wetland, 2016.



UPL=upland, FAC=Facultative, FACU=facultative upland, FACW=facultative wetland, OBL=obligate wetland

Figure 26. Comparison in Lake Huron water levels during the growing seasons in 2014, 2015 and 2016.

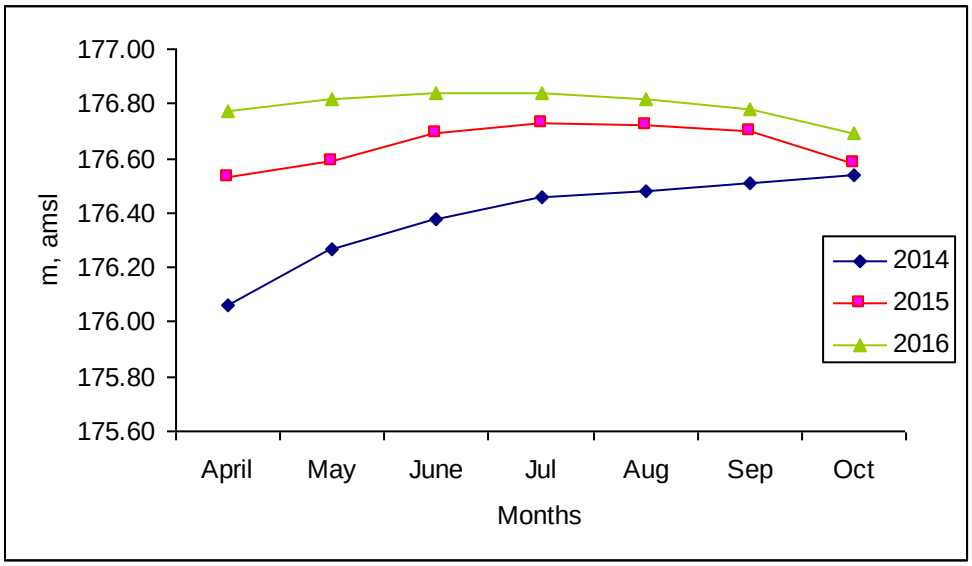


Figure 27. Dead trees within the meadow marsh community as a result of higher lake levels in 2015 and 2016, Wood Drive Coastal Wetland, August 2016.

Figure 28. Low native plant recovery in a flooded section of the meadow marsh previously dominated by Phragmites, Wood Drive Coastal Wetland, August 2016.

3.4 Wildlife Observations

Great Blue Herons, White Egrets, Canada Geese, Wood Ducks and Mallards were commonly seen foraging within a large open water area that had been cleared of Phragmites in Block 1. Minnows and fish were also prevalent in this section and the occasional crayfish was spotted. A fresh muskrat den had been constructed along the edge of thick Phragmites that had not been cut. Leopard Frogs and American Toads were numerous in damp sections of the meadow marsh and Green Frogs could be heard calling. A Least Bittern was flushed out of a dead willow in a flooded section of Block 2 where Phragmites had been controlled in 2014. In a larger open water section nearby ~120 ducks were also flushed out. Numerous crayfish chimneys were scattered throughout the non-flooded portions of the meadow marsh and dragonflies, damselflies, bees, butterflies and other pollinators were often observed on the flowering plants. Other species observed during visits to the site included Green Herons, Marsh Wrens, sparrows, Catbirds, Kingfishers, Sand Hill Cranes, Bald Eagles, Eastern Gartersnakes, Snapping Turtles, Long Nose Gar, Mute Swans with 2 cygnets, orb spiders, and the tracks of White Tailed Deer and Raccoons.

4. Planned Work for 2017

Due to the financial support of the NWCF, three consecutive years of assessments are able to be undertaken. The information obtained from this monitoring will be invaluable for increasing our understanding of the nature of native plant recovery post Phragmites control using different methods and in areas of differing pre-control densities and water depths. This program also allows for Phragmites reduction in treated areas to be tracked which is useful for improving future control actions.

Assessments will continue in 2017 during the peak biomass period (Aug/Sep) within the same plots established in 2016. Data collected from plots located within the areas treated with herbicide in 2016 will be used to inform how best to proceed with herbicide application in 2017. This information will be particularly useful for illuminating any differences with using WeatherMax or a tank mix (WeatherMax and Arsenal Powerline) to control Phragmites or desired plant recovery. Annual comparisons in native plant establishment within treated areas, across a water depth gradient and where Phragmites duff is thick will also be informative.

Assessments are also planned to occur earlier in the growing season to capture spring ephemerals and wildlife such as turtles and nesting birds. As well, additional plots will be established throughout Block 3 and within the higher density Phragmites cells to collect base line data prior to any control work being undertaken. This information will help capture differences in control efficacy within areas with different Phragmites densities and positive or negative impacts on specific native species as a result of control efforts.

Appendix A: List of Species at Risk in the Wood Drive Coastal Wetland

Species at Risk and rare species in the Wood Drive Wetland:

- 5 turtles (Blanding's Turtle, Northern Map Turtle, Snapping Turtle, Eastern Musk Turtle, Spotted Turtle)
- 5 snakes (Milksnake, Eastern Hog-nosed Snake, Eastern Foxsnake, Eastern Ribbon Snake, Blue Racer)
- 6 birds (Least Bittern, Virginia Rail, Sora, Prothonotary Warbler, Whip-poor-will, Bald Eagle)
- Monarch
- the wetland supports a high number of coastal meadow marsh vegetation spp. including Cyperus flavescens (S2), Echinochloa walteri (S3), Lycopus virginicus (S3), Panicum rigidulum (S3)

Appendix B: Wood Drive Cottager's Report

Michelle Hay
9187 Wood Drive, Lambton Shores.
October 15, 2015

While in my teens my parents purchased their second property on Wood Drive. Phragmites at that time had never been heard of. Due to various reasons my parents did not attend the cottage until approximately three years ago. The cottage was renovated internally however, the property needed to be landscaped and the jungle of phragmites in the channel directly in front of our patio needed to be removed. At that time, you could not see the water in the "moat" as I had dubbed it.

June 6, 2013 from our patio

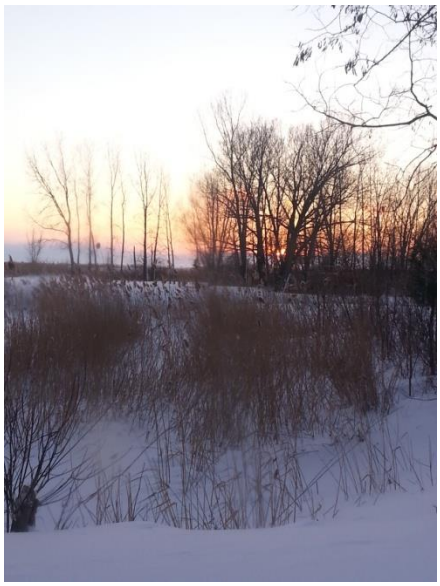
During the first summer three years ago, I was working solo at removing the phragmites and burning them. Finding they grew a foot within a week of cutting. At that time I was using garden sheers, a whipper snipper and my hedge trimmer to try and manage the phrags, with not much luck.
The second year, my best friend Jackie Moore started coming to the cottage and she began to assist me with landscaping the jungle terrace and removing the phrags. My brother, Bill Hay would visit from Vancouver and assist as well for a week. (What a holiday!?) Dried they were great for starting our evening bonfires! It was time consuming and labourious work. By the end of the summer her boyfriend Chris Smith was coming down to spend the weekends as well, and we were starting to make some progress.

June 16, 2014 Boat Launch

We were beginning to see water. Prior we could not see the channel out to the lake they were so high above our heads while we stood or sat on the patio. There was no real aquatic life there. Fish weren't able to navigate the dense phrags, frogs were on the sides of the terrace where we cleared the brush. Turtles could be found sitting on a pallet on the end of the peninsula the Bork's our next door neighbours had. Hence the point at the end of our property was coined "Turtle Point" I would sit and enjoy my

June 19, 2014 From the patio 1

morning coffee watching the many species of turtles that would bask in the sun.



In February 2015, Jackie and I went to the cottage to enjoy some much needed R&R. My intent was to cut the phrags down to give us a head start on the spring. I found the snow was too high to navigate the land to the channel. However, I did notice that many of the standing phrag were now laying down due to the heavy snowfall that season.

February 19, 2015 winter time

Come spring, a lot of the phrags in the centre remained fallen. Good news for us! We had our head start after all! Chris' daughters (Vanessa and Victoria Smith) and another girlfriend of ours, Virginia Campbell assisted with removal in early spring. During Victoria Day weekend, the Smith's, neighbours two doors down offered their "weed rake" to assist with the raking, cutting and removal of the phrags from the "moat". They could see our challenges with just using a rake and pulling them in after cutting. That weekend we were able to cut a large quantity of the phrags on the Bork's peninsula side, and a lot around the patio portion of the channel. We were making progress!

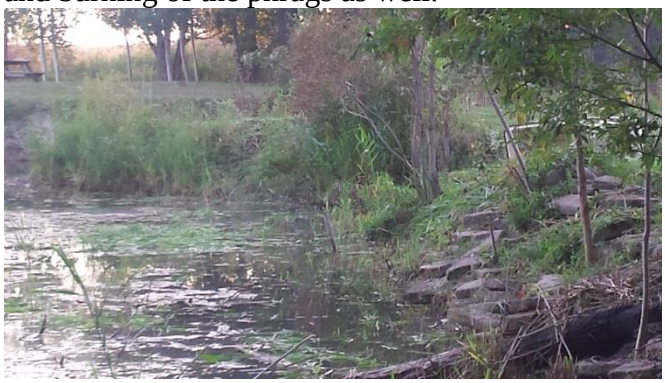
June 20, 2015 We can see progress!

By Monday morning that weekend, we noticed the return of sunfish, movement of carp, and other aquatic life in the channel in front of the cottage. The grand daddy snapping turtles even graced us with their presence! Our work was paying off! Not just visually, but the wildlife was returning! It was providing us with a cornucopia of entertainment and nature learnings. The snakes became busier at the water's edge hiding or basking on the terrace. We found three redwing blackbird nests in edges of the standing phrags, and waited until they finished nesting to remove those. Another surprise, a Baltimore oriole nest

was in the willow tree overhanging the channel in front of the cottage as well. We had spotted them flying, but finally were able to see where they nested.

August 23, 2015 phrags are almost gone

Jackie often jumped right in the water to get further out and cut the phrags. A few times stepping deep holes and to her surprise falling right in! By mid-summer we had removed more than half the phrags. We used our peddle boat to cut and ship the phrags away from the centre of the channel. My boyfriend Ian van Keulen assisted with cutting, removal and burning of the phrags as well.



Sept 26, 2015 Seeing the boat launch for the first time from the patio!

By mid-September the only real dense part of the phrags left was to the south of the boat launch on our property. Ian went gang busters one afternoon and cut them all using garden shears in less than an hour. What a great way to remove stress and frustration from a long week at work! It was an amazing view! One that hadn't been seen in well over a decade! I am in awe!

Nature is gracing us every time we are there with new and exciting acquatic and waterfowl life now that there is space in our channel for them to live!

Today there are some phrags, but with proper management and continuous removal we believe we can keep them either maintained, or by mid next summer (hopefully) completely removed.

Appendix C: Vegetation List for Assessed Plots

Common Name	*Scientific Name*	No. Plots Observed	Relative coverage %	WET	CofC	Family
Purple Gerardia	Agalinis purpurea	16	0.16	FACW+	10	Scophulariaceae
Tickle Grass	Agrostis scabra	22	1.31	FAC	3	Poaceae
Northern Water Plantain	Alisma triviale	29	0.70	OBL	6	Alismataceae
Indian Hemp	Apocynum cannabinum	2	0.00	FACU	1	Apocynaceae
Common Milkweed	Asclepias syriaca	2	0.08	FACU-	1	Asclepiadaceae
Slender white aster	Aster borealis	2	0.08	OBL	9	Asteraceae
Tall White Aster	Aster lanceolatus	2	0.00	FACW	3	Asteraceae
New England Aster	Aster novae-angliae	4	0.15	FACW-	2	Asteraceae
Purple-stemmed Aster	Aster puniceus	6	0.46	OBL	7	Asteraceae
Nodding Beggar's Ticks	Bidens cernuus	4	0.08	OBL	3	Asteraceae
River Bulrush	Bolboschoenus fluviatilis	12	0.69	OBL	5	Cyperaceae
Canada Bluejoint	Calamagrostis canadensis	8	0.16	FACW+	4	Poaceae
Hedge Bindweed	Calystegia sepium	4	0.00	FAC-	1	Convolvulaceae
Water Sedge	Carex aquatilis	2	0.08	OBL	9	Cyperaceae
Brown Sedge	Carex brunnescens	4	0.00	FACW	9	Cyperaceae
Porcupine Sedge	Carex hystericina	2	0.00	OBL	5	Cyperaceae
Lakebank Sedge	Carex lacustris	8	1.00	OBL	5	Cyperaceae
Wire Sedge	Carex lasiocarpa	2	0.08	OBL	8	Cyperaceae
Pointed Broom Sedge	Carex scoparia	2	0.15	FACW	3	Cyperaceae
Green Sedge	Carex viridula	2	0.00	OBL	8	Cyperaceae
Fox Sedge	Carex vulpinoidea	4	0.08	OBL	1	Cyperaceae
Stonewort	Chara spp.	31	13.12	OBL		Characeae
Canada Thistle	Cirsium arvense	8	0.08	FACU	*	Asteraceae
Twig Rush	Cladium mariscoides	8	0.16	OBL	9	Cyperaceae
Red Osier Dogwood	Cornus stolonifera	2	1.69	FACW+	3	Cornaceae
Shining Flatsedge	Cyperus bipartitus	24	1.92	FACW+	3	Cyperaceae
Fragrant Galingale	Cyperus odoratus	4	0.15	FACW	4	Cyperaceae
Queen Anne's Lace	Daucus carota	10	1.08	UPL	*	Apiaceae
Barnyard Grass	Echinochloa crusgalli	2	0.00	FACU	*	Poaceae
spike rush	Eleocharis elliptica	24	2.08	FACW+	7	Cyperaceae
Common Waterweed	Elodea canadensis	4	0.00	OBL	3	Hydrocharitaceae
Narrow-leaved Willowherb	Epilobium leptophyllum	4	0.08	OBL	7	Onagraceae
Marsh Horsetail	Equisetum palustre	2	0.08	FAC	2	Equisetaceae
Spotted Joe-pye Weed	Eupatorium maculatum	12	0.16	FACW	6	Asteraceae
Boneset	Eupatorium perfoliatum	2	0.00	FACW+	3	Asteraceae
Grass-leaved Goldenrod	Euthamia graminifolia	8	0.69	FAC	2	Asteraceae
Red/Green Ash	Fraxinus pennsylvanica	3	0.08	FACW	3	Oleaceae
Rough Bedstraw	Galium asprellum	4	0.15	OBL	4	Rubiaceae
Small Bedstraw	Galium trifidum	2	0.00	FACW+	7	Rubiaceae
Sneezeweed	Helenium autumnale	2	0.00	FACW+	4	Asteraceae
Kalm's St. John's-wort	Hypericum kalmianum	2	0.08	FAC	8	Clusiaceae
Jewelweed	Impatiens capensis	4	0.00	FACW	2	Balsaminaceae
Short-tailed Rush	Juncus brevicaudatus	49	4.23	OBL	6	Juncaceae
Canada Rush	Juncus canadensis	41	2.00	OBL	4	Juncaceae
Dudley's Rush	Juncus dudleyi	14	0.54	FACW-	3	Juncaceae
Soft Rush	Juncus effusus	27	0.92	FACW+	1	Juncaceae
Knotted Rush	Juncus nodosus	16	0.39	OBL	5	Juncaceae
Rice Cutgrass	Leersia oryzoides	4	0.15	OBL	1	Poaceae
Kalm's Lobelia	Lobelia kalmii	8	0.00	OBL	9	Campanulaceae
Northern Bugleweed	Lycopus uniflorus	2	0.01	OBL	3	Lamiaceae
Tufted Loosestrife	Lysimachia thyrsiflora	4	0.00	OBL	6	Primulaceae
Purple Loosestrife	Lythrum salicaria	43	4.65	FACW+	*	Lythraceae
Black Medick	Medicago lupulina	2	0.00	UPL	*	Fabaceae
Wild Mint	Mentha arvensis	4	0.54	FACW	2	Lamiaceae
Slender Naiad	Najas flexilis	2	0.08	OBL	5	Najadaceae
Woolly Panic Grass	Panicum acuminatum	2	0.15	FAC	2	Poaceae
Witch Grass	Panicum capillare	2	0.00	FAC-	1	Poaceae
Fall Panicum	Panicum dichotomiflorum	2	0.00	FACW-	0	Poaceae
Virginia Creeper	Parthenocissus quinquefolia	2	0.00	FACU	2	Vitaceae
European Reed	Phragmites australis	98	17.43	FACW	*	Poaceae
Pale Smartweed	Polygonum lapathifolium	4	0.00	FACW+	1	Polygonaceae
Variable Pondweed	Potamogeton gramineus	2	0.00	OBL	10	Potamogetonaceae
Silverweed	Potentilla anserina	10	0.16	OBL	5	Rosaceae
Staghorn sumach	Rhus typhina	2	0.08	UPL	2	Anacardiaceae
Capillary Beakrush	Rhynchospora capillacea	6	0.08	OBL	9	Cyperaceae
Wild Red Raspberry	Rubus idaeus	2	0.00	FAC-	6	Rosaceae
Broad-leaved Arrowhead	Sagittaria latifolia	8	0.08	OBL	1	Alismataceae
Bebb's Willow	Salix bebbiana	4	0.31	FACW	5	Salicaceae
Lowland Pussy Willow	Salix discolor	4	0.08	FACW	3	Salicaceae
Willow	Salix sp.	6	0.08	FACW		Salicaceae
Hardstem Bulrush	Schoenoplectus acutus	4	0.08	OBL	7	Cyperaceae
Common Three-square	Schoenoplectus pungens	29	0.33	FACW+	5	Cyperaceae
Soft-stem Bulrush	Schoenoplectus tabernaemontani	20	0.31	OBL	2	Cyperaceae
Black Bulrush	Scirpus atrovirens	29	2.30	OBL	1	Cyperaceae
Canada Goldenrod	Solidago canadensis	8	0.54	FACU	1	Asteraceae
Field Sow Thistle	Sonchus avensis	4	0.00	UPL	*	Asteraceae
Large-fruited Bur-reed	Sparganium eurycarpum	4	0.00	OBL	4	Sparganiaceae
Nodding Ladies Tresses	Spiranthes cernua	2	0.00	FACW	4	Orchidaceae
Marsh St John's-wort	Triadenum fraseri	2	0.00	OBL	6	Clusiaceae
White clover	Trifolium repens	2	0.00	FACU-	*	Fabaceae
Narrow-leaved Cattail	Typha angustifolia	31	1.69	OBL	*	Typhaceae
Hybrid Cattail	Typha glauca	8	0.41	OBL	*	Typhaceae
Flat-leaved Bladderwort	Utricularia intermedia	10	0.54	OBL	10	Lentibulariaceae
Common Bladderwort	Utricularia vulgaris	12	1.85	OBL	6	Lentibulariaceae
Blue Vervain	Verbena hastata	6	0.23	FACW+	4	Verbenaceae