2015 Phragmites Monitoring Results

for

Wazee Lake Recreation Area

Jackson County, Wisconsin

Flowering head of *Phragmites australis* from Wazee Lake Recreation Area

Project initiated by:
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ABSTRACT

Jackson County Parks and Recreation developed a management plan for non-native *Phragmites australis* (hereafter Phragmites) in Wazee Lake Recreation Area from 2015 through 2020. The county was successful in securing a three-year grant from the Wisconsin Department of Natural Resources (WDNR) to control Phragmites. Efforts began before the grant with herbicide treatment of an 11-acre unit around the Tailings Pond in 2014 and prescribed burn of the entire Tailings Basin in spring 2015. Observations suggest Phragmites in the 11-acre unit to be reduced by at least 90%, which was a goal identified in the grant application. In addition to the 11-acre unit, an additional 14 treatment units were delineated by county staff ranging in size from 0.1 to 10.37 acres and totaling 35 acres. These treatment units were located within and around the Tailings Basin. A total of 12 transects were established in 8 of the treatment units for multi-year monitoring of Phragmites. Transects were installed in July 2015 using a T-post to demarcate each end. During August 10-17, 2015, one-square-meter quadrats were placed along transects at every meter and dominance class was determined using modified methods from Moore (2015). Photos were taken at each transect. In addition, 6 photo points were established where transects were problematic due to site access and/or high water levels. Along the 12 transects, there were a total of 192 quadrats where dominance class was recorded. Seventy-eight percent (150) of the quadrats were >50% Phragmites while the remaining 22% (42) were mixed (i.e., no particular class/component dominating the quadrat). The transects that were most mixed with native plant species were #6 near the entrance of the Tailings Basin and #12 near the Tailings Pond. Herbicide treatment of 35 acres among the 14 treatment units occurred August 24, 2015. Data and photos will be used to compare pre-treatment conditions in 2015 to post-treatment conditions in 2016. Depending on findings in 2016, there may be efforts to re-treat some of the same areas to meet the goal of 90% reduction.

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INTRODUCTION

Project Background

Jackson County Forestry & Parks Department was awarded an Aquatic Invasive Species Control Grant in 2015 from the Wisconsin Department of Natural Resources. The grant funds are provided for three years for the control of the invasive wetland plant, *Phragmites australis*, hereafter Phragmites[1], within the Wazee Lake Recreation Area. Control efforts are concentrated within and around the Tailings Basin with approximately 46 acres of Phragmites units delineated, many of which are small patches less than 3 acres in size. The areas delineated in Figure 1 are intended to illustrate the areas of focus for control efforts in 2014-2015 and do not reveal all the locations of Phragmites in Wazee.

Control efforts began in July 2014 with aerial spray application of Imazapyr[2] on 11 acres immediately surrounding the Tailings Pond. Prescribed burning was attempted the following winter but was unsuccessful because the fire would not carry. The following spring 2015, the entire tailings basin was burned, including the 11 acres that were treated with Imazapyr in 2014. Initial reports of these treatments suggest a very high success with an estimated control of 98% of Phragmites in that 11-acre treatment area.

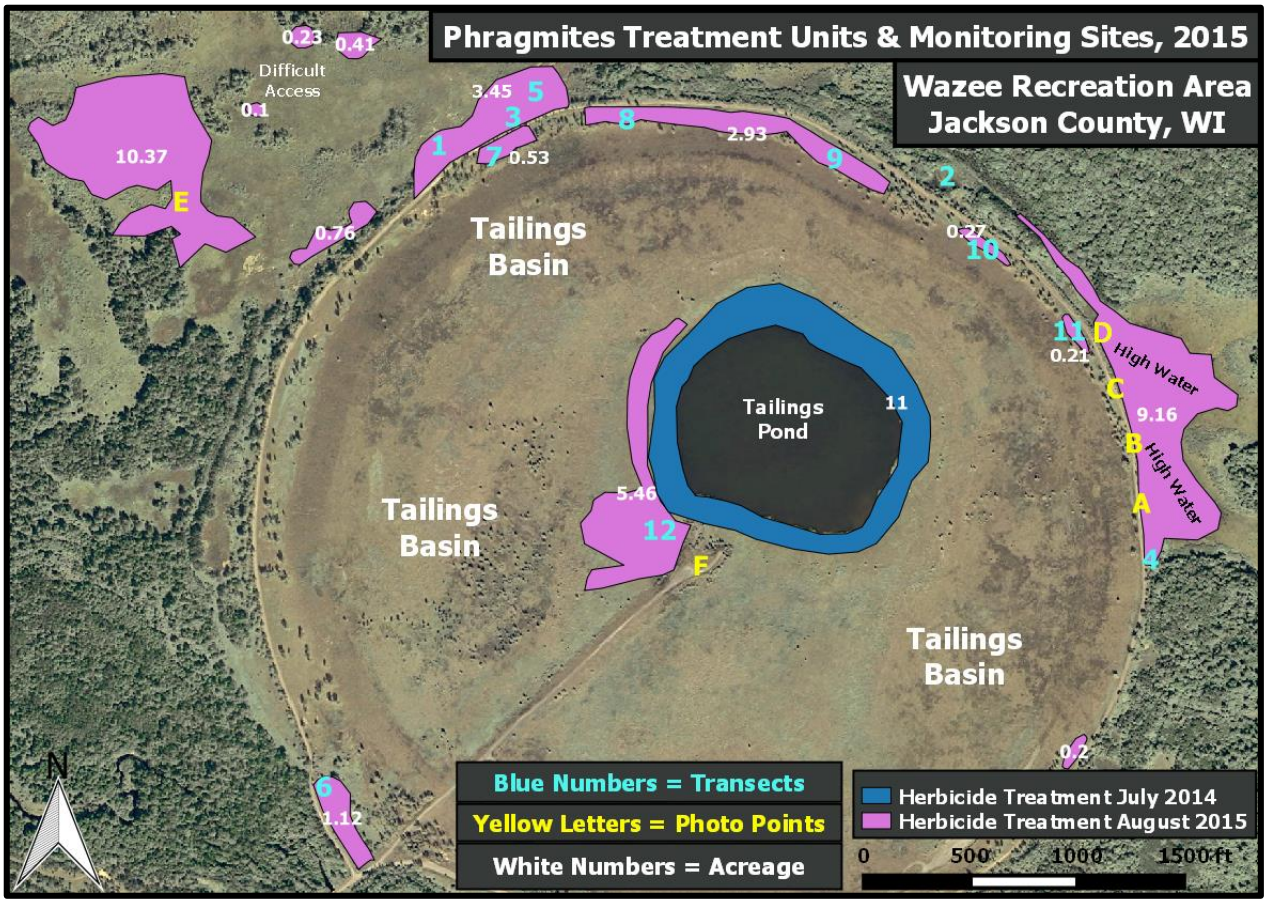
Jackson County partnered with Aquatic Plant and Habitat Services (APHS) in spring 2015 to assist with monitoring as outlined in the grant application. Aerial spray of Imazapyr was completed on another 35 acres on August 24, 2015. Before that time, monitoring efforts began with installation of 12 transects and another 6 photo points. This report provides pre-treatment survey data for those 35 acres that were treated.

Project Area

Wazee Lake Recreation Area is approximately 5 miles east of Black River Falls in Jackson County, Wisconsin. The property was the Jackson County Iron Mine from 1967 to 1983 owned by Inland Steel Mining Company. Before the mine closed, Inland Steel began reclamation of the site, which included planting vegetation to stabilize the soils. Due to the extremely poor nutrient content of the soils in the Tailings Basin area, less desirable plant species were selected for planting, one of which was the non-native *Phragmites australis.*

[1] See Appendix A for further information on *Phragmites australis.*
[2] See Appendix B for further information on Imazapyr.

Figure 1 – Project Map



Project Goals

Project goals listed below are an abbreviated version of those from the grant application submitted by Jackson County to the WDNR in early 2015. This report is intended to meet the requirements for Goal #3 in 2015 by establishing a monitoring strategy, defining monitoring locations, and providing pre-treatment data for sites that were sprayed in 2015.

1. Reduce Phragmites by 90% in five years (2014-2019) using aerial and ground application of approved herbicides.
2. Remove biomass on treated sites through mechanical means and prescribed burning to aid in monitoring and increase effectiveness of re-treatment.
3. Conduct monitoring to determine effectiveness of treatment and the need for additional treatment.
4. Provide public education and outreach to prevent Phragmites control to new areas.

METHODS

Monitoring Strategy Development

A monitoring strategy was developed for Wazee based on the project goals. Photo points, dominance class, and floristic quality were all considered (Table 2). Photo points and a dominance class method adapted from Moore (2015) were selected because they provide valuable information and only require a moderate amount of time at each survey site. Floristic quality could be used in future monitoring if needed. Although floristic quality provides the greatest amount of information, the time required may not be justified based on the goals of this project.

Table 1 – Phragmites Monitoring Options

PHOTO POINTS	Photos will be taken at fixed locations each time the site is visited for monitoring. GPS coordinates, a compass, and t-post installation will ensure photos are taken from the same location each time. This approach allows for the quickest assessment and visual comparisons over time. However, this approach is lacking in quantitative measurements of species diversity and stem density.
DOMINANCE CLASS	Either transects or a point-intercept (PI) grid will be established within Phragmites sites. Quadrats will be placed along the transect or at survey points (if PI) and dominating class within the quadrat will be recorded. Quadrat size and distance between quadrats is to be determined based on site characteristics. This approach provides a coarse assessment of plant types and changes over time. This approach requires more time than photo point monitoring, but less time than floristic quality monitoring. However, his approach is lacking in quantitative measurements of species diversity and stem density.
FLORISTIC QUALITY	Either transects or a point-intercept (PI) grid will be established within Phragmites sites. Quadrats will be placed along the transects and plant species within the quadrat will be identified to species. Percent cover and stem density of each plant will be recorded. Quadrats will be one square meter. Distance between quadrats will be determined based on site characteristics. This approach provides a quantitative measurement of species diversity and stem density. This approach is highly time intensive.

Field Methods

Transects were installed at 12 locations in July and August 2015 using 2 metal T-posts per transect to define each end with lengths ranging from 6 to 34 meters (Table 2). Transect length was largely dictated by site characteristics such as water depth and density of Phragmites and the mean length was 16 meters. Since the transects are to be visited over a number of years for monitoring purposes, T-posts were hammered using a post pounder to prevent ejection during freeze-thaw cycles. Latitude and longitude coordinates were captured using an IPhone 5c and PDF Maps application. Transects were located within areas planned for 2015 herbicide treatment except for Transect 2 (Figure 1).

Table 2 – Transect & Photo Point Identifiers & Coordinates

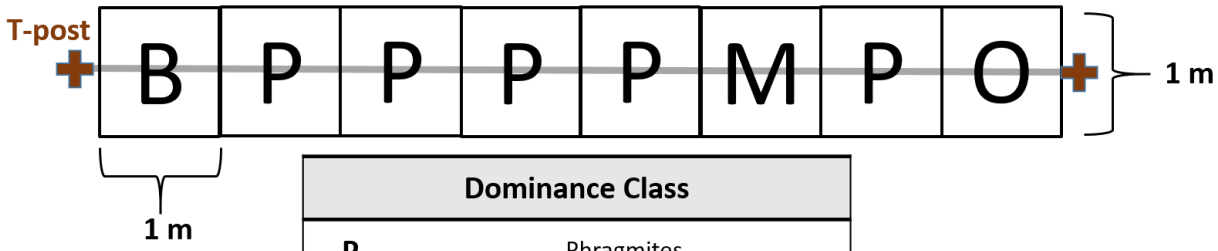
Transect Number	Transect Length (m)	Longitude	Latitude
1	15	*-90.720528*	*44.309271*
2	6	*-90.711455*	*44.308692*
3	18	*-90.719186*	*44.309609*
4	12	*-90.708002*	*44.303699*
5	34	*-90.718770*	*44.309929*
6	10	*-90.722902*	*44.301076*
7	16	*-90.719547*	*44.309107*
8	16	*-90.717151*	*44.309537*
9	15	*-90.713449*	*44.308957*
10	13	*-90.710856*	*44.307739*
11	14	*-90.709344*	*44.306663*
12	23	*-90.716775*	*44.304250*
Photo ID Letter		**Longitude**	**Latitude**
A		*-90.708204*	*44.304334*
B		*-90.708312*	*44.305107*
C		*-90.708612*	*44.305817*
D		*-90.709013*	*44.306553*
E		*-90.725241*	*44.308550*
F		*44.303689*	*44.303689*

Transect monitoring was completed between August 10 and 17, 2015. A measuring tape was secured to each end of the transect and a one-square-meter quadrat frame was placed along the transect starting at the first meter. Dominance class was recorded as defined in Figure 2. Each meter along the transect was surveyed using this procedure. Photos were taken at each transect.

Photo points were established at 6 locations as identified in Figure 1 and Table 2. Photos were taken at points A through D facing toward the 9.16-acre treatment unit. Transects were not possible in the 9.16-acre unit because water levels were too high. Point E photos were taken in various directions approximately 10 feet higher than ground level. Photos at point F were taken facing northeast. All photos were taken between August 10 and 17, 2015.

Survey data were uploaded to an open source geographic information systems (GIS) program known as QGIS (QGIS, 2015). Maps were created to illustrate transect and photo point locations, treatment units, and dominance class.

Figure 2 – Transect Illustration & Dominance Class Description



Dominance Class	
P	Phragmites
D	Desirable Species
O	Other (non-Phragmites) undesirable species such as narrow-leaved cattail
B	Bare ground
M	Mixed; no single component dominating

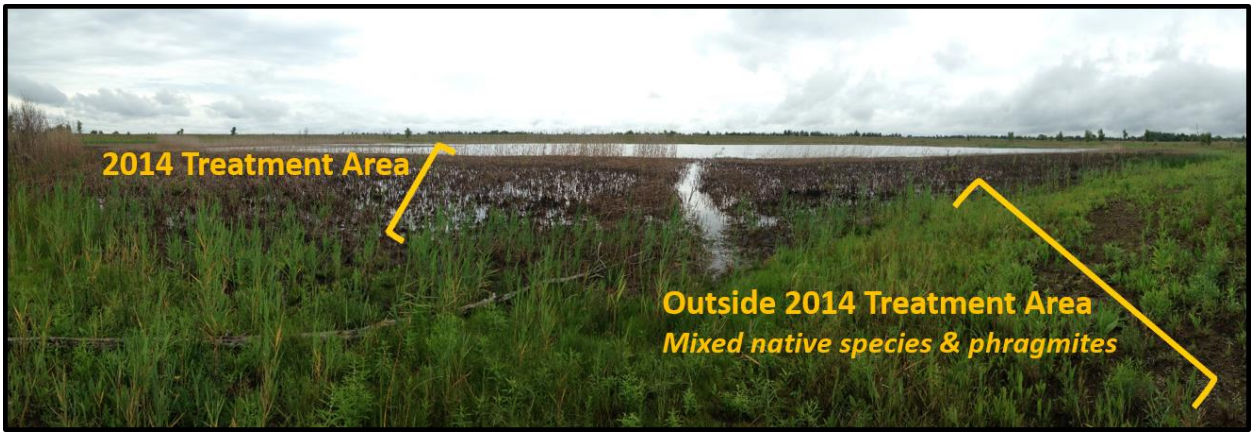
Dominance determined by >50% of quadrat with majority cover by the component

RESULTS

2014 Post-Treatment Results

A walk around the tailings pond (11-acre treatment site) in June 2015 revealed very little Phragmites growing where herbicide was applied in 2014 (Figure 3). Although there are no pre-treatment data from this site, it is reasonable to estimate there was at least 90% reduction of Phragmites because there was very little regrowth. Outside the treatment area was a mix of Phragmites and desirable native wetland and prairie species. The more upland sites were added to the treatment plan for 2015.

Figure 3 – Tailings Pond Photo, 2014 Treatment Area



2015 Pre-Treatment Results

The number of quadrats in a given transect was the same as its length. For example, transect 1 was 15 meters long (Table 2) so it had 15 quadrats. The total number of quadrats was 192, all of which had Phragmites present but at varying densities. All quadrats along transects 1 through 5, 7, 9, and 11 were dominated by Phragmites (Figure 4, Table 3). Transect 8 had 13 quadrats dominated by Phragmites and 3 that were mixed (i.e., no single component dominating, Figure 2). Transect 10 had 7 quadrats dominated by Phragmites and 6 that were mixed. All quadrats along transects 6 and 12 were mixed. Photos of all transects are included for visual comparisons to post-treatment conditions (Figure 5, Figure 6, Figure 7). Photos of points A-F are in Appendix C, also for comparison to post-treatment conditions in 2016. Points A-D were dense Phragmites, point E was mixed with native prairie species, and point F was dense Phragmites to the east and northeast but mixed to the north, southeast, and east.

Table 3 – Dominance Class Quantified in Quadrats

Transect	# Quadrats in Dominance Class	
	Phragmites	Mixed
1	15	0
2	6	0
3	18	0
4	12	0
5	34	0
6	0	10
7	16	0
8	13	3
9	15	0
10	7	6
11	14	0
12	0	23
TOTAL QUADRATS	150	42

Phragmites density and dominance classes were not highly variable among transects. With the exception of transect 6 and 12, all transects were challenging to walk through due to the high stem density of present year growth and the woody stems from previous year's growth. The data presented here are intended to serve as pre-treatment data for comparison in 2016. Post-treatment monitoring in July or August of 2016 will provide an estimate on whether 90% control was achieved and where re-treatment is required, if at all, in 2016. Dominance class information and photos will allow estimates as to whether 90% reduction was achieved.

Figure 4 – Dominance Class Map

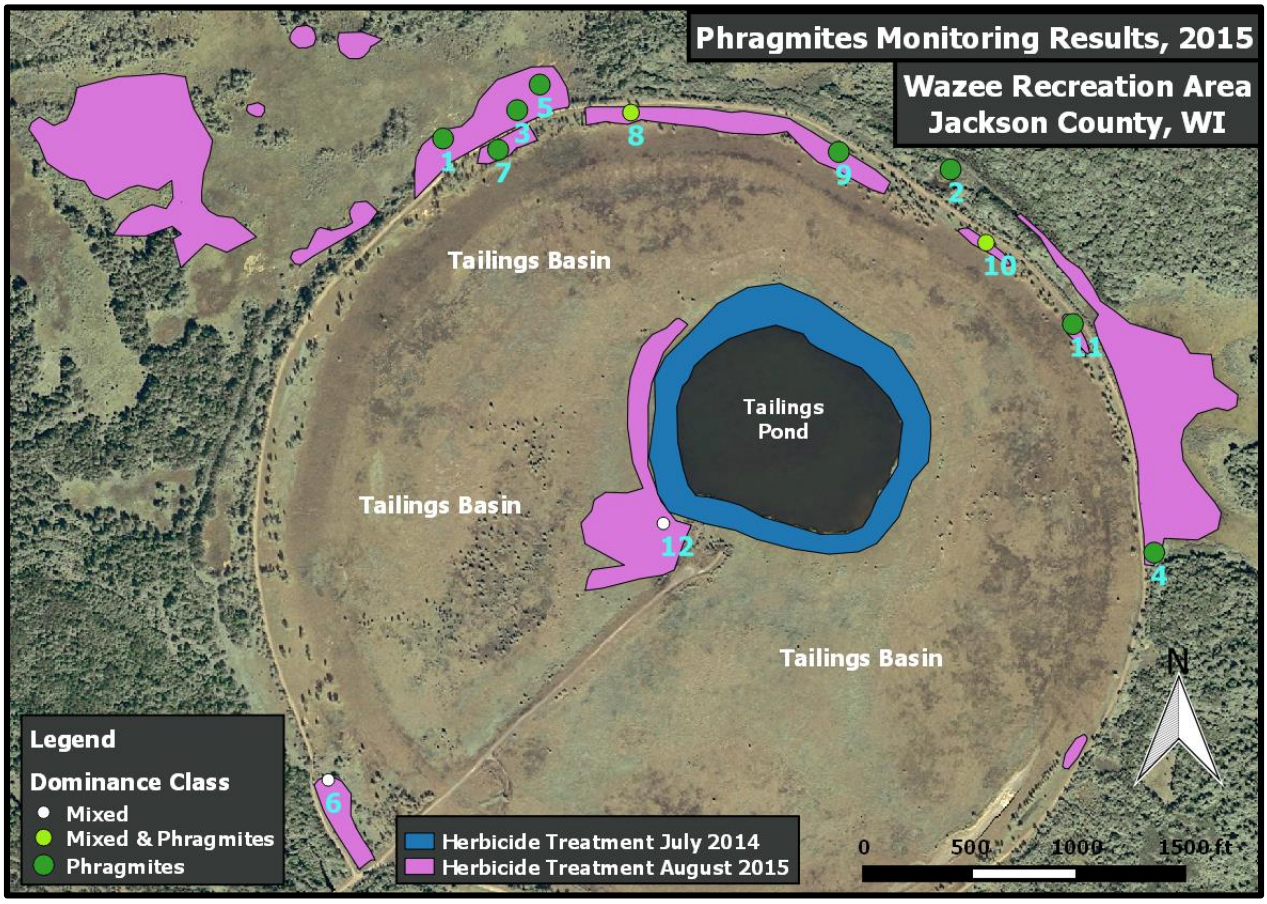
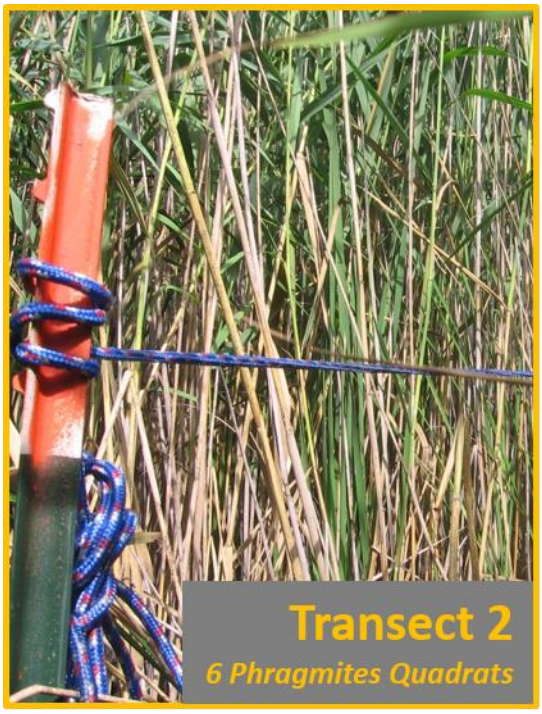


Figure 5 – Transect 1-4 Photos



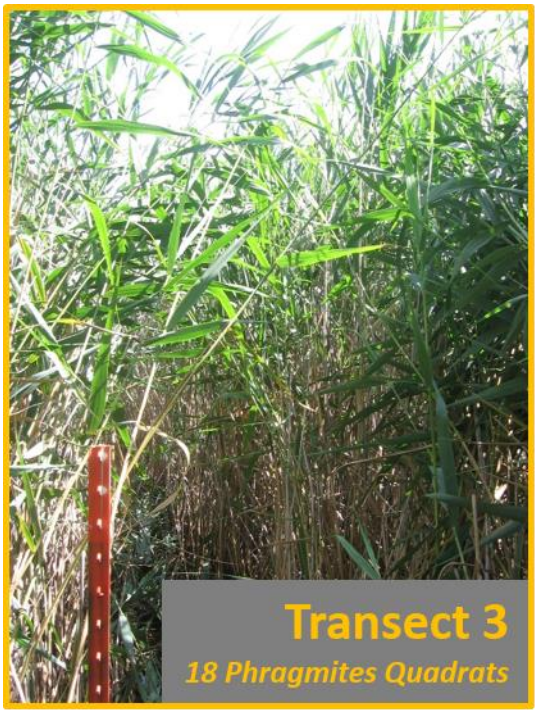
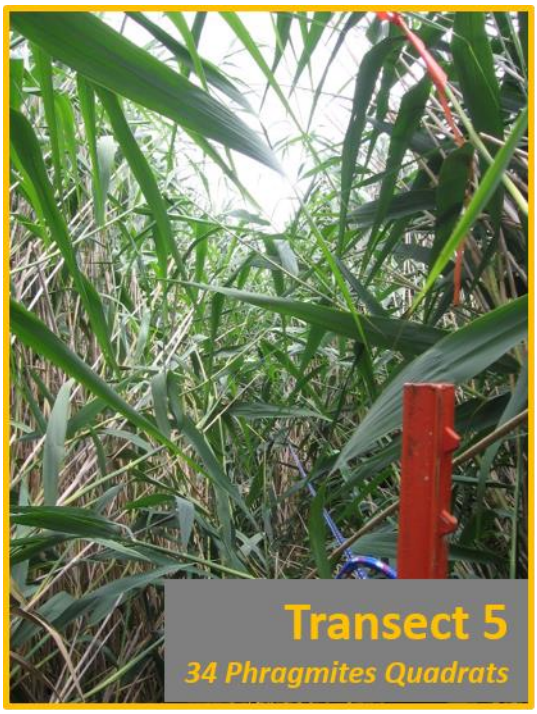


Figure 6 – Transect 5-8 Photos



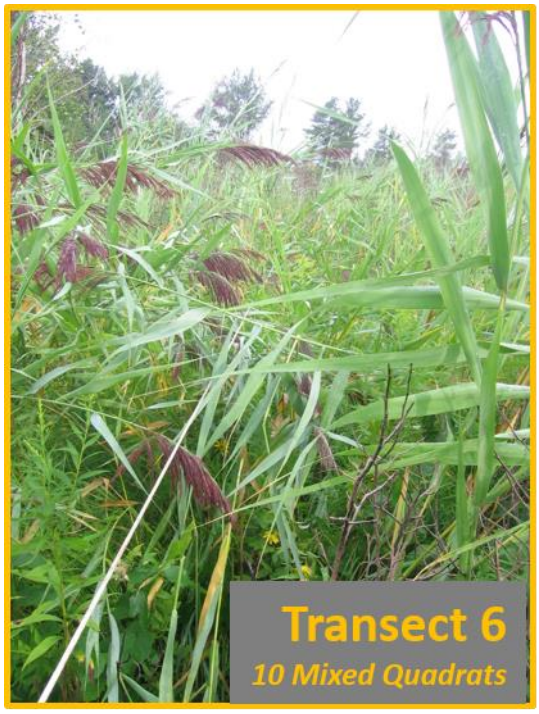
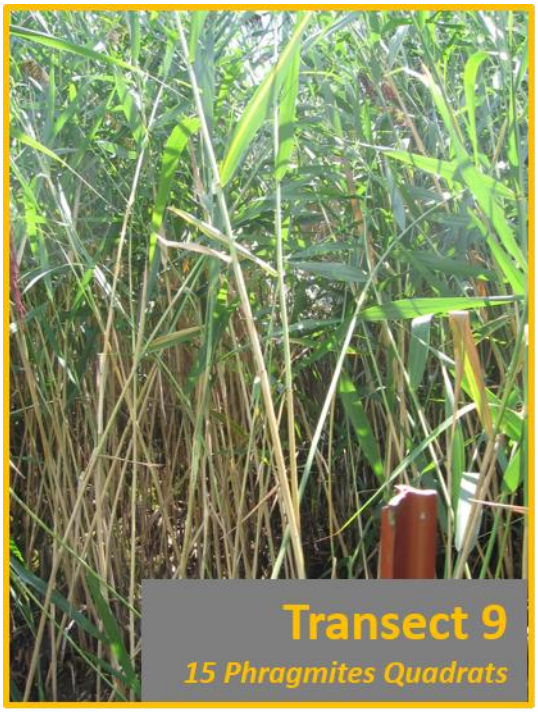
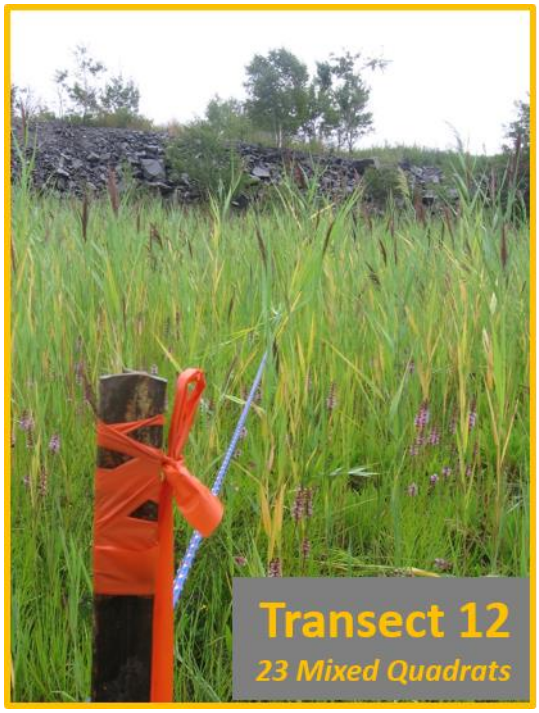


Figure 7 – Transect 9-12 Photos





REFERENCES

Moore, C. 2015. Learning-focused decision support for management of *Phragmites* in the U.S. Fish and Wildlife Service National Wildlife Refuge System. USGS Georgia Cooperative Fish and Wildlife Research Unit, University of Georgia. 7 May, 2015. http://greatlakesPhragmites.net/files/Moore-WebinarApril15.pdf.

QGIS Development Team, 2015. QGIS Geographic Information System. Open Source Geospatial Foundation Project. http://qgis.osgeo.org.

Swearingen, J. and K. Saltonstall. 2010. *Phragmites* Field Guide: Distinguishing Native and Exotic Forms of Common Reed (*Phragmites australis)* in the United States. Plant Conservation Alliance, Weeds Gone Wild. http://www.nps.gov/plants/alien/pubs/index.htm.

UWEX. 2016. University of Wisconsin-Extension. Wisconsin Horticulture, Bringing University Research to your Garden. https://hort.uwex.edu/articles/invhttp://dnr.wi.gov/topic/invasives/fact/Phragmites.htmlasive-Phragmites/. Accessed 11 January, 2016.

WDNR. 2016. Wisconsin Department of Natural Resources. Non-native Phragmites or Common reed (*Phragmites australis)*. http://dnr.wi.gov/topic/invasives/fact/Phragmites.html. Accessed 11 January, 2016.

APPENDIX A – INFORMATION ON *PHRAGMITES AUSTRALIS*

Phragmites australis is an erect perennial grass growing up to 15 feet tall. It remains standing through all seasons and the woody stems from previous years' growth make it challenging to navigate through. The plant is fairly easy to recognize based on its plume-like inflorescences (flowers). There is some difficulty, however, in identifying three subspecies because one is native and widespread in North America (*P. australis subsp. americanus*), one is non-native and from Europe *(P. australis*), and one whose origin is unclear but it occurs in the southern U.S. and into Central America (*P. australis subsp. berlandieri*) (Swearingen & Saltonstall, 2010).

Identification of *P. australis* (WDNR, 2016):

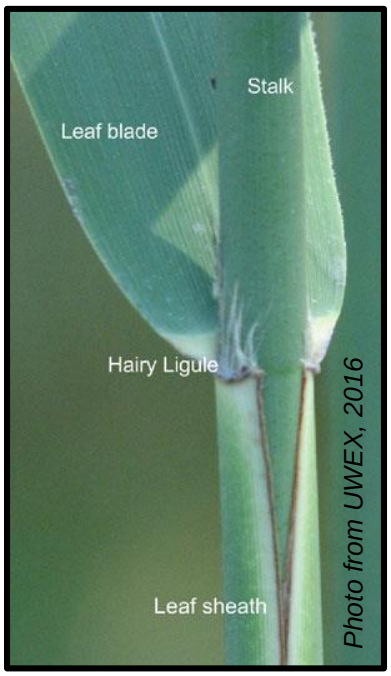
Leaves: Smooth, narrow leaves are 6- 24" long, 0.4-2.4" wide and blue-green in color. Leaf sheaths tightly clasp the stem, are difficult to remove, and stay on through winter. Long hairs are present at the junction of leaf and sheath.

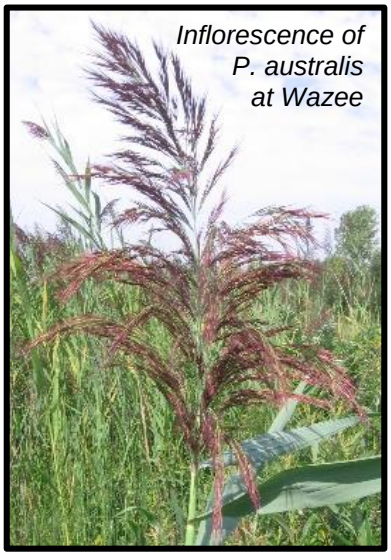
Flowers: Bushy, light brown to purple plumes are composed of spikelets that bloom July-September. Plumes are 7.5-15" long and often resemble feather dusters.

Fruits & seeds: Small and tan with many white hairs attached.

Roots: Stout oval rhizomes can reach to 6'deep and 10' horizontally.

Similar species: Native Phragmites (*Phragmites australis ssp. americanus*) has smooth, reddish-brown, flexible stems, often with shiny, round, black spots (a fungus). Its inflorescence is usually sparser than non-native Phragmites, as are most patches where it grows. Several species of Miscanthus grasses can be easily confused with Phragmites due to their showy, feathery plumes. However, they have smaller stems, a white mid-rib on the leaves, and white inflorescences.





APPENDIX B – WDNR IMAZAPYR CHEMICAL FACT SHEET

Wisconsin Department of Natural Resources

January 2012

Imazapyr Chemical Fact Sheet

Formulations

Imazapyr was registered with the EPA for aquatic use in 2003. The active ingredient is isopropylamine salt of imazapyr, (2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-3-pyridinecarboxylic acid). Formulations that can be used on aquatic vegetation in Wisconsin include Habitat™, Ecomazapyr 2sl™, Imazapyr 2sl™, and Polaris AC. Imazapyr is used for control of emergent and floating-leaf vegetation. It is not recommended for control of submersed vegetation.

Aquatic Use and Considerations

Imazapyr is a systemic herbicide that moves throughout the plant tissue and prevents plants from producing a necessary enzyme, acetolactate synthase (ALS), which is not found in animals. Susceptible plants will stop growing soon after treatment and become reddish at the tips of the plant. Plant death and decomposition will occur gradually over several weeks to months. Imazapyr should be applied to plants that are actively growing. If applied to mature plants, a higher concentration of herbicide and a longer contact time will be required.

In Wisconsin, imazapyr is used to control the invasive plants common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*) and Japanese knotweed (*Polygonum cuspidatum*). Native species that are also controlled include cattails (*Typha* spp.), water lilies (*Nymphaea* sp.), pickerelweed (*Pontederia cordata*), duckweeds (*Lemna* spp.) and arrowhead (*Sagittaria* spp.).

It is important to note that repeated use of herbicides with the same mode of action can lead to herbicide-resistant plants, even in aquatic plants. More resistant weeds have developed to the ALS inhibitor herbicides than to other herbicide types, and so this mechanism of action may be more susceptible to developing resistance. In order to prevent herbicide resistance, avoid using the same type of herbicides year after year, and when possible, use non-herbicide methods of control instead.

Post-Treatment Water Use Restrictions

There are no restrictions on recreational use of treated water, including swimming and eating fish from treated water bodies. If application occurs within a ½ mile of a drinking water intake, then the intake must be shut off for 48 hours following treatment. There is a 120-day irrigation restriction for treated water, but irrigation can begin sooner if the concentration falls below one part per billion (ppb).

Herbicide Degradation, Persistence and Trace Contaminants

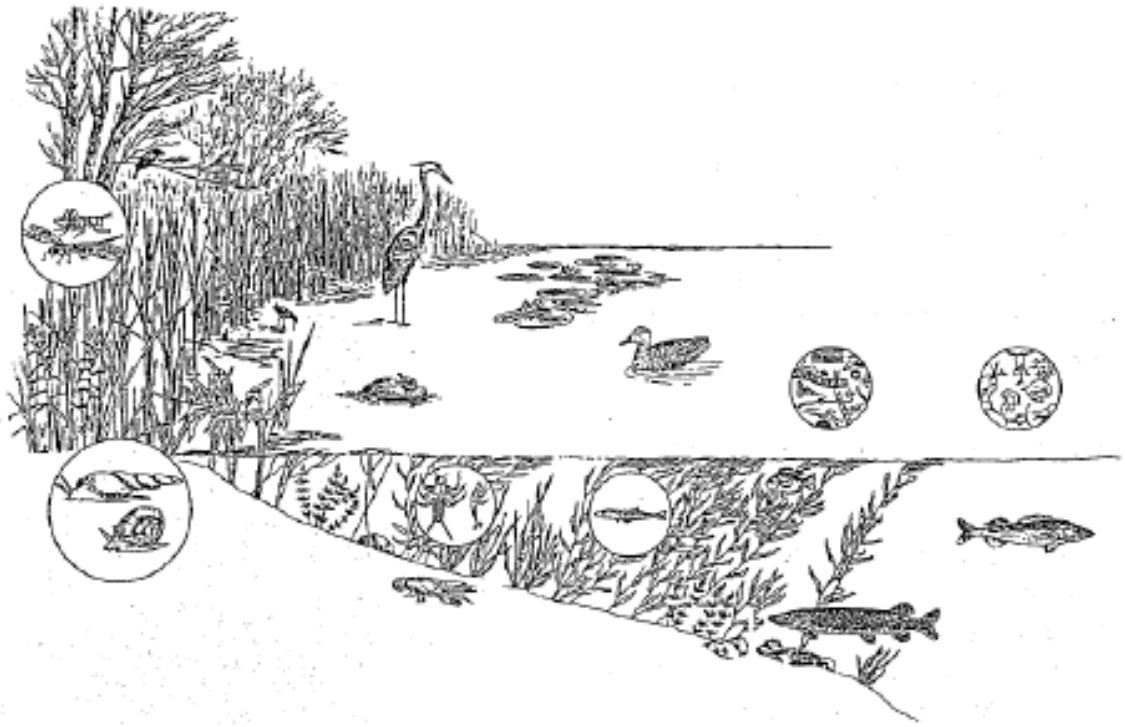
Imazapyr is broken down in the water by light and has a half-life (the time it takes for half of the active ingredient to degrade) ranging from three to five days.

Three degradation products are created as imazapyr breaks down. These are pyridine hydroxy-dicarboxylic acid, pyridine dicarboxylic acid (quinolinic acid), and nicotinic acid. These degradates persist in water for approximately the same amount of time as imazapyr (half-lives of three to eight days).

In soils imazapyr is broken down by microbes, and persists with a half-life of one to five months. It doesn't bind to sediments, so leaching through soil into groundwater is likely.

Impacts on Fish and Other Aquatic Organisms

Imazapyr is practically non-toxic (the EPA's lowest toxicity category) to fish, invertebrates, birds and mammals. Toxicity tests were not conducted on amphibians or reptiles. It does not bioaccumulate in animal tissues.



Human Health

Concentrated imazapyr has low acute toxicity on the skin or if ingested, but is harmful if inhaled and may cause irreversible damage if it gets in the eyes. Applicators should wear chemical-resistant gloves while handling, and persons not involved in application should avoid the treatment area during treatment.

Chronic toxicity tests for imazapyr indicate that it is not carcinogenic, mutagenic, or neurotoxic. It also does not cause reproductive or developmental toxicity, and is not a suspected endocrine disrupter.

Imazapyr degradates are no more toxic than imazapyr itself, and are excreted faster than imazapyr when ingested.

For Additional Information

Environmental Protection Agency
Office of Pesticide Programs
www.epa.gov/pesticides

Wisconsin Department of Agriculture, Trade, and Consumer Protection
http://datcp.wi.gov/Plants/Pesticides/

Wisconsin Department of Natural Resources
608-266-2621
http://dnr.wi.gov/lakes/plants/

Wisconsin Department of Health Services
http://www.dhs.wisconsin.gov/

National Pesticide Information Center
1-800-858-7378
http://npic.orst.edu/

Wisconsin Department of Natural Resources
Box 7921
Madison, WI 53707-7921

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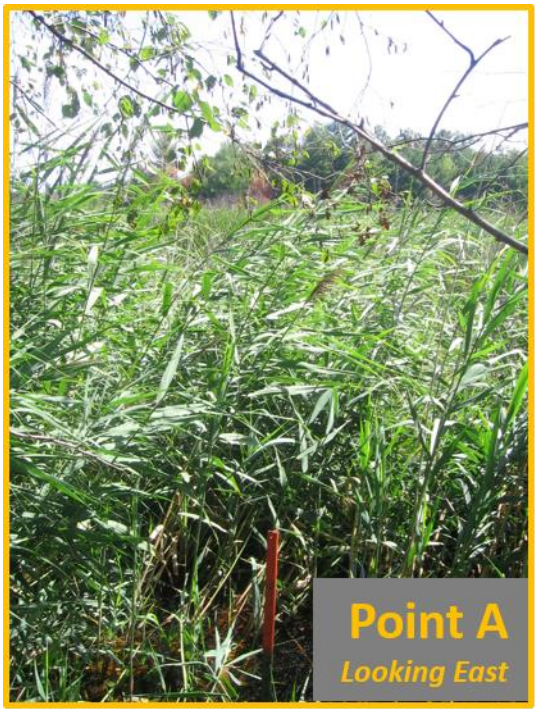
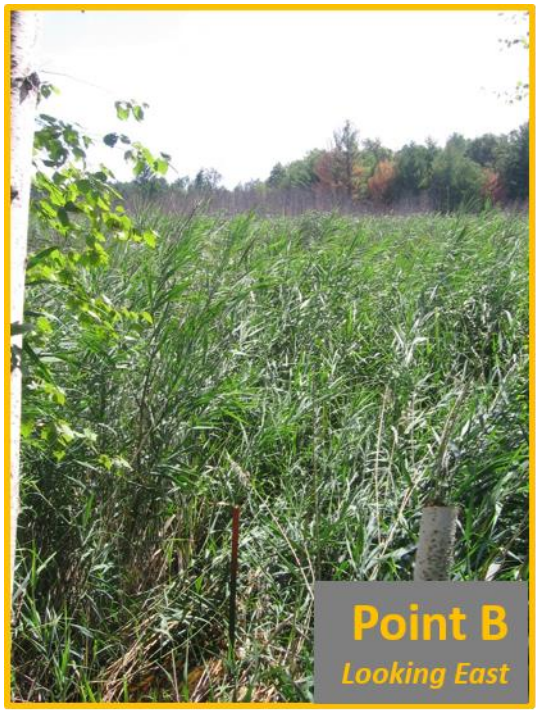
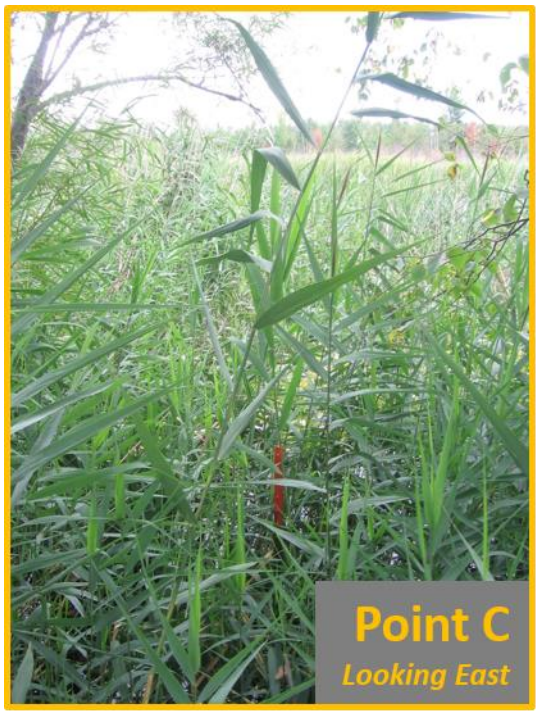
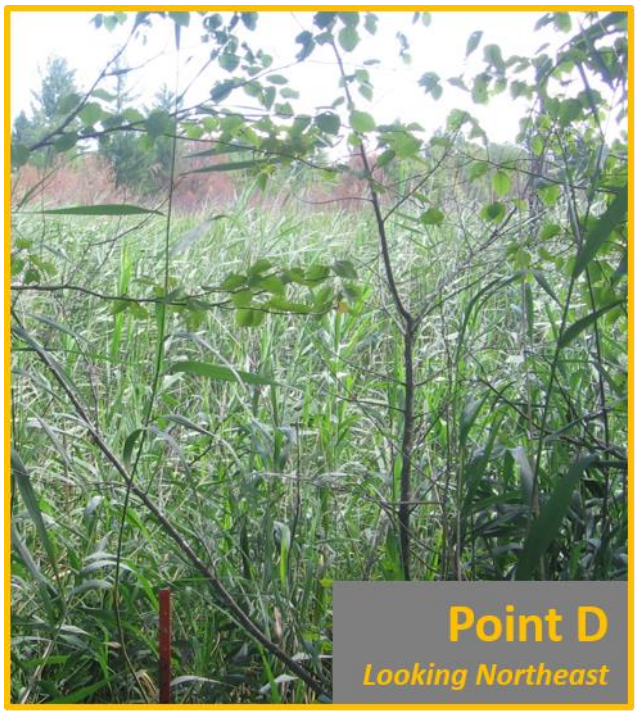
APPENDIX C – PHOTOS FOR POINTS A THROUGH F



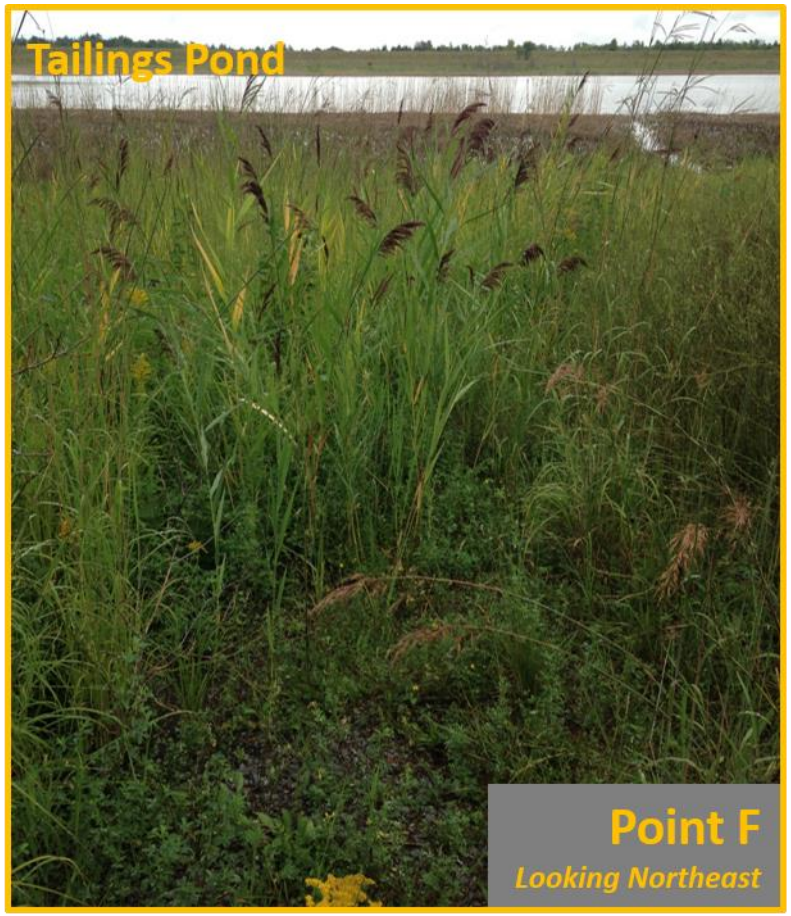







Point E
Looking East


Point E
Looking Northeast


Tailings Pond
Point F
Looking Northeast