

Deep Lake



Shoreline Vegetation Survey 9/13/18

This document details the methods and findings of a shoreline vegetation survey completed on Deep Lake.

Data collected and prepared by **Ramsey County Soil & Water Conservation Division** for

Vadnais Lake Area Water Management Organization
800 East County Rd E.
Vadnais Heights, MN 55127
Phone: (651) 204-6073 <http://www.vlawmo.org/>

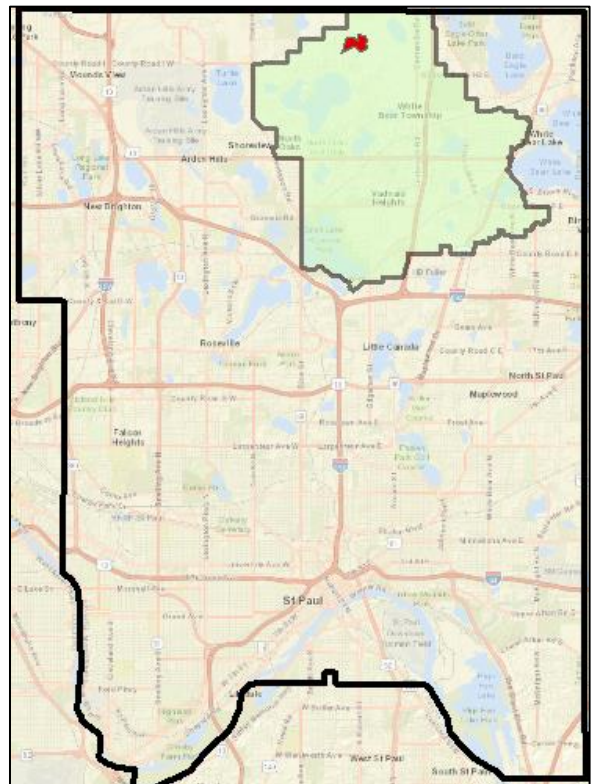


Figure 1. Location of Deep Lake (red) in Ramsey County within VLAWMO borders

Deep Lake Shoreline Vegetation Survey

September 13 & 14, 2018

Background:

Deep Lake is located in North Oaks, MN along the northern boundary of Ramsey County and the Vadnais Lake Area Watershed Management Organization (VLAWMO) [Figure 1].

About 2/3 of the shoreline of Deep Lake is classified as Northern Mixed Cattail Marsh (MRn83) [Figure 2-A], (MN DNR, 2014). Details characterizing the vegetation structure, composition, landscape, and natural history of this native plant community can be found within Appendix A of this report. The remaining 1/3 of the shoreline is in the more developed and higher-elevation southern/southwestern perimeter of the lake.

Within the US Fish & Wildlife Service's National Wetland Inventory (Cowardin Classification System), there are three predominant classifications around Deep Lake: PEM1C, PEM1F, and PSS1C, which correspond to Shallow Marsh and Shrub Wetland [Figure 2-B]. PEM1C and PEM1F refer to palustrine, emergent, persistent marshes that are seasonally flooded (1C) or semi-permanently flooded (1F), whereas PSS1C is identified as a palustrine scrub-shrub, broad-leaved deciduous wetland that is seasonally flooded (Cowardin *et al.*, 1979). PEM1C covers the northwest shoreline, PSS1C covers the northern shoreline to the east, and PEM1F covers the eastern and southeast shoreline. These three areas that immediately border the lake add up to 26.24 acres, or 106,190 square meters.

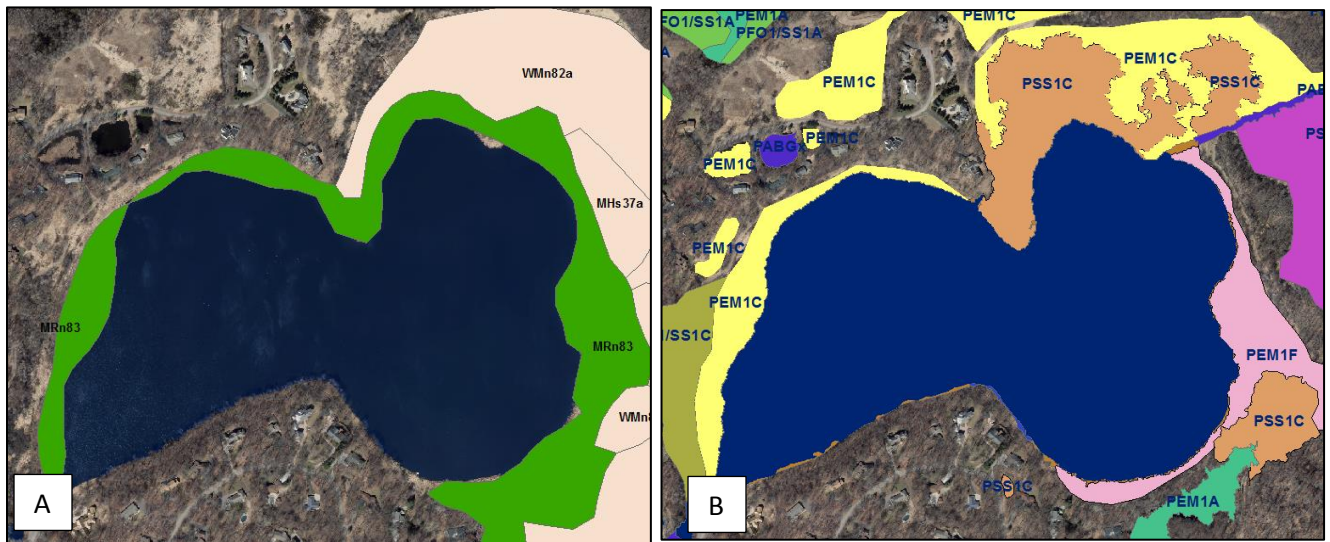


Figure 2-A. Left: Deep Lake Shoreline Classification by Native Plant Community (left) as MRn83, or Northern Mixed Cattail Marsh, (Source: MNDNR Native Plant Community shapefile)

Figure 2-B. Right: Deep Lake Shoreline Wetland Classification by National Wetland Inventory as three major wetland types: PEM1C, PEM1F, and PSS1C (Source: Wetlands_NWI2010 shapefile from Ramsey County).

Methods:

The vegetation sampling method chosen for this survey was quadrat-transect, as first developed by Curtis and McIntosh (1950). Around the perimeter of Deep Lake, six evenly spaced transect lines perpendicular to shore were pre-drawn in ArcMap with the objective of documenting environmental variations across the areas of study, including each of the different wetland classifications as well as the disturbed southern perimeter of the lake. To best account for vegetation present within dense herbaceous cattail marsh habitats, a one square meter quadrat was used within this survey (Goldsmith et al., 1986). Systematic sampling, using defined intervals for transect and quadrat placement, was chosen to best investigate spatial patterns in plant species and abundance along the lake shore (Barbour et al., 1987).

In the field, individual plants lying within a 1-meter square quadrat [Figure 3] were identified and counted at each of 4 locations along each transect line: at the interface with the lake (0 m), 5 m from shore, 10 m from shore, and 15 m from shore, for a total of 24 quadrat sample sites. A GIS shapefile was loaded into a Trimble GPS unit prior to the field work in order to locate each transect in the field. One 10-m alteration to a transect location was made in the field in order to better characterize local plant diversity. All transect locations were verified in the field by taking waypoints with the Trimble GPS at the 0 m and 15 m transect endpoints, and are accurately represented in the transect location map in Figure 4.



Figure 3. Placement of the 1-m square quadrat on Transect E, 0m from shore.

The quadrat-transect plant sampling method allowed for the computation of statistics including cover, density, and frequency of each species recorded, as calculated using the equations below (Cox, 1990).

$$\text{Relative Coverage} = \frac{\% \text{ of individual species occurring in all quadrats}}{\% \text{ cover of all species occurring in all quadrats}}$$

$$\text{Density} = \frac{\# \text{ of individuals}}{\text{Total area sampled}}$$

$$\text{Relative Density} = \frac{\text{Species density}}{\text{Total density for all species}} \times 100$$

$$\text{Frequency} = \frac{\# \text{ of quadrats species occurs in}}{\text{Total number of quadrats}} \times 100$$

$$\text{Relative Frequency} = \frac{\text{Species frequency}}{\text{Total frequency of all species}} \times 100$$

The number of individual plants of each species was recorded in the field, and percent cover was derived from the total number of individual plants in each quadrat sampled – for instance, if there were two purple loosestrife plants in a quadrat with 50 total plants, the # of individuals = 2 and the percent cover = 4 for purple loosestrife in that quadrat.

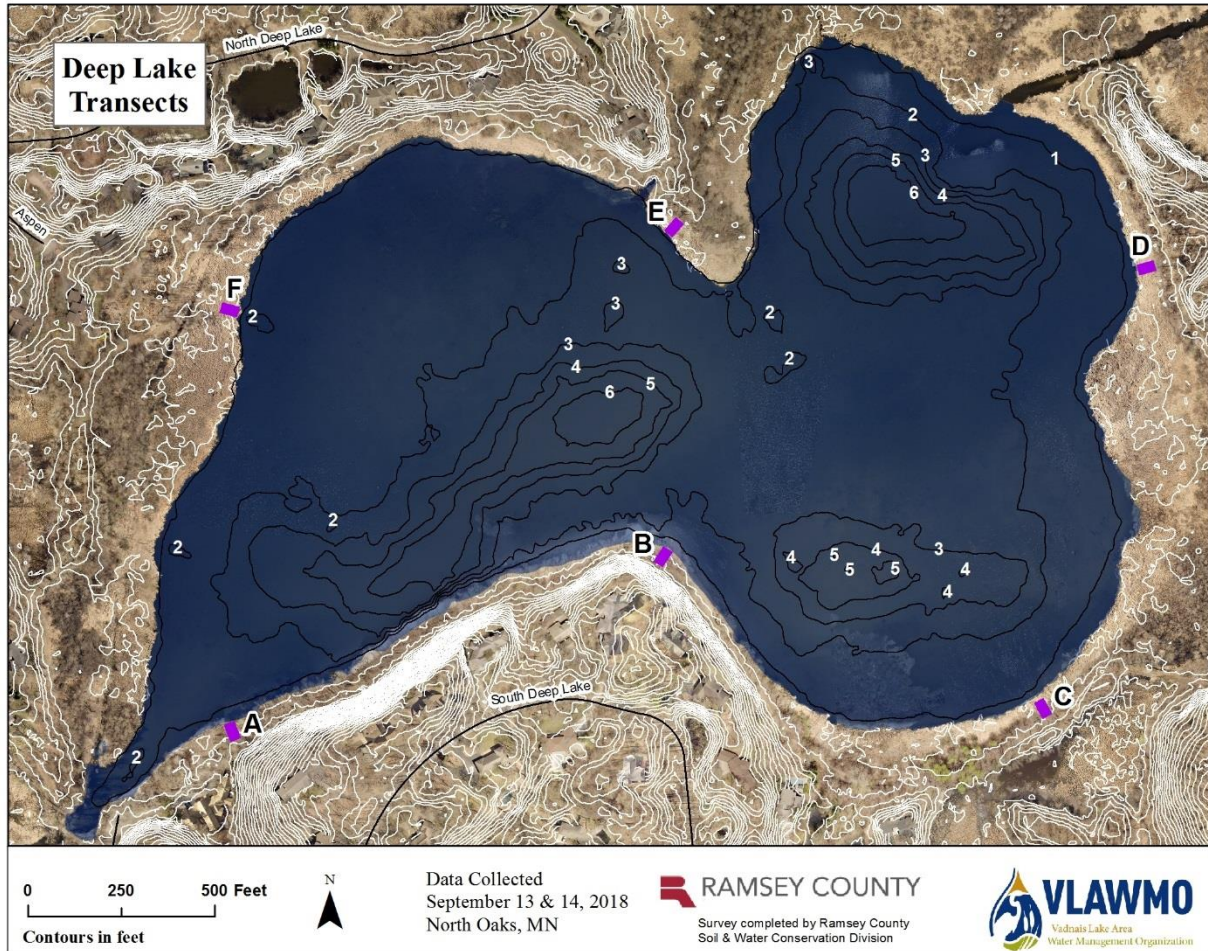


Figure 4. Transects A-F (in purple) used in the shoreline vegetation survey. Transects are evenly spaced and include the diversity of wetland classifications along the north, west, and east shores as well as the steeper, developed area in the south.

All vegetation observed and collected along the transect was identified to the lowest taxonomic level possible. All survey data was recorded in the field, except for species that were collected and labeled in the field and brought to the office for further identification.

Results per quadrat sampled can be found in Appendix B, with photos of each transect in Appendix C. The summary statistics of plant species, coverage, density, and frequency can be found in the results section below.

Results:

Transect-Quadrat Surveys

Tables 1 through 4 display shoreline plant species, coverage, density and frequency data as observed within N=24 one square meter quadrats sampled along six 15-meter long transects. A total of fifty-two (52) species were observed (Table 1), with Canada Bluejoint Grass (*Calamagrostis canadensis*) and Reed Canary Grass (*Phalaris arundinacea*) topping both the coverage list (Table 2) and the density list (Table 3) with the highest plant counts (over three times higher than the next most numerous species). The most widespread species across the lake – those found in 10 or greater quadrats – included Lake Sedge (*Carex lacustris*) and Canada Bluejoint (*Calamagrostis canadensis*), which top the frequency list (Table 4).

Other common species, found in 5-9 of the 24 total quadrats, included Reed Canary Grass (*Phalaris arundinacea*), Northern Marsh Fern (*Thelypteris palustris*), Purple Loosestrife (*Lythrum salicaria*), Rice Cut Grass (*Leersia oryzoides*), Virginia Bugleweed (*Lycopus virginicus*), Dwarf Clearweed (*Pilea pumila*), Broad-leaf Arrowhead (*Sagittaria latifolia*), and Native Cattail (*Typha latifolia*). Species found in three or four quadrats included Bulblet-Bearing Water Hemlock (*Cicuta bulbifera*), Green Ash (*Fraxinus pennsylvanica*), Sensitive Fern (*Onoclea sensibilis*), Common Buckthorn (*Rhamnus cathartica*), and Virginia Creeper (*Parthenocissus quinquefolia*). The remaining 37 species were found in only 1 or 2 quadrats (8% or less of the sample area) and are listed in Table 1. Indicator species that were found in the shoreline area, but not within quadrat areas, include Native Phragmites and Caterpillar Sedge (*Carex crinita*).

Six invasive species are among the results of this survey (in red), listed from highest to lowest plant count below:

Scientific Name	Common Name	Tot. Plant Count
<i>Phalaris arundinacea</i>	Reed Canary Grass	172
<i>Rhamnus cathartica</i>	Common Buckthorn	16
<i>Lythrum salicaria</i>	Purple Loosestrife	13
<i>Lonicera Spp.</i>	Bush Honeysuckle	3
<i>Salix alba</i>	White Willow	2
<i>Robinia pseudoacacia</i>	Black Locust	1

As seen by the total plant count, Reed Canary Grass is the single most prevalent invasive plant detected in this survey. It out-competes most native species, spreading through rhizomes and creating a thick mat at or directly below the soil surface. The MN Department of Natural Resources promotes a guide by Reinhardt and Galatowitsch (2000) for management of reed canary grass in wetland areas, whose information can be found in the References section. One additional invasive plant, Oriental Bittersweet (*Celastrus orbiculatus*), was observed along the pedestrian trail near transect C, but not within the survey area.

Table 1

Deep Lake Shoreline Vegetation Survey Species List (invasive in red)

Scientific Name	Common Name
<i>Acer negundo</i>	Boxelder
<i>Acer saccharinum</i>	Silver maple
<i>Ageratina altissima</i>	White Snakeroot
<i>Alnus incana</i>	Speckled Alder
<i>Boehmeria cylindrica</i>	Small-spike False Nettle
<i>Calamagrostis canadensis</i>	Canada Bluejoint
<i>Campanula aparinoides</i>	Marsh Bellflower
<i>Carex lacustris</i>	Lake Sedge
<i>Carex lasiocarpa</i>	Wiregrass sedge
<i>Cicuta bulbifera</i>	Bulblet-bearing Water Hemlock
<i>Cornus alternifolia</i>	Pagoda Dogwood
<i>Cornus sericea</i>	Red Osier Dogwood
<i>Decodon verticillatus</i>	Swamp Loosestrife
<i>Fraxinus pennsylvanica</i>	Green Ash
<i>Galium labradoricum</i>	Labrador Bedstraw
<i>Glechoma hederacea</i>	Creeping Charlie
<i>Impatiens capensis</i>	Jewelweed
<i>Leersia oryzoides</i>	Rice Cut Grass
<i>Lolium multiflorem</i>	Italian Rye Grass
<i>Lonicera Spp.</i>	Bush Honeysuckle
<i>Lycopus uniflorus</i>	Northern Bugleweed
<i>Lycopus virginicus</i>	Virginia Bugleweed
<i>Lysimachia thyrsoiflora</i>	Tufted Loosestrife
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Maianthemum canadense</i>	Canada Mayflower
<i>Maianthemum racemosum</i>	False Solomon's Seal
<i>Onoclea sensibilis</i>	Sensitive Fern
<i>Parthenocissus inserta</i>	Woodbine
<i>Parthenocissus quinquefolia</i>	Virginia Creeper
<i>Persicaria sagittata</i>	Arrow-leaved Tearthumb
<i>Persicaria spp.</i>	Smartweed
<i>Phalaris arundinacea</i>	Reed Canary Grass
<i>Pilea pumila</i>	Dwarf Clearweed
<i>Poa pratensis</i>	Kentucky Bluegrass
<i>Quercus alba</i>	White Oak
<i>Quercus rubra</i>	Red Oak
<i>Rhamnus cathartica</i>	Common Buckthorn
<i>Robinia pseudoacacia</i>	Black Locust
<i>Rubus occidentalis</i>	Black Raspberry
<i>Rumex crispus</i>	Curlydock
<i>Sagittaria latifolia</i>	Broad-leaf Arrowhead
<i>Salix alba</i>	White Willow
<i>Salix gracilis</i>	Slender Willow
<i>Salix nigra</i>	Black Willow
<i>Salix subsericea (Syn. Salix petiolaris)</i>	Meadow Willow
<i>Scirpus cyperinus</i>	Woolgrass
<i>Scutellaria lateriflora</i>	Mad Dog Skull Cap
<i>Taraxacum officinale</i>	Dandelion
<i>Thalictrum dioicum</i>	Early Meadow Rue
<i>Thelypteris palustris</i>	Northern Marsh Fern
<i>Typha latifolia</i>	Native Cattail
<i>Vitis riparia</i>	Wild Grape

Table 2

Coverage of Species Present in N=24 One Square Meter Quadrats, Deep Lake Shoreline (*invasive in red*)

Scientific Name	Common Name	Total Coverage	Relative Coverage
<i>Phalaris arundinacea</i>	Reed Canary Grass	470	19.57%
<i>Calamagrostis canadensis</i>	Canada Bluejoint	445	18.55%
<i>Carex lacustris</i>	Lake Sedge	161	6.69%
<i>Fraxinus pennsylvanica</i>	Green Ash	101	4.19%
<i>Rhamnus cathartica</i>	Common Buckthorn	96	4.01%
<i>Typha latifolia</i>	Native Cattail	93	3.88%
<i>Pilea pumila</i>	Dwarf Clearweed	90	3.77%
<i>Onoclea sensibilis</i>	Sensitive Fern	80	3.35%
<i>Poa pratensis</i>	Kentucky Bluegrass	75	3.13%
<i>Thelypteris palustris</i>	Northern Marsh Fern	61	2.55%
<i>Maianthemum canadense</i>	Canada Mayflower	59	2.45%
<i>Leersia oryzoides</i>	Rice Cut Grass	58	2.43%
<i>Cicuta bulbifera</i>	Bulblet-bearing Water He	56	2.32%
<i>Lycopus virginicus</i>	Virginia Bugleweed	54	2.24%
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	52	2.16%
<i>Taraxacum officinale</i>	Dandelion	47	1.96%
<i>Glechoma hederacea</i>	Creeping Charlie	45	1.89%
<i>Carex lasiocarpa</i>	Wiregrass sedge	37	1.55%
<i>Sagittaria latifolia</i>	Broad-leaf Arrowhead	30	1.24%
<i>Lythrum salicaria</i>	Purple loosestrife	29	1.19%
<i>Acer saccharinum</i>	Silver maple	25	1.04%
<i>Impatiens capensis</i>	Jewelweed	21	0.88%
<i>Alnus incana</i>	Speckled Alder	20	0.83%
<i>Lonicera Spp.</i>	Bush Honeysuckle	19	0.80%
<i>Rubus occidentalis</i>	Black Raspberry	14	0.58%
<i>Galium labradoricum</i>	Labrador Bedstraw	12	0.51%
<i>Maianthemum racemosum</i>	False Solomon's Seal	12	0.49%
<i>Ageratina altissima</i>	White Snakeroot	12	0.49%
<i>Cornus alternifolia</i>	Pagoda Dogwood	11	0.47%
<i>Cornus sericea</i>	Red Osier Dogwood	11	0.46%
<i>Persicaria spp.</i>	Smartweed	11	0.46%
<i>Salix alba</i>	White Willow	9	0.36%
<i>Vitis riparia</i>	Wild Grape	9	0.36%
<i>Persicaria sagittata</i>	Arrow-leaved Tearthumb	9	0.35%
<i>Salix subsericea</i>	Meadow Willow	8	0.35%
<i>Quercus rubra</i>	Red Oak	7	0.30%
<i>Salix gracilis</i>	Slender Willow	7	0.30%
<i>Parthenocissus inserta</i>	Woodbine	7	0.28%
<i>Scutellaria lateriflora</i>	Mad Dog Skull Cap	6	0.23%
<i>Quercus alba</i>	White Oak	5	0.20%
<i>Lycopus uniflorus</i>	Northern Bugleweed	4	0.18%
<i>Salix nigra</i>	Black Willow	3	0.14%
<i>Boehmeria cylindrica</i>	Small-spike False Nettle	3	0.10%
<i>Campanula aparinoides</i>	Marsh Bellflower	3	0.10%
<i>Decodon verticillatus</i>	Swamp Loosestrife	2	0.09%
<i>Rumex crispus</i>	Curlydock	2	0.09%
<i>Lolium multiflorem</i>	Italian Rye Grass	2	0.09%
<i>Acer negundo</i>	Boxelder	2	0.07%
<i>Lysimachia thyrsoiflora</i>	Tufted Loosestrife	2	0.07%
<i>Scirpus cyperinus</i>	Woolgrass	2	0.07%
<i>Robinia pseudoacacia</i>	Black Locust	2	0.07%
<i>Thalictrum dioicum</i>	Early Meadow Rue	2	0.07%
	TOTAL	2400	100%

Table 3

Density of Species Present in N=24 One Square Meter Quadrats, Deep Lake Shoreline (*invasive in red*)

Scientific Name	Common Name	Tot. Plant Count	Density (plants/m ²)	Relative Density
<i>Calamagrostis canadensis</i>	Canada Bluejoint	199	8.29	24.45%
<i>Phalaris arundinacea</i>	Reed Canary Grass	172	7.17	21.13%
<i>Pilea pumila</i>	Dwarf Clearweed	55	2.29	6.76%
<i>Carex lacustris</i>	Lake Sedge	50	2.08	6.14%
<i>Poa pratensis</i>	Kentucky Bluegrass	41	1.71	5.04%
<i>Leersia oryzoides</i>	Rice Cut Grass	28	1.17	3.44%
<i>Typha latifolia</i>	Native Cattail	24	1.00	2.95%
<i>Fraxinus pennsylvanica</i>	Green Ash	22	0.92	2.70%
<i>Onoclea sensibilis</i>	Sensitive Fern	22	0.92	2.70%
<i>Thelypteris palustris</i>	Northern Marsh Fern	21	0.88	2.58%
<i>Cicuta bulbifera</i>	Bulblet-bearing Water Heml	17	0.71	2.09%
<i>Carex lasiocarpa</i>	Wiregrass sedge	16	0.67	1.97%
<i>Rhamnus cathartica</i>	Common Buckthorn	16	0.67	1.97%
<i>Lythrum salicaria</i>	Purple loosestrife	13	0.54	1.60%
<i>Lycopus virginicus</i>	Virginia Bugleweed	11	0.46	1.35%
<i>Sagittaria latifolia</i>	Broad-leaf Arrowhead	10	0.42	1.23%
<i>Maianthemum canadense</i>	Canada Mayflower	9	0.38	1.11%
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	8	0.33	0.98%
<i>Impatiens capensis</i>	Jewelweed	7	0.29	0.86%
<i>Taraxacum officinale</i>	Dandelion	6	0.25	0.74%
<i>Acer saccharinum</i>	Silver maple	5	0.21	0.61%
<i>Galium labradoricum</i>	Labrador Bedstraw	5	0.21	0.61%
<i>Glechoma hederacea</i>	Creeping Charlie	5	0.21	0.61%
<i>Maianthemum racemosum</i>	False Solomon's Seal	4	0.17	0.49%
<i>Persicaria sagittata</i>	Arrow-leaved Tearthumb	4	0.17	0.49%
<i>Alnus incana</i>	Speckled Alder	3	0.13	0.37%
<i>Cornus alternifolia</i>	Pagoda Dogwood	3	0.13	0.37%
<i>Lonicera Spp.</i>	Bush Honeysuckle	3	0.13	0.37%
<i>Quercus alba</i>	White Oak	3	0.13	0.37%
<i>Scutellaria lateriflora</i>	Mad Dog Skull Cap	3	0.13	0.37%
<i>Ageratina altissima</i>	White Snakeroot	2	0.08	0.25%
<i>Cornus sericea</i>	Red Osier Dogwood	2	0.08	0.25%
<i>Persicaria spp.</i>	Smartweed	2	0.08	0.25%
<i>Rubus occidentalis</i>	Black Raspberry	2	0.08	0.25%
<i>Salix alba</i>	White Willow	2	0.08	0.25%
<i>Salix subsericea</i>	Meadow Willow	2	0.08	0.25%
<i>Vitis riparia</i>	Wild Grape	2	0.08	0.25%
<i>Acer negundo</i>	Boxelder	1	0.04	0.12%
<i>Boehmeria cylindrica</i>	Small-spike False Nettle	1	0.04	0.12%
<i>Campanula aparinoides</i>	Marsh Bellflower	1	0.04	0.12%
<i>Decodon verticillatus</i>	Swamp Loosestrife	1	0.04	0.12%
<i>Lolium multiflorem</i>	Italian Rye Grass	1	0.04	0.12%
<i>Lycopus uniflorus</i>	Northern Bugleweed	1	0.04	0.12%
<i>Lysimachia thyrsoiflora</i>	Tufted Loosestrife	1	0.04	0.12%
<i>Parthenocissus inserta</i>	Woodbine	1	0.04	0.12%
<i>Quercus rubra</i>	Red Oak	1	0.04	0.12%
<i>Robinia pseudoacacia</i>	Black Locust	1	0.04	0.12%
<i>Rumex crispus</i>	Curlydock	1	0.04	0.12%
<i>Salix gracilis</i>	Slender Willow	1	0.04	0.12%
<i>Salix nigra</i>	Black Willow	1	0.04	0.12%
<i>Scirpus cyperinus</i>	Woolgrass	1	0.04	0.12%
<i>Thalictrum dioicum</i>	Early Meadow Rue	1	0.04	0.12%
TOTAL		814	33.92	100%

Table 4

Frequency of Species Present in N=24 One Square Meter Quadrats, Deep Lake Shoreline (*invasive in red*)

Scientific Name	Common Name	# Quadrats	Frequency (%)	Relative Frequency (%)
<i>Calamagrostis canadensis</i>	Canada Bluejoint	11	45.83	8.09
<i>Carex lacustris</i>	Lake Sedge	10	41.67	7.35
<i>Phalaris arundinacea</i>	Reed Canary Grass	9	37.50	6.62
<i>Thelypteris palustris</i>	Northern Marsh Fern	7	29.17	5.15
<i>Lythrum salicaria</i>	Purple loosestrife	6	25.00	4.41
<i>Leersia oryzoides</i>	Rice Cut Grass	5	20.83	3.68
<i>Lycopus virginicus</i>	Virginia Bugleweed	5	20.83	3.68
<i>Pilea pumila</i>	Dwarf Clearweed	5	20.83	3.68
<i>Sagittaria latifolia</i>	Broad-leaf Arrowhead	5	20.83	3.68
<i>Typha latifolia</i>	Native Cattail	5	20.83	3.68
<i>Cicuta bulbifera</i>	Bulblet-bearing Water Hemlock	4	16.67	2.94
<i>Fraxinus pennsylvanica</i>	Green Ash	4	16.67	2.94
<i>Onoclea sensibilis</i>	Sensitive Fern	4	16.67	2.94
<i>Rhamnus cathartica</i>	Common Buckthorn	4	16.67	2.94
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	3	12.50	2.21
<i>Ageratina altissima</i>	White Snakeroot	2	8.33	1.47
<i>Cornus sericea</i>	Red Osier Dogwood	2	8.33	1.47
<i>Galium labradoricum</i>	Labrador Bedstraw	2	8.33	1.47
<i>Impatiens capensis</i>	Jewelweed	2	8.33	1.47
<i>Lonicera Spp.</i>	Bush Honeysuckle	2	8.33	1.47
<i>Maianthemum canadense</i>	Canada Mayflower	2	8.33	1.47
<i>Maianthemum racemosum</i>	False Solomon's Seal	2	8.33	1.47
<i>Poa pratensis</i>	Kentucky Bluegrass	2	8.33	1.47
<i>Rubus occidentalis</i>	Black Raspberry	2	8.33	1.47
<i>Salix subsericea</i> (Syn. <i>Salix petiolaris</i>)	Meadow Willow	2	8.33	1.47
<i>Scutellaria lateriflora</i>	Mad Dog Skull Cap	2	8.33	1.47
<i>Taraxacum officinale</i>	Dandelion	2	8.33	1.47
<i>Acer negundo</i>	Boxelder	1	4.17	0.74
<i>Acer saccharinum</i>	Silver maple	1	4.17	0.74
<i>Alnus incana</i>	Speckled Alder	1	4.17	0.74
<i>Boehmeria cylindrica</i>	Small-spike False Nettle	1	4.17	0.74
<i>Campanula aparinoides</i>	Marsh Bellflower	1	4.17	0.74
<i>Carex lasiocarpa</i>	Wiregrass sedge	1	4.17	0.74
<i>Cornus alternifolia</i>	Pagoda Dogwood	1	4.17	0.74
<i>Decodon verticillatus</i>	Swamp Loosestrife	1	4.17	0.74
<i>Glechoma hederacea</i>	Creeping Charlie	1	4.17	0.74
<i>Lolium multiflorem</i>	Italian Rye Grass	1	4.17	0.74
<i>Lycopus uniflorus</i>	Northern Bugleweed	1	4.17	0.74
<i>Lysimachia thysiflora</i>	Tufted Loosestrife	1	4.17	0.74
<i>Parthenocissus inserta</i>	Woodbine	1	4.17	0.74
<i>Persicaria sagittata</i>	Arrow-leaved Tearthumb	1	4.17	0.74
<i>Persicaria spp.</i>	Smartweed	1	4.17	0.74
<i>Quercus alba</i>	White Oak	1	4.17	0.74
<i>Quercus rubra</i>	Red Oak	1	4.17	0.74
<i>Robinia pseudoacacia</i>	Black Locust	1	4.17	0.74
<i>Rumex crispus</i>	Curlydock	1	4.17	0.74
<i>Salix alba</i>	White Willow	1	4.17	0.74
<i>Salix gracilis</i>	Slender Willow	1	4.17	0.74
<i>Salix nigra</i>	Black Willow	1	4.17	0.74
<i>Scirpus cyperinus</i>	Woolgrass	1	4.17	0.74
<i>Thalictrum dioicum</i>	Early Meadow Rue	1	4.17	0.74
<i>Vitis riparia</i>	Wild Grape	1	4.17	0.74
	TOTAL	136.00	566.67	100.00

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Appendix A: MRn83 Northern Mixed Emergent/Cattail Marsh

Source: MNDNR: https://files.dnr.state.mn.us/natural_resources/npc/marsh/mrn83.pdf

MRn83

MARSH SYSTEM
Northern Floristic Region 

Northern Mixed Cattail Marsh

Emergent marsh communities, typically dominated by cattails. Present on floating mats along shorelines in lakes, ponds, and river backwaters or rooted in mineral soil in shallow wetland basins.

Vegetation Structure & Composition

Description is based on summary of field survey records and vascular plant data from 22 plots (relevés).

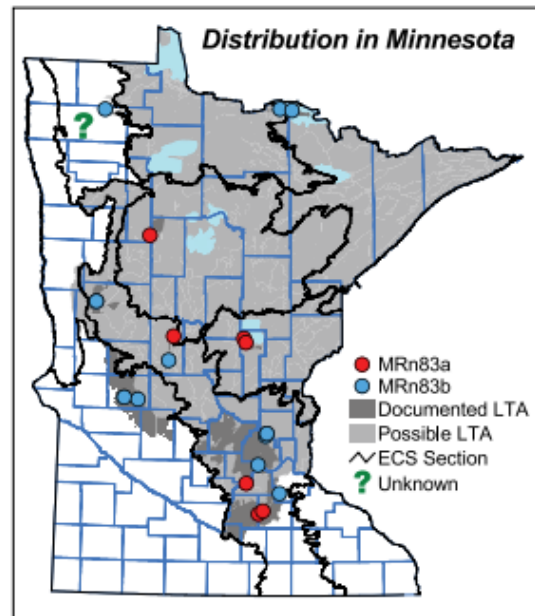
- **Floating-leaved and submergent aquatic plant** cover is sparse, with species such as duckweed (*Lemna* spp.) and greater duckweed (*Spirodela polyrhiza*) frequent, and common bladderwort (*Utricularia vulgaris*) and common coontail (*Ceratophyllum demersum*) occasionally present. Seasonally prolific, floating clones of the liverworts *Riccia fluitans* and *Ricciocarpos natans* may be present, becoming stranded during water-table drawdown.

- **Graminoid** cover is variable, with lake sedge (*Carex lacustris*) and bristly sedge (*C. comosa*) commonly present.

- **Forb** cover is strongly dominated by cattails (*Typha* spp.), usually with > 50% cover. Other common forbs include emergent species such as broad-leaved arrowhead (*Sagittaria latifolia*), marsh skullcap (*Scutellaria galericulata*), small or three-cleft bedstraw (*Galium tinctorium* or *G. trifidum*), and bur marigold and beggarticks (*Bidens* spp.).

- **Shrubs** are absent or very sparse.

- **Notes:** Vegetation is often composed of dense stands of cattails interspersed with pools of open water. Associated species are highly variable. MRn83 and other shallow-water wetlands throughout much of the state (particularly the agricultural region) have been invaded by dense stands of the non-native species narrow-leaved cattail (*Typha angustifolia*) and hybrid cattail (*T. x glauca*). Invasion and dominance of marshes by non-native cattail species is likely related to alterations in wetland hydrology, commonly from drain tiling, ditching, and impoundments; high levels of nutrient-rich runoff from agricultural fields; and salt-containing runoff from roads. Marshes dominated by non-native cattail species are considered to be low-quality or disturbed examples of MRn83. Marshes dominated by the native species broad-leaved cattail (*T. latifolia*) are considered higher-quality examples of MRn83 and are increasingly rare in Minnesota.



Landscape Setting & Soils

MRn83 occurs in shallow basins and depressions and along the shores of lakes, ponds, and river backwaters. Substrates range from muck or shallow, well-decomposed peat to floating peaty mats. Substrate surface is usually covered with plant litter, especially dead cattail stalks. MRn83 is often transitional between shallow aquatic communities and wet meadows.

Natural History

MRn83 develops in areas where standing water is present most of the year, providing conditions favorable for hydrophytic plants. Occurrences of the community with plants rooted in muck or peat substrates may succeed to shallow aquatic communities if the water table rises for prolonged periods, or to wet meadows if the water table drops or if silt or sedimentary peat accumulation causes the substrate surface to become elevated above the water surface. Floating mats, which rise and fall with changes in water level, are presumably successional stable but may be fragmented by strong winds or beaver activity. Variation in species composition observed in the class is likely due to differences in water depth, the permanence of standing water, and variation in substrate. Fires during severe droughts can remove accumulated peat in fens or wet meadows, effectively lowering the growing surface and creating the wetter conditions that favor marsh over fen or wet meadow vegetation.

MRn83 Northern Mixed Cattail Marsh – Species Frequency & Cover

	freq%	cover		freq%	cover
Grasses & Sedges			Unbranched bur reed (<i>Sparganium emersum</i>)	9	•
Lake sedge (<i>Carex lacustris</i>)	45	•••	Emergent Forbs		
Bristly sedge (<i>Carex comosa</i>)	41	••	Broad-leaved arrowhead (<i>Sagittaria latifolia</i>)	64	•
Red-stalked spikerush (<i>Eleocharis palustris</i>)	32	•	Marsh skullcap (<i>Scutellaria galericulata</i>)	64	•
Bluejoint (<i>Calamagrostis canadensis</i>)	27	•••	Three-cleft or small bedstraw (<i>Galium trifidum</i> or <i>G. tinctorium</i>)	59	•
Rice cut grass (<i>Leersia oryzoides</i>)	23	•	Bur marigold and Beggarticks (<i>Bidens</i> spp.)	50	•
Tall manna grass (<i>Glyceria grandis</i>)	23	•	Tufted loosestrife (<i>Lysimachia thyrsiflora</i>)	45	•
Soft stem bulrush (<i>Scirpus validus</i>)	18	••	Bulb-bearing water hemlock (<i>Cicuta bulbifera</i>)	41	••
Fen wiregrass sedge (<i>Carex lasiocarpa</i>)	14	•	Great water dock (<i>Rumex orbiculatus</i>)	41	•
Wild rice (<i>Zizania palustris</i>)	14	••	Marsh bellflower (<i>Campanula aparinooides</i>)	41	•
Common reed grass (<i>Phragmites australis</i>)	14	•	Clearweed (<i>Pilea</i> spp.)	36	•
Tussock sedge (<i>Carex stricta</i>)	14	•	Northern bugleweed (<i>Lycopus uniflorus</i>)	32	•
Cyperus sedge (<i>Carex pseudocyperus</i>)	14	••	Broad-leaved cattail (<i>Typha latifolia</i>)	32	••••
River bulrush (<i>Scirpus fluviatilis</i>)	14	••	Touch-me-not (<i>Impatiens</i> spp.)	32	•
Beaked sedge (<i>Carex utriculata</i>)	14	••	Giant bur reed (<i>Sparganium eurycarpum</i>)	27	•••
Ovoid spikerush (<i>Eleocharis ovata</i>)	9	•	Water parsnip (<i>Sium suave</i>)	27	•
Lesser-panicled sedge (<i>Carex diandra</i>)	9	•	Linear-leaved, Marsh, or Downy willow-herb*	23	•
Aquatic sedge (<i>Carex aquatilis</i>)	9	••	Spotted water hemlock (<i>Cicuta maculata</i>)	23	•
Fragrant cyperus (<i>Cyperus odoratus</i>)	9	•	Dotted smartweed (<i>Polygonum punctatum</i>)	18	•
Porcupine sedge (<i>Carex hystericina</i>)	9	••	Sweet flag (<i>Acorus calamus</i>)	18	•••
Woolgrass (<i>Scirpus cyperinus</i>)	9	•	Swamp milkweed (<i>Asclepias incarnata</i>)	18	•
Floating-Leaved & Submergent Forbs			Northern marsh fern (<i>Thelypteris palustris</i>)	18	•
Star-duckweed (<i>Lemna trisculata</i>)	64	••	Cut-leaved bugleweed (<i>Lycopus americanus</i>)	18	•
Lesser-duckweed (<i>Lemna minor</i>)	59	••	Marsh cinquefoil (<i>Potentilla palustris</i>)	14	•
Greater duckweed (<i>Spirodela polyrrhiza</i>)	55	•	Spotted Joe pye weed (<i>Eupatorium maculatum</i>)	14	•
Common bladderwort (<i>Utricularia vulgaris</i>)	45	••	Marsh horsetail (<i>Equisetum palustre</i>)	9	•
Common coontail (<i>Ceratophyllum demersum</i>)	36	••	Common mint (<i>Mentha arvensis</i>)	9	•
Water smartweed (<i>Polygonum amphibium</i>)	32	•	Stinging nettle (<i>Urtica dioica</i>)	9	•
Flat-stemmed pondweed (<i>Potamogeton zosteriformis</i>)	14	•	Nodding smartweed (<i>Polygonum lapathifolium</i>)	9	•
Common white water-lily (<i>Nymphaea odorata</i>)	14	•	Lady's thumb (<i>Polygonum persicaria</i>)	9	•
Straight-leaved pondweed (<i>Potamogeton strictifolius</i>)	9	•	Common water plantain (<i>Alisma triviale</i>)	5	•
Intermediate bladderwort (<i>Utricularia intermedia</i>)	9	•	Shrubs		
Yellow pond lily (<i>Nuphar variegata</i>)	9	•	Red-osier dogwood (<i>Cornus sericea</i>)	9	••

*Linear-leaved, Marsh, or Downy willow-herb (*Epilobium leptophyllum*, *E. palustre*, or *E. strictum*)

Appendix B: Field Data Results by Quadrat

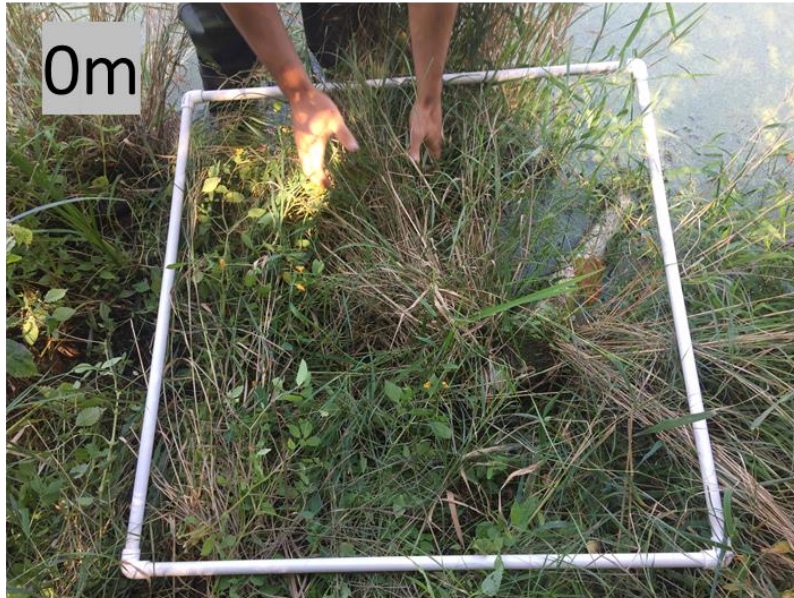
Transect	Quadrat (m from water)	Species (Common name)	Species (Latin name)	# Individuals	% Cover
A	15	Bush Honeysuckle	<i>Lonicera Spp.</i>	2	13%
		Black Raspberry	<i>Rubus occidentalis</i>	1	7%
		Woodbine	<i>Parthenocissus inserta</i>	1	7%
		Common Buckthorn	<i>Rhamnus cathartica</i>	4	27%
		Speckled Alder	<i>Alnus incana</i>	3	20%
		Virginia Creeper	<i>Parthenocissus quinquefolia</i>	3	20%
		White Snakeroot	<i>Ageratina altissima</i>	1	7%
	10	Red Oak	<i>Quercus rubra</i>	1	7%
		Black Raspberry	<i>Rubus occidentalis</i>	1	7%
		Slender Willow	<i>Salix gracilis</i>	1	7%
		Kentucky Bluegrass	<i>Poa pratensis</i>	2	14%
		Canada Mayflower	<i>Maianthemum canadense</i>	8	57%
		False Solomon's Seal	<i>Maianthemum racemosum</i>	1	7%
	5	Sensitive Fern	<i>Onoclea sensibilis</i>	7	50%
		Virginia Creeper	<i>Parthenocissus quinquefolia</i>	2	14%
		Virginia Bugleweed	<i>Lycopus virginicus</i>	5	36%
	0	Jewelweed	<i>Impatiens capensis</i>	6	19%
		Bulblet-bearing Water Hemlock	<i>Cicuta bulbifera</i>	14	45%
Canada Bluejoint		<i>Calamagrostis canadensis</i>	6	19%	
Rice Cut Grass		<i>Leersia oryzoides</i>	5	16%	
B	15	Creeping Charlie	<i>Glechoma hederacea</i>	5	45%
		Dandelion	<i>Taraxacum officinale</i>	5	45%
		Common Buckthorn	<i>Rhamnus cathartica</i>	1	9%
	10	White Snakeroot	<i>Ageratina altissima</i>	1	5%
		Silver maple	<i>Acer saccharinum</i>	5	25%
		Green Ash	<i>Fraxinus pennsylvanica</i>	14	70%
	5	Dandelion	<i>Taraxacum officinale</i>	1	2%
		Black Locust	<i>Robinia pseudoacacia</i>	1	2%
		False Solomon's Seal	<i>Maianthemum racemosum</i>	3	5%
		Canada Mayflower	<i>Maianthemum canadense</i>	1	2%
		Reed Canary Grass	<i>Phalaris arundinacea</i>	2	3%
		Kentucky Bluegrass	<i>Poa pratensis</i>	39	61%
		White Oak	<i>Quercus alba</i>	3	5%
		Common Buckthorn	<i>Rhamnus cathartica</i>	1	2%
		Canada Bluejoint	<i>Calamagrostis canadensis</i>	12	19%
	Early Meadow Rue	<i>Thalictrum dioicum</i>	1	2%	
	0	Reed Canary Grass	<i>Phalaris arundinacea</i>	25	44%
		Jewelweed	<i>Impatiens capensis</i>	1	2%
		Northern Marsh Fern	<i>Thelypteris palustris</i>	8	14%
Mad Dog Skullcap		<i>Scutellaria lateriflora</i>	2	4%	
Rice Cut Grass		<i>Leersia oryzoides</i>	7	12%	
Sensitive Fern		<i>Onoclea sensibilis</i>	11	19%	
Virginia Bugleweed	<i>Lycopus virginicus</i>	3	5%		

Transect	Quadrat (m from water)	Species (Common name)	Species (Latin name)	# Individuals	% Cover
C	15	Common Buckthorn	<i>Rhamnus cathartica</i>	10	59%
		Virginia Creeper	<i>Parthenocissus quinquefolia</i>	3	18%
		Northern Marsh Fern	<i>Thelypteris palustris</i>	2	12%
		Bush Honeysuckle	<i>Lonicera Spp.</i>	1	6%
		Green Ash	<i>Fraxinus pennsylvanica</i>	1	6%
	10	Native Cattail	<i>Typha latifolia</i>	3	11%
		Green Ash	<i>Fraxinus pennsylvanica</i>	4	14%
		Virginia Bugleweed	<i>Lycopus virginicus</i>	1	4%
		Reed Canary Grass	<i>Phalaris arundinacea</i>	19	68%
		Meadow Willow	<i>Salix subsericea</i>	1	4%
	5	Broad-leaf Arrowhead	<i>Sagittaria latifolia</i>	2	12%
		Virginia Bugleweed	<i>Lycopus virginicus</i>	1	6%
		Bulblet-bearing Water Hemlock	<i>Cicuta bulbifera</i>	1	6%
		Northern Marsh Fern	<i>Thelypteris palustris</i>	2	12%
		Reed Canary Grass	<i>Phalaris arundinacea</i>	11	65%
	0	Mad Dog Skullcap	<i>Scutellaria lateriflora</i>	1	2%
		Dwarf Clearweed	<i>Pilea pumila</i>	3	6%
		Broad-leaf Arrowhead	<i>Sagittaria latifolia</i>	3	6%
		Lake Sedge	<i>Carex lacustris</i>	1	2%
		Rice Cut Grass	<i>Leersia oryzoides</i>	7	15%
Reed Canary Grass		<i>Phalaris arundinacea</i>	33	69%	
D	15	Northern Marsh Fern	<i>Thelypteris palustris</i>	2	7%
		Green Ash	<i>Fraxinus pennsylvanica</i>	3	10%
		Lake Sedge	<i>Carex lacustris</i>	2	7%
		Canada Bluejoint	<i>Calamagrostis canadensis</i>	7	24%
		Virginia Bugleweed	<i>Lycopus virginicus</i>	1	3%
		Pagoda Dogwood	<i>Cornus alternifolia</i>	2	7%
		Black Willow	<i>Salix nigra</i>	1	3%
		Sensitive Fern	<i>Onoclea sensibilis</i>	2	7%
		Reed Canary Grass	<i>Phalaris arundinacea</i>	9	31%
	10	Reed Canary Grass	<i>Phalaris arundinacea</i>	9	43%
		Meadow Willow	<i>Salix subsericea</i>	1	5%
		Lake Sedge	<i>Carex lacustris</i>	11	52%
	5	Lake Sedge	<i>Carex lacustris</i>	5	12%
		Reed Canary Grass	<i>Phalaris arundinacea</i>	36	88%
	0	Reed Canary Grass	<i>Phalaris arundinacea</i>	28	60%
		Arrow-leaved Tearthumb	<i>Persicaria sagittata</i>	4	9%
		Broad-leaf Arrowhead	<i>Sagittaria latifolia</i>	2	4%
		Northern Marsh Fern	<i>Thelypteris palustris</i>	1	2%
		Purple loosestrife	<i>Lythrum salicaria</i>	1	2%
		Sensitive Fern	<i>Onoclea sensibilis</i>	2	4%
Dwarf Clearweed		<i>Pilea pumila</i>	7	15%	
Italian Rye Grass		<i>Lolium multiflorem</i>	1	2%	
Bulblet-bearing Water Hemlock	<i>Cicuta bulbifera</i>	1	2%		

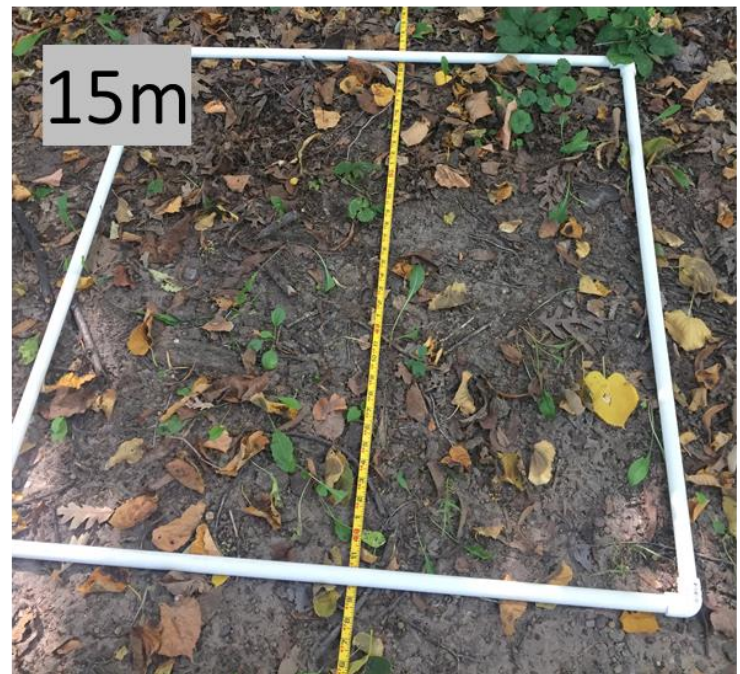
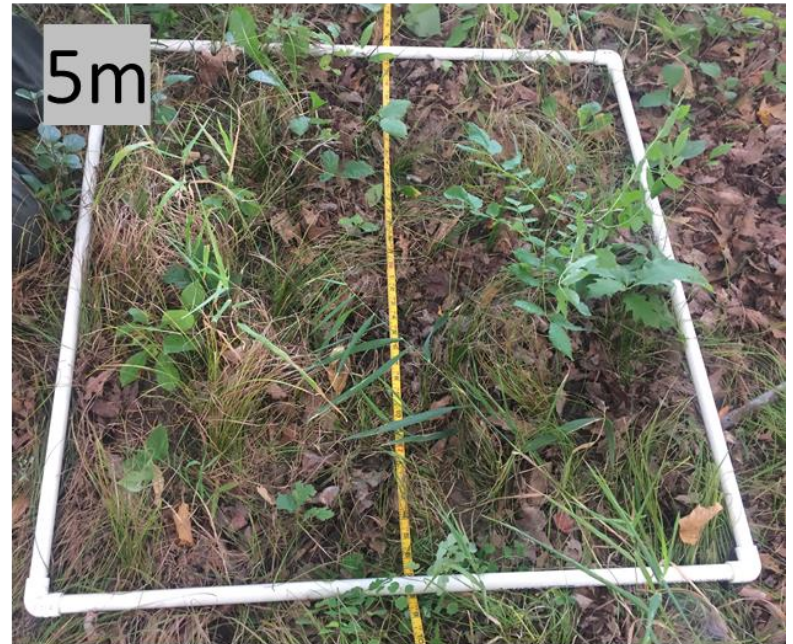
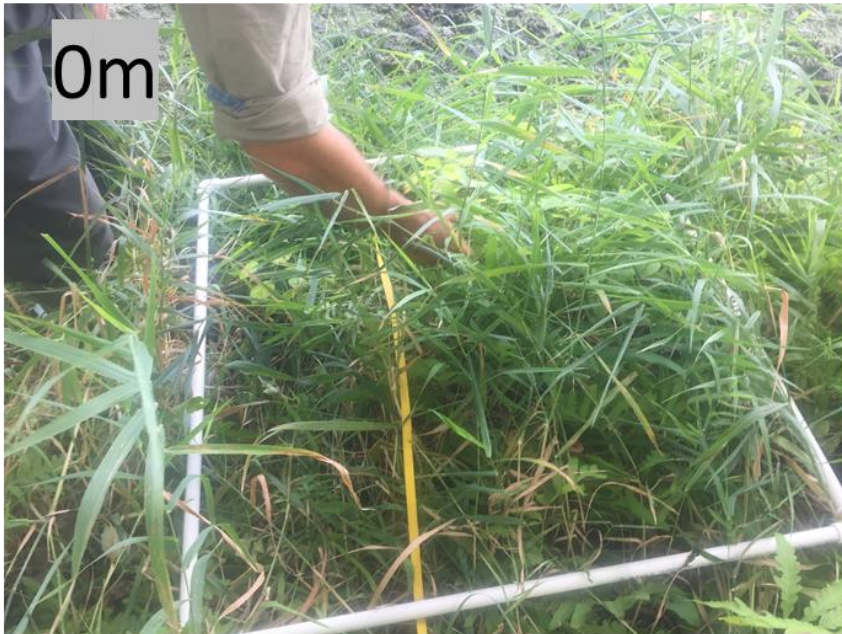
Transect	Quadrat (m from water)	Species (Common name)	Species (Latin name)	# Individuals	% Cover	
E	15	White Willow	<i>Salix alba</i>	2	9%	
		Pagoda Dogwood	<i>Cornus alternifolia</i>	1	4%	
		Lake Sedge	<i>Carex lacustris</i>	8	35%	
		Purple loosestrife	<i>Lythrum salicaria</i>	1	4%	
		Canada Bluejoint	<i>Calamagrostis canadensis</i>	5	22%	
		Wild Grape	<i>Vitis riparia</i>	2	9%	
		Northern Marsh Fern	<i>Thelypteris palustris</i>	2	9%	
		Northern Bugleweed	<i>Lycopus uniflorus</i>	1	4%	
	Native Cattail	<i>Typha latifolia</i>	1	4%		
	10	Lake Sedge	<i>Carex lacustris</i>	2	11%	
		Red Osier Dogwood	<i>Cornus sericea</i>	2	11%	
		Smartweed	<i>Persicaria spp.</i>	2	11%	
		Native Cattail	<i>Typha latifolia</i>	9	50%	
		Canada Bluejoint	<i>Calamagrostis canadensis</i>	3	17%	
	5	Native Cattail	<i>Typha latifolia</i>	10	26%	
		Canada Bluejoint	<i>Calamagrostis canadensis</i>	25	64%	
		Labrador Bedstraw	<i>Galium labradoricum</i>	3	8%	
		Bulblet-bearing Water Hemlock	<i>Cicuta bulbifera</i>	1	3%	
	0	Lake Sedge	<i>Carex lacustris</i>	4	9%	
		Swamp Loosestrife	<i>Decodon verticillatus</i>	1	2%	
		Canada Bluejoint	<i>Calamagrostis canadensis</i>	34	74%	
		Rice Cut Grass	<i>Leersia oryzoides</i>	3	7%	
		Purple loosestrife	<i>Lythrum salicaria</i>	1	2%	
		Dwarf Clearweed	<i>Pilea pumila</i>	2	4%	
		Curlydock	<i>Rumex crispus</i>	1	2%	
	F	15	Purple loosestrife	<i>Lythrum salicaria</i>	5	12%
			Lake Sedge	<i>Carex lacustris</i>	5	12%
			Labrador Bedstraw	<i>Galium labradoricum</i>	2	5%
Canada Bluejoint			<i>Calamagrostis canadensis</i>	14	33%	
Native Cattail			<i>Typha latifolia</i>	1	2%	
Wiregrass Sedge			<i>Carex lasiocarpa</i>	16	37%	
10		Woolgrass	<i>Scirpus cyperinus</i>	1	2%	
		Lake Sedge	<i>Carex lacustris</i>	10	16%	
		Dwarf Clearweed	<i>Pilea pumila</i>	14	22%	
		Canada Bluejoint	<i>Calamagrostis canadensis</i>	36	57%	
		Tufted Loosestrife	<i>Lysimachia thysiflora</i>	1	2%	
		Boxelder	<i>Acer negundo</i>	1	2%	
5		Purple loosestrife	<i>Lythrum salicaria</i>	1	3%	
		Broad-leaf Arrowhead	<i>Sagittaria latifolia</i>	1	3%	
		Marsh Bellflower	<i>Campanula aparinoides</i>	1	3%	
		Broad-leaf Arrowhead	<i>Sagittaria latifolia</i>	2	5%	
		Lake Sedge	<i>Carex lacustris</i>	2	5%	
		Small-spike False Nettle	<i>Boehmeria cylindrica</i>	1	3%	
		Canada Bluejoint	<i>Calamagrostis canadensis</i>	32	80%	
0		Rice Cut Grass	<i>Leersia oryzoides</i>	6	9%	
		Dwarf Clearweed	<i>Pilea pumila</i>	29	43%	
		Canada Bluejoint	<i>Calamagrostis canadensis</i>	25	37%	
		Northern Marsh Fern	<i>Thelypteris palustris</i>	4	6%	
	Purple loosestrife	<i>Lythrum salicaria</i>	4	6%		

Appendix C: Field Photos of each Quadrat surveyed, Sept 13-14, 2018
Transect labeled in blue, Distance from shore indicated in meters

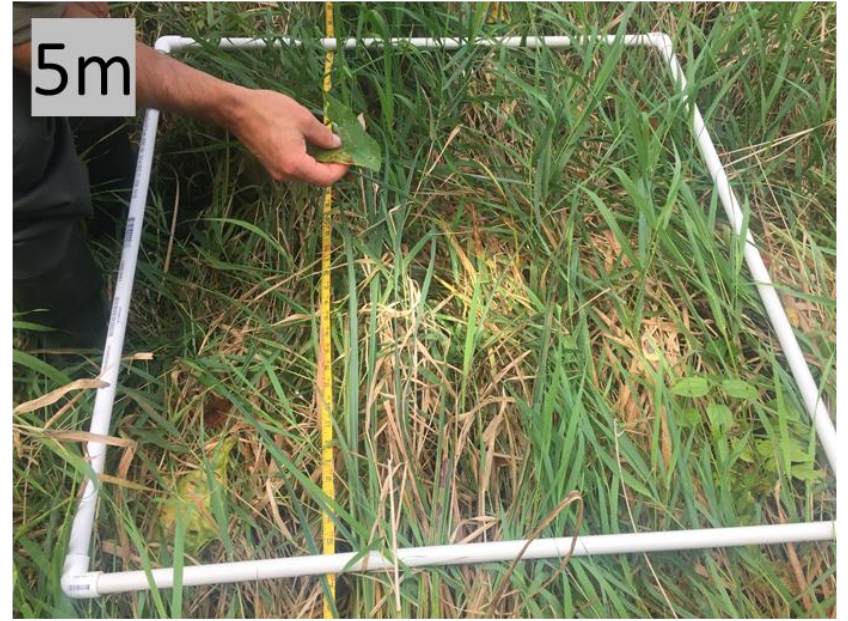
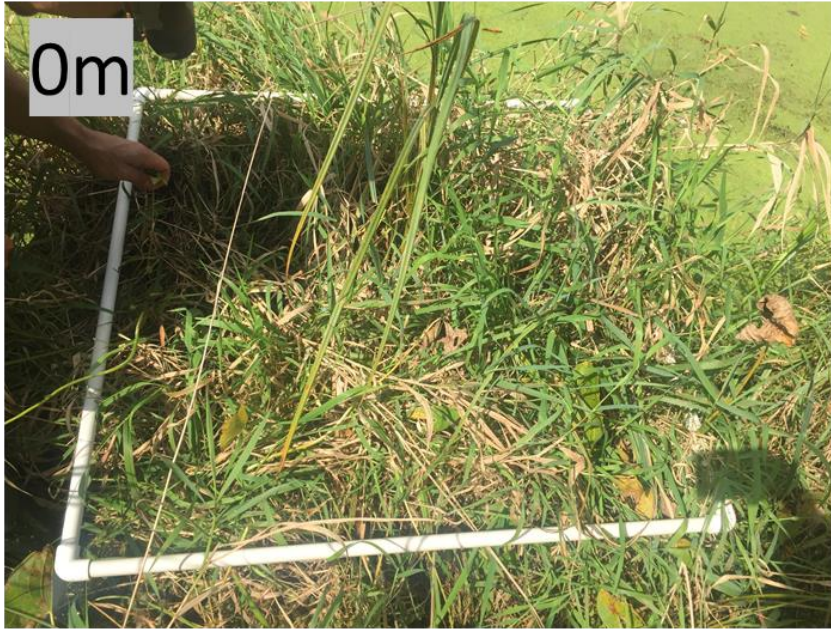
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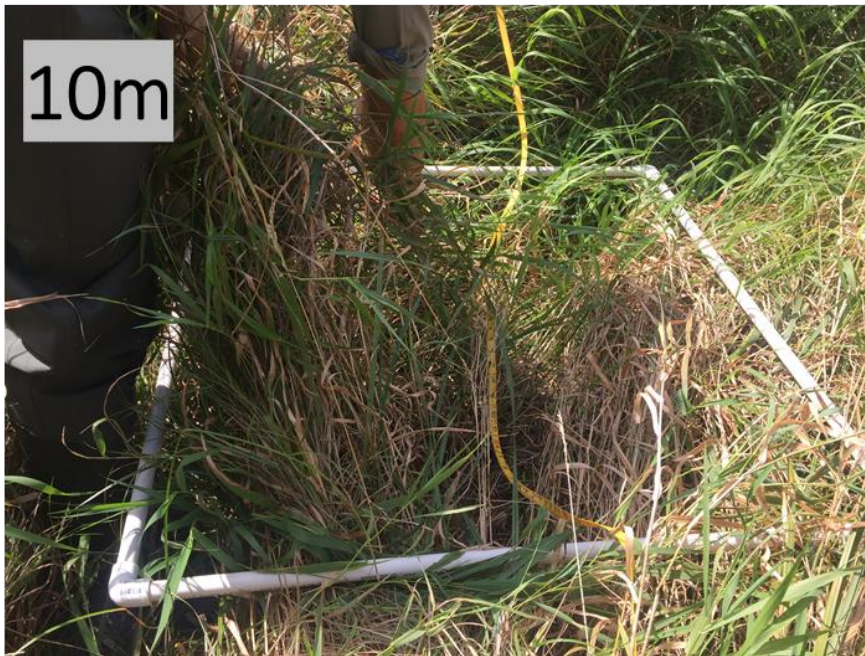
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