

**Changes in the Aquatic Plant Community
Of Halfmoon Lake
Eau Claire County, Wisconsin
2008 - 2014**



Lower Chippewa Basin

Wisconsin Department of Natural Resources

Eau Claire, WI

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Introduction

The aquatic plant community of a lake is full of complex interactions that contribute to the overall health of an aquatic ecosystem. Every level of the aquatic food chain from bacteria and invertebrates to fish and waterfowl are dependent upon aquatic plants to some degree for their survival (Engel, 1985; Wetzel, 2001). Photosynthesis and respiration are important in maintaining clear waters (Engel, 1990). Aquatic plants stabilize sediments and absorb wave action which in turn prevents turbidity caused by suspended sediments. Light penetration, excess nutrients from run-off, wave action and lake morphometry all affect the plant community of the littoral zone (Barko 1988; Duarte and Kalff, 1986). The importance of aquatic plants in an aquatic ecosystem creates the need to study the diversity, density and distribution of the aquatic plant community as well as an examination of the factors impacting the plant community.

Aquatic Plant Surveys were conducted on Halfmoon Lake during June and August of 2008 through 2014 by water resources staff at the Wisconsin Department of Natural Resources.

Methods

Half Moon Lake is a 135 acre oxbow lake with 5.2 miles of shoreline and a maximum depth of 13.8 feet. Plant surveys were conducted according to the Wisconsin Department of Natural Resources guidelines using the Point-Intercept method that can be found at: <http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/Aquatic%20Plants/PI-Protocol-2010.pdf> (Hauxwell et al. 2010). A 36 m sampling grid consisting of 430 points was used in June 2008, August 2008 and June 2009 (Map 1). A 43 m grid consisting of 430 points was used August 2009 thru August 2014 (Map 2). At each Point-Intercept point one sample was collected using a steel thatching rake. The aquatic plant species present on the rake were identified and recorded. Each species was given a density rating based on the total coverage of the plant on the rake (1 – few, 2 – moderate, 3 – abundant). Visual inspections were done between points in order to record the presence of any species that did not occur at the sampling sites. Plant species present were collected and saved for preparation of voucher specimens. Depth was recorded at each sample site. Depths were classified into four zones: zone 1 = 0 – 1.5 2ft; zone 2 = 2– 5 ft; zone 3 = 5.5 – 10 ft; zone 4 = 10.5 – 20 ft. Sediment data were collected at each site and classified as muck, sand or rock.

The percent frequency of occurrence of each plant species was calculated (number of sampling sites at which it occurred / total number of sampling sites). Relative frequency was calculated based on the number of occurrences of a species relative to all species' occurrences. A mean rake fullness where present was calculated for each species (sum of a species' rake fullness ratings / number of sampling sites at which it occurred). Relative rake fullness was calculated based on the total rake fullness of each species relative to all species rake fullness rankings. The relative frequency and relative rake fullness were summed to obtain a dominance value for each species.

The Aquatic Macrophyte Community Index (AMCI) was used to define the quality of the aquatic plant community based on seven parameters: the maximum rooting depth, the percentage of the littoral zone vegetated, the relative frequencies of submerged species, sensitive species and exotic species, Simpson's Diversity Index and the total number of taxa. Each parameter was scaled from 1-10 with 10 representing the most desirable condition. The scaled values were then summed to obtain the AMCI (Nichols et al., 2000).

The Floristic Quality Index (FQI) was used to assess each community's resemblance to an undisturbed condition. Coefficients of conservatism are values assigned to plant species based on their ties to a pre-settlement condition. Plants are given a value on a scale of 1 to 10 based on the

probability that a species will occur in a disturbed habitat with higher values given to plants that are less likely to occur in a disturbed habitat (Nichols, 1999). Coefficient of conservatism values are assigned only to native species that would normally be found in a lake environment.

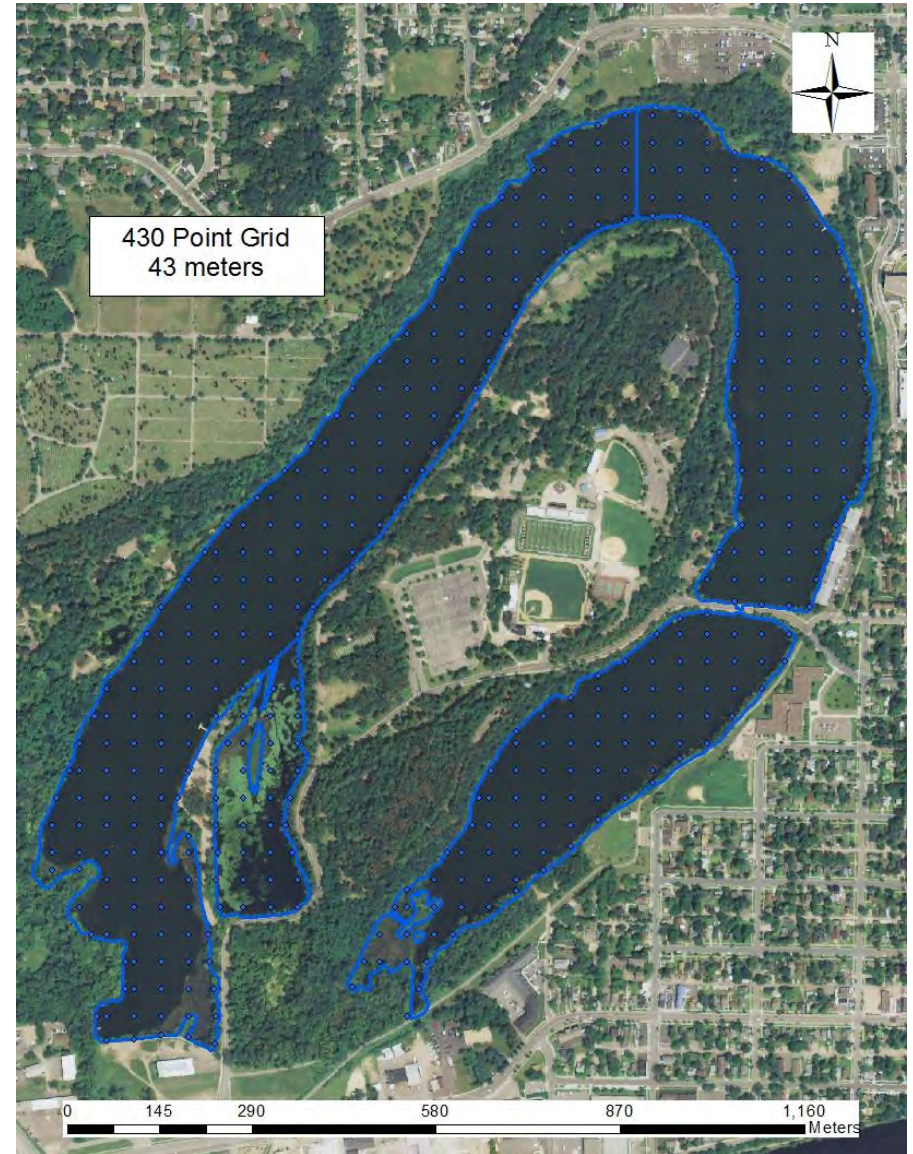
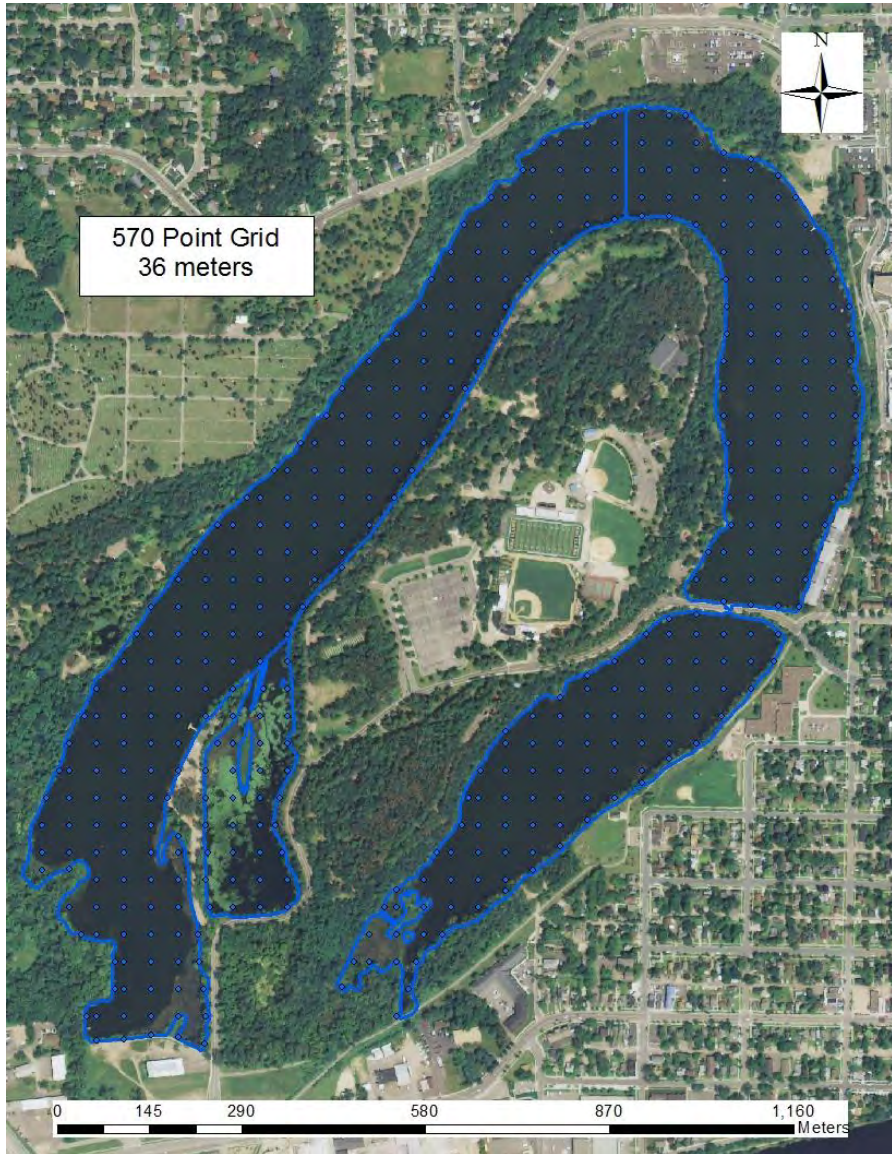
$$\text{FQI} = \text{Average Coefficient of conservatism} * \sqrt{\text{Number of species}}$$

The AMCI and FQI of each area were compared to those of all Wisconsin Lakes and Lake in Northern Central Hardwood Forested Region.

Simpson's Diversity Index (SDI) was used to measure the diversity of the plant communities in each survey. The formula measures the probability that two individuals from the same community will be the same species. Values for SDI range from 0-1 where a value of 0 indicates two individuals will always be the same species and a value of 1 indicates two individuals will always be different species.

$$\text{SDI} = 1 - (\text{Sum (frequency of occurrence of one species/sum frequency of all species)})$$

Chi-square analysis was used to determine significant differences between survey periods in the frequency of occurrence of each species. Comparisons were made between spring and summer periods within each year and spring vs. spring and summer vs. summer between consecutive years.



Figure

e 1. Figure 1. Sampling grid maps

Results

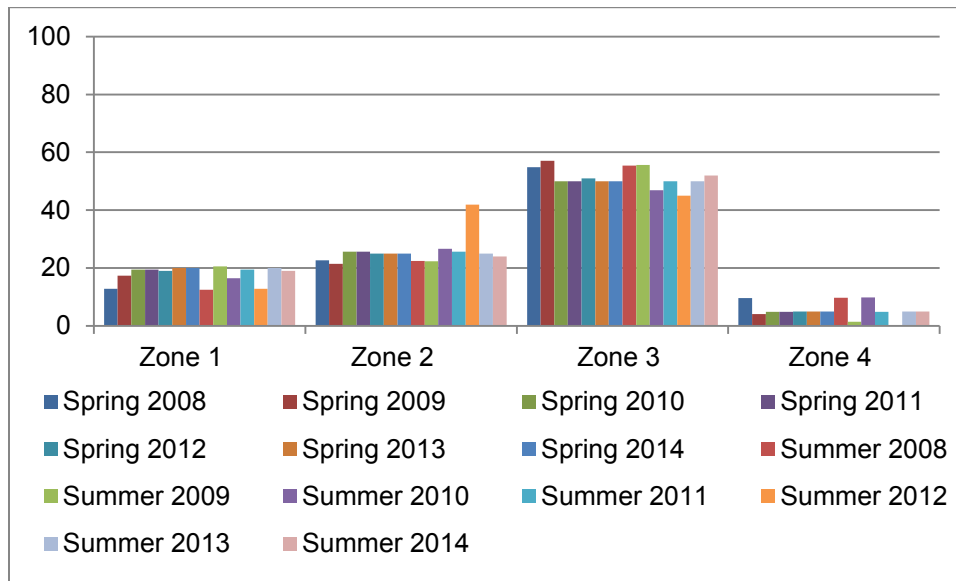


Figure 2. Percent of sites sampled per depth zone

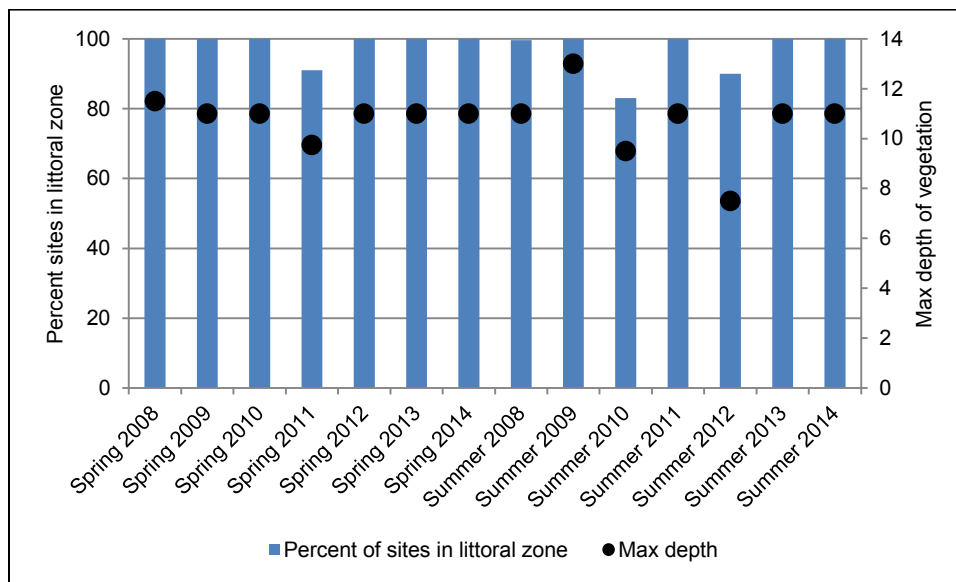


Figure 3. Percent of survey area in littoral zone and maximum depth of vegetation

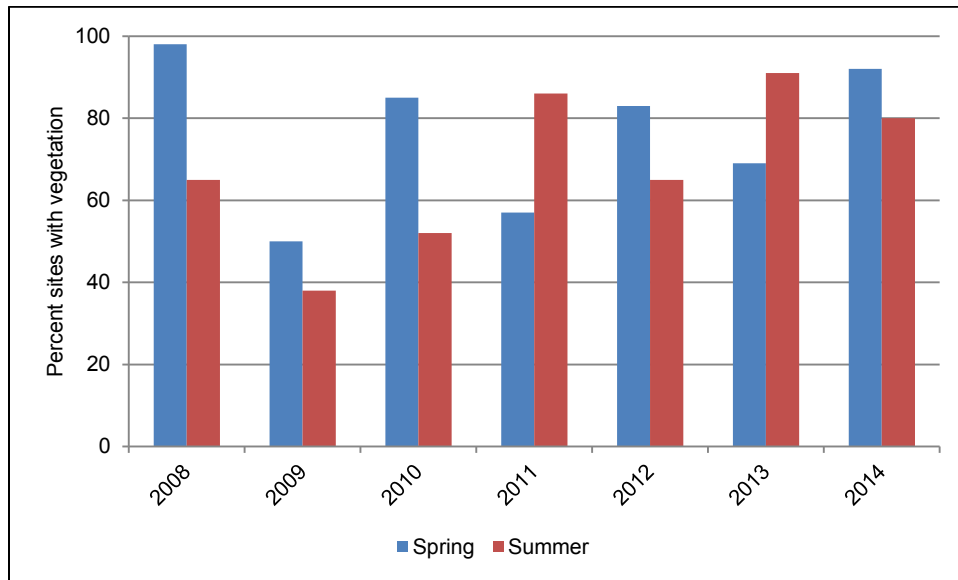


Figure 4. Percent frequency of sampled sites with vegetation

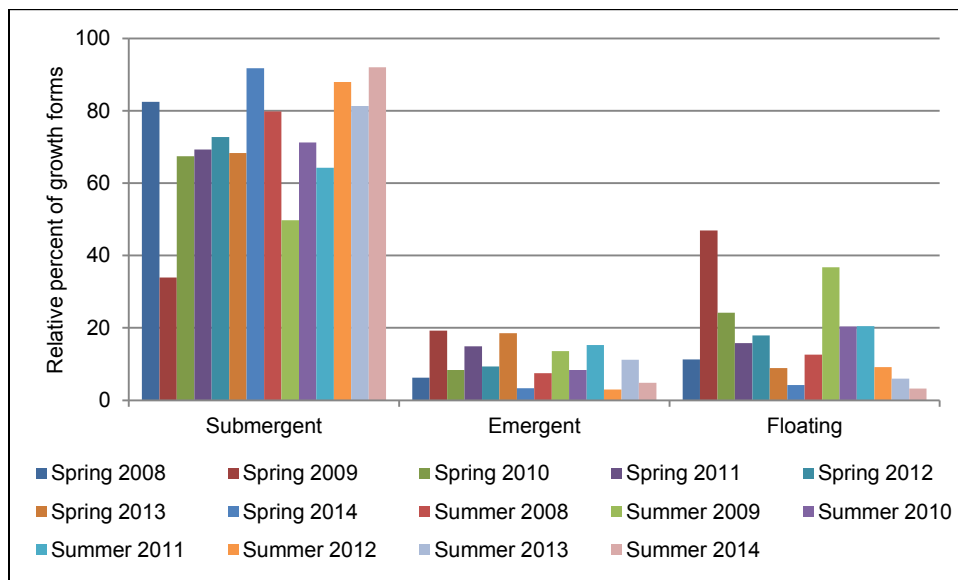


Figure 5. Relative percent frequency of plant growth forms in Pine Lake

Table 1. Species list: values indicate frequency of occurrence at all sample sites.

SCIENTIFIC NAME	COMMON NAME	Spring 2008	Spring 2009	Spring 2010	Spring 2011	Spring 2012	Spring 2013	Spring 2014	Summer 2008	Summer 2009	Summer 2010	Summer 2011	Summer 2012	Summer 2013	Summer 2014
<i>Acorus americanus</i>	Sweet-flag	1.18	1.56	0.73	0.73	1.00	1.23	0.74	0.79	0.98	0.25	0.73	0.26	1.48	0.74
<i>Alisma triviale</i>	Northern water-plantain											0.49			
<i>Bidens beckii</i> (formerly <i>Megalodonta</i>)	Water marigold								0.20						
<i>Callitriche palustris</i>	Common water-starwort						0.25								
<i>Carex comosa</i>	Bottle brush sedge	1.97	4.48	3.17	0.98	1.00	1.97		1.39	1.23	0.49	2.68		0.74	0.49
<i>Ceratophyllum demersum</i>	Coontail	49.31	13.65	0.49			0.25	1.48	61.51	3.92	1.23	0.49	1.83	1.72	7.88
<i>Ceratophyllum echinatum</i>	Spiny hornwort							1.23							
<i>Chara</i> sp.	Chara	1.58	0.39	3.17	2.44				0.99		1.23	0.49			
<i>Cicuta bulbifera</i>	Bulb-bearing waterhemlock						0.25							0.25	
<i>Dulichium arundinaceum</i>	Three-way sedge											0.24		0.25	
<i>Eleocharis acicularis</i>	Needle spikerush	0.79	2.53	0.73	0.49	1.24					0.74	1.46			
<i>Eleocharis palustris</i>	Creeping spikerush	0.59	1.36	1.22	1.46		0.49	0.49	1.59	1.23	1.23			2.22	0.25
<i>Elodea canadensis</i>	Common waterweed	15.58	12.28	42.93	51.46	73.38	58.97	77.34	21.63	6.62	43.95	80.49	58.64	83.25	72.41
<i>Equisetum fluviatile</i>	Water horsetail											0.24			
<i>Heteranthera dubia</i>	Water star-grass	7.30	4.29	9.76	1.95			7.39	11.71	7.60	6.42		4.45	10.59	11.08
<i>Iris versicolor</i>	Northern blue flag	0.39	0.39	1.71			0.49	0.25			0.25	0.24		0.99	
<i>Iris virginica</i>	Southern blue flag				0.49						0.49				
<i>Juncus pelocarpus</i> f. <i>submersus</i>	Brown-fruited rush			0.24								0.49			
<i>Lemna minor</i>	Small duckweed	7.69	17.35	21.22	3.66	5.22	2.21	1.48	5.56	13.97	8.64	8.54	2.36	2.22	0.74
<i>Ludwigia palustris</i>	Marsh purslane									0.25					
<i>Mimulus ringus</i>	Monkey flower						0.49							0.49	
<i>Myriophyllum spicatum</i>	Eurasian water milfoil	3.75						0.99	16.67						
<i>Najas flexilis</i>	Slender naiad			7.07	0.24				1.59	0.74	13.33	1.46	2.36	10.84	5.17
<i>Najas gracillima</i>	Northern naiad			1.22						1.96	1.48	1.71			
<i>Nitella</i> sp.	Nitella	2.96	2.34	21.95	0.98	1.49	1.23	0.74	0.99	3.43	8.15		3.14	1.23	1.48
<i>Nuphar X rubrodisca</i>	Intermediate pond lily	2.76	4.87	4.63	2.20	3.48	3.19	2.46	2.98	3.68	3.70	3.66	3.93	4.93	2.96
<i>Nymphaea odorata</i>	White water lily									0.25					
<i>Phalaris arundinacea</i>	Reed canary grass	1.38	0.78	0.24	2.20		4.18	0.49	0.20	1.96	0.49	0.24		2.22	
<i>Polygonum amphibium</i>	Water smartweed	1.97	2.53	2.68	1.22				1.59	0.98	0.25	1.71		0.49	
<i>Polygonum punctatum</i>	Dotted smartweed						0.49							0.25	
<i>Potamogeton crispus</i>	Curly-leaf pondweed	75.54	4.68	53.66	0.49	0.75	0.98	38.18	5.95	18.87	7.41	1.46	9.69	12.32	11.33
<i>Potamogeton epihydrus</i>	Ribbon-leaf pondweed													0.74	
<i>Potamogeton foliosus</i>	Leafy pondweed	5.92							0.79						
<i>Potamogeton natans</i>	Floating-leaf pondweed			0.24					0.20	0.25	0.49	0.24		0.25	0.25
<i>Potamogeton nodosus</i>	Long-leaf pondweed	0.59				0.50	0.49	0.99	0.40	0.25		1.46	0.79	1.23	0.49
<i>Potamogeton oakesianus</i>	Oakes' pondweed								0.20						
<i>Potamogeton praelongus</i>	White-stem pondweed				0.24						0.49				
<i>Potamogeton pusillus</i>	Small pondweed	3.35												0.74	0.25
<i>Ranunculus aquatilis</i>	White water crowfoot	0.20													
<i>Sagittaria graminea</i>	Grass-leaved arrowhead											0.24		0.99	2.22
<i>Sagittaria latifolia</i>	Common arrowhead	0.99	3.12	1.46			0.74		2.58	0.98	3.46	4.88		2.46	0.99
<i>Sagittaria rigida</i>	Sessile-fruited arrowhead	1.58							1.19			0.49			
<i>Sagittaria</i> sp.	Arrowhead			2.20	0.98	1.24	0.74	0.49		2.94	0.99	0.24	1.83		0.25
<i>Schoenoplectus acutus</i>	Hardstem bulrush											1.23			
<i>Schoenoplectus subterminalis</i>	Water bulrush						0.25								
<i>Schoenoplectus tabernaemontani</i>	Softstem bulrush	0.59	1.36	1.46	1.46	1.24	1.47	0.99	1.19	1.23		1.95	0.26	1.72	0.25
<i>Sparganium fluctuans</i>	Floating-leaf bur reed											0.24			
<i>Sparganium</i> sp.	Bur-reed		0.97			1.00	0.74	0.25				0.73	0.26	0.49	
<i>Spirodela polyrhiza</i>	Large duckweed	8.09	19.30	19.76	3.41	5.22	2.46	1.48	5.56	8.09	6.91	8.54	2.36	2.22	
<i>Typha angustifolia</i>	Narrow-leaved cattail	1.18	2.53	1.71	2.44	2.99	2.95	0.99	1.19	0.98	0.74	3.41		2.46	
<i>Typha latifolia</i>	Broad-leaved cattail		0.58	0.49		0.25	0.74		0.20	0.25	0.25	0.49		0.49	0.49
<i>Typha</i> sp.	Cattail						0.49					0.49	0.26	0.49	0.25
<i>Vallisneria americana</i>	Wild celery		1.56	4.88		1.49	0.25	0.25	3.77	2.94	8.15	3.90	4.71	5.42	3.45
<i>Wolffia borealis</i>	Northern watermeal										0.74				
<i>Wolffia columbiana</i>	Common watermeal	4.14	12.67	6.59	3.90	5.22	0.25	0.49	5.95	8.58	6.42	8.54	0.26		0.25

Table 2. Chi-square analysis of aquatic plant frequency of occurrence. ↓ = significant decrease; ↑ = significant increase; +/- indicates direction of non-significant change; nc = no change. Significance set at 0.05.

	spring vs spring						summer vs summer						spring vs summer						
	2008 v 2009	2009 v 2010	2010 v 2011	2011 v 2012	2012 v 2013	2013 v 2014	2008 v 2009	2009 v 2010	2010 v 2011	2011 v 2012	2012 v 2013	2013 v 2014	2008	2009	2010	2011	2012	2013	2014
<i>Acorus americanus</i>	+	-	nc	+	+	-	+	-	+	-	+	-	-	-	-	nc	-	+	nc
<i>Alisma triviale</i>																			
<i>Bidens beckii</i>																			
<i>Callitriche palustris</i>																			
<i>Carex comosa</i>	↑	-	↓	+	+		-	-	↑			-	-	↓	↓	+		-	
<i>Ceratophyllum demersum</i>	↓	↓				+	↓	↓	-	+	-	↑	↑	↓	+			↑	↑
<i>Ceratophyllum echinatum</i>																			
<i>Chara sp.</i>	-	↑	-						-						-	↓			
<i>Cicuta bulbifera</i>																		+	
<i>Dulichium arundinaceum</i>																			
<i>Eleocharis acicularis</i>	↑	↓	-	+					+						+	+			
<i>Eleocharis palustris</i>	+	-	+			+	-	+				↓	+	-	+			↑	-
<i>Elodea canadensis</i>	-	↑	↑	↑	↓	↑	↓	↑	↑	↓	↑	↓	↑	↓	+	↑	↓	↑	-
<i>Equisetum fluviatile</i>																			
<i>Heteranthera dubia</i>	↓	↑	↓				↓	-			↑	+	↑	↑	-				+
<i>Iris versicolor</i>	-	↑				-			-						↓			+	
<i>Iris virginica</i>																			
<i>Juncus pelocarpus f. submersus</i>																			
<i>Lemna minor</i>	↑	+	↓	+	↓	-	↑	↓	-	↓	-	-	-	-	↓	↑	↓	+	-
<i>Ludwigia palustris</i>																			
<i>Mimulus ringus</i>																			-
<i>Myriophyllum spicatum</i>													↑						
<i>Najas flexilis</i>			↓				-	↑	↓	+	↑	↓			↑	+			
<i>Najas gracillima</i>								-	+						+				
<i>Nitella sp.</i>	-	↑	↓	+	-	-	↑	↑			-	+	↓	+	↓		+	+	+
<i>Nuphar variegata</i>	+	-	-	+	-	-	+	+	-	+	+	-	+	-	-	+	+	+	+
<i>Nymphaea odorata</i>																			
<i>Phalaris arundinacea</i>	-	-	↑			↓	↑	-	-				↓	+	+	↓		-	
<i>Polygonum amphibium</i>	+	+	-				-	-	↑				-	-	↓	+			
<i>Polygonum punctatum</i>																			-
<i>Potamogeton crispus</i>	↓	↑	↓	+	+	↑	↑	↓	↓	↑	+	-	↓	↑	↓	+	↑	↑	↓
<i>Potamogeton ephedrus</i>																			
<i>Potamogeton foliosus</i>													↓						
<i>Potamogeton natans</i>							+	+	-			nc			+				
<i>Potamogeton nodosus</i>					-	+	-			-	+	-	-				+	+	-
<i>Potamogeton oakesianus</i>																			
<i>Potamogeton praelongus</i>																			
<i>Potamogeton pusillus</i>												-							
<i>Ranunculus aquatilis</i>																			
<i>Riccia fluitans</i>			+	-	-		↑	-			+	-	+		+		+	+	
<i>Ricciocarpus natans</i>						-													
<i>Sagittaria graminea</i>													+						
<i>Sagittaria latifolia</i>	↑	-					-	↑	+			-	+	↓	+			↑	
<i>Sagittaria rigida</i>													-						
<i>Sagittaria sp.</i>			-	+	-	-		↓	-	↑					-	-	+		-
<i>Schoenoplectus acutus</i>																			
<i>Schoenoplectus subterminalis</i>																			
<i>Schoenoplectus tabernaemontani</i>	+	+	nc	-	+	-	+			↑	↑	↓	+	-		+	-	+	-
<i>Sparganium fluctuans</i>																			
<i>Sparganium sp.</i>					-	-				-	+							-	-
<i>Spirodela polyrhiza</i>	↑	+	↓	+	↓	-	+	-	+	↓	-		-	↓	↓	↑	↓	-	
<i>Typha angustifolia</i>	+	-	+	+	-	↓	-	-	↑				+	-	-	+		-	
<i>Typha latifolia</i>		-			+		+	+	+			nc	-	-					-
<i>Typha sp.</i>										-	+	-							+
<i>Vallisneria americana</i>		↑			-	+	-	↑	↓	+	+	-		+	+		↑	↑	↑
<i>Wolffia borealis</i>																			
<i>Wolffia columbiana</i>	↑	↓	-	+	↓	+	+	-	+	↓			+	↓	-	↑	↓		-

Potamogeton crispus and Elodea canadensis

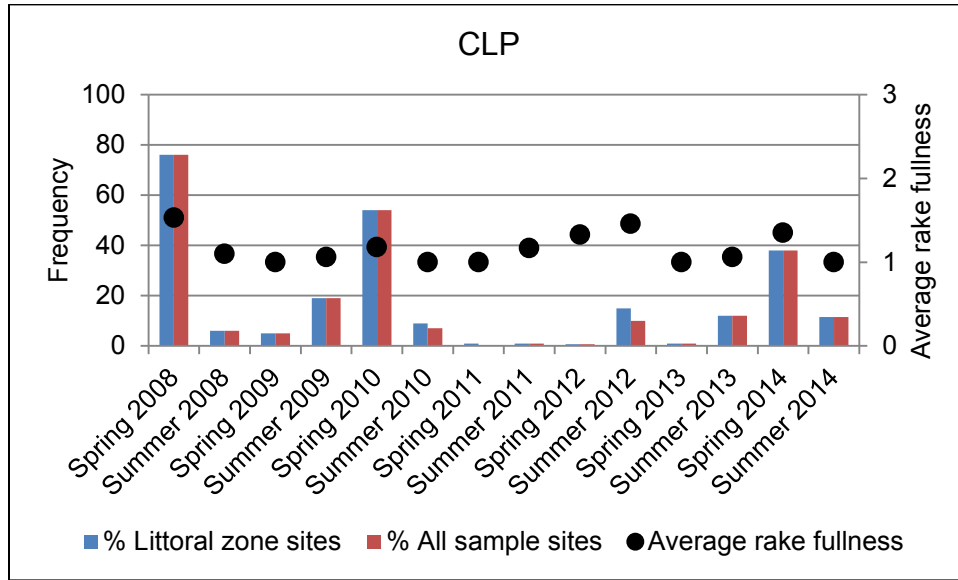


Figure 6. Percent frequency and average rake fullness of *Potamogeton crispus*

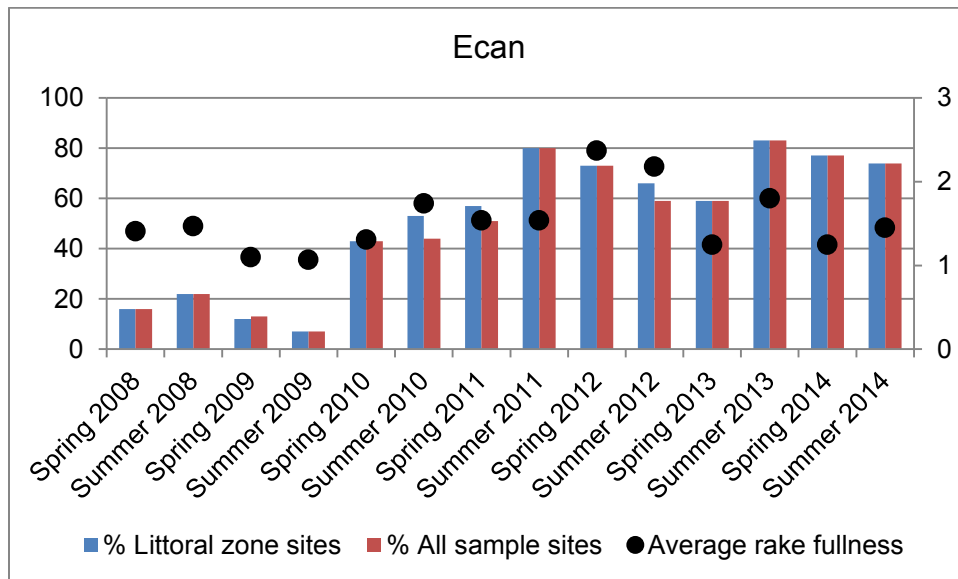


Figure 7. Percent frequency and average rake fullness of *Elodea canadensis*

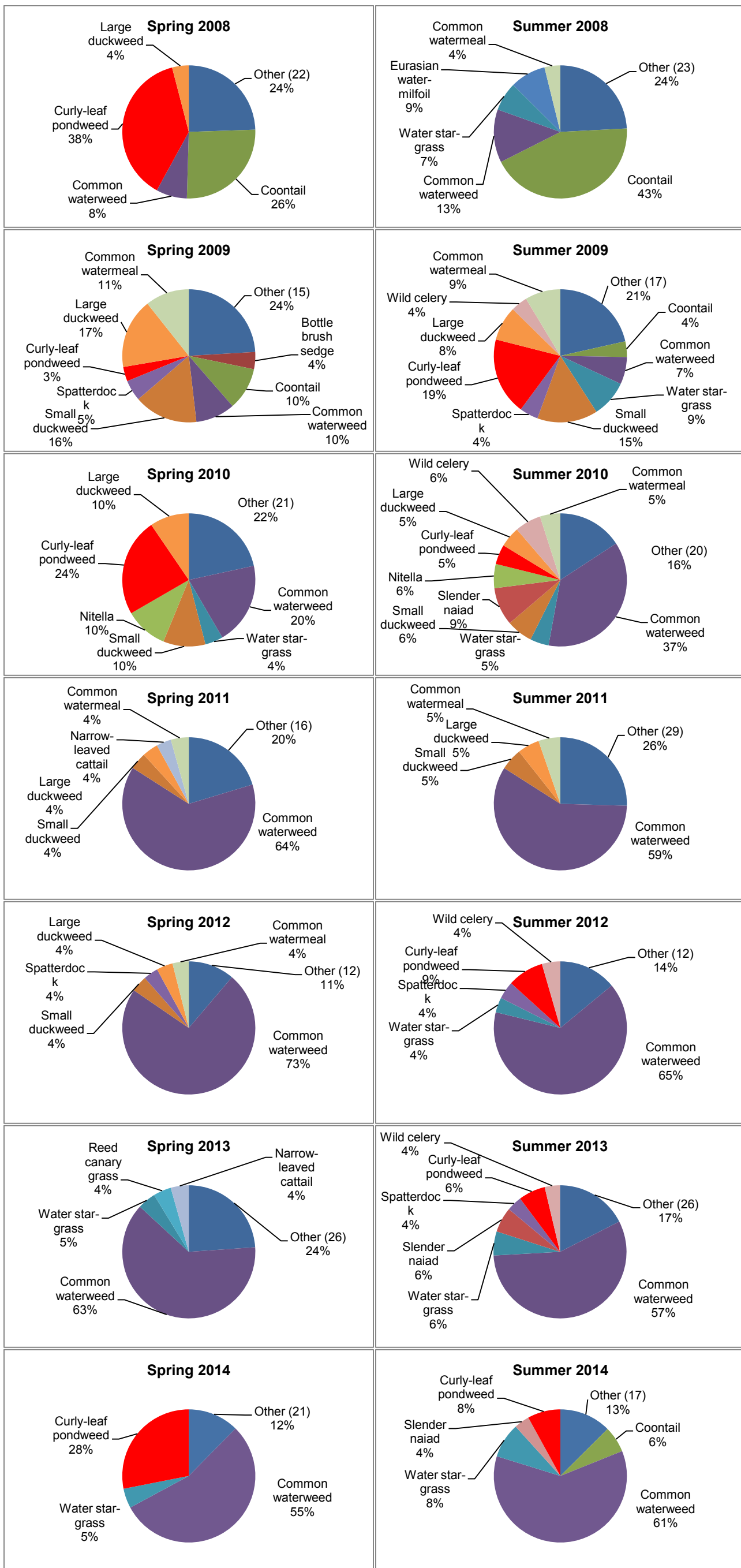


Figure 6. Dominance values of aquatic plant community

Half Moon Lake's FQI and AMCI values were compared to lakes in Wisconsin (WI) and the Driftless Area (DMR) region. Box plots illustrate where Half Moon Lake falls on the continuum of values. The graphic to the right illustrates the box plot. The minimum and maximum represent the lowest and highest values. 25% of lakes fall above and below the upper and lower quartile marks and 50% of lakes fall above and below the median value.

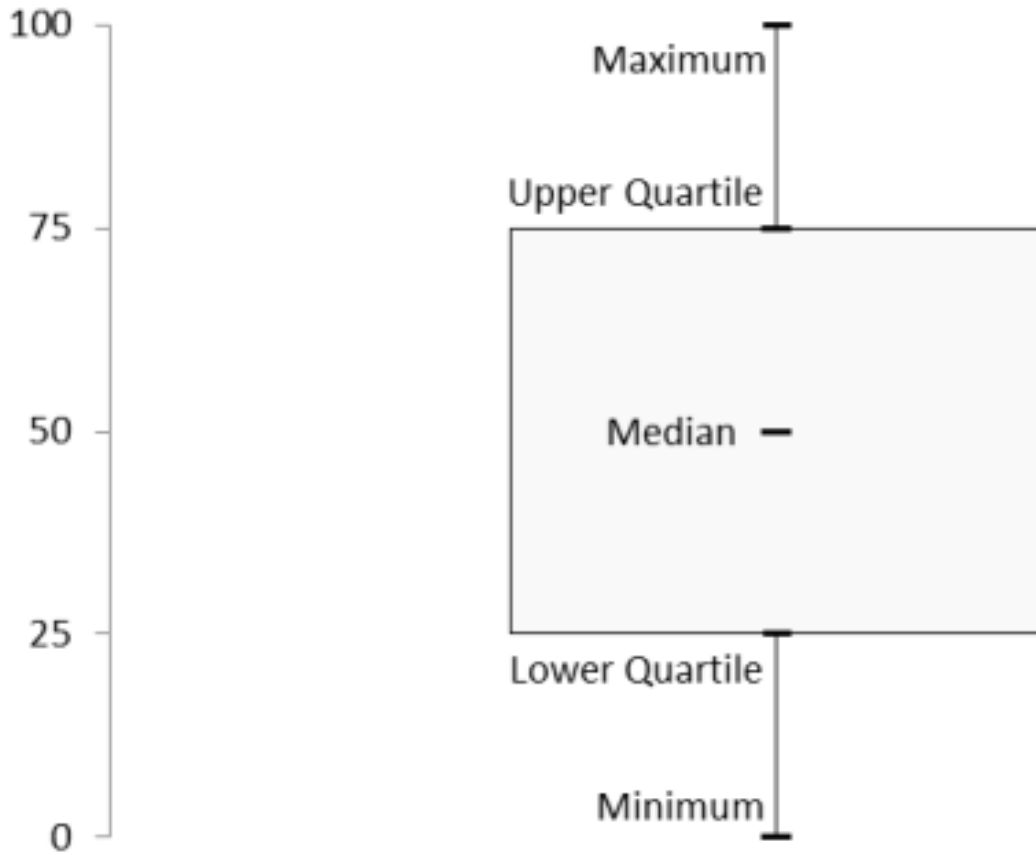


Table 3. AMCI

	Spring 2008		Spring 2009		Spring 2010		Spring 2011		Spring 2012		Spring 2013		Spring 2014		Summer 2008		Summer 2009		Summer 2010		Summer 2011		Summer 2012		Summer 2013		Summer 2014	
	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled	Value	Scaled
Maximum Rooting Depth (ft)	11.50	6	11.0	6	11.0	6	9.8	4	11.0	6	11.0	6	11.0	6	11.0	6	13.0	7	9.5	4	11.0	6	7.5	3	11.0	5	11.0	6
# Species	26	10	24.0	9	27.0	10	21.0	9	17.0	8	30.0	10	24.0	9	30.0	10	27.0	10	29.0	10	33.0	10	17.0	8	33.0	10	22.0	9
Littoral Zone Vegetated (%)	97.6	10	49.7	9	84.9	10	62.5	10	83.1	10	68.6	10	91.9	10	65.5	10	37.5	7	63.0	10	86.1	10	72.4	10	91.6	10	79.9	10
Submergent Species (%)	82.5	10	33.9	1	67.4	6	69.3	8	72.7	9	68.3	8	91.7	8	79.8	10	49.7	4	71.2	8	64.3	6	87.9	9	81.3	10	92.0	8
Sensitive Species (%)	3.0	4	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.9	1	0.5	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1
Exotic Species (%)	40.1	2	4.7	6	25.0	3	3.2	6	0.7	6	5.6	5	28.3	3	14.4	4	22.1	3	6.1	5	1.2	6	9.9	5	9.2	5	9.2	5
Simpson's Diversity	0.78	4	0.9	8	0.7	3	0.5	1	0.4	1	0.5	1	0.6	2	0.8	4	0.9	8	0.8	5	0.5	1	0.6	1	0.7	2	0.6	2
AMCI		46		40		39		39		41		41		39		45		40		43		40		37		43		41

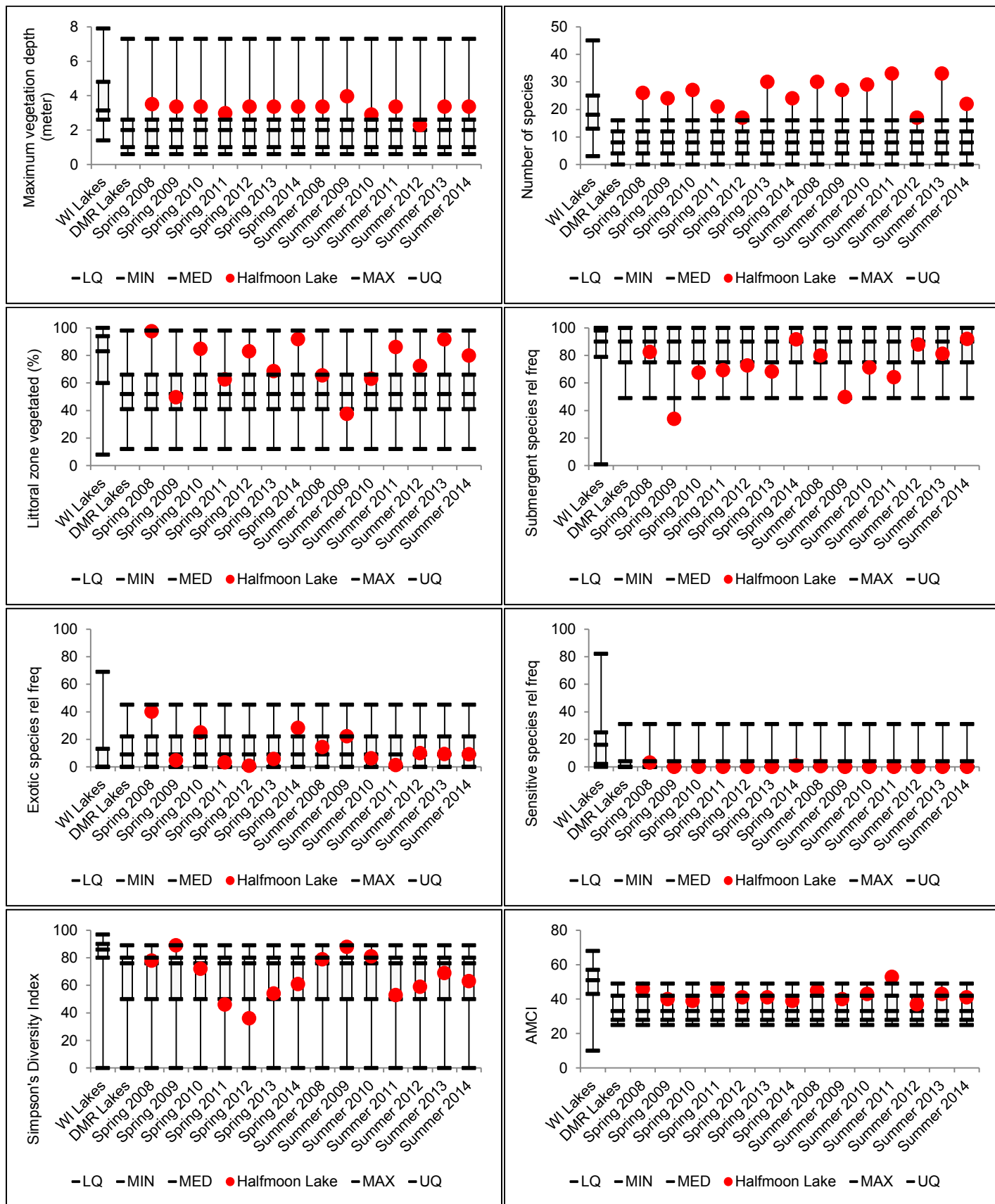


Figure 7. AMCI Box Plots

Table 4. FQI

	Spring 2008	Spring 2009	Spring 2010	Spring 2011	Spring 2012	Spring 2013	Spring 2014	Summer 2008	Summer 2009	Summer 2010	Summer 2011	Summer 2012	Summer 2013	Summer 2014
Species	23	19	24	18	15	21	15	26	24	25	28	15	26	21
Average C	5.43	4.68	5.08	5.38	4.87	4.9	5.33	5.42	4.95	5.2	5.39	5.13	5.23	5.14
FQI	26.06	20.48	24.9	22.86	18.85	22.48	20.66	27.65	24.29	26	28.53	19.88	26.67	23.57

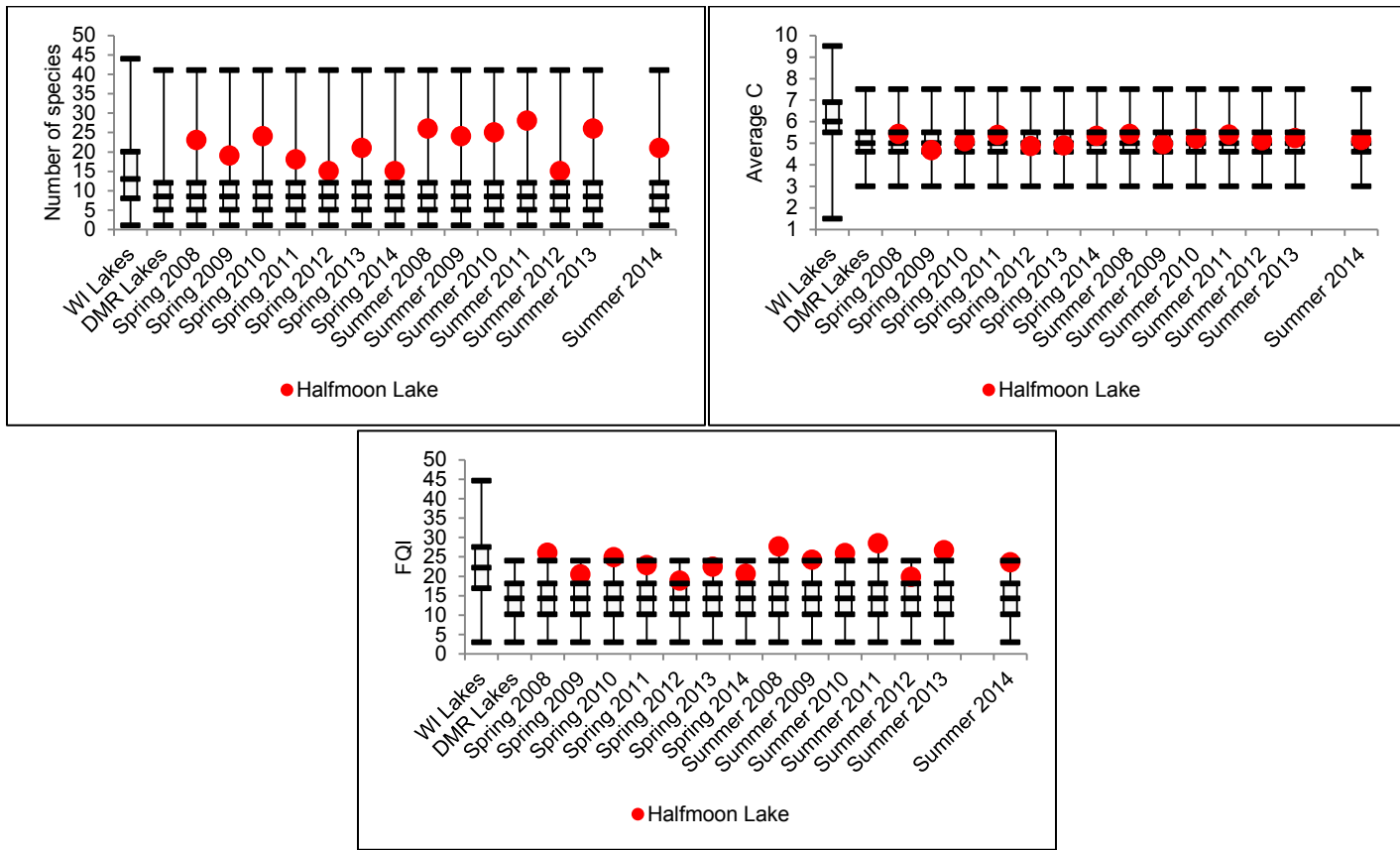
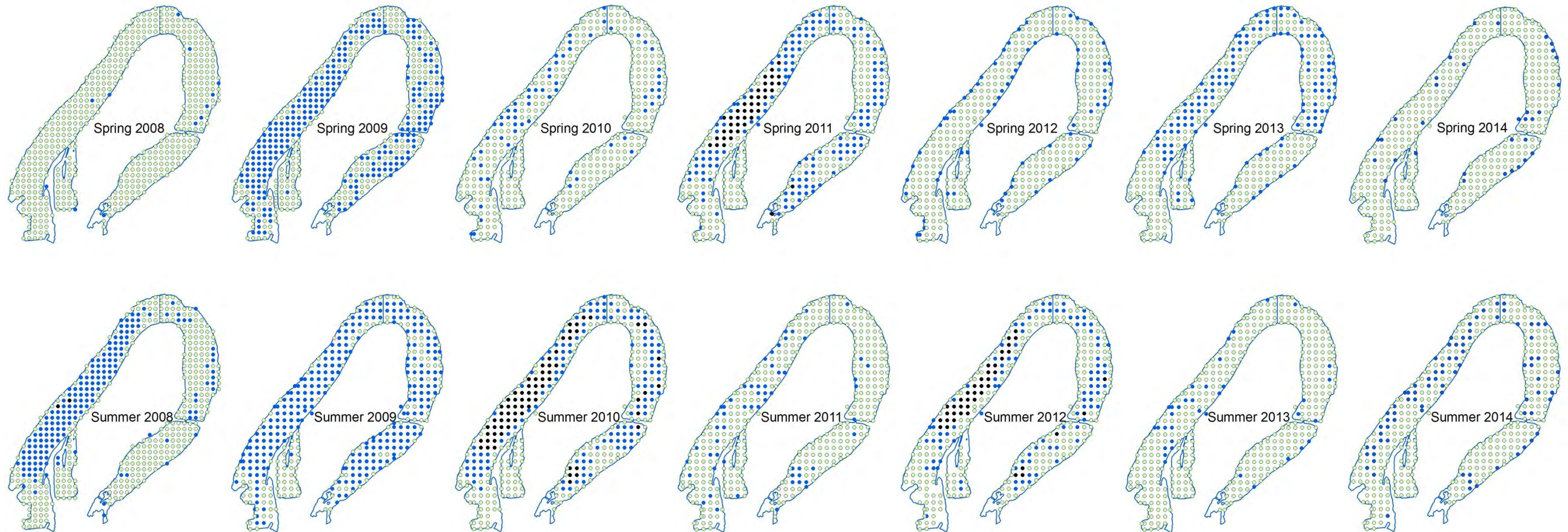


Figure 8. FQI Box Plots

Vegetation



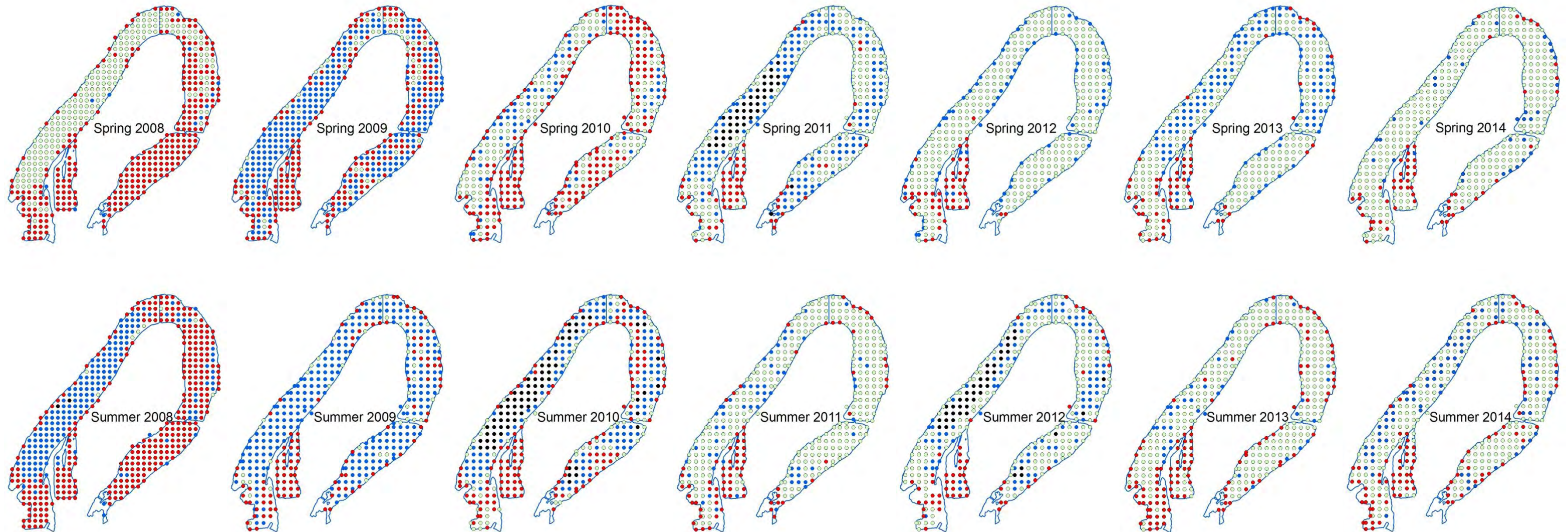
Legend

- Vegetated site
- Littoral site - no vegetation
- Beyond max depth of vegetation

0 125 250 500 750 1,000 Meters



Native Species



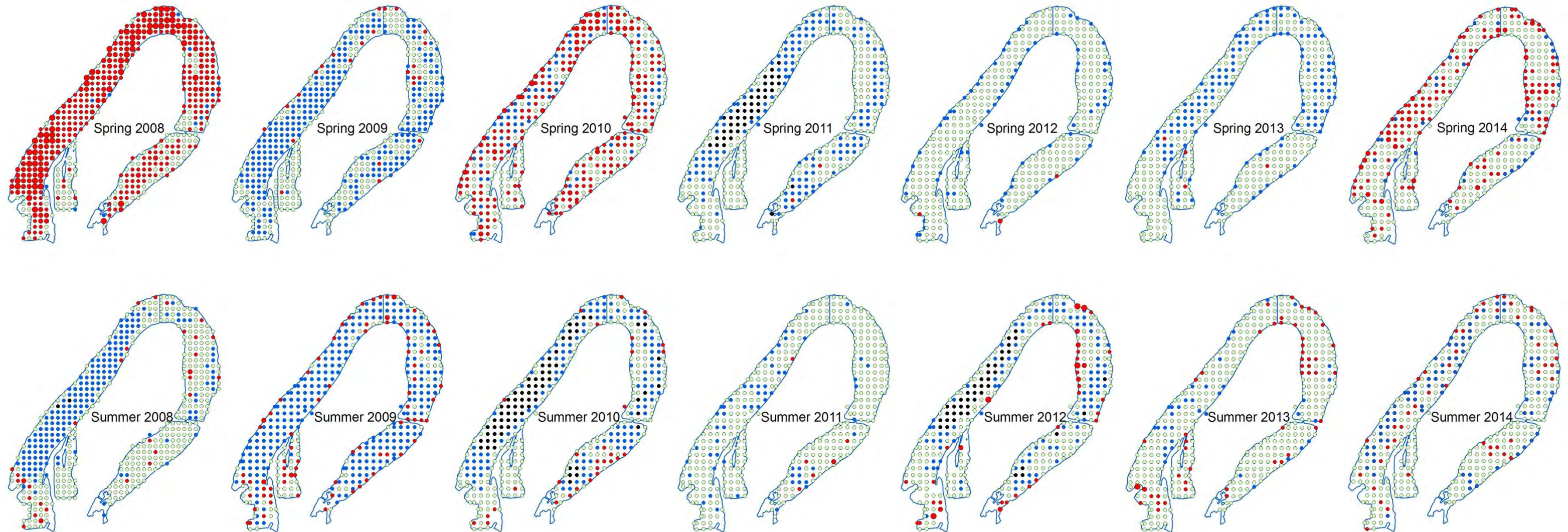
Legend

- At least one native species (not Ecan)
- Vegetated site
- Littoral site - no vegetation
- Beyond max depth of vegetation

0 125 250 500 750 1,000 Meters

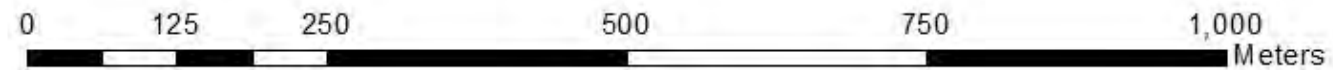


Curly-leaf Pondweed

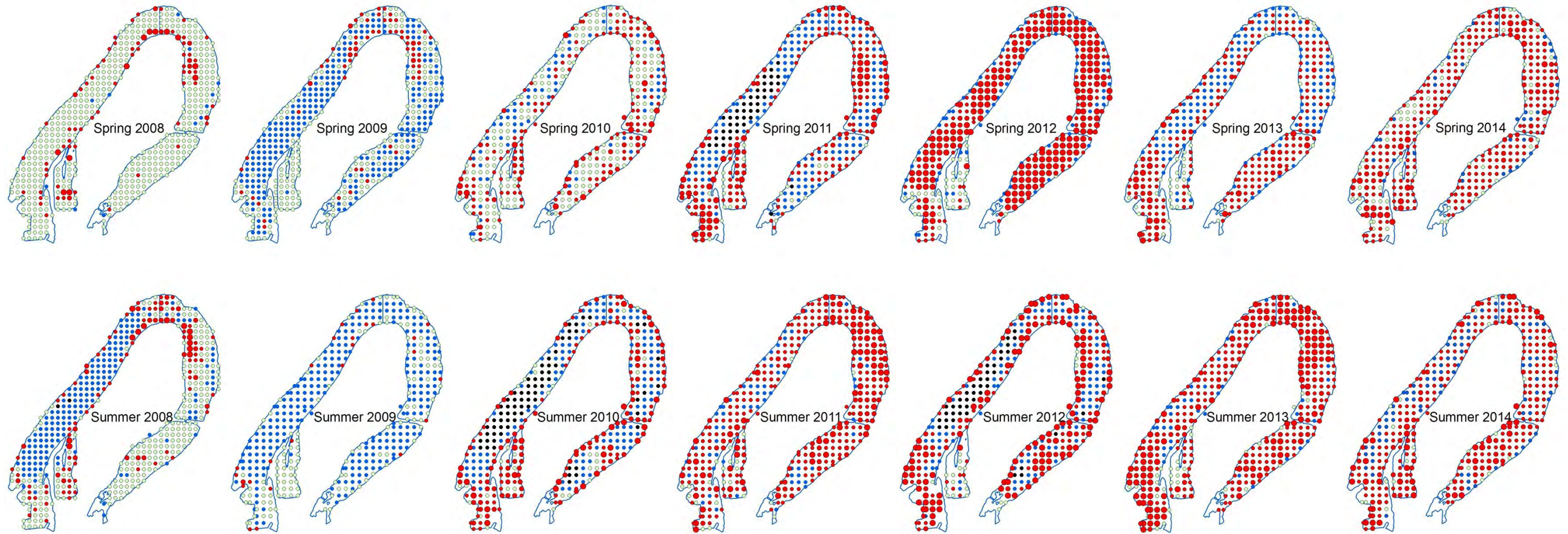


Legend

- CLP rake fullnes 1
- CLP rake fullnes 2
- CLP rake fullnes 3
- Vegetated site
- Littoral site - no vegetation
- Beyond max depth of vegetation

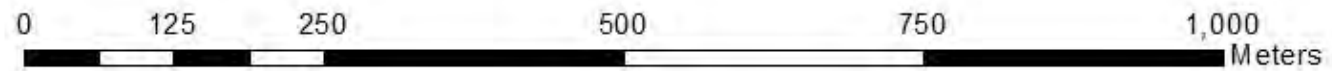


Common Waterweed



Legend

- ECAN rake fullnes 1
- ECAN rake fullnes 2
- ECAN rake fullnes 3
- Vegetated site
- Littoral site - no vegetation
- Beyond max depth of vegetation

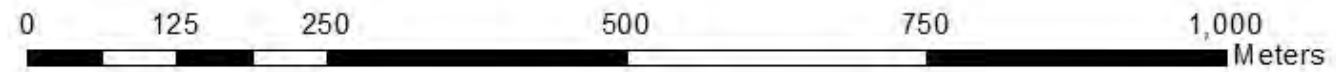


Coontail

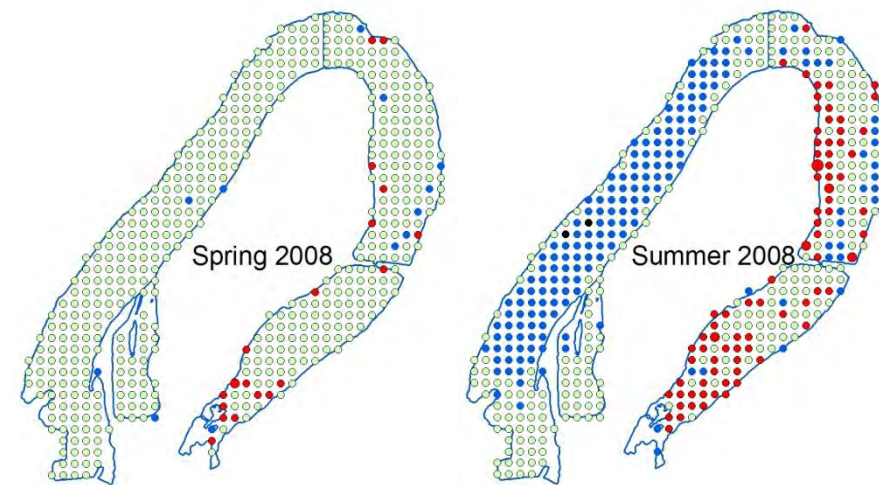


Legend

- COON rake fullnes 1
- COON rake fullnes 1
- COON rake fullnes 1
- Vegetated site
- Littoral site - no vegetation
- Beyond max depth of vegetation

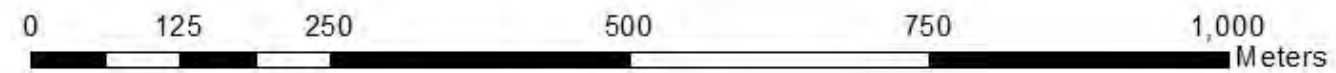


Eurasian Water Milfoil



Legend

- EWM rake fullness 1
- EWM rake fullness 2
- EWM rake fullness 3
- Vegetated site
- Littoral site - no vegetation
- Beyond max depth of vegetation



Appendix 1. Individual species statistics

Spring 2008 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
Acorus americanus, Sweet-flag	6	6				1.18	1.18	1.21	0.59
Carex comosa, Bottle brush sedge	10	10				1.97	1.97	2.02	0.98
Ceratophyllum demersum, Coontail	250	46	81	119	4	49.31	49.31	50.51	24.49
Chara sp., Muskgrasses	8		7	1		1.58	1.58	1.62	0.78
Eleocharis acicularis, Needle spikerush	4	1	2	1		0.79	0.79	0.81	0.39
Eleocharis palustris, Creeping spikerush	3	3				0.59	0.59	0.61	0.29
Elodea canadensis, Common waterweed	79	21	38	20		15.58	15.58	15.96	7.74
Heteranthera dubia, Water star-grass	37	3	14	20		7.30	7.30	7.47	3.62
Iris versicolor, Northern blue flag	2	2				0.39	0.39	0.40	0.20
Lemna minor, Small duckweed	39	25	14			7.69	7.69	7.88	3.82
Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	19	4	8	7		3.75	3.75	3.84	1.86
Nitella sp., Nitella	15	2	3	10		2.96	2.96	3.03	1.47
Nuphar variegata, Spatterdock	14	2	12			2.76	2.76	2.83	1.37
Phalaris arundinacea, Reed canary grass	7	7				1.38	1.38	1.41	0.69
Polygonum amphibium, Water smartweed	10	8	1	1		1.97	1.97	2.02	0.98
Potamogeton crispus, Curly-leaf pondweed	383	25	81	231	46	75.54	75.54	77.37	37.51
Potamogeton foliosus, Leafy pondweed	30	2	4	24		5.92	5.92	6.06	2.94
Potamogeton nodosus, Long-leaf pondweed	3	2	1			0.59	0.59	0.61	0.29
Potamogeton pusillus, Small pondweed	17	3	5	9		3.35	3.35	3.43	1.67
Ranunculus aquatilis, White water crowfoot	1		1			0.20	0.20	0.20	0.10
Sagittaria latifolia, Common arrowhead	5	2	3			0.99	0.99	1.01	0.49
Sagittaria rigida, Sessile-fruited arrowhead	8	3	5			1.58	1.58	1.62	0.78
Schoenoplectus tabernaemontani, Softstem bulrush	3	3				0.59	0.59	0.61	0.29
Spirodela polyrhiza, Large duckweed	41	27	13	1		8.09	8.09	8.28	4.02
Typha angustifolia, Narrow-leaved cattail	6	2	4			1.18	1.18	1.21	0.59
Wolffia columbiana, Common watermeal	21	16	5			4.14	4.14	4.24	2.06
Total	1021	225	302	444	50	201.38	201.38	206.26	100.00

Spring 2008 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
<i>Acorus americanus</i> , Sweet-flag	8.00	8.00				0.53	1.33	1.33			
<i>Carex comosa</i> , Bottle brush sedge	12.00	12.00				0.79	1.20	1.20			
<i>Ceratophyllum demersum</i> , Coontail	419.00	54.00	146.00	213.00	6.00	27.53	1.68	1.17	1.80	1.79	1.50
<i>Chara</i> sp., Muskgrasses	17.00		14.00	3.00		1.12	2.13		2.00	3.00	
<i>Eleocharis acicularis</i> , Needle spikerush	5.00	1.00	3.00	1.00		0.33	1.25	1.00	1.50	1.00	
<i>Eleocharis palustris</i> , Creeping spikerush	3.00	3.00				0.20	1.00	1.00			
<i>Elodea canadensis</i> , Common waterweed	111.00	26.00	61.00	24.00		7.29	1.41	1.24	1.61	1.20	
<i>Heteranthera dubia</i> , Water star-grass	44.00	3.00	16.00	25.00		2.89	1.19	1.00	1.14	1.25	
<i>Iris versicolor</i> , Northern blue flag	2.00	2.00				0.13	1.00	1.00			
<i>Lemna minor</i> , Small duckweed	46.00	31.00	15.00			3.02	1.18	1.24	1.07		
<i>Myriophyllum spicatum</i> , Eurasian water-milfoil or Hybrid water-milfoil	20.00	4.00	8.00	8.00		1.31	1.05	1.00	1.00	1.14	
<i>Nitella</i> sp., Nitella	16.00	2.00	3.00	11.00		1.05	1.07	1.00	1.00	1.10	
<i>Nuphar variegata</i> , Spatterdock	24.00	3.00	21.00			1.58	1.71	1.50	1.75		
<i>Phalaris arundinacea</i> , Reed canary grass	11.00	11.00				0.72	1.57	1.57			
<i>Polygonum amphibium</i> , Water smartweed	15.00	12.00	1.00	2.00		0.99	1.50	1.50	1.00	2.00	
<i>Potamogeton crispus</i> , Curly-leaf pondweed	585.00	31.00	123.00	370.00	61.00	38.44	1.53	1.24	1.52	1.60	1.33
<i>Potamogeton foliosus</i> , Leafy pondweed	32.00	2.00	5.00	25.00		2.10	1.07	1.00	1.25	1.04	
<i>Potamogeton nodosus</i> , Long-leaf pondweed	4.00	3.00	1.00			0.26	1.33	1.50	1.00		
<i>Potamogeton pusillus</i> , Small pondweed	19.00	3.00	6.00	10.00		1.25	1.12	1.00	1.20	1.11	
<i>Ranunculus aquatilis</i> , White water crowfoot	1.00		1.00			0.07	1.00		1.00		
<i>Sagittaria latifolia</i> , Common arrowhead	6.00	2.00	4.00			0.39	1.20	1.00	1.33		
<i>Sagittaria rigida</i> , Sessile-fruited arrowhead	15.00	5.00	10.00			0.99	1.88	1.67	2.00		
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	4.00	4.00				0.26	1.33	1.33			
<i>Spirodela polyrhiza</i> , Large duckweed	62.00	44.00	16.00	2.00		4.07	1.51	1.63	1.23	2.00	
<i>Typha angustifolia</i> , Narrow-leaved cattail	13.00	3.00	10.00			0.85	2.17	1.50	2.50		
<i>Wolffia columbiana</i> , Common watermeal	28.00	22.00	6.00			1.84	1.33	1.38	1.20		
Total	1522.00	291.00	470.00	694.00	67.00	100.00	35.73	30.00	28.10	18.24	2.83

Summer 2008 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	4	4				0.79	0.80	1.22	0.50
<i>Bidens beckii</i> (formerly <i>Megalodonta</i>), Water marigold	1	1				0.20	0.20	0.30	0.13
<i>Carex comosa</i> , Bottle brush sedge	7	7				1.39	1.39	2.13	0.88
<i>Ceratophyllum demersum</i> , Coontail	310	51	101	156	2	61.51	61.75	94.22	38.80
<i>Chara</i> sp., Muskgrasses	5		5			0.99	1.00	1.52	0.63
<i>Eleocharis palustris</i> , Creeping spikerush	8	5	3			1.59	1.59	2.43	1.00
<i>Elodea canadensis</i> , Common waterweed	109	21	49	39		21.63	21.71	33.13	13.64
<i>Heteranthera dubia</i> , Water star-grass	59	6	25	28		11.71	11.75	17.93	7.38
<i>Lemna minor</i> , Small duckweed	28	20	7	1		5.56	5.58	8.51	3.50
<i>Myriophyllum spicatum</i> , Eurasian water-milfoil or Hybrid water-milfoil	84	16	24	43	1	16.67	16.73	25.53	10.51
<i>Najas flexilis</i> , Slender naiad	8	3	4	1		1.59	1.59	2.43	1.00
<i>Nitella</i> sp., <i>Nitella</i>	5		2	3		0.99	1.00	1.52	0.63
<i>Nuphar variegata</i> , Spatterdock	15	2	11	2		2.98	2.99	4.56	1.88
<i>Phalaris arundinacea</i> , Reed canary grass	1	1				0.20	0.20	0.30	0.13
<i>Polygonum amphibium</i> , Water smartweed	8	8				1.59	1.59	2.43	1.00
<i>Potamogeton crispus</i> , Curly-leaf pondweed	30	3	16	11		5.95	5.98	9.12	3.75
<i>Potamogeton foliosus</i> , Leafy pondweed	4		1	3		0.79	0.80	1.22	0.50
<i>Potamogeton natans</i> , Floating-leaf pondweed	1	1				0.20	0.20	0.30	0.13
<i>Potamogeton nodosus</i> , Long-leaf pondweed	2	1	1			0.40	0.40	0.61	0.25
<i>Potamogeton oakesianus</i> , Oakes' pondweed	1			1		0.20	0.20	0.30	0.13
<i>Sagittaria latifolia</i> , Common arrowhead	13	12	1			2.58	2.59	3.95	1.63
<i>Sagittaria rigida</i> , Sessile-fruited arrowhead	6	2	4			1.19	1.20	1.82	0.75
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	6	6				1.19	1.20	1.82	0.75
<i>Spirodela polyrhiza</i> , Large duckweed	28	15	11	2		5.56	5.58	8.51	3.50
<i>Typha angustifolia</i> , Narrow-leaved cattail	6	2	4			1.19	1.20	1.82	0.75
<i>Typha latifolia</i> , Broad-leaved cattail	1	1				0.20	0.20	0.30	0.13
<i>Vallisneria americana</i> , Wild celery	19	3	15	1		3.77	3.78	5.78	2.38
<i>Wolffia columbiana</i> , Common watermeal	30	18	9	3		5.95	5.98	9.12	3.75
Total	799	209	293	294	3	158.53	159.16	242.86	100.00

Summer 2008 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
<i>Acorus americanus</i> , Sweet-flag	8.00	8.00				0.61	2.00	2.00			
<i>Bidens beckii</i> (formerly <i>Megalodonta</i>), Water marigold	1.00	1.00				0.08	1.00	1.00			
<i>Carex comosa</i> , Bottle brush sedge	10.00	10.00				0.76	1.43	1.43			
<i>Ceratophyllum demersum</i> , Coontail	631.00	92.00	206.00	328.00	5.00	47.98	2.04	1.80	2.04	2.10	2.50
<i>Chara</i> sp., Muskgrasses	10.00		10.00			0.76	2.00		2.00		
<i>Eleocharis palustris</i> , Creeping spikerush	13.00	8.00	5.00			0.99	1.63	1.60	1.67		
<i>Elodea canadensis</i> , Common waterweed	160.00	30.00	67.00	63.00		12.17	1.47	1.43	1.37	1.62	
<i>Heteranthera dubia</i> , Water star-grass	87.00	6.00	38.00	43.00		6.62	1.47	1.00	1.52	1.54	
<i>Lemna minor</i> , Small duckweed	35.00	27.00	7.00	1.00		2.66	1.25	1.35	1.00	1.00	
<i>Myriophyllum spicatum</i> , Eurasian water-milfoil or Hybrid water-milfoil	90.00	19.00	25.00	45.00	1.00	6.84	1.07	1.19	1.04	1.05	1.00
<i>Najas flexilis</i> , Slender naiad	11.00	6.00	4.00	1.00		0.84	1.38	2.00	1.00	1.00	
<i>Nitella</i> sp., Nitella	7.00		4.00	3.00		0.53	1.40		2.00	1.00	
<i>Nuphar variegata</i> , Spatterdock	28.00	3.00	23.00	2.00		2.13	1.87	1.50	2.09	1.00	
<i>Phalaris arundinacea</i> , Reed canary grass	1.00	1.00				0.08	1.00	1.00			
<i>Polygonum amphibium</i> , Water smartweed	11.00	11.00				0.84	1.38	1.38			
<i>Potamogeton crispus</i> , Curly-leaf pondweed	33.00	3.00	19.00	11.00		2.51	1.10	1.00	1.19	1.00	
<i>Potamogeton foliosus</i> , Leafy pondweed	4.00		1.00	3.00		0.30	1.00		1.00	1.00	
<i>Potamogeton natans</i> , Floating-leaf pondweed	1.00	1.00				0.08	1.00	1.00			
<i>Potamogeton nodosus</i> , Long-leaf pondweed	2.00	1.00	1.00			0.15	1.00	1.00	1.00		
<i>Potamogeton oakesianus</i> , Oakes' pondweed	1.00			1.00		0.08	1.00			1.00	
<i>Sagittaria latifolia</i> , Common arrowhead	19.00	18.00	1.00			1.44	1.46	1.50	1.00		
<i>Sagittaria rigida</i> , Sessile-fruited arrowhead	9.00	4.00	5.00			0.68	1.50	2.00	1.25		
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	9.00	9.00				0.68	1.50	1.50			
<i>Spirodela polyrhiza</i> , Large duckweed	36.00	22.00	12.00	2.00		2.74	1.29	1.47	1.09	1.00	
<i>Typha angustifolia</i> , Narrow-leaved cattail	11.00	5.00	6.00			0.84	1.83	2.50	1.50		
<i>Typha latifolia</i> , Broad-leaved cattail	2.00	2.00				0.15	2.00	2.00			
<i>Vallisneria americana</i> , Wild celery	33.00	3.00	28.00	2.00		2.51	1.74	1.00	1.87	2.00	
<i>Wolffia columbiana</i> , Common watermeal	52.00	32.00	14.00	6.00		3.95	1.73	1.78	1.56	2.00	
Total	1315.00	322.00	476.00	511.00	6.00	100.00	40.52	35.42	27.18	18.30	3.50

Spring 2009 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
Acorus americanus, Sweet-flag	8	7	1			1.56	1.56	3.14	1.35
Carex comosa, Bottle brush sedge	23	20		3		4.48	4.48	9.02	3.88
Ceratophyllum demersum, Coontail	70	3	12	54	1	13.65	13.65	27.45	11.80
Chara sp., Muskgrasses	2		2			0.39	0.39	0.78	0.34
Eleocharis acicularis, Needle spikerush	13	12	1			2.53	2.53	5.10	2.19
Eleocharis palustris, Creeping spikerush	7	7				1.36	1.36	2.75	1.18
Elodea canadensis, Common waterweed	63	8	26	28	1	12.28	12.28	24.71	10.62
Heteranthera dubia, Water star-grass	22	1	8	13		4.29	4.29	8.63	3.71
Iris versicolor, Northern blue flag	2	2				0.39	0.39	0.78	0.34
Lemna minor, Small duckweed	89	55	26	8		17.35	17.35	34.90	15.01
Nitella sp., Nitella	12		5	7		2.34	2.34	4.71	2.02
Nuphar variegata, Spatterdock	25	10	14	1		4.87	4.87	9.80	4.22
Phalaris arundinacea, Reed canary grass	4	3	1			0.78	0.78	1.57	0.67
Polygonum amphibium, Water smartweed	13	12		1		2.53	2.53	5.10	2.19
Potamogeton crispus, Curly-leaf pondweed	24	3	18	3		4.68	4.68	9.41	4.05
Sagittaria latifolia, Common arrowhead	16	14	2			3.12	3.12	6.27	2.70
Schoenoplectus tabernaemontani, Softstem bulrush	7	7				1.36	1.36	2.75	1.18
Sparganium sp., Bur-reed	5	5				0.97	0.97	1.96	0.84
Spirodela polyrhiza, Large duckweed	99	58	28	13		19.30	19.30	38.82	16.69
Typha angustifolia, Narrow-leaved cattail	13	10	3			2.53	2.53	5.10	2.19
Typha latifolia, Broad-leaved cattail	3	3				0.58	0.58	1.18	0.51
Vallisneria americana, Wild celery	8	3	4	1		1.56	1.56	3.14	1.35
Wolffia columbiana, Common watermeal	65	42	20	3		12.67	12.67	25.49	10.96
Total	593	285	171	135	2	115.59	115.59	232.55	100.00

Spring 2009 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
<i>Acorus americanus</i> , Sweet-flag	17.00	14.00	3.00			2.10	2.13	2.00	3.00		
<i>Carex comosa</i> , Bottle brush sedge	36.00	33.00		3.00		4.46	1.57	1.65		1.00	
<i>Ceratophyllum demersum</i> , Coontail	72.00	4.00	13.00	54.00	1.00	8.91	1.03	1.33	1.08	1.00	1.00
<i>Chara</i> sp., Muskgrasses	2.00		2.00			0.25	1.00		1.00		
<i>Eleocharis acicularis</i> , Needle spikerush	20.00	18.00	2.00			2.48	1.54	1.50	2.00		
<i>Eleocharis palustris</i> , Creeping spikerush	11.00	11.00				1.36	1.57	1.57			
<i>Elodea canadensis</i> , Common waterweed	69.00	8.00	29.00	31.00	1.00	8.54	1.10	1.00	1.12	1.11	1.00
<i>Heteranthera dubia</i> , Water star-grass	24.00	1.00	8.00	15.00		2.97	1.09	1.00	1.00	1.15	
<i>Iris versicolor</i> , Northern blue flag	4.00	4.00				0.50	2.00	2.00			
<i>Lemna minor</i> , Small duckweed	130.00	90.00	32.00	8.00		16.09	1.46	1.64	1.23	1.00	
<i>Nitella</i> sp., Nitella	12.00		5.00	7.00		1.49	1.00		1.00	1.00	
<i>Nuphar variegata</i> , Spatterdock	48.00	17.00	30.00	1.00		5.94	1.92	1.70	2.14	1.00	
<i>Phalaris arundinacea</i> , Reed canary grass	4.00	3.00	1.00			0.50	1.00	1.00	1.00		
<i>Polygonum amphibium</i> , Water smartweed	18.00	17.00		1.00		2.23	1.38	1.42		1.00	
<i>Potamogeton crispus</i> , Curly-leaf pondweed	24.00	3.00	18.00	3.00		2.97	1.00	1.00	1.00	1.00	
<i>Sagittaria latifolia</i> , Common arrowhead	26.00	22.00	4.00			3.22	1.63	1.57	2.00		
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	10.00	10.00				1.24	1.43	1.43			
<i>Sparganium</i> sp., Bur-reed	9.00	9.00				1.11	1.80	1.80			
<i>Spirodela polyrhiza</i> , Large duckweed	140.00	93.00	34.00	13.00		17.33	1.41	1.60	1.21	1.00	
<i>Typha angustifolia</i> , Narrow-leaved cattail	33.00	24.00	9.00			4.08	2.54	2.40	3.00		
<i>Typha latifolia</i> , Broad-leaved cattail	7.00	7.00				0.87	2.33	2.33			
<i>Vallisneria americana</i> , Wild celery	8.00	3.00	4.00	1.00		0.99	1.00	1.00	1.00	1.00	
<i>Wolffia columbiana</i> , Common watermeal	84.00	60.00	21.00	3.00		10.40	1.29	1.43	1.05	1.00	
Total	808.00	451.00	215.00	140.00	2.00	100.00	34.21	32.37	23.84	12.26	2.00

Summer 2009 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	4	3	1			0.98	0.98	2.61	1.04
<i>Carex comosa</i> , Bottle brush sedge	5	5				1.23	1.23	3.27	1.30
<i>Ceratophyllum demersum</i> , Coontail	16	2	2	11	1	3.92	3.92	10.46	4.17
<i>Eleocharis palustris</i> , Creeping spikerush	5	5				1.23	1.23	3.27	1.30
<i>Elodea canadensis</i> , Common waterweed	27	13	11	3		6.62	6.62	17.65	7.03
<i>Heteranthera dubia</i> , Water star-grass	31	19	11	1		7.60	7.60	20.26	8.07
<i>Lemna minor</i> , Small duckweed	57	41	13	3		13.97	13.97	37.25	14.84
<i>Ludwigia palustris</i> , Marsh purslane	1	1				0.25	0.25	0.65	0.26
<i>Najas flexilis</i> , Slender naiad	3	2	1			0.74	0.74	1.96	0.78
<i>Najas gracillima</i> , Northern naiad	8	7	1			1.96	1.96	5.23	2.08
<i>Nitella</i> sp., Nitella	14	5	3	6		3.43	3.43	9.15	3.65
<i>Nuphar variegata</i> , Spatterdock	15	9	6			3.68	3.68	9.80	3.91
<i>Nymphaea odorata</i> , White water lily	1		1			0.25	0.25	0.65	0.26
<i>Phalaris arundinacea</i> , Reed canary grass	8	8				1.96	1.96	5.23	2.08
<i>Polygonum amphibium</i> , Water smartweed	4	4				0.98	0.98	2.61	1.04
<i>Potamogeton crispus</i> , Curly-leaf pondweed	77	25	43	9		18.87	18.87	50.33	20.05
<i>Potamogeton natans</i> , Floating-leaf pondweed	1	1				0.25	0.25	0.65	0.26
<i>Potamogeton nodosus</i> , Long-leaf pondweed	1	1				0.25	0.25	0.65	0.26
<i>Sagittaria latifolia</i> , Common arrowhead	4	4				0.98	0.98	2.61	1.04
<i>Sagittaria</i> sp., Arrowhead	12	9	3			2.94	2.94	7.84	3.13
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	5	5				1.23	1.23	3.27	1.30
<i>Spirodela polyrhiza</i> , Large duckweed	33	31	2			8.09	8.09	21.57	8.59
<i>Typha angustifolia</i> , Narrow-leaved cattail	4	4				0.98	0.98	2.61	1.04
<i>Typha latifolia</i> , Broad-leaved cattail	1	1				0.25	0.25	0.65	0.26
<i>Vallisneria americana</i> , Wild celery	12	3	9			2.94	2.94	7.84	3.13
<i>Wolffia columbiana</i> , Common watermeal	35	23	10	2		8.58	8.58	22.88	9.11
Total	384	231	117	35	1	94.12	94.12	250.98	100.00

Summer 2009 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
<i>Acorus americanus</i> , Sweet-flag	6.00	5.00	1.00			1.29	1.50	1.67	1.00		
<i>Carex comosa</i> , Bottle brush sedge	6.00	6.00				1.29	1.20	1.20			
<i>Ceratophyllum demersum</i> , Coontail	16.00	2.00	2.00	11.00	1.00	3.43	1.00	1.00	1.00	1.00	1.00
<i>Eleocharis palustris</i> , Creeping spikerush	7.00	7.00				1.50	1.40	1.40			
<i>Elodea canadensis</i> , Common waterweed	29.00	14.00	12.00	3.00		6.22	1.07	1.08	1.09	1.00	
<i>Heteranthera dubia</i> , Water star-grass	46.00	31.00	14.00	1.00		9.87	1.48	1.63	1.27	1.00	
<i>Lemna minor</i> , Small duckweed	68.00	51.00	13.00	4.00		14.59	1.19	1.24	1.00	1.33	
<i>Ludwigia palustris</i> , Marsh purslane	2.00	2.00				0.43	2.00	2.00			
<i>Najas flexilis</i> , Slender naiad	3.00	2.00	1.00			0.64	1.00	1.00	1.00		
<i>Najas gracillima</i> , Northern naiad	12.00	10.00	2.00			2.58	1.50	1.43	2.00		
<i>Nitella</i> sp., Nitella	15.00	5.00	4.00	6.00		3.22	1.07	1.00	1.33	1.00	
<i>Nuphar variegata</i> , Spatterdock	24.00	14.00	10.00			5.15	1.60	1.56	1.67		
<i>Nymphaea odorata</i> , White water lily	1.00		1.00			0.21	1.00		1.00		
<i>Phalaris arundinacea</i> , Reed canary grass	8.00	8.00				1.72	1.00	1.00			
<i>Polygonum amphibium</i> , Water smartweed	5.00	5.00				1.07	1.25	1.25			
<i>Potamogeton crispus</i> , Curly-leaf pondweed	82.00	26.00	47.00	9.00		17.60	1.06	1.04	1.09	1.00	
<i>Potamogeton natans</i> , Floating-leaf pondweed	1.00	1.00				0.21	1.00	1.00			
<i>Potamogeton nodosus</i> , Long-leaf pondweed	1.00	1.00				0.21	1.00	1.00			
<i>Sagittaria latifolia</i> , Common arrowhead	7.00	7.00				1.50	1.75	1.75			
<i>Sagittaria</i> sp., Arrowhead	16.00	12.00	4.00			3.43	1.33	1.33	1.33		
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	5.00	5.00				1.07	1.00	1.00			
<i>Spirodela polyrhiza</i> , Large duckweed	38.00	34.00	4.00			8.15	1.15	1.10	2.00		
<i>Typha angustifolia</i> , Narrow-leaved cattail	6.00	6.00				1.29	1.50	1.50			
<i>Typha latifolia</i> , Broad-leaved cattail	1.00	1.00				0.21	1.00	1.00			
<i>Vallisneria americana</i> , Wild celery	23.00	4.00	19.00			4.94	1.92	1.33	2.11		
<i>Wolffia columbiana</i> , Common watermeal	38.00	26.00	10.00	2.00		8.15	1.09	1.13	1.00	1.00	
Total	466.00	285.00	144.00	36.00	1.00	100.00	33.07	31.64	19.90	7.33	1.00

Spring 2010 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	3	3				0.73	0.73	0.86	0.34
<i>Carex comosa</i> , Bottle brush sedge	13	11	2			3.17	3.17	3.74	1.47
<i>Ceratophyllum demersum</i> , Coontail	2	1	1			0.49	0.49	0.57	0.23
<i>Chara</i> sp., Muskgrasses	13	7	6			3.17	3.17	3.74	1.47
<i>Eleocharis acicularis</i> , Needle spikerush	3	2	1			0.73	0.73	0.86	0.34
<i>Eleocharis palustris</i> , Creeping spikerush	5	5				1.22	1.22	1.44	0.57
<i>Elodea canadensis</i> , Common waterweed	176	53	61	59	3	42.93	42.93	50.57	19.91
<i>Heteranthera dubia</i> , Water star-grass	40	20	20			9.76	9.76	11.49	4.52
<i>Iris versicolor</i> , Northern blue flag	7	7				1.71	1.71	2.01	0.79
<i>Juncus pelocarpus</i> f. <i>submersus</i> , Brown-fruited rush	1	1				0.24	0.24	0.29	0.11
<i>Lemna minor</i> , Small duckweed	87	57	29	1		21.22	21.22	25.00	9.84
<i>Najas flexilis</i> , Slender naiad	29	18	10	1		7.07	7.07	8.33	3.28
<i>Najas gracillima</i> , Northern naiad	5	3	2			1.22	1.22	1.44	0.57
<i>Nitella</i> sp., Nitella	90	14	14	62		21.95	21.95	25.86	10.18
<i>Nuphar variegata</i> , Spatterdock	19	12	7			4.63	4.63	5.46	2.15
<i>Phalaris arundinacea</i> , Reed canary grass	1	1				0.24	0.24	0.29	0.11
<i>Polygonum amphibium</i> , Water smartweed	11	9	2			2.68	2.68	3.16	1.24
<i>Potamogeton crispus</i> , Curly-leaf pondweed	220	37	62	113	8	53.66	53.66	63.22	24.89
<i>Potamogeton natans</i> , Floating-leaf pondweed	1	1				0.24	0.24	0.29	0.11
<i>Sagittaria latifolia</i> , Common arrowhead	6	6				1.46	1.46	1.72	0.68
<i>Sagittaria</i> sp., Arrowhead	9	6	3			2.20	2.20	2.59	1.02
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	6	6				1.46	1.46	1.72	0.68
<i>Spirodela polyrhiza</i> , Large duckweed	81	53	26	2		19.76	19.76	23.28	9.16
<i>Typha angustifolia</i> , Narrow-leaved cattail	7	4	3			1.71	1.71	2.01	0.79
<i>Typha latifolia</i> , Broad-leaved cattail	2	1	1			0.49	0.49	0.57	0.23
<i>Vallisneria americana</i> , Wild celery	20	7	12	1		4.88	4.88	5.75	2.26
<i>Wolffia columbiana</i> , Common watermeal	27	19	8			6.59	6.59	7.76	3.05
Total	884	364	270	239	11	215.61	215.61	254.02	100.00

Spring 2010 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
<i>Acorus americanus</i> , Sweet-flag	7.00	7.00				0.61	2.33	2.33			
<i>Carex comosa</i> , Bottle brush sedge	16.00	14.00	2.00			1.40	1.23	1.27	1.00		
<i>Ceratophyllum demersum</i> , Coontail	2.00	1.00	1.00			0.17	1.00	1.00	1.00		
<i>Chara</i> sp., Muskgrasses	17.00	8.00	9.00			1.49	1.31	1.14	1.50		
<i>Eleocharis acicularis</i> , Needle spikerush	3.00	2.00	1.00			0.26	1.00	1.00	1.00		
<i>Eleocharis palustris</i> , Creeping spikerush	7.00	7.00				0.61	1.40	1.40			
<i>Elodea canadensis</i> , Common waterweed	230.00	66.00	92.00	69.00	3.00	20.12	1.31	1.25	1.51	1.17	1.00
<i>Heteranthera dubia</i> , Water star-grass	48.00	21.00	27.00			4.20	1.20	1.05	1.35		
<i>Iris versicolor</i> , Northern blue flag	7.00	7.00				0.61	1.00	1.00			
<i>Juncus pelocarpus</i> f. <i>submersus</i> , Brown-fruited rush	1.00	1.00				0.09	1.00	1.00			
<i>Lemna minor</i> , Small duckweed	122.00	78.00	43.00	1.00		10.67	1.40	1.37	1.48	1.00	
<i>Najas flexilis</i> , Slender naiad	31.00	19.00	11.00	1.00		2.71	1.07	1.06	1.10	1.00	
<i>Najas gracillima</i> , Northern naiad	6.00	4.00	2.00			0.52	1.20	1.33	1.00		
<i>Nitella</i> sp., Nitella	122.00	17.00	19.00	86.00		10.67	1.36	1.21	1.36	1.39	
<i>Nuphar variegata</i> , Spatterdock	26.00	18.00	8.00			2.27	1.37	1.50	1.14		
<i>Phalaris arundinacea</i> , Reed canary grass	1.00	1.00				0.09	1.00	1.00			
<i>Polygonum amphibium</i> , Water smartweed	13.00	11.00	2.00			1.14	1.18	1.22	1.00		
<i>Potamogeton crispus</i> , Curly-leaf pondweed	260.00	40.00	77.00	135.00	8.00	22.75	1.18	1.08	1.24	1.19	1.00
<i>Potamogeton natans</i> , Floating-leaf pondweed	1.00	1.00				0.09	1.00	1.00			
<i>Sagittaria latifolia</i> , Common arrowhead	7.00	7.00				0.61	1.17	1.17			
<i>Sagittaria</i> sp., Arrowhead	11.00	7.00	4.00			0.96	1.22	1.17	1.33		
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	7.00	7.00				0.61	1.17	1.17			
<i>Spirodela polyrhiza</i> , Large duckweed	113.00	73.00	38.00	2.00		9.89	1.40	1.38	1.46	1.00	
<i>Typha angustifolia</i> , Narrow-leaved cattail	18.00	11.00	7.00			1.57	2.57	2.75	2.33		
<i>Typha latifolia</i> , Broad-leaved cattail	4.00	1.00	3.00			0.35	2.00	1.00	3.00		
<i>Vallisneria americana</i> , Wild celery	22.00	8.00	13.00	1.00		1.92	1.10	1.14	1.08	1.00	
<i>Wolffia columbiana</i> , Common watermeal	41.00	27.00	14.00			3.59	1.52	1.42	1.75		
Total	1143.00	464.00	373.00	295.00	11.00	100.00	35.68	34.41	26.64	7.75	2.00

Summer 2010 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	1	1				0.25	0.30	0.47	0.19
<i>Carex comosa</i> , Bottle brush sedge	2	2				0.49	0.60	0.95	0.38
<i>Ceratophyllum demersum</i> , Coontail	5		3	2		1.23	1.49	2.37	0.95
<i>Chara</i> sp., Muskgrasses	5	1	4			1.23	1.49	2.37	0.95
<i>Eleocharis acicularis</i> , Needle spikerush	3	2	1			0.74	0.90	1.42	0.57
<i>Eleocharis palustris</i> , Creeping spikerush	5	5				1.23	1.49	2.37	0.95
<i>Elodea canadensis</i> , Common waterweed	178	60	87	31		43.95	53.13	84.36	33.90
<i>Heteranthera dubia</i> , Water star-grass	26	10	14	2		6.42	7.76	12.32	4.95
<i>Iris versicolor</i> , Northern blue flag	1	1				0.25	0.30	0.47	0.19
<i>Iris virginica</i> , Southern blue flag	2	2				0.49	0.60	0.95	0.38
<i>Lemna minor</i> , Small duckweed	35	26	8	1		8.64	10.45	16.59	6.67
<i>Najas flexilis</i> , Slender naiad	54	29	22	3		13.33	16.12	25.59	10.29
<i>Najas gracillima</i> , Northern naiad	6	2	3	1		1.48	1.79	2.84	1.14
<i>Nitella</i> sp., Nitella	33	6	8	19		8.15	9.85	15.64	6.29
<i>Nuphar variegata</i> , Spatterdock	15	11	4			3.70	4.48	7.11	2.86
<i>Phalaris arundinacea</i> , Reed canary grass	2	2				0.49	0.60	0.95	0.38
<i>Polygonum amphibium</i> , Water smartweed	1	1				0.25	0.30	0.47	0.19
<i>Potamogeton crispus</i> , Curly-leaf pondweed	30	6	16	8		7.41	8.96	14.22	5.71
<i>Potamogeton natans</i> , Floating-leaf pondweed	2		2			0.49	0.60	0.95	0.38
<i>Potamogeton praelongus</i> , White-stem pondweed	2	1	1			0.49	0.60	0.95	0.38
<i>Sagittaria latifolia</i> , Common arrowhead	14	10	4			3.46	4.18	6.64	2.67
<i>Sagittaria</i> sp., Arrowhead	4	4				0.99	1.19	1.90	0.76
<i>Schoenoplectus acutus</i> , Hardstem bulrush	5	5				1.23	1.49	2.37	0.95
<i>Spirodela polyrhiza</i> , Large duckweed	28	24	4			6.91	8.36	13.27	5.33
<i>Typha angustifolia</i> , Narrow-leaved cattail	3		3			0.74	0.90	1.42	0.57
<i>Typha latifolia</i> , Broad-leaved cattail	1		1			0.25	0.30	0.47	0.19
<i>Vallisneria americana</i> , Wild celery	33	18	15			8.15	9.85	15.64	6.29
<i>Wolffia borealis</i> , Northern watermeal	3	1	2			0.74	0.90	1.42	0.57
<i>Wolffia columbiana</i> , Common watermeal	26	24	2			6.42	7.76	12.32	4.95
Total	525	254	204	67	0	129.63	156.72	248.82	100.00

Summer 2010 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
Acorus americanus, Sweet-flag	2.00	2.00				0.26	2.00	2.00			
Carex comosa, Bottle brush sedge	2.00	2.00				0.26	1.00	1.00			
Ceratophyllum demersum, Coontail	6.00		3.00	3.00		0.78	1.20		1.00	1.50	
Chara sp., Muskgrasses	5.00	1.00	4.00			0.65	1.00	1.00	1.00		
Eleocharis acicularis, Needle spikerush	3.00	2.00	1.00			0.39	1.00	1.00	1.00		
Eleocharis palustris, Creeping spikerush	10.00	10.00				1.30	2.00	2.00			
Elodea canadensis, Common waterweed	310.00	99.00	164.00	47.00		40.21	1.74	1.65	1.89	1.52	
Heteranthera dubia, Water star-grass	32.00	10.00	19.00	3.00		4.15	1.23	1.00	1.36	1.50	
Iris versicolor, Northern blue flag	1.00	1.00				0.13	1.00	1.00			
Iris virginica, Southern blue flag	2.00	2.00				0.26	1.00	1.00			
Lemna minor, Small duckweed	47.00	35.00	11.00	1.00		6.10	1.34	1.35	1.38	1.00	
Najas flexilis, Slender naiad	63.00	36.00	23.00	4.00		8.17	1.17	1.24	1.05	1.33	
Najas gracillima, Northern naiad	8.00	2.00	3.00	3.00		1.04	1.33	1.00	1.00	3.00	
Nitella sp., Nitella	42.00	7.00	9.00	26.00		5.45	1.27	1.17	1.13	1.37	
Nuphar variegata, Spatterdock	23.00	17.00	6.00			2.98	1.53	1.55	1.50		
Phalaris arundinacea, Reed canary grass	4.00	4.00				0.52	2.00	2.00			
Polygonum amphibium, Water smartweed	1.00	1.00				0.13	1.00	1.00			
Potamogeton crispus, Curly-leaf pondweed	30.00	6.00	16.00	8.00		3.89	1.00	1.00	1.00	1.00	
Potamogeton natans, Floating-leaf pondweed	3.00		3.00			0.39	1.50		1.50		
Potamogeton praelongus, White-stem pondweed	3.00	1.00	2.00			0.39	1.50	1.00	2.00		
Sagittaria latifolia, Common arrowhead	20.00	15.00	5.00			2.59	1.43	1.50	1.25		
Sagittaria sp., Arrowhead	4.00	4.00				0.52	1.00	1.00			
Schoenoplectus acutus, Hardstem bulrush	9.00	9.00				1.17	1.80	1.80			
Spirodela polyrhiza, Large duckweed	36.00	29.00	7.00			4.67	1.29	1.21	1.75		
Typha angustifolia, Narrow-leaved cattail	8.00		8.00			1.04	2.67		2.67		
Typha latifolia, Broad-leaved cattail	3.00		3.00			0.39	3.00		3.00		
Vallisneria americana, Wild celery	50.00	21.00	29.00			6.49	1.52	1.17	1.93		
Wolffia borealis, Northern watermeal	6.00	3.00	3.00			0.78	2.00	3.00	1.50		
Wolffia columbiana, Common watermeal	38.00	35.00	3.00			4.93	1.46	1.46	1.50		
Total	771.00	354.00	322.00	95.00	0.00	100.00	42.98	34.08	30.39	12.22	0.00

Spring 2011 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	3	2	1			0.73	0.81	1.29	0.88
<i>Carex comosa</i> , Bottle brush sedge	4	3	1			0.98	1.08	1.72	1.17
<i>Chara</i> sp., Muskgrasses	10	5	5			2.44	2.70	4.31	2.92
<i>Eleocharis acicularis</i> , Needle spikerush	2	2				0.49	0.54	0.86	0.58
<i>Eleocharis palustris</i> , Creeping spikerush	6	5	1			1.46	1.62	2.59	1.75
<i>Elodea canadensis</i> , Common waterweed	211	61	89	61		51.46	56.87	90.95	61.70
<i>Heteranthera dubia</i> , Water star-grass	8	3	4	1		1.95	2.16	3.45	2.34
<i>Iris virginica</i> , Southern blue flag	2	2				0.49	0.54	0.86	0.58
<i>Lemna minor</i> , Small duckweed	15	10	5			3.66	4.04	6.47	4.39
<i>Najas flexilis</i> , Slender naiad	1	1				0.24	0.27	0.43	0.29
<i>Nitella</i> sp., Nitella	4			4		0.98	1.08	1.72	1.17
<i>Nuphar variegata</i> , Spatterdock	9	8	1			2.20	2.43	3.88	2.63
<i>Phalaris arundinacea</i> , Reed canary grass	9	6	1	2		2.20	2.43	3.88	2.63
<i>Polygonum amphibium</i> , Water smartweed	5	5				1.22	1.35	2.16	1.46
<i>Potamogeton crispus</i> , Curly-leaf pondweed	2			2		0.49	0.54	0.86	0.58
<i>Potamogeton praelongus</i> , White-stem pondweed	1		1			0.24	0.27	0.43	0.29
<i>Sagittaria</i> sp., Arrowhead	4	2	2			0.98	1.08	1.72	1.17
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	6	6				1.46	1.62	2.59	1.75
<i>Spirodela polyrhiza</i> , Large duckweed	14	11	3			3.41	3.77	6.03	4.09
<i>Typha angustifolia</i> , Narrow-leaved cattail	10	5	5			2.44	2.70	4.31	2.92
<i>Wolffia columbiana</i> , Common watermeal	16	11	5			3.90	4.31	6.90	4.68
Total	342	148	124	70	0	83.41	92.18	147.41	100.00

Spring 2011 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
Acorus americanus, Sweet-flag	4.00	3.00	1.00			0.81	1.33	1.50	1.00		
Carex comosa, Bottle brush sedge	4.00	3.00	1.00			0.81	1.00	1.00	1.00		
Chara sp., Muskgrasses	10.00	5.00	5.00			2.02	1.00	1.00	1.00		
Eleocharis acicularis, Needle spikerush	2.00	2.00				0.40	1.00	1.00			
Eleocharis palustris, Creeping spikerush	8.00	7.00	1.00			1.62	1.33	1.40	1.00		
Elodea canadensis, Common waterweed	325.00	94.00	154.00	77.00		65.79	1.54	1.54	1.73	1.26	
Heteranthera dubia, Water star-grass	8.00	3.00	4.00	1.00		1.62	1.00	1.00	1.00	1.00	
Iris virginica, Southern blue flag	3.00	3.00				0.61	1.50	1.50			
Lemna minor, Small duckweed	19.00	11.00	8.00			3.85	1.27	1.10	1.60		
Najas flexilis, Slender naiad	1.00	1.00				0.20	1.00	1.00			
Nitella sp., Nitella	4.00			4.00		0.81	1.00			1.00	
Nuphar variegata, Spatterdock	13.00	12.00	1.00			2.63	1.44	1.50	1.00		
Phalaris arundinacea, Reed canary grass	13.00	9.00	1.00	3.00		2.63	1.44	1.50	1.00	1.50	
Polygonum amphibium, Water smartweed	6.00	6.00				1.21	1.20	1.20			
Potamogeton crispus, Curly-leaf pondweed	2.00			2.00		0.40	1.00			1.00	
Potamogeton praelongus, White-stem pondweed	1.00		1.00			0.20	1.00		1.00		
Sagittaria sp., Arrowhead	4.00	2.00	2.00			0.81	1.00	1.00	1.00		
Schoenoplectus tabernaemontani, Softstem bulrush	8.00	8.00				1.62	1.33	1.33			
Spirodela polyrhiza, Large duckweed	18.00	12.00	6.00			3.64	1.29	1.09	2.00		
Typha angustifolia, Narrow-leaved cattail	21.00	10.00	11.00			4.25	2.10	2.00	2.20		
Wolffia columbiana, Common watermeal	20.00	12.00	8.00			4.05	1.25	1.09	1.60		
Total	494.00	203.00	204.00	87.00	0.00	100.00	26.03	22.76	18.13	5.76	0.00

Summer 2011 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	3	2	1			0.73	0.73	0.85	0.51
<i>Alisma triviale</i> , Northern water-plantain	2	2				0.49	0.49	0.57	0.34
<i>Carex comosa</i> , Bottle brush sedge	11	10	1			2.68	2.68	3.12	1.88
<i>Ceratophyllum demersum</i> , Coontail	2	1		1		0.49	0.49	0.57	0.34
<i>Chara</i> sp., Muskgrasses	2	2				0.49	0.49	0.57	0.34
<i>Dulichium arundinaceum</i> , Three-way sedge	1	1				0.24	0.24	0.28	0.17
<i>Eleocharis acicularis</i> , Needle spikerush	6	4	2			1.46	1.46	1.70	1.03
<i>Elodea canadensis</i> , Common waterweed	330	58	84	174	14	80.49	80.49	93.48	56.41
<i>Equisetum fluviatile</i> , Water horsetail	1	1				0.24	0.24	0.28	0.17
<i>Iris versicolor</i> , Northern blue flag	1	1				0.24	0.24	0.28	0.17
<i>Juncus pelocarpus</i> f. <i>submersus</i> , Brown-fruited rush	2	2				0.49	0.49	0.57	0.34
<i>Lemna minor</i> , Small duckweed	35	26	9			8.54	8.54	9.92	5.98
<i>Najas flexilis</i> , Slender naiad	6	5	1			1.46	1.46	1.70	1.03
<i>Najas gracillima</i> , Northern naiad	7	4	3			1.71	1.71	1.98	1.20
<i>Nuphar variegata</i> , Spatterdock	15	11	4			3.66	3.66	4.25	2.56
<i>Phalaris arundinacea</i> , Reed canary grass	1	1				0.24	0.24	0.28	0.17
<i>Polygonum amphibium</i> , Water smartweed	7	6	1			1.71	1.71	1.98	1.20
<i>Potamogeton crispus</i> , Curly-leaf pondweed	6		2	4		1.46	1.46	1.70	1.03
<i>Potamogeton natans</i> , Floating-leaf pondweed	1	1				0.24	0.24	0.28	0.17
<i>Potamogeton nodosus</i> , Long-leaf pondweed	6	5	1			1.46	1.46	1.70	1.03
<i>Sagittaria graminea</i> , Grass-leaved arrowhead	1	1				0.24	0.24	0.28	0.17
<i>Sagittaria latifolia</i> , Common arrowhead	20	17	3			4.88	4.88	5.67	3.42
<i>Sagittaria rigida</i> , Sessile-fruited arrowhead	2	1	1			0.49	0.49	0.57	0.34
<i>Sagittaria</i> sp., Arrowhead	1	1				0.24	0.24	0.28	0.17
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	8	7	1			1.95	1.95	2.27	1.37
<i>Sparganium fluctuans</i> , Floating-leaf bur-reed	1	1				0.24	0.24	0.28	0.17
<i>Sparganium</i> sp., Bur-reed	3	3				0.73	0.73	0.85	0.51
<i>Spirodela polyrhiza</i> , Large duckweed	35	26	9			8.54	8.54	9.92	5.98
<i>Typha angustifolia</i> , Narrow-leaved cattail	14	9	5			3.41	3.41	3.97	2.39
<i>Typha latifolia</i> , Broad-leaved cattail	2	2				0.49	0.49	0.57	0.34
<i>Typha</i> sp., Cattail	2	1	1			0.49	0.49	0.57	0.34
<i>Vallisneria americana</i> , Wild celery	16	8	8			3.90	3.90	4.53	2.74
<i>Wolffia columbiana</i> , Common watermeal	35	26	9			8.54	8.54	9.92	5.98
Total	585	246	146	179	14	142.68	142.68	165.72	100.00

Summer 2011 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
<i>Acorus americanus</i> , Sweet-flag	3.00	2.00	1.00			0.36	1.00	1.00	1.00		
<i>Alisma triviale</i> , Northern water-plantain	2.00	2.00				0.24	1.00	1.00			
<i>Carex comosa</i> , Bottle brush sedge	11.00	10.00	1.00			1.32	1.00	1.00	1.00		
<i>Ceratophyllum demersum</i> , Coontail	2.00	1.00		1.00		0.24	1.00	1.00		1.00	
<i>Chara</i> sp., Muskgrasses	2.00	2.00				0.24	1.00	1.00			
<i>Dulichium arundinaceum</i> , Three-way sedge	1.00	1.00				0.12	1.00	1.00			
<i>Eleocharis acicularis</i> , Needle spikerush	7.00	4.00	3.00			0.84	1.17	1.00	1.50		
<i>Elodea canadensis</i> , Common waterweed	507.00	83.00	142.00	268.00	14.00	60.72	1.54	1.43	1.69	1.54	1.00
<i>Equisetum fluviatile</i> , Water horsetail	1.00	1.00				0.12	1.00	1.00			
<i>Iris versicolor</i> , Northern blue flag	1.00	1.00				0.12	1.00	1.00			
<i>Juncus pelocarpus</i> f. <i>submersus</i> , Brown-fruited rush	2.00	2.00				0.24	1.00	1.00			
<i>Lemna minor</i> , Small duckweed	39.00	30.00	9.00			4.67	1.11	1.15	1.00		
<i>Najas flexilis</i> , Slender naiad	8.00	7.00	1.00			0.96	1.33	1.40	1.00		
<i>Najas gracillima</i> , Northern naiad	11.00	6.00	5.00			1.32	1.57	1.50	1.67		
<i>Nuphar variegata</i> , Spatterdock	35.00	25.00	10.00			4.19	2.33	2.27	2.50		
<i>Phalaris arundinacea</i> , Reed canary grass	1.00	1.00				0.12	1.00	1.00			
<i>Polygonum amphibium</i> , Water smartweed	8.00	6.00	2.00			0.96	1.14	1.00	2.00		
<i>Potamogeton crispus</i> , Curly-leaf pondweed	7.00		3.00	4.00		0.84	1.17		1.50	1.00	
<i>Potamogeton natans</i> , Floating-leaf pondweed	3.00	3.00				0.36	3.00	3.00			
<i>Potamogeton nodosus</i> , Long-leaf pondweed	6.00	5.00	1.00			0.72	1.00	1.00	1.00		
<i>Sagittaria graminea</i> , Grass-leaved arrowhead	1.00	1.00				0.12	1.00	1.00			
<i>Sagittaria latifolia</i> , Common arrowhead	27.00	21.00	6.00			3.23	1.35	1.24	2.00		
<i>Sagittaria rigida</i> , Sessile-fruited arrowhead	2.00	1.00	1.00			0.24	1.00	1.00	1.00		
<i>Sagittaria</i> sp., Arrowhead	1.00	1.00				0.12	1.00	1.00			
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	14.00	12.00	2.00			1.68	1.75	1.71	2.00		
<i>Sparganium fluctuans</i> , Floating-leaf bur-reed	1.00	1.00				0.12	1.00	1.00			
<i>Sparganium</i> sp., Bur-reed	3.00	3.00				0.36	1.00	1.00			
<i>Spirodela polyrhiza</i> , Large duckweed	39.00	30.00	9.00			4.67	1.11	1.15	1.00		
<i>Typha angustifolia</i> , Narrow-leaved cattail	26.00	16.00	10.00			3.11	1.86	1.78	2.00		
<i>Typha latifolia</i> , Broad-leaved cattail	2.00	2.00				0.24	1.00	1.00			
<i>Typha</i> sp., Cattail	2.00	1.00	1.00			0.24	1.00	1.00	1.00		
<i>Vallisneria americana</i> , Wild celery	21.00	11.00	10.00			2.51	1.31	1.38	1.25		
<i>Wolffia columbiana</i> , Common watermeal	39.00	30.00	9.00			4.67	1.11	1.15	1.00		
Total	835.00	322.00	226.00	273.00	14.00	100.00	40.86	39.17	27.11	3.54	1.00

Spring 2012 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	4	4				1.00	1.00	1.20	0.93
<i>Carex comosa</i> , Bottle brush sedge	4	4				1.00	1.00	1.20	0.93
<i>Eleocharis acicularis</i> , Needle spikerush	5	4	1			1.24	1.24	1.50	1.17
<i>Elodea canadensis</i> , Common waterweed	295	25	63	187	20	73.38	73.38	88.32	68.76
<i>Lemna minor</i> , Small duckweed	21	18	3			5.22	5.22	6.29	4.90
<i>Nitella</i> sp., Nitella	6	3	2	1		1.49	1.49	1.80	1.40
<i>Nuphar variegata</i> , Spatterdock	14	10	4			3.48	3.48	4.19	3.26
<i>Potamogeton crispus</i> , Curly-leaf pondweed	3	2	1			0.75	0.75	0.90	0.70
<i>Potamogeton nodosus</i> , Long-leaf pondweed	2	1	1			0.50	0.50	0.60	0.47
<i>Sagittaria</i> sp., Arrowhead	5	5				1.24	1.24	1.50	1.17
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	5	5				1.24	1.24	1.50	1.17
<i>Sparganium</i> sp., Bur-reed	4	4				1.00	1.00	1.20	0.93
<i>Spirodela polyrhiza</i> , Large duckweed	21	18	3			5.22	5.22	6.29	4.90
<i>Typha angustifolia</i> , Narrow-leaved cattail	12	4	6	2		2.99	2.99	3.59	2.80
<i>Typha latifolia</i> , Broad-leaved cattail	1	1				0.25	0.25	0.30	0.23
<i>Vallisneria americana</i> , Wild celery	6	4	2			1.49	1.49	1.80	1.40
<i>Wolffia columbiana</i> , Common watermeal	21	18	3			5.22	5.22	6.29	4.90
Total	429	130	89	190	20	106.72	106.72	128.44	100.00

Spring 2012 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
Acorus americanus, Sweet-flag	4.00	4.00				0.45	1.00	1.00			
Carex comosa, Bottle brush sedge	4.00	4.00				0.45	1.00	1.00			
Eleocharis acicularis, Needle spikerush	6.00	5.00	1.00			0.67	1.20	1.25	1.00		
Elodea canadensis, Common waterweed	698.00	47.00	114.00	490.00	47.00	77.90	2.37	1.88	1.81	2.62	2.35
Lemna minor, Small duckweed	27.00	24.00	3.00			3.01	1.29	1.33	1.00		
Nitella sp., Nitella	9.00	6.00	2.00	1.00		1.00	1.50	2.00	1.00	1.00	
Nuphar variegata, Spatterdock	35.00	25.00	10.00			3.91	2.50	2.50	2.50		
Potamogeton crispus, Curly-leaf pondweed	4.00	3.00	1.00			0.45	1.33	1.50	1.00		
Potamogeton nodosus, Long-leaf pondweed	3.00	1.00	2.00			0.33	1.50	1.00	2.00		
Sagittaria sp., Arrowhead	5.00	5.00				0.56	1.00	1.00			
Schoenoplectus tabernaemontani, Softstem bulrush	5.00	5.00				0.56	1.00	1.00			
Sparganium sp., Bur-reed	6.00	6.00				0.67	1.50	1.50			
Spirodela polyrhiza, Large duckweed	27.00	24.00	3.00			3.01	1.29	1.33	1.00		
Typha angustifolia, Narrow-leaved cattail	29.00	12.00	11.00	6.00		3.24	2.42	3.00	1.83	3.00	
Typha latifolia, Broad-leaved cattail	1.00	1.00				0.11	1.00	1.00			
Vallisneria americana, Wild celery	6.00	4.00	2.00			0.67	1.00	1.00	1.00		
Wolffia columbiana, Common watermeal	27.00	24.00	3.00			3.01	1.29	1.33	1.00		
Total	896.00	200.00	152.00	497.00	47.00	100.00	24.17	24.63	15.14	6.62	2.35

Summer 2012 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	1	1				0.26	0.29	0.40	0.27
<i>Ceratophyllum demersum</i> , Coontail	7	3	4			1.83	2.05	2.83	1.88
<i>Elodea canadensis</i> , Common waterweed	224	31	132	61		58.64	65.69	90.69	60.22
<i>Heteranthera dubia</i> , Water star-grass	17	8	9			4.45	4.99	6.88	4.57
<i>Lemna minor</i> , Small duckweed	9	9				2.36	2.64	3.64	2.42
<i>Najas flexilis</i> , Slender naiad	9	3	6			2.36	2.64	3.64	2.42
<i>Nitella</i> sp., Nitella	12	8	4			3.14	3.52	4.86	3.23
<i>Nuphar variegata</i> , Spatterdock	15	10	5			3.93	4.40	6.07	4.03
<i>Potamogeton crispus</i> , Curly-leaf pondweed	37	10	27			9.69	10.85	14.98	9.95
<i>Potamogeton nodosus</i> , Long-leaf pondweed	3	1	2			0.79	0.88	1.21	0.81
<i>Sagittaria</i> sp., Arrowhead	7	5	2			1.83	2.05	2.83	1.88
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	1	1				0.26	0.29	0.40	0.27
<i>Sparganium</i> sp., Bur-reed	1	1				0.26	0.29	0.40	0.27
<i>Spirodela polyrhiza</i> , Large duckweed	9	9				2.36	2.64	3.64	2.42
<i>Typha</i> sp., Cattail	1	1				0.26	0.29	0.40	0.27
<i>Vallisneria americana</i> , Wild celery	18	9	9			4.71	5.28	7.29	4.84
<i>Wolffia columbiana</i> , Common watermeal	1	1				0.26	0.29	0.40	0.27
Total	372	111	200	61	0	97.38	109.09	150.61	100.00

Summer 2012 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
Acorus americanus, Sweet-flag	1.00	1.00				0.14	1.00	1.00			
Ceratophyllum demersum, Coontail	7.00	3.00	4.00			0.99	1.00	1.00	1.00		
Elodea canadensis, Common waterweed	489.00	69.00	310.00	110.00		69.36	2.18	2.23	2.35	1.80	
Heteranthera dubia, Water star-grass	19.00	10.00	9.00			2.70	1.12	1.25	1.00		
Lemna minor, Small duckweed	9.00	9.00				1.28	1.00	1.00			
Najas flexilis, Slender naiad	12.00	3.00	9.00			1.70	1.33	1.00	1.50		
Nitella sp., Nitella	16.00	12.00	4.00			2.27	1.33	1.50	1.00		
Nuphar variegata, Spatterdock	32.00	22.00	10.00			4.54	2.13	2.20	2.00		
Potamogeton crispus, Curly-leaf pondweed	54.00	16.00	38.00			7.66	1.46	1.60	1.41		
Potamogeton nodosus, Long-leaf pondweed	9.00	3.00	6.00			1.28	3.00	3.00	3.00		
Sagittaria sp., Arrowhead	11.00	8.00	3.00			1.56	1.57	1.60	1.50		
Schoenoplectus tabernaemontani, Softstem bulrush	1.00	1.00				0.14	1.00	1.00			
Sparganium sp., Bur-reed	3.00	3.00				0.43	3.00	3.00			
Spirodela polyrhiza, Large duckweed	9.00	9.00				1.28	1.00	1.00			
Typha sp., Cattail	3.00	3.00				0.43	3.00	3.00			
Vallisneria americana, Wild celery	29.00	14.00	15.00			4.11	1.61	1.56	1.67		
Wolffia columbiana, Common watermeal	1.00	1.00				0.14	1.00	1.00			
Total	705.00	187.00	408.00	110.00	0.00	100.00	27.74	27.93	16.42	1.80	0.00

Spring 2013 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	5	5				1.23	1.23	1.79	1.34
<i>Asclepias incarnata</i>	6	5	1			1.47	1.47	2.15	1.61
<i>Azolla</i> sp	2	1	1			0.49	0.49	0.72	0.54
<i>Callitriche palustris</i> , Common water-starwort	1	1				0.25	0.25	0.36	0.27
<i>Carex comosa</i> , Bottle brush sedge	8	6	1	1		1.97	1.97	2.87	2.15
<i>Ceratophyllum demersum</i> , Coontail	1	1				0.25	0.25	0.36	0.27
<i>Cicuta maculata</i>	1	1				0.25	0.25	0.36	0.27
<i>Eleocharis palustris</i> , Creeping spikerush	2	1	1			0.49	0.49	0.72	0.54
<i>Elodea canadensis</i> , Common waterweed	240	32	62	145	1	58.97	58.97	86.02	64.52
<i>Iris</i> sp	5	5				1.23	1.23	1.79	1.34
<i>Iris versicolor</i> , Northern blue flag	2	2				0.49	0.49	0.72	0.54
<i>Lemna minor</i> , Small duckweed	9	8	1			2.21	2.21	3.23	2.42
<i>Mimulus ringens</i>	2	2				0.49	0.49	0.72	0.54
<i>Nitella</i> sp., Nitella	5	3	1	1		1.23	1.23	1.79	1.34
<i>Nuphar variegata</i> , Spatterdock	13	11	2			3.19	3.19	4.66	3.49
<i>Phalaris arundinacea</i> , Reed canary grass	17	14	3			4.18	4.18	6.09	4.57
<i>Polygonum punctatum</i> , Dotted smartweed	2		2			0.49	0.49	0.72	0.54
<i>Potamogeton crispus</i> , Curly-leaf pondweed	4	1	1	1	1	0.98	0.98	1.43	1.08
<i>Potamogeton nodosus</i> , Long-leaf pondweed	2	2				0.49	0.49	0.72	0.54
<i>Sagittaria latifolia</i> , Common arrowhead	3	3				0.74	0.74	1.08	0.81
<i>Sagittaria</i> sp., Arrowhead	3	2	1			0.74	0.74	1.08	0.81
<i>Schoenoplectus subterminalis</i> , Water bulrush	1	1				0.25	0.25	0.36	0.27
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	6	5	1			1.47	1.47	2.15	1.61
<i>Sparganium</i> sp., Bur-reed	3	3				0.74	0.74	1.08	0.81
<i>Spirodela polyrhiza</i> , Large duckweed	10	9	1			2.46	2.46	3.58	2.69
<i>Typha angustifolia</i> , Narrow-leaved cattail	12	6	5	1		2.95	2.95	4.30	3.23
<i>Typha latifolia</i> , Broad-leaved cattail	3	3				0.74	0.74	1.08	0.81
<i>Typha</i> sp., Cattail	2	2				0.49	0.49	0.72	0.54
<i>Vallisneria americana</i> , Wild celery	1		1			0.25	0.25	0.36	0.27
<i>Wolffia columbiana</i> , Common watermeal	1	1				0.25	0.25	0.36	0.27
Total	372	136	85	149	2	91.40	91.40	133.33	100.00

Spring 2013 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
Acorus americanus, Sweet-flag	8.00	8.00				1.64	1.60	1.60			
Asclepias incarnata	7.00	6.00	1.00			1.44	1.17	1.20	1.00		
Azolla sp	3.00	2.00	1.00			0.62	1.50	2.00	1.00		
Callitriche palustris, Common water-starwort	1.00	1.00				0.21	1.00	1.00			
Carex comosa, Bottle brush sedge	11.00	8.00	2.00	1.00		2.26	1.38	1.33	2.00	1.00	
Ceratophyllum demersum, Coontail	1.00	1.00				0.21	1.00	1.00			
Cicuta maculata	1.00	1.00				0.21	1.00	1.00			
Eleocharis palustris, Creeping spikerush	4.00	3.00	1.00			0.82	2.00	3.00	1.00		
Eloдея canadensis, Common waterweed	299.00	36.00	84.00	178.00	1.00	61.40	1.25	1.13	1.35	1.23	1.00
Iris sp	6.00	6.00				1.23	1.20	1.20			
Iris versicolor, Northern blue flag	2.00	2.00				0.41	1.00	1.00			
Lemna minor, Small duckweed	11.00	10.00	1.00			2.26	1.22	1.25	1.00		
Mimulus ringens	3.00	3.00				0.62	1.50	1.50			
Nitella sp., Nitella	5.00	3.00	1.00	1.00		1.03	1.00	1.00	1.00	1.00	
Nuphar variegata, Spatterdock	26.00	21.00	5.00			5.34	2.00	1.91	2.50		
Phalaris arundinacea, Reed canary grass	20.00	17.00	3.00			4.11	1.18	1.21	1.00		
Polygonum punctatum, Dotted smartweed	2.00		2.00			0.41	1.00		1.00		
Potamogeton crispus, Curly-leaf pondweed	4.00	1.00	1.00	1.00	1.00	0.82	1.00	1.00	1.00	1.00	1.00
Potamogeton nodosus, Long-leaf pondweed	2.00	2.00				0.41	1.00	1.00			
Sagittaria latifolia, Common arrowhead	3.00	3.00				0.62	1.00	1.00			
Sagittaria sp., Arrowhead	3.00	2.00	1.00			0.62	1.00	1.00	1.00		
Schoenoplectus subterminalis, Water bulrush	1.00	1.00				0.21	1.00	1.00			
Schoenoplectus tabernaemontani, Softstem bulrush	9.00	8.00	1.00			1.85	1.50	1.60	1.00		
Sparganium sp., Bur-reed	3.00	3.00				0.62	1.00	1.00			
Spirodela polyrhiza, Large duckweed	12.00	11.00	1.00			2.46	1.20	1.22	1.00		
Typha angustifolia, Narrow-leaved cattail	27.00	13.00	11.00	3.00		5.54	2.25	2.17	2.20	3.00	
Typha latifolia, Broad-leaved cattail	6.00	6.00				1.23	2.00	2.00			
Typha sp., Cattail	5.00	5.00				1.03	2.50	2.50			
Vallisneria americana, Wild celery	1.00		1.00			0.21	1.00		1.00		
Wolffia columbiana, Common watermeal	1.00	1.00				0.21	1.00	1.00			
Total	487.00	184.00	117.00	184.00	2.00	100.00	39.44	38.82	20.05	7.23	2.00

Summer 2013 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	6	6				1.48	1.48	1.61	0.94
<i>Asclepias</i>	6	6				1.48	1.48	1.61	0.94
<i>Azolla</i>	1	1				0.25	0.25	0.27	0.16
<i>Carex comosa</i> , Bottle brush sedge	3	2	1			0.74	0.74	0.81	0.47
<i>Ceratophyllum demersum</i> , Coontail	7	2	4	1		1.72	1.72	1.88	1.09
<i>Cicuta</i>	1	1				0.25	0.25	0.27	0.16
<i>Dulichium arundinaceum</i> , Three-way sedge	1	1				0.25	0.25	0.27	0.16
<i>Eleocharis palustris</i> , Creeping spikerush	9	9				2.22	2.22	2.42	1.40
<i>Elodea canadensis</i> , Common waterweed	338	54	82	188	14	83.25	83.25	90.86	52.73
<i>Heteranthera dubia</i> , Water star-grass	43	24	17	2		10.59	10.59	11.56	6.71
<i>Iris versicolor</i> , Northern blue flag	4	3	1			0.99	0.99	1.08	0.62
<i>Lemna minor</i> , Small duckweed	9	9				2.22	2.22	2.42	1.40
<i>Mimulus ringens</i>	2	2				0.49	0.49	0.54	0.31
<i>Najas flexilis</i> , Slender naiad	44	25	12	6	1	10.84	10.84	11.83	6.86
<i>Nitella</i> sp., Nitella	5	2	3			1.23	1.23	1.34	0.78
<i>Nuphar variegata</i> , Spatterdock	20	16	4			4.93	4.93	5.38	3.12
<i>Phalaris arundinacea</i> , Reed canary grass	9	7	2			2.22	2.22	2.42	1.40
<i>Polygonum amphibium</i> , Water smartweed	2		2			0.49	0.49	0.54	0.31
<i>Polygonum punctatum</i> , Dotted smartweed	1	1				0.25	0.25	0.27	0.16
<i>Potamogeton crispus</i> , Curly-leaf pondweed	50	20	24	6		12.32	12.32	13.44	7.80
<i>Potamogeton epihydrus</i> , Ribbon-leaf pondweed	3	2	1			0.74	0.74	0.81	0.47
<i>Potamogeton natans</i> , Floating-leaf pondweed	1			1		0.25	0.25	0.27	0.16
<i>Potamogeton nodosus</i> , Long-leaf pondweed	5	3	2			1.23	1.23	1.34	0.78
<i>Potamogeton pusillus</i> , Small pondweed	3	1	1	1		0.74	0.74	0.81	0.47
<i>Sagittaria graminea</i> , Grass-leaved arrowhead	4	3	1			0.99	0.99	1.08	0.62
<i>Sagittaria latifolia</i> , Common arrowhead	10	10				2.46	2.46	2.69	1.56
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	7	7				1.72	1.72	1.88	1.09
<i>Sparganium</i> sp., Bur-reed	2	2				0.49	0.49	0.54	0.31
<i>Spirodela polyrhiza</i> , Large duckweed	9	9				2.22	2.22	2.42	1.40
<i>Typha angustifolia</i> , Narrow-leaved cattail	10	5	4	1		2.46	2.46	2.69	1.56
<i>Typha latifolia</i> , Broad-leaved cattail	2	2				0.49	0.49	0.54	0.31
<i>Typha</i> sp., Cattail	2	1	1			0.49	0.49	0.54	0.31
<i>Vallisneria americana</i> , Wild celery	22	8	14			5.42	5.42	5.91	3.43
Total	641	244	176	206	15	157.88	157.88	172.31	100.00

Summer 2013 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
Acorus americanus, Sweet-flag	8.00	8.00				0.79	1.33	1.33			
Asclepias	6.00	6.00				0.59	1.00	1.00			
Azolla	1.00	1.00				0.10	1.00	1.00			
Carex comosa, Bottle brush sedge	3.00	2.00	1.00			0.30	1.00	1.00	1.00		
Ceratophyllum demersum, Coontail	7.00	2.00	4.00	1.00		0.69	1.00	1.00	1.00	1.00	
Cicuta	1.00	1.00				0.10	1.00	1.00			
Dulichium arundinaceum, Three-way sedge	1.00	1.00				0.10	1.00	1.00			
Eleocharis palustris, Creeping spikerush	11.00	11.00				1.09	1.22	1.22			
Elodea canadensis, Common waterweed	610.00	88.00	163.00	344.00	15.00	60.40	1.80	1.63	1.99	1.83	1.07
Heteranthera dubia, Water star-grass	50.00	26.00	22.00	2.00		4.95	1.16	1.08	1.29	1.00	
Iris versicolor, Northern blue flag	4.00	3.00	1.00			0.40	1.00	1.00	1.00		
Lemna minor, Small duckweed	11.00	11.00				1.09	1.22	1.22			
Mimulus ringens	2.00	2.00				0.20	1.00	1.00			
Najas flexilis, Slender naiad	54.00	32.00	15.00	6.00	1.00	5.35	1.23	1.28	1.25	1.00	1.00
Nitella sp., Nitella	8.00	4.00	4.00			0.79	1.60	2.00	1.33		
Nuphar variegata, Spatterdock	43.00	35.00	8.00			4.26	2.15	2.19	2.00		
Phalaris arundinacea, Reed canary grass	10.00	8.00	2.00			0.99	1.11	1.14	1.00		
Polygonum amphibium, Water smartweed	2.00		2.00			0.20	1.00		1.00		
Polygonum punctatum, Dotted smartweed	1.00	1.00				0.10	1.00	1.00			
Potamogeton crispus, Curly-leaf pondweed	53.00	23.00	24.00	6.00		5.25	1.06	1.15	1.00	1.00	
Potamogeton epihydrus, Ribbon-leaf pondweed	3.00	2.00	1.00			0.30	1.00	1.00	1.00		
Potamogeton natans, Floating-leaf pondweed	1.00			1.00		0.10	1.00			1.00	
Potamogeton nodosus, Long-leaf pondweed	7.00	5.00	2.00			0.69	1.40	1.67	1.00		
Potamogeton pusillus, Small pondweed	3.00	1.00	1.00	1.00		0.30	1.00	1.00	1.00	1.00	
Sagittaria graminea, Grass-leaved arrowhead	4.00	3.00	1.00			0.40	1.00	1.00	1.00		
Sagittaria latifolia, Common arrowhead	10.00	10.00				0.99	1.00	1.00			
Schoenoplectus tabernaemontani, Softstem bulrush	9.00	9.00				0.89	1.29	1.29			
Sparganium sp., Bur-reed	2.00	2.00				0.20	1.00	1.00			
Spirodela polyrhiza, Large duckweed	11.00	11.00				1.09	1.22	1.22			
Typha angustifolia, Narrow-leaved cattail	27.00	14.00	10.00	3.00		2.67	2.70	2.80	2.50	3.00	
Typha latifolia, Broad-leaved cattail	5.00	5.00				0.50	2.50	2.50			
Typha sp., Cattail	2.00	1.00	1.00			0.20	1.00	1.00	1.00		
Vallisneria americana, Wild celery	40.00	16.00	24.00			3.96	1.82	2.00	1.71		
Total	1010.00	344.00	286.00	364.00	16.00	100.00	41.82	40.73	23.08	10.83	2.07

Spring 2014 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	3	2	1			0.74	0.74	0.80	0.53
<i>Carex</i> sp	1	1				0.25	0.25	0.27	0.18
<i>Ceratophyllum demersum</i> , Coontail	6	3	2	1		1.48	1.48	1.61	1.05
<i>Ceratophyllum echinatum</i> , Spiny hornwort	5	4	1			1.23	1.23	1.34	0.88
<i>Eleocharis palustris</i> , Creeping spikerush	2	2				0.49	0.49	0.54	0.35
<i>Elodea canadensis</i> , Common waterweed	314	58	70	176	10	77.34	77.34	84.18	55.18
<i>Heteranthera dubia</i> , Water star-grass	30	18	9	3		7.39	7.39	8.04	5.27
<i>Iris versicolor</i> , Northern blue flag	1	1				0.25	0.25	0.27	0.18
<i>Lemna minor</i> , Small duckweed	6	6				1.48	1.48	1.61	1.05
<i>Myriophyllum spicatum</i> , Eurasian water-milfoil or Hybrid water-milfoil	4	3	1			0.99	0.99	1.07	0.70
<i>Nitella</i> sp., Nitella	3	2	1			0.74	0.74	0.80	0.53
<i>Nuphar variegata</i> , Spatterdock	10	8	2			2.46	2.46	2.68	1.76
<i>Phalaris arundinacea</i> , Reed canary grass	2	2				0.49	0.49	0.54	0.35
<i>Potamogeton crispus</i> , Curly-leaf pondweed	155	33	45	62	15	38.18	38.18	41.55	27.24
<i>Potamogeton nodosus</i> , Long-leaf pondweed	4	3	1			0.99	0.99	1.07	0.70
<i>Sagittaria</i> sp., Arrowhead	2	2				0.49	0.49	0.54	0.35
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	4	3	1			0.99	0.99	1.07	0.70
sp5	1	1				0.25	0.25	0.27	0.18
<i>Sparganium</i> sp., Bur-reed	1	1				0.25	0.25	0.27	0.18
<i>Spirodela polyrhiza</i> , Large duckweed	6	6				1.48	1.48	1.61	1.05
<i>Typha angustifolia</i> , Narrow-leaved cattail	4	2	2			0.99	0.99	1.07	0.70
<i>Vallisneria americana</i> , Wild celery	1		1			0.25	0.25	0.27	0.18
<i>Wolffia columbiana</i> , Common watermeal	2	2				0.49	0.49	0.54	0.35
Yellow Iris	2	2				0.49	0.49	0.54	0.35
Total	569	165	137	242	25	140.15	140.15	152.55	100.00

Spring 2014 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
Acorus americanus, Sweet-flag	6.00	5.00	1.00			0.83	2.00	2.50	1.00		
Carex sp	1.00	1.00				0.14	1.00	1.00			
Ceratophyllum demersum, Coontail	6.00	3.00	2.00	1.00		0.83	1.00	1.00	1.00	1.00	
Ceratophyllum echinatum, Spiny hornwort	6.00	5.00	1.00			0.83	1.20	1.25	1.00		
Eleocharis palustris, Creeping spikerush	2.00	2.00				0.28	1.00	1.00			
Elodea canadensis, Common waterweed	392.00	73.00	94.00	215.00	10.00	54.29	1.25	1.26	1.34	1.22	1.00
Heteranthera dubia, Water star-grass	31.00	18.00	9.00	4.00		4.29	1.03	1.00	1.00	1.33	
Iris versicolor, Northern blue flag	1.00	1.00				0.14	1.00	1.00			
Lemna minor, Small duckweed	6.00	6.00				0.83	1.00	1.00			
Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	4.00	3.00	1.00			0.55	1.00	1.00	1.00		
Nitella sp., Nitella	3.00	2.00	1.00			0.42	1.00	1.00	1.00		
Nuphar variegata, Spatterdock	19.00	16.00	3.00			2.63	1.90	2.00	1.50		
Phalaris arundinacea, Reed canary grass	4.00	4.00				0.55	2.00	2.00			
Potamogeton crispus, Curly-leaf pondweed	209.00	48.00	65.00	79.00	17.00	28.95	1.35	1.45	1.44	1.27	1.13
Potamogeton nodosus, Long-leaf pondweed	5.00	3.00	2.00			0.69	1.25	1.00	2.00		
Sagittaria sp., Arrowhead	2.00	2.00				0.28	1.00	1.00			
Schoenoplectus tabernaemontani, Softstem bulrush	4.00	3.00	1.00			0.55	1.00	1.00	1.00		
sp5	1.00	1.00				0.14	1.00	1.00			
Sparganium sp., Bur-reed	1.00	1.00				0.14	1.00	1.00			
Spirodela polyrhiza, Large duckweed	6.00	6.00				0.83	1.00	1.00			
Typha angustifolia, Narrow-leaved cattail	6.00	2.00	4.00			0.83	1.50	1.00	2.00		
Vallisneria americana, Wild celery	1.00		1.00			0.14	1.00		1.00		
Wolffia columbiana, Common watermeal	2.00	2.00				0.28	1.00	1.00			
Yellow Iris	4.00	4.00				0.55	2.00	2.00			
Total	722.00	211.00	185.00	299.00	27.00	100.00	29.48	28.46	16.29	4.83	2.13

Summer 2014 Aquatic Plant Frequency	Total Occur.	Occur. Zone 1	Occur. Zone 2	Occur. Zone 3	Occur. Zone 4	% Freq	% Freq shallower than max	% Freq w/veg	Relative Freq
<i>Acorus americanus</i> , Sweet-flag	3	2	1			0.75	0.75	0.94	0.60
<i>Carex comosa</i> , Bottle brush sedge	2	1	1			0.50	0.50	0.63	0.40
<i>Ceratophyllum demersum</i> , Coontail	32	16	8	8		8.04	8.04	10.06	6.37
<i>Eleocharis palustris</i> , Creeping spikerush	1	1				0.25	0.25	0.31	0.20
<i>Elodea canadensis</i> , Common waterweed	294	61	76	148	9	73.87	73.87	92.45	58.57
<i>Heteranthera dubia</i> , Water star-grass	45	22	17	6		11.31	11.31	14.15	8.96
<i>Lemna minor</i> , Small duckweed	3	3				0.75	0.75	0.94	0.60
<i>Najas flexilis</i> , Slender naiad	21	11	8	2		5.28	5.28	6.60	4.18
<i>Nitella</i> sp., Nitella	6	2	3	1		1.51	1.51	1.89	1.20
<i>Nuphar variegata</i> , Spatterdock	12	9	3			3.02	3.02	3.77	2.39
<i>Potamogeton crispus</i> , Curly-leaf pondweed	46	5	13	25	3	11.56	11.56	14.47	9.16
<i>Potamogeton natans</i> , Floating-leaf pondweed	1	1				0.25	0.25	0.31	0.20
<i>Potamogeton nodosus</i> , Long-leaf pondweed	2	1	1			0.50	0.50	0.63	0.40
<i>Potamogeton pusillus</i> , Small pondweed	1			1		0.25	0.25	0.31	0.20
<i>Sagittaria graminea</i> , Grass-leaved arrowhead	9	7	2			2.26	2.26	2.83	1.79
<i>Sagittaria latifolia</i> , Common arrowhead	4	4				1.01	1.01	1.26	0.80
<i>Sagittaria</i> sp., Arrowhead	1		1			0.25	0.25	0.31	0.20
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	1	1				0.25	0.25	0.31	0.20
<i>Typha latifolia</i> , Broad-leaved cattail	2	2				0.50	0.50	0.63	0.40
<i>Typha</i> sp., Cattail	1		1			0.25	0.25	0.31	0.20
<i>Vallisneria americana</i> , Wild celery	14	6	6	2		3.52	3.52	4.40	2.79
<i>Wolffia columbiana</i> , Common watermeal	1	1				0.25	0.25	0.31	0.20
Total	502	156	141	193	12	126.13	126.13	157.86	100.00

Summer 2014 Aquatic Plant Density	Total Density	Density Zone 1	Density Zone 2	Density Zone 3	Density Zone 4	Relative Density %	Mean Density	Mean Density Zone1	Mean Density Zone2	Mean Density Zone3	Mean Density Zone4
<i>Acorus americanus</i> , Sweet-flag	4.00	3.00	1.00			0.59	1.33	1.50	1.00		
<i>Carex comosa</i> , Bottle brush sedge	2.00	1.00	1.00			0.30	1.00	1.00	1.00		
<i>Ceratophyllum demersum</i> , Coontail	43.00	21.00	10.00	12.00		6.39	1.34	1.31	1.25	1.50	
<i>Eleocharis palustris</i> , Creeping spikerush	1.00	1.00				0.15	1.00	1.00			
<i>Elodea canadensis</i> , Common waterweed	425.00	93.00	118.00	203.00	11.00	63.15	1.45	1.52	1.55	1.37	1.22
<i>Heteranthera dubia</i> , Water star-grass	54.00	30.00	18.00	6.00		8.02	1.20	1.36	1.06	1.00	
<i>Lemna minor</i> , Small duckweed	3.00	3.00				0.45	1.00	1.00			
<i>Najas flexilis</i> , Slender naiad	22.00	12.00	8.00	2.00		3.27	1.05	1.09	1.00	1.00	
<i>Nitella</i> sp., Nitella	6.00	2.00	3.00	1.00		0.89	1.00	1.00	1.00	1.00	
<i>Nuphar variegata</i> , Spatterdock	26.00	19.00	7.00			3.86	2.17	2.11	2.33		
<i>Potamogeton crispus</i> , Curly-leaf pondweed	46.00	5.00	13.00	25.00	3.00	6.84	1.00	1.00	1.00	1.00	1.00
<i>Potamogeton natans</i> , Floating-leaf pondweed	1.00	1.00				0.15	1.00	1.00			
<i>Potamogeton nodosus</i> , Long-leaf pondweed	3.00	2.00	1.00			0.45	1.50	2.00	1.00		
<i>Potamogeton pusillus</i> , Small pondweed	1.00			1.00		0.15	1.00			1.00	
<i>Sagittaria graminea</i> , Grass-leaved arrowhead	9.00	7.00	2.00			1.34	1.00	1.00	1.00		
<i>Sagittaria latifolia</i> , Common arrowhead	5.00	5.00				0.74	1.25	1.25			
<i>Sagittaria</i> sp., Arrowhead	1.00		1.00			0.15	1.00		1.00		
<i>Schoenoplectus tabernaemontani</i> , Softstem bulrush	1.00	1.00				0.15	1.00	1.00			
<i>Typha latifolia</i> , Broad-leaved cattail	4.00	4.00				0.59	2.00	2.00			
<i>Typha</i> sp., Cattail	1.00		1.00			0.15	1.00		1.00		
<i>Vallisneria americana</i> , Wild celery	14.00	6.00	6.00	2.00		2.08	1.00	1.00	1.00	1.00	
<i>Wolffia columbiana</i> , Common watermeal	1.00	1.00				0.15	1.00	1.00			
Total	673.00	217.00	190.00	252.00	14.00	100.00	26.29	24.15	16.19	8.87	2.22

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