

Aquatic Vegetation Meandering Survey

Survey Date 15 August 2018
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Lake Summary

Gilbert Pit (DOW 49-0137-00) is a small 254-acre lake located just south of Gilbert, MN in St. Louis County. Gilbert Pit has a maximum depth of 443 feet. Only 7% of the lakes is considered littoral zone, or area < 15 feet.

Gilbert Pit is classified as an oligotrophic lake with a mean TSI score of 29 as measured from 2006-2015. Water chemistry was measured on 15 August 2018 to test for chlorophyll-a, total phosphorus, calcium, alkalinity, pH and dissolved oxygen. Secchi depth was also measured, however it exceeded the length of rope of 30 ft. Dissolved oxygen was measured at 8.41 mg/L, and the pH was 8.32. Total phosphorous and chlorophyll-a (values that provide a measure of the amount of algae in the water) have mean values of < 3 and <1 ug/L, respectively. Alkalinity was measured at 127 mg/L, and calcium was measured at 27.9 mg/L, both in the high-risk zone for zebra mussel presence. Zebra mussels were observed during the survey and appeared to be thriving on all hard substrates such as boulders and logs.

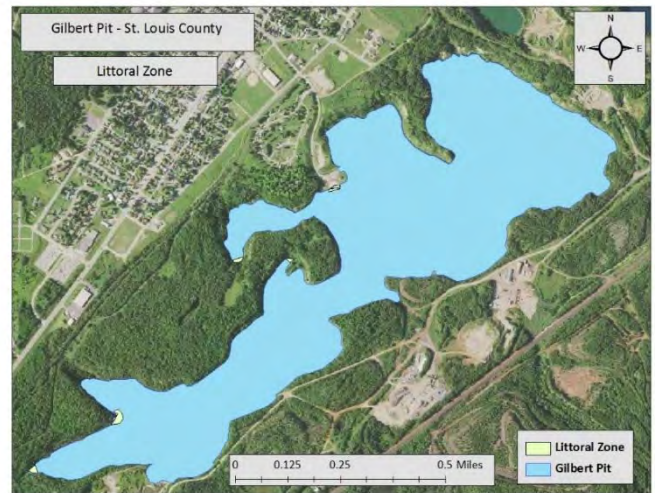
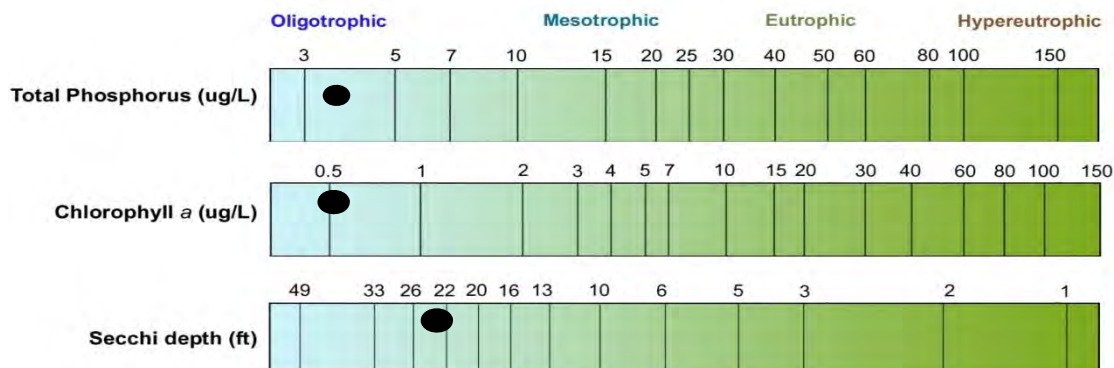


Figure 1: Gilbert Pit littoral zone, St. Louis County, MN.

WATER QUALITY STATISTICS

Over the past 10 years

MPCA primary site	Date	Secchi depth (feet)	Phosphorous (ug/L)	Chlorophyll-a (ug/L)	Mean TSI	Trophic State
NA	15 August 2018	> 30	< 3	< 1	29	Oligotrophic



Objectives of the Survey

This survey describes the aquatic plant community of Gilbert Pit including:

1. Plant taxa observed and the estimated abundance of each taxon
2. Identification of taxa to the level of species when possible
3. Frequency of occurrence of each taxon found, stating the number of points used as the denominator for the calculations
4. Frequency of all aquatic plants found
5. Estimation of abundance of species sampled using MN DNR ranking system
6. Distribution map for common species
7. Determination of any invasive aquatic plants

Methods

The aquatic plant survey followed our RMBEL Standard Operating Procedure and the methodology described by Madsen (1999). A meander survey was conducted to identify the spatial location of Eurasian water milfoil (EWM) throughout the lake. A Global Positioning System (GPS) unit was used to mark locations of EWM. Water depths at each site were recorded in 1-foot increments using an electronic depth finder.

A double-headed, weighted garden rake attached to a rope (Figure 2 and 3) was used to survey vegetation. Vegetation that was found under the surface by use of the double-headed garden rake was assigned a number between 0 and 4; 0 being absent, 1 being rare ($\leq 1/3$ of the rake head covered), 2 being scattered ($>1/3$ but $\leq 2/3$ of the rake head covered), 3 being common ($>2/3$ of the rake head covered), and 4 being abundant (plants over top of rake head). Plant identification followed Blickenderfer (2007).

Frequency of occurrence was calculated for each species as the number of sites in which a species occurred divided by the total number of sample sites. The average number of plants per rake sample was calculated as the total number of plants sampled divided by the number of sample locations.



Figure 2 and 3: Double-headed, weighted garden rake, attached to a rope used to survey aquatic vegetation

Survey Results

On 15 August 2018, 243 points were observed and sampled for aquatic vegetation. Plants were found in varying depths ranging from 3 – 20 feet. Because the lake used to be a mining pit, the shores of the lake mainly steep cliffs. Vegetation would grow out from the walls underneath the surface, as well as the shallower bays. The weather was good for the survey with sunny skies, temperatures reaching 72 degrees and little breeze, allowing us to see in the water very well. Water temperature was over 70 degrees.

Three different types of native plants were found across the sampling area, as well as the invasive. (Figure 4). Eurasian water milfoil was the only invasive plant found during the summer survey, and the most abundant plant found (Figures 5 & 6). No native northern milfoil was found during the survey, so there doesn't appear to be a risk of milfoil hybridization.

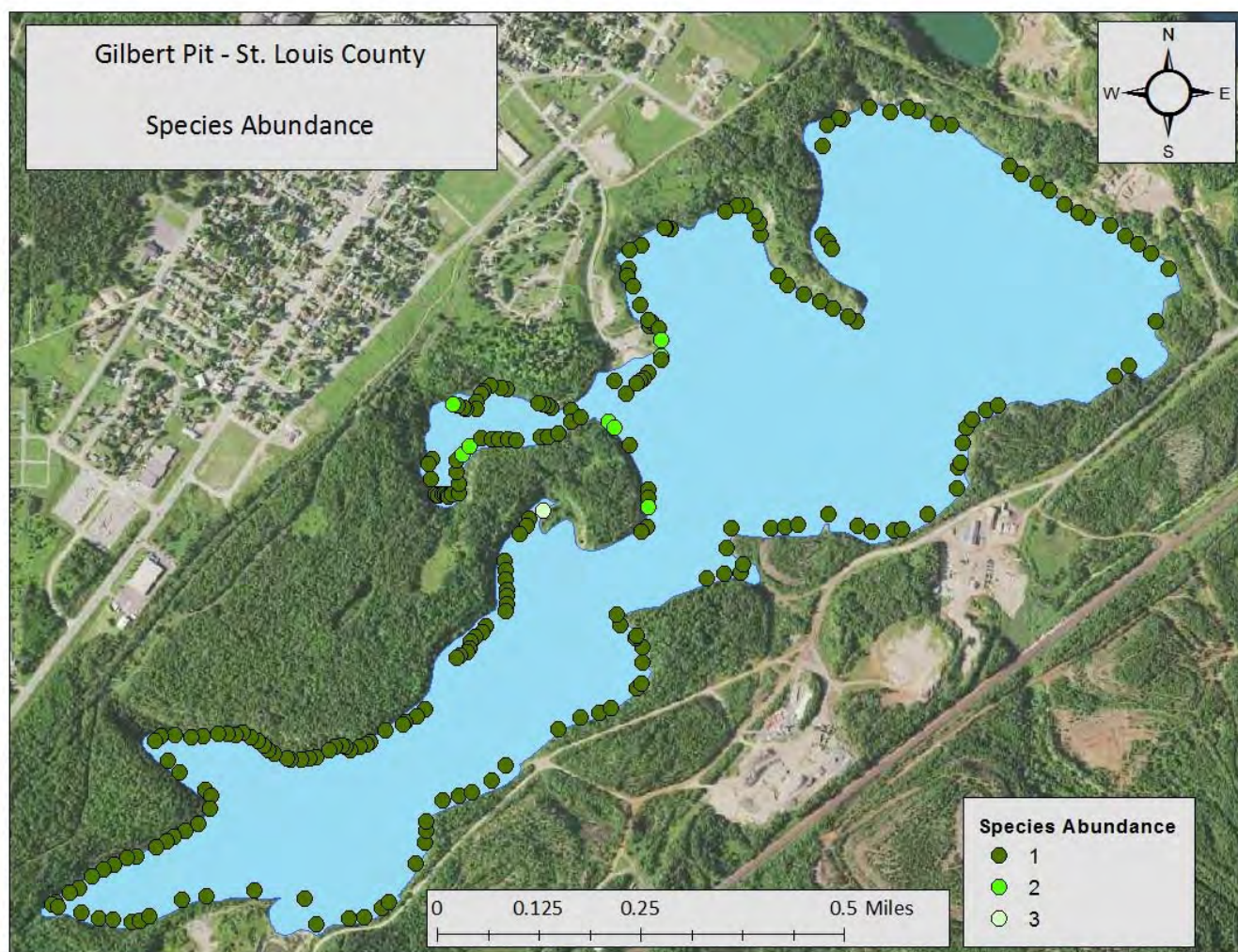


Figure 4: Number of species present at sample points in Gilbert Pit, St. Louis County, MN, 15 August 2018, 2018.

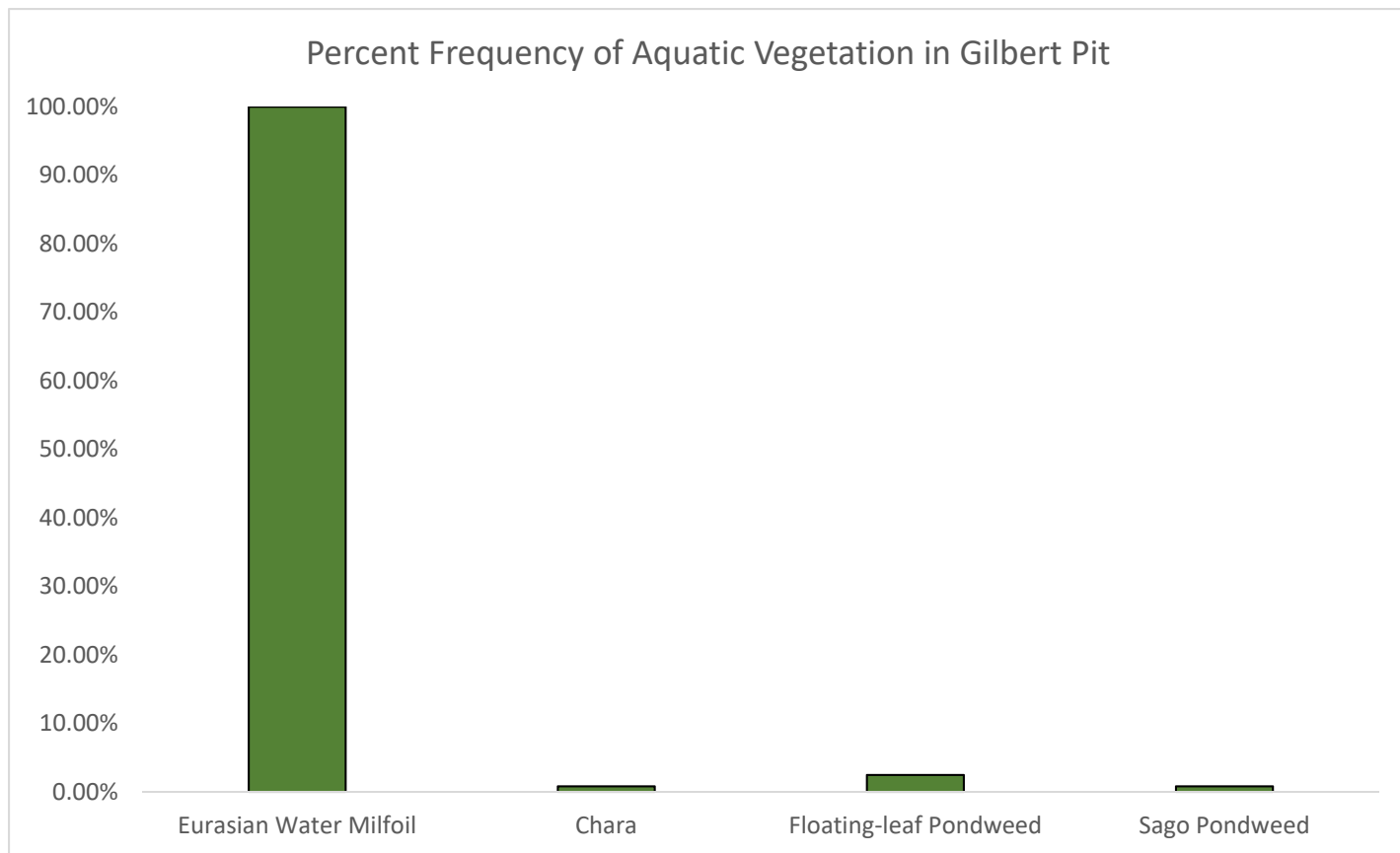


Figure 5: Frequency of aquatic plant species in Gilbert Pit 1 August 2018, 2018.

Table 2. Aquatic plants surveyed from Gilbert Pit, St. Louis County, MN: 1 August 2018, 2018.

Gilbert Pit				All sampled sites	
Life Form	Common Name	Scientific Name	Count	Frequency (%)	
SUBMERGED – ANCHORED – These plants grow primarily under the water surface. Upper leaves may float near the surface and flowers may extend above the surface. Plants are often rooted or anchored to the lake bottom.	Eurasian milfoil (invasive)	<i>Myriophyllum spicatum</i>	243	100%	
	Sago pondweed	<i>Stuckenia pectinata</i>	2	0.82%	
	Chara (Muskgrass)	<i>Chara sp.</i>	2	0.82%	
FLOATING – LEAF – These plant leaves float on water and are anchored to the bottom of the lake.	Floating-leaf pondweed	<i>Potamogeton natans</i>	6	2%	
Total number of plants (species diversity for the lake)			4		
Total number of plant occurrences			253		
Total number of sites			243		
Total number of sites <15			200		

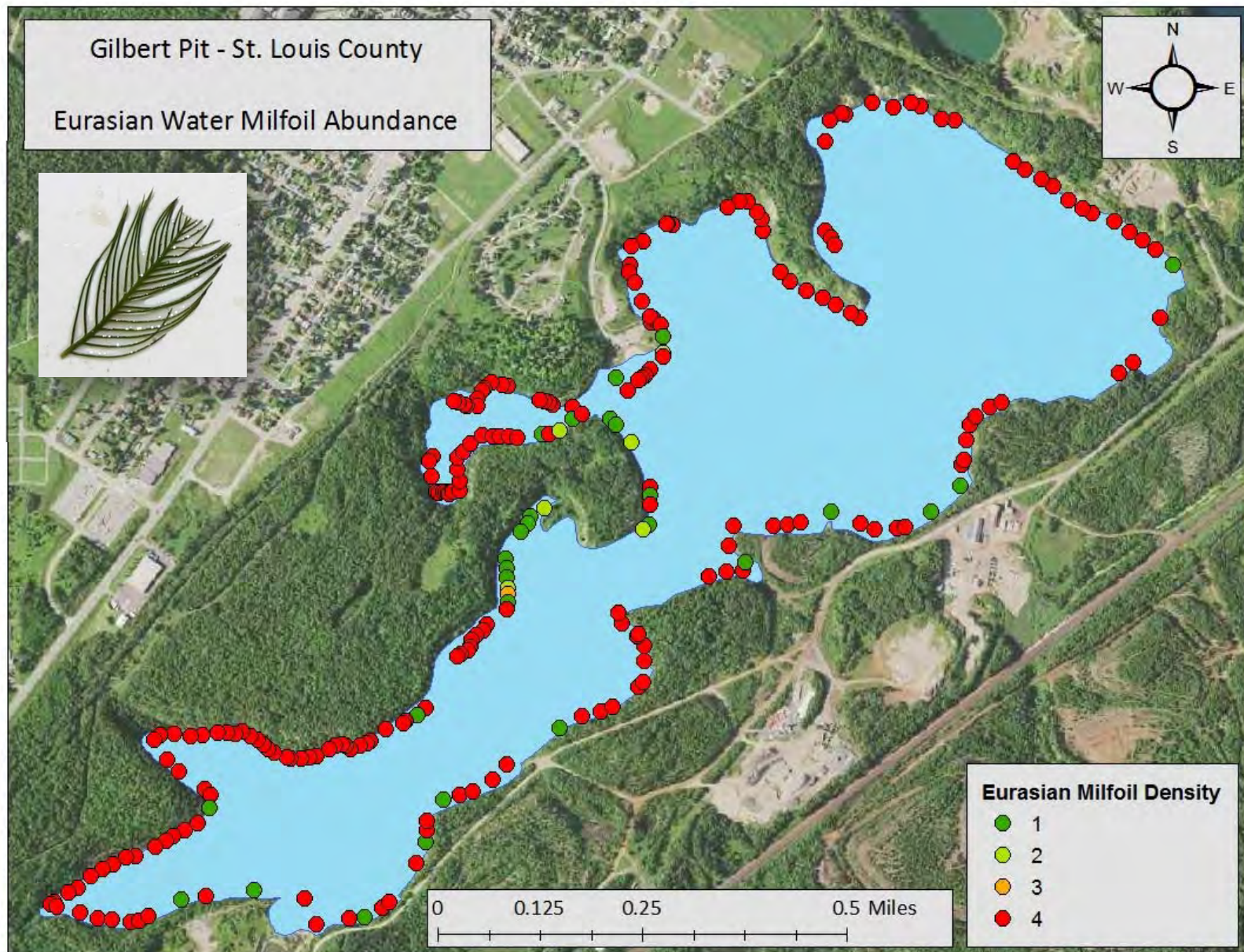


Figure 6: Density of Eurasian watermilfoil (*Myriophyllum spicatum*) at sample points in Gilbert Pit, St. Louis County, MN, 15 August 2018.

Discussion

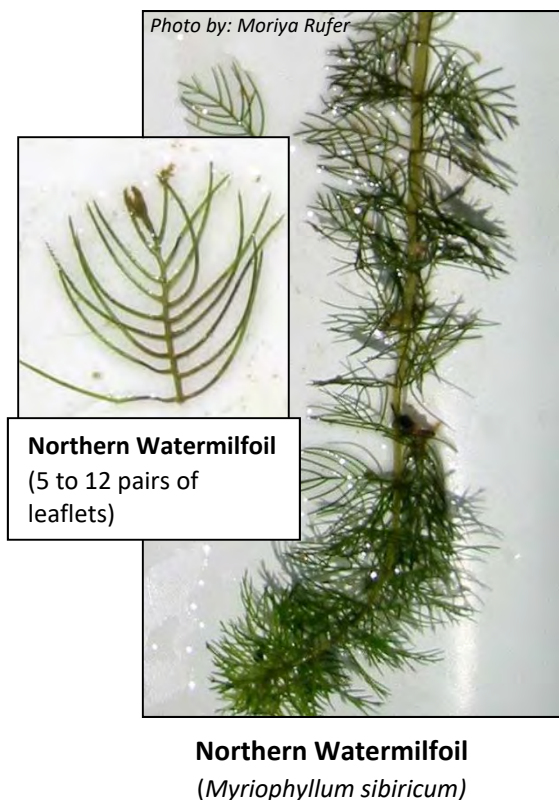
Gilbert Pit is a filled mining pit, so it is extremely deep and not a typical lake for Minnesota. The presence of plants and the depth at which one finds them is related to the water clarity. In areas where the sunlight does not reach the lake's bottom, there won't be plants present. Gilbert Pit has a clarity of over 30 feet, however lack of substrate and nutrients may limit plant growth and diversity.

The Minnesota DNR lists the littoral area of Gilbert Pit to be approximately 7% of the total surface area. Vegetation was found all around the lake, either growing out of the cliffs, or in the substrate in shallow areas in bays.

Zebra mussels and Eurasian watermilfoil (EWM) were found on Gilbert Pit during the survey. EWM was found all throughout the lake, mainly in high densities. Zebra mussels also appear to be thriving in the lake. Majority of rock piles were covered with colonies of zebra mussels.

Only a few beneficial, native plants were found in the survey. No native northern milfoil was found, so there appears to be no hybrid milfoil present in the lake and no chance of hybridization.

Due to the abundance of EWM and Zebra mussels, those leaving Gilbert Pit should make sure and decontaminate their boats. Perhaps a sign could be posted by the access that gives the location of the nearest decontamination station.



Survey Photos



Figure 3. Eurasian water milfoil in Gilbert Pit.



Figure 4. Very dense Eurasian watermilfoil in Gilbert Pit.



Figure 5. Eurasian watermilfoil growing out of the cliff in Gilbert Pit.

Literature Cited

Blickenderfer, Mary. 2007. A Field Guide to Identification of Minnesota Aquatic Plants. University of Minnesota Extension.

Borman, Susan et. al. 1997. Through the Looking Glass...a Field Guide to Aquatic Plants. University of Wisconsin Extension.

Madsen, J. D. 1999. Point intercept and line intercept methods for aquatic plant management. *APCRP Technical Notes Collection* (TN APCRP-M1-02). U.S. Army Engineer Research and Development Center, Vicksburg, MS. www.wes.army.mil/el/aqua