EXECUTIVE SUMMARY

Wazeda Lake is shallow lake with fair water quality and poor water clarity. As a eutrophic lake, Wazeda is high in nutrients and can support a large biomass. Filamentous algae is abundant.

The aquatic plant community in Wazeda Lake is of nearly average quality for Wisconsin lakes and is characterized by an average diversity and a less than average tolerance to disturbance.

Aquatic plants occurred throughout Wazeda Lake at more than half the sample sites, to a maximum depth of 7 feet; the most abundant plant growth occurred in the 0-1.5ft-depth zone. *Brasenia schreberi* is the dominant species within the plant community, growing at a high density.

Recommendations
It is important to take measures to protect the aquatic plant community that plays a key role in protecting water quality and providing habitat:
1) Protect the submergent and floating-leaf plant communities to stabilize the flocculent lake sediment.
2) Preserve the natural buffer zones of shoreline. Native vegetation reduces run-off into the lake and filters the run-off that does enter the lake.
3) Expand the natural buffer by leaving unmowed buffers along the lakes shore.
4) Eliminate the use of any lawn chemicals on the shoreline properties.
5) Limit boat motor impacts as much as possible due to the small size and shallow depths of the lake.
6) Cooperate with efforts in the watershed to reduce nutrient input to the lake.

The Aquatic Plant Community in Wazeda Lake, Monroe County 2001

By Deb Konkel

DRAFT

MWBC = 1332700

I. INTRODUCTION

A study of the aquatic macrophytes (plants) in Wazeda Lake was conducted during August 2001 by Water Resources staff of the West Central Region - Department of Natural Resources (DNR). This was the first quantitative vegetation study of Wazeda Lake by the DNR.

A study of the diversity, density, and distribution of aquatic plants is an essential component of understanding a lake due to the important ecological role of aquatic vegetation and the ability of the vegetation to characterize the water quality (Dennison et al. 1993).

Ecological Role: All other life in the lake depends on the plant life (including algae) - the beginning of the food chain. Aquatic plants provide food and shelter for fish, wildlife, and the invertebrates that in turn provide food for other organisms. Plants improve water quality, protect shorelines and lake bottoms, add to the aesthetic quality of the lake and impact recreation.

Characterize Water Quality: Aquatic plants serve as indicators of water quality because of their sensitivity to water quality parameters, such as water clarity and nutrient levels (Dennison et. al. 1993).

The present study will provide information that is important for effective management of the lake including: fish habitat improvement, protection of sensitive wildlife areas, aquatic plant management, and water resource regulations. The baseline data that it provides will be compared to future macrophyte inventories and offer insight into any changes occurring in the lake.

Background and History: Wazeda Lake is a 36-acre, impoundment on Beltz Creek in northern Monroe County, Wisconsin. Wazeda Lake has a maximum depth of

11.5 feet and a mean depth of 6 feet, which would classify it as a shallow water resource.

The lake is a major attraction for the County Park that encompasses the entire southwest shore.

II.METHODS

<u>Field Methods</u>

The study design was based primarily on the rake-sampling method developed by Jessen and Lound (1962), using stratified random placement of the transect lines.

The shoreline was divided into 12 equal segments and a transect, perpendicular to the shoreline, was randomly placed within each segment (Appendix IV), using a random numbers table.

One sampling site was randomly located in each depth zone (0-1.5ft., 1.5-5ft. and 5-10ft.) along each transect. Using a long-handled, steel, thatching rake, four rake samples were taken at each sampling site. The four samples were taken from each quarter of a 6-foot diameter quadrat. The aquatic plant species that were present on each rake sample were recorded. Each species was given a density rating (0-5) based on the number of rake samples on which it was present at each sampling site.
A rating of 1 indicates that a species was present on one rake sample
a rating of 2 indicates that a species was present on two rake samples
a rating of 3 indicates that it was present on three rake samples
a rating of 4 indicates that it was present on all four rake samples
a rating of 5 indicates that a species was abundantly present on all rake samples at that sampling site.)

The sediment type at each sampling site was recorded. Visual inspection and periodic samples were taken between transect lines in order to record the presence of any species that did not occur at the sampling sites. Specimens of all plant species present were collected and saved in a cooler for later preparation of voucher specimens. Nomenclature was according to Gleason and Cronquist (1991).

The type of shoreline cover was recorded at each transect. A section of shoreline, 50 feet on either side of the transect intercept with the shore and 30 feet back from the shore, was evaluated. The percentage of each cover type within this 100' x 30' rectangle was visually estimated and verified by a second researcher.

<u>Data Analysis</u>

The percent frequency of each species was calculated (number of sampling sites at which it occurred / total number of sampling sites) (Appendix I). Relative frequency was calculated based on the number of occurrences of a species relative to total occurrence of all species (Appendix I). The mean density was calculated for each species (sum of a species' density ratings / number of sampling sites) (Appendix II). Relative density was calculated based on a species density relative to total plant densities. A "mean density where present" was calculated for each species (sum of a species' density ratings / number of sampling sites at which the species occurred) (Appendix II). The relative frequency and relative density was summed to obtain a dominance value (Appendix III). Species diversity was measured by calculating Simpson's Diversity Index (Appendix I).

The Aquatic Macrophyte Community Index (AMCI) was applied to Wazeda Lake. Values between 0 and 10 are given for each of six parameters that characterize the plant community as outlined in Weber et. al. (1995).

The Average Coefficient of Conservatism and Floristic Quality was calculated to measure disturbance in the plant community (Nichols 1998). A coefficient of conservatism is an assigned value, 0-10, the probability that a plant species will occur in an undisturbed habitat. The Average Coefficient of Conservatism for the plant community is the mean of the Coefficients of Conservatism for each species found in a lake. The Floristic Quality (FQI) is calculated from the Coefficient of Conservatism.

III. RESULTS

PHYSICAL DATA

WATER QUALITY - The trophic state of a lake is an indication of its water quality. Phosphorus concentration, chlorophyll concentration, and water clarity data are collected and combined to determine the trophic state.

Eutrophic lakes are high in nutrients and therefore support a large biomass.
Oligotrophic lakes are low in nutrients and support limited plant growth and smaller fish populations.
Mesotrophic lakes have intermediate levels of nutrients and biomass.

Nutrients

Phosphorus is a limiting nutrient in many Wisconsin lakes and is measured as an indication of the nutrient level in a lake. Increases in phosphorus in a lake can feed algae blooms and, occasionally, excess plant growth.
August, 2001 phosphorus in Wazeda Lake was 28ug/l
This concentration of phosphorus in Wazeda Lake was indicative of a mesotrophic lake (Table 1).

Table 1. Trophic Status

	Quality Index	Phosphorus ug/l	Chlorophyll ug/l	Secchi Disc ft.
Oligotrophic	Excellent	<1	<1	> 19
	Very Good	1-10	1-5	8-19
Mesotrophic	Good	10-30	5-10	6-8
	Fair	30-50	10-15	5-6
Eutrophic	Poor	50-150	15-30	3-4
Hypereutrophic	Very Poor	>150	>30	>3
Wazeda Lake	Fair	28	46	4

After Lillie & Mason (1983) & Shaw et. al. (1993)

Algae

Measuring the level of chlorophyll in the water gives an indication of algae concentrations. Algae are natural and essential in lakes, but high algae levels can cause problems, increasing the turbidity and reducing the light available for plant growth.
August 2001 chlorophyll in Wazeda Lake was 46 ug/l.

The chlorophyll concentration in Wazeda Lake indicates that it was a hypereutrophic lake (Table 1).

Water Clarity

Water clarity is a critical factor for plants. When plants receive less than 1 - 2% of the surface illumination, they can not survive. Water clarity is reduced by turbidity (suspended materials such as algae and silt) and dissolved organic chemicals that color the water. Water clarity is measured with a Secchi disc that shows the combined effect of turbidity and color.

August, 2001 Secchi disc clarity was 4 ft.

Water clarity indicates (Table 1) that Wazeda Lake was a eutrophic lake with poor clarity.

The combination of phosphorus concentration, chlorophyll concentration and water clarity indicates that Wazeda Lake is a eutrophic lake with fair water quality. This trophic status would promote abundant plant growth and frequent algae blooms.

LAKE MORPHOMETRY - The morphometry of a lake is an important factor in determining the distribution of aquatic plants. Duarte and Kalff (1986) found that the slope of the littoral zone could explain 72% of the observed variability in the growth of submerged plants. Gentle slopes support more plant growth than steep slopes (Engel 1985).

Wazeda Lake has a gradually sloped littoral zone (Appendix IV). The shallow depths and the gradually sloped littoral zone would favor plant growth.

SEDIMENT COMPOSITION – Peat was the predominant sediment in Wazeda Lake, especially in the 0-5 ft. depth zone (Table 2).

Sand was commonly occurring in the 0-1.5ft zone. Sand and silt was common in the 1.5-10ft depth zone.

Table 2. Sediment Composition

Sediment Type		0-1.5' Depth	1.5-5' Depth	5-10' Depth	Percent of all Sample Sites
Soft Sediments	Peat	50%	50%	33%	45%
	Silt		10%	11%	7%
Mixed Sediments	Sand/Silt		20%	22%	13%
	Sand/Peat	10%	10%	11%	10%
	Silt/Gravel	10%		11%	7%
Hard Sediments	Sand	30%	10%	11%	17%

SHORELINE LAND USE – Land use practices strongly impact the aquatic plant community and, therefore, the entire aquatic community. These practices can directly impact the plant community through increased sedimentation from erosion, increased nutrient input from fertilizer run-off and soil erosion and increased toxics from farmland and urban run-off.

Native herbaceous growth was the most frequently encountered shoreline cover at the transects (Table 3). Wooded shoreline occurred at approximately half of the sites and had the highest mean coverage.

However, cultivated lawn occurred at more than half of the sites and had a high mean coverage, more than one-third of the shoreline (Table 3). Wooded shoreline and natural herbaceous plant growth had a high coverage also.

Table 3. Shoreline Land Use

Cover Type		Frequency of Occurrences at Transects	Mean % Coverage
Natural Shoreline	Wooded	58%	39%
	Native Herbaceous	75%	23%
Disturbed Shoreline	Cultivated Lawn	58%	36%
	Hard Structures	17%	1%
	Bare Sand	8%	1%

Some type of natural shoreline occurred at all of the sample sites and based on the sample sites, covered 62% of the shoreline. Disturbed shoreline occurred at 58% of the sites and covered 38% of the shoreline (Table3).

MACROPHYTE DATA

SPECIES PRESENT

Of the 11 species of aquatic plants found in Wazeda Lake, 4 were emergent species, 1 was a floating-leaf species and 6 were submergent species (Table 4). No non-native species, threatened or endangered species were found.

Table 4. Wazeda Lake Aquatic Plant Species

Scientific Name	Common Name	I. D. Code
Emergent Species		
1) *Carex* sp.	sedge	carsp
2) *Dulichium arundinaceum* (L.) Britton	three-way sedge	dular
3) *Sparganium androcladum* (Engelm.) Morong.	burreed	spaan
4) *Typha latifolia* L.	common cattail	typla
Floating leaf Species		
5) *Brasenia schreberi* J. F. Gmelin.	watershield	brasc
Submergent Species		
6) *Eleocharis acicularis* (L.) Roemer & Schultes.	needle spikerush	eleac
7) *Pontederia cordata* L. forma *taenia* Fasset.	Pickerelweed	ponco
8) *Potamogeton epihydrus* Raf.	ribbon-leaf pondweed	potep
9) *Potamogeton pusillus* L.	small pondweed	potpu
10) *Utricularia gibba* L.	creeping bladderwort	utrgi
11) *Utricularia vulgaris* L.	common bladderwort	utrvu

FREQUENCY OF OCCURRENCE

Brasenis schreberi was the most frequently occurring species in Wazeda Lake (63% of sample sites) (Figure 1). *Dulichium arundinacea*, *Sparganium androcladum* and *Utricularia vulgaris* were also commonly occurring species, (27%, 27% and 20%).

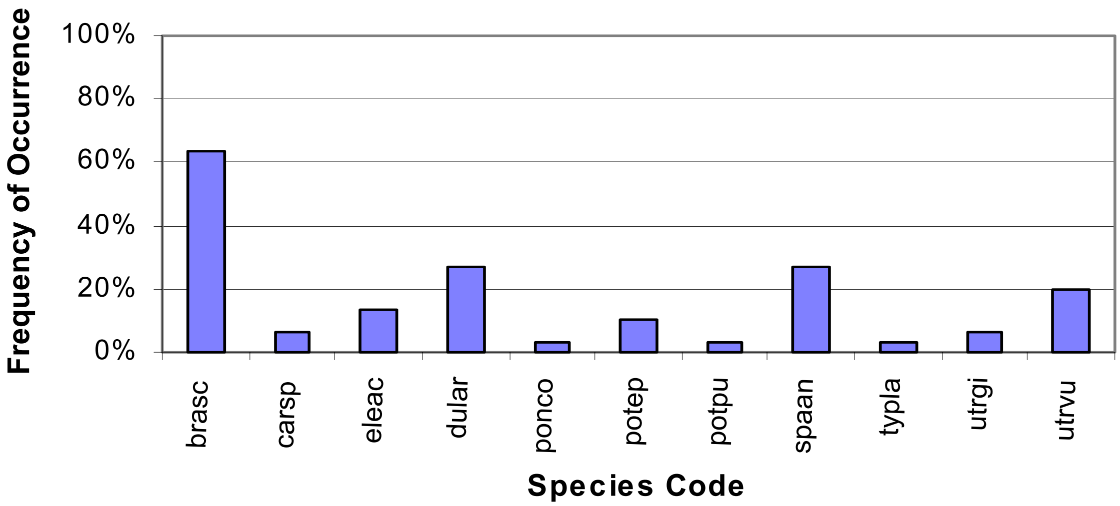


Figure 1. Aquatic plant frequencies in Wazeda Lake, 2001

Filamentous algae occurred at 47% of the sample sites.

64% of the sample site in the 0-1.5ft depth zone

70% of the sample site in the 1.5-5ft depth zone

DENSITY

Brasenia schreberi was also the species with the highest mean density (2.1 on a density scale of 0-4) in Wazeda Lake (Figure 2).

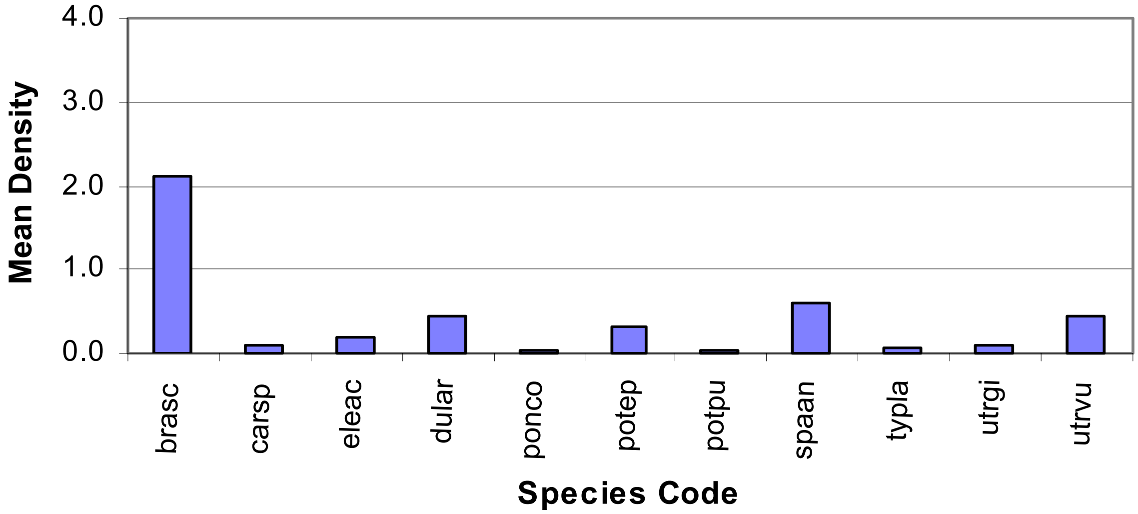


Figure 2. Densities of aquatic plants in Wazeda Lake, 2001

Brasenia schreberi had a "mean density where present" of 3.32. Its "mean density where present" indicates that *B. schreberi* exhibited a dense growth form in Wazeda Lake (Appendix II). The other species in Wazeda Lake that had a "density where present" of 2.5 or more, indicating that it grew at above average density, was *Potamogeton epihydrus* (3.0) but occurred at only three sites.

DOMINANCE

Combining relative frequency and relative density into a Dominance Value indicates how dominant a species is within the macrophyte community (Appendix III). Based on the Dominance Value, *Brasenia schreberi* was the dominant plant species in Wazeda Lake (Figure 3).

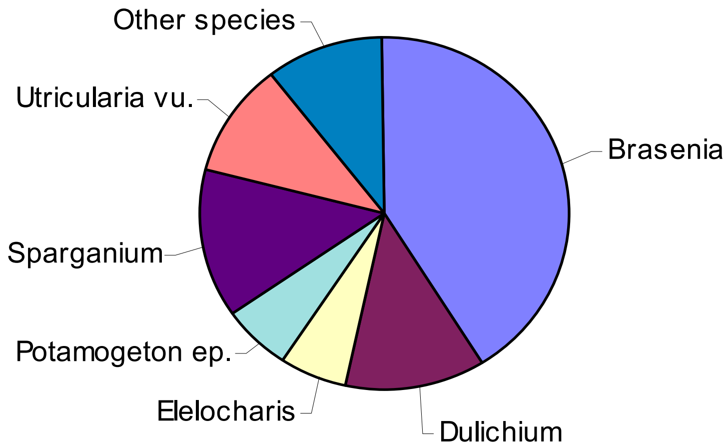


Figure 3. Dominance within the macrophyte community, of the most prevalent macrophytes in Wazeda Lake, 2001.

Brasenia schreberi was the most frequent and the most dense species in all depth zones (Appendix I, II). *B. schreberi* occurred at its highest frequency in the 0-1.5ft depth zone and its highest density in the 1.5-5 ft. depth zone (Figure 4, 5). The other aquatic plant species in Wazeda Lake occurred at their highest frequencies and densities in the 0-1.5ft depth zone and declined in frequency and density with increasing depth.

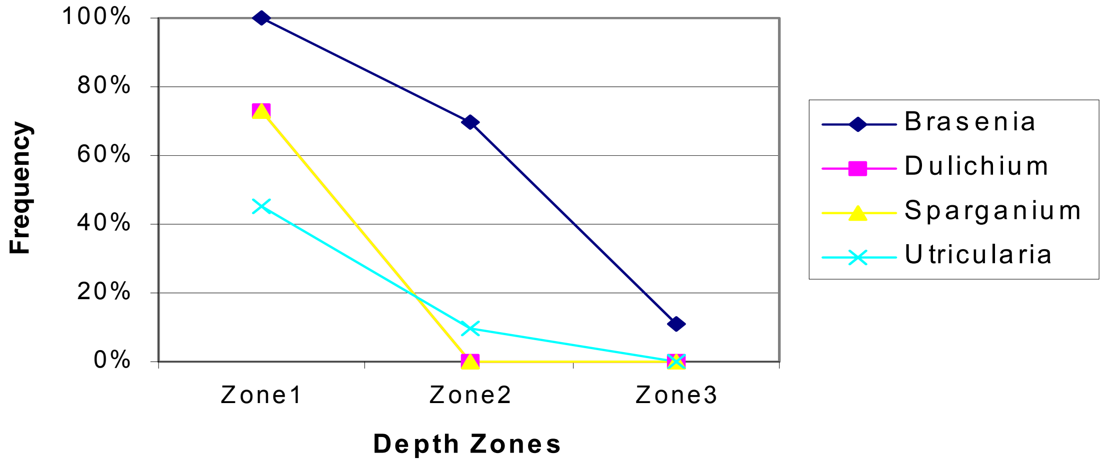


Figure 4. Frequency of occurrence of the most prevalent macrophytes in Wazeda Lake, by depth zone.

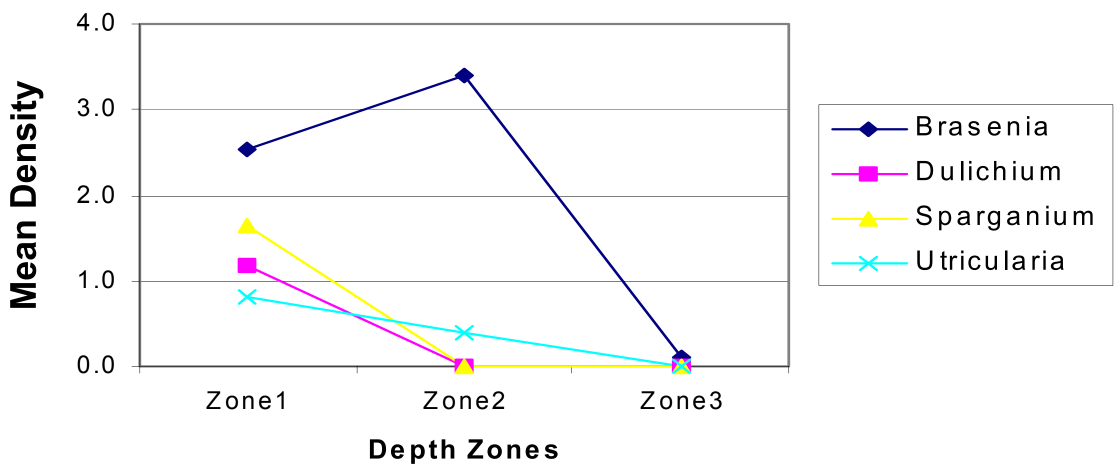


Figure 5. Density of the most prevalent macrophytes in Wazeda Lake, by depth zone.

DISTRIBUTION

Secchi disc water clarity data can be used to calculate a predicted maximum rooting depth for plants in the lake (Dunst 1982). Based on the August 2001 Secchi disc clarity, the predicted maximum rooting depth in Wazeda Lake would be 7.6 ft. Aquatic macrophytes occurred throughout Wazeda Lake to a maximum rooting depth of 7 feet. This is very close to the predicted rooting depth. The most prevalent species were distributed throughout the lake. Rooted aquatic vegetation occurred at 67% of the sampling sites.

The dominant plant species, *Brasenia schreberi,* occurred at the maximum rooting depth.

The 0-1.5ft depth zone supported the greatest amount of plant growth. The highest total occurrence and total density of plant growth were recorded in the 0-1.5ft depth zone (Figure 6). The highest percent of vegetated sites and the greatest mean number of species per site were also recorded in the 0-1.5ft depth zone (Figure 7).

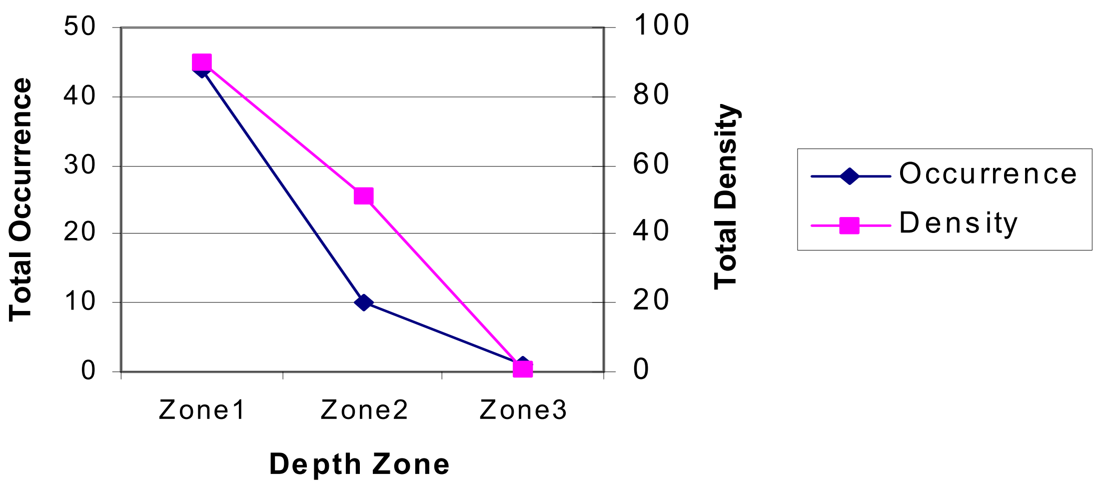


Figure 6. Total occurrence and density of plants by depth zone.

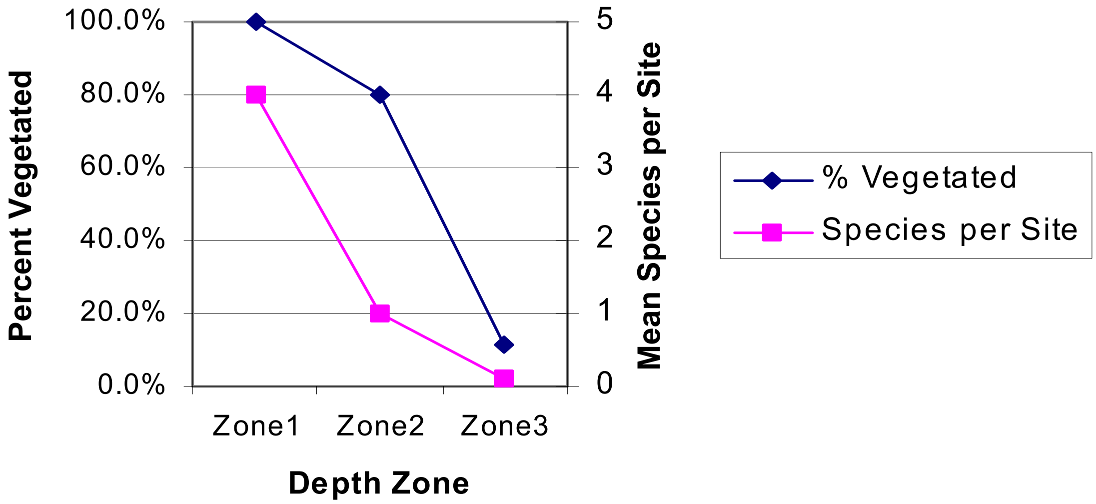


Figure 7. Percentage of vegetated site and mean number of plant species per site in Wazeda Lake, by depth zone.

The mean number of species found at each sampling sites was 1.8
10 sites had 0 species
7 sites had 1 species
3 sites had 2 species
1 sites had 3 species
6 sites had 4 species
3 sites had 5 species

INFLUENCE OF SEDIMENT – Many species of plants depend on the sediment in which they are rooted for their nutrients. The richness or sterility and texture of the sediment will determine the type and abundance of macrophyte species that can survive in a location. The availability of mineral nutrients for growth is highest in sediments of intermediate density, such as silt (Barko and Smart 1986).

Peat was the predominant sediment found in Wazeda Lake. Because of its flocculent nature, peat may be difficult for vegetation to root within (Table 5). However, peat supported the highest percent of vegetated sample sites.

All sediment types supported comparable amounts of vegetation in Wazeda Lake.

Table 5. Sediment Influence

Sediment Type		Percent of Sites	Percent Vegetated
Soft Sediments	Peat	45%	69%
	Silt	7%	50%
Mixed Sediments	Sand/Silt	13%	50%
	Sand/Peat	10%	67%
	Silt/Gravel	7%	50%
Hard Sediments	Sand	17%	60%

THE COMMUNITY

Simpson's Diversity Index was 0.81, indicating an average diversity in the plant community. A rating of 1.0 would mean that each plant in the lake was a different species (the most diversity achievable).

The Aquatic Macrophyte Community Index (AMCI) for Wazeda Lake was 38, which is nearly average (40) for lakes in Wisconsin (Table 6).

Table 6. Aquatic Macrophyte Community Index

Parameters		Value
Maximum Rooting Depth	2.1 meters	4
% Littoral Zone Vegetated	67%	10
Simpson's Diversity	0.81	8
# of Species	11 (no exotics)	4
% Submergent Species	30% Rel. Freq.	4
% Sensitive Species	41% Relative Freq.	8
Totals		38

The mean value for Wisconsin Lakes is 40, highest value for this index is 60.

The Average Coefficient of Conservatism for Wazeda Lake was in the upper quartile for all Wisconsin lakes and North Central Hardwood Region lakes analyzed (Table 7). This suggests that the aquatic plant community in Wazeda Lake among the group of lakes least tolerant of disturbance.

Table 7. Floristic Quality and Coefficient of Conservatism of Wazeda Lake, Compared to Wisconsin Lakes and Northern Wisconsin Lakes.

	(C)Average Coefficient of Conservatism †	Floristic Quality (FQI) ‡	(FQI) Based on Relative Frequency ‡
Wisconsin Lakes *	5.5, 6.0, 6.9	16.9, 22.2, 27.5	
NCHR *	5.2, 5.6, 5.8	17.0, 20.9, 24.4	
Wazeda Lake 2001	7.0	22.14	22.83

***** - Values indicate the highest value of the lowest quartile, the mean and the lowest value of the upper quartile. North Central Hardwoods Region (NCHR) is the region in which Wazeda Lake is located.

† - Average Coefficient of Conservatism for all Wisconsin lakes ranged from a low of 2.0 (the most disturbance tolerant) to a high of 9.5 (least disturbance tolerant).

‡ - The lowest Floristic Quality was 3.0 (farthest from an undisturbed condition) and the high was 44.6 (closest to an undisturbed condition).

The Floristic Quality of the aquatic plant community in Wazeda Lake was slightly below average for Wisconsin lakes and above average for North Central Hardwood Lakes (Table 7). This suggests that the plant community in Wazeda Lake has been subject to an average amount of disturbance as compared with lakes in Wisconsin or the region.

Since these values and conclusions were based only on the occurrence of disturbance-tolerant and disturbance-sensitive species, a species frequency or dominance in the plant community was not taken into consideration. The Floristic Quality was recalculated by weighting each species' disturbance tolerance with its relative frequency.

The resulting values place Wazeda Lake above average for lakes in Wisconsin and the north Central Hardwood Region in relation to their disturbance tolerance. This suggests that Wazeda Lake is less tolerant of disturbance than the average lake in the North Central Hardwood Region and all Wisconsin (Table 7). Lake Wazeda has likely been subjected to fewer disturbances than the average lake.

Disturbances can be of many types:

1) Direct disturbances to the plant beds result from boat traffic, plant harvesting, chemical treatments, the placement of docks and other structures, fluctuating water levels, etc.
2) Indirect disturbances can be the result of factors that impact water clarity and thus stress species that are more sensitive: resuspension of sediments,

sedimentation from erosion, increased algae growth due to nutrient inputs.

3) Biological disturbances include the introduction of a non-native or invasive plant species, grazing from an increased population of aquatic herbivores, destruction of plant beds by the fish population, etc.

V. DISCUSSION

Based on water clarity, chlorophyll and phosphorus data, Wazeda Lake is a eutrophic, shallow lake with poor clarity and fair water quality. Peat was the dominant sediment in the lake.

The eutrophic status that means abundant nutrient levels, shallow depth and gradually sloped littoral zone in Wazeda Lake would favor macrophyte growth.

Aquatic plant growth occurred throughout Wazeda Lake, at 67% of the sites, to a maximum depth of 7 ft. This maximum rooting depth is the same as the predicted maximum rooting depth. The prevalent aquatic plant species were distributed throughout the lake. The shallow depth zone, 0-1.5ft, supported the greatest amount of plant growth in Lake Wazeda: the highest total occurrence of plants, highest total density of plants, greatest percentage of vegetated sites, highest frequency and density of nearly all the aquatic plant species, and largest mean number of species per sample site.

Brasenia schreberi was the dominant macrophyte species in Wazeda Lake, occurring throughout the lake and dominating all depth zones. *Potamogeton epihydrus,* although it only occurred at only three sites, exhibited an above average dense growth form in Wazeda Lake also. Filamentous algae occurred at 47% of the sample sites, most commonly in the 1.5-5ft depth zone.

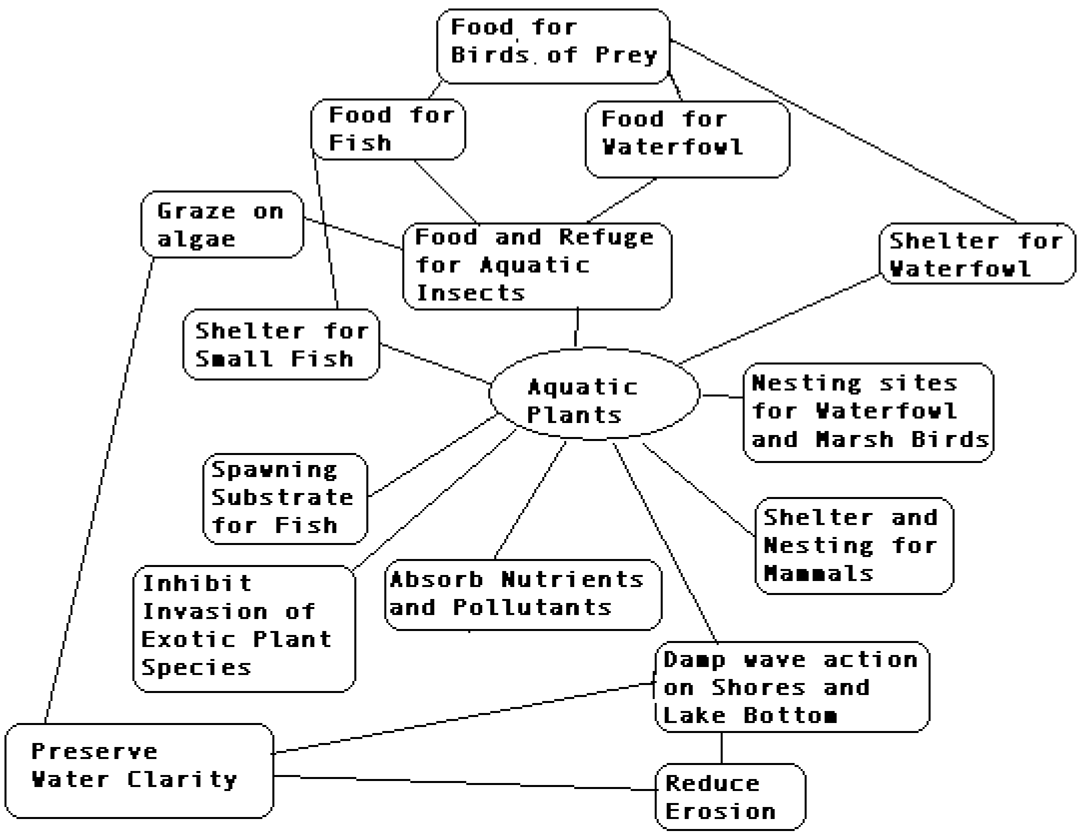
The Aquatic Macrophyte Community Index (AMCI) for Wazeda Lake was 38, indicating that the quality of the macrophyte community in Wazeda Lake was nearly average (40) for Wisconsin lakes. The limited number of species (11), dominance of floating-leaf species as compared to submergent and shallow maximum rooting depth are limiting the quality of the aquatic plant community. Simpson's Diversity Index (0.81) indicates that the macrophyte community had an average diversity. The mean number of species per sample site was 1.8.

The Floristic Quality Index suggests that Wazeda Lake has been subjected to less disturbance than the average lake in Wisconsin and in the North Central Hardwoods Region of Wisconsin.
This also indicates that Wazeda Lake would be less tolerant of any future disturbance than the average lake.

Wazeda Lake has some natural shoreline buffer protection (wooded and native herbaceous growth). Natural shoreline occurred at all of the sample sites and, based on the sample sites, covered 62% of the shore. Native herbaceous cover was found at the most sites and wooded cover had the highest coverage. However, disturbed shoreline (mowed lawn, bare sand, hard structures) occurred at 58% of the sites and covered 38% of the shoreline. Mowed lawn alone occurred at 58% of the sites and covered 36% of the shoreline. Mowed grass and hard structures both result in increased runoff to the lake. Runoff from mowed grass can also carry pesticides, fertilizers and other lawn chemicals and pet wastes. Bare sand can cause increased sedimentation.

VI. CONCLUSIONS

A healthy aquatic plant community plays a vital role within the lake community. This is due to the benefits plants provide in
1) improving water quality 2) providing valuable resources for fish and wildlife 3) resisting invasions of non-native species and 4) checking excessive growth of tolerant species that could crowd out the more sensitive species and reduce diversity.



1) Macrophyte communities improve water quality in many ways:
they trap nutrients, debris, and pollutants entering a water body;
they absorb and break down some pollutants;
they reduce erosion by damping wave action and stabilizing shorelines and lake bottoms;
they remove nutrients that would otherwise be available for algae blooms (Engel 1985).

2) Aquatic plant communities provide important fishery and wildlife resources. Plants (including algae) start the food chain that supports many levels of wildlife, and at the same time produce oxygen needed by animals. Plants are used as food, cover and nesting/spawning sites by a variety of wildlife and fish (Table 8). The macrophyte

community in Wazeda Lake provides habitat in 67% of the littoral zone. This amount of vegetation provides a good balance of cover (25-85%) and open water to support a healthy fishery.

Compared to non-vegetated lake bottoms, macrophyte beds support larger, more diverse invertebrate populations that in turn will support larger and more diverse fish and wildlife populations (Engel 1985). Additionally, mixed stands of macrophytes support 3-8 times as many invertebrates and fish as monocultural stands (Engel 1990). Diversity in the plant community creates more microhabitats for the preferences of more species. Macrophyte beds of moderate density support adequate numbers of small fish without restricting the movement of predatory fish (Engel 1990).

As a shallow lake, Wazeda Lake is a unique resource that can not be forced to act like a deep-water lake. Shallow lakes exist as two, alternate types:

1) A clear water lake with abundant aquatic plant growth

   or

2) A murky, algae-dominated lake with sparse aquatic plant growth

Once the balance is tipped from a clear water state to a turbid water state, it is very hard to bring a shallow lake back to a clear water state. Shallow lakes are much more susceptible to certain disturbances than deep water lakes. Wind has a much greater impact on shallow lakes. Boat motors have a greater impact on shallow lakes: a 25hp motor can disturb sediments 10 ft. below the surface (Asplund and Cook 1997). The impacts of disturbance are magnified when the lake lacks a stable aquatic plant community.

Wazeda Lake is shallow lake with fair water quality and poor water clarity. As a eutrophic lake, Wazeda is high in nutrients and can support a large biomass. Filamentous algae was recorded at nearly half of the sites, nearly three-quarters of the sites in the 1.5-5ft depth zone.

Wazeda Lake has some protection from a buffer of natural shoreline. But, disturbed shoreline impacts 38% of the shoreline; mowed lawn or grass impacts 36% of the shoreline.

The aquatic plant community in Wazeda Lake is of nearly average quality for Wisconsin lakes and is characterized by an average diversity and a less than average tolerance to disturbance.
This suggests that the plant community has been subjected to less disturbance than the average lake in Wisconsin or North Central Hardwood Region.

Aquatic plants occurred throughout Wazeda Lake at more than half the sample sites, to a maximum depth of 7 feet; the most abundant plant growth occurred in the 0-1.5ft-depth zone. *Brasenia schreberi* is the dominant species within the plant community, growing at a high density.

Recommendations
It is important to take measures to protect the aquatic plant community that plays a key role in protecting water quality and providing habitat:

7) Protect the submergent and floating-leaf plant communities to stabilize the flocculent lake sediment.
8) Preserve the natural buffer zones of shoreline. Native vegetation reduces run-off into the lake and filters the run-off that does enter the lake.
9) Expand the natural buffer by leaving unmowed buffers along the lakes shore.
10) Eliminate the use of any lawn chemicals on the shoreline properties.
11) Limit boat motor impacts as much as possible due to the small size and shallow depths of the lake.
12) Cooperate with efforts in the watershed to reduce nutrient input to the lake.

Wazeda Lake is an important resource for the County Park and County as a whole. Taking steps to protect the aquatic plant community in Wazeda Lake will preserve water quality and protect fish and wildlife resources.