Aquatic Vegetation Survey of

Latimer Lake (DOW #77-0105-00)

Todd County, Minnesota

Spring, 2009

Matted curly-leaf pondweed along south shore of Latimer Lake, June 2009.

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Summary

Latimer Lake is a 203 acre lake in central Minnesota. A spring 2009 aquatic vegetation survey was conducted to assess the abundance and distribution of the non-native plant, curly-leaf pondweed (*Potamogeton crispus*). The survey included vegetation and depth sampling at 76 sites and a characterization of near shore substrates.

Submerged plants were found to a maximum depth of 10 feet. Within the shore to 10 feet depth zone, 81% of sample sites contained vegetation.

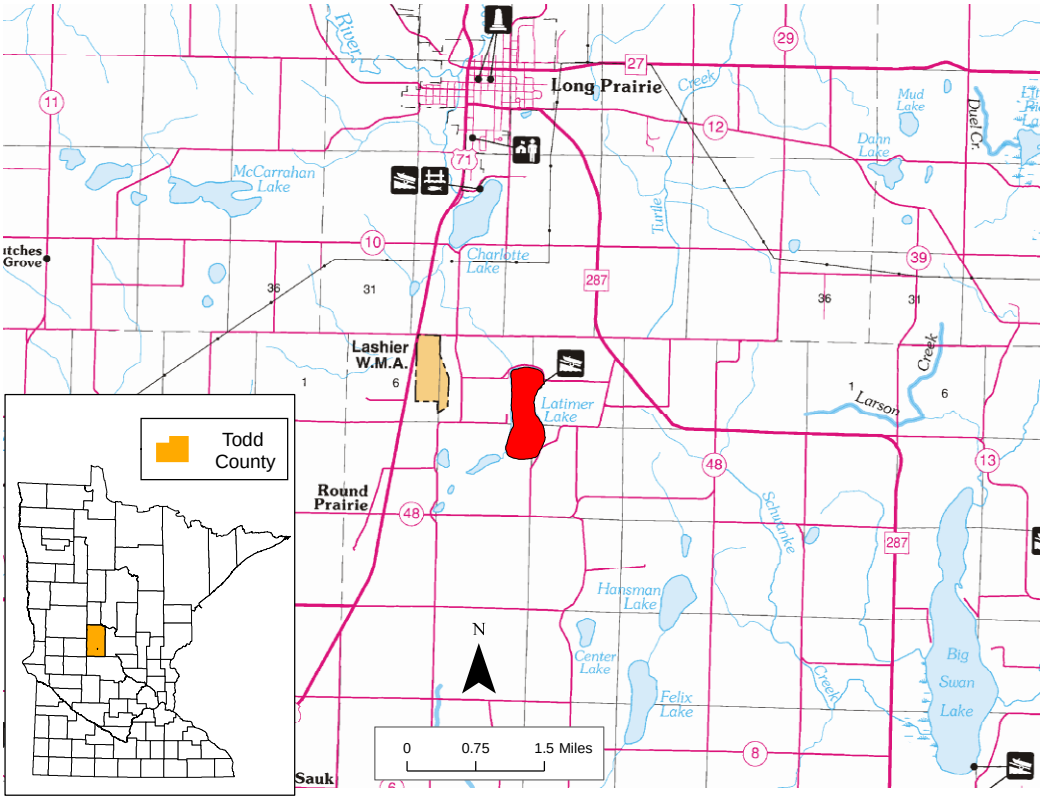
Curly-leaf pondweed was the most abundant submerged plant, occurring in 62% of the sites. It was found in depths from two to 10 feet and often reached the water surface forming dense mats.

Information on native plants was also collected but may be incomplete because many native plants do not reach peak growth until mid to late summer. Seven native submerged aquatic plant species were recorded in the lake. Northern watermilfoil (*Myriophyllum sibiricum*), flat-stem pondweed (*Potamogeton zosteriformis*), and star duckweed (*Lemna trisulca*) were each found in at least 20% of the sample sites. Other native species found were coontail (*Ceratophyllum demersum*), and several species of native pondweeds (*Potamogeton* spp.).

Introduction

Latimer Lake is located about three miles south of the city of Long Prairie in Todd County, central Minnesota (Figure 1). The lake has a surface area of 203 acres and about three miles of shoreline. Its maximum depth is 30 feet and about 40% of the lake is shallow (less than 15 feet in depth). Latimer Lake is described as eutrophic, or rich in nutrients. Water clarity is relatively low; in 2008 the average summer Secchi disc reading was four feet (MPCA, 2008).

Figure 1. Location of Latimer Lake, Todd County, Minnesota.



Objectives

The purpose of this vegetation survey was to provide a quantitative description of the 2009 curly-leaf pondweed population of Latimer Lake. Specific objectives included:

1. Describe the shoal sediments of the lake
2. Estimate the maximum depth of rooted vegetation
3. Record the aquatic plant species that occur in the lake
4. Estimate the abundance of common species
5. Develop distribution maps for the common species

Methods

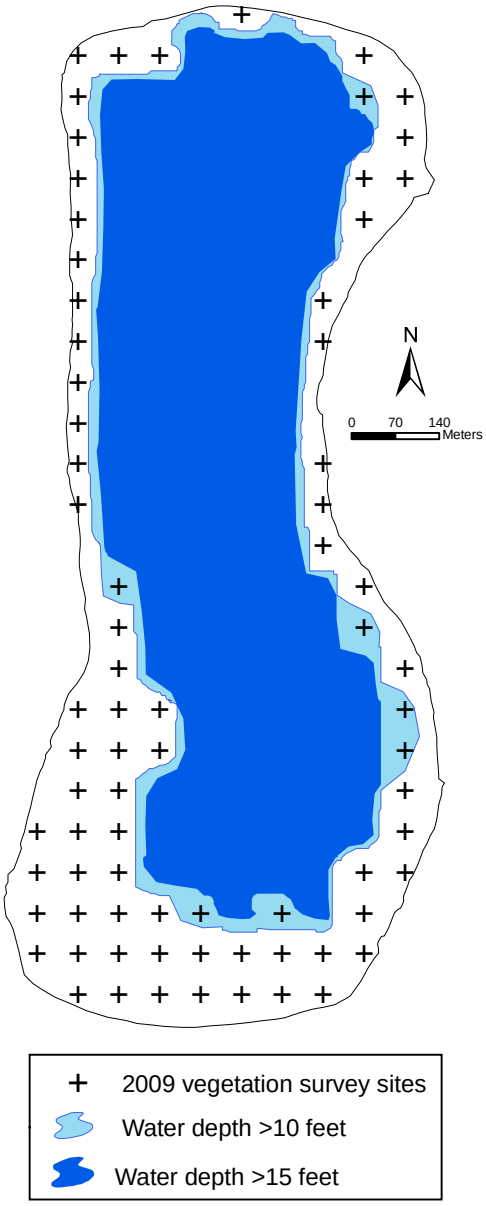
Latimer Lake was surveyed on June 24, 2009. A point-intercept survey method was used and followed the methods described by Madsen (1999). Survey waypoints were created using a Geographic Information System (GIS) computer program and downloaded into a handheld Global Positioning System (GPS) receiver. Survey points were placed in a grid between shore and the 15 feet water depth and spaced 65 meters (213 feet) apart. All sites within the shore to 15 feet depth zone were sampled for a total of 76 sites (Figure 2, Table 1).

Table 1. Sampling effort by water depth.

	Water depth interval	Sample sites
Vegetated	0 to 5 feet	36
	6 to 10 feet	33
	Sites used in calculations	69
Non-vegetated	11 to 15 feet	7
	Total sample sites	76

The GPS unit was used to navigate the boat to each sample point. One side of the boat was designated as the sampling area. At each site, water depth was recorded in one-foot increments. Surveyors recorded all plant taxa found within a one square meter sample site at the pre-designated side of the boat. A double-headed, weighted garden rake, attached to a rope was used to survey vegetation not visible from the surface (Figure 3).

Figure 2. Vegetation survey sites in Latimer Lake.



Plant identification and nomenclature followed MnTaxa (2009). Surveyors described bottom substrate at each sample site where water depth was seven feet and less. Standard substrate classes were used (Table 2) and if several substrate types occurred at a site, surveyors recorded the most common type.

Figure 3. Sampling rake.

Data were entered into a Microsoft Access database and frequency of occurrence was calculated for each taxon as the number of sites in which taxa occurred divided by the total number of sample sites. Frequency was calculated for the vegetated zone from shore to a

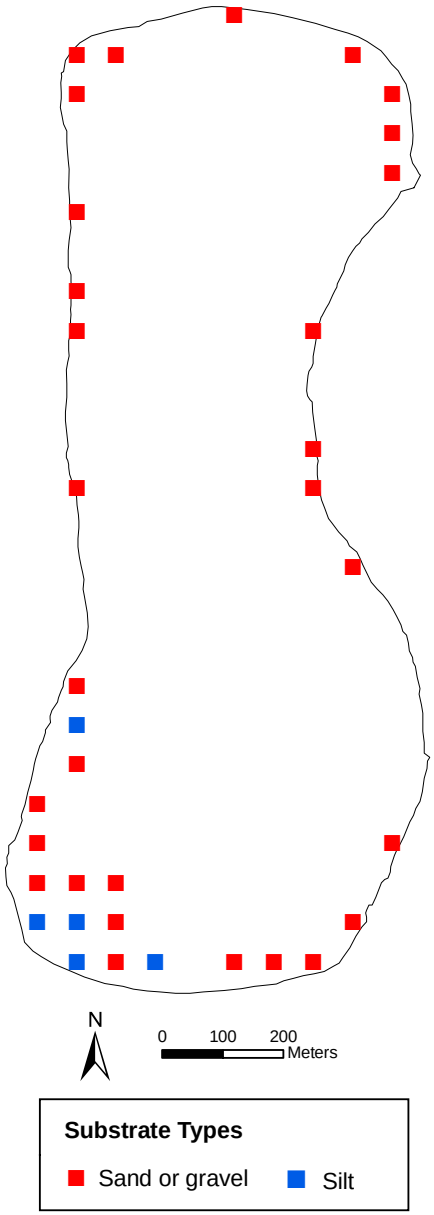
depth of 10 feet and sampling points were also grouped by water depth and separated into two depth zones for analysis (Table 1).

Example:
There were 69 samples sites in the vegetated zone (0 to10 feet depth zone).
Curly-leaf pondweed (*Potamogeton crispus*) occurred in 43 sites.
Curly-leaf pondweed frequency in 0-10 feet zone = 43/69 (*100) = 62%

Table 2. Substrate classes

muck	decomposed organic material
marl	calcareous material
silt	fine material with little grittiness
sand	diameter less than 1/8 inch
gravel	diameter 1/8 to 3 inches
rubble	diameter 3 to 10 inches
boulder	diameter over 10 inches

Figure 4. 2009 Shoal substrates of Latimer Lake.



Results

Shoal substrates
The shoal substrates of Latimer Lake were primarily sand and gravel with silt occurring in areas of the southwest shore (Figure 4).

Distribution of aquatic plants
Vegetation occurred around the entire shoreline to a depth of 10 feet. The broadest zone of vegetation occurred along the shallow southwest shore where plants extended lakeward 150 to 200 meters (500 to 650 feet) (Figure 5). Along shorelines with steep drop-offs, plant beds extended only 30 to 40 meters (100 to 125 feet) lakeward.

Within the shore to 10 feet depth zone, vegetation occurred in 81% of the sites. Plants were most common in the shore to five feet depth zone where 94% of the sites were vegetated (Figure 6).

Figure 5. Number of plant species at each sample site, Latimer Lake, 2009.

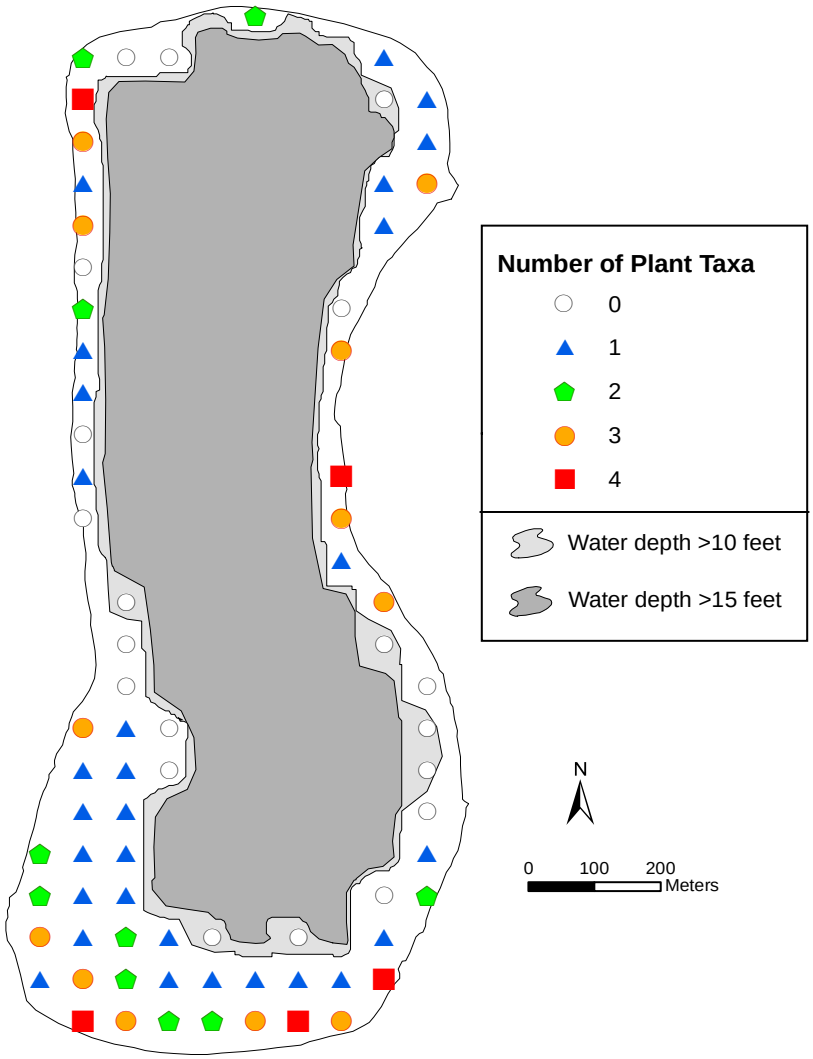
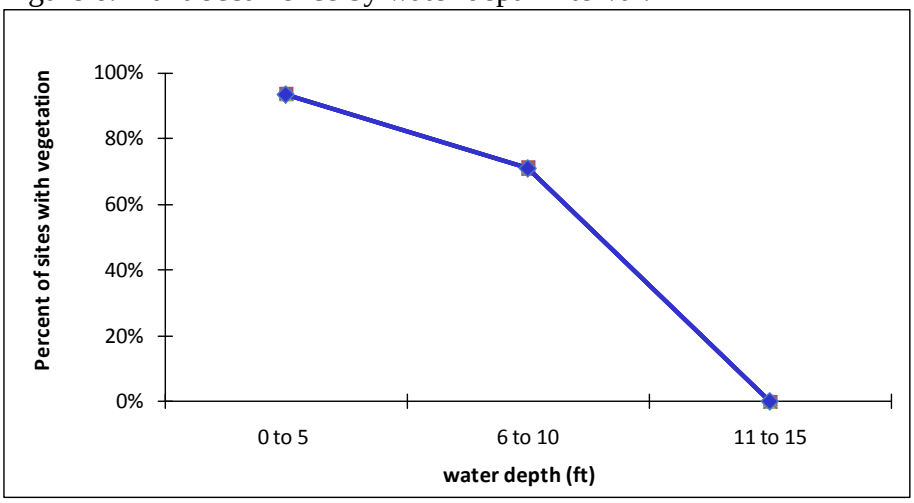


Figure 6. Plant occurrence by water depth interval.



Number and types of plant species recorded

A total of eight submerged plant species were documented during the survey, including one non-native species, curly-leaf pondweed (*Potamogeton crispus*) (Table 3). The number of plant species found at each one square meter sample site ranged from zero to four (Figure 5).

Table 3. Frequency of aquatic plants in Latimer Lake point-intercept survey, June 2009.

(Frequency is the percent of sample sites in which a plant taxon occurred within the shore to 10 ft water depth.)

Life Form	Common Name	Scientific Name	Frequency (%) N= 69 sites
Non-native	Curly-leaf pondweed	*Potamogeton crispus*	62
Native	Northern water milfoil	*Myriophyllum sibiricum*	23
	Flat-stem pondweed	*Potamogeton zosteriformis*	23
	Star Duckweed	*Lemna trisulca*	20
	Coontail	*Ceratophyllum demersum*	13
	Narrow-leaf pondweed	*Potamogeton* sp.	7
	White-stem pondweed	*Potamogeton praelongus*	1
	Robbins' pondweed	*Potamogeton robbinsii*	1

Common submerged plants

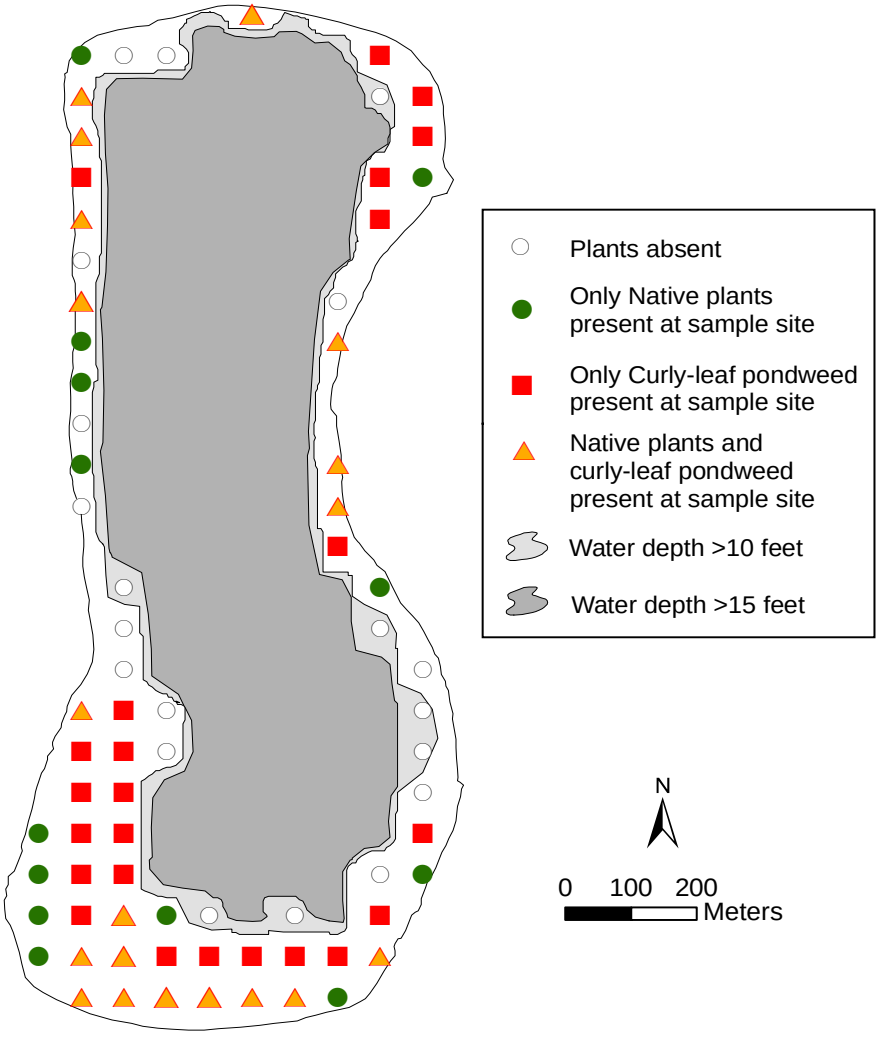
Figure 7. Curly-leaf pondweed.

The most common submerged plant in Latimer Lake was curly-leaf pondweed (*Potamogeton crispus*) (Figure 7). This submerged plant is closely related to native pondweeds but it is not native to Minnesota. Curly-leaf pondweed has been present in Minnesota since at least 1910 (Moyle and Hotchkiss 1945) and is now found in at least 700 Minnesota lakes (MnDNR Invasive Species Program 2008). Like many native submerged plants, it is perennial but has a unique life cycle that may provide a competitive advantage over native species. Curly-leaf pondweed is actually dormant during late summer and begins new growth in early fall. Winter foliage is produced and continues to grow under ice (Wehrmeister and Stuckey 1978). Curly-leaf reaches its maximum growth in May and June, when water temperatures are still too low for most native plant growth. In late spring and early summer, curly-leaf plants form structures called "turions" which are hardened stem tips that break off and fall to the substrate. Turions remain dormant through the summer and germinate into new plants in early fall (Catling and Dobson 1985).

The foliage of curly-leaf pondweed does provide some fish and wildlife habitat, but it may create problems in some lakes. During its peak growth in spring, curly-leaf may reach the water surface at certain depths and create dense mats. These dense growths may compete with native vegetation and can also cause problems for recreational lake users.

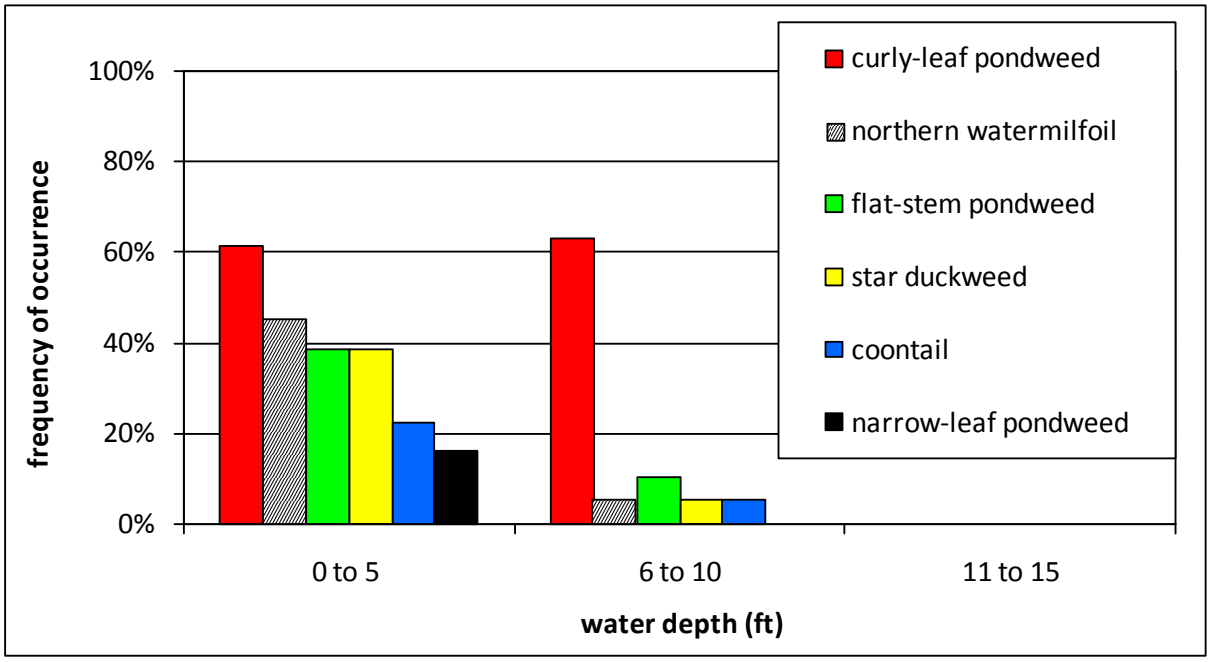
Curly-leaf pondweed was found around the entire perimeter of Latimer Lake (Figure 8). It occurred in 62% of the sites (Table 3) and was the only plant found in 35% of the sites. Curly-leaf pondweed was present in depths from two to 10 feet and was the dominant plant at all depths sampled (Figure 9).

Figure 8. Native plants vs. Curly-leaf Pondweed in Latimer Lake, 2009.



Native plants were found in 46% of the sample sites but often co-occurred with curly-leaf pondweed (Figure 8). Native plants were found to a depth of nine feet but were most frequent in depths less than six feet (Figure 9).

Figure 9. Frequency of common plants by water depth interval. Latimer Lake, June 2009.



Northern watermilfoil (*Myriophyllum sibiricum*) (Figure 10) was found in 23% of the Latimer Lake sites (Table 3). This native, submerged plant is a rooted perennial with finely dissected leaves. Particularly in depths less than ten feet, this plant may reach the water surface and its flower stalk will extend above the water surface. It spreads primarily by stem fragments and over-winters by hardy rootstalks and winter buds. Northern watermilfoil is not tolerant of turbidity and grows best in clear water lakes. In turbid lakes like Latimer, it may be restricted to shallow water where it can obtain sufficient sunlight.

Figure 10. Northern watermilfoil

Four native pondweeds (*Potamogeton* spp.) were found in Latimer Lake. These plants are closely related to curly-leaf pondweed and are one of the largest groups of submerged plants in Minnesota lakes. These plants are rooted perennials and their rhizomes may form mats on the lake bottom that help consolidate soil (Arber 1920). Pondweeds have opposite, entire leaves and form "cigar-shaped" flowers that emerge above the water surface. Many pondweed species over-winter as hardy rhizomes while other species produce tubers, specialized winter buds, or remain "evergreen" under the ice. Seeds and tubers of pondweeds are an important source of waterfowl food. The foliage of pondweeds provides food for a variety of marsh birds, shore birds and wildlife and provides shelter, shade and spawning sites for a range of fish species (Borman et al. 2001). Pondweeds inhabit a wide range of aquatic sites and species vary in their

water chemistry and substrate preferences and tolerance to turbidity. There are over 35 species of pondweeds in Minnesota and they vary in leaf shapes and sizes.

Figure 11. Flat- stem pondweed

Flat-stem pondweed (*Potamogeton zosteriformis*) (Figure 11) was one of four native pondweeds found in Latimer Lake and occurred in 23% of the sites (Table 3). It is anchored to the lake bottom by underground rhizomes and over-winters by winter buds. It is named for its flattened, grass-like leaves. Depending on water clarity and depth, these plants may reach the water surface and may produce flowers that extend above the water.

Figure 12. Star duckweed. photo by Robert Freckman, Univ of WI -Stevens Point

Star duckweed (*Lemna trisulca*) (Figure 12) is a free-floating species that often occurs submerged near the lake bottom but it does not anchor to the substrate and can float freely with the current. This plant was present in 20% percent of the Latimer Lake survey sites (Table 3).

Figure 13. Coontail

Coontail (*Ceratophyllum demersum*) (Figure 13) grows entirely submerged and its roots are only loosely anchored to the lake bottom. It is adapted to a broad range of lake conditions and is tolerant of higher turbidity and can grow in muck substrates. Coontail is perennial and can over winter as a green plant under the ice and then begins new growth early in the spring, spreading primarily by stem fragmentation. The finely divided leaves of this plant provide a home for insects valuable as fish food. Coontail occurred in 13% of the Latimer Lake survey sites (Table 3).

The other native plant species were found in less than 10% of the Latimer Lake sample sites (Table 3) but may become more frequent later in the summer. Several plants that were found in previous summer surveys of Latimer Lake were not located during the spring 2009 survey. These plants likely still occur in the lake but were not observed in June, 2009 because they had not yet germinated and/or reached maturity.

Aquatic vegetation provides critical habitat for fish and invertebrates, buffers the shoreline from wave action, and stabilizes sediments and utilizes nutrients that would otherwise be available for algae. (Click here for more information on: value of aquatic plants).

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