Sand Lake Aquatic Plant Survey and Management Plan

Prepared for
Sand Lake Management District

May 2006

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Executive Summary

An aquatic plant survey was completed during 2005 to evaluate Sand Lake's plant community. Survey results indicate the lake's aquatic plant community is diverse, healthy, and of higher quality than the aquatic plant community of the median lake in Wisconsin. Despite the favorable aquatic plant community found in Sand Lake, the aquatic invasive species, Myriophyllum spicatum (Eurasian watermilfoil, EWM) was found at or adjacent to 10 percent of sample locations. In June of 2005, EWM was observed in four areas of the lake (See Figure 9):

Area 1—Near the lake's outlet on the north end of the lake
Area 2—In the sand flats area near Silo Bay
Area 3—Near the western shoreline
Area 4—Near the boat launch at the south end of the lake

Specifically, EWM was found at or near the following sample locations (See Figures 4 and 9): SL-6, SL-7, SL-8, SL-9, SL-10, SL-11, SL-12, SL-13, SL-16, SL-28, SL-77, SL-87, SL-88, and SL-100. EWM density was light, ranging from 0.25 to 1.25. The average EWM density was 0.61, a rake coverage of approximately 12 percent.

The aquatic plant management plan for Sand Lake is based upon attainment of the lake's goals. Removing the current EWM growth from Sand Lake will preserve the lake's native species, preserve and/or improve the lake's fish and wildlife habitat, protect the lake's ecosystem, and prevent the spread of EWM to other lakes.

EWM infested areas of Sand Lake will be treated with granular 2,4-D (i.e., Navigate) during May of 2006. Areas 1 and 2 will be treated with a dose of 150 pounds per acre and areas 3 and 4 will be treated with a dose of 125 pounds per acre. Additional water movement in areas 1 and 2 necessitate a higher dose for areas 1 and 2 than areas 3 and 4.

Should regrowth of EWM occur within treated areas, warranted retreatment will occur in 2007 and in subsequent years. A post-treatment survey will be completed in July of 2006 to determine effectiveness and 2007 retreatment needs. A post-treatment survey will be completed during July of each year in which treatment occurs to assess treatment effectiveness and determine retreatment needs of the subsequent year.

Sand Lake Aquatic Plant Survey and Management Plan

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1.0 Introduction

Sand Lake in Barron County, Wisconsin is valued by lakeshore property owners, area residents, Barron County, and the Wisconsin Department of Natural Resources (WDNR) for its fisheries (northern pike, walleye, largemouth bass, muskies, and panfish) and for recreational use. The lake is "S" shaped with a width of about 5/8 mile and a length of about 2 ½ miles. The lake has a surface area of 322 acres, a maximum depth of 63 feet, and a mean depth of 28 feet (See Figure 2). Sand Lake is a drainage lake. It receives inflow from 4 streams, which mainly flow in the spring. The lake's outlet flows all year due to springs. The lake's watershed is mainly wooded. Residences are located along the lake's shore.

Sand Lake is a clear lake with a healthy ecosystem. However, the growth and spread of Eurasian watermilfoil (EWM) during the past three years has threatened harm to the lake's ecosystem. EWM is a nuisance non-native species that typically replaces native vegetation (See Figure 1). It has a canopy style growth pattern that causes heavy growth near the surface, making it more visible and a greater nuisance for boaters and fishermen.

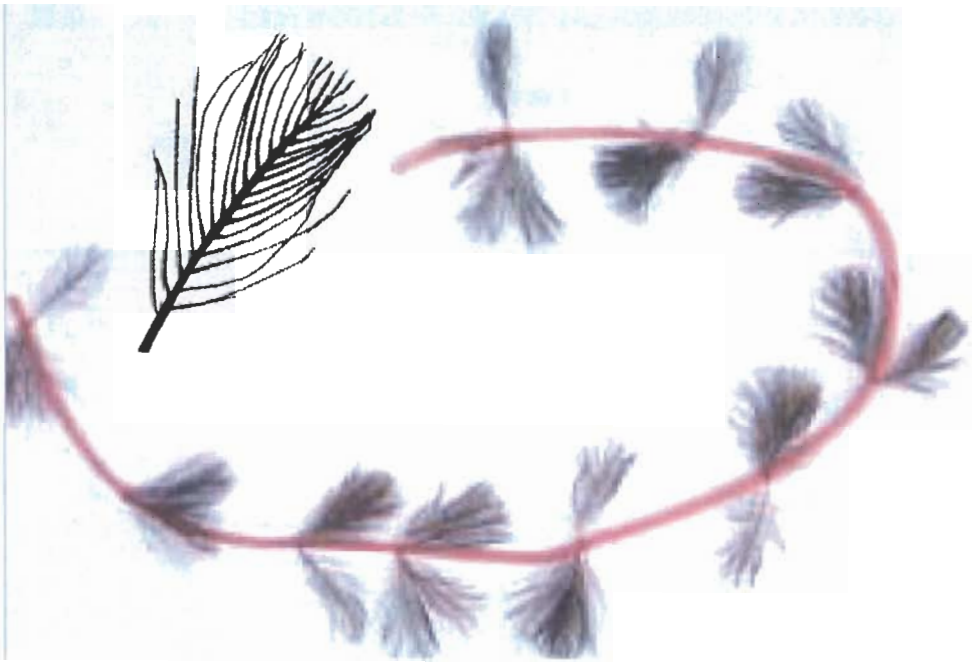

Figure 1. Eurasian Watermilfoil

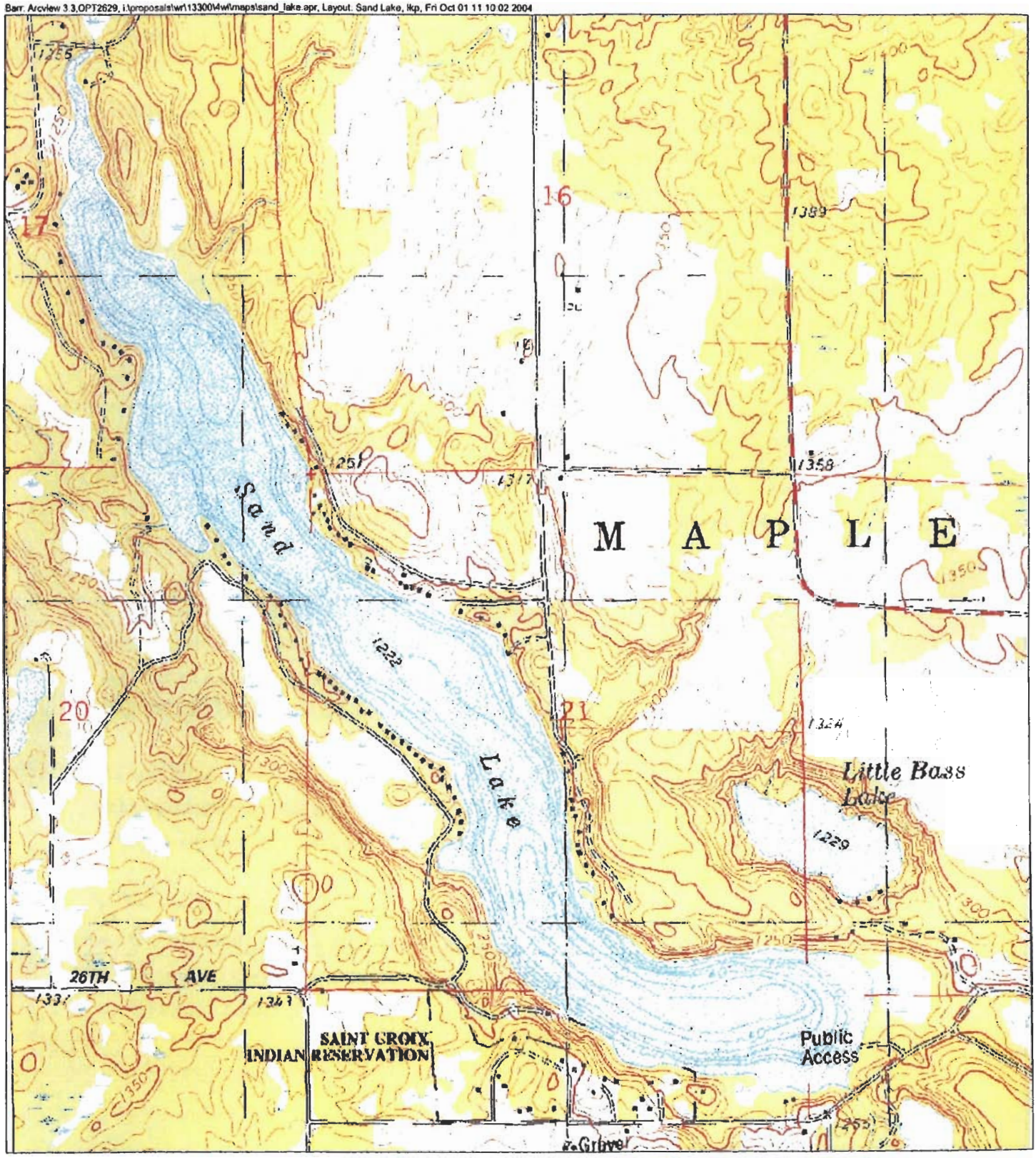

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Figure 2

SAND LAKE
Barron County, Wisconsin

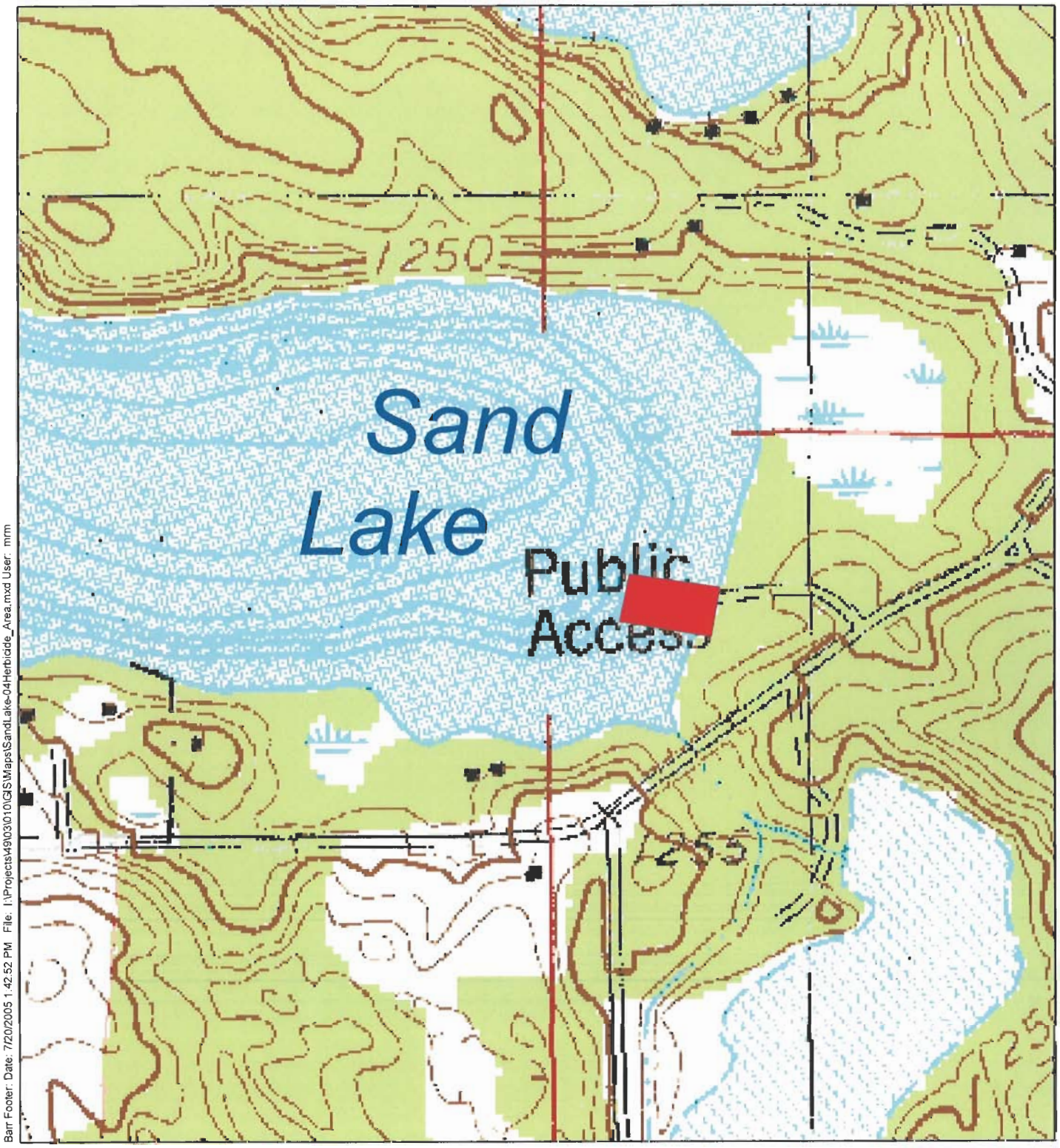
EWM was first observed in Sand Lake in 2002 when a WDNR staff person observed a few plants growing near the lake's boat landing. The Sand Lake Association attempted to hand pull the EWM with scuba divers for two years per the WDNR's recommendation. This effort proved to be unsuccessful as the EWM has spread rapidly and WDNR staff observed several acres of growth in front of the boat landing during 2004 (residents estimate 10 to 15 acres of growth). In 2004, WDNR staff and residents observed the shredding of EWM plants and spreading of plant fragments by boats traveling through the EWM growth near the boat landing. Area residents report EWM has been observed in various parts of the lake and within the lake's outlet.

Lake management concerns led to the formation of the Sand Lake Management District during 2004. The first annual membership meeting of the District was held on September 4, 2004. The membership elected a Board of Directors and voted to pursue an aquatic plant management plan to manage the EWM growth within the lake.

To reduce the spread of EWM prior to the completion of the Sand Lake Aquatic Plant Management Plan, herbicide treatment (2,4-D) of 1.12 acres EWM near the boat landing occurred on August 10, 2004 (See Figure 3). The treatment area was 150 feet wide and a length of 325 feet. The treatment rate was 100 pounds per acre.

An aquatic plant survey was completed in the lake during June of 2005 to characterize existing conditions. This report presents the survey results and an aquatic plant management plan for Sand Lake. This report discusses:

- Overview of macrophyte growth in lakes
- The methodology of the 2005 Sand Lake aquatic plant survey
- Results and discussion of the 2005 Sand Lake aquatic plant survey
- Sand Lake Aquatic Plant Management Plan



Barr Footer: Date: 7/20/2005 1:42:52 PM File: I:\Projects\49\03\010\GIS\Maps\SandLake-04Herbicide_Area.mxd User: mrm

Legend

2004 Herbicide Application Area

Meters
0 100 200

Feet
200 0 200 400 600

1:5,000

BARR

Figure 3

2004 HERBICIDE TREATMENT AREA
Sand Lake

2.0 Overview of Macrophyte Growth in Lakes

The basis of the following text on macrophyte growth in lakes is Minnesota Department of Natural Resources (MDNR) *A Guide to Aquatic Plants Identification and Management* (1994).

2.1 Location of Aquatic Plant Growth Within Lakes and Impoundments

Within a lake, pond, or impoundment, aquatic plants grow in the area known as the littoral zone—the shallow transition zone between dry land and the open water area of the lake. The littoral zone extends from the shore to a depth of about 15 feet, depending on water clarity. The littoral zone is highly productive. The shallow water, abundant light, and nutrient-rich sediment provide ideal conditions for plant growth. Aquatic plants, in turn, provide food and habitat for many animals such as fish, frogs, birds, muskrats, turtles, insects, and snails. Protecting the littoral zone is important for the health of a lake's fish and other animal populations.

The width of the littoral zone often varies within a lake and among lakes. In places where the slope of the lake bottom is steep, the littoral area may be narrow, extending several feet from the shoreline. In contrast, if the lake is shallow and the bottom slopes gradually, the littoral area may extend hundreds of feet into the lake or may even cover it entirely. Impoundments frequently note extensive littoral areas in the upper portion due to sedimentation and shallow depths. In contrast, the lower portions of impoundments may have little littoral area.

Cloudy or stained water, which limits light penetration, may restrict plant growth. In lakes where water clarity is low all summer, aquatic plants will not grow throughout the littoral zone, but will be restricted to the shallow areas near shore.

Other physical factors also influence the distribution of plants within a lake or pond. For example, aquatic plants generally thrive in shallow, calm water protected from heavy wind, wave, or ice action. However, if the littoral area is exposed to the frequent pounding of waves, plants may be scarce. In a windy location, the bottom may be sand, gravel, or large boulders—none of which provides a good place for plants to take root. In areas where a stream or river enters a lake, plant growth can be variable. Nutrients carried by the stream

may enrich the sediments and promote plant growth; or, suspended sediments may cloud the water and inhibit growth.

2.1.1 Categories of Aquatic Plants

Aquatic plants are grouped into four major categories:

- Algae have no true roots, stems, or leaves and range in size from tiny, one-celled organisms to large, multi-celled plant-like organisms, such as *Chara*. Plankton algae, which consist of free-floating microscopic plants, grow throughout both the littoral zone and the well-lit surface waters of an entire lake. Other forms of algae, including *Chara* and some stringy filamentous types (such as *Cladophora*), are common only in the littoral area.

- Submersed plants have stems and leaves that grow entirely underwater, although some may also have floating leaves. Flowers and seeds on short stems that extend above the water may also be present. Submerged plants grow from near shore to the deepest part of the littoral zone and display a wide range of plant shapes. Depending on the species, they may form a low-growing "meadow" near the lake bottom, grow with lots of open space between plant stems, or form dense stands or surface mats.

- Floating-leaf plants are often rooted in the lake bottom, but their leaves and flowers float on the water surface. Water lilies are a well-known example. Floating leaf plants typically grow in protected areas where there is little wave action.

- Emergent plants are rooted in the lake bottom, but their leaves and stems extend out of the water. Cattails, bulrushes, and other emergent plants typically grow in wetlands and along the shore, where the water is less than 4 feet deep.

2.1.2 Value of Aquatic Plants

Aquatic plants are a natural part of most lake communities and provide many benefits to fish, wildlife, and people. In lakes, life depends—directly or indirectly—on water plants. They are the primary producers in the aquatic food chain, converting the basic chemical nutrients in the water and soil into plant matter, which becomes food for all other aquatic life. Aquatic plants serve many important functions, including:

- ***Provide fish food***—More food for fish is produced in areas of aquatic vegetation than in areas where there are no plants. Insect larvae, snails, and freshwater shrimp thrive in plant beds. Sunfish eat aquatic plants besides aquatic insects and crustaceans.

- ***Offer fish shelter***—Plants provide shelter for young fish. Because bass, sunfish, and yellow perch usually nest in areas where vegetation is growing, certain areas of lakes are protected and posted by the DNR as fish spawning areas during spring and early summer. Northern pike use aquatic plants, too, by spawning in marshy and flooded areas in early spring.

- ***Improve water quality***—Certain water plants, such as rushes, can actually absorb and break down polluting chemicals.

- ***Protect shorelines and lake bottoms***—Aquatic plants, especially rushes and cattails, dampen the force of waves and help prevent shoreline erosion. Submerged aquatic plants also weaken wave action and help stabilize bottom sediment.

- ***Provide food and shelter for waterfowl***—Many submerged plants produce seeds and tubers (roots), which are eaten by waterfowl. Bulrushes, sago pondweed, and wild rice are especially important duck foods. Submerged plants also provide habitat to many insect species and other invertebrates that are, in turn, important foods for brooding hens and migrating waterfowl.

- ***Improve aesthetics***—The visual appeal of a lakeshore often includes aquatic plants, which are a natural, critical part of a lake community. Plants such as water lilies, arrowhead, and pickerelweed have flowers or leaves that many people enjoy.

- ***Provide economic value***—As a natural component of lakes, aquatic plants support the economic value of all lake activities. Wisconsin has a huge tourism industry centered on lakes and the recreation they support. Residents and tourists spend large sums of money each year to hunt, fish, camp, and watch wildlife on and around the state's lakes.

3.0 Methods

3.1 Aquatic Plant Survey

An aquatic plant survey of Sand Lake was completed during June 6 through June 8, 2005. The survey was completed by Barr Engineering Co. with assistance from Sand Lake Management District volunteers. Samples were collected approximately every 225 feet from a location between shore and the maximum depth of plant growth. The lake's littoral region is very narrow and one sample location between shore and the maximum depth of plant growth was considered appropriate. Following is a description of the sampling methodology for the survey.

The sampling protocol for the June survey followed the rake sampling methodology developed by Jessen and Lound (1962). The methodology is outlined in "Wisconsin's Department of Natural Resources Long-Term Trend Monitoring Methods," (Bureau of Water Resources Management, July 1987). This methodology enables the plant specialist an opportunity to determine the presence, frequency, and density of different plant species. The following outlines the Jessen and Lound methodology:

- A total of 139 sample locations were surveyed (See Figure 4).
- A Global Positioning System (GPS) was used to record the location of each sample site.
- Sediment type was determined at each sample location.
- Four samples were taken at each sample location to determine the presence and abundance of species. The sample point at each depth zone consisted of a 6-foot diameter circle divided into four quadrants. A tethered garden rake with an extended handle (16 feet) was used to collect a sample from each quadrant.
- Collection of samples, identification of species, and determination of density ratings for each species occurred at all sampling points. Density ratings were given in accordance with the following criteria:

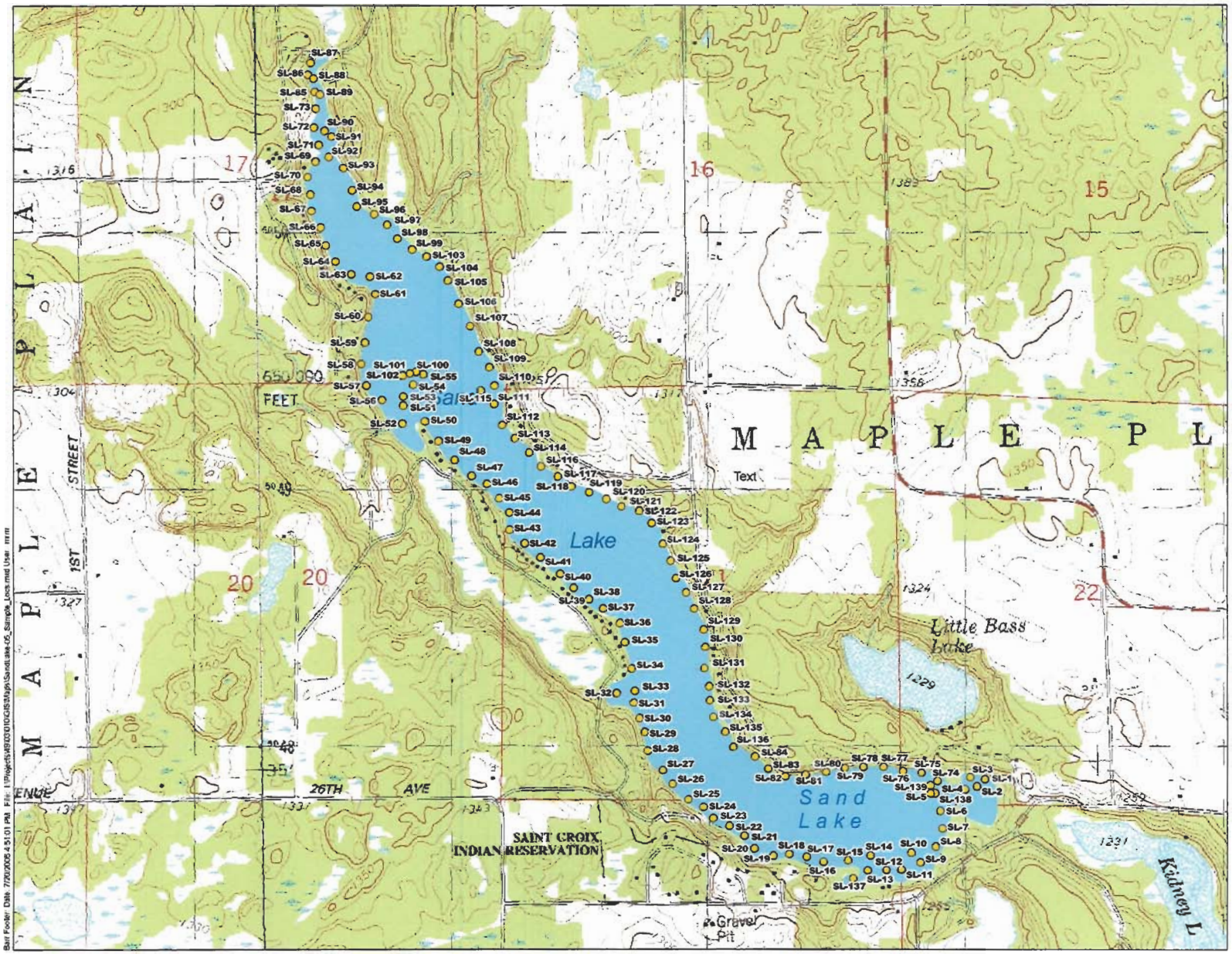


Figure 4

SAND LAKE
SAMPLE LOCATIONS
Sand Lake

Rake Coverage (% of Rake Head) Covered by a Species	Density Rating
81-100	5
61-80	4
41-60	3
21-40	2
1-20	1
0	0

3.2 Milfoil Weevil

The milfoil weevil (*Euhrychiopsis lecontei*) is a small, herbivorous beetle. It is a milfoil specialist, meaning that it feeds and develops only on plants in this genus. Samples were collected to determine whether milfoil weevils occurred on Sand Lake EWM plants and if so, the density of the beetles. A total of 125 representative EWM stems were collected from 15 Sand Lake sample locations (See Figure 6). Selection of sample locations for the stems was made following completion of the macrophyte survey. A tethered garden rake with an extended handle (16 feet) was used to collect EWM stems from representative locations. EWM plant stems from each sample location were placed in a labeled Ziploc baggie and the sample location recorded with the GPS. The stem samples were placed in a cooler on ice. At the laboratory, the top 20 inches of each stem was examined because the beetle is exclusively found in the plant's top 20 inches. The presence of milfoil weevil eggs, larvae, pupa, and/or adults was determined (See Figure 5). The results of the stem analysis were recorded and the data summarized.

Eggs Larvae Pupa Adult

Figure 5. Euhrychiopsis lecontei (Milfoil Weevil) Eggs, Larvae, Pupa, and Adult (Pictures from University of Minnesota Laboratory—Ray Newman)

Legend

- 2005 MILFOIL WEEVIL SAMPLE LOCATIONS AND IDENTIFICATION

Feet
1,000 0 1,000

Meters
200 0 200 400

1:14,000

BARR

Figure 6

SAND LAKE
MILFOIL WEEVIL
SAMPLE LOCATIONS
Sand Lake

4.0 Results and Discussion

4.1 Aquatic Plant Survey Results

4.1.1 Aquatic Plant Types

Results of the 2005 Sand Lake surveys indicate the lake contained a diverse assemblage of aquatic plant species representing three aquatic plant types—submersed plants, floating-leaf plants, and algae. Of the three types, submersed plants dominated the macrophyte community. Survey results are summarized in Table 1.

Table 1. Macrophyte Type Distribution

Aquatic Plant Type	% of Sample Locations
Submersed Aquatic Plants	99
Floating Aquatic Plants	11
Chara (alga)	4

4.1.2 Number of Species

The large number of species noted in Sand Lake during 2005 is indicative of a stable and healthy aquatic plant community. Specifically, a total of 26 species were found. The presence of a large number of species:

- Provides a diverse habitat for fish and invertebrates (i.e., food for fish) and encourages a more diverse fish and invertebrate community;

- Protects fisheries' habitat from destruction by a disease as a species-specific disease would only impact one species and have little impact upon the diverse community.

4.1.3 Frequently Occurring Species

Although a diverse aquatic plant community was observed, a few species were abundant. One measure of abundance is the frequency of occurrence of a species measured as the percentage of sample locations containing a species. As shown in Figure 7, the four most frequently occurring species in Sand Lake were:

- *Myriophyllum sibiricum* (northern watermilfoil) was found in 89 percent of the sample locations

- *Ceratophyllum demersum* (coontail) was found in 73 percent of the sample locations

- *Zosterella dubia* (water stargrass) was found in 70 percent of the sample locations

- *Potamogeton zosteriformis* (flatstem pondweed) was found in 63 percent of the sample locations

4.1.4 Aquatic Plant Density

2005 aquatic plant density in Sand Lake ranged from 0 to 5 (See Methods Section—0 denotes no macrophytes and 5 denotes maximum density). The lake's average density was 2.5, indicating a moderate plant density. The problematic non-native species Eurasian watermilfoil was observed in approximately 10 percent of sample locations during 2005. Plant density in Eurasian watermilfoil infested locations ranged from 1 to 4 with an average of 2.9. The average density of Eurasian watermilfoil infested areas was slightly higher than the lake's average density.

Individual species in Sand Lake noted a light average density during 2005 (See Figure 8). All species noted an average density of less than 1.5 (i.e., all species noted an average rake coverage of less than 25 percent of rake head). The three species noting the highest average density were:

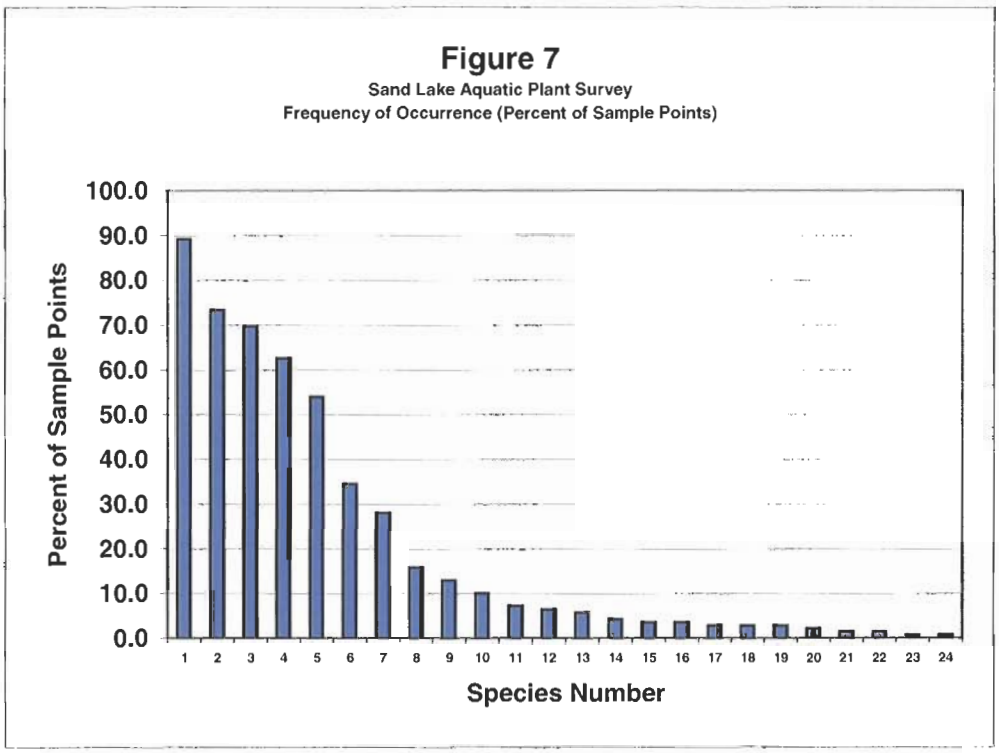
- *Ceratophyllum demersum* (coontail) noted an average density of 1.43, a rake coverage of approximately 24 percent of rake head.

- *Myriophyllum sibiricum* (northern milfoil) noted an average density of 1.09, a rake coverage of approximately 21 percent of rake head.

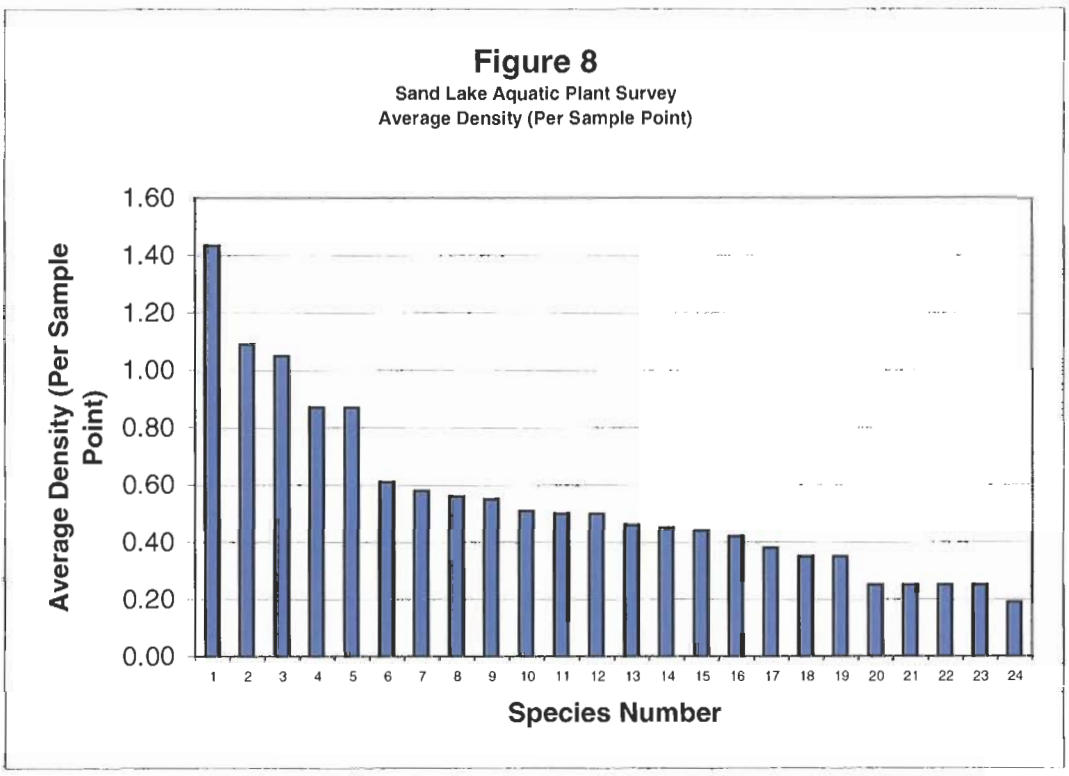
- *Chara spp.* (muskgrass) noted an average density of 1.05, a rake coverage of approximately 21 percent of rake head.

Figure 7

Sand Lake Aquatic Plant Survey
Frequency of Occurrence (Percent of Sample Points)



Species Number	Scientific Name	Common Name	Frequency (% of Sample Points)
1	*Myriophyllum sibiricum*	northern watermilfoil	89.2
2	*Ceratophyllum demersum*	coontail	73.4
3	*Zosterella dubia*	water stargrass	69.8
4	*Potamogeton zosteriformis*	flatstem pondweed	62.6
5	*Elodea canadensis*	Canada waterweed	54.0
6	*Potamogeton amplifolius*	largeleaf pondweed	34.5
7	*Potamogeton illinoensis*	Illinois pondweed	28.1
8	*Potamogeton robbinsii*	Robbins' pondweed	15.8
9	*Ranunculus sp.*	water crowfoot	12.9
10	*Myriophyllum spicatum*	Eurasian watermilfoil	10.1
11	*Potamogeton sp.*	narrow leaf pondweed	7.2
12	*Nuphar advena*	yellow pondlily	6.5
13	*Nuphar variegata*	spatterdock	5.8
14	*Fontinalis antipyretica*	water moss	4.3
15	*Chara spp.*	muskgrass	3.6
16	*Potamogeton natans*	floatingleaf pondweed	3.6
17	*Nitella sp.*	stonewort	2.9
18	*Utricularia sp.*	bladderwort	2.9
19	*Vallisneria americana*	wild celery	2.9
20	*Potamogeton pectinatus*	sago pondweed	2.2
21	*Nymphaea odorata*	American white waterlily	1.4
22	*Potamogeton richardsonii*	Richardson's pondweed	1.4
23	*Chlorophyceae*	Green Algae	0.7
24	*Nymphaea tetragona*	pygmy waterlily	0.7
25	*Nymphaea tuberosa*	white waterlily	0.7
26	*Potamogeton gramineus*	grassleaved pondweed	0.7



Species Number	Scientific Name	Common Name	Average Density Per Sample Point
1	Ceratophyllum demersum	coontail	1.43
2	Myriophyllum sibiricum	northern watermilfoil	1.09
3	Chara spp.	muskgrass	1.05
4	Zosterella dubia	water stargrass	0.87
5	Elodea canadensis	Canada waterweed	0.87
6	Myriophyllum spicatum	Eurasian watermilfoil	0.61
7	Nuphar advena	yellow pondlily	0.58
8	Potamogeton amplifolius	largeleaf pondweed	0.56
9	Potamogeton natans	floatingleaf pondweed	0.55
10	Potamogeton zosteriformis	flatstem pondweed	0.51
11	Nitella sp.	stonewort	0.50
12	Potamogeton richardsonii	Richardson's pondweed	0.5
13	Potamogeton illinoensis	Illinois pondweed	0.46
14	Potamogeton robbinsii	Robbins' pondweed	0.45
15	Ranunculus sp.	water crowfoot	0.44
16	Potamogeton pectinatus	sago pondweed	0.42
17	Nuphar variegata	spatterdock	0.38
18	Potamogeton sp.	narrow leaf pondweed	0.35
19	Fontinalis antipyretica	water moss	0.35
20	Nymphaea tetragona	pygmy waterlily	0.25
21	Nymphaea odorata	white waterlily	0.25
22	Potamogeton gramineus	grassleaved pondweed	0.25
23	Nymphaea sp.	Unidentified white waterlily	0.25
24	Utricularia sp.	bladderwort	0.19
25	*Vallisneria americana*	wild celery	0.19

P:\49\03\010\Average Density.xls

Although average individual plant densities were light, individual plant densities ranged from light to heavy (See Table 2). Plant species with heavy densities include:

- *Ceratophyllum demersum* (coontail) noted a high density of 4.75, a rake coverage of approximately 95 percent,

- *Chara spp.* (muskgrass) noted a high density of 4.25, a rake coverage of approximately 85 percent; and

- *Elodea canadensis* (Elodea) noted a high density of 4.25, a rake coverage of approximately 85 percent.

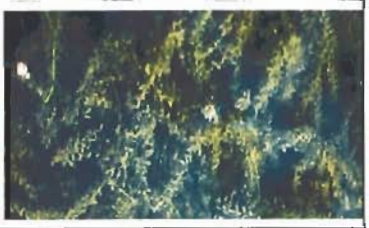
Table 2. 2005 Sand Lake Aquatic Plants			
Common Name	**Scientific Name**	**2005 Density**	**Picture**
Submerged Aquatics			
Coontail	*Ceratophyllum demersum*	0.25 – 4.75	
Muskgrass	*Chara spp.*	0.25 – 4.25	
Elodea	*Elodea canadensis*	0.25 – 4.25	
Water moss	*Fontinalis antipyretica*	0.25 – 0.50	
Northern watermilfoil	*Myriophyllum sibiricum.*	0.25 – 3.75	

Table 2. 2005 Sand Lake Aquatic Plants (Continued)			
Common Name	Scientific Name	2005 Density	Picture
Submerged Aquatics			
Eurasian watermilfoil	*Myriophyllum spicatum*	0.25 – 1.25	
Stonewort	*Nitella sp.*	0.25 – 0.75	
Largeleaf pondweed	*Potamogeton amplifolius*	0.25 – 1.25	
Grassleaved pondweed	*Potamogeton gramineus*	0.25 – 0.25	
Illinois pondweed	*Potamogeton illinoensis*	0.25 – 1.25	

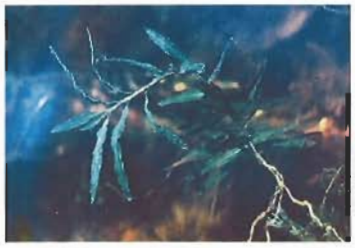
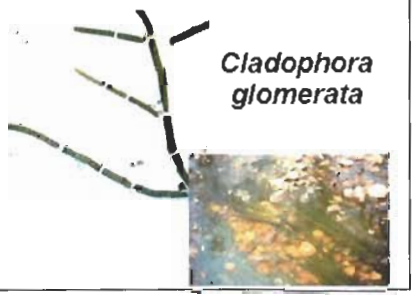
Table 2. 2005 Sand Lake Aquatic Plants (Continued)			
Common Name	Scientific Name	2005 Density	Picture
Submerged Aquatics			
Floatingleaf pondweed	*Potamogeton natans*	0.25 – 1.00	
Sago pondweed	*Potamogeton pectinatus*	0.25 – 0.75	
Richardson's pondweed	*Potamogeton richardsonii*	0.50 – 0.50	
Robbin's pondweed	*Potamogeton robbinsii*	0.25 – 2.00	
Flatstem pondweed	*Potamogeton zosteriformis*	0.25 – 1.50	

Table 2. 2005 Sand Lake Aquatic Plants (Continued)			
Common Name	Scientific Name	2005 Density	Picture
Submerged Aquatics			
Narrowleaf pondweed	*Potamogeton sp.* (Shown: *P. foliosus*)	0.25 – 0.75	
Crowfoot	*Ranunculus sp.*	0.25 – 1.00	
Bladderwort	*Utricularia spp.*	0.25 – 0.50	
Wild celery	*Vallisneria Americana*	0.25 – 0.50	
Water stargrass	*Zosterella dubia.*	0.25 – 3.25	

Table 2. 2005 Sand Lake Aquatic Plants (Continued)			
Common Name	Scientific Name	2005 Density	Picture
Floating Leaf Plants			
Yellow pondlily	*Nuphar advena*	0.25 – 1.00	
Spadderdock	*Nuphar variegata*	0.25 – 0.75	
White waterlily	*Nymphaea odorata (Nymphaea tuberosa)*		
Unidentified waterlily	*Nymphaea sp.*	0.25 – 0.25	
Pygmy waterlily	*Nymphaea tetragona*	0.25 – 0.25	

Table 2. 2005 Sand Lake Aquatic Plants (Continued)			
Common Name	**Scientific Name**	**2005 Density**	**Picture**
Algae			
Green Algae	*Chlorophyceae* *(Pictured is Cladophora glomerata)*		

4.1.5 Aquatic Plant Diversity

The data indicate the occurrence of a healthy, balanced growth by the lakes' diverse assemblage of species rather than predominance by a few species.

Aquatic plant diversity was calculated for Sand Lake using a modification of Simpson's Index (1949):

$1-\sum(rf/100)^2$

Where:

rf = the relative frequency of each species. Frequencies were calculated as the number of sampling points where a species occurred divided by the total number of sampling points at depths less than or equal to the maximum depth of plant growth. Frequencies were relativized to 100 percent to describe community structure (i.e., rf). Frequencies and relative frequencies are presented in Appendix A.

The data indicate a highly diverse plant community was found in Sand Lake. On a scale of 0 to 1, with 0 indicating no plant diversity and 1 indicating the highest plant diversity, Sand Lake noted a diversity of 0.91. The diversity measured in Sand Lake is near the high end of the range of diversities noted for 56 Wisconsin Lakes (See Table 3).

Table 3. Diversities of Some Wisconsin Plant Communities
(from Nichols 1997 and Barr 2001)
Samples Collected by WDNR Unless Otherwise Indicated

Lake Name	Diversity	Lake Name	Diversity
Amnicon Lake	0.95	Como Lake	0.88
Church Pine Lake	0.93*	White Ash Lake, North	0.88***
Decorah Lake	0.93	Dowling Lake	0.87
Half Moon Lake	0.93	Chute Pond	0.86
Spider Chain of Lakes--North Lake	0.93*	Enterprise Lake	0.86
Beaver Dam Lake (West)	0.92**	Okauchee Lake	0.86
Balsam Lake	0.92*	Pearl Lake	0.86
Spider Chain of Lakes--Fawn Lake	0.92*	Bear Lake	0.85
Muskellunge Lake	0.92	Big Butternut Lake	0.84
Round (Wind) Lake	0.92*	Beaver Dam Lake (East)	0.81**
Spider Chain of Lakes--Spider Lake (north)	0.92*	Long Lake T32N	0.81
Apple River Flowage	0.91	Twin Lake, South	0.81
Ashippun Lake	0.91	Helen Lake	0.80
Big Blake Lake (Blake)	0.91*	McCann Lake	0.80
Cedar Lake	0.91	Cary Pond	0.79
Little Elkhart Lake	0.91	Island Lake	0.78
Pine Lake	0.91	Leota Lake	0.78
Post Lake	0.91	Little Arbor Vitae Lake	0.78
Morris Lake (Mt. Morris)	0.91	Mid Lake (Nawaii)	0.78
Sand Lake	**0.91***	Half Moon Lake T47N	0.77
White Ash Lake*	0.91***	Clear Lake	0.74
Pike Lake	0.90	Chain Lake	0.74
Mud Hen Lake	0.90	Twin Lake North	0.73
Spider Chain of Lakes--Spider Lake (south)	0.90*	Rib Lake	0.71
Big Round Lake	0.89	Oconomowoc Lake, Upper	0.70
Pigeon Lake	0.89	Silver Lake (Anderson)	0.69
Big Hills Lake (Hills)	0.88	Tichigan Lake	0.69
Spider Chain of Lakes--Clear Lake	0.88*	George Lake	0.58

*Sampled by Barr Engineering Company **Sampled by Beaver Dam Lake volunteers trained by Barr Engineering Company ***Sampled by White Ash Lake volunteers trained by Barr Engineering Company

4.1.6 Percent Open Area

The cumulative effect of the lake's diverse aquatic plant community was assessed from the proportion of open area in the littoral zone (i.e., Percent Open Area). The percent open area was estimated from the number of sampling points containing no vegetation divided by the total number of sampling points at a depth less than or equal to the maximum depth of plant growth. Maximum depth of plant growth is the deepest water depth at which plant growth was found. The maximum depth of plant growth in Sand Lake was 29 feet, although plant growth decreased markedly at 15 feet. Sand Lake noted an open area of 0.7 percent.

4.1.7 Functions and Values of Aquatic Plants

The Sand Lake aquatic plant community (See Appendix B) performs a number of valuable functions. These include:

- Habitat for fish, insects, and small aquatic invertebrates
- Food for waterfowl, fish, and wildlife
- Oxygen producers
- Provide spawning areas for fish in early spring
- Helps stabilize marshy borders of the lake; helps protect shorelines from wave erosion
- Provides nesting sites for waterfowl and marsh birds

Functions of individual species found in Sand Lake are presented in Table 4.

Table 4. Functions of Aquatic Plant Species Found in Sand Lake

Scientific Name (Common Name)	Plant Type	Plant Functions
Ceratophyllum demersum (Coontail)	Submersed	Many waterfowl species eat the shoots; it provides cover for young bluegills, perch, largemouth bass, and northern pike; supports insects that fish and ducklings eat.
Chara spp. (Muskgrass)	Submersed	Muskgrass is a favorite waterfowl food. Algae and invertebrates found on muskgrass provide additional grazing. It is also considered valuable fish habitat. Beds of muskgrass offer cover and are excellent producers of food, especially for largemouth bass and smallmouth bass.
Elodea canadensis (Canada Waterweed)	Submersed	Provides habitat for many small aquatic animals, which fish and wildlife eat.

Scientific Name (Common Name)	Plant Type	Plant Functions
Myriophyllum sibericum (formerly exalbescens) (Northern Milfoil)	Submersed	Provides cover for fish and invertebrates; supports insects and other small animals eaten by fish; waterfowl occasionally eat the fruit and foliage.
Myriophyllum spicatum (Eurasian watermilfoil)	Submersed	Waterflowl graze on fruit and foliage to a limited extent. Milfoil beds provide invertebrate habitat, but studies have shown mixed stands of pondweeds and wild celery have higher diversity and numbers of invertebrates (Engel 1990).
Nitella sp. (Stonewort)	Submersed	*Nitella* is sometimes grazed by waterfowl. The algae and invertebrates on the surface are attractive to ducks and geese. *Nitella* also offers foraging opportunities for fish.
Nuphar advena (Yellow pond lily)	Floating	Yellow pond lily provides seeds for waterflowl including mallard, northern pintail, ring-necked duck, and scaup. Leaves, stems, and flowers are grazed by deer. Muskrat, beaver, and porcupine eat the rhizomes. The leaves offer shade and shelter for fish as well as habitat for invertebrates.
Nuphar variegata (Spadderdock)	Floating	Spadderdock anchors the shallow water community and provides food for many residents. It provides seeds for waterfowl including mallard, pintail, ringneck and scaup. The leaves, stems and flowers are grazed by deer. Muskrat, beaver and even porcupine have been reported to eat the rhizomes. The leaves offer shade and shelter for fish as well as habitat for invertebrates.
Nymphaea odorata and Nymphaea sp. (White Water Lily)	Floating	White water lily provides seeds for waterfowl. Rhizomes are eaten by deer, muskrat, beaver, moose and porcupine. The leaves offer shade and shelter for fish.
Potamogeton amplifolius (Large-leaf Pondweed)	Submersed	The broad leaves of *Potamogeton amplifolius* offer shade, shelter and foraging opportunities for fish. Abundant production of large nutlets makes this a valuable waterfowl food.
Potamogeton gramineus (grassleaved pondweed)	Submersed	The fruit and tubers of grassleaved pondweed are grazed by a variety of waterfowl including geese and wood duck. The foliage and fruit may also be eaten by muskrat, beaver, deer, and moose. The extensive network of branches offers invertebrates' habitat and foraging opportunities for fish.
Potamogeton Illinoensis (Illinois Pondweed)	Submersed	The fruit produced by Illinois pondweed can be a locally important food source for a variety of ducks and geese. The plant may also be grazed by muskrat, deer, beaver, and moose. This pondweed offers excellent shade and cover for fish and good surface area for invertebrates.
Potamogeton natans (Floating-leaf Pondweed)	Submersed	The fruit of floating-leaf pondweed is held on the stalk until late in the growing season. This provides valuable grazing opportunities for ducks and geese including scaup and blue-winged teal. Portions of this pondweed may also be consumed by muskrat, beaver, deer, and moose. Floating-leaf pondweed is considered good fish habitat because it provides shade and foraging opportunities.
Potamogeton pectinatus (sago pondweed)	Submersed	Sago pondweed is considered one of the top food producers for waterflowl. Both the fruit and tubers are heavily grazed and are considered critical for a variety of migratory waterflowl. Sago also provides food and shelter for young trout and other juvenile fish.

Scientific Name (Common Name)	Plant Type	Plant Functions
Potamogeton Richardsonii (Clasping-leaf Pondweed)	Submersed	The fruit produced by clasping-leaf pondweed can be a locally important food source for a variety of ducks and geese including black duck, canvasback, redhead, ring-necked duck, and green-winged teal. The plant may also be grazed by muskrat, deer, beaver, and moose. The leaves and stem are colonized by invertebrates and offer foraging opportunities and cover for fish.
Potamogeton robbinsii (Robbin's Pondweed)	Submersed	Robbin's pondweed provides habitat for invertebrates that are grazed by waterfowl. It also offers good cover and foraging opportunities for fish, particularly northern pike.
Potamogeton zosteriformis (Flat-stem Pondweed),	Submersed	Flat-stem pondweed can be a locally important food source for a variety of geese and ducks including redhead and green-winged teal. The plant may also be grazed by muskrat, deer, beaver, and moose. Flat-stem pondweed provides a food source and cover for fish and invertebrates.
Ranunculus spp. (Water Crowfoot)	Submersed	As flowers give way to fruit, the water crowfoot bed becomes a choice spot for dabbling ducks. Both fruit and foliage of water crowfoot are consumed by a variety of waterfowl. When it is growing in shallow zones, it is sometimes consumed by upland game birds including ruffed grouse. Stems and leaves of water crowfoot provide valuable invertebrate habitat.
Utricularia sp. (bladderwort)	Submersed	Bladderwort provides food and cover for fish.
Vallisneria americana (Wild Celery)	Submersed	Wild celery is a premiere source of food for waterfowl. All portions of the plant are consumed including foliage, rhizomes, tubers, and fruit. Wild celery beds become a prime destination for thousands of canvasback ducks every fall. Wild celery is also important to marsh birds and shore birds including rail, plover, sand piper, and snipe. Muskrats are also known to graze on it. Beds of wild celery are considered good fish habitat providing shade, shelter, and feeding opportunities.
Zosterella dubia (Water Star Grass)	Submersed	Water star grass can be a locally important source of food for geese and ducks including northern pintail, blue-winged teal and wood duck. It also offers good cover and foraging opportunities for fish.

*Plant functions are from: Borman, S. et al. 1997. Through the Looking Glass...A Field Guide to Aquatic Plants and Minnesota Department of Natural Resources. 1997. A Guide to Aquatic Plants--Identification and Management.

4.1.8 Wisconsin Floristic Quality Assessment

The Sand Lake plant community was assessed using the Wisconsin Floristic Quality Assessment (WFQA). The WFQA is an adaptation for use in Wisconsin of the original floristic quality assessment method developed for the Chicago region (Swink and Wilhelm 1994). The basis of the floristic quality assessment is the concept of species conservatism, the degree to which a species can tolerate disturbance and its fidelity to undegraded conditions. Conservatism is not always equated with rarity. The method uses the aggregate conservatism of all species found on a site as a measure of the site's intactness, an indication of its ecological integrity (Bernthal 2003).

The method requires the *a priori* assignment of "coefficients of conservatism" to every aquatic plant species in a regional flora, relying on the collective knowledge of a group of experts. The coefficients for Wisconsin aquatic plants were assigned by a group of aquatic ecologists led by Stanley Nichols (Bernthal 2003)

The method requires an accurate and complete inventory of aquatic plants within a lake. The appropriate coefficient is applied to each species, and an average coefficient of conservatism (Mean C) is calculated for the entire lake. The Floristic Quality Index (FQI) adds a weighted measure of species richness by multiplying the Mean C by the square root of the total number of native species. $FQI = \text{Mean C} * \sqrt{N}$

Where:

$\text{Mean C} = \sum(c_1+c_2+c_3+\ldots c_n)/N$

Non-native species are assigned a C value of 0. Higher Mean C and FQI numbers indicate higher floristic integrity and a lower level of disturbance impacts to the site (Bernthal 2003)

The method is based on the concept of species conservatism. Each native aquatic plant species occurring in a regional flora is assigned a coefficient of conservatism (C) representing an estimated probability that a species is likely to occur in a lake relatively unaltered from what is believed to be a pre-settlement condition. The most conservative species require a narrow range of ecological conditions, are intolerant of disturbance, and are unlikely to be found outside undegraded remnant natural settings, while the least conservative species can be found in a wide variety of settings, and thrive on disturbance. Coefficients range from 0 (highly tolerant of disturbance, little fidelity to any natural community) to 10 (highly

intolerant of disturbance, restricted to pre-settlement remnants). Conceptually this 10-point scale can be subdivided into several ranges.

- 0-3—taxa found in a wide variety of plant communities and very tolerant of disturbance
- 4-6—taxa typically associated with a specific plant community, but tolerate moderate disturbance
- 7-8—taxa found in a narrow range of plant communities, but can tolerate minor disturbance
- 9-10—taxa restricted to a narrow range of synecological conditions, with low tolerance of disturbance(Bernthal 2003)

In 2005, the Mean C of Sand Lake was 6 and the FQI was 29.4 (See Table 5). The Mean C of 6 indicates the lake's plant community is tolerant of moderate disturbance. The median FQI for Wisconsin is 22.2 (WDNR 2005). Sand Lake's FQI is higher than the median Wisconsin Lake, indicating the lake's plant community is of higher quality and less tolerant to disturbance than the plant community of the median Wisconsin lake.

4.1.9 Exotic Species

In 2005, aquatic plants in Sand Lake consisted almost exclusively of native species (i.e., species historically present in this region). One exotic (i.e., not native) species occurred in the lake, *Myriophyllum spicatum* (Eurasian watermilfoil, EWM). Exotic or non-native species are undesirable because their natural control mechanisms are not introduced with the species. Consequently, exotic species frequently exhibit unchecked growth patterns.

EWM, a submersed aquatic plant, is native to northern Europe and Asia. It arrived in North America sometime between the late 1800s (Reed 1977) and the early 1940s (Couch and Nelson 1985); the later date has verified vouchers. EWM is a particularly problematic exotic aquatic plant in North America, due to its ability to reproduce from fragments and spread rapidly, its high growth rate in a range of temperatures and environmental conditions, and its tendency to reach the surface and form extensive mats of plant at the surface, which can allow it to shade and out compete native vegetation (Madsen et al. 1991; Valley and Newman 1998). Grace and Wetzel (1978), Aiken et al. (1979), and Smith and Barko (1990) provide good overviews of Eurasian watermilfoil biology and ecology. Eurasian watermilfoil has been

Table 5. 2005 Sand Lake Floristic Quality Index

Species	Common Name	Coefficient of Conservatism (C)	Species Present = 1 and Species absent = 0	Floristic Quality
Ceratophyllum demersum	Coontail	3	1	3
Chara spp.	Muskgrass	7	1	7
Elodea Canadensis	Elodea	3	1	3
Myriophyllum Sibiricum	Northern watermilfoil	7	1	7
Myriophyllum spicatum	Eurasian watermilfoil	0	1	0
Nitella sp.	Stonewort	7	1	7
Nuphar advena	Yellow pondlily	8	1	8
Nuphar variegate	Spadderdock	6	1	6
Nymphaea odorata	White waterlily	6	1	6
Nymphaea sp.	Unidentified waterlily	6	1	6
Nymphaea tetragona	Pygmy waterlily	6	1	6
Potamogeton amplifolius	Largeleaf pondweed	7	1	7
Potamogeton gramineus	Grassleaved pondweed	7	1	7
Potamogeton illinoensis	Illinois pondweed	6	1	6
Potamogeton natans	Floatingleaf pondweed	5	1	5
Potamogeton pectinatus	Sago pondweed	6	1	6
Potamogeton richardsonii	Richardson's pondweed	5	1	5
Potamogeton robbinsii	Robbin's pondweed	8	1	8
Potamogeton sp.	Narrowleaf pondweed	7	1	7
Potamogeton zosteriformis	Flatstem pondweed	6	1	6
Ranunculus sp.	Water crowfoot	7	1	7
Utricularia spp.	Bladderwort	9	1	9
Vallisneria Americana	Wild celery	6	1	6
Zosterella dubia	Water stargrass	6	1	6
Mean C				6
N (Number of Plant Species in Lake)				24
FQI				29.4

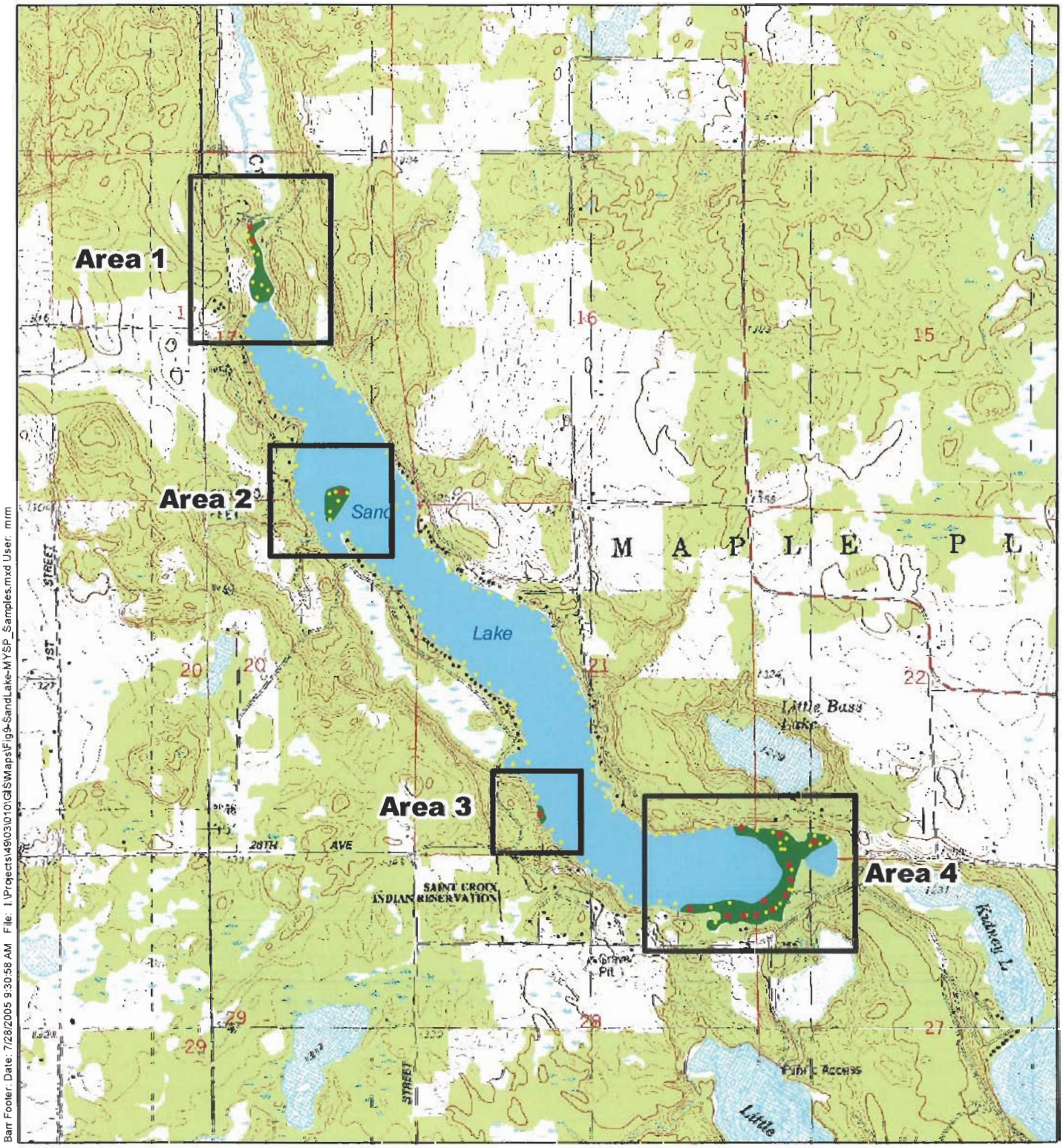
reported in 48 states (Madsen 2005) and it is estimated that millions of dollars are spent annually on Eurasian watermilfoil control (Sales 1997). Eurasian watermilfoil has been in Wisconsin since the 1960s. In 1999 it was found in 319 Wisconsin waterbody sites, more than any state in the United States (Engel 1999).

The spread of EWM is believed due to inadvertent transport by boaters and by natural means (downstream transport and waterfowl transport). EWM was first discovered in Sand Lake during 2002.

In June of 2005, EWM was observed in four areas of the lake (See Figure 9):

- Area 1-- Near the lake's outlet on the north end of the lake
- Area 2--In the sand flats area near Silo Bay
- Area 3--Near the western shoreline
- Area 4--Near the boat launch at the south end of the lake

Aquatic plant survey results indicate EWM was found at or adjacent to 10 percent of sample locations. Specifically, EWM was found at or near the following sample locations (See Figures 4 and 9): SL-6, SL-7, SL-8, SL-9, SL-10, SL-11, SL-12, SL-13, SL-16, SL-28, SL-77, SL-87, SL-88, and SL-100. EWM density was light, ranging from 0.25 to 1.25. The average EWM density was 0.61, a rake coverage of approximately 12 percent.



Sample Locations

Locations with Eurasian Watermilfoil

Eurasian Watermilfoil Treatment Areas

Feet

1,000 0 1,000 2,000

Meters

500 0 500

1:24,000

BARR

Figure 9

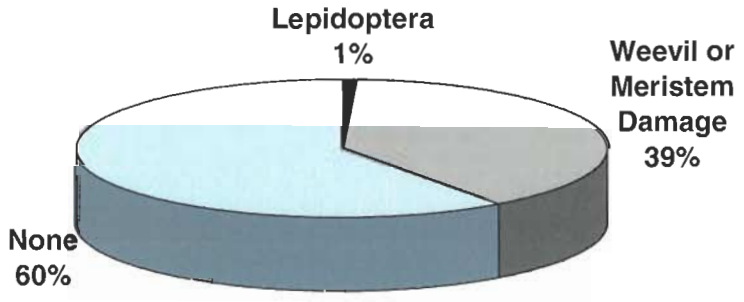
EURASIAN WATERMILFOIL DISTRIBUTION
Sand Lake

4.2 Milfoil Weevil Survey Results

The milfoil weevil is a small, herbivorous aquatic beetle, belonging to the family Curculionidae. It is a milfoil (*Myriophyllum spp.*) specialist, meaning that it feeds and develops only on plants in this genus. The weevil completes all life stages fully submersed and the larvae are stem miners. These characteristics make it very unique, as specialist herbivores are very rare among insects (Solarz and Newman 1996). These characteristics are precisely why the milfoil weevil has shown the most promise as a potential biocontrol agent for EWM and why it has been the subject of much research (Newman 1999).

During 2005, a survey was completed to determine whether the milfoil weevil was found on Sand Lake EWM plants. A total of 15 sites were surveyed (See Figure 5) and a total of 125 EWM stems were examined. The results (See Figure 10) indicate 39 percent of the stems contained weevils (i.e., adult or eggs) or meristem damage was observed on the plants, 1 percent contained a Lepidoptera caterpillar (i.e., also damages EWM stems), and 60 percent were undamaged and did not contain either weevils or Lepidoptera. The data indicate some biological control of EWM is occurring within Sand Lake. However, the majority of EWM stems did not contain the milfoil weevil or Lepidoptera and did not exhibit meristem damage. Hence, the majority of EWM stems had no biological control.

Figure 10. 2005 Sand Lake Milfoil Weevil Survey Results



4.3 Sand Lake Water Quality Data

Sand Lake water quality data were collected on August 3 and November 7, 2004. The data were evaluated to determine the lake's present water quality. The evaluation was based upon a standardized lake rating system. The rating system uses the lake's total phosphorus, chlorophyll *a*, and Secchi disc transparency as the key water quality indicators to determine the lake's present water quality for the following reasons. Phosphorus generally controls the growth of algae in lake systems. Of all the substances needed for biological growth, phosphorus is generally the one present in limited quantity. Consequently, when phosphorus is added to a system, it enhances algal growth. Chlorophyll *a* is the main pigment in algae; therefore, the concentration of chlorophyll *a* in the water indicates the amount of algae present in the lake. Secchi disc transparency is a measure of water clarity, and is inversely related to algal abundance. Water clarity determines recreational use-impairment. Table 6 summarizes the concentrations of total phosphorus and chlorophyll *a*, and Secchi disc transparencies for Sand Lake in August and November of 2004. The data are compared with a standardized lake rating system.

Table 6. 2004 Concentrations of Epilimnetic Total Phosphorus and Chlorophyll a and Secci Disc Transparencies in Sand Lake

Parameter	August 3, 2004	Trophic State	November 7, 2004	Trophic State
Total Phosphorus µg/L/TSI	14/49	Mesotrophic (Good Water Quality)	12/47	Mesotrophic (Good Water Quality)
Chlorophyll *a* µg/L/TSI	2.4/41	Mesotrophic (Good Water Quality)	3.6/44	Mesotrophic (Good Water Quality)
Secchi disc m/TSI	4.88/37	Oligotrophic (Excellent Water Quality)	3.88/41	Mesotrophic (Good Water Quality)

4.4 Membership Survey Results

Landowners of property within the Sand Lake Management District were surveyed to determine:

- Uses of the lake
- Uses impacted by aquatic plant growth
- Needs for regulations
- Fishing details including species fished for and changes in the number of fish caught over time
- Fetilizer use
- Overall Sand Lake water quality
- Sand Lake problems
- Projects the lake District should complete

A total of 153 surveys were mailed out and 81 responses (53 percent) were received. Survey results are presented in Appendix C.

Respondents indicated the 10 activities most frequently engaged in on Sand Lake are swimming (40), fishing (37), pontooning (33), ice fishing (32), cross country skiing (32), waterskiing/boarding (30), canoeing, power boating (29), paddle boating (24), and sailing (22). Activities impacted by the current level of aquatic plant growth include swimming (53), fishing (40), pontooning (23), waterskiing (21), power boating (21), paddle boating (15), jet skiing (9), canoeing (8), ice fishing (7), kayaking (3), and sailing (3). The majority of respondents indicated the lake was not crowded during Monday through Friday, but was crowded (i.e., very crowded, crowded, or sometimes crowded) on weekends and holidays. Respondents felt additional regulations were needed to regulate or restrict jet skiing (50), power boating (43), boating in areas infested with Eurasian watermilfoil (29), water skiing/boarding (26), snowmobiling (6), fishing (5), pontooning (3), hiking/walking (2), kayaking (1), and paddle boating (1). Written comments included "no boating in milfoil area" and "milfoil should be marked."

The majority of respondents fish for walleye (44) or sunfish (42). Northern (33), largemouth bass (31), and crappie (25) are also popular species according to respondents. Respondents rated sunfish and largemouth bass fishing as best and walleye and crappie fishing as worst.

The majority of respondents felt that walleye, crappie, and northern have declined in number and other species have stayed about the same.

Less than 20 percent of respondents use fertilizer on their property. Of the respondents who use fertilizer, only 20 percent use a phosphate free fertilizer.

Eighty seven percent of respondents rated the water quality of Sand Lake as either excellent or good. The remaining 13 percent rated the lake's water quality as fair. The majority of respondents indicated the criteria for judging the overall quality of Sand Lake was clarity of the water and lake quality was the most valuable resource in the Sand Lake area.

Nearly two thirds of respondents have attempted to remove plants from around their dock and property shoreline. Nearly all had completed the removal themselves by hand.

Respondents indicated the most significant problems on Sand Lake were Eurasian watermilfoil (47), water quality (24), aquatic plants (23), boating too close to shore/other boats (22) jet ski noise (21), development on the lake (16), boat/jet ski speed (16), sediment from shoreline erosion (15), boat/jet ski noise (14), lawn fertilizer (12), fishery (10), power boat use (9) not obeying boating laws (7), and water skiers (2).

In addition to the District's Euarasian watermilfoil management project, the majority of respondents would like the District to complete projects to address boating/jet ski regulation enforcement (23), reduce erosion (21), improve fish habitat (20), more fish stocking (18), boat/jet ski regulations (15), improve water quality (15), zoning enforcement (15), other aquatic plants (12), establish quiet hours (12), and improve waterfowl/loon habitat.

Respondents indicated they have owned property on the lake from 2 to 56 years. The majority of respondents (61 percent) have owned property on the lake for less than 20 years. However, 27 percent of respondents have owned property on the lake for more than 30 years.

5.0 Sand Lake Aquatic Plant Management Plan

An aquatic plant management plan is an orderly and effective approach to plant management. The plan defines the problem, establishes goals, evaluates possible management options, selects a feasible management option, and determines an effective monitoring program to evaluate results of the management strategy. A successful aquatic plant management plan is based upon six principles:

- Define the problem
- Establish goals
- Understand plant ecology
- Consider all the techniques
- Develop management plan
- Monitor the results

5.1 Define the Problem

Sand Lake has a healthy aquatic plant community that is of higher quality and is less tolerant to disturbance than the plant community of the median Wisconsin lake. The presence of EWM is of concern because it is not native to this region and has caused problems in lakes throughout the United States by out competing native plants and developing objectionable dense growths. EWM was first discovered in Sand Lake during 2002. The coverage of EWM in the lake has increased from a few plants near the boat launch in 2002 to a coverage of approximately 10 percent of the lake's surface area in 2005. This occurred in spite of the efforts to slow or control the growth of EWM with hand pulling with scuba divers. Without effective management, EWM is expected to continue displacement of native vegetation within Sand Lake and cause harm to the lake's ecosystem. Because EWM density is currently light and its coverage is limited to 10 percent of the lake's surface area, EWM management is expected to effectively reduce and possibly eradicate EWM from Sand Lake.

5.2 Establish Goals

The Sand Lake Management District has established five aquatic plant management goals for Sand Lake:

- Preserve native species
- Preserve and/or improve fish and wildlife habitat
- Protect the lake's ecosystem by removing current EWM growth to the greatest extent practicable and eradicate EWM from Sand Lake if possible
- Prevent the spread of EWM to other area lakes by removing EWM from Sand Lake to the greatest extent possible.
- Prevent the introduction of additional non-native species to the greatest extent practicable, including education, postings, etc.

5.3 Understand Plant Ecology

Aquatic plant management is based upon an understanding of plant ecology. Understanding the biology of aquatic plants and their habitat requirements is necessary to effectively manage plants. Effective management is necessary to maintain the delicate balance of preservation of fish and wildlife habitat and concurrently provide reasonable lake-use opportunities to area residents.

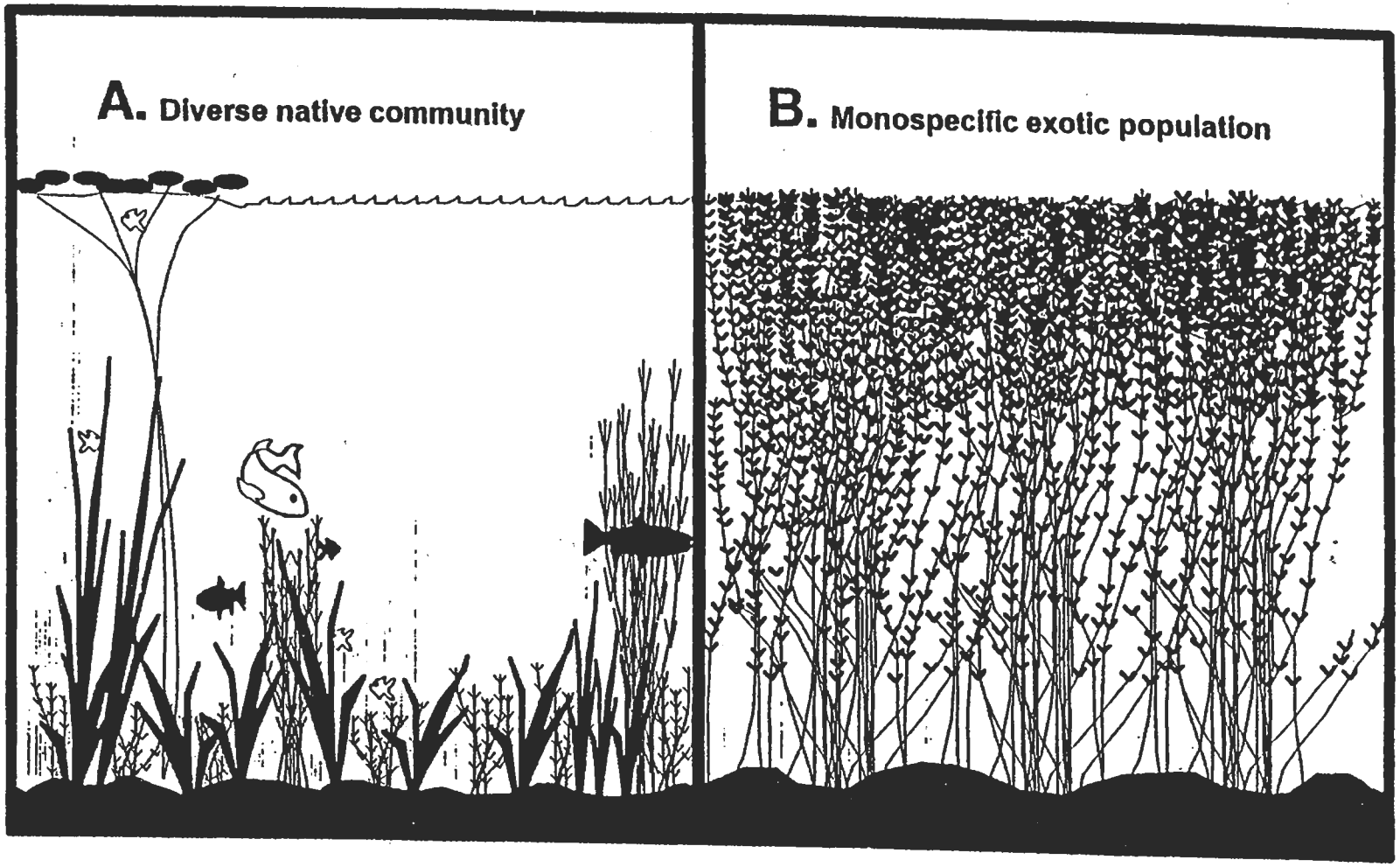
Differences in growth patterns between exotic plants (i.e., not native to this area) and native plants indicate a compelling reason for management of exotic species to protect native communities. Native plant communities are typically dominated by growth forms that concentrate biomass below the surface of the water (See Figure 11A), contain a high diversity of species, and have low to moderate levels of biomass. Exotic plants typically follow an extremely rapid growth pattern. Exotic species generally produce a dense canopy of vegetation at the air:water interface and develop high levels of biomass (See Figure 11B). Such a growth pattern interferes with use of the water resource by recreational-users and may eliminate the beneficial native plant community through shading (Smart, et al., 1996). Management to control the growth of exotic species is necessary to protect the native plant community and provide a reasonable use of the lake to recreational users. The exotic species of primary concern in Sand Lake is EWM. An understanding of the biology of EWM is necessary to effectively manage this plant of concern.

The following paragraphs present an overview of EWM biology.

The submersed, rooted aquatic macrophyte *Myriophyllum spicatum* L. or Eurasian watermilfoil (EWM) belongs to the dicotyledonous family Haloragaceae. It has the ability to survive unfavorable environmental conditions and has been demonstrated to outcompete many other submersed aquatic plant species in temperate, subtropical, and tropical areas. This species has consequently a very large distributional area. It may be considered as the most aggressive member of a circumboreal complex of closely related taxa (Patten 1954).

EWM is a rooted perennial with long, flexible stems and finely dissected leaves. The leaves are arranged in whorls around the stems. The plant stems may reach lengths in excess of 4 m in summer, branching close to the water surface (canopy formation). It has been found in water depths ranging from 0.2 to 6 m (Grace and Wetzel 1978; Madsen, Eichler, and Boylen 1988).

Milfoil is able to propagate itself by seeds, by vegetative fragmentation, and in an evergreen condition. Flowering of milfoil in the northern hemisphere occurs from June to November; one (Aiken, Newroth, and Wile 1979), two (Patten 1956), and three (Grace and Wetzel 1978) flowering periods per year have been reported. Flowering usually coincides with peak biomass and is followed immediately by autofragmentation/sloughing.



Source: Smart et al., 1996

The production of viable seeds requires emersion of the typically monoecious flowering spikes (Patten 1954) with transfer of pollen by wind as the dominant pollination mechanism (Hutchinson 1975). Seeds are important in long-distance dispersal and as insurance against local extinction, but seed germination may be delayed (Patten 1955) or decreased by desiccation (Standifer and Madsen 1997). Seedling establishment appears to be a particularly fragile stage in the life cycle (Patten 1956; Hartleb, Madsen, and Boylen 1993).

Shoot fragmentation is usually the result of abscission just after flowering, but it can also be accidental (by boat contact or wave action). Although shoot fragmentation can be substantial, the number of established, new plants originating from shoot fragments is relatively low (Madsen and Smith 1997). Fragmentation is probably the most important means of dispersal within a water body or between nearby water bodies.

Milfoil most frequently winters in an evergreen form as root crowns and/or lower shoots attached to the rhizome system (Grace and Wetzel 1978; Madsen, Eichler, and Boylen 1988; Madsen 1997a) and may maintain considerable winter biomass (Stanley et al. 1976). This species does not form turions described as important hibernacula of other Myriophyllum species (M. exalbescens, M. verticillatum, M. heterophyllum; Grace and Wetzel 1978).

An understanding of EWM biology indicates aggressive management of EWM is essential to the preservation of Sand Lake's ecosystem. Rapid expansion of EWM coverage during 2002 through 2005 suggests unchecked expansion is likely to result in continued displacement of the lake's native plant community. Treatment to halt EWM expansion and, if practicable, eradicate EWM from Sand Lake will preserve the lake's native plant community and its ecosystem. Optimum treatment effectiveness is expected to occur in spring when the plant is most vulnerable to death from herbicides. EWM stores carbohydrate reserves in its root crown throughout the growing season. During the winter months, EWM uses up these reserves and, hence, carbohydrate reserves are at their lowest point in spring (Madsen 1997b; Madsen and Owens 1998). The plant is most vulnerable to harm when carbohydrate storage is lowest and the plant has the least amount of stored carbohydrates for regrowth. Rapid growth during the spring period places additional stresses on the plant, further increasing its vulnerability to death from herbicides.

5.4 Consider All Techniques

Following a consideration of all possible management alternatives, a feasible management option may be identified for Sand Lake. The following discussion focuses on four types of aquatic plant management techniques currently used for aquatic plant control. They include:

1. Physical
2. Mechanical
3. Chemical
4. Biological

5.4.1 Physical

Physical tactics typically used to manage aquatic plants are light manipulation and habitat manipulation. Habitat manipulation includes such techniques as overwinter lake drawdown, dredging, sand blanketing, the use of dyes, and nutrient limitation and inactivation (Barr, 1997).

Although light manipulation has been used in lakes with some success, its greatest utility has been found in managing dense vegetation in streams through streamside shading. Shading by use of different densities of shading cloth has resulted in decreased plant biomass. Natural shade from streamside vegetation has also reduced plant biomass along the stream course (Barr, 1997). Dark colored dyes are sometimes used in small ponds and lakes to reduce aquatic plant growth. The dyes are added to the lake or pond. The resultant change in water color reduces the amount of light reaching the submersed plants, thereby limiting plant growth. Use of dyes is limited to shallow waterbodies with no outflow. Because Sand Lake is a large lake with an outflow, dyes cannot be used in the lake for plant management.

Lake level drawdown, particularly over winter, is commonly used to control nuisance aquatic plants in northern North America. Biomass studies before and after drawdown have demonstrated that drawdown was effective in controlling plants down to the depth of drawdown, but had no effect at greater depths. While drawdown is an extremely effective technique for some species, it may actually stimulate the growth of other species. (Madsen and Bloomfield, 1992). A study of Trego Flowage (Washburn County, Wisconsin) indicated the benefits of drawdown were temporary, and the same species of plants returned in about their former abundance within a few years (Barr, 1994). For Eurasian watermilfoil,

drawdown effects have been variable, partly because of its ability to withstand low temperatures for short periods of time as well as its resiliency and tenacity (Gibbons 1994). Drawdown as a plant management technique is only feasible when a dam is present and lowering the water level for a period of time is feasible. Drawdown is not a feasible option for Sand Lake.

Another commonly-used group of physical control techniques uses benthic barriers, weed rollers, or sediment alteration to inhibit the growth of aquatic plants at the sediment surface. Barrier material is applied over the lake bottom to prevent plants from growing, leaving the water clear of rooted plants. Benthic barriers are generally applied to small areas (Barr, 1997). Negatively buoyant (i.e., sink in water) screens are available in rolls 7 feet wide and 100 feet long. The screens can be laid on the lake bottom in the spring and removed in the fall. These screens can be reused for about 10 years. Burlap has been found to provide up to 2 to 3 years of relief from problematic growth before eventually decomposing (Truelson 1985 and Truelson 1989). Bottom barriers would be appropriate for controlling aquatic plant nuisances for small applications such as adjacent to a boat dock or from small swimming areas. The barriers are safe, effective, non-chemical control using a simple technology. Bottom barriers do not result in significant production of plant fragments (critical for milfoil treatment). Bottom barriers may cause harm to fisheries and invertebrate habitat. Consequently, the WDNR should be contacted prior to barrier installation to determine whether a permit is needed. Bottom barriers are not feasible for Sand Lake because the area requiring management is large (i.e., 31 acres).

Weed rollers or 'Automated Unintended Aquatic Plant Control Devices' are motor-drive rollers (round bars) placed on the lake bottom and roll over and uproot plants. The rollers are 25-to-30 feet long and are centered on the end post of a dock. The rollers roll in a circular pattern, normally covering 270^0 or using a 25-foot roller over a full circular area. Weed rollers would be appropriate for controlling aquatic plant nuisances in small areas such as adjacent to a boat dock or for small swimming areas. The rollers are an effective non-chemical control using a simple technology. However, weed rollers cause harm to fisheries and invertebrate habitat. Consequently, use of rollers in Wisconsin lakes is not allowed.

Sediment inactivation has included the application of substances to sediments (i.e., such as lime slurry) that affect the nitrogen and phosphorus composition of the sediments. The growth of aquatic plants is inhibited by the reduced availability of phosphorus or a change in nitrogen in the sediments (Barr, 1997) Lime slurry is an experimental tool currently the

subject of a research project by the Eau Galle Aquatic Ecology Laboratory. Use of lime slurry is not a feasible option for Sand Lake because it is not currently available for widespread use.

5.4.2 Mechanical

Mechanical control involves aquatic plant removal via harvesting, handpulling, hand-digging, rotovation/cultivation, or diver-operated suction dredging. Small scale harvesting may involve the use of the hand or hand-operated equipment such as rakes, cutting blades, or motorized trimmers. Individual residents frequently clear swimming areas via small scale harvesting or hand pulling or hand digging. Hand-digging is very useful for aggressive control of sparse or small pockets of Eurasian watermilfoil (Gibbons 1994). Small scale harvesting is not a feasible option for Sand Lake because the area of EWM coverage is large (i.e., approximately 10 percent of the lake's surface area). In addition, hand pulling has proven to be ineffiective on Sand Lake.

Large-scale mechanical control often uses floating, motorized harvesting machines that cut the plants and remove them from the water onto land, where they can be disposed. Harvesting has not proven to be an effective means of sustaining long-term reductions in growth of EWM. Regrowth of EWM to pre-harvest levels typically occurs within 30-60 days, depending on water depth and the depth of cut (Perkins 1987). In addition, fragments from harvesting may result in additional EWM growth and may increase EWM coverage within a lake. Harvesting is not a feasible option for Sand Lake because fragments from harvesting would increase EWM coverage within the lake.

Rotovation/cultivation (underwater rototilling) are bottom tillage methods that remove aquatic plant root systems. This results in reduced stem development and seriously impairs growth of rooted aquatic plants. Derooting methods were developed by aquatic plant experts with the British Columbia Ministry of Environment as a more effective EWM control alternative to harvesting. Essentially two types of tillage machinery have been developed. Deep water tillage is performed in water depths of 1.5 to 11.5 feet using a barge-mounted rototiller equipped with a 6-10 foot wide rotating head. Cultivation in shallow water depths up to a few meters is accomplished by means of an amphibious tractor or modified WWII "DUCW" vehicle towing a cultivator. Both methods involve tilling the sediment to a depth of 4-6 inches, which dislodges plants including roots. Certain plants like EWM have roots that are buoyant and float on the surface where they can be collected. Treatments are made in an overlapping swath pattern. Bottom tillage is usually performed in the cold "off-season" months of winter and spring to reduce plant growth potential.

Bottom tillage has been used effectively for long-term control of EWM where populations are well-established and prevention of stem fragments is not critical. Single treatments using a crisscross pattern have resulted in EWM stem density reductions of 80-97 percent in bottom tillage treatments (Gibbons et al. 1987 and Maxnuk 1979). Depending on plant density, carryover effectiveness of rototilling can persist for up to 2 to 3 years without retreatment. Following treatment, rotovated areas in Washington and British Columbia have shown increases in species diversity of native plants, of potential benefit to fisheries (Gibbons 1994). Rototilling is not advised where bottom sediments have excessive nutrient and/or metals concentrations, because of potential release of contaminants into the overlying water. The method does result in production of plant fragments, and is not recommended for use in waterbodies with new or sparse EWM infestations or where release of fragments is a concern. Bottom tillage is not a feasible option for Sand Lake because the lake's EWM infestation is relatively new and release of fragments is of concern.

Diver dredging utilizes a small barge or boat carrying portable dredges with suction heads that are operated by scuba divers to remove individual rooted plants (including roots) from the sediment. Divers physically dislodge plants with sharp tools. The plant/sediment slurry is then suctioned up and carried back to the barge through hoses operated by the diver. On the barge, plant parts are sieved out and retained for later off-site disposal. The water sediment slurry can be discharged back to the water or piped off-site for upland disposal. Diver dredging can be highly effective under appropriate conditions (Gibbons 1994). Efficiency of removal is dependent on sediment conditions, density of aquatic plants and underwater visibility (Cooke et al. 1993). As it is best used for localized infestations of low plant density where fragmentation must be minimized, the technique has great potential for milfoil control. Depending on local conditions, milfoil removal efficiencies of 85-97 percent can be achieved by diver dredging (Maxnuk 1979). Diver dredging is not feasible for Sand Lake because the area of EWM coverage is too large.

5.4.3 Chemical

Chemical aquatic vegetation management programs are widespread, being the preferred method of EWM control. Chemical control involves the use of a herbicide (i.e., a plant-killing chemical) that is applied in liquid, granular, or pellet form. Herbicides are of two types, systemic herbicides and contact herbicides. Systemic herbicides, such as 2, 4-D, fluoridone, and glyphosate, are absorbed by and translocated throughout the plant, capable of killing the entire plant (roots and shoots). In contrast, contact herbicides, such as endothall, kill the plant surface with which it comes in contact, leaving roots alive and capable of regrowth. The aquatic plants (sometimes only stems and leaves) die and decompose in the lake. To reduce human exposure to the chemicals, temporary water-use restrictions are imposed in treatment areas whenever herbicides are used. Only herbicides for aquatic use are allowed, and any use of a herbicide requires a WDNR permit (Barr, 1997). Use of a systemic herbicide, such as 2,4-D, is feasible for Sand Lake.

5.4.4 Biological

Biological control involves the use of a biological control agent to control aquatic plant growth. Biological controls include predation by herbivorous fish, mammals, waterfowl, insects and other invertebrates, diseases caused by microorganisms and competition from other aquatic plants (Little, 1968). The most widely used biological control agent is herbivorous fish, particularly grass carp. Use of grass carp as a biological control agent is not allowed in Wisconsin. Weevils have been used experimentally to control EWM (Creed, et al., 1995; Newman, et al., 1995). Weevils are naturally present in Sand Lake and have not effectively controlled the spread of EWM in the lake. Hence an additional management measure (i.e., herbicide treatment) is needed to manage EWM in Sand Lake.

Mechanical, physical, and chemical aquatic plant control techniques and estimated costs are summarized in Table 7. The costs are somewhat dated (i.e., based upon 1997 dollars), but provide a relative cost comparison between the various techniques.

Table 7. Control Techniques for Aquatic Plants: Procedure, Cost, Advantages, and Disadvantages (Modified from a Summary Prepared by the Vermont DNR in 1997)

Control Technique	Procedure	Cost	Advantages	Disadvantages
Mechanical and Physical Removal			+Immediate plant removal and creation of open water +No interference with water supplies or water-use	-- Creates plant fragments – Usually disturbs sediments, affecting biota and causing short-term turbidity – Plant disposal necessary
Harvesting	Plant stems and leaves cut up to 8 ft below water surface, collected and removed from lake	Cut from 1 to 2 ac/day @ $1,200/day New machine: $80,000-100,000+	+Relatively low operational cost	– Can get regrowth within 4 weeks – Removes small fish, turtles, etc. – Plant fragments may cause spread of Eurasian watermilfoil
Hydro-raking	Mechanical rake removes plants up to 14 ft below water surface and deposits them on shore	Rake up to 1 ac/day @ $1,500–$2,000/ac	+Longer lasting control than harvesting because of root removal	– Regrowth by end of growing season
Rotovating	Sediment is "tilled" to a depth of 4"-6" to dislodge plant roots and stems Can work in depths up to 17 ft	Can do up to 2-3 ac/day @$700–$1,200/ac Cost of new machine is $100,000+	+Immediate 85% – 95% decrease in stem density +Up to 2 years control +Frequently done in fall when plant fragments not viable	
Hydraulic Dredging	Steel cutter blade dislodges sediment and plants; removed by a suction pump	$2,500/ac and up Cost of new machine is $100,000+	+90% effective at root removal, with plant regrowth probable within 1 year	– Expensive

Table 7 Control Techniques for Aquatic Plants: Procedure Cost, Advantages, Disadvantages (Modified from a Summary Prepared by the Vermont DNR in 1997) (Continued)

Control Technique	Procedure	Cost	Advantages	Disadvantages
Diver-operated Suction Harvesting	Scuba divers use 4" suction hose to selectively remove plants from lake bottom Plants disposed of on shore	Cost is $800–$10,000/ac depending on cost of divers, type of sediments, travel time, etc. Cost of new machine $20,000+	+Up to 97% effective at removing plant roots and stems +1–2 years of control +Can work in areas with underwater obstruction	– Effectiveness varies greatly with type of sediment – Slow and labor intensive – Expensive – Potentially hazardous because of scuba
Handpulling	Plants and roots are removed by hand using snorkeling and wading Plants disposed of on shore	Variable, depending on volunteers; divers cost $15-$60/hr	+Most effective on newly established populations that are scattered in density +Volunteers can keep cost down +Long term control if roots removed	– Too slow and labor intensive to use on large scale – Short-term turbidity makes it difficult to see remaining plants
Chemical Treatment			+ Doesn't interfere with underwater obstructions	– Affects water-use; can be toxic to biota – Plants remain in lake and decompose, which can cause oxygen depletion late in the season
2,4-D (Aquakleen, Aquacide, Navigate)	Systemic herbicide available in liquid and pellet form that kills plants by interfering with cell growth and division Can be applied at surface or subsurface in early spring as soon as plants start to grow, or later in the season	$350–$700/ac depending on plant density and water depth; cost does not include collection or analysis of water samples, which may be required	+Under favorable conditions can see up to 100% decrease +Kills roots and root crowns +Fairly selective for EWM	– Plants decompose over 2-3 weeks

Table 7 Control Techniques for Aquatic Plants: Procedure Cost, Advantages, Disadvantages (Modified from a Summary Prepared by the Vermont DNR in 1997) (Continued)

Control Technique	Procedure	Cost	Advantages	Disadvantages
Tripclopyr (Garlon 3A)	Liquid systemic herbicide that kills plants by interfering with hormones that regulate normal plant growth	$75/gal or $1200-$1700/ac, depending on water depth, concentration of chemical, etc.	+Effectively removes up to 99% of EWM biomass 4 weeks after treatment +Fast-acting herbicide +Kills roots and root crowns +Fairly selective for EWM	– No domestic-use of water within 1 mile of treated area for 21 days after treatment – No fishing in treated area for 30 days after treatment – Expensive
Fluridone (Sonar)	Systemic herbicide available in liquid and pellet form that inhibits a susceptible plant's ability to make food Can be applied to surface or subsurface in early spring as soon as plants start to grow	$500-$1500/ac depending on water depth and formulation	+Can be applied near water intakes if concentration is less than 20 ppb +Under favorable conditions susceptible species may decrease 100% after 6-10 weeks +Control lasts 1-2 years depending supplemental hand removal +Because slow-acting, low oxygen generally not a problem	– Long contact time required; may take up to 3 months to work – Potential risk to human health remains controversial – Not selective for milfoil – Spot treatments generally not effective
Endothall (Aquathol and Aquathol K)	Granular (Aquathol) and liquid (Aquathol K) kills plants on contact by interfering with protein synthesis Can be applied to surface or subsurface when water temperature is at least 65°F	$300-$700/ac depending on treatment area and use of adjuvants	+Under favorable conditions can see up to 100% decrease +Fast-acting herbicide	– Regrowth within 30 days – Not selective for milfoil – Does not kill roots; only leaves and stems that it contacts – No swimming for 24 h, no fishing for 3 days

Table 7 Control Techniques for Aquatic Plants: Procedure Cost, Advantages, Disadvantages (Modified from a Summary Prepared by the Vermont DNR in 1997) (Continued)

Control Technique	Procedure	Cost	Advantages	Disadvantages
Diquat (Reward)	Liquid kills plants on contact by interfering with photosynthesis Can be applied to surface or subsurface when water temperature is at least 65°F	$200-$500/ac	+Fast-acting herbicide +Relatively cheap per acre	– Retreatment within same season may be necessary – Not selective for milfoil – Does not kill roots; only leaves and stems that it contacts – No swimming for 24 h, no drinking for 14 days – Toxic to wildlife

5.5 Sand Lake Aquatic Plant Management Plan

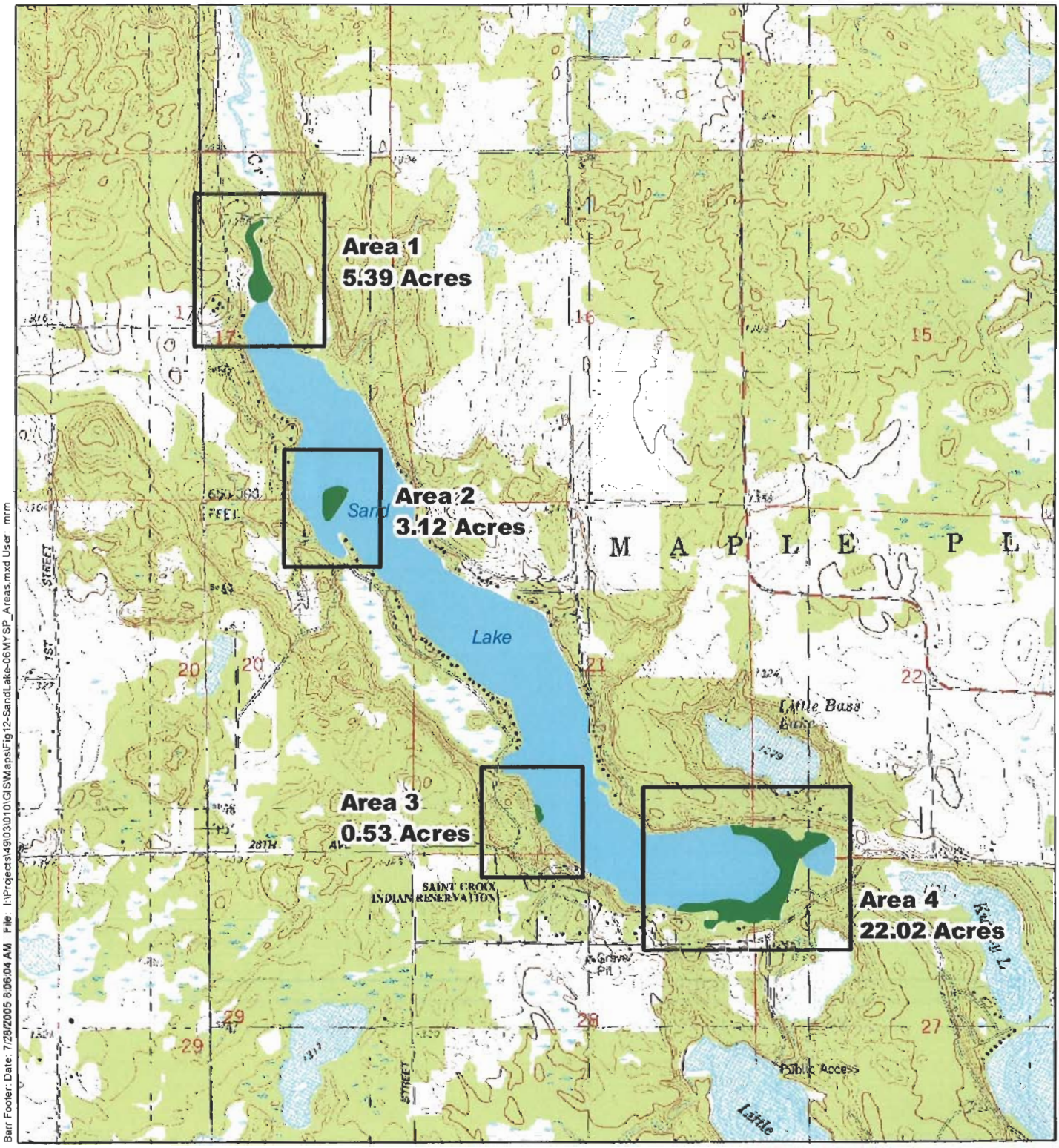
The aquatic plant management plan for Sand Lake is based upon attainment of the lake's goals (See Section 5.2). Removing the current EWM growth from Sand Lake will preserve the lake's native species, preserve and/or improve the lake's fish and wildlife habitat, protect the lake's ecosystem, and prevent the spread of EWM to other lakes.

The management tool selected for the removal of EWM from Sand Lake is the systemic herbicide, 2,4-D (2,4-dichlorophenoxy acetic acid). The herbicide works by mimicking the plant hormone auxin, which causes uncontrolled growth and eventually death in EWM. Provided sufficient chemical is conveyed to the EWM plant and root crown prior to plant death, both plant and root crown are destroyed.

Native vegetation is not expected to be harmed by the herbicide treatment because 2,4-D is fairly selective for EWM. To further safeguard native vegetation, the herbicide will be applied during spring when the native species are still seasonally suppressed. 2,4-D is a biodegradable compound whose residues are not persistent in water. It has a relatively short half life, averaging 10 days in water. Both UV light and microorganisms living in the water and sediments convert the herbicide to carbon dioxide, water, and chlorine. Because 2,4-D will be applied during spring, it is expected to biodegrade before native vegetation begins its seasonal growth.

EWM infested areas of Sand Lake (see Figure 12) will be treated with granular 2,4-D (i.e., Navigate) during May of 2006. Areas 1 and 2 will be treated with a dose of 150 pounds per acre and areas 3 and 4 will be treated with a dose of 125 pounds per acre. Additional water movement in areas 1 and 2 necessitate a higher dose for areas 1 and 2 than areas 3 and 4.

Should regrowth of EWM occur within treated areas, warranted retreatment will occur in 2007 and in subsequent years. A post-treatment survey will be completed in July of 2006 to determine treatment effectiveness and 2007 retreatment needs. A post-treatment survey will be completed during July of each year in which treatment occurs to assess treatment effectiveness and determine retreatment needs of the subsequent year.



Eurasian Watermilfoil Treatment Areas

Feet
1,000 0 1,000 2,000

Meters
500 0 500

1:24,000

BARR

Figure 12

2006 EURASIAN WATERMILFOIL TREATMENT AREAS
Sand Lake

The Sand Lake Management District will continue its efforts to prevent the introduction of EWM and additional non-native species to Sand Lake. A sign posted at the public boat launch currently instructs lake users to inspect their boats before entering Sand Lake. Boaters are asked to remove vegetation from boats to avoid introducing EWM or other unwanted species to the lake. In the future, the District will maintain the sign at the boat launch (i.e., repair or replace as needed) to insure that lake users are educated as to the importance of cleaning vegetation from boats before entering the lake.

An education component will be included in the District's newsletter and annual meeting to educate residents as to the dangers posed by non-native species. Residents will be instructed to never introduce plants to Sand Lake. Studies of plants obtained from mail order distributors indicate that non-native species are routinely present in such orders. Educating lake residents to not introduce plants to Sand Lake will safeguard the lake from unintentional introductions of non-native plant species by residents desiring to plant attractive water plants near their homes.

5.6 Sand Lake Treatment Effectiveness Monitoring Program

The purpose of the Sand Lake treatment effectiveness monitoring program is to determine changes in EWM coverage and changes in the lake's native plant community. A post-treatment survey will be completed during July of 2006 to determine presence or absence of EWM and to determine the response of the native plant community to the herbicide treatment and resultant changes in EWM coverage. Because EWM is a perennial, areas with EWM coverage during July of 2006 would be expected to contain EWM during the spring of 2007. Hence, the July 2006 monitoring event will determine the 2007 treatment area. The 2006 monitoring program, hence, will double as a post-treatment monitoring program for 2006 and a pre-treatment monitoring program for 2007.

The July 2006 monitoring program is comprised of a plant community assessment and an assessment to determine presence or absence of EWM.

5.6.1 Plant Community Assessment

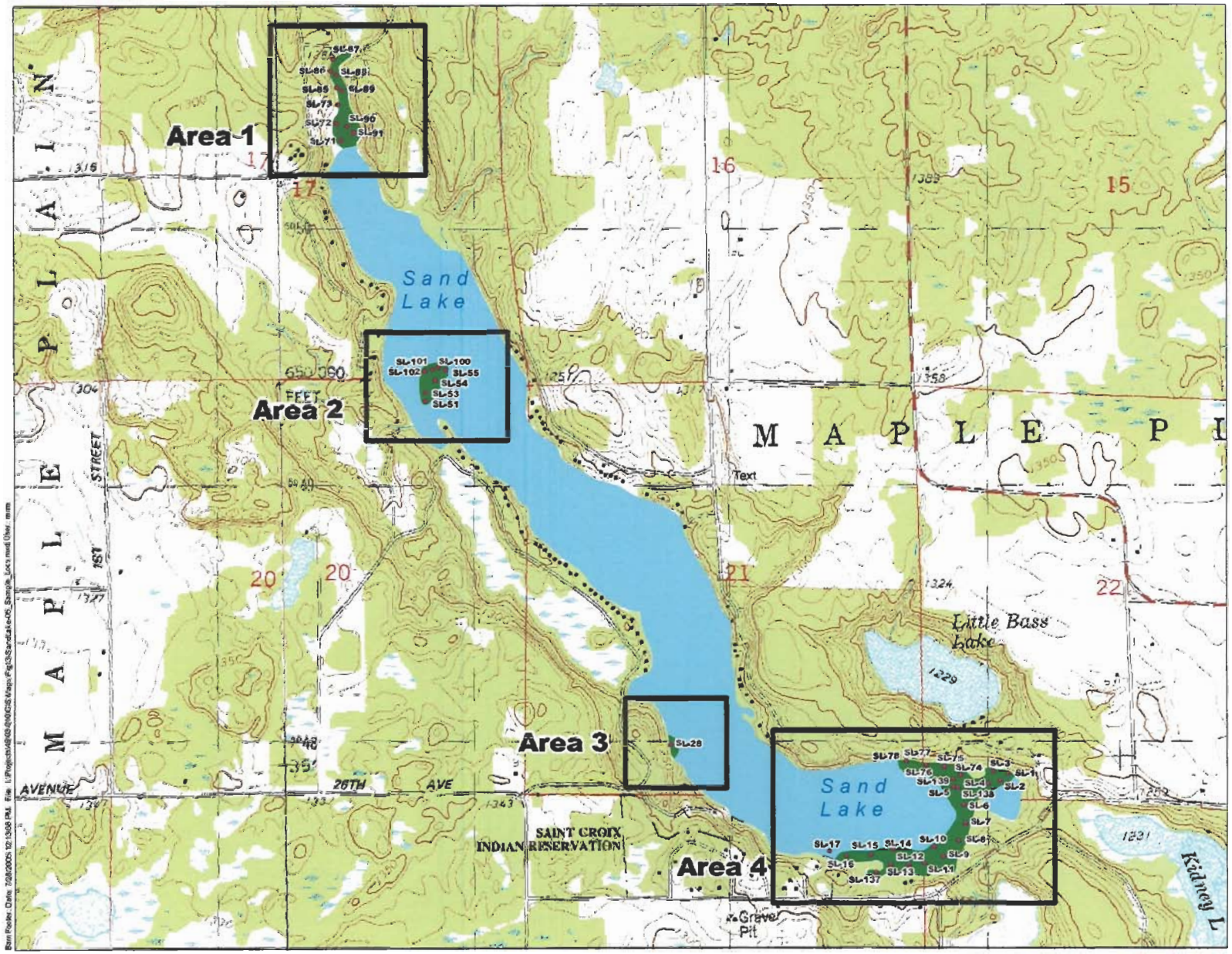
The plant community assessment will assess changes in the entire plant community within treatment areas, including EWM and native vegetation. 2006 sample locations for the plant community assessment will be the same as 2005 sample locations within treatment areas 1, 2, 3 and 4 and are shown in Figure 13. A total of 43 sample locations will be monitored. Specifically, 10 locations will be monitored in Area 1, 7 locations will be monitored in Area 2, 1 location will be monitored in Area 3, and 25 locations will be monitored in Area 4. Sample locations are at 225-foot intervals. 2006 sample methods for the plant community assessment will be consistent with 2005 sample methods. Monitoring will be completed by a professional with assistance from Sand Lake Management District volunteers.

Monitoring data from the 2006 plant community assessment will be compared with data from the 2005 Sand Lake Aquatic Plant Survey to determine treatment effectiveness and treatment effects on the native plant community.

5.6.2 Assessment to Determine Presence or Absence of EWM

Treatment effectiveness will be further evaluated by monitoring a large number of stations within and adjacent to the four treatment areas to determine presence or absence of EWM. Sample locations are at 75 foot intervals and are shown in Figures 14 through 20. A total of approximately 231 locations will be monitored. Approximately 25 locations will be monitored in Area 1, 61 locations in Area 2, 7 locations in Area 3, and 138 locations in Area 4. A Global Positioning System (GPS) will be used to record the location of each sample site.

At each sample location, a tethered garden rake with an extended handle or a tethered garden rake with a rope attached will be used to collect a sample. One rake toss will occur at each sample location. The plants collected on each rake sample will be examined to determine whether EWM is present or absent. The presence or absence of EWM will be recorded at each sample location. If present, representative EWM stems will be placed in a labeled Ziploc baggie. The identification of these EWM stems will be later confirmed by a professional. If northern milfoil is present in the sample areas, representative samples of northern milfoil will be placed in labeled Ziploc baggies. The identification of northern milfoil will be later confirmed by a professional. Monitoring for presence or absence of EWM will be completed by District volunteers.



Legend

- SAMPLE LOCATIONS AND IDENTIFICATION NO.

Feet
1,000 0 1,000

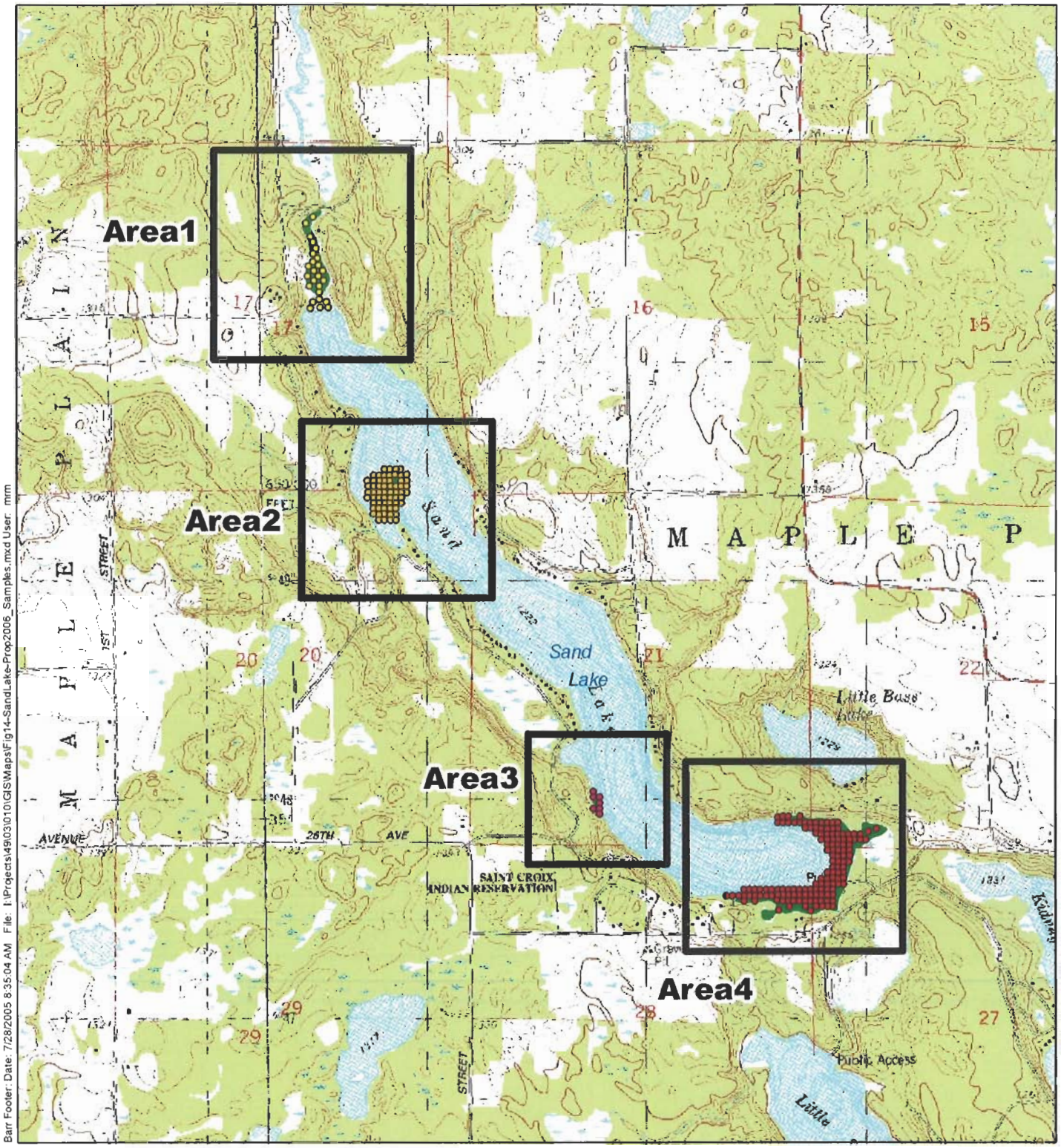
Meters
200 0 200 400

1:14,000

BARR

Figure 13

2006 SAMPLE LOCATIONS FOR COMMUNITY ASSESSMENT
Sand Lake



Legend

- 2006 Sample Locations Area 4
- 2006 Sample Locations Area 3
- 2006 Sample Locations Area 2
- 2006 Sample Locations Area 1

Feet
1,000 0 1,000 2,000

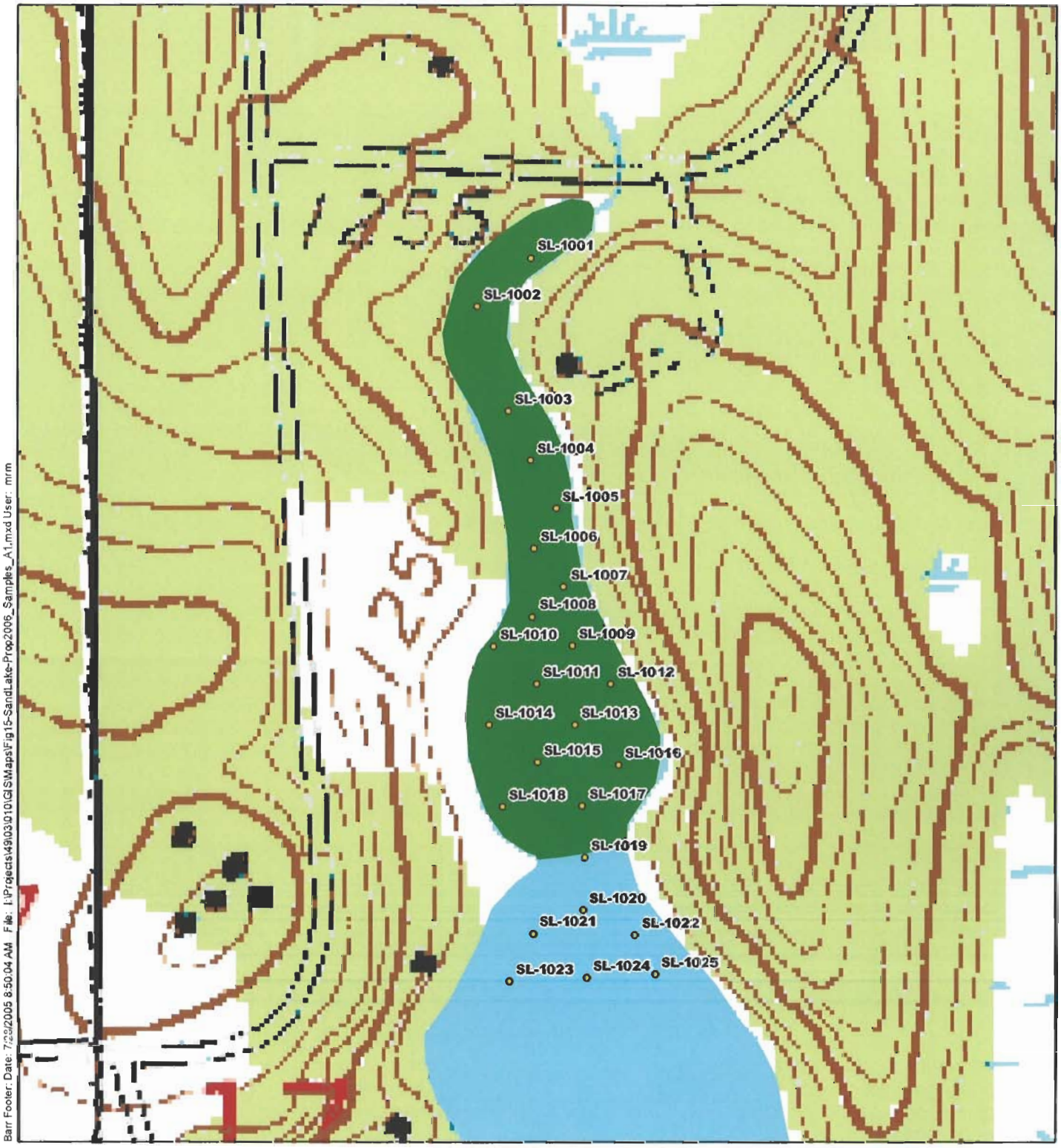
Meters
500 0 500

1:24,000

BARR

Figure 14

2006 SAMPLING LOCATIONS FOR EWM PRESENCE/ ABSENCE ASSESSMENT
Sand Lake



Legend

- ○ 2006 Sample Locations Area 1

N

Feet
200 0 200

Meters
50 0 50

1:3,000

BARR

Figure 15

AREA1
2006 SAMPLING LOCATIONS
FOR EWM PRESENCE
/ABSENCE ASSESSMENT
Sand Lake

Legend

- ○ 2006 Sample Locations Area 2

N

Feet
100 0 100

Meters
50 0 50

1:2,000

BARR

Figure 16

AREA 2
2006 SAMPLING LOCATIONS
FOR EWM PRESENCE/
ABSENCE ASSESSMENT
Sand Lake

Legend

- 2006 Sample Locations Area 3

N

Feet

50 0 50 100

Meters

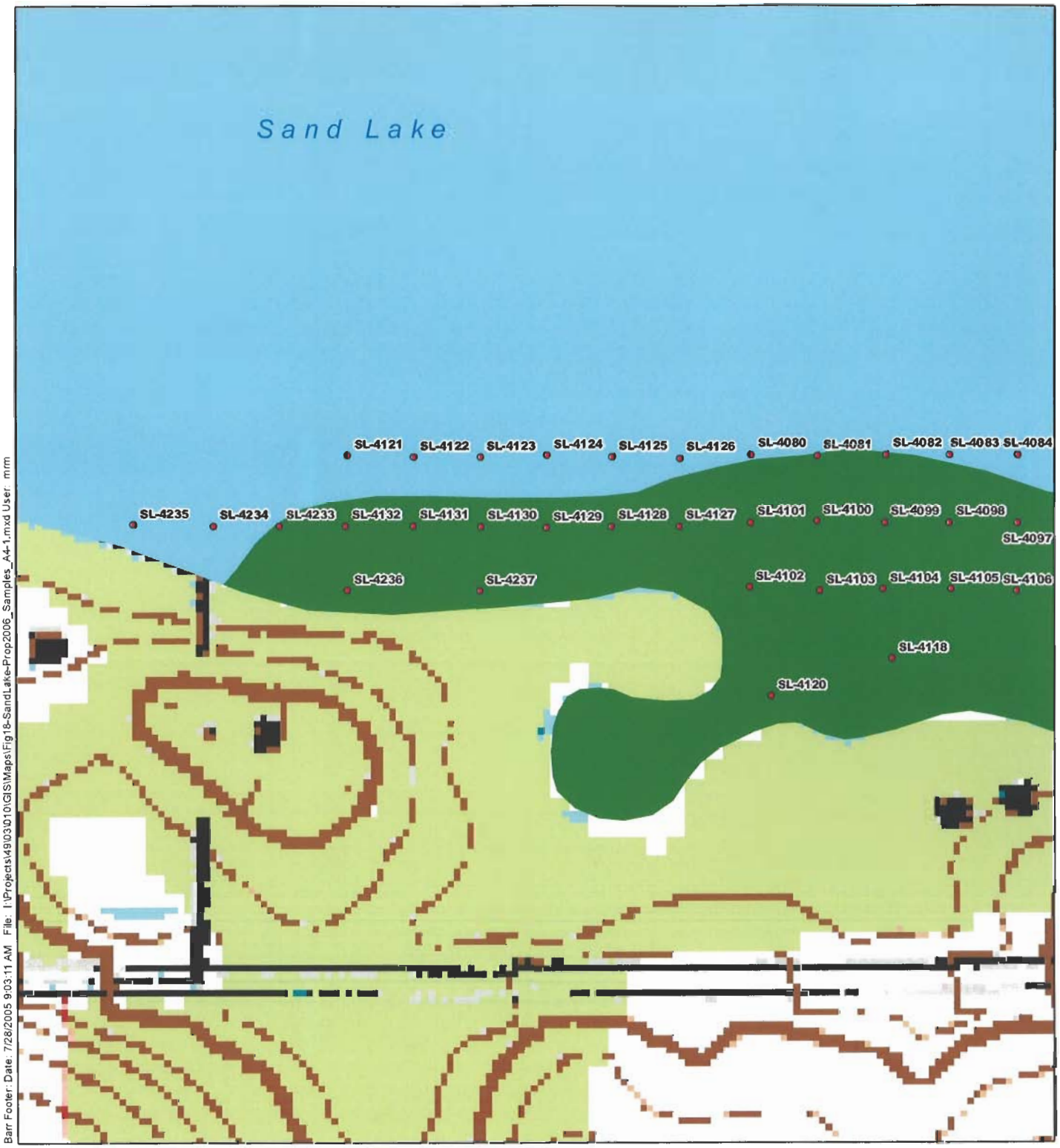
10 0 10 20

1:1,000

BARR

Figure 17

AREA 3
2006 SAMPLING LOCATIONS
FOR EWM PRESENCE/
ABSENCE ASSESSMENT
Sand Lake



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Legend

- 2006 Sample Locations Area 4

N

Feet
100 0 100

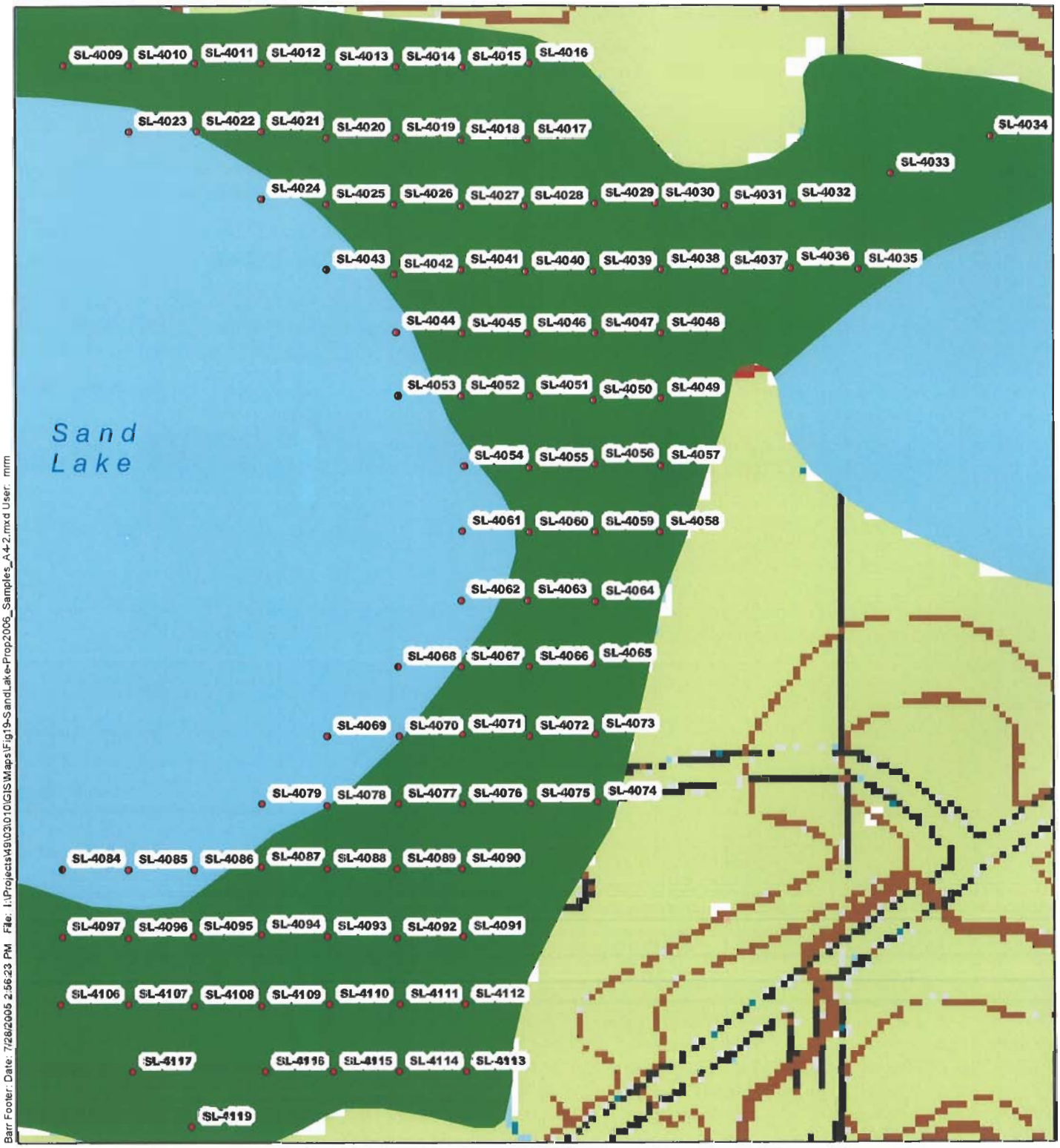
Meters
20 0 20 40

1:2,000

BARR

Figure 18

AREA 4-1
2006 SAMPLING LOCATIONS
FOR EWM PRESENCE/
ABSENCE ASSESSMENT
Sand Lake



Barr Footer: Date: 7/28/2005 2:56:23 PM File: I:\Projects\49103010\GIS\Maps\Fig19-SandLake-Prop2006_Samples_A4-2.mxd User: mrm

Legend

- 2006 Sample Locations Area 4

N

Feet
100 0 100

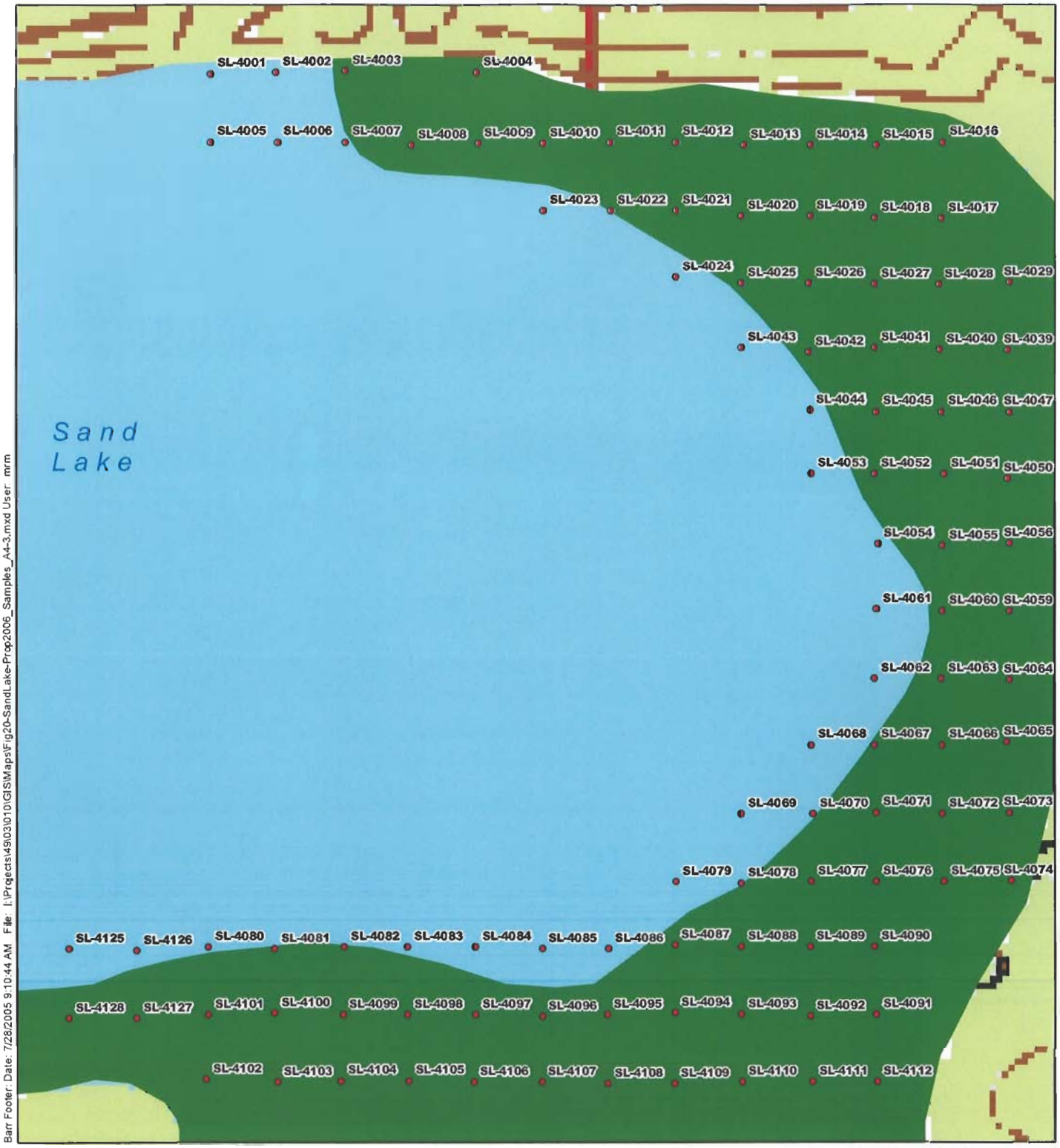
Meters
20 0 20 40

1:2,000

BARR

Figure 19

AREA 4-2
2006 SAMPLING LOCATIONS
FOR EWM PRESENCE/
ABSENCE ASSESSMENT
Sand Lake



Barr Footer: Date: 7/28/2005 9:10:44 AM File: I:\Projects\49\031\01\GIS\Maps\Fig20-SandLake-Prop2006_Samples_A4-3.mxd User: mrm

Legend

- 2006 Sample Locations Area 4

N

Feet

100 0 100 200

Meters

20 0 20 40

1:2,000

BARR

Figure 20

AREA 4-3
2006 SAMPLING LOCATIONS
FOR EWM PRESENCE/
ABSENCE ASSESSMENT
Sand Lake

5.6.3 Future Monitoring Programs

The 2006 plant community assessment and assessment to determine presence or absence of EWM will determine whether or not retreatment is warranted in 2007. If retreatment occurs in 2007, monitoring to determine treatment effectiveness will occur during July of 2007. The monitoring program will again be divided into plant community assessment and assessment to determine presence or absence of EWM. Sample locations for the plant community assessment will consist of 2005 sample locations which are located within the treatment area(s). Hence, sample locations will be at 225 foot intervals. Sample locations for the assessment to determine presence or absence of EWM will consist of locations at 75 foot intervals throughout the treatment area(s) and adjacent to the treatment area(s). 2006 sample locations located within the 2007 treatment area(s) will be used for the 2007 monitoring program. 2007 sample methods will be consistent with 2006 sample methods.

Should retreatment for EWM occur in subsequent years, the monitoring methodology outlined for 2006 and 2007 will consistently be used during each treatment year. Treatment will occur each May and sampling will occur each July. Sample results will be compared with data collected in previous year(s) to determine treatment effectiveness. In addition, the data will determine whether EWM treatment for the following year is warranted. Treatment results will also be used to determine whether a change in 2,4-D dose is warranted.

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Appendix A
2005 Sand Lake Frequency/Relative Diversity Data

2005 Sand Lake Macrophyte Frequency of Occurrence, Relative Frequency, and Diversity (June)

Lake: Sand

Sample Date: June 6-8, 2005

Species Name	Frequency of Occurrence	rf	rf/100	(rf/100)^2
Myriophyllum sibiricum	89.20863309	17.92	0.179	0.03211
Ceratophyllum demersum	73.38129496	14.74	0.147	0.02173
Zosterella dubia	69.78417266	14.02	0.140	0.001
Potamogeton zosteriformis	62.58992806	12.57	0.126	0.01581
Elodea canadensis	53.95683453	10.84	0.108	0.01175
Potamogeton amplifolius	34.5323741	6.94	0.069	0.00481
Potamogeton illinoensis	28.05755396	5.64	0.056	0.001
Potamogeton robbinsii	15.82733813	3.18	0.032	0.000
Ranunculus sp.	12.94964029	2.60	0.026	0.000
Myriophyllum spicatum	10.07194245	2.02	0.020	0.000
Potamogeton sp.	7.194244604	1.45	0.014	0.000
Nuphar advena	6.474820144	1.30	0.013	0.00017
Nuphar variegata	5.755395683	1.16	0.012	0.00013
Fontinalis antipyretica	4.316546763	0.87	0.009	0.00008
Chara spp.	3.597122302	0.72	0.007	0.000
Potamogeton natans	3.597122302	0.72	0.007	0.000
Nitella sp.	2.877697842	0.58	0.006	0.00003
Utricularia sp.	2.877697842	0.58	0.006	0.00003
Vallisneria americana	2.877697842	0.58	0.006	0.000
Potamogeton pectinatus	2.158273381	0.43	0.004	0.00002
Nymphaea odorata	1.438848921	0.29	0.003	0.00001
Potamogeton richardsonii	1.438848921	0.29	0.003	0.00001
Chlorophyceae	0.71942446	0.14	0.001	0.00000
Nymphaea tetragona	0.71942446	0.14	0.001	0.000
Nymphaea tuberosa	0.71942446	0.14	0.001	0.00000
Potamogeton gramineus	0.71942446	0.14	0.001	0.00000
TOTAL	497.8417266	100.00	1.000	0.08979
	Diversity = 1 - sum of (rf/100)^2		**Diversity**	**0.91021**

Appendix B
2005 Sand Lake Survey Data

Sand Lake **June 6-8, 2005**

SL-1	4.5	MUCK	TOTAL	Total Density at Station	N/A	3	2	3	2	2.50		N/A
SL-1	4.5	MUCK	NISP	*Nitella sp.*	stonewort	2	1			0.75		1
SL-1	4.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1	1	1	1.00		1
SL-1	4.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1	1	1.00		1
SL-1	4.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1			0.25		1
SL-1	4.5	MUCK	PONA	*Potamogeton natans*	floatingleaf pondweed		1	2	1	1.00		1
SL-1	4.5	MUCK	UTSP	*Utricularia sp.*	bladderwort					0.00	X	1
SL-1	4.5	MUCK	NUAD	*Nuphar advena*	yellow pondlily					0.00	X	2
SL-2	4.5	MUCK	TOTAL	Total Density at Station	N/A	4	2.5	4	3	3.38		N/A
SL-2	4.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	3	1	1	1	1.50		1
SL-2	4.5	MUCK	NUAD	*Nuphar advena*	yellow pondlily	1				0.25		2
SL-2	4.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1				0.25		1
SL-2	4.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	3	4	3	2.75		1
SL-2	4.5	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1				0.25		1
SL-2	4.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1			0.50		1
SL-2	4.5	MUCK	ZODU	*Zosterella dubia*	water stargrass	1				0.25		1
SL-2	4.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed					0.00	X	1
SL-2	4.5	MUCK	UTSP	*Utricularia sp.*	bladderwort					0.00	X	1
SL-3	4.0	MUCK	TOTAL	Total Density at Station	N/A	4	2.5	3	3	3.13		N/A
SL-3	4.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed	1				0.25		1
SL-3	4.0	MUCK	NUAD	*Nuphar advena*	yellow pondlily	1	1	1	1	1.00		2
SL-3	4.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1	1	1	1.00		1
SL-3	4.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	3	3	2	1	2.25		1
SL-3	4.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1		1		0.50		1
SL-3	4.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1	1	1	0.75		1
SL-3	4.0	MUCK	VAMM	*Vallisneria americana*	wild celery					0.00	X	1
SL-3	4.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil					0.00	X	1
SL-4	4.0	MUCK	TOTAL	Total Density at Station	N/A	5	4	3	2	3.50		N/A
SL-4	4.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed	4				1.00		1
SL-4	4.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	2	2	1	1.50		1
SL-4	4.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	4	2	1	2.00		1

Sand Lake **June 6-8, 2005**

Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-4	4.0	MUCK	NUAD	*Nuphar advena*	yellow pondlily	1.00		1.00	2.00	1.00		2	South Bay 60%
SL-4	4.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1.00				0.25		1	
SL-4	4.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1.00	1.00		0.50		1	
SL-4	4.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1.00		1.00	0.50		1	
SL-4	4.0	MUCK	ZODU	*Zosterella dubia*	water stargrass		1.00			0.25		1	
SL-4	4.0	MUCK	UTSP	*Utricularia sp.*	bladderwort			1.00	1.00	0.50		1	
SL-4	4.0	MUCK	VAAM	*Vallisneria americana*	wild celery					0.00	X	1	
SL-5	7.5	MUCK	TOTAL	Total Density at Station	N/A	5.00	4.00	5.00	5.00	4.75		N/A	
SL-5	7.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	5.00	1.00	5.00	2.00	3.25		1	
SL-5	7.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1.00	1.00	1.00	3.00	1.50		1	
SL-5	7.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1.00	3.00	1.00		1.25		1	
SL-5	7.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1.00			0.25		1	
SL-5	7.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed				1.00	0.25		1	
SL-6	8.0	SILT/GRAVEL	TOTAL	Total Density at Station	N/A	3.00	3.00	2.00	2.00	2.50		N/A	
SL-6	8.0	SILT/GRAVEL	CEDE	*Ceratophyllum demersum*	coontail	3.00	1.00	1.00	2.00	1.75		1	
SL-6	8.0	SILT/GRAVEL	ELCA	*Elodea canadensis*	Canada waterweed	1.00	2.00	2.00	1.00	1.50		1	
SL-6	8.0	SILT/GRAVEL	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1.00	1.00	1.00		0.75		1	
SL-6	8.0	SILT/GRAVEL	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil		2.00			0.50		1	
SL-7	5.5	MUCK	TOTAL	Total Density at Station	N/A	3.00	4.00	4.00	4.00	3.75		N/A	
SL-7	5.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1.00	1.00	1.00		0.75		1	
SL-7	5.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1.00	1.00	1.00	1.00	1.00		1	
SL-7	5.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	2.00	3.00		1.00	1.50		1	
SL-7	5.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1.00				0.25		1	
SL-7	5.5	MUCK	NUAD	*Nuphar advena*	yellow pondlily		1.00			0.25		2	
SL-7	5.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1.00	2.00	1.00	1.00		1	
SL-7	5.5	MUCK	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil			1.00	1.00	0.50		1	
SL-8	4.0	SILT	TOTAL	Total Density at Station	N/A	4.00	3.00	3.00	3.00	3.25		N/A	
SL-8	4.0	SILT	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil	2.00		1.00	1.00	1.00		1	

[1]Type (plant community): 1=submerged, 2=floating-leaf, 3=emergent

Sand Lake

June 6-8, 2005

Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-8	4.0	SILT	ELCA	*Elodea canadensis*	Canada waterweed	1	3	1	1	1.50		1	
SL-8	4.0	SILT	ZODU	*Zosterella dubia*	water stargrass	1		1		0.50		1	
SL-8	4.0	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1		1	0.75		1	
SL-8	4.0	SILT	NUAD				1		1	0.50		2	
SL-8	4.0	SILT	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1			0.25		1	
SL-8	4.0	SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1	1		0.50		1	
SL-8	4.0	SILT	CEDE	*Ceratophyllum demersum*	coontail			1		0.25		1	
SL-9	4.5	SILT	TOTAL	Total Density at Station	N/A	5	5	5	5	5.00		N/A	
SL-9	4.5	SILT	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1	1	1		0.75		1	
SL-9	4.5	SILT	ELCA	*Elodea canadensis*	Canada waterweed	1	1			0.50		1	
SL-9	4.5	SILT	CEDE	*Ceratophyllum demersum*	coontail	4	4	4	5	4.25		1	
SL-9	4.5	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1		1	0.50		1	
SL-9	4.5	SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1			0.25		1	
SL-9	4.5	SILT	POIL	*Potamogeton illinoensis*	Illinois pondweed		1			0.25		1	
SL-9	4.5	SILT	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil					0.00	X	1	
SL-10	7.0	SILT	TOTAL	Total Density at Station	N/A	4	3	3	4	3.50		N/A	
SL-10	7.0	SILT	CEDE	*Ceratophyllum demersum*	coontail	4	3	2	4	3.25		1	
SL-10	7.0	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	1	1	1.00		1	
SL-10	7.0	SILT	ELCA	*Elodea canadensis*	Canada waterweed	1		1	1	0.75		1	
SL-10	7.0	SILT	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1	1	1	0.75		1	
SL-10	7.0	SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1		0.25		1	
SL-10	7.0	SILT	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil				1	0.25		1	
SL-11	6.5	SILT	TOTAL	Total Density at Station	N/A	3	5	4	3	3.00		1	
SL-11	6.5	SILT	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1		2	1	1.00		1	
SL-11	6.5	SILT	CEDE	*Ceratophyllum demersum*	coontail	3	5	1	1	2.50		1	
SL-11	6.5	SILT	ELCA	*Elodea canadensis*	Canada waterweed			2	1	0.75		1	
SL-11	6.5	SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1	1	0.50		1	
SL-11	6.5	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil				1	0.25		1	
SL-11	6.5	SILT	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil					0.00	X	1	
SL-12	5.5	ROCK/SILT	TOTAL	Total Density at Station	N/A	3	2	3	5	3.25		N/A	
SL-12	5.5	ROCK/SILT	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1	1			0.50		1	

Sand Lake

June 6-8, 2005

Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-12	5.5	ROCK/SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2		1	1	1.00		1	
SL-12	5.5	ROCK/SILT	ELCA	*Elodea canadensis*	Canada waterweed	1	2	1	5	2.25		1	
SL-12	5.5	ROCK/SILT	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil					0.00	X	1	
SL-12	5.5	ROCK/SILT	CEDE	*Ceratophyllum demersum*	coontail			1		0.25		1	
SL-12	5.5	ROCK/SILT	POIL	*Potamogeton illinoensis*	Illinois pondweed			1		0.25		1	
SL-13	4.0	MUCK/SILT	TOTAL	Total Density at Station	N/A	4	1	4	4	3.25		N/A	
SL-13	4.0	MUCK/SILT	NISP	*Nitella sp.*	stonewort	3				0.75		1	
SL-13	4.0	MUCK/SILT	ELCA	*Elodea canadensis*	Canada waterweed	1	1	3	4	2.25		1	
SL-13	4.0	MUCK/SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1		1		0.50		1	
SL-13	4.0	MUCK/SILT	CEDE	*Ceratophyllum demersum*	coontail	1	1	2	1	1.25		1	
SL-13	4.0	MUCK\SILT	NUAD	*Nuphar advena*	yellow pondlily	1	1			0.50		2	
SL-13	4.0	MUCK/SILT	ZOOU	*Zosterella dubia*	water stargrass	1				0.25		1	
SL-13	4.0	MUCK/SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1			0.25		1	
SL-13	4.0	MUCK/SILT	POIL	*Potamogeton illinoensis*	Illinois pondweed			1		0.25		1	
SL-13	4.0	MUCK/SILT	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil					0.00	X	1	
SL-14	10.5	SILT	TOTAL	Total Density at Station	N/A	2	5	5	3				
SL-14	10.5	SILT	POIL	*Potamogeton illinoensis*	Illinois pondweed	1	1			0.50		1	
SL-14	10.5	SILT	CEDE	*Ceratophyllum demersum*	coontail	1	5	5	2	3.25		1	
SL-14	10.5	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1			1	0.50		1	
SL-14	10.5	SILT	ELCA	*Elodea canadensis*	Canada waterweed	1				0.25		1	
SL-14	10.5	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1	
SL-15	7.5	SILT/ROCK	TOTAL	Total Density at Station	N/A	4	3	2	5	3.50		N/A	
SL-15	7.5	SILT/ROCK	CEDE	*Ceratophyllum demersum*	coontail	3	1	1	5	2.50		1	
SL-15	7.5	SILT/ROCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	3	2	1	1.75		1	
SL-15	7.5	SILT/ROCK	ELCA	*Elodea canadensis*	Canada waterweed	1			1	0.50		1	
SL-15	7.5	SILT/ROCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1			0.25		1	
SL-15	7.5	SILT/ROCK	POIL	*Potamogeton illinoensis*	Illinois pondweed				1	0.25		1	
SL-16	7.0	GRAVEL	TOTAL	Total Density at Station	N/A	1	1	1	1	1.00		N/A	
SL-16	7.0	GRAVEL	CEDE	*Ceratophyllum demersum*	coontail	1				0.25		1	
SL-16	7.0	GRAVEL	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1			0.50		1	

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SL-16	7.0	GRAVEL	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1			0.50		1	
SL-16	7.0	GRAVEL	ZODU	*Zosterella dubia*	water stargrass	1	1		1	0.75		1	
SL-16	7.0	GRAVEL	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil			1		0.25		1	
SL-16	7.0	GRAVEL	POAM	*Potamogeton amplifolius*	largeleaf pondweed					0.00	X	1	
SL-17	5.0	SILT/SAND	TOTAL	Total Density at Station	N/A	1	1	0	1	0.75		N/A	
SL-17	5.0	SILT/SAND	CEDE	*Ceratophyllum demersum*	coontail	1				0.25		1	
SL-17	5.0	SILT/SAND	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1		1	0.50		1	
SL-17	5.0	SILT/SAND	ZODU	*Zosterella dubia*	water stargrass				1	0.25		1	
SL-18	6.0	ROCK	TOTAL	Total Density at Station	N/A	0	0	0	0	0.00		N/A	
SL-19	6.5	ROCK	TOTAL	Total Density at Station	N/A	1	0	1	1	0.75		N/A	
SL-19	6.5	ROCK	CEDE	*Ceratophyllum demersum*	coontail	1				0.25		1	
SL-19	6.5	ROCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil			1	1	0.50		1	
SL-20	6.5	SILT	TOTAL	Total Density at Station	N/A	4	3	4	4	3.75		N/A	
SL-20	6.5	SILT	ZODU	*Zosterella dubia*	water stargrass	3	3	4	1	2.75		1	
SL-20	6.5	SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1	1	1.00		1	
SL-20	6.5	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1		1	3	1.25		1	
SL-20	6.5	SILT	ELCA	*Elodea canadensis*	Canada waterweed		1		1	0.50		1	
SL-20	6.5	SILT	CEDE	*Ceratophyllum demersum*	coontail				1	0.25		1	
SL-20	6.5	SILT	NYSP	*Nymphaea sp.*	Unidentified waterlily					0.00	X	2	
SL-21	7.5	MUCK	TOTAL	Total Density at Station	N/A	2	3	2	4	2.75		N/A	
SL-21	7.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	1	1	1.00		1	
SL-21	7.5	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed	1	1			0.50		1	
SL-21	7.5	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	3	1	4	2.25		1	
SL-21	7.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1	1		0.50		1	
SL-21	7.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed			1	1	0.50		1	
SL-22	6.5	SAND/SILT	TOTAL	Total Density at Station	N/A	2	2	1	3	2.00		N/A	
SL-22	6.5	SAND/SILT	ZODU	*Zosterella dubia*	water stargrass	1	2	1	3	1.75		1	

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SL-22	6.5	SAND/SILT	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1	1			0.50		1	
SL-22	6.5	SAND/SILT	CEDE	*Ceratophyllum demersum*	coontail	1				0.25		1	
SL-22	6.5	SAND/SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1		1	0.50		1	
SL-22	6.5	SAND/SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil				1	0.25		1	
SL-23	6.0	SAND/SILT	TOTAL	Total Density at Station	N/A	1	2	1	3	1.75		N/A	
SL-23	6.0	SAND/SILT	ZODU	*Zosterella dubia*	water stargrass	1	2	1	3	1.75		1	
SL-23	6.0	SAND/SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1		1	0.50		1	
SL-23	6.0	SAND/SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1		1	0.50		1	
SL-24	10.0	SILT/ROCK	TOTAL	Total Density at Station	N/A	2	1	3	2	2.00		N/A	
SL-24	10.0	SILT/ROCK	CEDE	*Ceratophyllum demersum*	coontail	2	1	2	2	1.75		1	
SL-24	10.0	SILT/ROCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1	1	0.75		1	
SL-24	10.0	SILT/ROCK	ZODU	*Zosterella dubia*	water stargrass			1		0.25		1	
SL-25	6.5	SILT	TOTAL	Total Density at Station	N/A	2	5	4	4	3.75		N/A	
SL-25	6.5	SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1	1	1.00		1	
SL-25	6.5	SILT	ZODU	*Zosterella dubia*	water stargrass	2	5	1	1	2.25		1	
SL-25	6.5	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	3	3	2.00		1	
SL-26	6.5	SILT/SAND	TOTAL	Total Density at Station	N/A	2	1	3	4	2.50		N/A	
SL-26	6.5	SILT/SAND	ZODU	*Zosterella dubia*	water stargrass	1	1	3	4	2.25		1	
SL-26	6.5	SILT/SAND	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1				0.25		1	
SL-26	6.5	SILT/SAND	ELCA	*Elodea canadensis*	Canada waterweed	1				0.25		1	
SL-26	6.5	SILT/SAND	MYSI	*Myriophyllum sibiricum*	northern watermilfoil			1	1	0.50		1	
SL-26	6.5	SILT/SAND	CEDE	*Ceratophyllum demersum*	coontail				1	0.25		1	
SL-27	6.0	SILT/SAND	TOTAL	Total Density at Station	N/A	3	2	2	3	2.50		1	
SL-27	6.0	SILT/SAND	ZODU	*Zosterella dubia*	water stargrass	3	2	2	3	2.50		1	
SL-27	6.0	SILT/SAND	CEDE	*Ceratophyllum demersum*	coontail	1				0.25		1	
SL-27	6.0	SILT/SAND	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1		1	0.75		1	
SL-27	6.0	SILT/SAND	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1		1	0.50		1	
SL-28	6.5	SILT	TOTAL	Total Density at Station	N/A	2	2	2		1.50		N/A	
SL-28	6.5	SILT	ZODU	*Zosterella dubia*	water stargrass	1	1	2		1.00		1	two densities entered for cast 3
SL-28	6.5	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1				0.25		1	
SL-28	6.5	SILT	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil		1			0.25		1	

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SL-28	6.5	SILT	CEDE	*Ceratophyllum demersum*	coontail			1		0.25		1	
SL-29	5.0	SILT	TOTAL	Total Density at Station	N/A	0	1	4	1	1.50		1	
SL-29	5.0	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1		0.50		1	
SL-29	5.0	SILT	ZODU	*Zosterella dubia*	water stargrass		1	4		1.25		1	
SL-30	6.0	SILT	TOTAL	Total Density at Station	N/A	0	1	0	0	0.25		N/A	
SL-30	6.0	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1					1	
SL-30	6.0	SILT	ZODU	*Zosterella dubia*	water stargrass		1			0.25		1	
SL-31	10.0	MUCK	TOTAL	Total Density at Station	N/A	2	4	3	3	3.00		N/A	
SL-31	10.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2	4	3	3	3.00		1	
SL-31	10.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1		1	1	0.75		1	
SL-31	10.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1			0.50		1	
SL-31	10.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1	1	1	0.75		1	
SL-31	10.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1		1	0.50		1	
SL-32	4.0	MUCK	TOTAL	Total Density at Station	N/A	3	3	4	3	3.25		N/A	
SL-32	4.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1		1	0.75		1	
SL-32	4.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1	1		0.75		1	
SL-32	4.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1	1	1.00		1	
SL-32	4.0	MUCK	PONA	*Potamogeton natans*	floatingleaf pondweed	1		1	1	0.75		2	
SL-32	4.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1		1	0.50		1	
SL-32	4.0	MUCK	ZODU	*Zosterella dubia*	water stargrass			1	1	0.50		1	
SL-33	16.5	MUCK	TOTAL	Total Density at Station	N/A	1	1	2	1	1.25		1	
SL-33	16.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	2	1	1.25		1	
SL-33	16.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1	1		0.50		1	
SL-34	7.0	MUCK	TOTAL	Total Density at Station	N/A	3	3	2	5	3.25		N/A	
SL-34	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1			1	0.50		1	
SL-34	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	2	1		1.00		1	
SL-34	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2	1	1	5	2.25		1	
SL-34	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1		1	1	0.75		1	

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SL-35	4.5	SAND/SILT	TOTAL	Total Density at Station	N/A	5	4	1	0	2.50		N/A	
SL-35	4.5	SAND/SILT	ELCA	*Elodea canadensis*	Canada waterweed	5		1		1.50	X	1	
SL-35	4.5	SAND/SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1				0.25		1	
SL-35	4.5	SAND/SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1	
SL-35	4.5	SAND/SILT	CEDE	*Ceratophyllum demersum*	coontail		1			0.25		1	
SL-35	4.5	SAND/SILT	ZODU	*Zosterella dubia*	water stargrass		2	1		0.75		1	
SL-35	4.5	SAND/SILT	RASP	*Ranunculus sp.*	water crowfoot		1		0	0.25		1	
SL-36	5.0	MUCK	TOTAL	Total Density at Station	N/A	2	3	2	1	2.00		N/A	
SL-36	5.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1	1	1.00		1	
SL-36	5.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1			1	0.50		1	
SL-36	5.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2	1			0.75		1	
SL-36	5.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1				0.25		1	
SL-36	5.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1		0.75		1	
SL-36	5.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed			1		0.25		1	
SL-36	5.0	MUCK	RASP	*Ranunculus sp.*	water crowfoot			1	1	0.50		1	
SL-36	5.0	MUCK	ZODU	*Zosterella dubia*	water stargrass				1	0.25		1	
SL-37	5.0	MUCK	TOTAL	Total Density at Station	N/A	5	5	2	4	4.00		N/A	
SL-37	5.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	4	5		1	2.50		1	
SL-37	5.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1		1	0.75		1	
SL-37	5.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1				0.25		1	
SL-37	5.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1		0.75		1	
SL-37	5.0	MUCK	ZODU	*Zosterella dubia*	water stargrass		1	1	3	1.25		1	
SL-38	7.0	MUCK	TOTAL	Total Density at Station	N/A	4	5	2	4	3.75		N/A	
SL-38	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	3	5	1	4	3.25		1	
SL-38	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	2	1	1		1.00		1	
SL-38	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	1	1	1.00		1	
SL-38	7.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed	1				0.25		1	
SL-38	7.0	MUCK	POSP	*Potamogeton sp.*	narrow leaf pondweed	1				0.25		1	

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SL-39	5.0	MUCK	TOTAL	Total Density at Station	N/A	1	1	3	1	1.50		N/A	
SL-39	5.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1		1		0.50		1	
SL-39	5.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	2	1	1.25		1	
SL-39	5.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1		1	1	0.75		1	
SL-39	5.0	MUCK	NUVA	*Nuphar variegata*	spatterdock			1		0.25	X	2	
SL-39	5.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail				1	0.25		1	
SL-40	5.5	SILT/SAND	TOTAL	Total Density at Station	N/A	3	5	2	2	3.00		N/A	
SL-40	5.5	SILT/SAND	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	1		0.75		1	
SL-40	5.5	SILT/SAND	ZODU	*Zosterella dubia*	water stargrass	3	5	2	2	3.00		1	
SL-40	5.5	SILT/SAND	CEDE	*Ceratophyllum demersum*	coontail	1				0.25		1	
SL-40	5.5	SILT/SAND	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1	1	1	0.75		1	
SL-40	5.5	SILT/SAND	NUVA	*Nuphar variegata*	spatterdock				1	0.25		2	
SL-41	6.0	SILT/SAND	TOTAL	Total Density at Station	N/A	3	4	1	2	2.50		N/A	
SL-41	6.0	SILT/SAND	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2	1	1	1	1.25		1	
SL-41	6.0	SILT/SAND	POIL	*Potamogeton illinoensis*	Illinois pondweed	1		1	1	0.75		1	
SL-41	6.0	SILT/SAND	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1				0.25		1	
SL-41	6.0	SILT/SAND	ELCA	*Elodea canadensis*	Canada waterweed	1	1			0.50		1	
SL-41	6.0	SILT/SAND	ZODU	*Zosterella dubia*	water stargrass	1	4	1	1	1.75		1	
SL-41	6.0	SILT/SAND	POGR3	*Potamogeton gramineus*	grassleaved pondweed	1				0.25		1	
SL-41	6.0	SILT/SAND	CEDE	*Ceratophyllum demersum*	coontail		1			0.25		1	
SL-42	8.0	MUCK	TOTAL	Total Density at Station	N/A	2	3	2	1	2.00		N/A	
SL-42	8.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	2	3	2	1	2.00		1	
SL-42	8.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1		0.50		1	
SL-43	7.0	MUCK	TOTAL	Total Density at Station	N/A	2	1	5	2	2.50		N/A	
SL-43	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	2			2	1.00		1	
SL-43	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1	
SL-43	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1	5		1.50		1	

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SL-43	7.0	MUCK	NISP	*Nitella sp.*	stonewort		1			0.25		1	
SL-44	9.0	MUCK	TOTAL	Total Density at Station	N/A	3	3	3	3	3.00		N/A	
SL-44	9.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	3	3	3	3.00		1	
SL-44	9.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	1		0.75		1	
SL-44	9.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed			1	1	0.50		1	
SL-44	9.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed				1	0.25		1	
SL-45	7.5	MUCK	TOTAL	Total Density at Station	N/A	3	3	2	2	2.50		N/A	
SL-45	7.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	1	1	1	1.50		1	
SL-45	7.5	MUCK	POSP	*Potamogeton sp.*	narrow leaf pondweed	1	1			0.50		1	
SL-45	7.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1	1	1	0.75		1	
SL-46	8.0	SILT/SAND	TOTAL	Total Density at Station	N/A	2	2	1	1	1.50		N/A	
SL-46	8.0	SILT/SAND	ZODU	*Zosterella dubia*	water stargrass	2	2	1		1.25		1	
SL-46	8.0	SILT/SAND	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1			0.50		1	
SL-46	8.0	SILT/SAND	ELCA	*Elodea canadensis*	Canada waterweed			1	1	0.50		1	
SL-46	8.0	SILT/SAND	POIL	*Potamogeton illinoensis*	Illinois pondweed			1		0.25		1	
SL-47	6.0	SAND/GRAVEL	TOTAL	Total Density at Station	N/A	1	0	1	1	0.75		N/A	
SL-47	6.0	SAND/GRAVEL	ZODU	*Zosterella dubia*	water stargrass	1		1	1	0.75		1	
SL-47	6.0	SAND/GRAVEL	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1				0.25		1	
SL-48	5.0	SAND/GRAVEL	TOTAL	Total Density at Station	N/A	0	1	0	1	0.50		N/A	
SL-48	5.0	SAND/GRAVEL	ZODU	*Zosterella dubia*	water stargrass				1	0.25		1	
SL-48	5.0	SAND/GRAVEL	NYTL	*Nymphaea tetragona*	pygmy waterlily		1			0.25		2	
SL-49	7.0	MUCK	TOTAL	Total Density at Station	N/A	4	4	4	3	3.75		N/A	
SL-49	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	4	4	4	3	3.75		1	
SL-49	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1			1	0.50		1	
SL-49	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1			0.25		1	
SL-49	7.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed		1			0.25		1	
SL-49	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1	1	0.50		1	

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Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-50	8.0	MUCK	TOTAL	Total Density at Station	N/A	3	2	4	4	3.25		N/A	
SL-50	8.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2	1	3	3	2.25		1	
SL-50	8.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1	1	1.00		1	
SL-50	8.0	MUCK	ZODU	*Zosterella dubia*	water stargrass		1	1	1	0.75		1	
SL-51	15.0	MUCK	TOTAL	Total Density at Station	N/A	2	3	4	1	2.50		N/A	
SL-51	15.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	2	1	3	1	1.75		1	
SL-51	15.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1			1	0.50		1	
SL-51	15.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1	2	1		1.00		1	
SL-51	15.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1			0.25		1	
SL-51	15.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1	1	0.75		1	
SL-52	4.0	MUCK	TOTAL	Total Density at Station	N/A	5	4	3	3	3.75		N/A	
SL-52	4.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	2	2	3		1.75		1	
SL-52	4.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	4	3	1	3	2.75		1	
SL-52	4.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1				0.25		1	
SL-52	4.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1	1	1	0.75		1	
SL-52	4.0	MUCK	POSP	*Potamogeton sp.*	narrow leaf pondweed			1		0.25		1	
SL-53	10.0	MUCK	TOTAL	Total Density at Station	N/A	3	4	4	4	3.75		N/A	
SL-53	10.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1				0.25		1	
SL-53	10.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	4	3	3	3.25		1	
SL-53	10.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1	1	1.00		1	
SL-53	10.0	MUCK	POSP	*Potamogeton sp.*	narrow leaf pondweed	1	1		1	0.75		1	
SL-53	10.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed			1		0.25		1	
SL-54	9.5	MUCK	TOTAL	Total Density at Station	N/A	3	2	2	2	2.25		N/A	
SL-54	9.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1		1	1	0.75		1	
SL-54	9.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	2	1	1	1	1.25		1	
SL-54	9.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1	
SL-55	10.5	SILT	TOTAL	Total Density at Station	N/A	0	1	0	3	1.00		N/A	
SL-55	10.5	SILT	ELCA	*Elodea canadensis*	Canada waterweed	0	1	0		0.25		1	
SL-55	10.5	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil				3	0.75		1	

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Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-56	7.0	MUCK	TOTAL	Total Density at Station	N/A	3	1	3	2	2.25		N/A	
SL-56	7.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1	1	1	1	1.00		1	
SL-56	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	2	2	1.50		1	
SL-56	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1	1	0.75		1	
SL-56	7.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1			0.25		1	
SL-57	10.0		TOTAL	Total Density at Station	N/A	5	4	3	3	3.75		N/A	
SL-57	10.0		CEDE	*Ceratophyllum demersum*	coontail	5	4	3	3	3.75		1	
SL-57	10.0		ELCA	*Elodea canadensis*	Canada waterweed		1	1	1	0.75		1	
SL-57	10.0		MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1	
SL-57	10.0		FOAN	*Fontinalis antipyretica*	water moss				1	0.25		N/A	Growing on Lake Bottom
SL-58	7.0	MUCK	TOTAL	Total Density at Station	N/A	3	3	3	3	3.00		N/A	
SL-58	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	2	3	1	2.25		1	
SL-58	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	2	1	3	1.75		1	
SL-58	7.0	MUCK	RASP	*Ranunculus sp.*	water crowfoot	1				0.25		1	
SL-58	7.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed			1		0.25		1	
SL-59	9.0	MUCK	TOTAL	Total Density at Station	N/A	2	2	5	3	3.00		N/A	
SL-59	9.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	2	1	5	3	2.75		1	
SL-59	9.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1	1			0.50		1	
SL-59	9.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1			1	0.50		1	
SL-59	9.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed				1	0.25		1	
SL-60	9.0	MUCK/GRAVEL	TOTAL	*Total Density @ Station*	N/A	1	2	4	3	2.50		N/A	
SL-60	9.0	MUCK/GRAVEL	ZODU	*Zosterella dubia*	water stargrass	1	1		1	0.75		1	
SL-60	9.0	MUCK/GRAVEL	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	4	3	2.00		1	
SL-60	9.0	MUCK/GRAVEL	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1			0.25		1	
SL-61	6.5	SILT/GRAVEL	TOTAL	*Total Density @ Station*	N/A	3	2	3	2	2.50		N/A	
SL-61	6.5	SILT/GRAVEL	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	2	2	2	1.75		1	
SL-61	6.5	SILT/GRAVEL	ZODU	*Zosterella dubia*	water stargrass	1	1	1	1	1.00		1	
SL-61	6.5	SILT/GRAVEL	RASP	*Ranunculus sp.*	water crowfoot	1				0.25		1	
SL-61	6.5	SILT/GRAVEL	POZO	*Potamogeton zosteriformis*	flatstem pondweed				1	0.25		1	
SL-62	6.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	3	2	2	2.25		N/A	
SL-62	6.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	3	2	1	1.75		1	
SL-62	6.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1		1	1	0.75		1	
SL-62	6.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1	1	0.75		1	
SL-62	6.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1			0.25		1	
SL-62	6.0	MUCK	ZODU	*Zosterella dubia*	water stargrass		1			0.25		1	
SL-62	6.0	MUCK	POPE	*Potamogeton pectinatus*	sago pondweed				1	0.25		1	

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Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-63	8.0	MUCK	TOTAL	*Total Density @ Station*	N/A	3	2	4	3	3.00		N/A	
SL-63	8.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	2	4	3	3.00		1	
SL-63	8.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1	1		0.50		1	
SL-63	8.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed			1	1	0.50		1	
SL-63	8.0	MUCK	ZODU	*Zosterella dubia*	water stargrass			1		0.25		1	
SL-64	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	2	3	3	2.50		N/A	
SL-64	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2	2	2	2	2.00		1	
SL-64	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1	2	1.25		1	
SL-64	7.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed			1		0.25		1	
SL-65	8.0	ILT/GRAVEL/ROC	TOTAL	*Total Density @ Station*	N/A	1	1	1	1	1.00		N/A	
SL-65	8.0	ILT/GRAVEL/ROC	ZODU	*Zosterella dubia*	water stargrass	1	1	1	1	1.00		1	
SL-65	8.0	ILT/GRAVEL/ROC	MYSI	*Myriophyllum sibiricum*	northern watermilfoil			1		0.25		1	
SL-65	8.0	ILT/GRAVEL/ROC	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1		0.25		1	
SL-66	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	1	2	1	1.25		N/A	
SL-66	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	1	1	1.00		1	
SL-66	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	2	1	1.25		1	
SL-66	7.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed			1		0.25		1	
SL-67	6.0	MUCK	TOTAL	*Total Density @ Station*	N/A	3	4	2	3	3.00		N/A	
SL-67	6.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1		1	0.75		1	
SL-67	6.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	2	1	1	1.25		1	
SL-67	6.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	2	2	1.50		1	
SL-67	6.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1		1	0.50		1	
SL-68	5.5	SILT	TOTAL	*Total Density @ Station*	N/A	4	3	3	4	3.50		N/A	
SL-68	5.5	SILT	POAM	*Potamogeton amplifolius*	largeleaf pondweed	2	1	1	1	1.25		1	
SL-68	5.5	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2	1	2	3	2.00		1	
SL-68	5.5	SILT	ELCA	*Elodea canadensis*	Canada waterweed	1	2	1	1	1.25		1	
SL-68	5.5	SILT	CEDE	*Ceratophyllum demersum*	coontail		1	2	1	1.00		1	
SL-69	5.5	SILT/MUCK	TOTAL	*Total Density @ Station*	N/A	3	3	4	3	3.25		N/A	
SL-69	5.5	SILT/MUCK	CEDE	*Ceratophyllum demersum*	coontail	2	1	4	3	2.50		1	
SL-69	5.5	SILT/MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	2	1	1	1.25		1	
SL-69	5.5	SILT/MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1	1	1	1.00		1	
SL-69	5.5	SILT/MUCK	ZODU	*Zosterella dubia*	water stargrass	1		1		0.50		1	
SL-69	5.5	SILT/MUCK	NUBA	*Nuphar advena*	yellow pondlily					0.00	X	2	CLOSER TO SHORE
SL-69	5.5	SILT/MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed				1	0.25		1	
SL-70	5.5	MUCK	TOTAL	*Total Density @ Station*	N/A	5	3	4	2	3.50		N/A	
SL-70	5.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	5	3	4	1	3.25		1	
SL-70	5.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1				0.25		1	
SL-70	5.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1	1	1	1.00		1	
SL-70	5.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1			0.25		1	
SL-70	5.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil			1	1	0.50		1	
SL-70	5.5	MUCK	ZODU	*Zosterella dubia*	water stargrass			1		0.25		1	
SL-70	5.5	MUCK	RASP	*Ranunculus sp.*	water crowfoot				1	0.25		1	

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Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]
SL-71	4.5	MUCK	TOTAL	*Total Density @ Station*	N/A	3	3	3	4	3.25		N/A
SL-71	4.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1		1	1	0.75		1
SL-71	4.5	MUCK	ZODU	*Zosterella dubia*	water stargrass	2		1		0.75		1
SL-71	4.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1		1	1	0.75		1
SL-71	4.5	MUCK	RASP	*Ranunculus sp.*	water crowfoot		1	1		0.50		1
SL-71	4.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail		2	3	4	2.25		1
SL-71	4.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1	1	1	0.75		1
SL-71	4.5	MUCK	NYTU	*Nymphaea tuberosa*	white waterlily			1		0.25	X	2
SL-71	4.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil				1	0.25		1
SL-72	5.0	MUCK	TOTAL	*Total Density @ Station*	N/A	5	5	5	5	5.00		N/A
SL-72	5.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	5	5	5	5	5.00		1
SL-72	5.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1				0.25		1
SL-72	5.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1				0.25		1
SL-72	5.0	MUCK	NUBA	*Nuphar advena*	yellow pondlily					0.00	X	2
SL-72	5.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1		0.25		1
SL-73	6.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	4	3	3	3.00		N/A
SL-73	6.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1				0.25		1
SL-73	6.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1			1	0.50		1
SL-73	6.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	4	3	1	2.25		1
SL-73	6.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1
SL-73	6.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1	1	2	1.00		1
SL-73	6.0	MUCK	RASP	*Ranunculus sp.*	water crowfoot		1	1	1	0.75		1
SL-73	6.0	MUCK	ZODU	*Zosterella dubia*	water stargrass				1	0.25		1
SL-74	6.0	MUCK	TOTAL	*Total Density @ Station*	N/A	4	3	5	3	3.75		N/A
SL-74	6.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	3	2	2	3	2.50		1
SL-74	6.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	1	2	1.25		1
SL-74	6.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1		1	0.75		1
SL-74	6.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1	2	1	1.25		1
SL-74	6.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1	1	2		1.00		1
SL-74	6.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed				1	0.25		1

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Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]
SL-75	9.0	MUCK	TOTAL	*Total Density @ Station*	N/A	3	3	3	3	3.00		N/A
SL-75	9.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	2	3	1	3	2.25		1
SL-75	9.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	2	1	1.25		1
SL-75	9.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1	1	1.00		1
SL-75	9.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1		1		0.50		1
SL-75	9.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed		1			0.25		1
SL-75	9.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed			2		0.50		1
SL-76	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	3	1	2	1.75		N/A
SL-76	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	3	1	1	1.50		1
SL-76	7.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1	1		1	0.75		1
SL-76	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1			0.25		1
SL-76	7.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed					0.00	X	1
SL-76	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass			1	1	0.50		1
SL-76	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil				1	0.25		1
SL-77	10.0	SILT/GRAVEL	TOTAL	*Total Density @ Station*	N/A	1	1	1	2	1.25		N/A
SL-77	10.0	SILT/GRAVEL	UTSP	*Utricularia sp.*	bladderwort	1				0.25		1
SL-77	10.0	SILT/GRAVEL	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil	1	1	1	2	1.25		1
SL-77	10.0	SILT/GRAVEL	ZODU	*Zosterella dubia*	water stargrass				1	0.25		1
SL-78	8.5	SANDY SILT	TOTAL	*Total Density @ Station*	N/A	1	1	1	1	1.00		N/A
SL-78	8.5	SANDY SILT	ELCA	*Elodea canadensis*	Canada waterweed	1	1			0.50		1
SL-78	8.5	SANDY SILT	ZODU	*Zosterella dubia*	water stargrass	1	1		1	0.75		1
SL-78	8.5	SANDY SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1				0.25		1
SL-78	8.5	SANDY SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1		0.50		1
SL-78	8.5	SANDY SILT	RASP	*Ranunculus sp.*	water crowfoot			1		0.25		1
SL-78	8.5	SANDY SILT	PORO	*Potamogeton robbinsii*	Robbins' pondweed			1		0.25		1
SL-78	8.5	SANDY SILT	CEDE	*Ceratophyllum demersum*	coontail				1	0.25		1
SL-79	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	2	1	2	1.75		N/A
SL-79	7.0	MUCK	RASP	*Ranunculus sp.*	water crowfoot	1	1			0.50		1
SL-79	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1		0.75		1
SL-79	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1		1	0.75		1
SL-79	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1				0.25		1
SL-79	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		2	1	1	1.00		1

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Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]
SL-80	10.0	RAVEL/SILT/MUC	TOTAL	*Total Density @ Station*	N/A			1	1	0.50		N/A
SL-80	10.0	RAVEL/SILT/MUC	MYSI	*Myriophyllum sibiricum*	northern watermilfoil			1		0.25		1
SL-80	10.0	RAVEL/SILT/MUC	CEDE	*Ceratophyllum demersum*	coontail				1	0.25		1
SL-81	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	2	2	2	1.75		N/A
SL-81	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1		1	1	0.75		1
SL-81	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	2	2	2	1.75		1
SL-81	7.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed		1	1		0.50		1
SL-81	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1	1	0.50		1
SL-82	5.0	SAND/GRAVEL	TOTAL	*Total Density @ Station*	N/A	1	1	1	1	1.00		N/A
SL-82	5.0	SAND/GRAVEL	POIL	*Potamogeton illinoensis*	Illinois pondweed	1				0.25		1
SL-82	5.0	SAND/GRAVEL	CEDE	*Ceratophyllum demersum*	coontail		1	1	1	0.75		1
SL-82	5.0	SAND/GRAVEL	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1
SL-82	5.0	SAND/GRAVEL	ZODU	*Zosterella dubia*	water stargrass		1	1	1	0.75		1
SL-82	5.0	SAND/GRAVEL	RASP	*Ranunculus sp.*	water crowfoot			1		0.25		1
SL-82	5.0	SAND/GRAVEL	ELCA	*Elodea canadensis*	Canada waterweed			1		0.25		1
SL-83	7.5	MUCK	TOTAL	*Total Density @ Station*	N/A	2	1	1	1	1.25		N/A
SL-83	7.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2	1	1	1	1.25		1
SL-83	7.5	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1		1	0.75		1
SL-83	7.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1		0.25		1
SL-84	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	1	2	1	1.50		N/A
SL-84	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1		1		0.50		1
SL-84	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1		1	1	0.75		1
SL-84	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1				0.25		1
SL-84	7.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1			0.25		1
SL-84	7.0	MUCK	RASP	*Ranunculus sp.*	water crowfoot		1	1	1	0.75		1
SL-85	4.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	1	1	2	1.25		N/A
SL-85	4.0	MUCK	VAAM	*Vallisneria americana*	wild celery	1	1			0.50		1
SL-85	4.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	1	1	1.00		1
SL-85	4.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1	1	1.00		1
SL-85	4.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1		1	1	0.75		1
SL-85	4.0	MUCK	FOAN	*Fontinalis antipyretica*	water moss			1		0.25		1
SL-85	4.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil				1	0.25		1

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Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-86	5.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	2	1	2	1.50		N/A	MYSP PLANTS OBSERVED 40 FT EAST
SL-86	5.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1		0.75		1	EWM 4X4 FT GROWTH NUMEROUS PL
SL-86	5.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1				0.25		1	
SL-86	5.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1	1	2	1.00		1	
SL-86	5.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail			1		0.25		1	
SL-87	6.0	MUCK	TOTAL	*Total Density @ Station*	N/A	4	4	4	4	4.00		N/A	
SL-87	6.0	MUCK	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil		1	1		0.50	X	1	
SL-87	6.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	4	3	3	2	3.00		1	
SL-87	6.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	3	1	1	1.50		1	
SL-87	6.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1	4	1.75		1	
SL-87	6.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1				0.25		1	
SL-87	6.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1	1	0.75		1	
SL-88	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	3	3	2	3	2.75		N/A	
SL-88	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	3	3	1	1	2.00		1	
SL-88	7.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1	2	1	1.25		1	
SL-88	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1		1	0.50		1	
SL-88	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil			1	1	0.50		1	
SL-88	7.0	MUCK	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil					0.00	X	1	
SL-88	7.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed				1	0.25		1	
SL-89	5.0	SILT	TOTAL	*Total Density @ Station*	N/A	2	3	1	3	2.25		N/A	
SL-89	5.0	SILT	NUVA	*Nuphar variegata*	spatterdock					0.00	X	2	
SL-89	5.0	SILT	CEDE	*Ceratophyllum demersum*	coontail	1			1	0.50		1	
SL-89	5.0	SILT	ELCA	*Elodea canadensis*	Canada waterweed	1	3	1	1	1.50		1	
SL-89	5.0	SILT	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1				0.25		1	
SL-89	5.0	SILT	ZODU	*Zosterella dubia*	water stargrass		1		2	0.75		1	
SL-89	5.0	SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil			1	1	0.50		1	
SL-89	5.0	SILT	NISP	*Nitella sp.*	stonewort			1		0.25		1	
SL-90	6.5	MUCK	TOTAL	*Total Density @ Station*	N/A	4	4	4	5	4.25		N/A	
SL-90	6.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1	1	2	1	1.25		1	
SL-90	6.5	MUCK	FOAN	*Fontinalis antipyretica*	water moss					0.00		1	
SL-90	6.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	4	4	4	5	4.25		1	
SL-90	6.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1		1		0.50		1	
SL-90	6.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1			0.25		1	
SL-90	6.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed				1	0.25		1	
SL-91	5.0	MUCK	TOTAL	*Total Density @ Station*	N/A	3	3	4	2	3.00		N/A	
SL-91	5.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	3	2	1	1	1.75		1	
SL-91	5.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1		0.75		1	
SL-91	5.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1	1	1	0.75		1	
SL-91	5.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1	4		1.25		1	
SL-91	5.0	MUCK	ZODU	*Zosterella dubia*	water stargrass			1		0.25		1	

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Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-92	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	3	4	3	3	3.25		N/A	
SL-92	7.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1	1	1	1	1.00		1	
SL-92	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	3	4	1	2	2.50		1	
SL-92	7.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1		1	0.75		1	
SL-92	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1		1	1	0.75		1	
SL-92	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1	1	0.75		1	
SL-93	6.5	MUCK	TOTAL	*Total Density @ Station*	N/A	2	2	2	2	2.00		N/A	
SL-93	6.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1		1		0.50		1	
SL-93	6.5	MUCK	ZODU	*Zosterella dubia*	water stargrass	2	2	2	2	2.00		1	
SL-93	6.5	MUCK	RASP	*Ranunculus sp.*	water crowfoot	1	1	1		0.75		1	
SL-93	6.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed				1	0.25		1	
SL-93	6.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed				1	0.25		1	
SL-94	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	4	3	4	3	3.50		N/A	
SL-94	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	4	3	4	3	3.50		1	
SL-94	7.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1			0.25		1	
SL-94	7.0	MUCK	NUVA	*Nuphar variegata*	spatterdock					0.00	X	2	NEAR SHORE
SL-94	7.0	MUCK	RASP	*Ranunculus sp.*	water crowfoot			4		1.00		1	
SL-94	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass			1		0.25		1	
SL-94	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil				1	0.25		1	
SL-95	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	2	2	1	1.75		N/A	
SL-95	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	2	1	1	1.25		1	
SL-95	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1			1	0.50		1	
SL-95	7.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1	1	1		0.75		1	
SL-95	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1		0.75		1	
SL-95	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1	
SL-95	7.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed		1			0.25		1	
SL-95	7.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1	1	1	0.75		1	
SL-96	6.5	MUCK	TOTAL	*Total Density @ Station*	N/A	2	2	2	4	2.50		N/A	
SL-96	6.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	2	2	1	1	1.50		1	
SL-96	6.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1		1	1	0.75		1	
SL-96	6.5	MUCK	POSP	*Potamogeton sp.*	narrow leaf pondweed	1				0.25		1	
SL-96	6.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1	1	4	1.75		1	
SL-96	6.5	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed		1			0.25		1	
SL-96	6.5	MUCK	ZODU	*Zosterella dubia*	water stargrass			1	1	0.50		1	
SL-96	6.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed				1	0.25		1	

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Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-97	9.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	3	2	2	2.25		N/A	
SL-97	9.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1	1	1.00		1	
SL-97	9.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	2	2	1	1	1.50		1	
SL-97	9.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	1	1	1.00		1	
SL-97	9.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1		1	0.75		1	
SL-97	9.0	MUCK	PORI	*Potamogeton richardsonii*	Richardson's pondweed		1	1		0.50		1	
SL-97	9.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed			1		0.25		1	
SL-97	9.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed			1	1	0.50		1	
SL-98	3.5	SANDY SILT	TOTAL	*Total Density @ Station*	N/A	1	2	1	1	1.25		N/A	
SL-98	3.5	SANDY SILT	NUVA	*Nuphar variegata*	spatterdock					0.00	X	2	NEAR SHORE
SL-98	3.5	SANDY SILT	NUVA	*Nuphar variegata*	spatterdock	1	1	1		0.75		2	
SL-98	3.5	SANDY SILT	PORO	*Potamogeton robbinsii*	Robbins' pondweed	1				0.25		1	
SL-98	3.5	SANDY SILT	ELCA	*Elodea canadensis*	Canada waterweed	1	1		1	0.75		1	
SL-98	3.5	SANDY SILT	RASP	*Ranunculus sp.*	water crowfoot		2			0.50		1	
SL-98	3.5	SANDY SILT	POIL	*Potamogeton illinoensis*	Illinois pondweed			1	1	0.50		1	
SL-99	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	2	2	1	1.75		N/A	
SL-99	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	2	2	2	1	1.75		1	
SL-99	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1	1		0.50		1	
SL-99	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1	1	0.75		1	
SL-99	7.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed		1		1	0.50		1	
SL-100	10.0	MUCK	TOTAL	*Total Density @ Station*	N/A	3	2	2	1	2.00		N/A	
SL-100	10.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	2		1	1.50		1	
SL-100	10.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1	1	1	1	1.00		1	
SL-100	10.0	MUCK	MYSP	*Myriophyllum spicatum*	eurasian watermilfoil	1	1	1	1	1.00		1	
SL-100	10.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1				0.25		1	
SL-100	10.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed				1	0.25		1	
SL-100	10.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed				1	0.25		1	
SL-101	11.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	3	2	3	2.25		N/A	
SL-101	11.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	3	2	3	2.25		1	
SL-101	11.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1				0.25		1	
SL-101	11.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1			0.50		1	
SL-101	11.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1			0.25		1	
SL-101	11.0	MUCK	ZODU	*Zosterella dubia*	water stargrass				1	0.25		1	

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Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-102	8.5	MUCK	TOTAL	*Total Density @ Station*	N/A	3	3	3	3	3.00		N/A	
SL-102	8.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	3	3	3	3.00		1	
SL-102	8.5	MUCK	POSP	*Potamogeton sp.*	narrow leaf pondweed	1		1		0.50		1	
SL-102	8.5	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1	1			0.50		1	
SL-102	8.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail			1	1	0.50		1	
SL-103	8.0	SILTY-SAND	TOTAL	*Total Density @ Station*	N/A	3	2	4	4	4.00		N/A	
SL-103	8.0	SILTY-SAND	CEDE	*Ceratophyllum demersum*	coontail	3		4	4	2.75		1	
SL-103	8.0	SILTY-SAND	ZODU	*Zosterella dubia*	water stargrass	1	2	1	1	1.25		1	
SL-103	8.0	SILTY-SAND	POIL	*Potamogeton illinoensis*	Illinois pondweed		1	1	1	0.75		1	
SL-103	8.0	SILTY-SAND	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1	
SL-103	8.0	SILTY-SAND	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1	1	4	1.50		1	
SL-104	8.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	1	4	3	2.50		N/A	
SL-104	8.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed	1		4	3	2.00		1	
SL-104	8.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	1	1	1.00		1	
SL-104	8.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1			1	0.50		1	
SL-104	8.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1		0.75		1	
SL-104	8.0	MUCK	ZODU	*Zosterella dubia*	water stargrass		1	1	1	0.75		1	
SL-105	7.5	SANDY-GRAVEL	TOTAL	*Total Density @ Station*	N/A	0	1	0	1	0.50		N/A	
SL-105	7.5	SANDY-GRAVEL	ZODU	*Zosterella dubia*	water stargrass		1		1	0.50		1	
SL-106	6.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	1	1	1	1.00		N/A	
SL-106	6.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	1	1	1.00		1	
SL-106	6.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil				1	0.25		1	
SL-107	6.5	SANDY-MUCK	TOTAL	*Total Density @ Station*	N/A	2	2	1	2	1.75		N/A	
SL-107	6.5	SANDY-MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	1	2	1.25		1	
SL-107	6.5	SANDY-MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	1	1	1.00		1	
SL-107	6.5	SANDY-MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed		1		1	0.50		1	
SL-107	6.5	SANDY-MUCK	RASP	*Ranunculus sp.*	water crowfoot			1		0.25		1	
SL-107	6.5	SANDY-MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1		0.25		1	

[1]Type (plant community): 1=submerged, 2=floating-leaf, 3=emergent

Sand Lake

June 6-8, 2005

Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-108	8.5	MUCKY-SILT	TOTAL	*Total Density @ Station*	N/A	1	2	2	1	1.50		N/A	
SL-108	8.5	MUCKY-SILT	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	2	1	1.25		1	
SL-108	8.5	MUCKY-SILT	ZODU	*Zosterella dubia*	water stargrass	1		1	1	0.75		1	
SL-108	8.5	MUCKY-SILT	VAAM	*Vallisneria americana*	wild celery	1				0.25		1	
SL-108	8.5	MUCKY-SILT	ELCA	*Elodea canadensis*	Canada waterweed		1			0.25		1	
SL-108	8.5	MUCKY-SILT	CHSP	*Chara spp.*	muskgrass		1			0.25		1	
SL-108	8.5	MUCKY-SILT	POPE	*Potamogeton pectinatus*	sago pondweed			1		0.25		1	
SL-108	8.5	MUCKY-SILT	POSP	*Potamogeton sp.*	narrow leaf pondweed			1		0.25		1	
SL-109	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	3	2	3	2.50		N/A	
SL-109	7.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1		1		0.50		1	
SL-109	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	2	2	1	1.50		1	
SL-109	7.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed	1			2	0.75		1	
SL-109	7.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed		1			0.25		1	
SL-109	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail			1		0.25		1	
SL-109	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed				1	0.25		1	
SL-110	3.5	SANDY-SILT	TOTAL	*Total Density @ Station*	N/A	4	4	5	4	4.25		N/A	
SL-110	3.5	SANDY-SILT	CHSP	*Chara spp.*	muskgrass	4	4	5	4	4.25		1	
SL-110	3.5	SANDY-SILT	POAM	*Potamogeton amplifolius*	largeleaf pondweed					0.00	X	1	
SL-110	3.5	SANDY-SILT	PORI	*Potamogeton richardsonii*	Richardson's pondweed					0.00	X	1	60 ft East
SL-111	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	3	4	5	4	4.00		N/A	
SL-111	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	1		3	1.75		1	
SL-111	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	4	4	2	2.75		1	
SL-111	7.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1	1	1	0.75		1	
SL-111	7.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1	1	1	0.75		1	
SL-112	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	4	3	3	2	3.00		N/A	
SL-112	7.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1	1	1		0.75		1	
SL-112	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	2	2	2	1	1.75		1	
SL-112	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2	2	1	1	1.50		1	
SL-112	7.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1				0.25		1	
SL-112	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass		1	1	1	0.75		1	
SL-112	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed				1	0.25		1	
SL-112	7.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed				1	0.25		1	

Sand Lake

June 6-8, 2005

Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-113	6.5	MUCK	TOTAL	*Total Density @ Station*	N/A	1	1	1	1	1.00		N/A	
SL-113	6.5	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	1		0.75		1	
SL-113	6.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1	1	1	0.75		1	
SL-113	6.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1	
SL-113	6.5	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed				1	0.25		1	
SL-113	6.5	MUCK	CHSP	*Chara spp.*	muskgrass				1	0.25		1	
SL-114	12.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	4	3	4	3.00		N/A	
SL-114	12.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1				0.25		1	
SL-114	12.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		4	2	4	2.50		1	
SL-114	12.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1	2	1	1.00		1	
SL-114	12.0	MUCK	NUVA	*Nuphar variegata*	spatterdock					0.00	X	2	
SL-114	12.0	MUCK	ZODU	*Zosterella dubia*	water stargrass			1	1	0.50		1	
SL-114	12.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed			1		0.25		1	
SL-114	12.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed				1	0.25		1	
SL-115	8.5	MUCK	TOTAL	*Total Density @ Station*	N/A	3	5	3	3	3.50		N/A	
SL-115	8.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	1	1	3	2.00		1	
SL-115	8.5	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1	1	2	1	1.25		1	
SL-115	8.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	5	1		1.75		1	
SL-115	8.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1		1	0.50		1	
SL-115	8.5	MUCK	ZUDU	*Zosterella dubia*	water stargrass		1			0.25		1	
SL-116	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	1	1	1	1.00		N/A	
SL-116	7.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1				0.25		1	
SL-116	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1		1	1	0.75		1	
SL-116	7.0	MUCK	POPE	*Potamogeton pectinatus*	sago pondweed	1	1	1		0.75		1	
SL-116	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	1		0.75		1	
SL-116	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed					0.00	X	1	
SL-117	7.5	MUCK	TOTAL	*Total Density @ Station*	N/A	4	3	4	3	3.50		N/A	
SL-117	7.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	4	1	3	1	2.25		1	
SL-117	7.5	MUCK	ZODU	*Zosterella dubia*	water stargrass	0	1	1	0	0.50		1	
SL-117	7.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	0	2	1	2	1.25		1	
SL-117	7.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	0	0	1	0	0.25		1	
SL-117	7.5	MUCK	FOAN	*Fontinalis antipyretica*	water moss	0	0	1	1	0.50		1	
SL-117	7.5	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed	0	0	0	1	0.25		1	
SL-117	7.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	0	0	0	1	0.25		1	

[1]Type (plant community): 1=submerged, 2=floating-leaf, 3=emergent

Sand Lake

June 6-8, 2005

Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]
SL118	10.0	MUCK	TOTAL	*Total Density @ Station*	N/A	3	4	3	4	3.50		N/A
SL118	10.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1				0.25		1
SL118	10.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	2	2	1	1	1.50		1
SL118	10.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1				0.25		1
SL118	10.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	3	1	3	2.00		1
SL118	10.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		2	1		0.75		1
SL118	10.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed			2	1	0.75		1
SL118	10.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed				1	0.25		1
SL-119	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	5	3	4	4	4.00		N/A
SL-119	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	5	1	1	3	2.50		1
SL-119	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1		1	1	0.75		1
SL-119	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	2		1.00		1
SL-119	7.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1	1	1	0.75		1
SL-119	7.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1	1	1	0.75		1
SL-119	7.0	MUCK	PONA	*Potamogeton natans*	floatingleaf pondweed		1			0.25		2
SL-119	7.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed			1		0.25		1
SL-119	7.0	MUCK	FOAN	*Fontinalis antipyretica*	water moss				1	0.25		1
SL-120	6.5	MUCK	TOTAL	*Total Density @ Station*	N/A	3	3	3	2	2.75		N/A
SL-120	6.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	2	1	1	1.75		1
SL-120	6.5	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	2	2	2	1.75		1
SL-120	6.5	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1		1		0.50		1
SL-120	6.5	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1		1	0.50		1
SL-120	6.5	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1			0.25		1
SL-120	6.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1		0.25		1
SL-120	6.5	MUCK	GRAL	*Green Algae*	N/A					0.00	X	N/A
SL-120	6.5	MUCK	RASP	*Ranunculus sp.*	water crowfoot				1	0.25		1
SL-121	9.0	MUCK	TOTAL	*Total Density @ Station*	N/A	3	3	4	2	3.00		N/A
SL-121	9.0	MUCK	FOAN	*Fontinalis antipyretica*	water moss	1	1			0.50		1
SL-121	9.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	3	1	1		1.25		1
SL-121	9.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1		1		0.50		1
SL-121	9.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		2	3	2	1.75		1

Sand Lake **June 6-8, 2005**

Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]
SL-122	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	2	5	2	2.75		N/A
SL-122		MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	2	2	3	2	2.25		1
SL-122		MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1				0.25		1
SL-122		MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	1		0.75		1
SL-122		MUCK	CEDE	*Ceratophyllum demersum*	coontail			2	1	0.75		1
SL-123	8.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	2	3	3	2.50		N/A
SL-123		MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	2	2	1.50		1
SL-123		MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1	2	2	1.50		1
SL-123		MUCK	ZODU	*Zosterella dubia*	water stargrass	1		1		0.50		1
SL-123		MUCK	PONA	*Potamogeton natans*	floatingleaf pondweed		1		1	0.50		2
SL-124	7.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	2	2	2	1.75		N/A
SL-124	7.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1		1	0.75		1
SL-124	7.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	2			0.75		1
SL-124	7.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	2	1	1.00		1
SL-124	7.0	MUCK	POSP	*Potamogeton sp.*	narrow leaf pondweed			1		0.25		1
SL-124	7.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed				1	0.25		1
SL-124	7.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed				1	0.25		1
SL-124	7.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail				1	0.25		1
SL-125	5.0	SILTY-SAND	TOTAL	*Total Density @ Station*	N/A	2	2	1	2	1.75		N/A
SL-125	5.0	SILTY-SAND	PORO	*Potamogeton robbinsii*	Robbins' pondweed	1	1	1		0.75		1
SL-125	5.0	SILTY-SAND	POAM	*Potamogeton amplifolius*	largeleaf pondweed	1				0.25		1
SL-125	5.0	SILTY-SAND	ELCA	*Elodea canadensis*	Canada waterweed	1	1	1	1	1.00		1
SL-125	5.0	SILTY-SAND	POSP	*Potamogeton sp.*	narrow leaf pondweed	1				0.25		1
SL-125	5.0	SILTY-SAND	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1	1		0.50		1
SL-125	5.0	SILTY-SAND	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1		1	0.50		1
SL-125	5.0	SILTY-SAND	ZODU	*Zosterella dubia*	water stargrass		1		1	0.50		1
SL-125	5.0	SILTY-SAND	POIL	*Potamogeton illinoensis*	Illinois pondweed				1	0.25		1
SL-125	5.0	SILTY-SAND	CHSP	*Chara spp.*	muskgrass				1	0.25		1
SL-126	10.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	4	4	3	3.00		N/A
SL-126	10.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	4	4	3	3.00		1
SL-126	10.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1		0.75		1
SL-126	10.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1			1	0.50		1
SL-126	10.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1	1	1	0.75		1

[1]Type (plant community): 1=submerged, 2=floating-leaf, 3=emergent

Sand Lake

June 6-8, 2005

Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]
SL-127	8.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	2	2	1	1.50		N/A
SL-127	8.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1	1	1	1	1.00		1
SL-127	8.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1			0.25		1
SL-127	8.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1		0.50		1
SL-127	8.0	MUCK	ZODU	*Zosterella dubia*	water stargrass			1	1	0.50		1
SL-128	8.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	2	3	4	2.50		N/A
SL-128	8.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	2	3	3	2.25		1
SL-128	8.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1				0.25		1
SL-128	8.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		1		1	0.50		1
SL-128	8.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1		0.25		1
SL-128	8.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed			1	2	0.75		1
SL-128	8.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed			1	1	0.50		1
SL-129	7.5	MUCK	TOTAL	*Total Density @ Station*	N/A	1	2	3	2	2.00		N/A
SL-129	7.5	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	2	2	1	1.50		1
SL-129	7.5	MUCK	PONA	*Potamogeton natans*	floatingleaf pondweed	1				0.25		2
SL-129	7.5	MUCK	ZODU	*Zosterella dubia*	water stargrass		1	1	2	1.00		1
SL-129	7.5	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1	1	0.50		1
SL-130	8.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	2	3	2	2.00		N/A
SL-130	8.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1	1	1	1	1.00		1
SL-130	8.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	2	2	1.50		1
SL-130	8.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	2		1	1.00		1
SL-130	8.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail			1		0.25		1
SL-130	8.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1		0.25		1
SL-131	9.5	SILTY-SAND	TOTAL	*Total Density @ Station*	N/A	2	3	2	2	2.25		N/A
SL-131	9.5	SILTY-SAND	ZODU	*Zosterella dubia*	water stargrass	2	2	1	1	1.50		1
SL-131	9.5	SILTY-SAND	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	2	2	1.50		1
SL-131	9.5	SILTY-SAND	POIL	*Potamogeton illinoensis*	Illinois pondweed		1	1		0.50		1
SL132	7.5	MUCK/SAND	TOTAL	*Total Density @ Station*	N/A	1	2	1	1	1.25		N/A
SL132		MUCK/SAND	ZODU	*Zosterella dubia*	water stargrass	1	2	1	1	1.25		1
SL132		MUCK/SAND	RASP	*Ranunculus sp.*	water crowfoot		1	1		0.50		1
SL132		MUCK/SAND	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1	1		0.50		1
SL132		MUCK/SAND	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1		0.25		1
SL132		MUCK/SAND	CHSP	*Chara spp.*	muskgrass				1	0.25		1

Sand Lake

June 6-8, 2005

Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-133	9.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	2	3	1	2.00		N/A	
SL-133	9.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	2	1	1.25		1	
SL-133	9.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	1	1	1.00		1	
SL-133	9.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1	1	0.50		1	
SL-133	9.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1	1		0.50		1	
SL-133	9.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed		1			0.25		1	
SL-134	8.0	MUCK	TOTAL	*Total Density @ Station*	N/A	4	3	3	4	3.50		N/A	
SL-134	8.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	4	3	1	1	2.25		1	
SL-134	8.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	1	1		1	0.75		1	
SL-134	8.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed	1	1	1	1	1.00		1	
SL-134	8.0	MUCK	ZODU	*Zosterella dubia*	water stargrass	1	1	2	1	1.25		1	
SL-134	8.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed		1	1	1	0.75		1	
SL-134	8.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed			1		0.25		1	
SL-134	8.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed					0.00	X	1	
SL-134	8.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed				1	0.25		1	
SL-135	9.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	3	2	4	2.50		N/A	
SL-135	9.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	2		1.00		1	
SL-135	9.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail		3		4	1.75		1	
SL-135	9.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed		1		1	0.50		1	
SL-135	9.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed			1		0.25		1	
SL-135	9.0	MUCK	ZODU	*Zosterella dubia*	water stargrass			1		0.25		1	
SL-135	9.0	MUCK	RASP	*Ranunculus sp.*	water crowfoot			1		0.25		1	
SL-135	9.0	MUCK	POSP	*Potamogeton sp.*	narrow leaf pondweed	1				0.25		1	
SL-136	8.0	MUCK	TOTAL	*Total Density @ Station*	N/A	1	2	2	2	1.75		N/A	
SL-136	8.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil	1	1	2	2	1.50		1	
SL-136	8.0	MUCK	POZO	*Potamogeton zosteriformis*	flatstem pondweed		1			0.25		1	
SL-136	8.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed				1	0.25		1	
SL-137	4.0	MUCK	TOTAL	*Total Density @ Station*	N/A	4	5	5	5	4.75		N/A	
SL-137	4.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	4	5	5	5	4.75		1	
SL-137	4.0	MUCK	NUVA	*Nuphar variegata*	spatterdock	1				0.25		2	70% of Bay NUVA
SL-137	4.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1	1	1	1.00		1	
SL-137	4.0	MUCK	PORO	*Potamogeton robbinsii*	Robbins' pondweed		1			0.25		1	

Sand Lake

June 6-8, 2005

Transect or Point	Depth (ft)	Substrate Type	Species Code	Species (Scientific Name)	Species (Common name)	Density Rating Cast # 1	Density Rating Cast # 2	Density Rating Cast # 3	Density Rating Cast # 4	Average Density	Observed (x)	Type[1]	Comments
SL-138	11.0	MUCK	TOTAL	*Total Density @ Station*	N/A	2	3	4	4	3.25		N/A	
SL-138	11.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	2	3	3	4	3.00		1	
SL-138	11.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed	1	1	1	1	1.00		1	
SL-138	11.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed		1	1	1	0.75		1	
SL-138	11.0	MUCK	MYSI	*Myriophyllum sibiricum*	northern watermilfoil		1			0.25		1	
SL-139	9.0	MUCK	TOTAL	*Total Density @ Station*	N/A	4	5	4	4	4.25		N/A	
SL-139	9.0	MUCK	CEDE	*Ceratophyllum demersum*	coontail	4	5	3	4	4.00		1	
SL-139	9.0	MUCK	POIL	*Potamogeton illinoensis*	Illinois pondweed	1				0.25		1	
SL-139	9.0	MUCK	ELCA	*Elodea canadensis*	Canada waterweed		1	1	1	0.75		1	
SL-139	9.0	MUCK	NYSI	*Nymphaea odorata*	American white waterlily		1			0.25		2	
SL-139	9.0	MUCK	POAM	*Potamogeton amplifolius*	largeleaf pondweed			1	1	0.50		1	
		SEE	COMMENTS										S.Bay/Boat Launch
													Heavest MYSP in 1 - 11 ft Depths
													Max. growth depth: under water camera
													15 - 20 feet
													Plants observed sparse @ 28 - 29 feet
													about 15 feet growth drops off

Appendix C
Membership Survey Results

J.Carr & Associates

7317 Carmen Avenue East
Inver Grove Heights, MN 55076
Phone- 651-455-6040 Fax-651-552-9430
Email: karenjcarrinc@aol.com

Fax/Memo

TO: Meg Rattei @ Barr Engineering
FROM: Karen Hennes
RE: Sand Lake Management District Landowner Survey
CC:
NUMBER OF PAGES (INCLUDING THIS ONE) Many
DATE: 6/2/2006

Meg,
Enclosed is a copy of the original survey sent to the landowners of property in the Sand Lake Management District. We sent out 153 surveys and received responses back from 81. The results have been compiled for use in determining where we go as a lake district to address the concerns of the landowners.
Should you have any questions please feel free to contact me at the phone or email listed. I will be out of town June 7th-12th and June 14th-17th.

Sincerely,

Karen Hennes

Karen Hennes

July 2005

Sand Lake Property Owner

As a part of the DNR grants received by Sand Lake this year we are required to conduct a survey of property owners. The following survey has been adapted from several used by other lakes. Your responses will help guide the activities of the Board and your candid response will be appreciated. You may return your completed survey in a number of ways:

1. ***Mail it to the District at: P.O. Box 1053 Cumberland, WI 54829***
2. ***Drop it off with any Lake District Commissioner, or***
3. ***Bring it to the Lake District Annual Meeting on August 20.***

We would appreciate receiving your completed survey by August 20. Thank You.

Your Board: Len Bluhm, Rob Haugen, Dale Heinecke, Karen Hennes, Drake Miller, Karen Rindsig, Jerry Schliemann

Sand Lake Management District
2005 Landowner Survey

1. How often do you engage in each of the following on Sand Lake?
1 = very often; 2 =frequently; 3 = occasionally; 4 = Not at all

Swimming	____	Paddle Boating	___	Ice Fishing	___
Fishing	____	Sailing	____	Snowmobile	____
Pontooning	____	Jet Skiing	____	X Country Skiing	___
Power Boating	____	Water Skiing/Boarding	____	Canoeing	___
Kayaking	____				

2. Indicate your satisfaction level while participating in recreational activities on Sand Lake by checking the appropriate response.

Always pleasurable	____	Usually not pleasurable	____
Usually pleasurable	____	Never pleasurable	____
Pleasurable some times	____		

Why or why not Pleasurable_____

_____

3. Which of these is impacted by the current level of Aquatic Plant growth (invasive or native) on Sand Lake?

Swimming	____	Paddle Boating	___	Ice Fishing	____
Fishing	____	Sailing	____	Pontooning	____
Jet Skiing	____	Power Boating	____	Canoeing	____
Kayaking	____	Water Skiing	____		

Original Survey

4. How would rate Sand Lake (and area) overall for the following?
1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor, 5 = Very Poor

Swimming	____	Paddle Boating	___	Ice Fishing	___
Fishing	____	Sailing	____	Snowmobile	____
Pontooning	____	Jet Skiing	____	X/Country Skiing	___
Power Boating	____	Water Skiing/Boarding	___	Hiking/Walking	____
Canoeing	____	Kayaking	____	Scenic viewing	____

5. When visiting your property on Sand Lake, how do you feel about the number of people on Sand Lake during the time periods shown? 1 = Very Crowded, 2 = Crowded, 3 = Crowded some times, 4 = usually not crowded, 5 = Never crowded

Week Days ___ Week Ends ____ Holidays ____

6. Are you familiar with the Wisconsin/Barron County Boating regulations?

Yes ____ No _____

7. Do you feel Sand Lake needs regulation or restrictions for any of the following?

Swimming	____	Paddle Boating	____	Ice Fishing	___
Fishing	____	Sailing	____	Snowmobile	____
Pontooning	____	Jet Skiing	____	X Country Skiing	___
Power Boating	____	Water Skiing/Boarding	___	Hiking/Walking	____
Canoeing	____	Boating in milfoil area	___	Kayaking	____

Please elaborate _____

8. Are the current water use regulations adequately enforced by County/State officials?

Yes ____ No _____

9. Do you fish Sand Lake?

Yes ____ No _____(if no, skip questions 11-13)

10. If you don't fish, did you fish Sand Lake in the past?

Yes ____ No _____ (if yes, why did you stop?
_____)

11. Which species do you mainly fish for?

Walleye	____	Sunfish	____	Muskie	____
Northern	____	Crappie	____	Large mouth bass	____

12. How do you rate fishing for the following?
1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor, 5 = Very Poor

Walleye	____	Sunfish	____	Muskie	____
Northern	____	Crappie	____	Large mouth bass	____

13. Has the number of fish changed in Sand Lake from the time you first fished Sand Lake?

1 = Increased, 2= About the same, 3 = Decreased

14. Are you aware that walleyes and muskies are stocked in Sand Lake every other year?
Yes ____ No _____

15. Do you feel a change in fish stocking should be made?
Yes ____ No _____
If yes, which species and why?
_____

16. Do you use fertilizers on your Sand Lake property?
Yes ____ No _____

17. If yes, do you use a phosphate free fertilizer?
Yes ____ No _____

18. Have you attempted to remove aquatic plants from around your dock and property shoreline?
Yes ____ No _____

19. If yes to question 24, how was it done?
Did yourself by hand ___ Hired a mechanical harvester ____
Hired hand removal ___ Hired chemical treatment ____
Other/comment
_____

20. How would you rate the water quality in Sand Lake?
Excellent ____ Fair ____ Very Poor ____
Good ____ Poor ____ Don't know ____

21. Have you noticed a change in the water quality sense you purchased your Sand Lake property?
Much worse ____ Somewhat worse ____ A little worse ____
Improved ____ Varies ____ Don't know ____

22. How long have you owned your Sand Lake property? _____

23. Describe how changes in water quality have affected your use of Sand Lake.
_____
_____

24. What are the three most important criteria for judging the overall quality of Sand Lake?
Clarity of water ___ Quality of fisheries ___ Peace & Quiet ___
Remoteness/Solitude ___ Proximity to nature ___ Scenic surroundings ___
Condition for swimming ___ Friendliness of people ___
Other _____

25. To what extent do you believe water quality affects the value of your property?

Very much ____ Some what _____ Very little ____ No affect _____

26. Are you familiar with the local land/zoning regulations?
Yes ____ No _____

27. If you answered yes, do you feel the regulations are adequate to protect the water quality of Sand Lake?
Yes ____ No _____

28 . Do you feel the current zoning regulations are adequately enforced?
Adequately enforced _____ Enforced sometimes _____
Not adequately enforced _____ No opinion _____

29. What do you feel are the most valuable resources in the Sand Lake area?
Natural beauty ____ Wildlife ____ Trees ____
Fisheries resource ____ Lake quality ____ Recreation ____

30. What do you believe are the <u>three</u> most significant problems on Sand Lake (check only three)?
Water Quality ___ Eurasian milfoil ____ Aquatic plants ___
Fishery ___ Lawn fertilizer ____ Development on the lake ___
Power boat use ___ Jet ski use ____ Water skiers ___
Boat/Jet ski speed ___Boat/Jet ski noise ____ Gas/Oil from boats ___
Not obeying the boating laws ___ Boating to close to shore/other boats ____
Sediment from shoreline erosion ___

31. What would encourage you to attend a Lake District meeting? _____

_____

32. Are you willing to assist Lake District projects in some way.
Yes ____ No _____

33. What additional projects would you like the Lake District to address?
More fish stocking ____ Improved fish habitate ____ Establish quite hours ____
Improved waterfowl/loon habitate ____ Boat/Jet ski regulations ___
Improving water quality ___ Reduce erosion ____ Zoning enforcement ____
Boating/Jet ski regulation enforcement ____ Other Aquatic Plants ____
Other _____

_____

34. What can the Sand Lake Management District do to improve communications with landowners.

_____

_____

35. Other comments or conclusions. _____

1. How often do you engage in each of the following on Sand Lake?
   1-Very Often; 2-Frequently; 3-Occasionally;4-Not at all

Swimming- 1-13, 2-13, 3-12, 4-2
Fishing- 1-11, 2-5, 3-19, 4-2
Pontooning- 1-16, 2-9, 3-3, 4-5
Power Boating- 1-3, 2-10, 3-7, 4-6
Kayaking- 1-1, 2-3, 3-1, 4-12
Paddle Boating- 1-1, 2-6, 3-9, 4-8
Sailing- 1-0, 2-0, 3-6, 4-16
Jet Skiing- 1-2, 2-1, 3-3, 4-12
Water Ski/Board-1-4, 2-6, 3-10, 4-10
Ice Fishing- 1-3, 2-4, 3-16, 4-6
X-Country Ski- 1-5, 2-2, 3-7, 4-18
Canoeing- 1-1, 2-7, 3-9, 4-12

2. Indicate your satisfaction level while participating in recreational activities on Sand Lake by checking the appropriate response.

Always pleasurable-0 Usually pleasurable-0 **Pleasurable sometimes-6**
Usually not pleasurable-2 Never pleasurable-0
Why pleasurable- natural setting
Why not pleasurable- jet skis, power boats, weeds

3. Which of these is impacted by the current level of Aquatic Plant growth (invasive or native) on Sand Lake?

Swimming-53 Fishing-40 Jet Skiing-9 Kayaking-3 Paddle Boating-15
Sailing-3 Power Boating-21 Water Skiing-21 Ice Fishing-7
Pontooning-23 Canoeing-8

4. How would you rate Sand Lake (and area) for the following?
   1- Excellent; 2-Good; 3-Fair; 4-Poor; 5-Very Poor

Swimming- 1-22, 2-15, 3-12
Fishing- 1-3, 2-14, 3-15, 4-5, 5-3
Pontooning- 1-19, 2-17, 3-3
Power Boating- 1-8, 2-16, 3-6, 4-3, 5-2
Canoeing- 1-16, 2-16, 3-1, 4-3
Paddle Boating- 1-15, 2-14, 3-3, 4-2
Sailing- 1-3, 2-2, 3-7, 4-7, 5-2
Jet Skiing- 1-4, 2-8, 3-4, 4-2, 5-6
Water Ski/Boarding- 1-11, 2-12, 3-6, 4-2
Kayaking- 1-9, 2-12, 3-6, 4-1
Ice Fishing- 1-3, 2-5, 3-7, 4-8, 5-3
Snowmobile- 1-8, 2-4, 3-4, 4-1, 5-1
X-Country Ski- 1-10, 2-7, 3-6, 5-1
Hike/Walk- 1-11, 2-19, 3-10, 4-1, 5-1
Scenic Viewing- 1-26, 2-15, 4-1

5. When visiting your property on Sand Lake, how do you feel about the number of people during the periods shown? 1- Very Crowded; 2- Crowded
3-Crowded sometimes; 4-Usually not crowded; 5-never crowded

Weekdays- 4-44, 5-29
Weekends- 1-11, 2-20, 3-35, 4-14, 5-5
Holidays- 1-34, 2-22, 3-21

6. Are you familiar with the WI/Barron County Boating regulations
   Yes-75 No-4 (98% response)

Survey Results

7. Do you feel Sand Lake needs regulation or restrictions for any of the following?

Jet skiing- 50 Power boating- 43 Boating in EWM- 29
Water skiing/boarding- 26 Snowmobile- 6 Fishing- 5
Ice Fishing- 4 Pontooning- 3 Hiking/Walking- 2
Kayaking- 1 Paddle boating- 1

(See additional comments)

8. Are the current water use regulations adequately enforced by County/State officials?

Yes- 26 No- 37 (78% response)

9. Do you fish Sand Lake? (If no, skip questions 11-13)

Yes- 58 No- 15 (91% response)

10. If you don't fish, did you fish Sand Lake in the past? (if yes, why did you stop)

Yes- 9 No- 5 (18% response)

11. Which species do you mainly fish for?

Walleye- 44 Sunfish- 42 Northern- 33
Large mouth bass- 31 Crappie- 25
Muskie- 22

12. How do you rate fishing for the following?
1-Excellent; 2-Good; 3-Fair; 4-Poor; 5-Very Poor

Walleye- 1-1, 2-3, 3-21, 4-18, 5-9 Northern- 1-2, 2-14, 3-21, 4-9, 5-2
Sunfish- 1-5, 2-26, 3-17, 4-12, 5-5 Crappie- 2-10, 3-9, 4-21, 5-9
Muskie- 1-2, 2-10, 3-19, 4-4, 5-1
Large Mouth Bass- 1-13, 2-18, 3-20, 4-4, 5-1

13. Has the number of fish changed in Sand Lake from the time you first fished the lake?
1-Increased; 2-About the same; 3-Decreased

Walleye- 1-3, 2-19, 3-24 Northern- 1-2, 2-17, 3-35
Sunfish- 2-31, 3-16 Crappie- 2-15, 3-26
Muskie- 1-4, 2-24, 3-11 Large Mouth Bass- 1-1, 2-30, 3-10

14. Are you aware that walleye & muskies are stocked in Sand Lake every other year?
Yes- 41 No- 33 (91% response)

15. Do you feel a change in fish stocking should be made?
Yes- 28 No- 28 (70% response)
If yes which species & why? More walleye (see comment page)

16. Do you use fertilizers on your Sand Lake property?
Yes- 10 No- 45 (68% response)

17. If yes do you use a phosphate free fertilizer?
Yes- 9 No- 35 (55% response)

18. Have you attempted to remove aquatic plants from around your dock & shoreline?
Yes- 48 No- 31 (98% response)

19. If yes to question 18, how was it done?
Did yourself by hand- 46 Hired a mechanical harvester- 1
Hired chemical treatment- 1

20. How would you rate the water quality in Sand Lake?
Excellent- 21 Good- 46 Fair- 10 (95% response)

21. Have you noticed a change in the water quality since you purchased your Sand Lake property?
Much worse- 9 Somewhat worse- 24 Varies- 14
A little worse- 9 (92% response)

22. How long have you owned your Sand Lake property?
See separate sheet (87% response)

23. Describe how changes in water quality have affected your use of Sand Lake.
Swimming most affected (See separate sheet for other comments)

24. What are the three most important criteria for judging the overall quality of Sand Lake?
Clarity of water- 67 **Peace & Quiet- 36** **Scenic surroundings- 32**
Swimming conditions- 29 Quality of fisheries- 23 Proximity to nature- 21
Friendliness of people- 17 Remoteness/Solitude- 14

25. To what extent do you believe water quality affects the value of your property?
Very much- 70 Somewhat- 7 Very little- 1 (97% response)

26. Are you familiar with the local land/zoning regulations?
Yes- 64 No- 17 (100% response)

27. If you answered yes, do you feel the regulations are adequate to protect the water quality of Sand Lake?
Yes- 46 No- 23 (85% response)

28. Do you feel the current zoning regulations are adequately enforced?
Adequately enforced- 15 Enforced sometimes- 17
Not adequately enforced- 29 No opinion- 15 (94% response)

29. What do you feel are the most valuable resources in the Sand Lake area?
Lake Quality- 68 **Natural beauty- 62** Trees- 34 Wildlife- 27
Recreation- 23 Fisheries resource- 22

30. What do you feel are the <u>three</u> most significant problems on Sand Lake (check only three)?
Eurasian milfoil- 47 **Water quality- 24** **Aquatic plants- 23**
Boating too close to shore/other boats- 22 Jet ski use- 21
Development on lake- 16 Boat/jet ski speed- 16 Sediment from erosion- 15
Boat/jet ski noise- 14 Lawn fertilizer- 12 Fishery- 10 Power boat use- 9
Not obeying boating laws- 7

31. What would encourage you to attend a Lake District meeting?
Time meeting is held (see additional comments)

32. Are you willing to assist the Lake District in some way?
Yes- 50 No- 13 (78% response)

33. What other projects would you like the Lake District to address?
Boating/Jet ski regulation enforcement- 23 Reduce erosion- 21
Improve fish habitat- 20 More fish stocking- 18 Improve water quality- 15
Boat/Jet ski regulations- 15 Zoning enforcement- 15 Quiet hours-12

33. continued
Improved waterfowl/loon habitat- 7 (See additional comments)

34. What can the Sand Lake Management District do to improve communications with landowners?

Communication via: Establish a website Email landowners
Newsletters (See additional comments)

35.Other comments or conclusions.

Eurasian milfoil
Campground by Hilltop restaurant (not a factor at this time)
More DNR visibility on the lake
Restrict power boats/jet skiis
(see additional comments)

COMMENTS #2 - INDICATE YOUR SATISFACTION LEVEL WHILE PARTICIPATING IN RECREATIONAL ACTIVITIES ON SAND LAKE

"Always pleasuable in natural setting."
"Boats creating large wakes along shoreline. Frequent fireworks, jet skii waverunners, jet skiis and LARGE powerboats too close to boats and shoreline."
"Too many powerboats after 8:00 pm."
"Jet skiis make it unpleasurable."
"Usually except for jet skiis."
"Not pleasurable because of jet skiis."
Not--lake too narrow for a bunch of jetskiiers a, powerboats and 3 to 4 tubes with kids on them and weaving in and out of other boats."
"Usually too crowded."
"Usually pleasurable."
"We enjoy the fact that Sand Lake is rarely busy."
"Jet ski drivers and power boat drivers are reckless and noisey."
"Clean and beautiful."
"Jet skiis - unpleasurable."
"People tubing and waterskiing after sundown."
"Wakes from large motors and jet skiis travelling too fast and too close."
"Jet skiing is crazy on the lake."
"Boats coming too close to shore."
"Too much power boat traffic - lake has become very weedy also."
Power boats tend to be on average too large for the size of the lake. Ban jet skiis--too much noise and to much irresponsible use."
"Too many jet skiis."
"Beautiful lake and pleasant people."
"Too weedy to swim in front of our cabin."
"Very busy on the lake."
"I do sometimes fear for the safety of my skiiers and tubers."

COMMENTS #7 - DO YOU FEEL SAND LAKE NEEDS REGULATION OR RESTRICTIONS ?

"Too small a lake for jet skiing."
"Restrict speed noise and recklessness."
"Long narrow lake--shore erosion and noise are major problems."
"Hours of using."
"Skiing should be more regulated."
"Jet skiing should be regulated."
"Let's all be adults and resolve any "behavorial" issues without regulation. Use the District to solely promot environmental issues as was promised at the onset of forming the District."
"Fishing has deteriorated over the last 5+ years. I would propose a 48" muskie minimum size and a slot size limit for walleyes to help improve the fish numbers."
"Establish quiet periods, late evening and early morning."
"Restrict fireworks and barking dogs."
"Around, around, around. They are noisy and cause excess waves and erosion."
"No jet skiis or waterskiing before 9:00 am and after 6:00 pm."
"Jet skiis are too noisy and should be restricted to areas of the lake near <u>their</u> cabins."
"Lake too small for power boats and jet skiis."
"Snowmobile shoud slow down on north end when entering lake."
"Bigger boats with large motors are too fast--noise pollution up. Jet skoiis are too fast and noisy."
"No fishing between swimming rafts and shore. Boating too close to shore."
"Milfoil area should be marked."
"Boats too close to shore."
"Limit use of jet skiis and powerboats before 9:00 am or afterr 5:00 pm."
"Leave no wake."
"No boating in milfoil area."

Additional Comments

Comment #7 - (continued)

"Should limit motor size--don't need 150 HP on a lake this size."
"Jet skiis disturb wildlife, causes soil erosion and causes noise and air pollution."
"Restriction and regulations should be apolied to boats at launch site--minimal charge and some kind of cleaning apparatus."
"HP restrictions on powerboating."
"Ban jet skiing--lake too narrow."
"Need enforcement of boats too close to other boats, shoreline and swimming."
"Skiing too late in pm."
"Consider regulations on hours and location of jet skiing."
"Ban jet skiing and water skiing."
"Careless driving of jet skiis and powerboats."
"People poweboat too late in the evening."
"Some way to report those that are breaking boating regulations."

10/5/2005

Question 22

HOW LONG HAVE YOU OWNED YOUR PROPERTY?

Years Owned	How Many Owners?
2	2
3	4
4	5
5	3
6	1
7	3
8	6
9	1
10	2
11	3
12	4
13	3
15	3
16	1
17	1
19	1
20	1
22	2
25	2
26	1
27	1
28	1
30	1
32	1
33	3
34	1
35	2
36	1
37	4
38	1
42	1
45	1
49	1
55	2
56	1

COMMENTS #23 - DESCRIBE HOW CHANGES IN WATER QUALITY HAVE AFFECTED YOUR USE OF SAND LAKE

"More algae in the water--reduces swimming."
"Swimming less, fishing less.""m
"Activity, weeds."
"Have to dive off dock and swim in deep water."
"More weeds impact swimming."
"Weed growth on shoreline limits swimming."
"More weeds."
"More green algae floating."
"More weeds, more sediment, less visibility. More weeds floating from weekend and holiday use."
"Fishing has steadily deteriorated."
"None."
"Less swimming - have to go to middle of lake to swim."
"Water quality still terrific."
"More weeds, less sand on shoreline."
"It hasn't."
"No effect to date."
"Little impact to date - been here 18 yrs."
"No snorkling'"
"Swim less. Large wakes by large boats are deteriating the shoreline and affecting the water quality."
"More weeds."
"Made fishing and boating more difficult.
"Wave action - erosion from speed boats affecting shoreline. Snorkeling visability reduced."
"Swimming more difficult to do."
"Harder to avoid weeds when boating."
"More difficult to locate anchors for swimming raft."
"Not as pretty."
"Too weedy for fishing."
"I snorkle less because of clarity."
"Lake more weedy and limits access to fishing area."
"Weeds affect swimming."
"Don't swim much because of weeds."
"Not as pleasant swimming as boaters keep us off the lake on weekends. Too dangerous."
"Weed problems while swimming and pontooning."
"Too many plants and weeds."
"Too many buildings and people."
"No effect except for plant growth."
"More weeds, less clean."
"'Slime" appears and don't like swimming."
"Milfoil should be restricted and marked."

COMMENTS #24 - WHAT ARE THE THREE MOST IMPORTANT CRITERIA FOR JUDGING THE OVERALL QUALITY OF SAND LAKE-- Other

"Having a high level of trust that the local government respects and honors our rights."
Weed control."
"We are taxpayers with no representation."
"Would like to check the quality of water and weeds."
"No wakes hear the banks."
"No fireworks."
"Dogs barking uncontrollably."

COMMENTS #31 - WHAT WOULD ENCOURAGE YOU TO ATTEND A LAKE DISTRICT MEETING?

"Nothing!"
"Not much - I live too far away."
"If I were in town."
"For the people running the meeting to have a more open mind. Everything is already decided before the meeting. People "not in the group" are treated poorly !!!"
"Different time - I golf on saturdays."
"Letter sent to me with time and date one month prior."
"If angry, will come."
"Lake regulations set up and enforced."
"Copies of past board minutes and next meeting agenda."
"Changes."
Get a better view of other people's opinions."
Would come if you tried to ban or limit skiing, boating and tubing."
"Better time offering."
"P.M. meeting."
"Afternoon meeting."
"Hold in SW Minneapolis."
"If asked to help with a project."
"Free beer - just kidding. Staggered times."
"Advance notice."
"Good reports. Plans for next year."
"If I believe that our lack of fair representation would be changed, I would be open to it."
"In the future--not able now."
"Bing in town when the meeting takes place and knowing about it beforehand."
"Free time to get there - weekend would be best."
"If problems were addressed and felt there might be some results."
"If the budget of the funds was controlled by people on the lake."
"Being in the area and available'"
"We do attend to find out about weed treatment and building code violations."
"If we felt our voices would be heard and could see some results being made."
"I think the meetings have been fine."
"Keep recreation activities accessable to ALL."

COMMENTS #15 - DO YOU FEEL A CHANGE IN FISH STOCKING SHOULD BE MADE?

"Stop of significantly reduce Muski as they have ruined norther and crappie fishing."
"More walleye."
"Sand Lake is not a good walleye lake."
"Walleye summer catch poor."
"Less muskies."
"Muskies too agressive."
"Fewer muskies."
"Stock yearly."

COMMENTS #33 - WHAT ADDITIONAL PROJECT SOUL YOU LIKE THE LAKE DISTRICT TO ADDRESS?

"Owner and guests follow boating reulations and respect others."
"More regulaton fish size."
"We love the lake now?
"Milfoil."
"Abolish the Lake District"
"There was a time when evening was for the fisherman."
"No more building."

9/16/2005

COMMENTS #34-What can the Sand Lake Management District do to improve communication with land owners?

"Set up a website w/weekly or bi-weekly updates".
"Send flyers to remind people of reulations. Be good neighbors!"
"Open, honest communication, appreciate long, long time residents input also".
"Copies of past board minutes and an agenda for next meeting".
"E-mail elsmorea@hickorytech.net".
"Newsletters--what has been done and plans for the future""
"Let us know what is being done".
"Ask DNR to enforce existing rules and laws on the books now".
"Quit making us pay for mailing and every thing else".
"Regular timely newsletters on a schedule."
Letter requesting owners to take responsibility for guests--information on boating regulations."
"Newsletter."
Be more credible on what the increase in levy would really be."
"Establish a web site."
"Email, more meetings @ convenient time."
"More information on commissioners so when voting, we know what we are voting for--aside from one person on the last ballot. I knew nothing about the other two or what they stood for."
"Put out quarterly newsletter. More feedback of meeting results."
"I was turned in for a zoning infraction I believe was initiated by members of the Lake District. I would have appreciated it if they would have spoken to me directly first. My retaining walls exceed one foot."
"Continue good Soundings articles about issues and problems."
"Our experience is that people are unreasonable when approached about problems in most situations."
"Good question--perhaps input from this and the surveys will provide suggestions."
"Use email for those who wish to give out their email address."
"We have a person on thejsoutheast side of the lake that pulls four tubes and does figure-eights and cuts in front of other boats and pontoons. Also no spotter in the boat."
"Land owners tell their Minn. friends or relatives not to bring all their friends and toys every week and holidays to the lake. That is where all this stuff is coming into the lake."
"Come up with suggestions on improving current problems and find ways that regulations can be enforced."
"Your newsletter is great. Your staff does a wonderful job! People need to get more involved, including myself. Have some fund raising."
"Establish internet site to post info, etc."
"Give accurate information about milfoil and steps to take to fix the problem'"
"Communication highlighting current regulations that are most likely to affect water quality and related packet for new owners--welcome packet.""You are doing a pretty good job now and we appreciate that. Written communiques should be brief, to-the -point andreular"

General consensus is: "You are all doing a good job and it is appreciated. Communications have improved greatly."

9/16/2005

COMMENTS #35 - OTHER COMMENTS OR CONCLUSIONS IN REGARD COMMENT #34

All of the Sand Lake District Commissioners should be required to live on the lake--What is Dal Heinecke doing on our board!? Isn't he part of the Twn Board that railroaded us on the rezoning of the Hilltop campground site, and the request to classify 2-1/4 stree as a rustic road 4 yrs + ago? We only wanted to save our 80 yr oak and maple trees. I think he was at that time , a logger. Check for more conflicts of interest. Our biggest problem is the local town board that breaks even their own ordinances. If I believed that our lack of fair representation could be changed, I would be open to it. I've been here for a long time and have been screwed enough times by the locals to not have much trust in the system. I have been currently involved in the campground dispute. Refer to your last question and see "Dale Heinecke."
Are the current zoning regulations adequately enforced? The answer to this would depend on whether you are a local resident or a cabin owner--the rules appear to differ. This must be addressed."

"Must restrict powerboating near shore, the shoreline is disappearing. It is a small minority of the boaters doing a majority of the damage. For instance, the guy on far South East corner of the lake insists on pulling 4 tubers at maximum wask 50 ft. from the shore. We are on the Northend and this individual has done more damage to our shore than all others combined."

"Overall people are not concerned about their neighbors. We have been nearly hit head-on by speed boats and laughed at!! DNR patrols might help- -sadly. Large boats must slow down and stay back from the shoreline for safety and erasion sake. We'v had ice fisherment drill holes in our cleared skating area in front of our home. When we've asked them nicely to move over so as not to ruin the rink, are are told we do not own the lake--they continue to drill."

"Mabe producing some sort of document or booklet suggesting appropriate lake protocall and distributed to all land owners would be appropiate. Continually addressing issues in newletter is appreciated as well--education of rules and expectations is the best way to curb misuse. I am sure everyone loves the lake as much as we do. They just need to be continually reminded what damages this resource. Thanks for the opportunity to share thoughts."

"The selective enforcement of zoning rules ticks me off. If there are 120 cabins on the lake, I could find infractions on 60 of them. Based in conversation with David Gifford, they are vigorously pursuing about 6 infractions. This is a joke. How do I get on the list of exempt properties? I know 5 of the 6 infractions and there are much worse than mine or my neighbors."

"We're concerned with the camp ground approved for Hilltop area. Sand Lake is a small, narrow lake that would be negatively impacted by heavy use."
"More feedback of meeting results."
"Presently the lake level is low with not much erosion. However, on the north end of the lake we have a beaver problem and in the fall the outlet and spillway are completely blocked and this raises the lake level considerably causing extreme shoreline erosion. This beaver problem has never been solved in the 49 years that we have been on the lake."
"Conduct workshops on projects that have interest. More articles and more frequent "Soundings" publications."
"Generally the people on Sand Lake obey boating laws and regulations. When there are issues it is not associated with a boat type but with the operator. I have seen every type of boat violation (including kayaks and canoes). Let's focus on lawful operation as opposed to restricting or limiting certain boat types."
"I hate restrictions. We do not jet ski. I admit is is sort of annoying but I do not feel it is the right of a committee to regulate it. We use the lake alot and most everbody tries to be considerate of others using the lake. What if we put a stop to your favorite use of the lake?"
"We have concern over milfoil We love the lake."
"I think SLMD should be pushing the town board to blacktop roads. The majority of taxes come from the lake and we should be taken care of better. The zoning laws should change so people can enjoy their lake shore. The retaining walls people have built look nice. (I'm not one of them)."

When the new RV camp is completed, will our efforts be in vain when more boats, jetskiis, etc. will be on the lake where the boats have been previously in milfoil areas? How do you stop this?"
"To improve water quality--major contribution of nitrogen-phospherous-potassium is from septic tank's effulents. Need a sanitary district in the next 10 years."
"We need to enforce present rules and ask DNR to enforce."
"I am glad to see as much involement as there is. This is a super resource that needs to be preserved."
"Land use issues must be controlled by close adherence to existing statutes, not by "good old boy" politics. Government agencies must avail themselves to fight and control erosion of shoreline and also roadways that drain into the lake."
"I am against a time zone for skiing/boating. l. I do not think traffic is generally heavy or evenings anyway. 2. Other than holids traffic is generally no to bad. 3. Establishing a time zone will incfrase traffic during periods that are already heaviest."
"Thanks for you efforts in putting eogether this excellent questionaire. I hope you get back many responses."
"DNR should police the lake more often. We are on the lake most of the summer and we see the DNR two times at the most. I"ve been cut off by boats pulling water skiers and pulling tubes."
"When are the illegally built sheds and fire pots near the lake going to be removed?"
"Ban or regulate jet skis on lake."
"Very pleased that the Mgmt. District has been established."
"Eurasion milfoil main concern priority. Need to stop spreading of this plant and kill off what already exists, at all costs, which may mean no public access??"

"Eusasion milfoil has to be top concern followed by: Erosion of lakeshore caused by power boating; enforce zoing laws so people do not clear-cut nor bring in bobcats and other earth moving equipment too closes to shoreline (woods are large reason for lake beauty and need to be preserved)."

"Two black bears are getting too familiar with people. The need to be relocated for the and bear's safety. Our property taxes have almost tripled within the last 3 years. The increases in taxes is not affordable for residents and non-residents."

"I would like to see the state of Wi. limit the size motors allowed on the lakes according to the size of the lake. Hopefull we could preserve the natural beauty of the lakes."
"I am glad to see as much involvement as there is. This is a super resource that needs to be preserved."