

Lake Minnewawa

Aquatic Vegetation

Management Plan

2007 – 2012

Lake Minnewawa Aquatic Vegetation Management Plan
2007-2012

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Background and Introduction

The Lake Minnewawa Association (LMA) was formed in 1961 and currently has approximately 225 members. *“The purpose of the Lake Minnewawa Association is to promote and develop interest in controlling pollution, beautification, water safety, and stable water level maintenance. In general it is dedicated to creating, promoting and implementing methods of improving and preserving the overall condition of Lake Minnewawa.”* The Minnewawa Sportsmen’s Club (MSC) was formed in 1955 and has approximately 250 members. A number of people belong to both organizations. There are approximately 450 property owners on Lake Minnewawa.

Lake Minnewawa has long had issues related to aquatic vegetation. The following excerpt is from the minutes of the Aitkin County Board of Commissioners for November 1, 1927: *“The petition of E. A. Kangas and others for a weed machine to remove weeds from Lake Minnewawa, was referred to County Attorney Allin, for report at the next meeting of this board.”*

The Department of Natural Resources and the Lake Minnewawa Association have cooperatively developed aquatic vegetation management plans. Organized efforts for vegetation control on a large scale began in the late 1970’s. In 1981 the Save Minnewawa Association purchased its first aquatic plant harvester and the first formal plan was prepared in 1982. This harvester was replaced with another one in 1994. A three person crew operates the harvester. The plan has been modified over time to changes in conditions and needs on Lake Minnewawa. Revisions were made in 1996 and 2000. An amendment was added in 2001. The Lake Minnewawa Association, the Big Sandy Area Lakes Watershed management Project (BSALWMP) and the Department of Natural Resources cooperatively conducted a formal survey of Lake Minnewawa landowners in 2000. The reason for the survey was due to concerns with the operators and operations of the harvesting machine, a perceived change in aquatic vegetation in the lake the need for a more user friendly plan and a desire to more accurately describe how the LMA was managing lake vegetation. In 2005 members of both the Minnewawa Sportsmen’s Club and the Lake Minnewawa Association approached the Department of Natural Resources with an interest in revising the existing plan and formed an Aquatic Plant Committee to do so. The most current plan had a January 2006 expiration. Further, there was an expressed concern that the current plan, which included harvesting as the principal control measure, was not meeting the needs of the landowners on Lake Minnewawa in terms of being able to utilize the lake.

Lake and Watershed Description

Lake Minnewawa (Id. No. 1-33) is located in Aitkin County approximately 5.4 miles north and east of McGregor (Figure 1). Lake Minnewawa was originally named Rice Lake in allusion to the large amounts of wild rice present (Upham, 2001). Lake Minnewawa has a surface area of 2512 acres with 2286 acres or 91 percent of the lake

being littoral¹. The maximum lake depth is 21 feet and the mean depth is 8.2 feet. The length of the shoreline is 17.8 miles with the greatest fetch being 2.9 miles with a southwest orientation. The Minnesota Department of Natural Resources (DNR) created a bathymetric map of Lake Minnewawa in 1957 (Figure 2). Lake Minnewawa is a Class 41 lake (Schupp, 1992). There are 2 public accesses on Lake Minnewawa and a number of sites “dedicated to the public”.

Lake Minnewawa and its immediate watershed lie entirely in Shamrock Township (Figure 3). Much of Lake Minnewawa’s shoreline is developed with approximately 438 dwellings (Figure 4). Lake Minnewawa has a shoreland management classification of recreational development.

Lake Minnewawa has moderately clear water. Secchi disc readings collected by volunteers show a mean summer (June through September) average range of 3.1 to 5.5 feet for the years 1979 through 2002. The trophic status index calculated for Lake Minnewawa based on Secchi disc readings is 54, that based on chlorophyll a is 49 and that based on phosphorus is 53 each indicating a eutrophic lake. Based on the available water quality data for Lake Minnewawa, the Minnesota Pollution Control Agency (MPCA) has indicated that aquatic recreation use is partially supported.

Lake Minnewawa has four inlets. It’s outlet, Minnewawa Creek, flows to the Sandy River and ultimately Big Sandy Lake. There is an artificial control structure (dam) built in 1982 on the outlet. It is owned by the Department of Natural Resources. Water level data is available for the period from 1938 to 2005. During that period, DNR staff and volunteers have collected over 1300 water level readings. The lowest level was in September 1961 at 1223.39 feet Mean Sea Level (MSL) and the highest level was in April 2001 at 1226.2 feet MSL. This is a range in fluctuation of 2.81 feet. The DNR has determined that the ordinary high water level (OHWL)² for Lake Minnewawa is 1224.7 feet MSL.

Lake Minnewawa Water Levels, 1996 to 2005³



¹ See Glossary

² See Glossary

³ The red horizontal line is the OHWL.

Lake Minnewawa is a popular sport-angling destination. The Minnesota Department of Health (MDH) is responsible for determining fish consumption advisories for Minnesota lakes. A consumption advisory for northern pike and walleye has been issued by MDH for Lake Minnewawa.

The most current Fisheries Management Plan was prepared by the DNR following the 1997 survey. The plan has as its long range goal: *Protect black crappies and bluegills so the trapnet catches remain within the lake class 41 interquartile range and with a trapnet PSDs of 40 to 60. For black crappies, the interquartile range for trapnet catches is 1.0 to 12.3 fish per lift and for bluegills it is 1.0 to 14.9 fish per lift. Protect the walleye population at indices of 3 to 8 fish per gillnet lift and at least 4 year classes present.*

The DNR conducted a creel census and water surface use study on Lake Minnewawa in the winter of 1987-88 and the summer of 1988. During the winter survey period there were an estimated 17,301 hours of angling and spearing on Lake Minnewawa or 6.9 hours per acre. An estimated 108,988 hours of boat and dock angling or 43.4 hours per acre were observed during the summer, 1988 survey.

In terms of numbers, in descending order, the fish most taken by anglers during the winter of 1987-88 were bluegill, black crappie, yellow perch, northern pike and walleye. The summer, 1988 harvest, in terms of numbers, was bluegill, northern pike, walleye, yellow perch, black crappie and pumpkinseed.

Winter angling use on Lake Minnewawa can also be measured by means of winter fish house counts. Counts are made twice in a winter, once in the first half of the season (early) and once in the second half (late). During the period from the winter of 1980 to 2001, DNR staff made 15 counts in the early part of the winter season and 11 in the later part of the winter season. Early counts averaged 108 houses per count (range of 47 in 1984-85 to 149 in 1991-92) and late counts averaged 84 houses per count (range of 34 in 1982-83 to 141 in 1991-92). The early and late counts for the winter of 1987-88, the season of the creel census were, respectively, 120 and 85.

The Aquatic Plant Committee estimated the greatest recreational use at this time (2006) to be, in descending order: summer fishing, winter fishing, pleasure boating, water skiing, jet skiing, waterfowl hunting, swimming and snowmobiling.

Lake Minnewawa is in the Upper Mississippi Basin. It is in the Sandy River Watershed (HUC 7010103)⁴ (Figure 5). The Sandy River Watershed is part of the larger Mississippi River Watershed of north central Minnesota.

The immediate watershed of Lake Minnewawa is 13.2 square miles (8449 acres) in area. The watershed is in the Northern Lakes and Forest Ecoregion (MPCA). It also lies in the Laurentian Mixed Forest province and the Northern Minnesota Drift and Lake Plains section (DNR). Most of the watershed is in the St Louis Moraines subsection and the Sandy Lake Moraine (8012 acres) with a small portion in the southwestern part of the watershed in the Tamarack Lowlands subsection and Palisade Lake Plains (434 acres) and the Moose-Willow Peatlands (3 acres)(Figure 6).

⁴ See Glossary

A significant portion (3002 acres) of the immediate watershed of Lake Minnewawa is in public ownership (Figure 7). A total of 35.5 percent of the watershed is owned or administered by the DNR Division of Forestry (2873 acres), the Minnesota Chippewa Tribe (122 acres) and the Army Corps of Engineers (7 acres)

Shamrock Township, which is the only governmental unit in of the Lake Minnewawa watershed, had a total population of 1172 in the 2000 Census and 793 in the 1990 Census.

Year	Population
1920	134
1930	230
1940	471
1950	371
1960	381
1970	465
1980	820
1990	793
2000	1172

At the time of the original land survey, the immediate Lake Minnewawa watershed was dominated by deciduous forest, lakes and conifer bog (Figure 8).

Cover Type	Acres
Aspen-Birch-Conifer Forest	3057
Lakes	2317
Conifer Bog	1886
Aspen-Oak Forest	541
Wet Prairie	504
White and Red Pine Forest	86
Jack Pine Barrens	62

Land cover information from the 1990s indicates that the Lake Minnewawa watershed is still dominated by deciduous forest (2306 acres), lakes (2561 acres and bogs and marshes (2836 acres)(Figure 9).

Cover Type	Acres
Bog and marsh	2836
Lakes	2561
Deciduous forest	2306
Mixed forest	633
Development	373
Grassland, all types	371
Young/regenerating forest	169
Coniferous forest	82
Gravel pits	16

Several Minnesota DNR listed plants and animals are known from the Lake Minnewawa watershed. Each of these species has a known record in the watershed that is no older than 1992. In addition there are records of nesting common loon (*Gavia immer*).

Species	Scientific Name	Year	Classification
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1993	Special concern ⁵
Club-spur Orchid	<i>Platanthera clavellata</i>	1996	Special concern
Blunt-lobed Grapefern	<i>Botrychium oneidense</i>	1991	Endangered
Vasey's Pondweed	<i>Potamogeton vaseyi</i>	1997	Special concern
Little White Water Lily	<i>Nymphaea liebergii</i>	1992	Threatened
Four-toed Salamander	<i>Hemidactylum scutatum</i>	2001	Special Concern

Aquatic Plant Community Description

A total of 61 species of aquatic and wetland plants have been identified from Lake Minnewawa during various surveys conducted by DNR staff (Appendix 1). One is an invasive⁶ species and two are species listed by the DNR.

Form ⁷	Native	Exotic	Total
Emergent species	27	1	28
Floating leaf species	7		7
Free floating species	4		4
Submerged species	25		25
			64

DNR Fisheries surveys include aquatic plant surveys and have been conducted in 1946, 1956, 1976, 1982, 1992, 1994, and 1997 for Lake Minnewawa. Survey techniques have varied. The surveys done in 1956, 1976, 1982, 1992, 1994, 1997 and 2006 indicated submerged aquatic plants grew to a depth of 6 to 7, 5, 7, 9, 3.5, 14 and 13 feet respectively.

The aquatic plant community is quite diverse as indicated by the Floristic Quality Index (FQI) (Nichols, 1999) calculated from the 1997 fisheries survey plant species list and the 2006 point intercept survey (Appendix 2). A comparison with Wisconsin lakes in the Northern Lakes and Forest ecoregion can be made. The mean FQI for the Wisconsin lakes was 24.3 and the interquartile range (IQR) was 17.8 to 30.2 (Nichols, 1999). In 1997, the calculated FQI for Lake Minnewawa was 37.99 and in 2006 it was calculated at 37.77, both well above the IQR for lakes in the same ecoregion in Wisconsin.

The 2006-point intercept survey indicates that Lake Minnewawa has a diverse aquatic plant community. In 2006, as indicated below, there were 5 plant species which were found at 20% or more (158) of the sites surveyed (792). Plants grew to a maximum depth of 13 feet with a wide range of depths according to species of plant.

⁵ Federal status is Threatened

⁶ See Glossary

⁷ See Glossary

Common Name	Scientific Name	N ⁸	Mean Depth in Feet ⁹	Range of Depth in Feet
Coontail	<i>Ceratophyllum demersum</i>	279	6.1 (276)	1-13
Canada waterweed	<i>Elodea canadensis</i>	248	5.2(243)	1-11
Wild celery	<i>Valisneria americana</i>	226	3.7(223)	1-10
Flatstem pondweed	<i>Potamogeton zosteriformis</i>	205	5.8 (203)	1-11
Robbins' pondweed	<i>Potamogeton robbinsi</i>	191	4.0 (188)	1-9
Narrowleaf pondweed	<i>Potamogeton spp.</i>	127	7.3 (127)	2-12
Northern watermilfoil	<i>Myriophyllum sibiricum</i>	108	5.6 (108)	1-11
Bushy pondweed	<i>Najas flexilis</i>	102	3.8 (101)	1-10
Largeleaf pondweed	<i>Potamogeton amplifolius</i>	71	4.2 (70)	1-9
Claspingleaf pondweed	<i>Potamogeton richardsonii</i>	70	4.3 (70)	1-9
Whitestem pondweed	<i>Potamogeton praelongus</i>	48	5.4 (48)	2-11
Variable pondweed	<i>Potamogeton gramineus</i>	46	3.0 (46)	1-9
Wild rice	<i>Zizania palustris</i>	45	3.5 (45)	2-6
White waterlily	<i>Nymphaea tuberosa</i>	35	3.5 (35)	1-6
Greater duckweed	<i>Spirodela polyrhiza</i>	34	3.2 (34)	1-6
Water marigold	<i>Megalodonta beckii</i>	28	4.0 (27)	2-10
Hardstem bulrush	<i>Scirpus acutus</i>	24	3.0 (24)	1-6
White water buttercup	<i>Ranunculus spp.</i>	23	3.2 (23)	1-10
Arrowhead	<i>Sagittaria spp.</i>	23	2.3 (23)	1-5
Muskgrass	<i>Chara spp.</i>	21	4.2 (20)	2-7
Yellow waterlily	<i>Nuphar luteum variegatum</i>	19	2.7 (19)	2-5
Illinois pondweed	<i>Potamogeton illinoensis</i>	19	3.2 (18)	2-7
Water stargrass	<i>Zosterella dubia</i>	16	4.2 (16)	1-8
Star duckweed	<i>Lemna trisulca</i>	15	4.5 (15)	2-7
Floating pondweed	<i>Potamogeton natans</i>	15	3.9 (15)	2-10
Small's spikerush	<i>Eleocharis smallii</i>	13	2.5 (13)	1-5
Bladderwort	<i>Utricularia spp.</i>	12	4.6 (12)	3-7
Pickerelweed	<i>Pontederia cordata</i>	11	2.0 (11)	1-3
Water shield	<i>Brasenia schreberi</i>	6		
Swamp horsetail	<i>Equisetum fluviatile</i>	6		
Cane	<i>Phragmites australis</i>	4		
Water naiad	<i>Najas spp.</i>	3		
Floating burreed	<i>Sparganium fluctuans</i>	3		
Burreed	<i>Sparganium spp.</i>	3		
Softstem bulrush	<i>Scirpus validus</i>	2		
Cattail	<i>Typha spp.</i>	2		
Water moss	<i>Drepanocladus spp.</i>	1		
Quillwort	<i>Isoetes spp.</i>	1		
Nuttall's pondweed	<i>Potamogeton epihydrus</i>	1		

Aquatic Plant Values and Ecological Relationships

Aquatic plants have intricate relationships in the ecosystems where they exist and with the people who use lakes and streams. The relationships, or effects, may be good or bad. The effects may be quite localized or widespread. The relationships may be related to the physical, chemical or biological aspects of an ecosystem. They may

⁸ Number of stations where the plant was sampled.

⁹ Number in parentheses indicates the number of stations with depth data.

also relate to human consumption, agricultural benefits or use as raw materials in various human activities. Aquatic plants may have medicinal benefits, be irritating to the skin or actually poisonous. Invasive, non-native plants can replace the native species with a resultant loss of the benefits native plants provide. Finally, their mere abundance may cause extreme difficulties in pursuing water oriented recreational activities like swimming, fishing and boating.

Let's take a look at some of these aspects related to aquatic plants. In Minnesota, a review of readily available sources¹⁰ indicates some 230 aquatic and wetland plants with documented values to systems and people. All the plants are defined by the U. S. Fish and Wildlife Service as obligate¹¹ wetland species or facultative¹² wetland species (Reed, 1988; Reed 1996). All the plants are non-woody.

Aquatic and wetland plants have effects on the physical component of lake and stream ecosystems in several different ways. These include functioning as wave breaks, acting to stabilize sediments and soils and providing shoreline stabilization and protection against erosion. At least 43 species of Minnesota plants can have this physical relationship in the environment (Appendix 2) (Borman et. al, 1997; Dindorf, 1993; Hamel and Parsons, 2001; Henderson et. al., 1998; Lahring, 2003; Nichols and Vennie, 1991; Welsch, undated). A great proportion of these are emergent plants. Plants which function as wave breaks include spikerush (*Eleocharis smallii*), hardstem and softstem bulrush (*Scirpus acutus* and *S. validus*) and wild celery (*Valisneria americana*). The stems of these plants, and others, reduce the energy in waves and protect shorelines. A number of plants have the ability to stabilize shoreline soils or bottom sediments. Among these are lakeshore sedge (*Carex lasiocarpa*), as well as other sedges, muskgrass (*Chara spp.*) and stonewort (*Nitella spp.*), which are submerged algae with a plantlike growth appearance, water smartweed (*Polygonum amphibium*), duck potato (*S. latifolia*) and wild rice (*Zizania aquatica*).

Aquatic plants influence the chemical aspects of lakes and streams. These influences include aeration, nutrient use and absorption of metals, wastewater treatment and as water quality indicators. Twenty aquatic plants found in Minnesota have some documentation related to chemical relationships in ecosystems (Appendix 3.) (Hamel and Parsons, 2001; Lahring, 2003; Welsch, undated; Whitley, 1990). Muskgrass (*Chara spp.*) and stonewort (*Nitella spp.*) remove lime from the water and often have calcium deposits on them. Horsetail (*Equisetum fluviatile*) absorbs heavy metals from systems and is often used to bioassay for these metals. Since gold is a heavy metal, horsetail is sometimes used to detect it as well. Canada waterweed (*Elodea canadensis*) removes metals such as lead, mercury and cadmium. Additionally, Canada waterweed has been use experimentally to remove oil. Northern watermilfoil (*Myriophyllum sibiricum*) and water marigold (*Megalodonta beckii*) are efficient users of nutrients in the water. Several plants are especially effective in aerating water. They include water marigold, northern watermilfoil, bushy pondweed (*Najas flexilis*) and slender pondweed (*Potamogeton pusillus*). Aquatic plants are sometimes used for treating sewage effluent in wastewater systems. Several plants that have proven efficient are pickerelweed (*Pontederia cordata*), hardstem and softstem bulrush (*Scirpus acutus* and *validus*), cane

¹⁰ See References

¹¹ See Glossary

¹² See Glossary

(*Phragmites australis*) and several species of duckweeds (*Lemna minor*, *Lemna trisulca* and *Spirodela polyrhiza*). Specific aquatic plant species may be indicators of good water quality. Among Minnesota plants with this characteristic are wild celery (*Valisneria americana*), white water buttercup (*Ranunculus longirostris*) and water marigold.

Many of the aquatic plants found in Lake Minnewawa have an ecological value for some species of bird (Appendix 4.). Aquatic and wetland plants may provide cover, food, nesting material or nesting sites for a wide variety of bird species. For instance, hardstem and softstem bulrush, common cattail (*Typha latifolia*), and wild rice all provide cover for a variety of waterfowl, shorebird, marsh bird and songbird species. Cattail and bulrushes also provide both sites for nesting and materials to construct the nests. Aquatic plants such as wild rice, wild celery and bushy pondweed are among the very best foods for waterfowl.

Aquatic plants are also valuable to several species of mammals. Whitetail deer, as an example, utilize pondweeds (*Potamogeton spp.*) and yellow waterlily (*Nuphar variegata*) as a regular part of their diet. Beaver also eat these plants in addition to duckweeds (*Lemna spp.*). Muskrats utilize hardstem and softstem bulrush and cattails for food, cover, nesting material and sites for their houses.

Fish are benefited by aquatic plants in several ways. Bluegill, largemouth bass and northern pike are all afforded shelter (cover) by plants such as coontail (*Ceratophyllum demersum*), muskgrass, Canada waterweed, bushy pondweed, claspingleaf pondweed (*Potamogeton richardsonii*) and flatstem pondweed (*Potamogeton zosterformis*), among others. Northern pike may use cattails and threesquare as spawning sites. Many aquatic plants serve as the substrate on which fish food organisms (insects, other invertebrates) live.

Aquatic Plant Management Permit History

Aquatic plant management activities can take several different forms in Minnesota (Appendix 5). Many of these activities require an aquatic plant management permit from the Department of Natural Resources (Appendix 6). An average of 8 aquatic plant management permits per year were issued on Lake Minnewawa for the control of submerged vegetation with an automated unattended aquatic plant control device (AUAPCD)¹³ during the 2000 to 2005 period. Permits to control swimmer's itch, submerged vegetation filamentous algae and *Chara* by chemical means were also issued during these years. An average of 2.6 permits per year were issued to chemically control one or more of these nuisance conditions. A permit was also issued annually to the Lake Minnewawa Association for the lakewide harvest and control of submerged vegetation.

¹³ See Glossary

Year	Chemical Control		AUAPCD	
	Number	Acres	Number	Acres
2000	3	0.31	4	0.20
2001	0	-	5	0.26
2002	2	0.52	7	0.32
2003	1	0.13	9	0.47
2004	4	0.46	10	0.53
2005	6	0.89	13	0.82
Mean	2.6	0.46	2.6	0.43

Lake Issues

The Aquatic Plant Committee prepared the following list of issues facing lake property owners. It is not in priority order.

1. Dead vegetation washing up on shore especially after weekends and in area of jet ski use.
2. Declining lake usage as vegetation increases through the season.
3. Need to control vegetation.
4. Lake conditions affect property values.
5. Jet ski interference with angling during "prime" hours.
6. Increased number of rough fish (in particular dogfish) being caught.
7. Erosion and conversion of natural shoreline.
8. Difficulties in coordination.
9. Lack of parking at "dedicated" access lots.
10. Reduction in the size of walleyes caught.
11. Angler taking of small walleye.
12. Water levels need to be maintained at spring levels.
13. Increasing sedimentation changing the lake bottom.
14. Some septic systems may not be up to ate.
15. Weed harvester spreads plants around the lake.
16. Lawn runoff, especially from clippings and campfires fertilizes water.

Aquatic Plant Issues

The Aquatic Plant Committee prepared the following non-prioritized list of aquatic plant issues facing lake property owners.

1. Differences of opinion among landowners regarding how problem plants should be controlled.
2. Control of nuisance plants.
3. Declining beds of water lilies and bulrush.
4. Bays that are too shallow for the harvester to work in remain difficult to fish.
5. Matting of submerged plants (watermilfoil).
6. Harvester can't harvest all the species that are nuisances.
7. Floating mats of "topped out" plants (watermilfoil)
8. Dead plant stems (wild rice; bulrush) in the springtime prevents boat travel.
9. Floating bog.

10. The effects of plant abundance on fish populations.
11. Snails and leeches.
12. Weed harvester spreads plants around the lake.

Goals, Actions and Conditions

This plan is intended to protect and enhance the aquatic plants of Lake Minnewawa for fish and wildlife habitat, and their own intrinsic values, while providing reasonable recreational access and use to lakeshore owners and the citizens of Minnesota.

Goal 1. Assure lakeshore owners have access to the aquatic plant management plan for Lake Minnewawa.

Action 1. Provide a copy of this plan to all Lake Minnewawa property owners requesting it.

Action 2. Add this plan to the LMA website.

Goal 2. Control aquatic vegetation that prevents reasonable surface water use in both offshore and inshore areas by mechanical harvesting.

Condition 1. Harvest Areas 1, 2, 3, and 4 (Figure 22). Harvesting of submerged vegetation is allowed on up to 50% of the area from the 0 to 10 foot contour. Harvesting of submerged aquatic plants on offshore reefs and bars is permitted only when vegetation mats at the surface and significantly impacts recreational use. Emergent vegetation control is restricted to that allowed in Goal 6, Actions 1 and 2 below.

Condition 2. South Bay Harvest Area (Figure 22). Harvesting of submerged vegetation in this bay is allowed only when submerged plants restrict access to the main lake for the three residences in this area.

Condition 3. No Cut Area (Figure 22). This area extends from Warner's Point generally easterly to the northernmost property line of the last house (J. Oldakowski; Parcel number 29-0-045903) on the east shore of the bay. The majority of this shoreline is in State of Minnesota (DNR) ownership. Emergent and floating leaf plants largely dominate the bay. No harvest is permitted in this area.

Condition 4. *Dead* wild rice stalks contribute to the build up of muck and detritus in some portions of the lake. The harvest permit issued to the LMA will permit the removal of the dead wild rice stalks where they cause a problem. Dead stalks may be removed until October 1 of the year for which the permit is issued. In the spring, dead wild rice stalks may not be removed after June 1.

Condition 5. Floating bog (islands) are an occasional navigation problem on Lake Minnewawa. The harvest permit issued to the LMA will authorize the removal of problematic pieces of bog. The bog must be completely removed from the water and disposed of in an approved upland site.

Goal 3. Manage the daily and seasonal operations of the weed harvester.

Action 1. Prepare job descriptions for the harvesting manager and harvester operator positions (see Appendix 8).

Action 2. Prepare an annual report of the activities of the weed harvester for the LMA and the DNR.

Goal 4. Protect Lake Minnewawa from the introduction of invasive aquatic plants.

Action 1. Establish a trained team(s) to conduct searches for invasive plants.
 Action 2. Provide voluntary inspections at public accesses in cooperation with the DNR Division of Ecological Resources.

Goal 5. Provide maximum protection to stands of emergent and floating leaf plants, particularly wild rice, pickerelweed, hardstem bulrush, cane and white water lily.

Action 1. The control of cane and water lily will not be allowed under the LMA harvesting permit. Individual landowners with nuisance conditions caused by cane or water lily must seek their own permit from the DNR.
 Action 2. The control of wild rice, bulrush or pickerelweed under the LMA harvesting may be allowed under some circumstances. Harvesting may be allowed when densities of these plants prevent access to the lake and the individual landowner has requested relief, in writing, from the LMA harvesting manager. The maximum amount of control allowed is a 15-foot wide channel to open water using the most direct (shortest) route to open water.

Goal 6. Develop an aquatic plant information and education program for lakeshore owners.

Action 1. Add lakescaping information to the Lake Minnewawa website.
 Action 2. Develop and promote several lakescaping demonstration sites on Lake Minnewawa.
 Action 3. Conduct lakescaping workshops and/or provide lakeshore owners with access to workshops sponsored by other groups.
 Action 4. Conduct aquatic plant identification workshops and/or provide lakeshore owners with access to workshops sponsored by other groups.

The following chart indicates the party or parties involved in and/or responsible for the implementation of the goals and action of this plan.

Goal & Action	DNR	LMA
Goal 1, Actions 1 & 2		X
Goal 2, Actions 1,2,3,4, & 5	X	X
Goal 3	X	X
Goal 3, Actions 1 & 2		X
Goal 4, Actions 1 & 2	X	X
Goal 5, Action 1	X	
Goal 5, Action 2		X
Goal 6, Action 1		X
Goal 6, Actions 2,3,4	X	X

Variance

Minnesota Rule 6280.0350 Subpart 3 C. reads in part: *An application for mechanical control of aquatic macrophytes must include the name, address, signature, and location on the lake of all property owners whose shoreline will be controlled.* This provision is waived for the duration of this plan and constitutes a variance from the rule.

Permit Application and Issuance

Minnesota Rules 6280.0350 Subpart 2 (Appendix 7.) states: “When a lake vegetation management plan approved by the commissioner has been developed, APM permits will be issued according to the guidelines of the plan”.

Plan Preparation, Duration and Review

The Aquatic Plant Committee prepared this plan. The participants were: Ron Conzet, Ed Feiler, Nancy Karjalahti, Marolyn Martinson, Pat McGinn, Jerry Smith, Gary Vorklicky and Ralph Vorlicky. It may be necessary to make minor adjustments to this plan in any one year. This may be done by mutual agreement. This plan will be in effect through January 1, 2012, at which time both parties agree to review the plan and its effectiveness in reaching its goals. Adjustments to the plan based on this review may be made at that time and the plan renewed by mutual agreement.

Approval

We agree with the conditions in this vegetation management plan and will implement them.

Rick Bruesewitz, Area Fisheries Supervisor DNR

Date

Joe Mix, Assistant Regional Fisheries Manager DNR

Date

Bob Liebfried, Regional Ecological Resources Manager DNR

Date

Bev Rath, President, Lake Minnewawa Association

Date

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Appendix 1. Checklist of Aquatic Plants in Lake Minnewawa (1-33)

Common Name	Scientific Name	1946	1956	1976	1982	1992	1994	1997	2006
Sweet flag	<i>Acorus calamus</i>							X	
Swamp milkweed	<i>Asclepias incarnata</i>					X			
Water shield	<i>Brasenia schreberi</i>	X	X						X
Water-arum	<i>Calla palustris</i>					X			
Sedge	<i>Carex aquatilis</i>			X	X				
Bottlebrush sedge	<i>Carex comosa</i>							X	
Coontail	<i>Ceratophyllum demersum</i>	X		X	X	X	X	X	X
Leatherleaf	<i>Chamaedaphne calyculata</i>							X	
Muskgrass	<i>Chara spp.</i>								X
Water moss	<i>Drepanocladus spp.</i>								X
Needlerush	<i>Eleocharis acicularis</i>					X		X	
Small's spikerush	<i>Eleocharis smallii</i>	X		X		X	X	X	X
Canada waterweed	<i>Elodea canadensis</i>					X	X	X	X
Swamp horsetail	<i>Equisetum fluviatile</i>					X		X	X
Joe Pye weed	<i>Eupatorium maculatum</i>					X			
Blue flag	<i>Iris versicolor</i>					X		X	
Quillwort	<i>Isoetes spp.</i>								X
Lesser duckweed	<i>Lemna minor</i>							X	
Star duckweed	<i>Lemna trisulca</i>					X		X	X
Water marigold	<i>Megalodonta beckii</i>					X	X	X	X
Northern watermilfoil	<i>Myriophyllum sibiricum</i>	X		X	X	X	X	X	X
Leafless watermilfoil	<i>Myriophyllum tenellum</i>							X	
Bushy pondweed	<i>Najas flexilis</i>	X					X	X	X
Stonewort	<i>Nitella spp.</i>					X			
Yellow waterlily	<i>Nuphar luteum variegatum</i>			X	X	X	X	X	X
Little yellow waterlily	<i>Nuphar microphyllum</i>	X				X			
Little white waterlily ¹⁴	<i>Nymphaea liebergii</i>					X			

¹⁴ Listed as threatened

Common Name	Scientific Name	1946	1956	1976	1982	1992	1994	1997	2006
White waterlily	<i>Nymphaea tuberosa</i>	X		X	X	X	X	X	X
Cane	<i>Phragmites australis</i>	X				X	X	X	X
Reed canary grass ¹⁵	<i>Phalaris arundinacea</i>			X	X				
Clearweed	<i>Pilea fontana</i>				X				
Water smartweed	<i>Polygonum amphibium</i>					X		X	
Pickeralweed	<i>Pontederia cordata</i>	X		X	X	X	X	X	X
Largeleaf pondweed	<i>Potamogeton amplifolius</i>	X				X	X	X	X
Nuttall's pondweed	<i>Potamogeton epihydrus</i>	X						X	X
Variable pondweed	<i>Potamogeton gramineus</i>	X				X	X	X	X
Illinois pondweed	<i>Potamogeton illinoensis</i>							X	X
Floating pondweed	<i>Potamogeton natans</i>	X	X	X	X	X		X	X
Blunt-leaved pondweed	<i>Potamogeton obtusifolius</i>	X							
Whitestem pondweed	<i>Potamogeton praelongus</i>	X				X		X	X
Palermo pondweed	<i>Potamogeton pusillus</i>							X	
Claspingleaf pondweed	<i>Potamogeton richardsonii</i>	X		X	X	X	X	X	X
Robbins' pondweed	<i>Potamogeton robbinsi</i>					X	X	X	X
Narrowleaf pondweed	<i>Potamogeton spp.</i>								X
Vasey's pondweed ¹⁶	<i>Potamogeton vaseyi</i>							X	
Flatstem pondweed	<i>Potamogeton zosterformis</i>	X				X		X	X
Swamp fivefinger	<i>Potentilla palustris</i>					X		X	
White water buttercup	<i>Ranunculus spp.</i>	X						X	X
Greater water dock	<i>Rumex orbiculatus</i>					X		X	
Duck potato	<i>Sagittaria latifolia</i>				X				
Stiff wapato	<i>Sagittaria rigida</i>					X		X	
Hardstem bulrush	<i>Scirpus acutus</i>					X	X	X	X
Arrowhead	<i>Sagittaria spp.</i>								X
River bulrush	<i>Scirpus fluviatilis</i>							X	

¹⁵ Invasive species

¹⁶ Listed as special concern

Common Name	Scientific Name	1946	1956	1976	1982	1992	1994	1997	2006	
Softstem bulrush	<i>Scirpus validus</i>	X		X X					X	
Water parsnip	<i>Sium suave</i>					X				
Giant burreed	<i>Sparganium eurycarpum</i>					X		X		
Floating burreed	<i>Sparganium fluctuans</i>			X X	X				X	
Burreed	<i>Sparganium spp.</i>								X	
Greater duckweed	<i>Spirodela polyrhiza</i>				X			X X	X	
Narrowleaf cattail	<i>Typha angustifolia</i>					X				
Common cattail	<i>Typha latifolia</i>	X		X X	X X	X X	X X			
Cattail	<i>Typha spp.</i>								X	
Greater bladderwort	<i>Utricularia vulgaris</i>				X			X		
Bladderwort	<i>Utricularia spp.</i>								X	
Wild celery	<i>Valisneria americana</i>	X		X X	X X	X X	X X	X X	X	
Water meal	<i>Wolffia columbiana</i>					X				
Wild rice	<i>Zizania palustris</i>	X X	X X	X X	X X	X X	X X	X X	X	
Water stargrass	<i>Zosterella dubia</i>	X X		X					X	
Depth of plant growth		- 6-7' 5' 7' 9' 3.5' 14' 13'								

Appendix 2. Coefficient of Conservatism (C) for Aquatic Plants (1997, 2006).

Common Name	Scientific Name	1997	2006
		C	C
Sweet Flag	<i>Acorus calamus</i>	7	
Water shield	<i>Brasenia schreberi</i>		7
Bottlebrush sedge	<i>Carex comosa</i>	5	
Coontail	<i>Ceratophyllum demersum</i>	3	3
Leatherleaf	<i>Chamaedaphne calyculata</i>	6	
Muskgrass	<i>Chara spp.</i>		7
Water moss	<i>Drepanocladus spp.</i>		6
Needlerush	<i>Eleocharis acicularis</i>	5	
Small's spikerush	<i>Eleocharis smallii</i>	6	6
Canada waterweed	<i>Elodea canadensis</i>	3	3
Swamp horsetail	<i>Equisetum fluviatile</i>	7	7
Blue flag	<i>Iris versicolor</i>	6	
Quillwort	<i>Isoetes spp.</i>		6
Lesser duckweed	<i>Lemna minor</i>	5	
Star duckweed	<i>Lemna trisulca</i>	6	6
Water marigold	<i>Megalodonta beckii</i>	8	8
Northern watermilfoil	<i>Myriophyllum sibiricum</i>	7	7
Leafless watermilfoil	<i>Myriophyllum tenellum</i>	10	
Bushy pondweed	<i>Najas flexilis</i>	6	6
Yellow waterlily	<i>Nuphar luteum variegatum</i>	6	6
Little yellow waterlily	<i>Nuphar microphyllum</i>	9	
White waterlily	<i>Nymphaea tuberosa</i>	6	6
Cane	<i>Phragmites australis</i>	1	1
Water smartweed	<i>Polygonum amphibium</i>	5	
Pickerelweed	<i>Pontederia cordata</i>	9	9
Largeleaf pondweed	<i>Potamogeton amplifolius</i>	7	7
Nuttall's pondweed	<i>Potamogeton epihydrus</i>	8	8
Variable pondweed	<i>Potamogeton gramineus</i>	7	7
Illinois pondweed	<i>Potamogeton illinoensis</i>	6	6
Floating pondweed	<i>Potamogeton natans</i>	5	5
Whitestem pondweed	<i>Potamogeton praelongus</i>	8	8
Palermo pondweed	<i>Potamogeton pusillus</i>	7	
Claspingleaf pondweed	<i>Potamogeton richardsonii</i>	5	5
Robbins' pondweed	<i>Potamogeton robbinsi</i>	8	8
Narrowleaf pondweed	<i>Potamogeton spp.</i>		6
Flatstem pondweed	<i>Potamogeton zosterformis</i>	6	6
Swamp fivefinger	<i>Potentilla palustris</i>	6	
White water buttercup	<i>Ranunculus spp.</i>	6	6
Greater water dock	<i>Rumex orbiculatus</i>	6	
Duck potato	<i>Sagittaria latifolia</i>	3	
Stiff wapato	<i>Sagittaria rigida</i>	8	
Arrowhead	<i>Sagittaria spp.</i>		6
Hardstem bulrush	<i>Scirpus acutus</i>	5	5
River bulrush	<i>Scirpus fluviatilis</i>	5	

Appendix 2. Coefficient of Conservatism (C) for Aquatic Plants (1997, 2006).

Common Name	Scientific Name	1997 C	2006 C
Softstem bulrush	<i>Scirpus validus</i>		4
Giant burreed	<i>Sparganium eurycarpum</i>	5	
Floating burreed	<i>Sparganium fluctuans</i>		10
Burreed	<i>Sparganium spp</i>		6
Greater duckweed	<i>Spirodela polyrhiza</i>	5	5
Common cattail	<i>Typha latifolia</i>	1	
Cattail	<i>Typha spp</i>		6
Bladderwort	<i>Utricularia spp</i>		6
Greater bladderwort	<i>Utricularia vulgaris</i>	7	
Wild celery	<i>Valisneria americana</i>	6	6
Wild rice	<i>Zizania palustris</i>	8	8
Number of Species (N)		44	37
Mean Coefficient of Conservatism		6	6.2
Square root of N		6.332	6.083
Floristic Quality Index		37.99	37.71

Appendix 3. Aquatic Plants with Attributes Affecting the Physical Environment

Common Name	Scientific Name
Sweet flag	<i>Acorus calamus</i>
Lakeshore sedge	<i>Carex lacustris</i>
Wooly sedge	<i>Carex lasiocarpa</i>
Muskgrass	<i>Chara vulgaris</i>
Threeway sedge	<i>Dulichium arundinaceum</i>
Waterwort	<i>Elatine triandra</i>
Needlerush	<i>Eleocharis acicularis</i>
Blunt spikerush	<i>Eleocharis obtusa</i>
Spikerush	<i>Eleocharis smallii</i>
Swamp horsetail	<i>Equisetum fluviatile</i>
Spotted Joe Pye weed	<i>Eupatorium maculatum</i>
Blue flag	<i>Iris versicolor</i>
Soft rush	<i>Juncus effusus</i>
Rush	<i>Juncus nodosus</i>
Rice cutgrass	<i>Leersia oryzoides</i>
Water lobelia	<i>Lobelia dortmanna</i>
Tufted loosestrife	<i>Lysimachia thyrsoiflora</i>
Leafless watermilfoil	<i>Myriophyllum tenellum</i>
Yellow lotus	<i>Nelumbo lutea</i>
Stonewort	<i>Nitella spp.</i>
Reed canary grass	<i>Phalaris arundinacea</i>
Cane	<i>Phragmites australis</i>
Water smartweed	<i>Polygonum amphibium</i>
Marsh smartweed	<i>Polygonum coccineum</i>
Pickeralweed	<i>Pontederia cordata</i>
Floating pondweed	<i>Potamogeton natans</i>
Spiral pondweed	<i>Potamogeton spirillus</i>
Arrowhead	<i>Sagittaria cuneata</i>
Duck potato	<i>Sagittaria latifolia</i>
Hardstem bulrush	<i>Scirpus acutus</i>
Leafy bulrush	<i>Scirpus atrovirens</i>
Wool grass	<i>Scirpus cyperinus</i>
River bulrush	<i>Scirpus fluviatilis</i>
Threesquare	<i>Scirpus pungens</i>
Softstem bulrush	<i>Scirpus validus</i>
Giant burreed	<i>Sparganium eurycarpum</i>
Prairie cord grass	<i>Spartina pectinata</i>
Awlwort	<i>Subularia aquatica</i>
Narrowleaf cattail	<i>Typha angustifolia</i>
Common cattail	<i>Typha latifolia</i>
Wild celery	<i>Valisneria americana</i>
Horned pondweed	<i>Zannichellia palustris</i>
Wild rice	<i>Zizania palustris</i>

Appendix 4. Aquatic Plants with Attributes Affecting the Chemical Environment

Common Name	Scientific Name
Muskgrass	<i>Chara vulgaris</i>
Swamp horsetail	<i>Equisetum fluviatile</i>
Stonewort	<i>Nitella spp.</i>
Cane	<i>Phragmites australis</i>
Pickerelweed	<i>Pontederia cordata</i>
Hardstem bulrush	<i>Scirpus acutus</i>
Threesquare	<i>Scirpus pungens</i>
Softstem bulrush	<i>Scirpus validus</i>
Wild celery	<i>Valisneria americana</i>
Canada waterweed	<i>Elodea canadensis</i>
Mare's tail	<i>Hippuris vulgaris</i>
Quillwort	<i>Isoetes echinospora</i>
Lesser duckweed	<i>Lemna minor</i>
Star duckweed	<i>Lemna trisulca</i>
Water marigold	<i>Megalodonta beckii</i>
Northern watermilfoil	<i>Myriophyllum sibiricum</i>
Bushy pondweed	<i>Najas flexilis</i>
Palermo pondweed	<i>Potamogeton pusillus</i>
White water buttercup	<i>Ranunculus longirostris</i>
Greater duckweed	<i>Spirodela polyrhiza</i>

Appendix 5. Aquatic Plants with Habitat Attributes for Birds

Common Name	Scientific Name	Cover	Food	Nest Material	Nest Area
Sweet flag	<i>Acorus calamus</i>	x	x	x	x
Redtop grass	<i>Agrostis stolonifera</i>		x		
Water plantain	<i>Alisma trivale</i>		x		
Swamp milkweed	<i>Asclepias incarnata</i>		x	x	
Mexican waterfern	<i>Azolla mexicana</i>		x		
Water hyssop	<i>Bacopa rotundifolia</i>		x		
	<i>Beckmannia</i>				
Slough grass	<i>syzigachne</i>		x		
Nodding beggarticks	<i>Bidens cernua</i>		x		
Beggar ticks	<i>Bidens comosa</i>		x		
Small beggar ticks	<i>Bidens discoidea</i>		x		
Beggar ticks	<i>Bidens frondosa</i>		x		
Water shield	<i>Brasenia schreberi</i>		x		
Flowering rush	<i>Butomus umbellatus</i>	x			
	<i>Callitriche</i>				
Water starwort	<i>hermaphroditica</i>		x		
Water starwort	<i>Callitriche heterophylla</i>		x		
Water starwort	<i>Callitriche verna</i>		x		
Marsh marigold	<i>Caltha palustris</i>		x		
	<i>Cardamine</i>				
Bitter cress	<i>pennsylvanica</i>		x		
Lake sedge	<i>Carex aquatilis</i>		x		
Bottlebrush sedge	<i>Carex comosa</i>		x		
Lakeshore sedge	<i>Carex lacustris</i>		x		
Wooly sedge	<i>Carex lasiocarpa</i>		x		
Hop sedge	<i>Carex lupulina</i>		x		
Fewseed sedge	<i>Carex oligosperma</i>		x		
Beaked sedge	<i>Carex rostrata</i>		x		
Hummock sedge	<i>Carex stricta</i>		x		x
Tuckerman's sedge	<i>Carex tuckermani</i>		x		
	<i>Ceratophyllum</i>				
Coontail	<i>demersum</i>		x		
Muskgrass	<i>Chara vulgaris</i>		x		
Bulb bearing water hemlock	<i>Cicuta bulbifera</i>		x		
Giant water hemlock	<i>Cicuta maculata</i>		x		
Twig rush	<i>Cladium mariscoides</i>		x		
Redroot flatsedge	<i>Cyperus erythrorhizos</i>		x		
Chufa nut grass	<i>Cyperus esculentus</i>		x		
Fragrant Cyperus	<i>Cyperus odoratus</i>		x		
Brook sedge	<i>Cyperus rivularis</i>		x		
Strawcolored nutsedge	<i>Cyperus strigosus</i>		x		
Swamp loosestrife	<i>Decodon verticillatus</i>		x		
Sprangletop	<i>Diplachne fascicularis</i>		x		
Salt grass	<i>Distichlis stricta</i>		x		

Appendix 5. Aquatic Plants with Habitat Attributes for Birds

Common Name	Scientific Name	Cover	Food	Nest Material	Nest Area
Threeway sedge	<i>Dulichium arundinaceum</i>		x		
Barnyard grass	<i>Echinochloa crusgalli</i>		x		
Wild millet	<i>Echinochloa muricata</i>		x		
Walter's millet	<i>Echinochloa walteri</i>		x		
Waterwort	<i>Elatine minima</i>		x		
Waterwort	<i>Elatine triandra</i>		x		
Needlerush	<i>Eleocharis acicularis</i>		x		
Flatstem spikerush	<i>Eleocharis compressa</i>		x		
Blunt spikerush	<i>Eleocharis obtusa</i>		x		
Ovate spikerush	<i>Eleocharis ovata</i>		x		
Dwarf spikerush	<i>Eleocharis parvula</i>		x		
Few flowered spikerush	<i>Eleocharis quinqueflora</i>		x		
Triangle spikerush	<i>Eleocharis robbinsi</i>		x		
Spikerush	<i>Eleocharis smallii</i>	x	x		
Canada waterweed	<i>Elodea canadensis</i>		x		
Western waterweed	<i>Elodea nuttallii</i>		x		
Swamp horsetail	<i>Equisetum fluviatile</i>		x		
Winter scouring rush	<i>Equisetum hyemale</i>		x		
Creeping lovegrass	<i>Eragrostis hypnoides</i>		x		
	<i>Eriocaulon</i>				
Northern pipewort	<i>septangulare</i>		x		
Small bedstraw	<i>Galium trifidum</i>		x		
Northern manna grass	<i>Glyceria borealis</i>		x		
Fowl manna grass	<i>Glyceria striata</i>		x		
Mare's tail	<i>Hippuris vulgaris</i>		x		
St Johns Wort	<i>Hypericum boreale</i>		x		
St Johns Wort	<i>Hypericum majus</i>		x		
Jewelweed	<i>Impatiens capensis</i>		x		
Blue flag	<i>Iris versicolor</i>	x	x		
Southern blue flag	<i>Iris virginica</i>		x		
Baltic (Arctic) Rush	<i>Juncus arcticus</i>		x		
Soft rush	<i>Juncus effusus</i>	x	x		
Rush	<i>Juncus nodosus</i>		x		
Brown fruited rush	<i>Juncus pelocarpus</i>	x	x		
Catchfly grass	<i>Leersia lenticularis</i>		x		
Rice cutgrass	<i>Leersia oryzoides</i>		x		
White grass	<i>Leersia virginica</i>		x		
Lesser duckweed	<i>Lemna minor</i>		x		
Star duckweed	<i>Lemna trisulca</i>		x		
Hooded arrowhead	<i>Lophotocarpus calycina</i>		x		
Water purslane	<i>Ludwigia palustris</i>		x		
Hairy water clover	<i>Marsilea vestita</i>		x		
Water marigold	<i>Megalodonta beckii</i>		x		
Small forget me not	<i>Myosotis laxa</i>		x		

Appendix 5. Aquatic Plants with Habitat Attributes for Birds

Common Name	Scientific Name	Cover	Food	Nest Material	Nest Area
Farwell's watermilfoil	<i>Myriophyllum farwelli</i>		x		
Northern watermilfoil	<i>Myriophyllum sibiricum</i>		x		
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>		x		
Leafless watermilfoil	<i>Myriophyllum tenellum</i>		x		
	<i>Myriophyllum</i>				
Whorled watermilfoil	<i>verticillatum</i>		x		
Bushy pondweed	<i>Najas flexilis</i>		x		
Slender naiad	<i>Najas gracillima</i>		x		
Southern naiad	<i>Najas guadalupensis</i>		x		
Sea naiad	<i>Najas marina</i>		x		
Water cress	<i>Nasturtium officinale</i>		x		
Yellow lotus	<i>Nelumbo lutea</i>	x	x		
Stonewort	<i>Nitella spp.</i>		x		
	<i>Nuphar luteum</i>				
Little yellow water lily	<i>pumillum</i>		x		
	<i>Nuphar luteum</i>				
Yellow water lily	<i>variegatum</i>		x		
Little white water lily	<i>Nymphaea tetragona</i>		x		
White water lily	<i>Nymphaea tuberosa</i>		x		
Reed canary grass	<i>Phalaris arundinacea</i>		x		
Cane	<i>Phragmites australis</i>	x			
Fowl bluegrass	<i>Poa palustris</i>		x		
Water smartweed	<i>Polygonum amphibium</i>		x		
Carey's smartweed	<i>Polygonum careyi</i>		x		
Marsh smartweed	<i>Polygonum coccineum</i>		x		
Common smartweed	<i>Polygonum hydropiper</i>		x		
	<i>Polygonum</i>				
Water pepper	<i>hydropiperoides</i>		x		
	<i>Polygonum</i>				
Nodding smartweed	<i>lapathifolium</i>		x		
	<i>Polygonum</i>				
Pinkweed	<i>pennsylvanicum</i>		x		
Lady's thumb	<i>Polygonum persicaria</i>		x		
Water smartweed	<i>Polygonum punctatum</i>		x		
Arrowleaved tearthumb	<i>Polygonum sagittatum</i>		x		
Pickerelweed	<i>Pontederia cordata</i>	x	x		
Northern pondweed	<i>Potamogeton alpinus</i>		x		
	<i>Potamogeton</i>				
Largeleaf pondweed	<i>amplifolius</i>		x		
Curlyleaf pondweed	<i>Potamogeton crispus</i>		x		
	<i>Potamogeton</i>				
Rafinesque's pondweed	<i>diversifolius</i>		x		
Nuttall's pondweed	<i>Potamogeton epihydrus</i>		x		
Filiform pondweed	<i>Potamogeton filiformis</i>		x		
Leafy pondweed	<i>Potamogeton foliosus</i>		x		

Appendix 5. Aquatic Plants with Habitat Attributes for Birds

Common Name	Scientific Name	Cover	Food	Nest	
				Material	Nest Area
Fries' pondweed	<i>Potamogeton friesii</i>		x		
	<i>Potamogeton</i>				
Variable pondweed	<i>gramineus</i>		x		
	<i>Potamogeton</i>				
Illinois pondweed	<i>illinoensis</i>		x		
Floating pondweed	<i>Potamogeton natans</i>		x		
River pondweed	<i>Potamogeton nodosus</i>		x		
	<i>Potamogeton</i>				
Bluntleaf pondweed	<i>obtusifolius</i>		x		
	<i>Potamogeton</i>				
Whitestem pondweed	<i>praelongus</i>		x		
Palermo pondweed	<i>Potamogeton pusillus</i>		x		
	<i>Potamogeton</i>				
Claspingleaf pondweed	<i>richardsonii</i>		x		
Robbins' pondweed	<i>Potamogeton robbinsi</i>		x		
Spiral pondweed	<i>Potamogeton spirillus</i>		x		
	<i>Potamogeton</i>				
Narrowleaf pondweed	<i>strictifolius</i>		x		
Vasey's pondweed	<i>Potamogeton vaseyi</i>		x		
	<i>Potamogeton</i>				
Flatstem pondweed	<i>zosterformis</i>		x		
Swamp fivefinger	<i>Potentilla palustris</i>		x		
White water buttercup	<i>Ranunculus aquatilis</i>		x		
White water crowfoot	<i>Ranunculus circinatus</i>		x		
Seaside crowfoot	<i>Ranunculus cymbalaria</i>		x		
Yellow water buttercup	<i>Ranunculus flabellaris</i>		x		
Spearwort	<i>Ranunculus flammula</i>		x		
Small yellow water					
crowfoot	<i>Ranunculus gmelini</i>		x		
White water buttercup	<i>Ranunculus longirostris</i>		x		
Cursed crowfoot	<i>Ranunculus scleratus</i>		x		
Slender riccia	<i>Riccia fluitans</i>		x		
Purple-fringed riccia	<i>Ricciocarpus natans</i>		x		
Golden dock	<i>Rumex maritimus</i>		x		
Water dock	<i>Rumex orbiculatus</i>		x		
Widgeon grass	<i>Ruppia maritimus</i>		x		
Engelmann's arrowhead	<i>Sagittaria brevirostra</i>		x		
Slender arrowhead	<i>Sagittaria cristata</i>		x		
Arrowhead	<i>Sagittaria cuneata</i>		x		
Grass leaved					
arrowhead	<i>Sagittaria graminea</i>		x		
Duck potato	<i>Sagittaria latifolia</i>		x		
Stiff wapato	<i>Sagittaria rigida</i>		x		
Red saltwort	<i>Salicornia rubra</i>		x		
Hardstem bulrush	<i>Scirpus acutus</i>	x	x	x	x

Appendix 5. Aquatic Plants with Habitat Attributes for Birds

Common Name	Scientific Name	Cover	Food	Nest	
				Material	Nest Area
Wool grass	<i>Scirpus cyperinus</i>	x	x		
River bulrush	<i>Scirpus fluviatilis</i>		x		x
Slender bulrush	<i>Scirpus heterochaetus</i>		x		
Panicle bulrush	<i>Scirpus microcarpus</i>				x
Bayonet grass	<i>Scirpus paludosus</i>		x		
Threesquare	<i>Scirpus pungens</i>	x	x		x
Bluntscale bulrush	<i>Scirpus smithii</i>		x		
Swaying bulrush	<i>Scirpus subterminalis</i>		x		x
Torrey's bulrush	<i>Scirpus torreyi</i>		x		
Softstem bulrush	<i>Scirpus validus</i>	x	x	x	x
Whitetop	<i>Scolochloa festucacea</i>		x		
Mad Dog Skullcap	<i>Scutellaria lateriflora</i>		x		
Three leaf False Solomons Seal	<i>Smilacina trifolia</i>		x		
Nuttall's burreed	<i>Sparganium americanum</i>	x	x		
	<i>Sparganium angustifolium</i>		x		
Greenfruited burreed	<i>Sparganium chlorocarpum</i>		x		
	<i>Sparganium eurycarpum</i>		x		x
Floating burreed	<i>Sparganium fluctuans</i>		x		
Alkali cordgrass	<i>Spartina gracilis</i>		x		
Prairie cordgrass	<i>Spartina pectinata</i>		x		
Greater duckweed	<i>Spirodela polyrhiza</i>		x		
Sago pondweed	<i>Stuckenia pectinatus</i>		x		
Sheathed pondweed	<i>Stuckenia vaginata</i>		x		
Seaside arrow grass	<i>Triglochin maritima</i>		x		
Narrowleaf cattail	<i>Typha angustifolia</i>	x	x		x
Common cattail	<i>Typha latifolia</i>	x	x	x	x
Humped bladderwort	<i>Utricularia gibba</i>		x		
Greater bladderwort	<i>Utricularia vulgaris</i>		x		
Wild celery	<i>Valisneria americana</i>		x		
Water meal	<i>Wolffia columbiana</i>		x		
Dotted water meal	<i>Wolffia punctata</i>		x		
Horned pondweed	<i>Zannichellia palustris</i>		x		
Wild rice	<i>Zizania palustris</i>	x	x		
Water star grass	<i>Zosterella dubia</i>		x		

Appendix 6. General Techniques Used for Aquatic Plant Control in Minnesota

Several control methods may be used for submerged, floating leaf and emergent vegetation, swimmer's itch (snails), leeches and algae when they occur in such numbers that they interfere with boating, swimming and other aquatic recreation or beneficial water use. Specific control varies by species and site conditions. Mechanical control, chemical control and biological control are among the control methods available. A single control method or a combination of the methods for specific conditions is frequently chosen so that lakeshore homeowners have reasonable access and use of the lake while still protecting and enhancing Minnesota's aquatic resources.

Mechanical Control

Mechanical control on a small-scale means to cut or pull by hand or with equipment such as rakes, cutting blades, hand operated motorized trimmers, or use of an automated untended aquatic plant control device (e.g., weed roller). Use of automated untended aquatic plant control devices are generally not approved at sites where a soft bottom type is present due to the adverse effects caused from disrupting this type of bottom. Large-scale mechanical control often uses a floating, motorized harvesting machine that cuts plants and then removes them from the water. Annual cutting is required to maintain control of submerged plants. All individuals conducting mechanical control are required to remove the plants from the water onto upland areas. Permits are required under certain conditions (MN Rule 6280).

Chemical Control

Herbicide control means to use a plant-killing chemical that is applied in a liquid, granular or pellet form. Only herbicides labeled for aquatic use and approved for use by the MN DNR may be used. Any use of an herbicide requires a permit.

Generally, herbicide use between June 15 and July 15 achieves the most effective short-term control of native submerged aquatic plant species that are restricting access to a lake.

Herbicide control of curlyleaf pondweed with low dosages of endothall-based products is most effective when conducted prior to the formation of turions, which are the primary vegetative reproductive structures. The current research suggests that this type of herbicide should be used when water temperatures are at, or near 55°F in the spring. Treatment at this time should kill curlyleaf pondweed, may reduce or eliminate turion production in treated areas, and have less negative impacts on native aquatic plants than treatments done later in the summer.

Chemical control of the exotic purple loosestrife (*Lythrum salicaria*) is most effective from June 15 to August 1 when the plant is first in flower. Spot treatments with glyphosate products (e.g., RODEO™) on new, small infestations are recommended. Exotic Species Control staff from the Division of Ecological Services can provide expert technical assistance regarding control of purple loosestrife, curlyleaf pondweed or Eurasian watermilfoil (*Myriophyllum spicatum*).

Chemical control of swimmer's itch (snails), leeches and filamentous algae is done by application of an algaecide such as copper sulfate (CuSO_4). Application is made only after a problem has been identified. The control method provides only temporary relief for a week or so.

Biological Control

Biological control of purple loosestrife with insects is currently being conducted. More information is available from the Exotic Species staff of the Division of Ecological Services.

Appendix 7. Minnesota Rules Chapter 6280 Aquatic Plants and Nuisances

- 6280.010 Definitions.
- 6280.020 [repealed, 21 sr 1406]
- 6280.025 Standards for aquatic plant management permit issuance.
- 6280.030 [repealed, 21 sr 1406]
- 6280.035 Aquatic plant management practices.
- 6280.040 [repealed, 21 sr 1406]
- 6280.045 Permit application, fees, and annual report.
- 6280.050 [repealed, 21 sr 1406]
- 6280.060 Approval of pesticides and methods used for aquatic plant management or aquatic nuisance control.
- 6280.070 Commercial applicators and operators.
- 6280.080 Annual reports and treatment notices.
- 6280.090 Amendments and revocation.
- 6280.100 Variance.
- 6280.110 Review and appeal of permit decision.
- 6280.120 Penalty.

6280.0100 DEFINITIONS.

Subpart 1. Scope. The terms used in this chapter have the meanings given them in this part.

Subp. 2. Aquatic macrophytes. "Aquatic macrophytes" means vascular nonwoody plants, either submerged, floating leafed, floating, or emergent plants growing in water.

Subp. 2a. Aquatic plant management. "Aquatic plant management" means activities which are intended to alter aquatic plant populations (either reduce or enhance) by means of herbicides, biological agents, mechanical devices, or physical alteration. This includes the transplanting or seeding of aquatic macrophytes.

Subp. 2b. Aquatic plant management permit or APM permit. "Aquatic plant management permit" or "APM permit" means a permit issued by the commissioner authorizing aquatic plant management or aquatic nuisance control activities.

Subp. 3. Aquatic nuisance. "Aquatic nuisance" means the presence of leeches, snails that carry swimmer's itch, or algae in such numbers or such abundance as to interfere with boating, swimming, or other aquatic recreation or beneficial water use.

Subp. 3a. Automated untended aquatic plant control device. "Automated untended aquatic plant control device" means a device for destroying aquatic macrophytes that may be remotely operated or placed on a timer and is capable of being operated without the assistance of an operator.

Subp. 4. Bog. "Bog" means an aquatic mat, either attached to or resting on the bottom or floating, that is normally made up of dead organic matter held together by various types of living plants.

Subp. 5. Dense growth of submerged vegetation. "Dense growth of submerged vegetation" means that a condition exists where the vegetation occurs at 90 percent or more of sampling stations within a proposed treatment area and has an average recovery of three or more, when percent occurrence and average recovery are determined according to the method described by Jessen and Lound in Game Investigational Report No. 6, Minnesota Department of Conservation (1962), the original filed in the Office of the Director of Fish and Wildlife, Saint Paul, Minnesota.

Subp. 6. Excessive algae bloom. "Excessive algae bloom" means that some or all of the following conditions are present:

- A. algae population is dominated by blue-green algae;
- B. secchi disc reading is typically two feet or less;
- C. floating mats or scums of algae have accumulated on the downwind shore; or
- D. decomposition of accumulated algae has occurred releasing a blue-green pigment and causing an offensive odor.

Subp. 7. Field inspection. "Field inspection" means an on-site determination by department personnel of relevant characteristics of a proposed treatment area.

Subp. 8. Label and labeling. "Label and labeling" has the meaning given in Minnesota Statutes, section 18B.01, subdivisions 13 and 14.

Subp. 9. Littoral area. "Littoral area" means any part of a body of water 15 feet deep or less.

Subp. 10. Monitoring. "Monitoring" means assessment by the commissioner of the status, progress, or efficacy of activities authorized by permit and observation of control operations being done under permit.

Subp. 11. Ordinary high water level. "Ordinary high water level" has the meaning given in Minnesota Statutes, section 103G.005, subdivision 14.

Subp. 12. Pesticide. "Pesticide" has the meaning given by Minnesota Statutes, section 18B.01, subdivision 18.

Subp. 13. Public waters. "Public waters" means those waters of the state defined as public waters by Minnesota Statutes, section 103G.005, subdivision 15, and inventoried pursuant to Laws 1979, chapter 199, and Minnesota Statutes, section 103G.201.

Subp. 14. Storm water retention ponds. "Storm water retention ponds" means those bodies of public water, usually less than ten acres in size, lying within home rule charter or statutory cities or towns and are specifically managed for the primary public value of retaining storm water.

Subp. 15. [Repealed, 21 SR 1406]

STAT AUTH: MS s 103G.615 HIST: 18 SR 83; 21 SR 1406
6280.0250 STANDARDS FOR AQUATIC PLANT MANAGEMENT PERMIT ISSUANCE.

Subpart 1. Actions not requiring permit. Unless otherwise required in subpart 2, an APM permit is not required for items A to F:

A. cutting or pulling aquatic macrophytes for the purpose of constructing shooting and observation blinds in amounts sufficient for that purpose;

B. gathering aquatic macrophytes or plant parts, other than wild rice and American lotus, for personal use only and not for resale;

C. cutting or pulling submerged aquatic macrophytes in order to maintain a site for swimming or boat docking not to extend along more than 50 feet of the owner's shoreline or one-half the length of the owner's total shoreline, whichever is less, and that does not exceed 2,500 square feet in area, except that a boat channel extending to open water, not to exceed 15 feet in width, may be maintained. The boating channel is included in the maximum shoreline feet allowed. Cutting or pulling may only be done under the following conditions:

(1) by hand or with power-operated cutters, rakes, or similar equipment that does not significantly alter the course, current, or cross-section of the lake bottom. Draglines, bulldozers, hydraulic jets, suction dredges, automated untended aquatic plant control devices, or other power-operated earth-moving equipment may not be used;

(2) cutting or pulling takes place in the same location each year unless an APM permit has been obtained authorizing a change in location; and

(3) aquatic macrophytes that have been cut or pulled must immediately and permanently be removed from the water;

D. destroying aquatic macrophytes incidental to activities authorized by a department permit for work in public waters as provided by Minnesota Statutes, section 103G.245, or by a license permitting the passage of utilities over public lands and waters as provided by parts 6135.0100 to 6135.1800 and Minnesota Statutes, section 84.415;

E. cutting or pulling purple loosestrife (*Lythrum salicaria*); and

F. cutting or pulling water lilies and water shield or submerged vegetation to obtain a channel extending to open water, provided that:

(1) the channel is no more than 15 feet wide and takes the most direct route to open water;

(2) the channel is maintained by cutting or pulling; and

(3) the channel remains in the same location from year to year.

Subp. 2. Actions requiring a permit. Except as provided in subpart 1, an APM permit is required to:

A. apply pesticides below the ordinary high water level of public waters to control:

(1) snails that carry swimmer's itch, or leeches;

(2) dense growths of aquatic macrophytes that interfere with watercraft use, swimming, or other traditional recreational uses;

(3) excessive filamentous algae;

(4) excessive plankton algae blooms; and

(5) purple loosestrife (*Lythrum salicaria*), except for state and county noncommercial aquatic pesticide applicators, controlling purple loosestrife as part of rights-of-way maintenance, when the public waters are within the rights-of-way;

B. physically remove from or transplant into public waters any aquatic plants or a bog of any size whether free-floating or lodged in an area other than its original location;

C. destroy emergent aquatic macrophytes in public waters;

D. destroy water lilies and water shield in public waters except as provided in subpart 1, item F;

E. install or operate an automated untended aquatic plant control device for each property where the device is intended for operation, except that a permit of three years' duration may be issued when:

(1) the site to be controlled extends along no more than 50 feet of the owner's shoreline or one-half the length of the owner's total shoreline, whichever is less, and the site does not exceed 2,500 square feet in area; and

(2) the site to be controlled does not contain emergent or floating-leaf aquatic macrophytes; or

F. create a channel extending to open water through emergent vegetation by cutting or pulling. The permit shall be of continuing duration provided that:

(1) the channel is no more than 15 feet wide and takes the most direct route to open water;

(2) the channel is maintained by cutting or pulling;

(3) the channel remains in the same location from year to year; and

(4) the permit is not transferable.

Subp. 3. Justification required for issuance of permits. Permits for the destruction of emergent and floating-leaf aquatic macrophytes including wild rice, bulrush, cattail, water lilies, and other vegetation will not be issued unless the commissioner determines sufficient justification exists. The commissioner will balance the reasonable needs of riparian owners to gain access and use to public water against the need to protect emergent and floating-leaf aquatic macrophytes so that the integrity and value of the aquatic macrophyte community is maintained.

Subp. 4. Prohibitions. An APM permit will not be issued for the following purposes:

A. to place plastic mats, plastic sheets, filter fabric, or similar materials on the bed of public waters to destroy or prevent the growth of aquatic macrophytes;

B. to improve the appearance of undeveloped shoreline;

C. for esthetic purposes alone on developed shoreline;

D. for the control of aquatic macrophytes in areas posted or designated by the commissioner as scientific and natural areas or for the protection of lotus (*Nelumbo lutea*) or other kinds of aquatic macrophytes and animals;

E. for pesticide control of aquatic macrophytes in natural environment lakes established pursuant to part 6120.3000;

F. for pesticide control of aquatic macrophytes in watercourses or portions of watercourses classified as wild as defined under either the Minnesota or federal Wild and Scenic Rivers Acts as provided in Minnesota Statutes, section 103F.325, and Public Law Number 90-542 (1968), United States Code, title 16, sections 1271 to 1287, as amended;

G. to destroy aquatic macrophytes within a posted fish spawning area; or

H. to destroy or prevent the growth of aquatic plants or invertebrate life in public waters by means not authorized under parts 6280.0100 to 6280.1100.

Subp. 5. Pesticide treatment of drinking water. The commissioner shall not issue an APM permit for pesticide treatment of waters used by humans for drinking unless approval is obtained from the Minnesota Department of Health.

STAT AUTH: MS s 103G.615 HIST: 21 SR 1406

6280.0350 AQUATIC PLANT MANAGEMENT PRACTICES.

Subpart 1. Inspection, supervision, and monitoring. Items A and B apply to the inspection, supervision, and monitoring of permitted aquatic plant management activities.

A. Supervision by a department employee will be required, unless waived, for initial lakewide treatment of excessive algae blooms and may be periodically required for treatments by experienced groups.

B. Field inspection will be made at the discretion of the commissioner in cases of new applications for pesticide treatment or mechanical control. Field inspection of other previously permitted areas will also be required at intervals to evaluate conditions and the need for continued control measures.

Subp. 2. Lake vegetation management plan (LVMP). When a lake vegetation management plan approved by the commissioner has been developed, APM permits will be issued according to the guidelines of the plan.

Subp. 3. Mechanical control. Items A to C apply to conditions for mechanical control of aquatic macrophytes.

A. A person who cuts or pulls aquatic macrophytes must immediately and permanently remove the vegetation from the water and dispose of it above the ordinary high water level of any public water.

B. Organized lakewide cutting and removal programs are restricted to a maximum area not to exceed 50 percent of the total littoral area as determined by the commissioner.

C. Applications for lakewide or baywide mechanical control of aquatic macrophytes must include a written statement of the plan and a map showing proposed areas to be controlled. The commissioner may reduce the littoral area proposed for harvest. An

application for mechanical control of aquatic macrophytes must include the name, address, signature, and location on the lake of all property owners whose shoreline will be controlled.

Subp. 4. Pesticide control of aquatic macrophytes. Except as otherwise specified in this part, items A and B apply to pesticide control of aquatic macrophytes.

A. On all public waters and watercourses, the lesser of 15 percent of the littoral area or a maximum of 100 feet of shoreline per site belonging to an individual riparian property owner may be treated for control of submerged vegetation. These limitations do not apply in the circumstances described in subitems (1) to (3).

(1) For resorts, apartments, condominium complexes, public swimming beaches, and marinas, the commissioner must make an individual determination, taking into consideration the total impact on the protected water.

(2) Larger percentages of the littoral area shall be treated at the discretion of the commissioner when authorized by permits issued prior to 1976.

(3) On stormwater retention ponds, treatment may occur on up to five acres or one-half the surface area of the pond, whichever is less.

B. Applications from riparian property owners' associations for large area or baywide treatment must include a written statement of the plan and a map showing areas proposed to be treated. The commissioner may reduce the amount of littoral area which the applicant proposes to control. Any application for treatment must include the names, addresses, location on lake, and signatures of all property owners whose shorelines will be treated. Signatures must be obtained every three years or when there is a change of property ownership.

Subp. 5. Control of algae. An application for proposed lakewide control of algae must be accompanied by dated signatures from a majority of the riparian property owners stating that they are in favor of the proposed treatment. Signatures must be obtained every three years or when there is a change in property ownership.

Subp. 6. Treatment notice. The holder of an APM permit or the holder's agent must give notice of the proposed date of treatment to all persons specified on the permit. The notification must be received prior to beginning any work under the permit. Failure to give notice is grounds for revocation of any existing permit or refusal to issue future permits.

STAT AUTH: MS s 103G.615 HIST: 21 SR 1406

6280.0450 PERMIT APPLICATION, FEES, AND ANNUAL REPORT.

Subpart 1. Application process. Application for an APM permit for any body of public waters may be made by a riparian owner, a lessee, an easement holder, or by owners of a fee, leasehold, or interest to riparian lands to that body of water or by the representative of a group of riparian owners. Application for an APM permit must be made on forms provided by the commissioner and must be submitted to the address

specified in the instructions. All information requested on the application form must be provided.

Subp. 2. Deadline for permit application. Applications for permits to control submerged or floating aquatic macrophytes with pesticides will not be accepted after August 1 annually, unless the commissioner determines that sufficient justification exists for late season pesticide treatment.

Subp. 3. Duration of permits. Unless otherwise noted, an APM permit is only valid for one growing season and expires on September 1 of the year it was issued.

Subp. 4. APM permit application fees. Items A to C apply to APM permit fees.

A. When application is made to control two or more nuisance conditions, only the larger fee applies. A permit application fee, in the form of a check or money order payable to the Minnesota Department of Natural Resources, must accompany each permit application when required by the following fee schedule:

(1) to control rooted aquatic vegetation by pesticide means, to install and operate an automatic untended aquatic plant control device, or to control emergent or floating-leaf rooted aquatic vegetation by mechanical means: \$35 for each contiguous parcel of shoreline owned by an owner, up to a maximum of \$750;

(2) except as provided under subitems (6) and (7), to control nonrooted aquatic vegetation by pesticide means: \$20 for each contiguous parcel of shoreline owned by an owner, up to a maximum of \$200;

(3) to control submerged rooted aquatic vegetation in an area larger than 2,500 square feet, by mechanical means: \$35 for the first acre or portion of an acre and \$2 for each additional acre or portion of an acre to be controlled, up to a maximum of \$750;

(4) to gather or harvest aquatic macrophytes or plant parts, other than wild rice, for sale purposes: no charge;

(5) to transplant aquatic macrophytes or bog into public waters: no charge;

(6) to control chara, filamentous algae, snails that carry swimmer's itch, or leeches, singly or in combination: \$4 per 100 shoreline feet or portion proposed to be treated, up to a maximum of \$200;

(7) to control algae by lakewide application of copper sulfate or other approved algicide: \$20 plus 40 cents per acre to be treated, up to a maximum of \$200; and

(8) to control purple loosestrife (*Lythrum salicaria*): no charge.

B. If the fee does not accompany the application, the applicant will be notified and no action will be taken on the application until the fee is received.

C. The fee is refundable only when the application is withdrawn, prior to issuance of the permit, or the commissioner determines that the activity does not require a permit.

Subp. 5. Fees for state and federal agencies. The fees set forth in this part will not be required of any state agency as defined in Minnesota Statutes, section 15.01, or of any federal agency.

Subp. 6. Annual report. The holder of a commercial aquatic plant harvester's permit, commercial aquatic pest control license, or APM permit must, no later than December 31 of each year, report to the commissioner, on the forms provided, information on permitted operations requested. Failure to report will be grounds for refusing to issue such permits in the future.

Subp. 7. Regulations of other programs apply. APM permits issued as provided by this part may not be construed to supersede the requirements of shoreland conservation ordinances, flood plain management ordinances, lake management plans and programs, wild and scenic river plans and programs, or other pertinent ordinances and regulations.

STAT AUTH: MS s 103G.615 HIST: 21 SR 1406

6280.0600 APPROVAL OF PESTICIDES AND METHODS USED FOR AQUATIC PLANT MANAGEMENT OR AQUATIC NUISANCE CONTROL.

Subpart 1. Pesticides must be labeled for use in aquatic sites. Pesticides used to control aquatic macrophytes or algae in public waters must be registered by the United States Environmental Protection Agency (EPA) and the Minnesota Department of Agriculture (MDA), including pesticides registered pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), United States Code, title 7, sections 136c (experimental use permit), 136p (emergency exemption), and 136v (special local need), and must be approved for use in aquatic sites by the EPA and by the commissioner in consultation with the MDA.

Subp. 2. Instructions and precautions of pesticides must be followed. Pesticides must be applied according to the label and labeling provided by the manufacturer and other water use restrictions imposed by the department or the MDA. Pesticide-treated areas must be posted with signs provided by the department bearing the permit number; the name of pesticide used; the date of treatment; and dates on which water from the treated area may be safely used for swimming, fishing, and other uses, as specified on the product label or by the department. The department, in consultation with the MDA, may require water use restrictions in addition to those on the product label. The permittee or agent is responsible for the placement and removal of required signs. The treatment area must be posted in such a way that people entering from any direction can see the signs, or as otherwise prescribed in the permit.

Subp. 3. Pesticide control of aquatic macrophytes in watercourses. Pesticides may be used to control aquatic macrophytes in flowing waters, provided that the vegetation is present to such a degree that it impedes the flow of water and that the flow rate will not carry the pesticide beyond the treatment area during the period of water use restriction specified on the pesticide label. The pesticide to be used must be labeled for use in flowing water.

STAT AUTH: MS s 103G.615 HIST: 18 SR 83; 21 SR 1406

6280.0700 COMMERCIAL APPLICATORS AND OPERATORS.

Subpart 1. Pesticide applicators. A person or firm may not apply pesticides of any kind for hire for aquatic plant management or aquatic nuisance control on public waters unless a commercial aquatic pest control license has been obtained from the Minnesota Department of Agriculture.

Subp. 2. Commercial aquatic plant harvesters. A person or firm may not cut, pull, or harvest aquatic macrophytes on public waters for hire without first obtaining a commercial aquatic plant harvester's permit issued by the department. Issuance of a commercial aquatic plant harvester's permit is contingent upon determination by the commissioner that the applicant has adequate equipment and knowledge to properly harvest aquatic macrophytes in public waters. This subpart does not apply to persons or firms using power-operated earth-moving equipment in public waters under terms of permits issued by the department for work in the bed of public waters as provided by Minnesota Statutes, section 103G.245, or by a license permitting the passage of utilities over public lands and waters as provided by Minnesota Statutes, section 84.415. Persons or firms that use aquatic vegetation cutting and harvesting equipment must thoroughly inspect, remove, and properly dispose of plant parts from the equipment before transporting it to another body of water.

STAT AUTH: MS s 103G.615 HIST: 18 SR 83; 21 SR 1406

6280.0800 ANNUAL REPORTS AND TREATMENT NOTICES.

Subpart 1. Annual report. The holder of an aquatic operator's permit, commercial pesticide applicator's license, or aquatic nuisance control permit must, no later than November 15 of each year, report to the commissioner, on the forms provided, information on aquatic nuisance control operations requested. Failure to report will be grounds for refusing to issue such permits in the future.

Subp. 2. Treatment notice. Holders of aquatic nuisance control permits or their agents must give notice of the proposed date of treatment to all persons specified on the permit. The notification must be received prior to beginning any work under the permit. Failure to give notice is grounds for revocation of any existing permit or refusal to issue future permits. Notification is not required for mechanical control of vegetation where no permit is required.

STAT AUTH: MS s 103G.615 HIST: 18 SR 83

6280.0900 AMENDMENTS AND REVOCATION.

Subpart 1. Amendments and revocation. The commissioner may amend or revoke any commercial aquatic plant harvester's permit or APM permit without prior notice whenever it has been determined that it is necessary to protect the interests of the public, to protect human life, or to protect fish, wildlife, and native plants or for violation of the terms and conditions of APM permits, this chapter, or other applicable laws or rules.

Subp. 2. Amendments by request. The commissioner may amend a commercial aquatic plant harvester permit or an APM permit upon request from the permittee if the amendment maintains adequate protection for interests of the public, human life, and fish, wildlife, and native plants.

STAT AUTH: MS s 103G.615 HIST: 18 SR 83; 21 SR 1406

6280.1000 VARIANCE.

Subpart 1. Variance. Provisions of this chapter may be waived under special circumstances when deemed necessary by the commissioner for the protection and preservation of the natural resources of the state.

Subp. 2. Lake vegetation management plan (LVMP). This chapter may be modified or waived in accordance with a lake vegetation management plan approved by the commissioner.

STAT AUTH: MS s 103G.615 HIST: 18 SR 83; 21 SR 1406

6280.1100 REVIEW AND APPEAL OF PERMIT DECISION.

Subpart 1. Commissioner's review. If an APM permit is granted with conditions or is denied, the applicant may file with the commissioner a written request for review. The commissioner shall review the permit application and render a decision within 15 days of the request for review.

Subp. 2. Contested case hearing. If the applicant wishes to appeal the decision of the commissioner after review under subpart 1, the applicant may file with the commissioner a written request for a contested case hearing under Minnesota Statutes, chapter 14.

STAT AUTH: MS s 103G.615 HIST: 18 SR 83; 21 SR 1406

6280.1200 PENALTY.

The destruction of aquatic macrophytes in public waters without an APM permit issued pursuant to parts 6280.0100 to 6280.1100 or in violation of the terms of such a permit is a misdemeanor.

STAT AUTH: MS s 103G.615 HIST: 21 SR 1406

Appendix 8. Harvest Operator Job Description and Harvest Data, 2001-2005

TO: Ed Feiler
 FROM: Mike Zell
 SUBJECT: LMA Weed Harvesting Program

Hi Ed,

I believe I have included all the documents and data we have discussed. I could not locate the harvesting data sheets for the years 2001, 2002, and 2003. For those years, I have provided only annual harvesting amounts by region (see summary). For the years 2004 and 2005, I have provided monthly harvesting amounts by region.

You will note that we did not harvest in the south bay in 2004 and 2005. The reasons for this are as follows

1. We lost use of the landing at Sportsmen's Club. The next closest landing significantly increased harvester travel time which we felt was not effective
2. The south bay water depth is shallow, making for almost impossible harvesting conditions.
3. The main lake provides for maximum lake usage.

We attempt to harvest a channel in the bay annually.

We do not have a job description for the harvesting manager position. I plan on writing a job description for this position. I can send you a copy when completed if you wish.

If there is any additional data you may require, please contact me.

Mike

Year	Region 1 ¹⁸	Region 2	Region 3	Region 4	South Bay	Total
2001	37.5	9.5	37.5	80.5	29	194
2002	31	17	46	63	62	219
2003	33	8	49	78	14	182
2004	31	19	22	134	0	206
2005	55	42	85	70	0	252
Total	187.5	95.5	239.5	425.5	105	948 ¹⁹
Average	37.5	19.1	47.9	85.1	35.0	189.6 ²⁰
2006 ²¹	54	31	70	70	0	225

¹⁷ Data Supplied by Mike Zell, LMA, July 2006

¹⁸ Numbers are the number of full harvesters removed

¹⁹ South Bay data not included

²⁰ South Bay data not included

²¹ Goals for 2006, not actual harvest

JOB DESCRIPTION (2-4-01)

TITLE:

Weed Harvester Operator

EMPLOYER:

Lake Minnewawa Association Board of Directors

LOCATION:

Lake Minnewawa McGregor, MN

GENERAL DESCRIPTION:

This job is the harvesting and disposing of unwanted weeds in Lake Minnewawa. Weeds are harvested by use of a motorized weed harvester under the direction of the Lake Minnewawa Association Board of Directors. The Board of Directors manages the harvesting under a permit issued by the DNR. This is a seasonal job between the approximate dates of June 15 through September 15. The planned work hours are 40 hours per week. However, hours may vary due to weather conditions and weed growth.

DUTIES AND RESPONSIBILITIES:

- ① Operation of a large motorized weed harvester
- ② Operation of a truck and trailer for weed disposal
- ③ Cutting of specific weeds and areas on the lake as defined by a weed harvesting plan
- ④ Record and report on:
 - a. Areas cut
 - b. Loads cut
 - c. Weed harvester operation hours
 - d. Preventive maintenance activity
 - e. Work hours
- ⑤ Perform preventive maintenance on weed harvester and truck
- ⑥ Perform minor repairs on weed harvester and truck
- ⑦ Provide supervision to one or two crewmembers.

KNOWLEDGE, SKILLS AND ABILITIES REQUIRED:

- ① Physical ability and skills to operate a large mechanical machine
- ② Skill and knowledge to perform preventive maintenance and some minor repairs on mechanical and hydraulic devices
- ③ Ability to navigate and cut on specified areas of the lake
- ④ Ability to recognize weeds that are allowed to be harvested
- ⑤ Ability to follow directions of the Board of Directors and as outlined in the weed-harvesting plan
- ⑥ Ability to supervise and train
- ⑦ Ability to record and report on data as requested
- ⑧ Dependable and able to work with minimum supervision
- ⑨ General knowledge of aquatic plant management rules

WORKING CONDITIONS:

- ① Extended hours operating a large mechanical machine
- ② Outdoor conditions as defined by northern lake country weather
- ③ Working around a mechanical environment

ACCOUNTABILITY:

The person performing this job is accountable to the Lake Minnewawa Board of Directors

COMPENSATION:

As negotiated with and approved by the Lake Minnewawa Board of Directors.

2006 WORK SCHEDULE

The LMA Board has decided to implement a 3-person rotating harvesting team for 2006. The reason is to allow better schedule flexibility for the team. The important guideline is that only 2 persons will be working 3; the same time in order to control costs. Lyle is scheduled to work 4 days per week. Steve and Jerry are scheduled for 3 days per week.

Below is a typical workweek schedule. The team should use it only as a guide to manage their work schedule, as long as they hold to the guideline of only 2 persons working at the same time.

Monday	Tuesday	Wednesday	Thursday	Friday
Lyle/Steve	Lyle/Steve	Lyle/Jerry	Lyle/Jerry	Steve/Jerry

Appendix 9. Glossary

Algal bloom: an unusual or excessive abundance of algae.

AUAPCD: Automated, Unattended, Aquatic, Plant Control Device such as a WeedRoller or LakeSweeper

Buffer zone: Undisturbed shoreline vegetation that can serve as to slow down and/or retain surface water runoff, and assimilate nutrients.

Chlorophyll a: the green pigment in plants that is essential to photosynthesis.

Clean Water Partnership (CWP) Program: a program created by the legislature in 1990 to protect and improve ground water and surface water in Minnesota by providing financial and technical assistance to local units of government interested in controlling nonpoint source pollution.

Emergent species: aquatic plants that are rooted in the lake bottom, but their leaves and stems extend out of the water and typically grow in wetlands and along the shore, where the water is less than 4 feet deep. Common species include bulrush, cattail, arrowhead and wild rice.

Epilimnion: deeper lakes form three distinct layers of water during summertime weather. The epilimnion is the upper layer and is characterized by warmer and lighter water.

Esthetics: the enjoyment of scenery, a beautiful view, sunrise/sunset, etc

Eutrophication: the aging process by which lakes are fertilized with nutrients.

Eutrophic lake: a nutrient-rich lake, usually shallow, "green" and with limited oxygen in the bottom layer of water.

Facultative Wetland Plant: Plants which usually occur in wetlands (estimated probability 67 percent to 99 percent) but occasionally are found in non-wetlands.

Floating-leaf species: aquatic plants that are 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.

Free floating species: aquatic plants that float on the water surface but their roots, if any, are not rooted in the lake bottom. Well-known examples are the duckweeds.

Hardwater: describes a lake with relatively high levels of dissolved minerals such as calcium and magnesium.

Hypolimnion: the bottom layer of lake water during the summer months. The water in the hypolimnion is denser and much colder than the water in the upper two layers.

HUC: the acronym for Hydrologic Unit Code, a nationwide system created by the U.S. Geological Survey to identify watersheds

Invasive species: any non-native species that can cause displacement of or otherwise threaten native communities.

Littoral zone: the shallow areas, less than 15 feet in depth, around a lake's shoreline, usually dominated by aquatic plants. These plants produce oxygen and provide food, shelter and reproduction areas for fish & animal life.

Mesotrophic lake: a lake that is midway in nutrient concentrations (between a eutrophic and oligotrophic lake). Characterized by periodic problems with algae blooms or problem aquatic vegetation.

Native species: an animal or plant species that is naturally present and reproducing.

Obligate Wetland Plant: Plants which are almost always found in wetlands under natural conditions (probability is less than 99 percent).

Offshore zone: generally, for aquatic plant management permit purposes, this is the area of a lake more than 150 feet from shore

OHWL: Ordinary high water level. "Ordinary high water level" means the boundary of water basins, watercourses, public waters, and public waters wetlands, and the ordinary high water level is an elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial; for watercourses, the ordinary high water level is the elevation of the top of the bank of the channel; and for reservoirs and flowages, the ordinary high water level is the operating elevation of the normal summer pool.

Oligotrophic lake: a relatively nutrient-poor lake, characterized by outstanding water clarity and high levels of oxygen in the deeper waters.

Riparian: the natural ecosystem or community associated with river or lake shoreline.

Secchi disc: a device measuring the depth of light penetration in water. A Secchi disk is a circular metal plate attached to a calibrated rope. The most common design in use in Minnesota today is the 8-inch diameter black and white quadrant version disk. An all white disc is also sometimes used.

Submerged species: aquatic plants that have stems and leaves that grow entirely underwater, although some may also have floating leaves. Common examples are the pondweeds, coontail, milfoil and Canada waterweed

Thermocline: during summertime deeper lakes stratify by temperature to form three discrete layers; the middle layer of lake water is known as the thermocline.

Trophic status: the level of growth or productivity of a lake as measured by phosphorus, content, algae abundance, and depth of light penetration.

Watershed: the surrounding land area that drains into a lake, river, or river system.

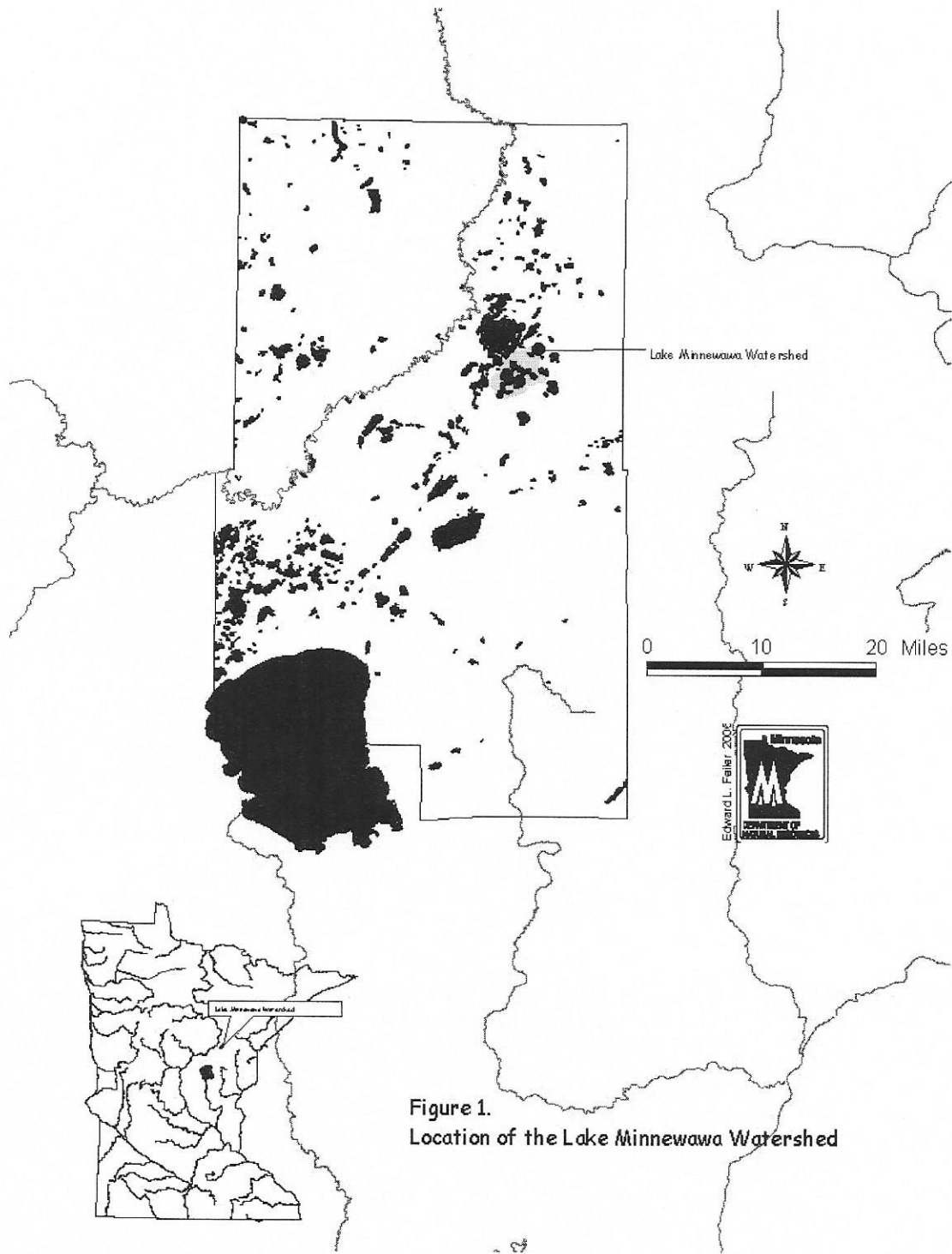


Figure 1.
Location of the Lake Minnewawa Watershed

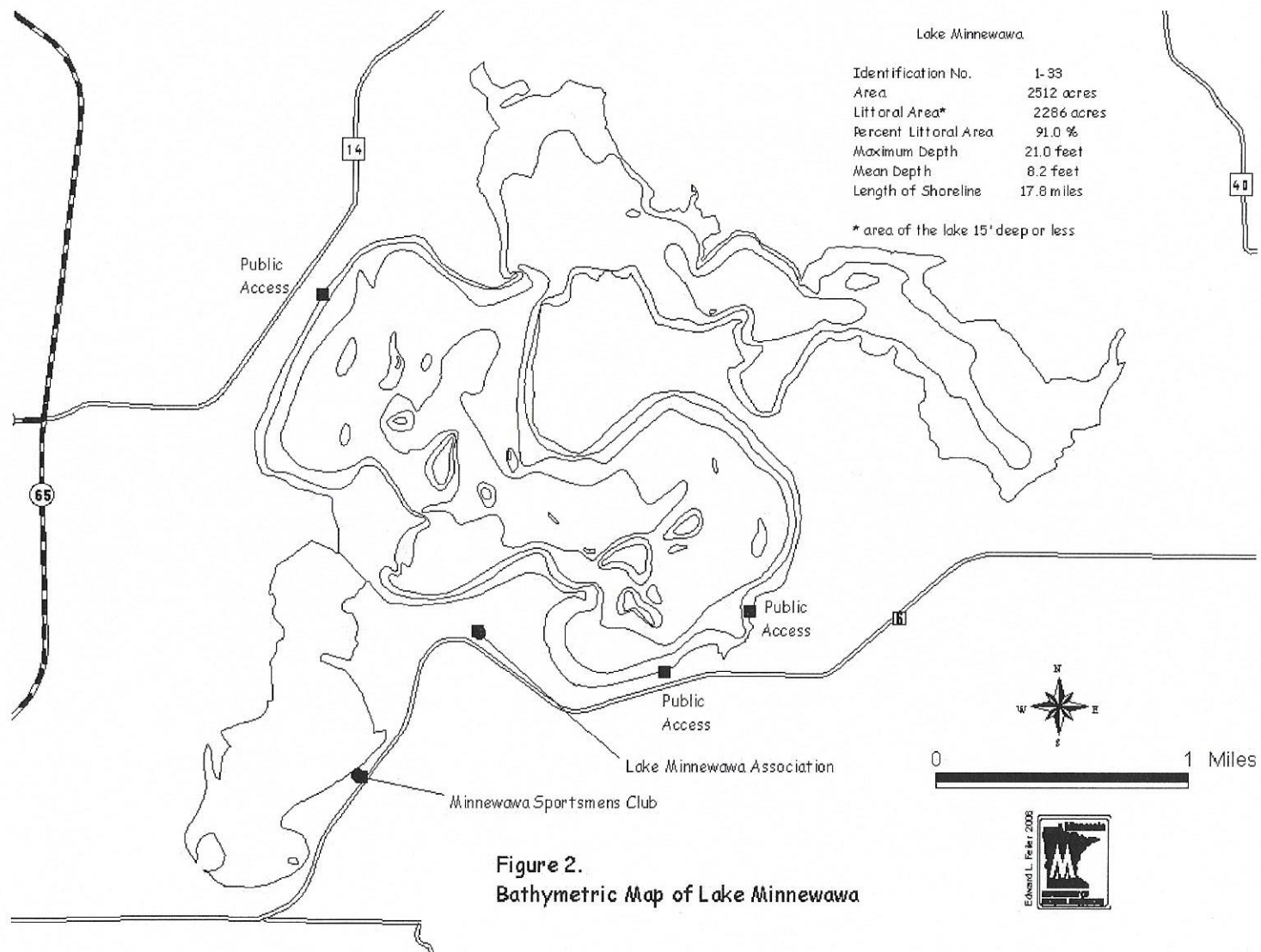


Figure 2.
Bathymetric Map of Lake Minnewawa

Figure 3. Watershed of Lake Minnewawa

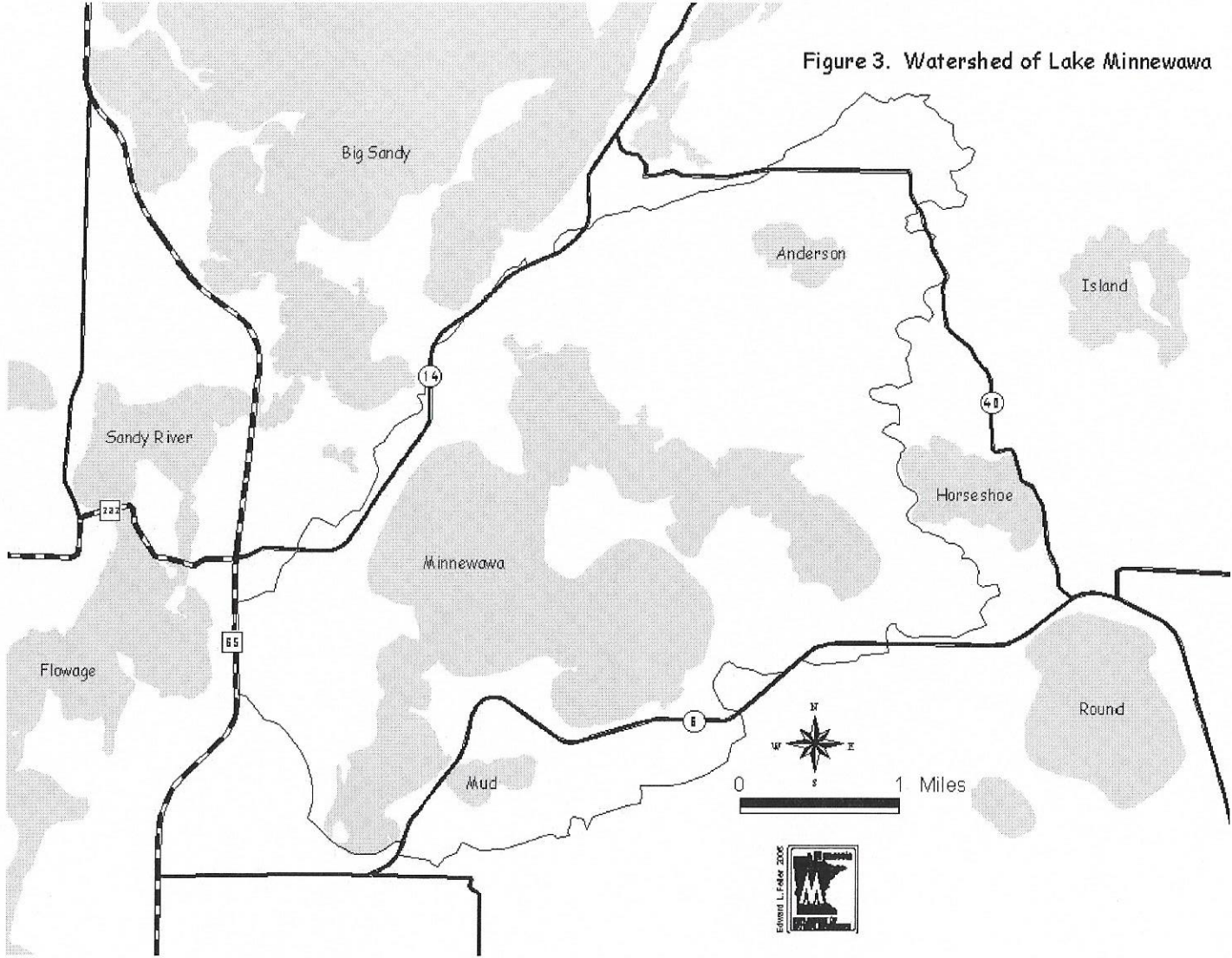
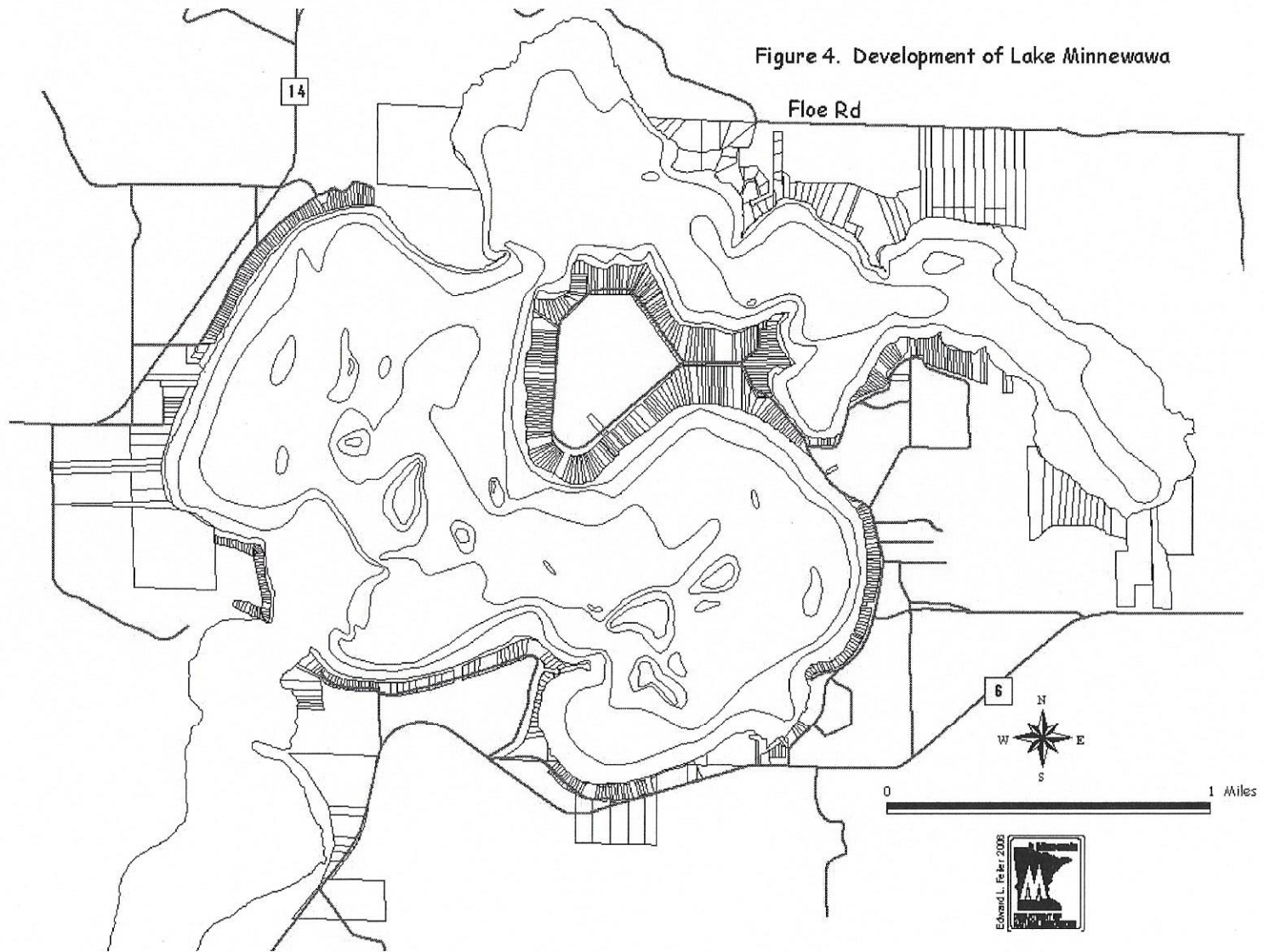


Figure 4. Development of Lake Minnewawa



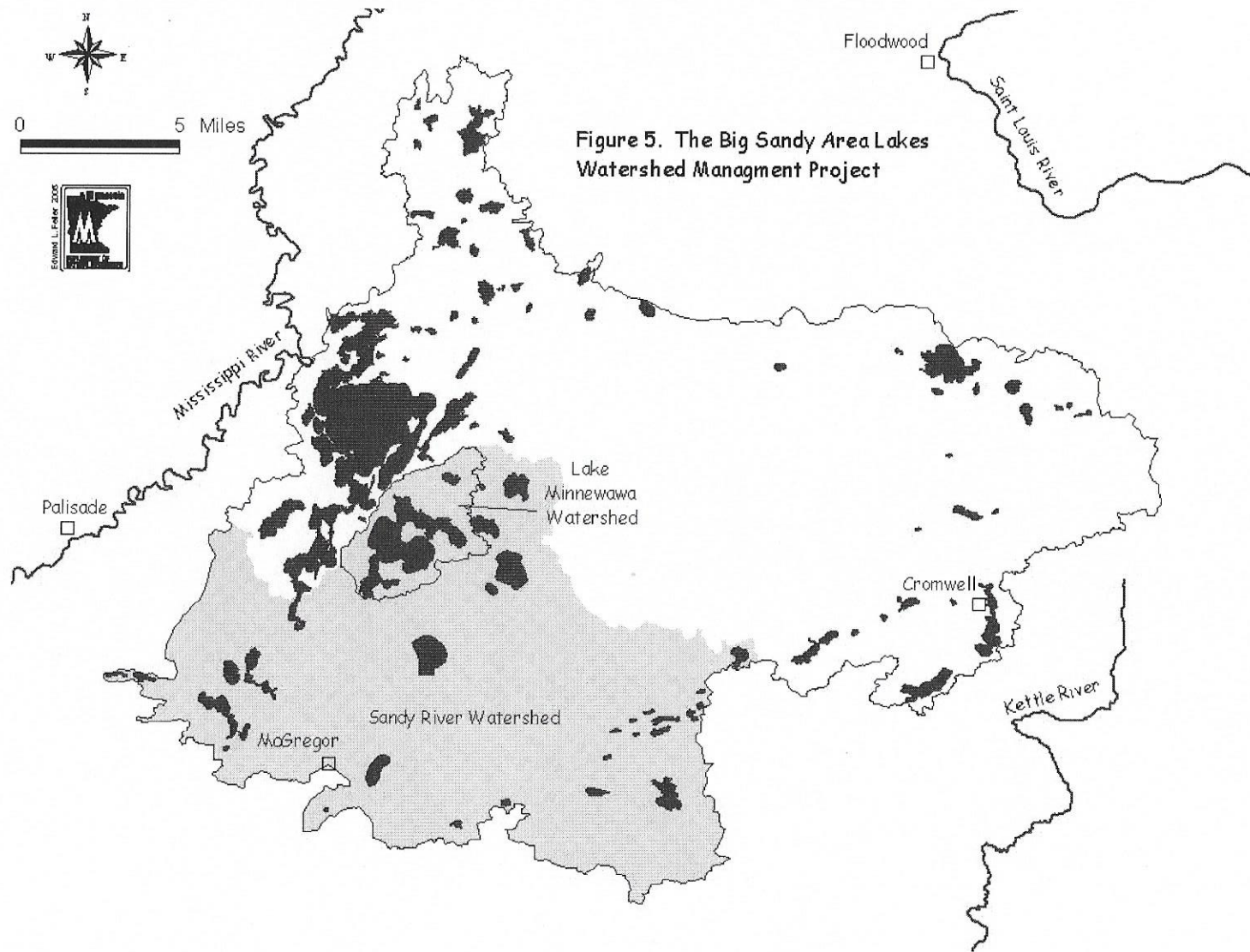


Figure 5. The Big Sandy Area Lakes Watershed Management Project

Figure 6. Land Type Associations of the Lake Minnewawa Watershed

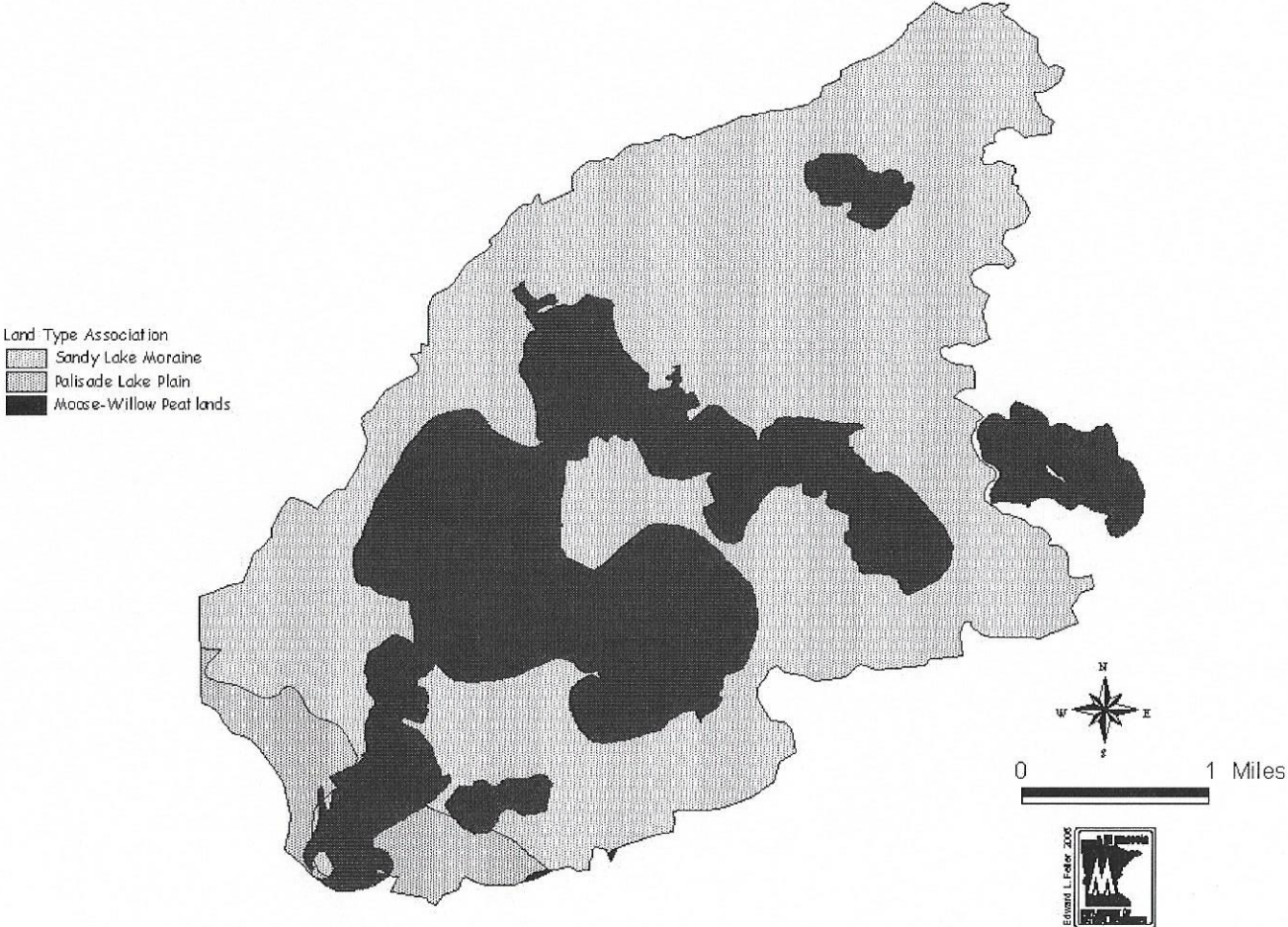


Figure 7. Public Land in the Lake Minnewawa Watershed

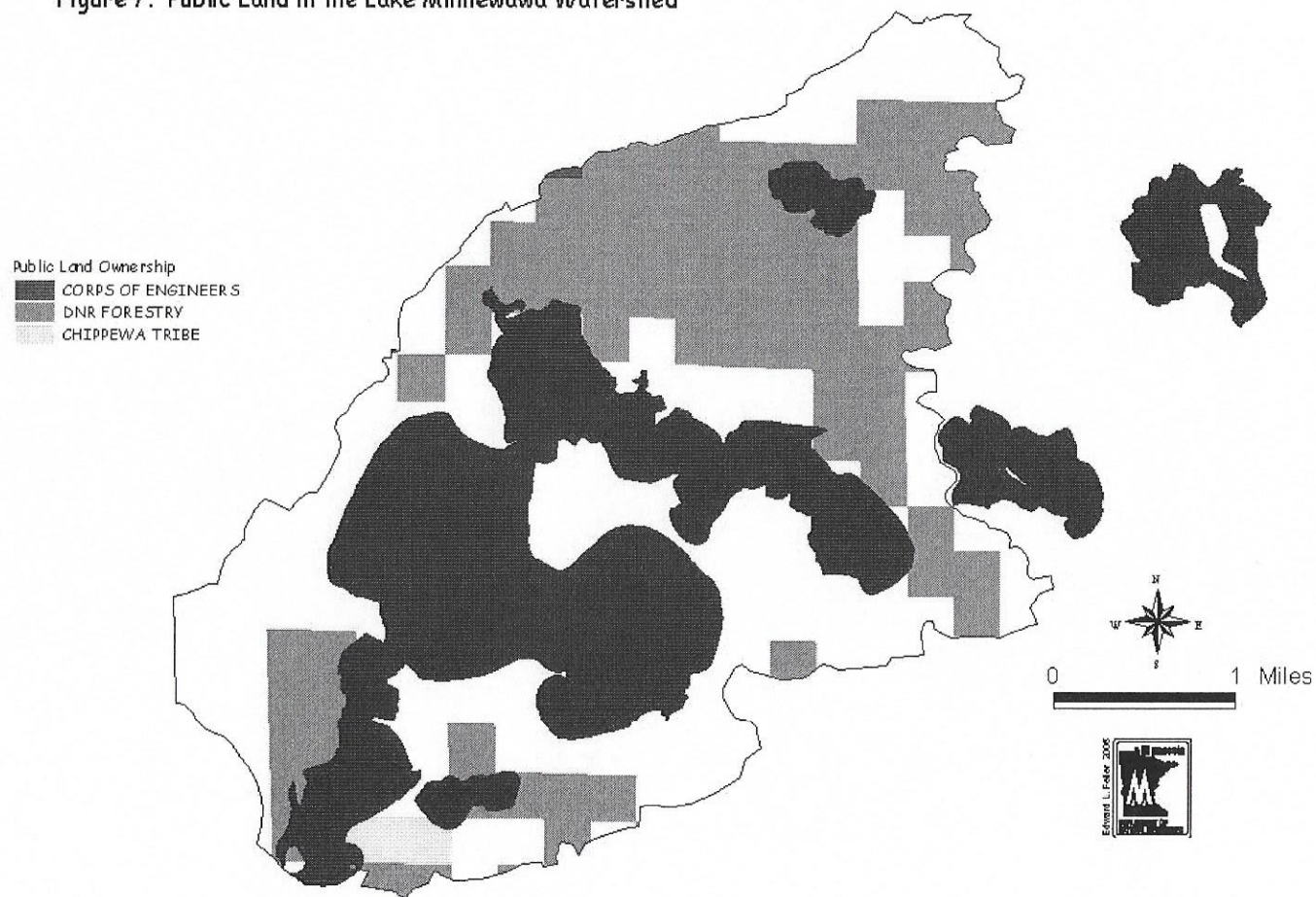


Figure 8. Vegetation of the Lake Minnewawa Watershed at the time of the Original Land Survey

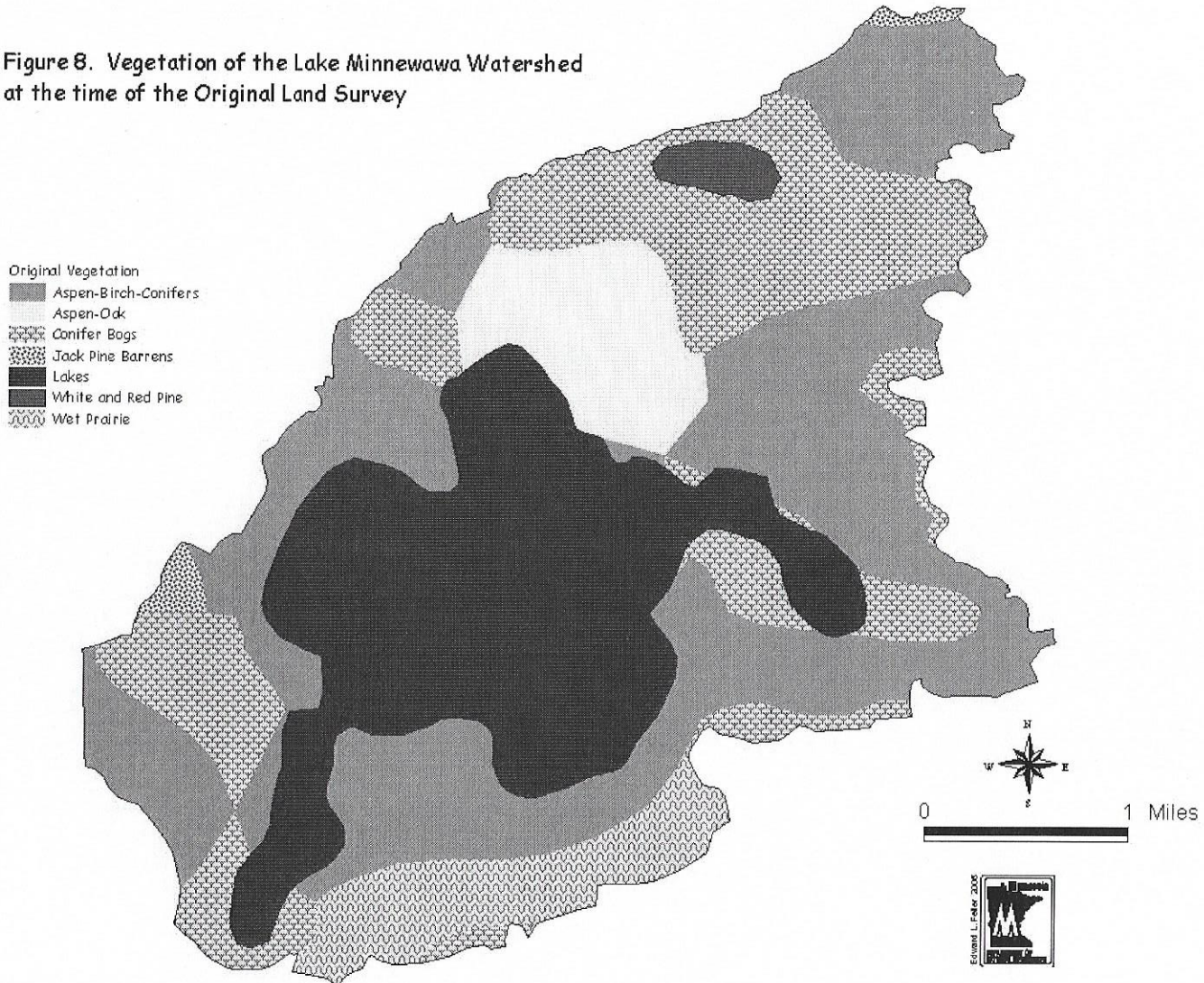


Figure 9. Land Cover in the Lake Minnewawa Watershed in the mid 1990s

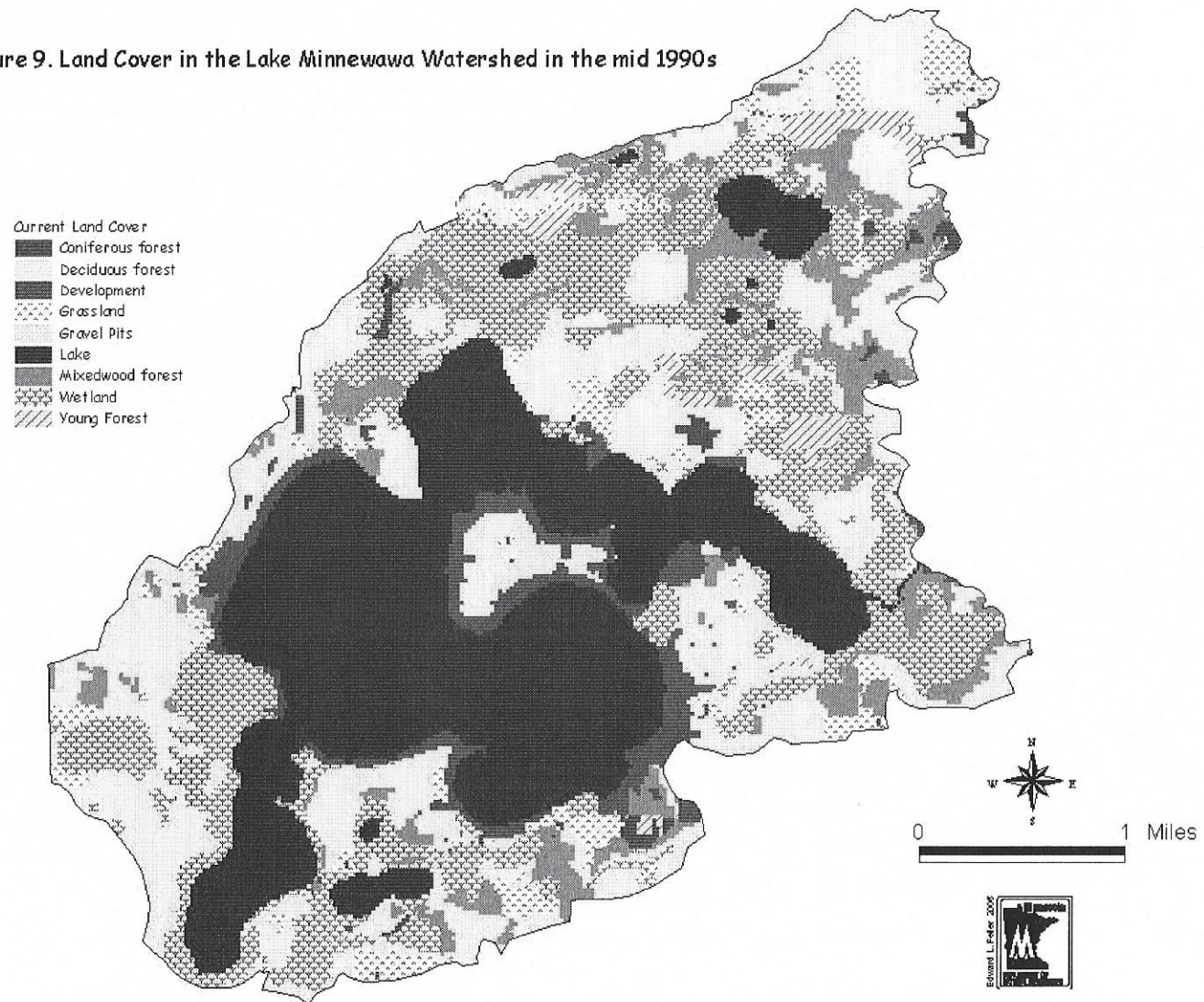
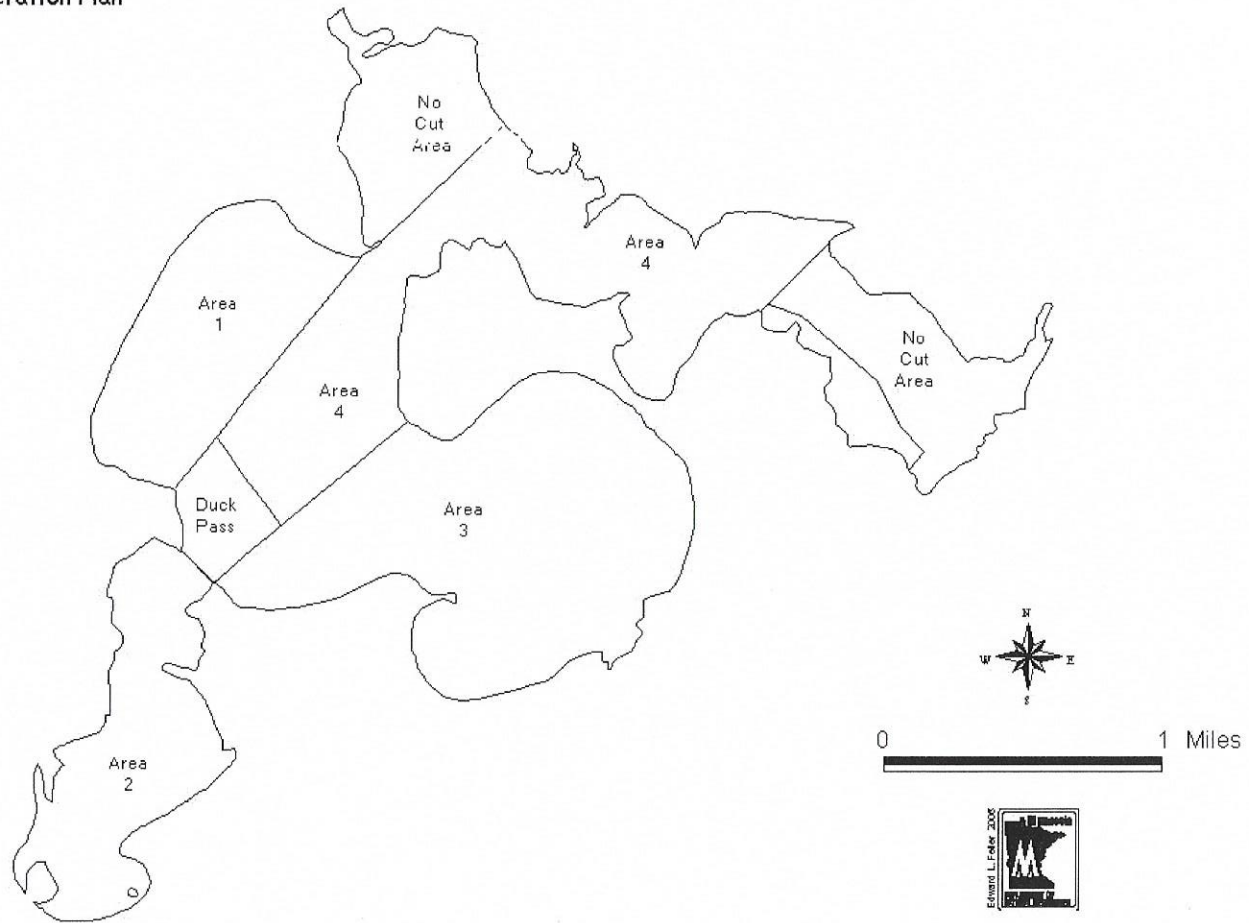


Figure 10. Vegetation Harvest Areas as Described in the 2000 -2006 Lake Minnewawa Vegetation Plan



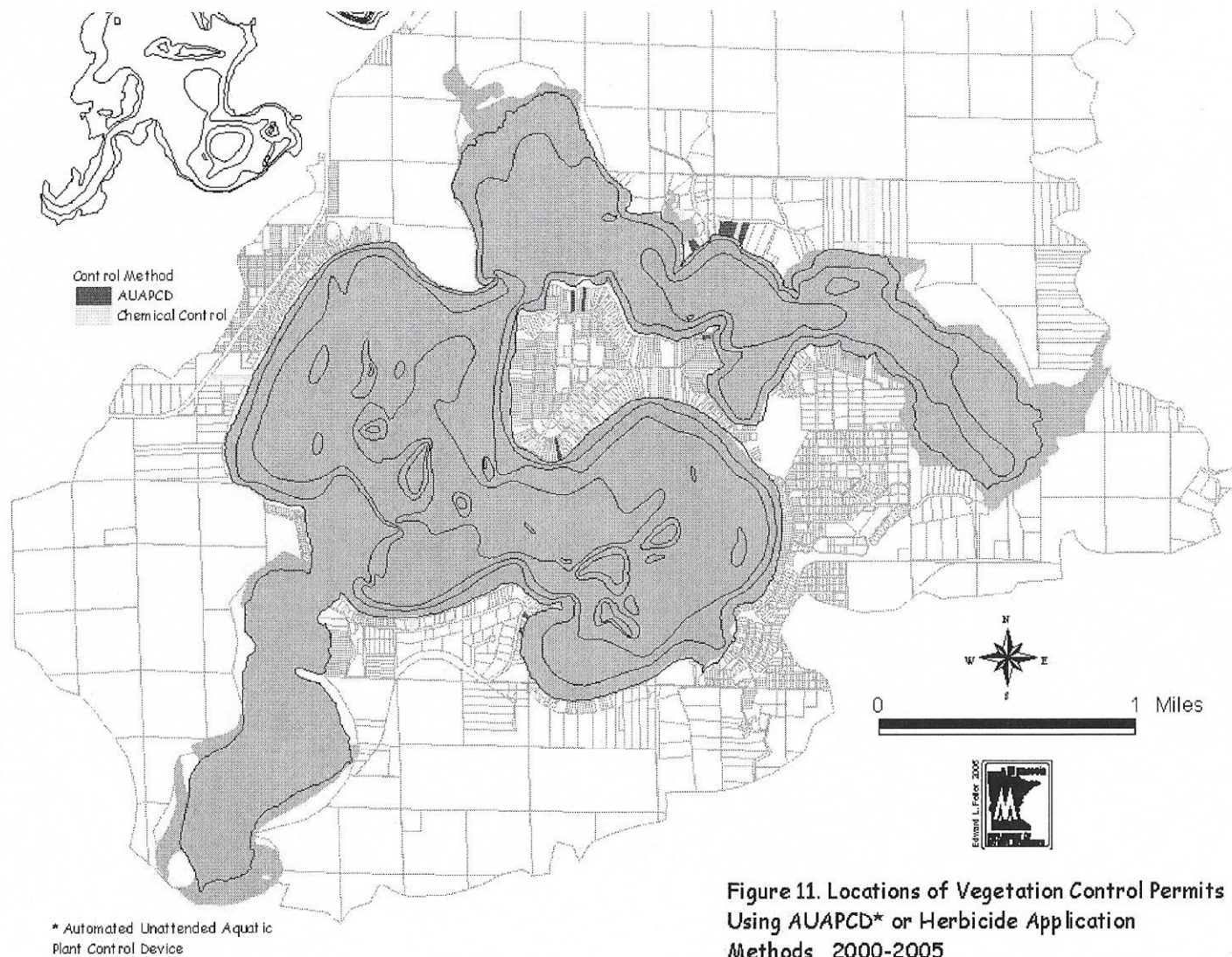


Figure 11. Locations of Vegetation Control Permits Using AUAPCD* or Herbicide Application Methods, 2000-2005

Figure 12. Stations Sampled for Submerged Aquatic Vegetation August 21-25, 2006

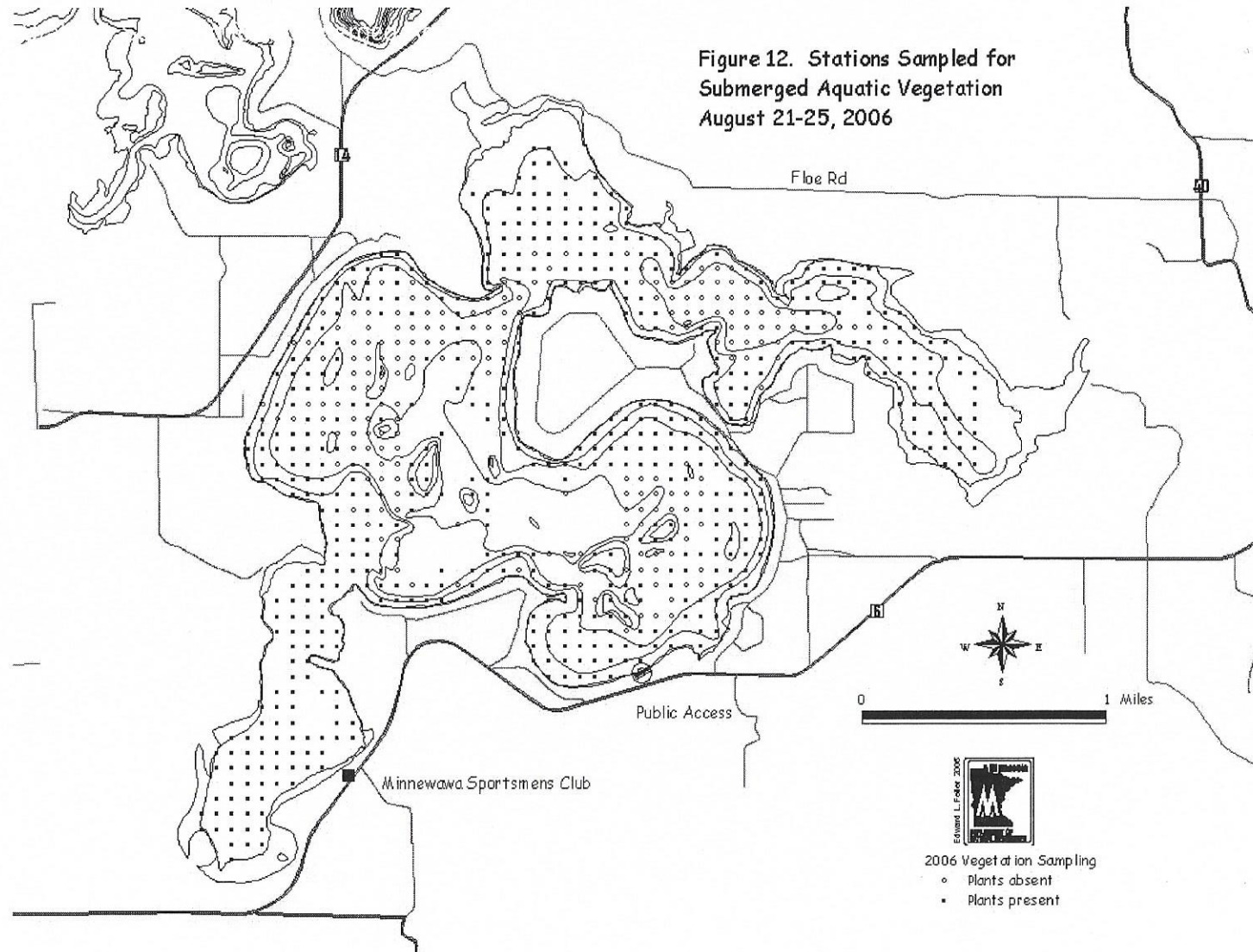
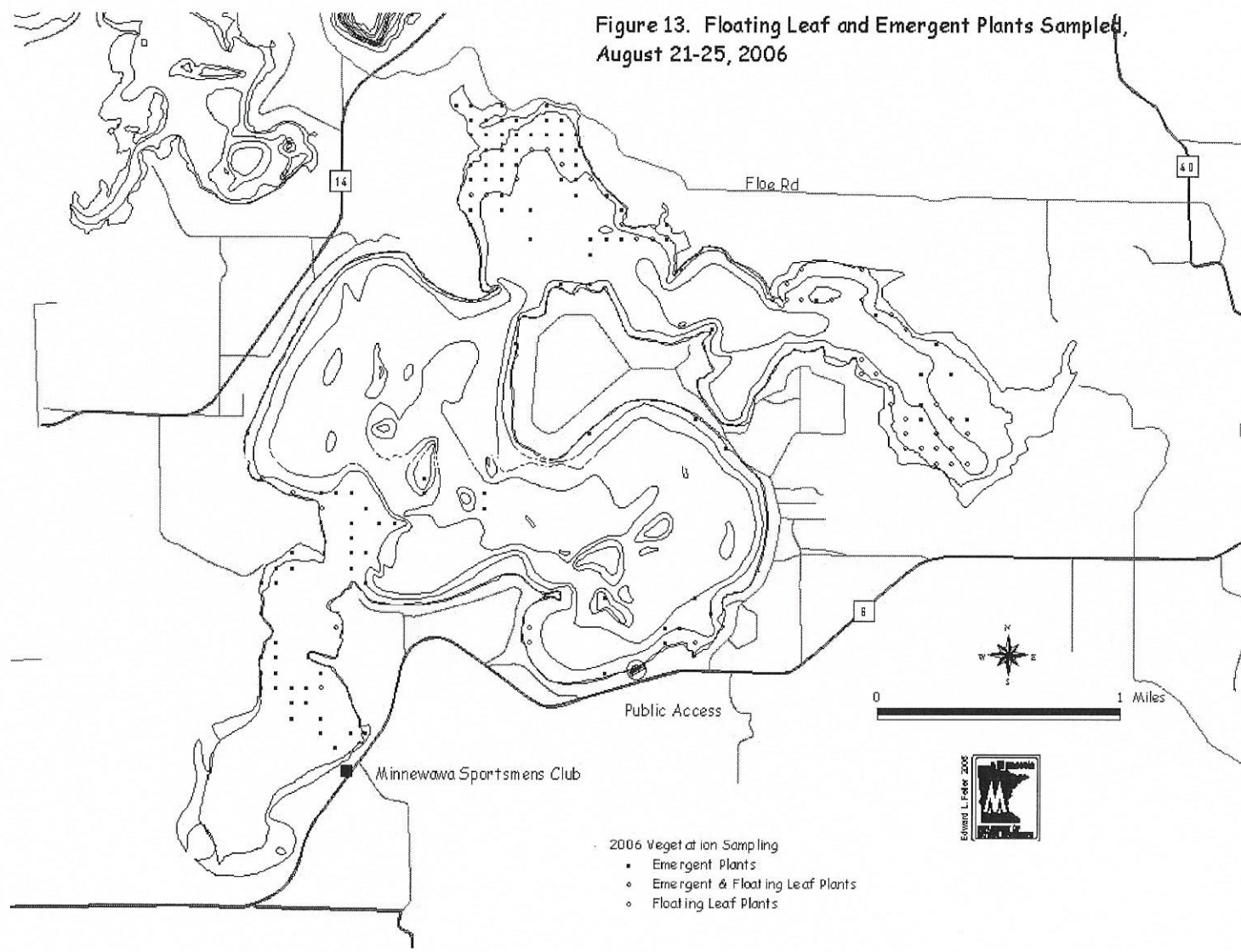


Figure 13. Floating Leaf and Emergent Plants Sampled,
August 21-25, 2006



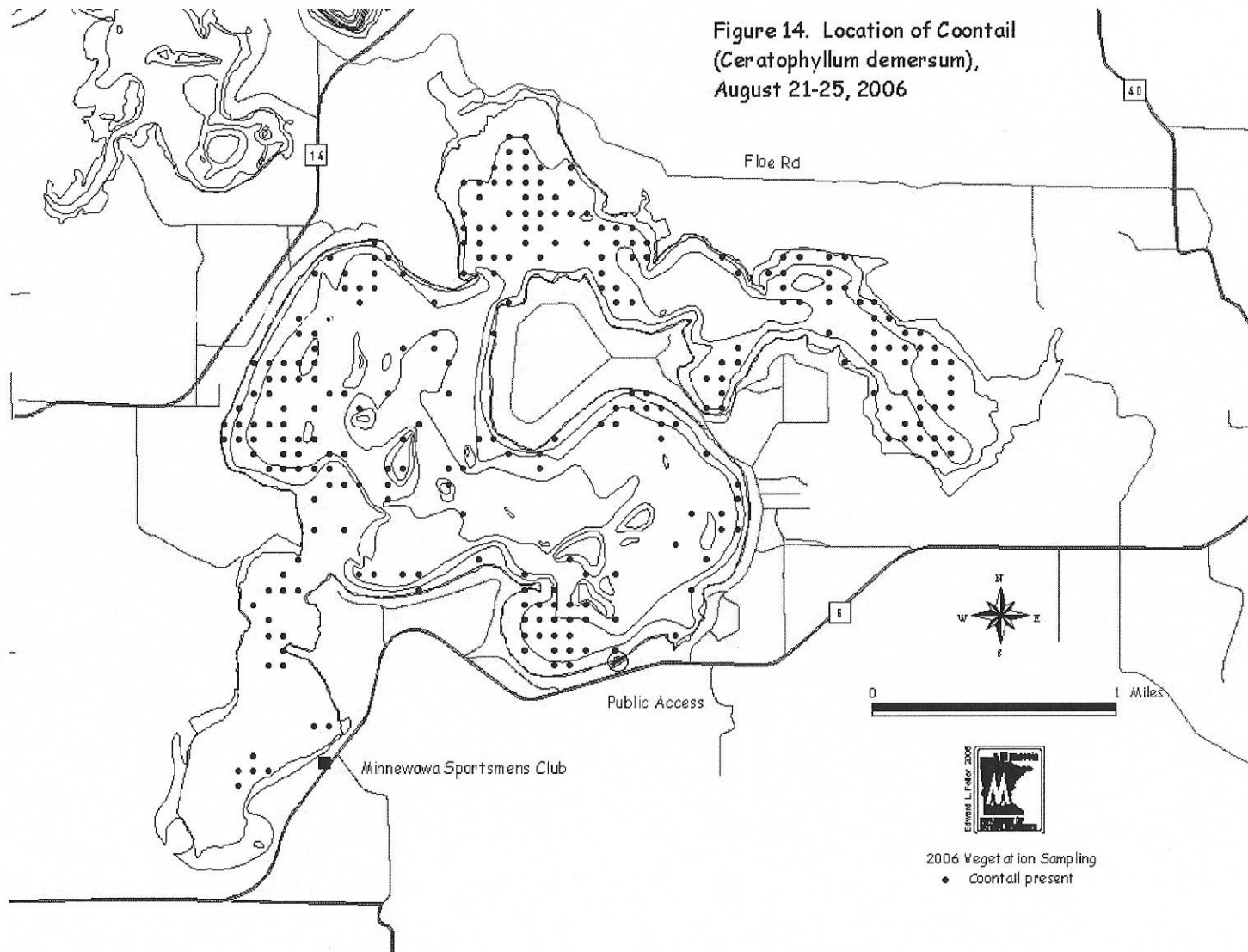


Figure 15. Location of Canada Waterweed,
(*Elodea canadensis*),
August 21-25, 2006

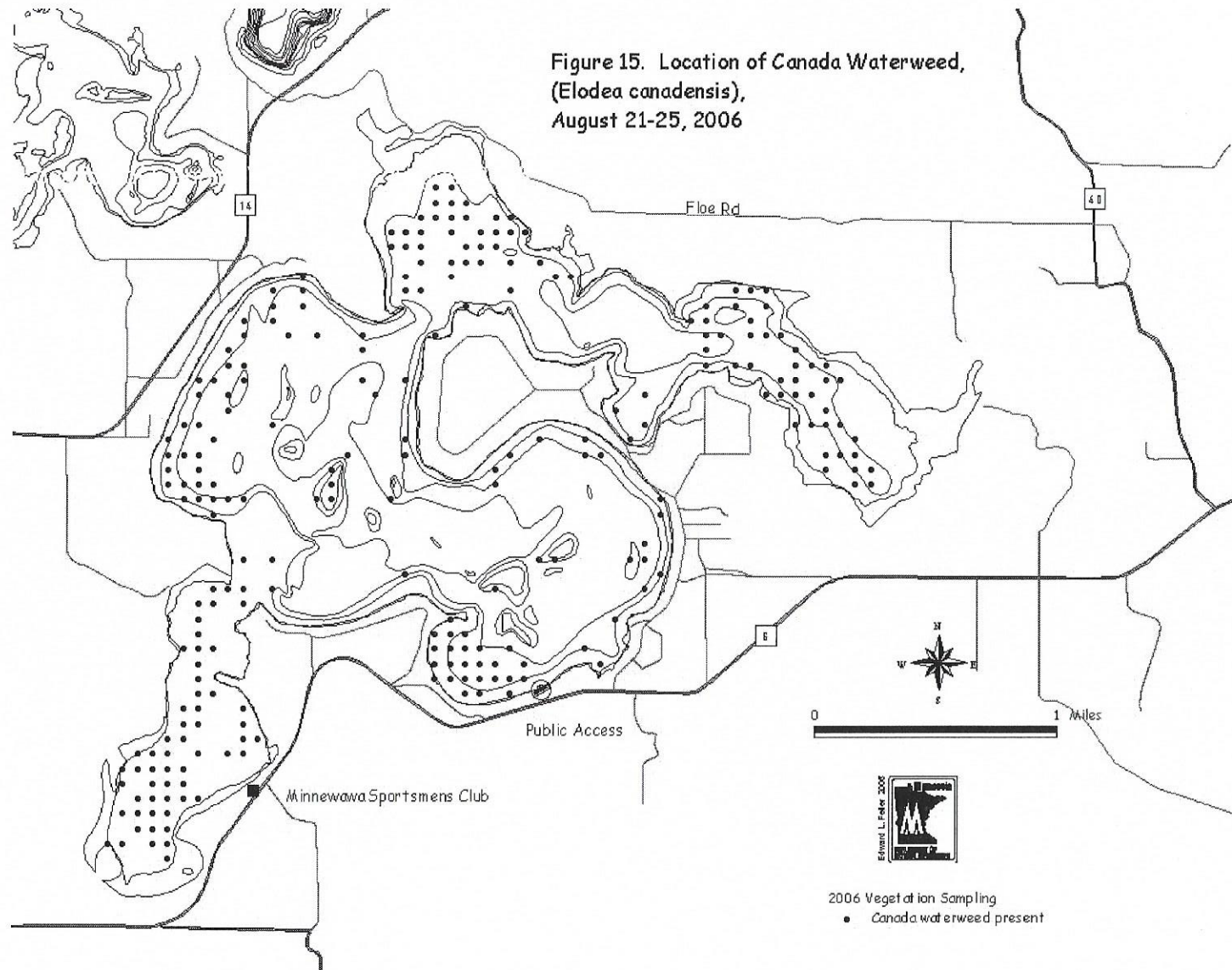


Figure 16. Location of Wild Celery
(*Valisneria americana*),
August 21-25, 2006

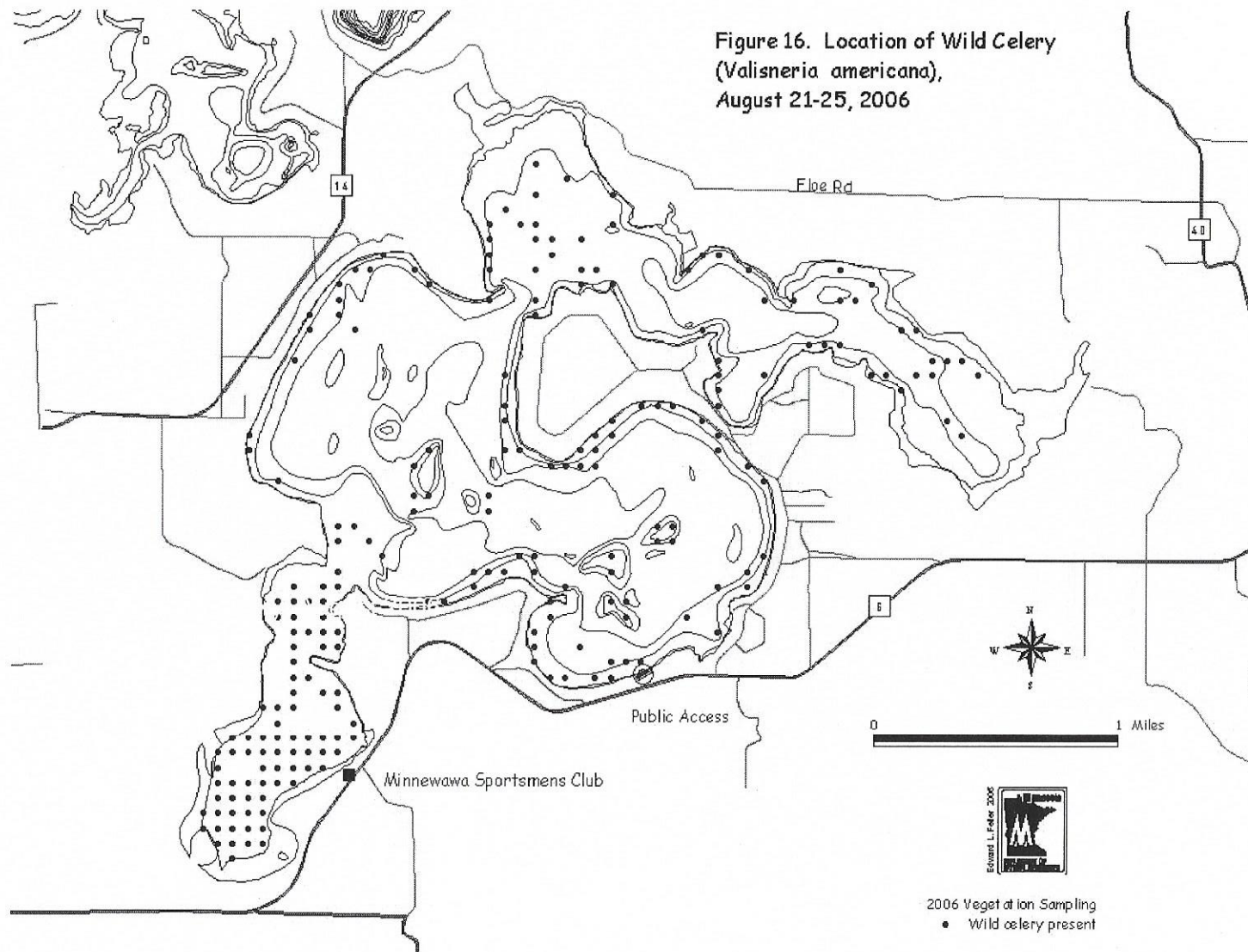


Figure 17. Location of Flatstem Pondweed, (*Potamogeton zosteriformis*), August 21-25, 2006

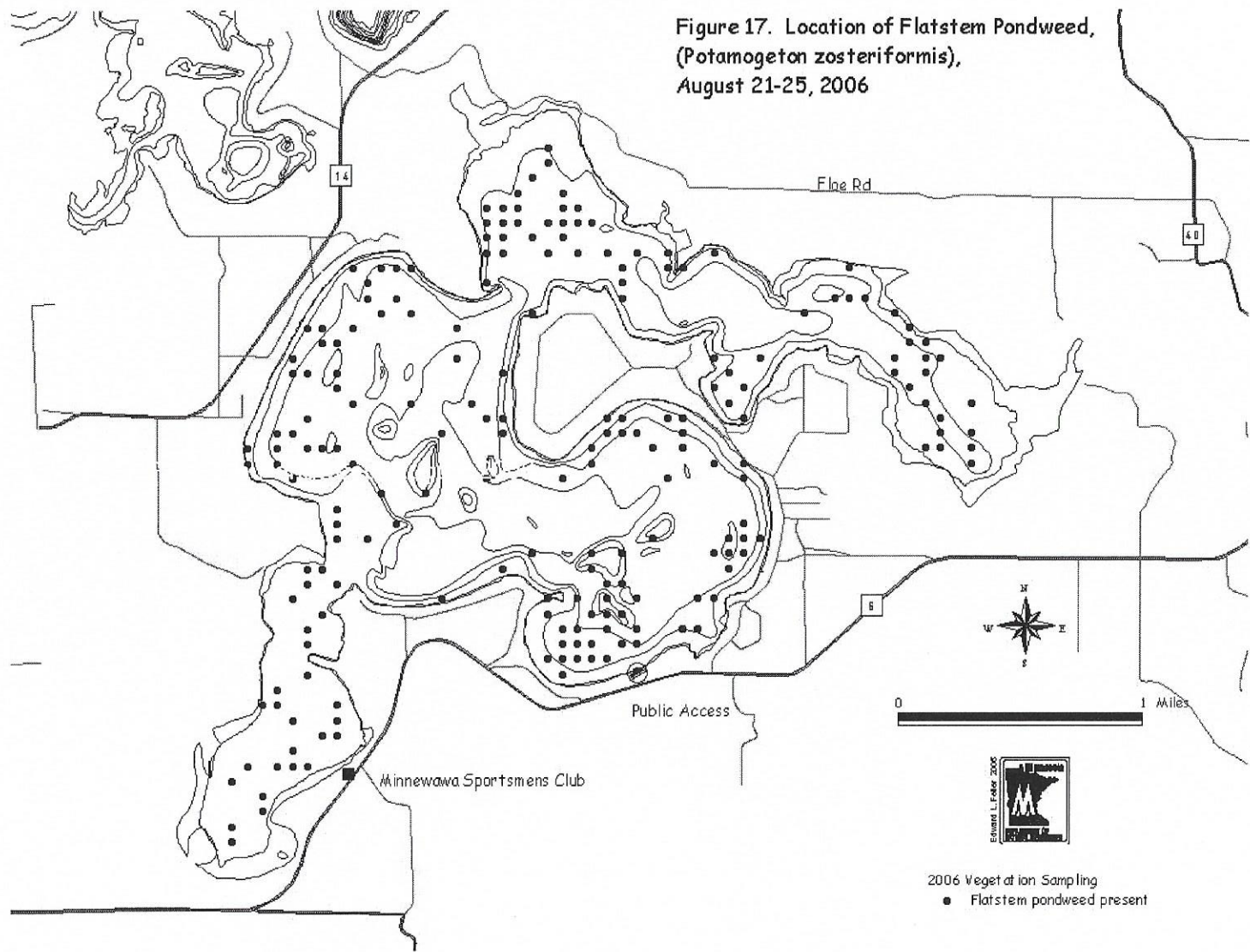


Figure 18. Location of Robbins' Pondweed
(*Potamogeton robbinsi*),
August 21-25, 2006

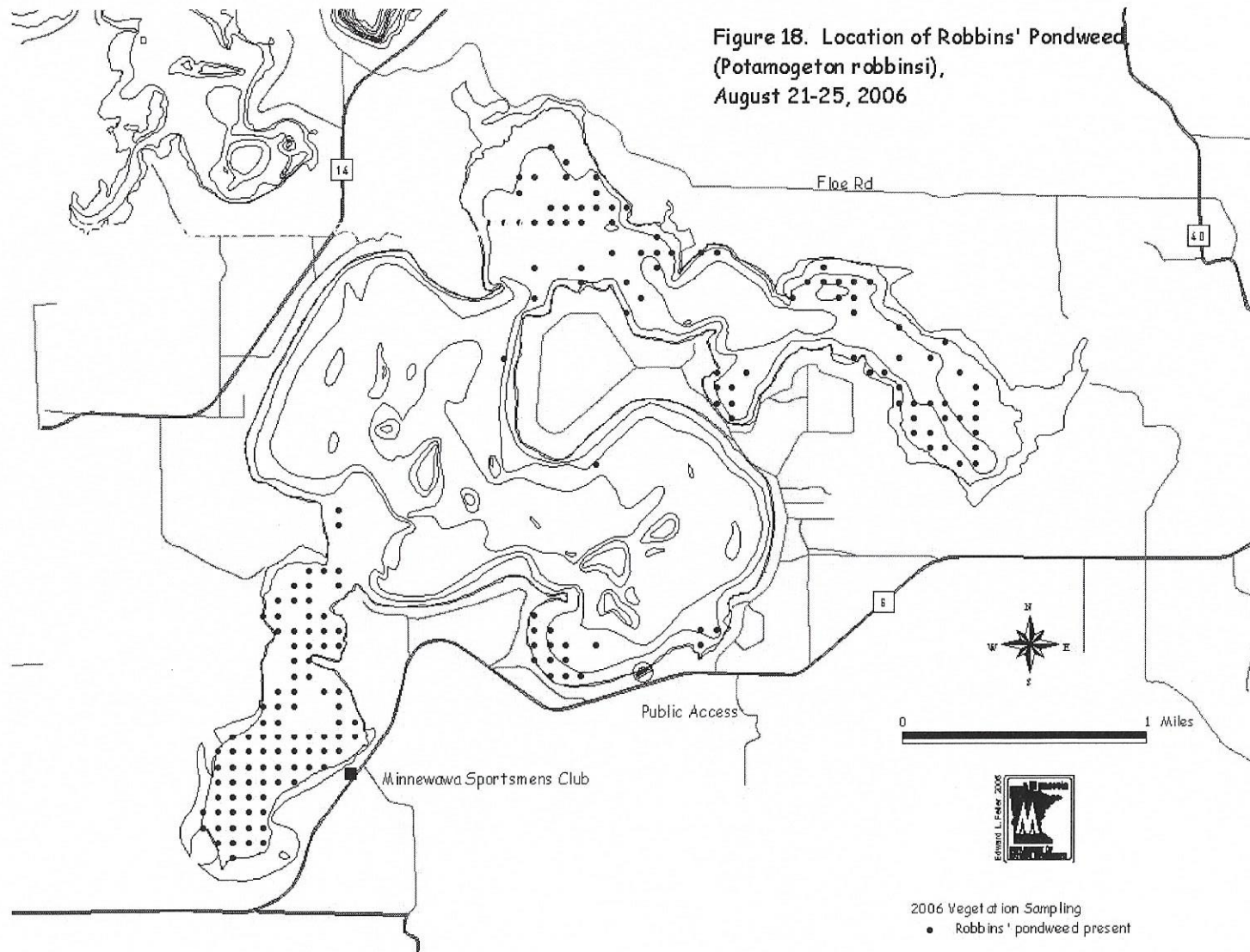


Figure 19. Location of Narrowleaf Pondweed species,
(*Potamogeton* spp.),
August 21-25, 2006

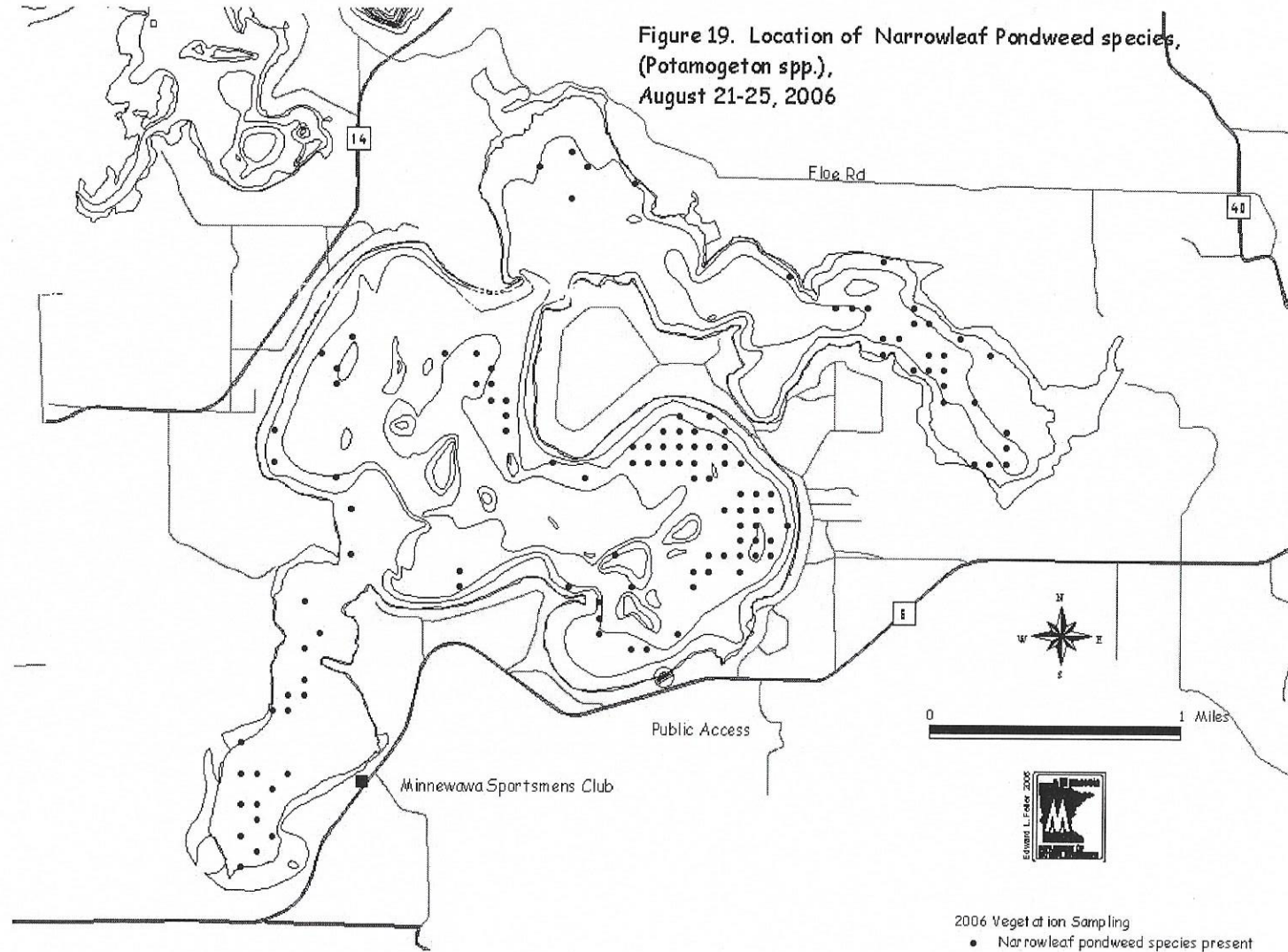


Figure 20. Location of Wild Rice,
(*Zizania palustris*),
August 21-25, 2006



Figure 21. Number of Species Sampled per Station, August 21-25, 2006

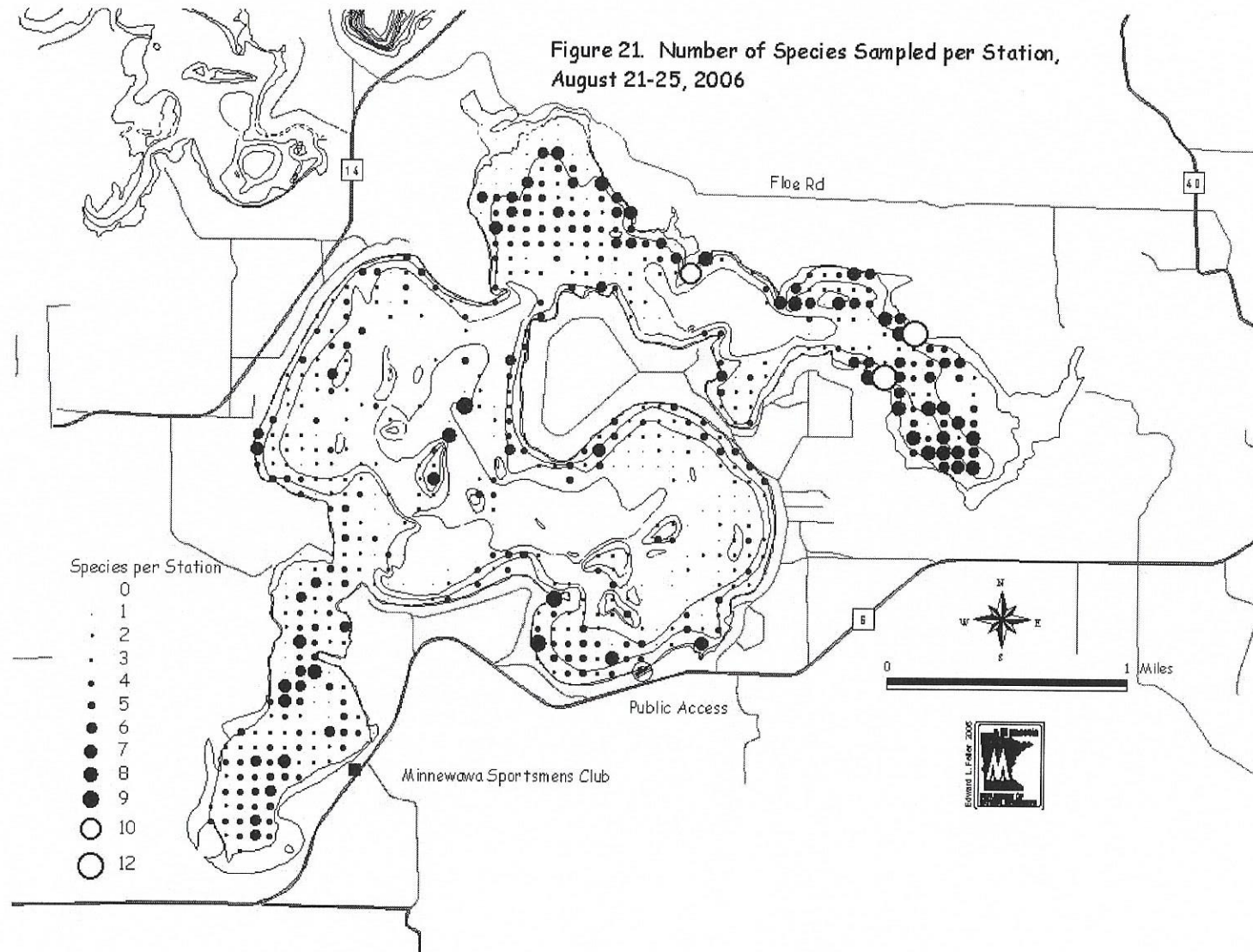


Figure 22. Lake Minnewawa Aquatic Plant Harvest Areas, 2007 - 2012

