

Grand Lake Aquatic Vegetation Management Plan, 2006-2011

Background and Introduction

The mission of the Grand Lake Area Association is to restore and preserve the Grand Lake watershed, returning Grand Lake to its mesotrophic state, creating the finest lake experience in central Minnesota.

Grand Lake Property Owners Association was formed around 1950 by the owners of property who wanted to address mutual needs and concerns about the lake and the surrounding area. Road access and improvements, the future of surrounding land, fisheries, and water quality were priorities. A name change to the Grand Lake Area Association provided recognition to the important contributions of all property owners in the Grand Lake watershed.

Currently there are approximately 80 members in the Lake Association, all shoreland residents. There are approximately 188 year round homes and seasonal use cabins on the lake.

The Grand Lake Area Association was a 2002 participant in the Healthy Lakes and Rivers Program sponsored by the Central Minnesota Initiative Foundation. The *Grand Lake Management Plan*, a product of this participation, has been revised to include new strategic goals and implementation projects for the years 2006 – 2011.

The Department of Natural Resources, Section of Fisheries Management, conducts periodic lake surveys of Grand Lake. The latest one was in 1998. The first lake survey was conducted in 1949. Based on data obtained from the lake surveys and assessments, a *Fisheries Lake Management Plan* has been prepared for Grand Lake. The current plan was prepared in 1999.

Lake and Watershed Location

Grand Lake is located in the City of Rockville in Stearns County. Although the watershed is primarily agricultural and rural, the proximity Saint Cloud (10 miles) is creating great pressure for development and urbanization. (Figure 1).

There are two significant streams that flow into Grand Lake. The larger is Ploof creek in the southwest corner and Johannes Creek in the northwest corner. The outlet stream flows to Mill Creek which flows into the Sauk River in Rockville.

The Grand Lake watershed is 6,892 acres, entirely within Stearns County. Virtually the entire watershed lies to the west of the lake (Figure 2). The Grand Lake watershed is a part of the larger Sauk River watershed which is a part of the Upper Mississippi River basin.

Lake Description

Physical Data

Grand Lake has a surface area of 655 acres, of which 235 acres (36 percent) is in the littoral zone, meaning it has a water depth of 15 feet or less. Grand Lake has a maximum depth of 34 feet with very little structure except for a sand bar coming out from the east shore one third the distance of the lake (Figure 3). The lake is unusual in that it has a natural occurring sand shoreline on northeast side for several thousand feet. The lakes greatest length (fetch) is 1.4 miles and there are 3.7 miles of shoreline. Grand Lake is a class 27 lake.

Grand Lake is zoned a general development lake having about 188 cabins and year round homes. Very few lots are left undeveloped. Grand Lake has one public access on the south shore with a concrete ramp and a roll-in dock. It is operated by the Department of Natural Resources.

Water Quality Data

Citizen volunteers from Grand Lake have participated in the Minnesota Pollution Control Agency's (MPCA) Citizen Lake Monitoring Program (CLMP) since 1977, recording secchi disc transparency, a measure of water clarity.

Mean Summer Secchi Disc Values

Year	Mean (feet)
1977	4.7
1978	5.3
1979	4.5
1980	5.6
1989	5.2
1990	8.0
1991	6.9
1992	6.8
1993	6.0
1994	6.5
1995	9.2
1996	12.0
1997	11.9
1998	6.6
1999	8.3
2000	7.6
2001	7.4

2002	8.9
2003	7.7
2004	9.0

Scientists at the Minnesota Pollution Control Agency conducted a statistical analysis on the Grand Lake secchi data and concluded that Grand Lake has a statistically significant trend showing improving water clarity.

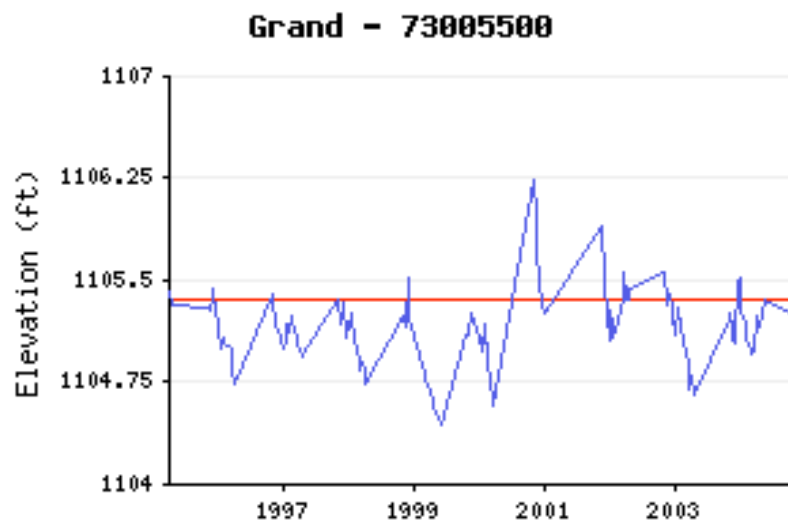
Trophic Status Index data suggest that water quality in Grand Lake routinely exhibits conditions in the upper “mesotrophic” range (a TSI score above 40 but below 50) and lower “eutrophic” range (above 50 but below 70). Aquatic recreational use is “fully supported” as indicated by these data.

Trophic Status Index	
TSI (Phosphorus)	54
TSI (Chlorophyll a)	58
TSI (Secchi disc)	47

Water Level Data

The water level stays fairly constant; varying about 10 inches from high to low. No other lake or watershed flows into Grand Lake and its outlet flow into the Sauk River at Rockville. The Minnesota Department of Natural Resources, Division of Waters has 850 records of lake elevation for Grand Lake from 1937 to 2004, with the following summary characteristics:

	Elevation ¹	Date
Highest Recorded Water Level	1106.8 ft	June 29, 1983
Lowest Recorded Water Level	1103.59 ft	Oct. 8, 1989
Average Water Level	1105.22 ft	
Ordinary High Water Level	1105.36 ft	



¹ Mean Sea Level in feet

Fish Population Description

Grand Lake supports a warm/cool water fish population. The angler harvest consists primarily of northern pike, yellow perch, walleye, black crappie, bluegill, yellow bullhead, pumpkinseed sunfish and largemouth bass. The goal of the Fisheries Lake Management Plan (1999) is to “Provide a walleye and northern pike fishery where relative abundance of both species is 6-8/gill net and the average weight is greater than two pounds.” (Attachment 1).

There is a fish consumption advisory developed by the Minnesota Department of Health for the eating of northern pike and walleye taken from Grand Lake.

Recreational Use

A creel census was conducted in the summer of 1988. At that time fishing pressure was estimated at 25.1 hours per acre and all other recreational use was 7.2 hours per acre. Most of the angling was done from boats.

<u>Recreational Use</u>	<u>Hours per Acre</u>
Fishing	25.1
Runabout	2.2
Pontoon boat	2.1
Water skiing	2.0
Sailing	0.4
Paddle boat	0.3
Other	0.2
	<u>32.3</u>

A winter creel census was conducted in 1991. Winter angling was 45.8 hours per acre and spearing was 3.5 hours per acre. These winter pressures we considered to be high.

Counts of fish houses have been conducted since the late 1970s. Counts have been made early in the winter fishing season, late in the winter fishing season or both. Since the winter of 1981-82 there have been 12 early season counts and 12 late season counts. The counts average 107 and 102 houses respectively.

<u>Winter</u>	<u>Early</u> <u>Season</u>	<u>Late</u> <u>Season</u>
<u>1981-82</u>	<u>142</u>	<u>111</u>
<u>1982-83</u>	<u>110</u>	
<u>1983-84</u>		<u>73</u>
<u>1984-85</u>	<u>120</u>	
<u>1985-86</u>		<u>49</u>
<u>1986-87</u>	<u>92</u>	<u>85</u>
<u>1987-88</u>	<u>106</u>	<u>86</u>
<u>1988-89</u>	<u>125</u>	<u>127</u>
<u>1989-90</u>	<u>71</u>	<u>84</u>
<u>1990-91</u>	<u>132</u>	<u>157</u>
<u>1991-92</u>	<u>120</u>	<u>137</u>
<u>1992-93</u>		<u>136</u>
<u>1997-98</u>	<u>125</u>	<u>94</u>
<u>2000-01</u>	<u>93</u>	<u>87</u>
<u>2003-04</u>	<u>51</u>	

The Grand Lake Area Association committee which prepared this plan estimated the current recreational use of Grand Lake. In descending order, they indicated the greatest hours of recreational use were winter fishing, summer fishing, recreational boating, swimming, snowmobiling, water skiing, esthetics, and personal watercraft. Additional activities on Grand Lake included ATVs, canoeing, ice-skating, sailing and wake boarding.

Watershed Description

The Grand Lake Watershed (6271 acres) is a part of the larger Sauk River Watershed (Hydrologic Unit Code 7010202) of the Upper Mississippi River Basin. The Grand Lake Watershed is 6271 acres in size resulting in a land to water ratio for the Grand Lake watershed of 9.6 to 1. The Grand Lake Watershed is in the Eastern Broadleaf Forest province, Minnesota and Northeast Iowa Morainal section and Hardwood Hills subsection. The Vawler Moraine makes up nearly 4000 acres of the western portion of the watershed while the Luxemburg Sand Plain makes up approximately 2300 acres of the eastern part of the watershed including Grand Lake itself (Figure 4).

Prior to European settlement the land cover of the Grand Lake Watershed was primarily deciduous forest (Figure 5). The major cover was aspen-oak forest covering nearly 5000 acres of the watershed. Land cover in the mid 1990s had changed to nearly 3000 acres of cultivated land and 1200 acres of deciduous forest (Figure 6).

The Grand Lake watershed encompasses parts of 3 townships (Wakefield, Maine Prairie and Luxemburg) and one city (Rockville) (Figure 7). The current (2005) City of Rockville is the result of a merger, in 2002, of the Cities of Rockville and Pleasant Lake and Rockville Township.

Slightly more than half of the Grand Lake watershed (3760 acres) is in the City of Rockville and approximately one fourth (1519 acres) is in Maine Prairie Township. The remainder of the watersheds 6271 acres is split between Wakefield Township (571 acres) and Luxemburg Township (421 acres).

The population of the four governmental units in the Grand Lake watershed was estimated by the Minnesota State Demographer to be 8,109 in 2005. Census figures for the same area in 1970 were 5,045

	2005	2000	1990	1980	1970
Rockville ²	2722	2507	2048	1972	1305
Maine Prairie	1725	1686	1536	1518	1294
Wakefield	3019	3103	2461	2230	1540
Luxemburg	643	689	788	912	971
Sub-total	8109	7985	6833	6632	5045
Saint Cloud	62,182	59,107	48,812	42,566	39,691
Stearns County	141,120	133,166	118,791	101,861	95,400
Minnesota	5,197,000	4,919,479	4,375,099	4,075,970	3,806,103

Wildlife Resources

The DNR has conducted a County Biological Survey for Stearns County. Two bird species and two fish species of special interest have been found in the Grand Lake watershed at various times. Henslow's sparrow (1933), Forster's tern (1965), least darter (1997) and pugnose shiner (1949) have been reported. Henslow's sparrow is listed by the Minnesota DNR as endangered. The other three species are of special concern. Bald eagles and common loons are also present.

Aquatic Plant Community Description

A total of 39 species of aquatic plants have been identified from in Grand Lake. Aquatic plant surveys were conducted by the DNR in 1975, 1987, 1997 and 1998 (Appendix 1). A curlyleaf pondweed (*Potamogeton crispus*) survey was conducted in 2005. Submerged species grew to a maximum depth of 18-20 feet, 20 feet and 18 feet according to the 1975, 1987 and 1998 surveys respectively. The plants include 13 emergent species, 3 floating leaf species, 3 free flowing species and 20 submerged species. The emergent vegetation stands were mapped with GPS technology in 1998.

² as currently (2005) configured.

Species needing particular protection include largeleaf pondweed (*Potamogeton amplifolius*), hardstem bulrush (*Scirpus acutus*), wild rice (*Zizania aquatica*) and water lilies (*Nuphar spp.*)

Curlyleaf pondweed is an exotic plant that forms surface mats that can interfere with aquatic recreation. The plant is usually senescent (dies back) by early July. Curlyleaf pondweed was the most severe nuisance aquatic plant in the Midwest until Eurasian watermilfoil appeared. Curlyleaf pondweed is a problem of nuisance proportions in Grand Lake. In a survey documenting the distribution of curlyleaf pondweed in Grand Lake (June 2, 2005), the MDNR notes that there are 79 acres of “near surface” curlyleaf, representing 33.6 percent of the lakes littoral area. In 2005 the curlyleaf pondweed was observed primarily in 6 to 12 feet of water (Figure 8). Herbicide treatments to control curlyleaf pondweed were conducted in the springs of 2003 through 2005.

<u>Year</u>	<u>Acres Treated</u>
2003	8.4
2004	22.5
2005	5.4

Eurasian watermilfoil (*Myriophyllum spicatum*) is not present in Grand Lake. The infestation closest (within 12 miles) to Grand Lake is Clearwater Lake. Purple loosestrife (*Lythrum salicaria*) is not reported to occur in the Grand Lake watershed. However, it is found in the Sauk River watershed. The nearest known location is approximately 1.25 miles northeast of Grand Lake.

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 positive or negative. 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 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.

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. Plants which function as wave breaks include threeway sedge (*Dulichium arundinaceum*), 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 sedges (*Carex spp.*) and muskgrass (*Chara spp.*), duck potato (*Sagittaria latifolia*) and wild rice.

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. Muskgrass (*Chara spp.*) removes lime from the water and often has calcium deposits on it. Threesquare (*Scirpus pungens*) and Canada waterweed (*Elodea canadensis*) remove metals such as lead, mercury and cadmium. Additionally, Canada waterweed has been used experimentally to remove oil. Northern watermilfoil (*Myriophyllum sibiricum*) is an efficient user of nutrients in the water. Several plants are especially effective in aerating water. They include northern watermilfoil and bushy pondweed (*Najas flexilis*). Aquatic plants are sometimes used for treating sewage effluent in wastewater systems. Several plants that have proven efficient are hardstem and softstem bulrush (*Scirpus acutus* and *validus*) 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 and white water buttercup (*Ranunculus spp.*).

Virtually every aquatic plant found in Grand Lake has an ecological value for some species of bird (Appendix 2). 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, threesquare (*Scirpus pungens*), common cattail (*Typha latifolia*), narrowleaf cattail (*Typha angustifolia*) and wild rice all provide cover for a variety of waterfowl, shorebird, marsh bird and songbird species. Cattails and bulrushes also provide both sites for nesting and materials to construct the nests. Aquatic plants such as wild rice, wild celery, sago pondweed (*Stuckenia pectinatus*) 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

In the last five years (2001-2005) a total of 21 aquatic plant management permits have been issued. These permits include all types of nuisance conditions and all types of control methods. In three of these years (2003-2005) a permit was issued to the Grand Lake Area Association for large-scale herbicide treatment of curlyleaf pondweed in offshore locations. In 2003 the area allowed for this treatment was 10 acres. In 2004-2005 it was 25 acres. The first permit for a large-scale control of submerged vegetation in Grand Lake was issued in 1994. It was issued for the mechanical control of submerged vegetation along the lakes south and west shores. The first large-scale permit application for chemical control was in 1999. The permit application for this permit also requested an offshore treatment of 4.7 acres of curlyleaf pondweed.

Citizen Determined Lake Issues

The committee preparing this plan determined a number of issues affecting Grand Lake landowners. The following list is not in any particular order of priority.

Water Quality Issues:

- The water quality of Grand Lake is in between a mesotrophic and eutrophic state. Part of our mission is to return Grand Lake to a consistent mesotrophic state.
- Excess nutrient runoff from Ploof and Johannes Creeks has a negative impact on water quality.
- Excess nutrient runoff from impervious surfaces and use of fertilizers has a negative impact on water quality.
- Inadequate watershed buffer zones and shoreline practices fail to provide an adequate filter for nutrient runoff.
- High recreational boat use contributes to sediment disruption.
- Lakeshore owners need up-to-date education and information regarding shoreline management, the location of campfire pits, buffer zone practices, and rain gardens.
- Grand Lake, like all lakes, has the potential to get Eurasian milfoil with so many boats trailering on and off the lake.
- Sand is added to the beaches of many property owners on a regular basis without an understanding of the impact on water depth, aquatic vegetation, and shoreline stabilization.

Quality of Lake Life Issues:

- Proposed large-scale residential developments near Grand Lake threaten to take away the rural nature of the Grand Lake experience, with negative impacts on

the quality of lake life for existing residents due to increased boat traffic, noise, traffic on nearby highways, and pollution.

- Grand Lake now has a major sewer project but no city water, natural gas, high speed Internet, cable, or adequate roads.

- The Grand and Pleasant Lake sewer project will remain a dividing issue among many residents for some time.

- Rising property taxes and assessments threaten to make the Grand Lake experience unaffordable for many residents.

- The City of Rockville is the product of a recent consolidation. As a result, the potential for leapfrog developments or urban sprawl is significant. In addition, this young city does not have adequate shoreland zoning ordinances to protect the shoreland overlay from poorly designed residential developments.

- Grand Lake has the potential to become overcrowded and unsafe with the possibility of second tier developments and lake access lots with piers or boat slips. This needs to be prevented through a petitioning process and city ordinances.

- Residents want to maintain the rural feel of the area.

- There is often too much noise from cars, jet skis and big boats.

- There is often excessive litter from winter lake use by snowmobiles and ice fishermen.

- Some seasonal-use residential cabins on Grand Lake have the potential to deteriorate if the once-peaceful Grand Lake experience becomes unpleasant due to second tier developments that are built too close with inadequate green space.

- Most roads adjacent to or surrounding Grand Lake need improvements, including County Road 8 (to pull this away from the lake for environmental reasons), Hubert Lane (to bring it up to fire code), Agate Beach Road (concerns about dust and swampy water in ditches), and Grand Lake Road (deteriorating road bed).

- Natural habitats need protection so we can still enjoy seeing bald eagles, loons, wild turkeys, deer, and good fisheries.

- Concern is expressed that there is a lack of awareness of the vision contained in the comprehensive plan for the city of Rockville, and a lack of commitment to establish city unity and a shared vision among many residents.

- There is concern that some people boat or fish too close to docks, creating annoyances for property owners and potentially unsafe conditions for swimmers.

- Some individuals are not educated or do not follow safety rules and courtesies related to boats, jet skis, maintaining distance from wildlife, and the management/control of pets.

- Grand Lake is over-fished due to the proximity to St. Cloud, creating significant challenges for fisheries management.

- More engagement from landowners is needed, especially in issues that impact environmentally sensitive areas and the quality of life for the residents of Grand Lake. For example, all area residents should belong to the lake association.

Citizen Determined Aquatic Plant Issues

The committee preparing this plan described specific aquatic plant issues affecting Grand Lake landowners. The following list is not in any particular order of priority

- Lakeshore owners need up-to-date education and information regarding the identification and management of aquatic plants and invasive exotic vegetation.

- Emergence and spread of invasive exotic vegetation, especially curlyleaf pondweed.

- Curlyleaf pondweed has taken over certain parts of Grand Lake, especially in the southwest corner. This prevents swimming, fishing, waterskiing, sailing, and other water activities. This growth is further fueled by nutrient runoff from Ploof and Johannes Creek. Boat usage (cutting off plants) and southerly winds spread these plants to other parts of the lake causing floating mats of plants. Also, it's possible that some of these aquatic plants can emerge in other areas of the lake due to the spread of turion beds.

- Tall aquatic plants that were once abundant in Grand Lake, like bulrushes, should be restored.

- Lakeshore owners need to have more information and understanding of what is needed for a healthy lakeshore, including buffer zones and aquatic plants that restore the ecological functions of the lakeshore.

- In areas of Grand Lake, mats of curlyleaf pondweed and other aquatic plants negatively impact recreation and esthetics, and make it necessary to clean up the shoreline on an ongoing basis.

- In the late summer and early fall, algae blooms and scums from decomposing aquatic plants are odorous, unsightly and impact lake use.

- Property owners on Grand Lake and within the Grand Lake watershed need up-to-date information on the proper use of chemicals on lawns, especially near the shoreline and streams, in order to avoid the negative impact of these chemicals on aquatic plants, fisheries, and water quality.

Goals and Action Steps

1. Reduce turion bank for curlyleaf pondweed from its current 79 acres.
 - a. Explore funding mechanisms for control of curlyleaf pondweed.
 - b. Maintain a curlyleaf pondweed management program.
 - c. Target areas each year to reduce curlyleaf pondweed.

2. Have more property owners restore shoreland to a natural, healthier state.
 - a. Buy Restore Your Shore CD and make it available to all lake owners.
 - b. Develop annual award for lot that best showcases restored shoreland.
 - c. Score each individual lakeshore and provide to property owner.
 - d. Sponsor a lakeshore improvement workshop to provide education to lakeshore owners.

3. Provide more information and education on lake management and watershed issues to all people within the Grand Lake watershed area.
 - a. Provide information and pamphlets on exotic species to all lakeshore owners.
 - b. Develop monitoring and reporting system on exotic species for lakeshore owners.
4. Reduce nutrient run-off from the creeks and impervious surfaces around Grand Lake.
 - a. Develop and maintain a collaborative relationship with the Sauk River Watershed District, the Department of Natural Resources, the Soil and Water Conservation District, Stearns County Environmental Services and the City of Rockville in all activities and implementation projects that improve the water quality and aquatic vegetation in our watershed.
 - b. Host meetings with surrounding property owners to educate them on watershed issues.
 - c. Develop an award and host an awards dinner to recognize a neighbor for their lake friendly environmental practices.

Specific Plan Guidelines

1. Curlyleaf pondweed will be controlled by means of an early application of herbicides as described in Appendix 4 *Considerations When Doing Early Season Treatments for Curlyleaf Pondweed*.
2. Control of curlyleaf pondweed by the Grand Lake Area Association will be in the nearshore and offshore areas labeled A, F, G, H, I and J in Figure 10. Control under the permit issued to the Grand Lake Area Association will be limited to 30 acres.
3. When curlyleaf pondweed is treated in nearshore areas, the control area for each landowner will be 50 feet along shore OR half the lot width, whichever is less, by 50 feet lakeward. If necessary a channel to open water up to 15 feet wide may be treated. The width of the channel will be included in the shoreline distance allowed (Figure 11). Please note that the location shown in Figure 11 is for illustration purposes. Each owner will determine the precise location of the treatment area. The location of control may not change from year to year.
4. Individual landowners may treat curlyleaf pondweed in nearshore areas in the areas labeled B, C, D, and E in Figure 10. The control area for each landowner will be as described in (3) above. Total treatment in this area may not exceed 5 acres. Individual landowners are responsible for obtaining the permit for this control.
5. The responsibility for obtaining a permit to control other nuisance aquatic plant conditions is the individual landowners.

Permit Application and Issuance

Minnesota Rules 6280.0350 Subpart 2 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”.*

The Grand Lake Area Association will make permit application for work under (1) and (2) of the above Specific Plan Guidelines. The application will be sent to the DNR Fisheries office in Little Falls no later than March 1 of each year. GPS coordinates of the proposed offshore curlyleaf pondweed treatment areas, in an electronic format compatible with DNR GIS programs, need to be submitted with the permit application. The GPS coordinates of the actual area treated the previous year must also be included if this is different from the proposed treatment area. Written permission for the control of curlyleaf pondweed in near shore areas must be obtained from each landowner requesting control according to Minnesota Rules, Chapter 6280. This written permission must be obtained every three (3) years or upon change of land ownership. The three-year periods will be 2006 through 2008 and 2009 through 2011. New signatures granting permission must be obtained and submitted with the permit applications in 2006 and 2009, any time land changes ownership or when a property owner not previously seeking control now requests control. Written permission from landowners must also be obtained if offshore treatment comes within 150 feet of their shoreline. This permission must accompany the application.

Permit issuance will be by the DNR Fisheries office in Little Falls. The permit will be issued within two weeks of receipt of all necessary application materials and supporting documentation. One permit will be issued for the control of aquatic nuisance problems but may be issued in two or more parts.

Individual landowners are responsible for permit application for work under (4) and (5) of the above Specific Plan Guidelines.

Monitoring

1. The Grand Lake Area Association will visually monitor the effects of the curlyleaf pondweed treatments and keep a record of the observations annually.
2. The Grand Lake Area Association should obtain information from lakeshore owners annually regarding how effective they feel the curlyleaf pondweed control program has been.
3. The Grand Lake Area Association should obtain information from lakeshore owners annually regarding how effective control efforts were for increasing usability of Grand Lake for recreational uses.

4. The DNR (Fisheries or Ecological Services) will conduct a curlyleaf pondweed survey in 2011 to determine the effectiveness of the control program to reduce areas of curlyleaf pondweed. Since treatment with herbicides could interfere with the survey, treatment in 2011 should take place after the completion of the survey. A comparison will be made using data from 2005 and 2011 to determine changes in the curlyleaf pondweed occurrence.

Plan Preparation

The Grand Lake Area Association and the Minnesota Department of Natural Resources prepared this plan. The participants were: Susan Dean, Ed Feiler, Paul Ludwig, Scott Palmer, Sue Palmer, Pat Sell, and Robert White. 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, 2011, 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.

Paul Diedrich, Area Fisheries Supervisor, MDNR

Date

Dirk Peterson, Regional Fisheries Manager, MDNR

Date

Scott Palmer, President, Grand Lake Area Association
Date

References

- Borman, S., Korht, R. and J. Temte. 1997. *Through the Looking Glass. A Field Guide to Aquatic Plants.*
- Carlson, R. A. and J. B. Moyle. 1968. *Key to the Common Aquatic Plants of Minnesota*
- Eggers, S. D. and D. M. Reed. 1997. *Wetland Plants and Plant Communities of Minnesota and Wisconsin*
- Crow, G.E. and C.B. Hellquist. 2000. *Aquatic and Wetland Plants of Northeastern North America.*
- Dindorf, C.J. 1993. *Aquascaping: A Guide to Shoreline Landscaping.*
- Fassett, N.C. 1957. *A Manual of Aquatic Plants*
- Hamel K. and J. Parsons. 2001. *An Aquatic Plant Identification Manual for Washington's Freshwater Plants*
- Henderson, C.L., Dindorf, C.J. and F.J. Rozumalski. 1998. *Lakescaping for Wildlife and Water Quality.*
- Lahring, H. 2003. *Water and Wetland Plants of the Prairie Provinces.* Martin, A.C. and F.M. Uhler. 1939. *Food of Game Ducks in the United States and Canada.*
- Newmaster, S.G., A. G. Harris and L. J. Kershaw. 1997. *Wetland Plants of Ontario.*
- Nichols, S. A. and J. G. Vennie. 1991. *Attributes of Wisconsin Lake Plants.*
- Reed, P. 1988. *National List of Plant Species that Occur in Wetlands – North Central (Region3).*
- Reed, P. 1996. *National List of Vascular Plant Species That Occur in Wetlands.*
- Tarver, D. P., Rodgers, J. A., Mahler, M.J. and R.L. Lazor. 1978. *Aquatic and Wetland Plants of Florida*
- Welsch, J. Undated. *Guide to Wisconsin Aquatic Plants.*

Whitley, J. R., Bassett, B., Dillard, J. G. and R. A. Haefner. 1990. *Water Plants for Missouri Ponds*