

AN AQUATIC PLANT MANAGEMENT PLAN FOR THE LAUDERDALE LAKES

WALWORTH COUNTY WISCONSIN

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**MEMORANDUM REPORT
NUMBER 143**

**AN AQUATIC PLANT MANAGEMENT PLAN FOR THE LAUDERDALE LAKES
WALWORTH COUNTY, WISCONSIN**

Prepared by the

**Southeastern Wisconsin Regional Planning Commission
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Chapter I

INTRODUCTION

The Lauderdale Lakes, consisting of Green, Middle, and Mill Lakes, located at the head waters of Honey Creek in the Towns of LaGrange and Sugar Creek in Walworth County, Wisconsin, are a valuable natural resource offering a unique setting and variety of recreational and related-use opportunities to the residential community and its visitors. However, the recreational and aesthetic value of the Lakes is perceived to be adversely affected by excessive aquatic plant growth within the Lakes. Seeking to maintain the usability of these Lakes, and prevent deterioration of the natural assets and recreational potential of the Lauderdale Lakes, the Lauderdale Lakes Lake Management District continues to undertake an annual program of lake and aquatic plant management.

During 1998, the Lauderdale Lakes Lake Management District requested the assistance of the Southeastern Wisconsin Regional Planning Commission in compiling an aquatic plant management plan for Lauderdale Lakes and refining its ongoing aquatic plant management program. A planning program, conducted in association with the Wisconsin Department of Natural Resources and the Lauderdale Lakes Lake Management District, was designed to provide inventory information on the aquatic plant communities, water quality, and recreational usage of the Lauderdale Lakes as the initial step in formulating a lake protection and rehabilitation program for the Lakes and updating the existing aquatic plant management plan for the Lakes.¹ This report sets forth the recreational use inventory and inventory of aquatic and riparian wetland plant communities present within or adjacent to Lauderdale Lakes. These inventories were prepared by the Southeastern Wisconsin Regional Planning Commission, with the assistance of the Lauderdale Lakes Lake Management District, during 1999 and 2000.

The inventory data were gathered using standard aquatic plant and wetland plant survey techniques and protocols. The aquatic plant survey of the Lauderdale Lakes was conducted by Commission staff using the modified Jesson and Lound² transect method employed by the Wisconsin Department of Natural Resources for aquatic plant surveys throughout the State. The wetland plant inventories were compiled by Commission staff using the wetland inventory maps prepared for the Wisconsin Department of Natural Resources by the Regional Planning Commission and field inventory data gathered by Commission staff using assessment techniques summarized in the adopted regional natural areas and critical species habitat protection and management plan.³ The scope of this report is limited to consideration of the factors affecting the aquatic plant communities and riparian wetland plant communities present within and adjacent to the Lauderdale Lakes and the recreational uses of the Lakes.

To the extent necessary, water quality data gathered by the U.S. Geological Survey pursuant to their trophic state index (TSI) lake monitoring protocol were incorporated into this plan. In addition, data on the Lauderdale Lakes also were abstracted from the Wisconsin Department of Natural Resources nonpoint source pollution control plan

¹*Integrated Lakes Management, Lauderdale Lakes Aquatic Plant Distribution, July 1989.*

²*R. Jesson and R. Lound, Minnesota Department of Conservation Game Investigational Report No. 6, An Evaluation of a Survey Technique for Submerged Aquatic Plants, 1962.*

³*SEWRPC Planning Report No. 42, A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin, September 1997.*

for the Sugar-Honey Creeks Priority Watershed.⁴ This aquatic plant management plan is intended to form an integral part of any future comprehensive lake management plan for the Lauderdale Lakes, the preparation of which will require additional water quality and biological data collection and analysis.

This plan is intended to address the recreational lake use goals and objectives for the Lauderdale Lakes developed in consultation with the Lauderdale Lakes Lake Management District. These goals and objectives are:

1. To protect and maintain public health, and to promote public comfort, convenience, necessity, and welfare, through the environmentally sound management of the aquatic plant and riparian wetland communities in and around the Lauderdale Lakes;
2. To provide for high-quality, water-oriented recreational and aesthetic opportunities for residents and visitors to the Lauderdale Lakes, and manage the aquatic plant communities in the Lakes in an environmentally sound manner;
3. To effectively manage the water quality of the Lauderdale Lakes to maintain a healthy aquatic and riparian wetland plant communities and, thereby, better facilitate the conduct of water-related recreation, improve the aesthetic value of the resource to the community, and enhance the resource value of the waterbody and,
4. To review the status of the shorelands and Wisconsin Department of Natural Resources-delineated environmentally sensitive areas within the lake basin relative to existing and planned future development to minimize current and probable future ecological impacts on the Lakes, thereby contributing to the sustainable use of the waterbody and structure and function of its ecosystem.

This inventory and plan element, which conforms to the requirements and standards set forth in the relevant *Wisconsin Administrative Codes*,⁵ should serve as an initial step in achieving these objectives over time.

⁴*Wisconsin Department of Natural Resources Publication No. PUBL-WT-478-97, A Nonpoint Source Control Plan for the Sugar-Honey Creeks Priority Watershed Project, February 1997.*

⁵*This plan has been prepared pursuant to the standards and requirements set forth in three chapters of the Wisconsin Administrative Code: Chapter NR 1, "Public Access Policy for Waterways;" Chapter NR 103, "Water Quality Standards for Wetlands;" and Chapter NR 107, "Aquatic Plant Management."*

Chapter II

INVENTORY FINDINGS

INTRODUCTION

The Lauderdale Lakes are located in the north central portion of Walworth County, Wisconsin, as shown on Map 1. The Lakes form the headwaters of Honey Creek, a tributary stream to the Fox River. The Lauderdale Lakes are a multiple-lake system comprised of three individual waterbodies that have been conjoined as a result of the impoundment of Honey Creek, which stream forms the common outlet of the three lake systems. The three lakes are Green Lake and Middle Lake, both located in the Town of LaGrange, and Mill Lake, located in the Towns of LaGrange and Sugar Creek, all in Walworth County, Wisconsin. These Lakes continue to retain their individual identities, as shown on Map 1, and each has significantly different characteristics. The Lauderdale Lakes were formed as a result of glacial ice deposition at the base of an end moraine in a terrace of outwash sand and gravel. The outflow of the Lauderdale Lakes is controlled by a dam on the eastern side of Mill Lake. Honey Creek begins at the dam and drains east and south to its confluence with the Fox River system at Burlington in Racine County.

WATERBODY CHARACTERISTICS

The Lauderdale Lakes are a multiple-lake system. The Lakes are a 841-acre waterbody, the hydrographical characteristics of which are set forth in Table 1. The Lakes have a maximum depth of 55 feet, a mean depth of 14.3 feet, and a volume of 11,560 acre-feet. The bathymetry of the Lakes is shown on Map 2. As noted, the Lauderdale Lakes are comprised of three individual lake basins: the 311-acre spring-fed Green Lake, the 259-acre flow-through Middle Lake, and the 271-acre drained Mill Lake. The Lakes have no named inlets, but one common, named outlet on the eastern side of Mill Lake. The outlet is the beginning of Honey Creek.

Green Lake is the deepest of the three lakes. Green Lake has a single deep basin, with shallower southwestern and southeastern lobes. Green Lake has a surface area of 311 acres and a maximum depth 55 feet. Middle Lake is elongate in shape with a deep central basin, and extensive deep- and shallow-water marsh areas at the western end. Middle Lake has a surface area of 259 acres and a maximum depth 42 feet. Mill Lake has a central deep hole with an extensive shallow area locally known as Don Jean Bay. The original dam on the outlet of Mill Lake was constructed during the mid-1800s to provide waterpower for a sawmill. The current dam was constructed in 1962. Mill Lake has a surface area of 271 acres and a maximum depth of 44 feet.

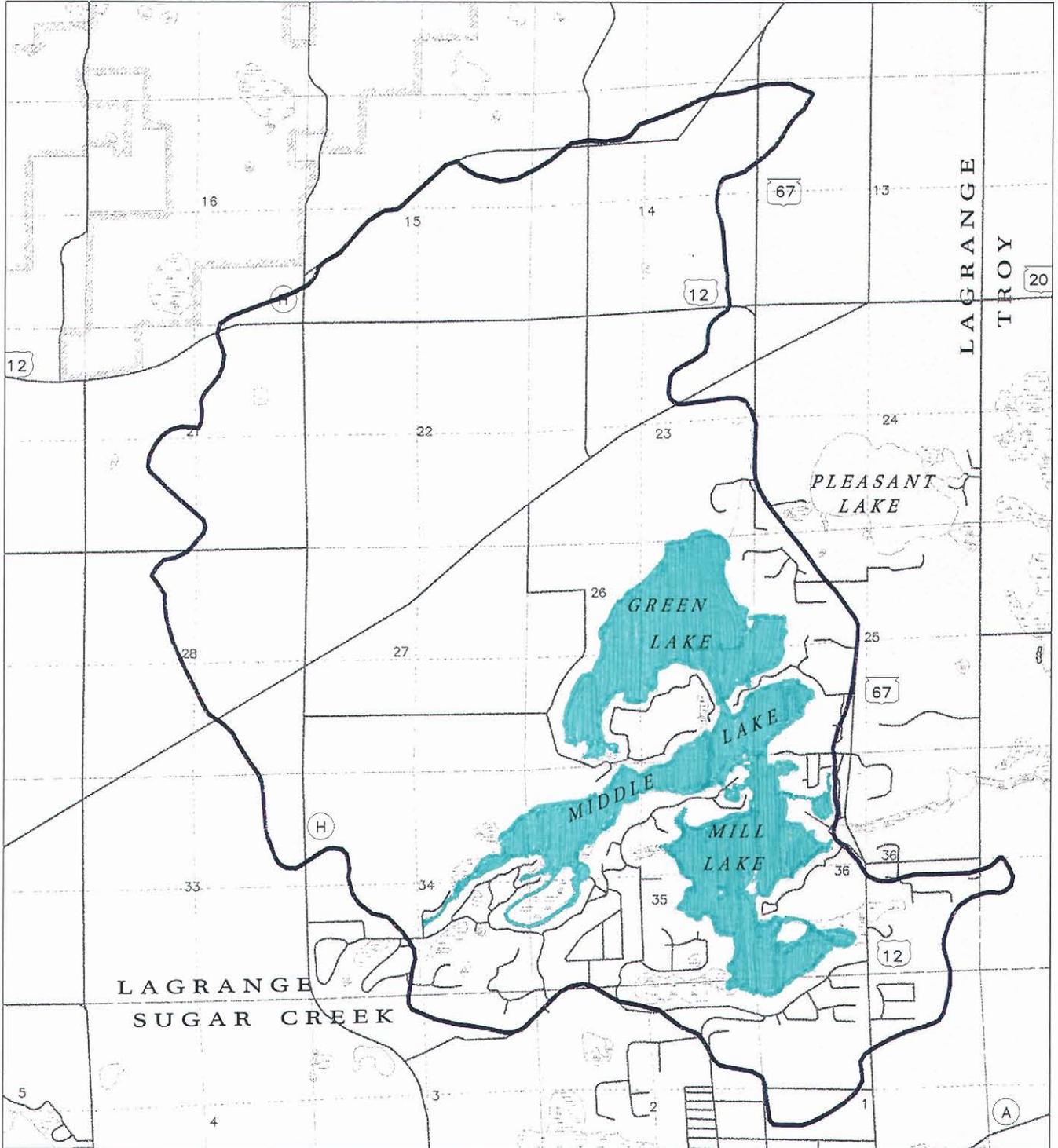
TRIBUTARY DRAINAGE AREA AND LAND USE CHARACTERISTICS

The tributary drainage area to the Lauderdale Lakes extends into the Towns of LaGrange and Sugar Creek, and into a very small portion of the Town of Troy, all in Walworth County, as shown on Map 1. This drainage area has an areal extent of 6,217 acres, including the Lakes surface areas.

The lakeshore of the Lauderdale Lakes and some immediately adjacent lands currently are primarily developed for residential use, except for the northwestern shoreline of Middle Lake that is largely wetland and undeveloped woodland. Portions of this shoreline have been placed into privately owned conservancy. On Green Lake, two

Map 1

LOCATION MAP OF THE LAUDERDALE LAKES



Source: SEWRPC.

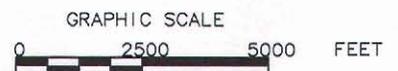


Table 1

HYDROGRAPHIC CHARACTERISTICS OF THE LAUDERDALE LAKES

Parameter	Measurement
Lauderdale Lakes System	
Surface Area	841 acres
Volume	11,560 acre-feet
Shoreline Length	14.7 miles
Maximum Depth	55 feet
Mean Depth	14.3 feet
Tributary Drainage Area...	6,217 acres
Green Lake	
Surface Area	311 acres
Maximum Depth	55 feet
Middle Lake	
Surface Area	259 acres
Maximum Depth	42 feet
Mill Lake	
Surface Area	271 acres
Maximum Depth	44 feet

Source: U.S. Geological Survey, Wisconsin Department of Natural Resources, and SEWRPC.

large camps and the public boat landing, located along the shoreline of the southwestern embayment, provide a largely undeveloped aspect to this portion of the Lauderdale Lakes.

The surrounding land uses in the tributary drainage area are primarily agricultural and open land uses, with limited scattered single-family residential uses. Wetlands and woodlands are the principal rural features of the drainage area tributary to the Lauderdale Lakes. Existing land uses as of 1995 are shown on Map 3, and are summarized in Table 2. About 1,000 acres, or about 16 percent, of the drainage area directly tributary to the Lauderdale Lakes were devoted to urban land uses. The dominant urban land use was residential, encompassing 610 acres, or about 60 percent of the area in urban land use. About 5,218 acres, or 83 percent of the Lauderdale Lakes drainage area, were still devoted to rural land uses. About 3,465 acres, or about 55 percent of the rural area, were in agricultural uses. Woodlands, wetlands, and surface waters, including the surface area of the Lauderdale Lakes, accounted for approximately 1,753 acres, or about 33 percent of the rural land uses.

Few changes in land use within the drainage area tributary to the Lauderdale Lakes are anticipated and are limited to infilling of already platted lots and the possible redevelopment of existing properties.¹ Only minor, additional large-lot residential development is envisioned for the drainage area, based upon forecast land uses within the Town of LaGrange.²

Population

As of 1990, there were approximately 1,200 persons residing in 1,193 housing units within the drainage area tributary to the Lauderdale Lakes. About 61 percent of the households were reported to be seasonally occupied. Residential lands encompass approximately 60 percent of the shoreline of the Lauderdale Lakes.

Public Recreational Boating Access and Recreational Facilities

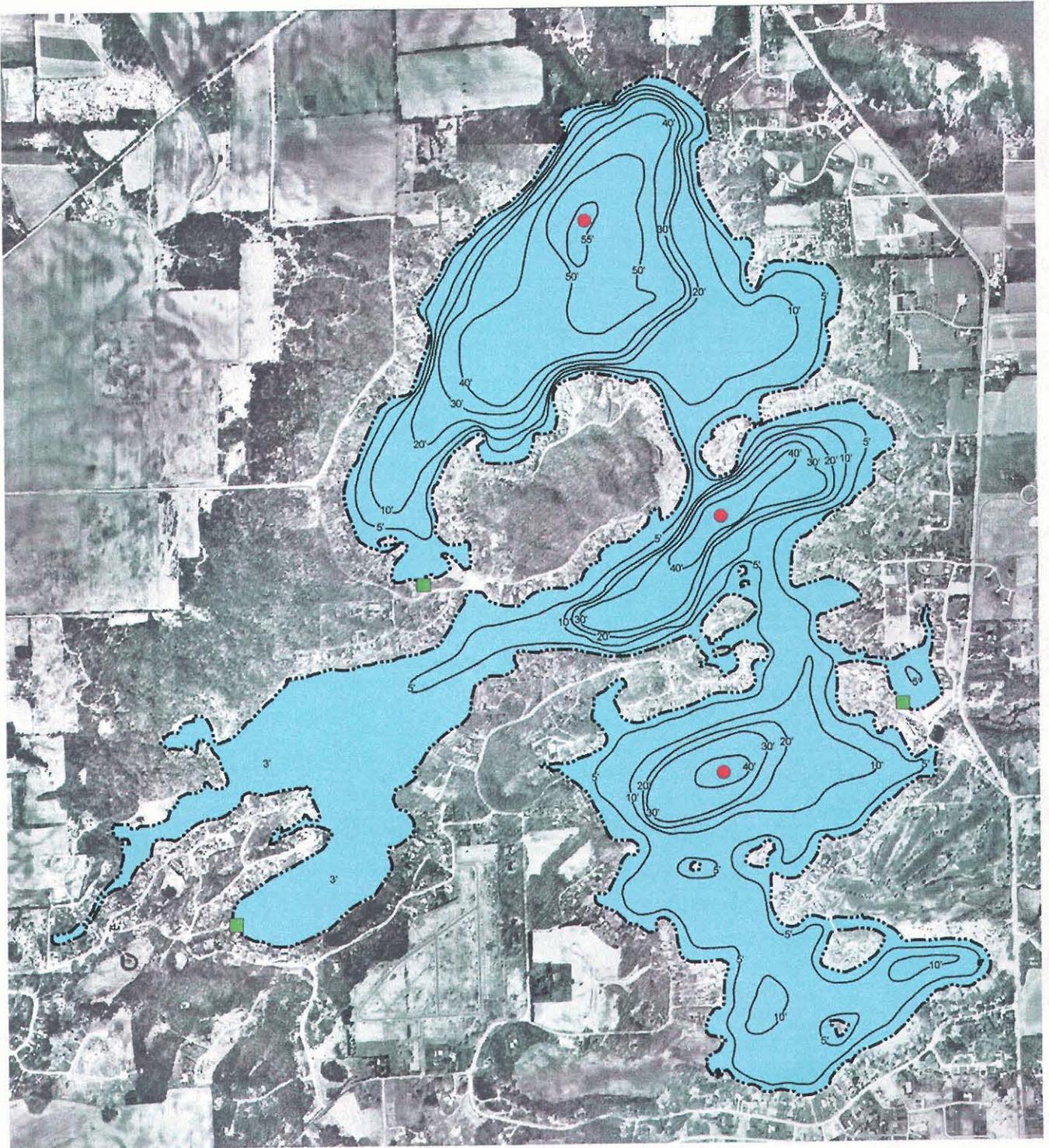
The Lauderdale Lakes have adequate public recreational boating access pursuant to the public recreational boating access standards set forth in Chapter NR 1 of the *Wisconsin Administrative Code*. Public recreational boating access is provided at one site on each of the three Lakes. The access site on Green Lake is located on the southwestern shore of that Lake. The access site on Middle Lake is located on the southwestern shore of that Lake, in the vicinity of the "Bubbling Springs." The access site on Mill Lake is located on the eastern side of the Lake within the embayment known as Sterlingworth Bay.

¹SEWRPC Planning Report No. 45, A Regional Land Use Plan for Southeastern Wisconsin: 2020, December 1997.

²SEWRPC Community Assistance Planning Report No. 168, A Land Use Plan for the Town of LaGrange: 2010, March 1991.

Map 2

BATHYMETRIC MAP OF THE LAUDERDALE LAKES



—20'— WATER DEPTH CONTOUR IN FEET

● SAMPLING SITE LOCATION

■ PUBLIC-ACCESS SITE

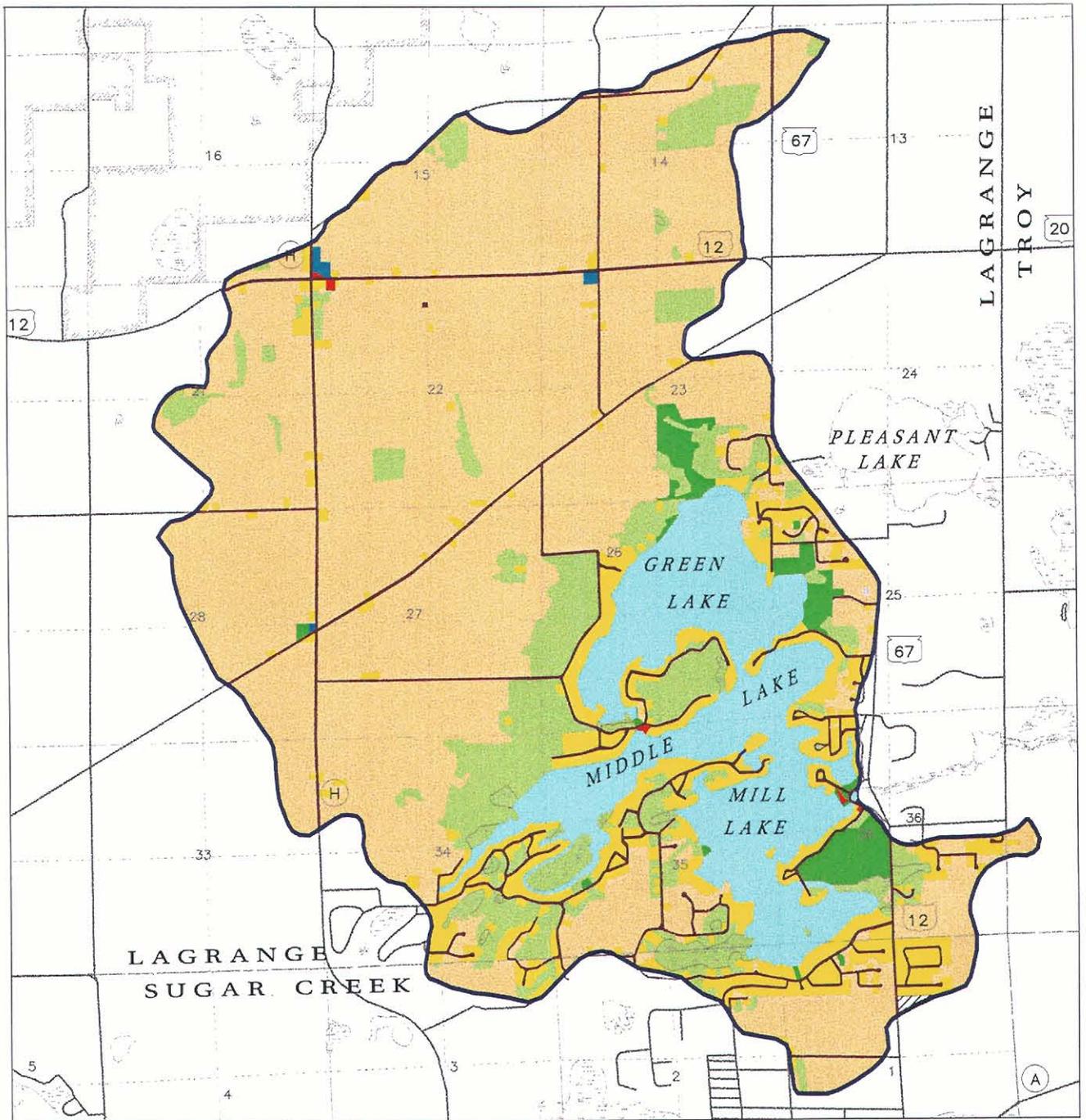


GRAPHIC SCALE

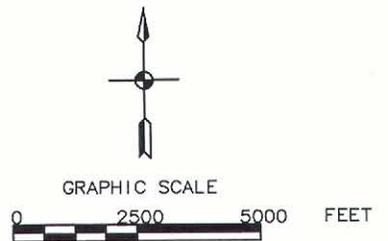
0 900 1800 FEET

Map 3

GENERALIZED LAND USE WITHIN THE TOTAL TRIBUTARY
DRAINAGE AREA TO THE LAUDERDALE LAKES: 1995



- | | |
|---|--|
| Single-family residential | Recreation |
| Multi-family residential | Surface water |
| Commercial | Wetlands and woodlands |
| Industrial | Agricultural, unused, and other open lands |
| Transportation, communications, and utilities | Extractive and landfill |
| Government and institutional | |



Source: SEWRPC.

Table 2

**EXISTING AND RECOMMENDED LAND USE
WITHIN THE DRAINAGE AREA TRIBUTARY
TO THE LAUDERDALE LAKES**

Land Use Categories	1995	
	Acres	Percent of Drainage Area
Urban		
Residential.....	610	9.8
Commercial	8	0.1
Governmental	7	0.1
Transportation and Utilities	253	4.1
Recreational.....	121	2.0
Subtotal	999	16.1
Rural		
Agricultural.....	3,465	55.7
Wetlands.....	100	1.6
Woodlands	653	10.5
Water	795	12.8
Other Open Land	205	3.3
Subtotal	5,218	83.9
Total	6,217	100.0

Source: SEWRPC.

feet and 17.1 feet; and 6.2 feet and 13.1 feet, respectively. Average Secchi-disk transparency values in the three lakes were 13.2 feet; 11.4 feet; and 9.1 feet, respectively. These transparency conditions resulted in a Wisconsin Trophic State Index (WTSI) value of about 40 for Green Lake, of about 42 for Middle Lake, and of about 45 for Mill Lake. Figure 4 suggests that the water quality in each of the three individual Lake systems has remained relatively stable over the approximately 20-year period since 1980. All three values indicate that the Lauderdale Lakes are mesotrophic waterbodies.⁴ Mesotrophic lakes are moderately fertile lakes that support abundant aquatic plant growth and may support productive fisheries. Nuisance growths of algae and plants are usually not exhibited by mesotrophic lakes. Many of the cleaner lakes in southeastern Wisconsin are classified as mesotrophic.⁵

³U.S. Geological Survey Open-File Reports No. 95-190 through 00-89, Water-Quality and Lake-Stage Data for Wisconsin Lakes, Water Years 1994 through 1999, published annually from 1995 through 2000.

⁴R.A. Lillie, S. Graham, and P. Rasmussen, "Trophic State Index Equations and Regional Predictive Equations for Wisconsin Lakes," Research and Management Findings, Wisconsin Department of Natural Resources Publication No. PUBL-RS-735 93, May 1993.

⁵See R.A. Lillie, and J.W. Mason, Limnological Characteristics of Wisconsin Lakes, Wisconsin Department of Natural Resources Technical Bulletin No. 138, 1983; also see SEWRPC Memorandum Report No. 93, A Regional Water Quality Management Plan for Southeastern Wisconsin: An Update and Status Report, March 1995.

In addition to the public recreational boating access sites, private boating access is provided at five additional sites. These sites include the Singing Hills Camp owned by the Racine County Girl Scout Council and the Lutherdale Lutheran Bible Camp on Green Lake; Lauderdale Landings on Middle Lake; and, the Sterlingworth Inn and the Lauderdale Lakes Marina on Mill Lake.

Other recreational facilities include a municipal golf course on Mill Lake, currently owned and operated by the Lake Management District.

WATER QUALITY

Data collected during the period from November 1993 through October 1999 by the U.S. Geological Survey were used to determine water quality conditions in the Lauderdale Lakes.³ These data are summarized in Tables 3 through 5 and are shown in Figures 1 through 3. The sampling locations used for data collection are shown on Map 2. Based upon these measurements, Green Lake and Middle Lake have a very good water quality rating, while Mill Lake has a very good to fair water quality rating.

During the period of record, Green Lake, Middle Lake and Mill Lake had Secchi-disk transparency measurements that ranged between 8.5 feet and 19.7 feet; 7.2

Table 3

GREEN LAKE WATER QUALITY DATA: 1993-1999

Water Quality Parameter	November 10, 1993		April 18, 1994		May 10, 1994		May 25, 1994		June 07, 1994		June 24, 1994		July 05, 1994		July 22, 1994	
	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth of Sample (feet)	1.5	56	1.5	56	1.6	56	1.5	54	1.5	56	1.5	55	1.5	55	1.5	55
Specific Conductance ($\mu\text{S}/\text{cm}$).....	434	451	471	471	472	472	481	479	470	486	450	496	435	499	433	511
pH (standard units)	8.2	8.1	8.2	8.2	8.3	8.1	8.3	7.8	8.4	7.6	8.3	7.5	8.3	7.4	8.4	7.4
Water Temperature ($^{\circ}\text{C}$)	7.0	7.0	9.0	7.5	13.0	9.0	20.5	9.5	22.0	9.5	24.0	9.5	24.5	9.5	25.0	9.5
Color (platinum-cobalt scale)	10	10	5	5	--	--	--	--	--	--	--	--	--	--	--	--
Turbidity (NTU)	1.4	1.5	0.5	0.6	--	--	--	--	--	--	--	--	--	--	--	--
Secchi Disk (feet)	3.6	3.6	5.4	5.4	6.3	6.3	5.6	5.6	3.2	3.2	2.0	2.0	2.0	2.0	3.6	3.6
Dissolved Oxygen	10.0	9.6	11.9	12.7	10.4	8.3	9.8	--	9.9	0.6	10.1	0.6	9.0	0.0	8.3	0.4
Hardness, as CaCO_3	220	230	240	240	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	37	38	40	40	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	32	33	33	33	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	6.1	6.2	6.2	6.2	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	2	2	2	2	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, as CaCO_3	190	190	200	200	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	17	17	16	17	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	31	31	30	31	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Solids	250	246	278	274	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate/Nitrate Nitrogen	0.11	0.12	0.28	0.29	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	0.31	0.31	0.29	0.29	--	--	--	--	--	--	--	--	--	--	--	--
Total Nitrogen	0.90	0.92	0.98	0.98	--	--	--	--	--	--	--	--	--	--	--	--
Total Phosphorus	0.012	0.013	0.005	0.008	0.004	<0.02	0.011	0.013	0.008	<0.02	0.01	0.03	0.01	0.03	0.007	0.05
Orthophosphorus	0.004	0.005	<0.002	<0.002	--	--	--	--	--	--	--	--	--	--	--	--
Iron ($\mu\text{g}/\text{l}$)	<50	<50	<50	<50	--	--	--	--	--	--	--	--	--	--	--	--
Manganese ($\mu\text{g}/\text{l}$)	<40	<40	<40	<40	--	--	--	--	--	--	--	--	--	--	--	--
Chlorophyll- <i>a</i> ($\mu\text{g}/\text{l}$)	5.6	--	0.8	--	1.2	--	1.7	--	3.3	--	6.9	--	4.4	--	2.4	--

Table 3 (continued)

Water Quality Parameter	August 02, 1994		August 22, 1994		August 31, 1994		September 16, 1994		September 27, 1994		October 12, 1994		November 02, 1994	
	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth of Sample (feet)	1.5	56	1.5	56	1.5	55	1.5	56	1.5	57	1.5	56	1.5	56
Specific Conductance ($\mu\text{S}/\text{cm}$).....	423	531	408	544	416	558	403	548	424	571	447	552	409	548
pH (standard units)	8.5	7.3	8.4	7.3	8.6	7.3	8.5	7.2	8.4	7.1	8.2	7.4	8.5	7.2
Water Temperature ($^{\circ}\text{C}$)	25.0	9.5	23.0	9.5	23.5	9.5	20.0	9.5	15.5	9.5	11.5	10.5	23.0	9.5
Color (platinum-cobalt scale)	--	--	--	--	--	--	--	--	--	--	5	10	--	--
Turbidity (NTU)	--	--	--	--	--	--	--	--	--	--	0.7	15	--	--
Secchi Disk (feet)	3.0	3.0	3.6	3.6	3.5	3.5	4.8	4.8	4.0	4.0	3.9	3.9	3.9	3.9
Dissolved Oxygen	9.5	0.0	8.3	0.0	9.2	0.0	7.6	0.0	9.2	0.0	7.7	0.0	9.6	0.0
Hardness, as CaCO_3	--	--	--	--	--	--	--	--	--	--	220	270	--	--
Calcium	--	--	--	--	--	--	--	--	--	--	34	50	--	--
Magnesium	--	--	--	--	--	--	--	--	--	--	34	35	--	--
Sodium	--	--	--	--	--	--	--	--	--	--	6.4	6.2	--	--
Potassium	--	--	--	--	--	--	--	--	--	--	2	2	--	--
Alkalinity, as CaCO_3	--	--	--	--	--	--	--	--	--	--	180	250	--	--
Chloride	--	--	--	--	--	--	--	--	--	--	24	21	--	--
Sulfate	--	--	--	--	--	--	--	--	--	--	31	13	--	--
Dissolved Solids	--	--	--	--	--	--	--	--	--	--	254	300	--	--
Nitrate/Nitrate Nitrogen	--	--	--	--	--	--	--	--	--	--	0.03	<0.01	--	--
Ammonia Nitrogen	--	--	--	--	--	--	--	--	--	--	0.31	0.28	--	--
Total Nitrogen	--	--	--	--	--	--	--	--	--	--	0.73	3.7	--	--
Total Phosphorus	0.006	0.053	0.008	0.055	0.009	0.044	0.01	0.041	0.014	--	0.012	0.028	0.007	0.051
Orthophosphorus	--	--	--	--	--	--	--	--	--	--	<0.002	<0.002	--	--
Iron ($\mu\text{g}/\text{l}$)	--	--	--	--	--	--	--	--	--	--	<10	30	--	--
Manganese ($\mu\text{g}/\text{l}$)	--	--	--	--	--	--	--	--	--	--	0.8	250	--	--
Chlorophyll- <i>a</i> ($\mu\text{g}/\text{l}$)	3.5	--	2.7	--	2.2	--	2.3	--	6.0	--	2.7	--	2.0	--

Source: U.S. Geological Survey and SEWRPC.

Table 4

MIDDLE LAKE SPRING OVERTURN WATER QUALITY: 1993-1999

Water Quality Parameter	November 10, 1993		April 18, 1994		May 10, 1994		May 25, 1994		June 07, 1994		June 24, 1994		July 05, 1994		July 22, 1994	
	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth of Sample (feet)	1.5	47	1.5	47	1.6	48	1.5	45	1.5	48	1.5	47	1.5	47	1.5	46
Specific Conductance ($\mu\text{S}/\text{cm}$)	493	510	548	564	532	550	526	552	515	557	486	570	475	572	472	573
pH (standard units)	8.2	8.2	8.2	8.0	8.3	7.8	8.2	7.6	8.2	7.6	8.3	7.4	8.2	7.3	8.4	7.4
Water Temperature ($^{\circ}\text{C}$)	6.0	6.0	10.5	8.0	14.0	9.0	22.0	9.5	23.0	9.5	24.0	9.5	25.0	9.5	25.5	9.5
Color (platinum-cobalt scale)	10	10	5	5	--	--	--	--	--	--	--	--	--	--	--	--
Turbidity (NTU)	1.2	0.60	0.70	0.80	--	--	--	--	--	--	--	--	--	--	--	--
Secchi Disk (feet)	4.4	4.4	3.4	3.4	6.4	6.4	4.0	4.0	2.6	2.6	2.0	2.0	2.1	2.1	2.4	2.4
Dissolved Oxygen	10.5	10.1	11.7	11.1	9.9	5.6	9.2	0.5	9.4	0.8	9.2	0.7	9.0	0.7	8.1	0.0
Hardness, as CaCO_3	260	260	280	280	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	48	48	55	57	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	35	35	34	34	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	6.7	6.8	6.5	6.5	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	2	2	2	2	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, as CaCO_3	220	220	230	240	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	19	19	18	18	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	34	34	35	35	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Solids	288	288	326	332	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate/Nitrate Nitrogen	0.53	0.55	1.4	1.4	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	0.33	0.34	0.16	0.24	--	--	--	--	--	--	--	--	--	--	--	--
Total Nitrogen	1.3	1.4	2.0	2.0	--	--	--	--	--	--	--	--	--	--	--	--
Total Phosphorus	0.01	0.009	0.006	0.008	0.011	0.03	0.016	0.014	0.009	0.04	0.01	0.04	0.01	0.05	0.01	0.041
Orthophosphorus	0.003	0.002	<0.002	<0.002	--	--	--	--	--	--	--	--	--	--	--	--
Iron ($\mu\text{g}/\text{l}$)	<50	<50	<50	<50	--	--	--	--	--	--	--	--	--	--	--	--
Manganese ($\mu\text{g}/\text{l}$)	<40	<40	<40	<40	--	--	--	--	--	--	--	--	--	--	--	--
Chlorophyll- <i>a</i> ($\mu\text{g}/\text{l}$)	2.0	--	2.3	--	1.1	--	1.6	--	3.3	--	6.2	--	3.6	--	3.5	--

Table 4 (continued)

Water Quality Parameter	July 22, 1994		August 02, 1994		August 22, 1994		August 31, 1994		October 12, 1994		November 02, 1994	
	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth of Sample (feet)	1.5	46	1.5	46	1.5	47	1.5	46	1.5	47	1.5	46
Specific Conductance ($\mu\text{S}/\text{cm}$).....	472	573	467	592	447	595	446	605	483	649	505	503
pH (standard units)	8.4	7.4	8.4	7.3	8.5	7.2	8.5	7.2	8.3	7.1	8.2	8.2
Water Temperature ($^{\circ}\text{C}$)	25.5	9.5	25.0	9.5	23.0	10.0	23.0	10.0	14.5	10.0	10.5	10.5
Color (platinum-cobalt scale)	--	--	--	--	--	--	--	--	--	--	10	5
Turbidity (NTU)	--	--	--	--	--	--	--	--	--	--	0.70	1.00
Secchi Disk (feet).....	2.4	2.4	2.8	2.8	2.3	2.3	2.9	2.9	4.5	4.5	4.3	4.3
Dissolved Oxygen	8.1	0.0	8.6	0.0	9.5	0.0	8.3	0.0	8.5	0.0	8.3	8.8
Hardness, as CaCO_3	--	--	--	--	--	--	--	--	--	--	260	260
Calcium	--	--	--	--	--	--	--	--	--	--	44	43
Magnesium	--	--	--	--	--	--	--	--	--	--	37	36
Sodium	--	--	--	--	--	--	--	--	--	--	7.0	6.9
Potassium	--	--	--	--	--	--	--	--	--	--	2	2
Alkalinity, as CaCO_3	--	--	--	--	--	--	--	--	--	--	210	210
Chloride	--	--	--	--	--	--	--	--	--	--	20	20
Sulfate	--	--	--	--	--	--	--	--	--	--	34	33
Dissolved Solids	--	--	--	--	--	--	--	--	--	--	280	278
Nitrate/Nitrate Nitrogen	--	--	--	--	--	--	--	--	--	--	0.28	0.25
Ammonia Nitrogen	--	--	--	--	--	--	--	--	--	--	0.46	0.49
Total Nitrogen	--	--	--	--	--	--	--	--	--	--	1.3	1.3
Total Phosphorus	0.01	0.041	0.008	0.048	0.009	0.044	0.009	0.045	0.008	0.087	0.011	0.012
Orthophosphorus	--	--	--	--	--	--	--	--	--	--	<0.002	<0.002
Iron ($\mu\text{g}/\text{l}$)	--	--	--	--	--	--	--	--	--	--	<10	<10
Manganese ($\mu\text{g}/\text{l}$)	--	--	--	--	--	--	--	--	--	--	0.6	<0.4
Chlorophyll- <i>a</i> ($\mu\text{g}/\text{l}$)	3.5	--	3.6	--	3.1	--	3.3	--	3.0	--	1.8	--

Source: U.S. Geological Survey and SEWRPC.

Table 5

MILL LAKE WATER QUALITY DATA: 1993-1994

Water Quality Parameter	November 10, 1993		April 18, 1994		May 10, 1994		May 25, 1994		June 07, 1994		June 24, 1994		July 05, 1994		July 22, 1994	
	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth of Sample (feet)	1.5	51	1.5	50	1.5	50	1.5	51	1.5	49	1.5	47	1.5	49	1.5	50
Specific Conductance ($\mu\text{S}/\text{cm}$)....	475	489	512	599	512	545	458	559	447	565	503	538	494	547	474	562
pH (standard units)	8.3	8.3	8.3	7.5	8.2	7.5	8.2	7.3	8.3	7.3	8.3	7.4	8.2	7.4	8.1	7.3
Water Temperature ($^{\circ}\text{C}$)	5.0	5.0	10.5	5.0	15.0	7.5	24.5	8.5	25.5	8.5	22.0	8.0	23.0	8.0	24.0	8.0
Color (platinum-cobalt scale)	10	10	5	10	--	--	--	--	--	--	--	--	--	--	--	--
Turbidity (NTU)	0.8	0.9	0.7	2.1	--	--	--	--	--	--	--	--	--	--	--	--
Secchi Disk (feet)	4.0	4.0	2.6	2.6	5.1	5.1	2.1	2.1	1.7	1.7	2.9	2.9	2.6	2.6	1.6	1.6
Dissolved Oxygen	11.1	11.3	11.8	1.8	9.9	0.8	9.2	0.0	8.1	0.0	--	--	9.5	0.7	8.5	0.6
Hardness, as CaCO_3	250	250	250	300	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	44	44	47	56	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	34	34	32	38	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	7.5	7.5	7.3	8.5	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	2	2	2	2	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, as CaCO_3	210	210	220	260	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	20	20	19	22	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	31	31	30	33	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Solids	276	272	306	346	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate/Nitrate Nitrogen	0.22	0.22	0.62	0.02	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	0.28	0.28	0.09	1.1	--	--	--	--	--	--	--	--	--	--	--	--
Total Nitrogen	1.0	1.0	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Phosphorus	0.011	0.01	0.009	0.046	0.006	0.09	0.016	0.139	0.013	0.078	0.013	0.043	0.012	0.06	0.014	0.10
Orthophosphorus	0.003	0.002	<0.002	<0.002	--	--	--	--	--	--	--	--	--	--	--	--
Iron ($\mu\text{g}/\text{l}$)	<50	<50	<50	<50	--	--	--	--	--	--	--	--	--	--	--	--
Manganese ($\mu\text{g}/\text{l}$)	<40	<40	<40	210	--	--	--	--	--	--	--	--	--	--	--	--
Chlorophyll- <i>a</i> ($\mu\text{g}/\text{l}$)	1.9	--	4.6	--	1.2	--	7.1	--	6.3	--	2.3	--	3.4	--	5.6	--

Table 5 (continued)

Water Quality Parameter	August 02, 1994		August 22, 1994		August 31, 1994		September 16, 1994		September 27, 1994		October 12, 1994		November 02, 1994	
	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth of Sample (feet)	1.5	49	1.5	51	1.5	49	1.5	44	1.5	51	1.5	49	1.5	50
Specific Conductance (μ S/cm)....	437	570	423	582	422	588	436	588	424	611	448	630	473	475
pH (standard units)	8.3	7.3	8.5	7.2	8.6	7.2	8.4	7.3	8.5	7.1	8.4	7.0	8.2	8.2
Water Temperature ($^{\circ}$ C)	25.0	8.5	23.0	8.5	22.5	8.5	24.0	9.0	19.0	8.5	14.5	8.5	10.0	10.0
Color (platinum-cobalt scale)	--	--	--	--	--	--	--	--	--	--	--	--	10	10
Turbidity (NTU)	--	--	--	--	--	--	--	--	--	--	--	--	1.1	1.4
Secchi Disk (feet)	1.8	1.8	1.8	1.8	2.0	2.0	2.0	2.0	2.4	2.4	3.6	3.6	3.7	3.7
Dissolved Oxygen	9.1	0.7	9.0	0.0	7.8	0.0	9.1	0.0	7.2	0.0	8.4	0.0	8.5	8.1
Hardness, as CaCO ₃	--	--	--	--	--	--	--	--	--	--	--	--	240	240
Calcium	--	--	--	--	--	--	--	--	--	--	--	--	37	37
Magnesium	--	--	--	--	--	--	--	--	--	--	--	--	36	36
Sodium	--	--	--	--	--	--	--	--	--	--	--	--	7.6	7.5
Potassium	--	--	--	--	--	--	--	--	--	--	--	--	2	2
Alkalinity, as CaCO ₃	--	--	--	--	--	--	--	--	--	--	--	--	190	190
Chloride	--	--	--	--	--	--	--	--	--	--	--	--	20	20
Sulfate	--	--	--	--	--	--	--	--	--	--	--	--	31	32
Dissolved Solids	--	--	--	--	--	--	--	--	--	--	--	--	266	266
Nitrate/Nitrate Nitrogen	--	--	--	--	--	--	--	--	--	--	--	--	0.06	0.05
Ammonia Nitrogen	--	--	--	--	--	--	--	--	--	--	--	--	0.42	0.38
Total Nitrogen	--	--	--	--	--	--	--	--	--	--	--	--	0.96	0.95
Total Phosphorus	0.011	0.058	0.014	0.043	0.013	0.03	0.013	0.031	0.014	0.046	0.011	0.053	0.012	0.012
Orthophosphorus	--	--	--	--	--	--	--	--	--	--	--	--	<0.002	<0.002
Iron (μ g/l)	--	--	--	--	--	--	--	--	--	--	--	--	<10	<10
Manganese (μ g/l)	--	--	--	--	--	--	--	--	--	--	--	--	1	<0.4
Chlorophyll- <i>a</i> (μ g/l)	8.0	--	7.7	--	7.7	--	4.2	--	6.1	--	5.3	--	2.7	--

Source: U.S. Geological Survey and SEWRPC.

Figure 1

DISSOLVED OXYGEN, TEMPERATURE, pH, AND SPECIFIC CONDUCTANCE PROFILES FOR GREEN LAKE: 1993-1999

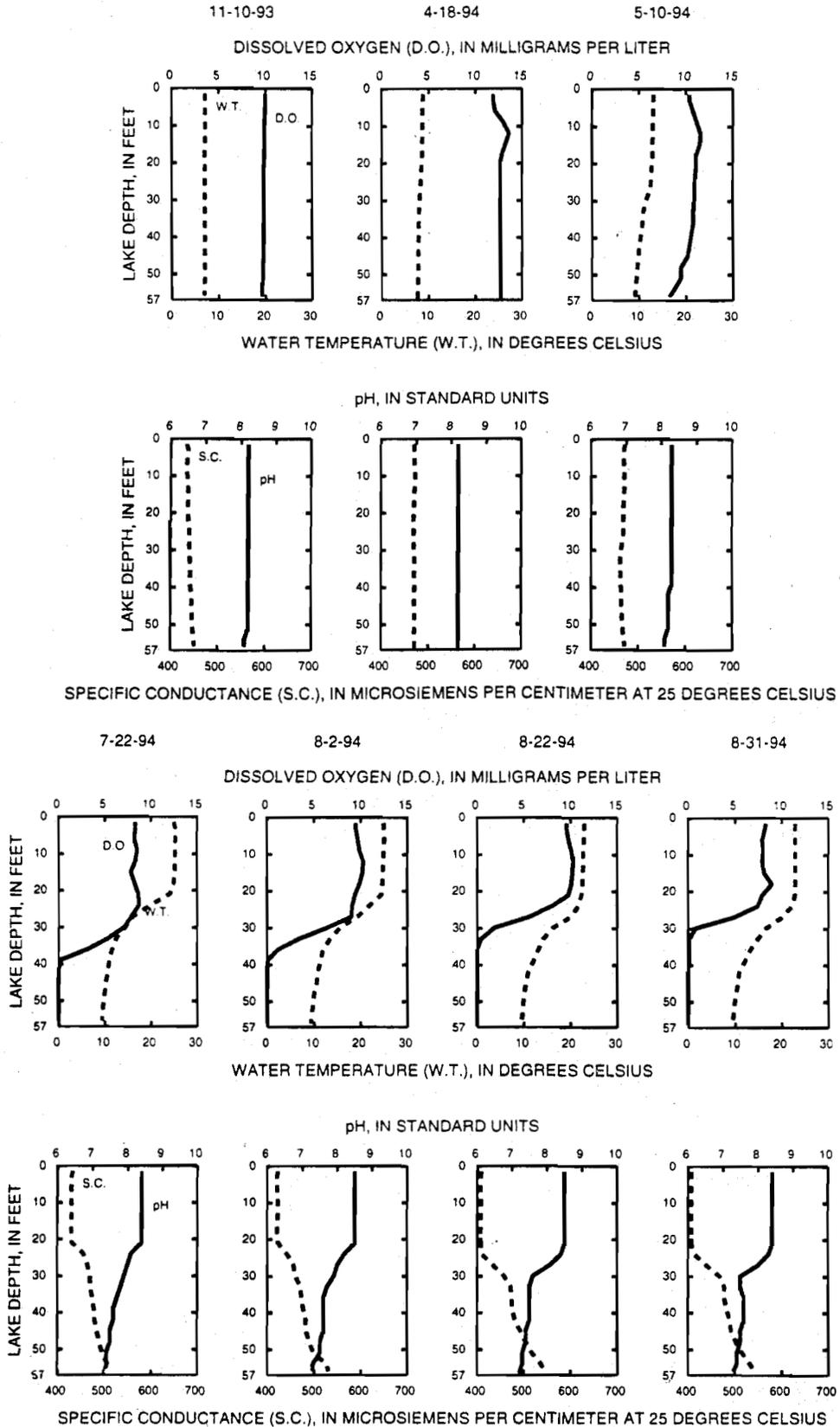
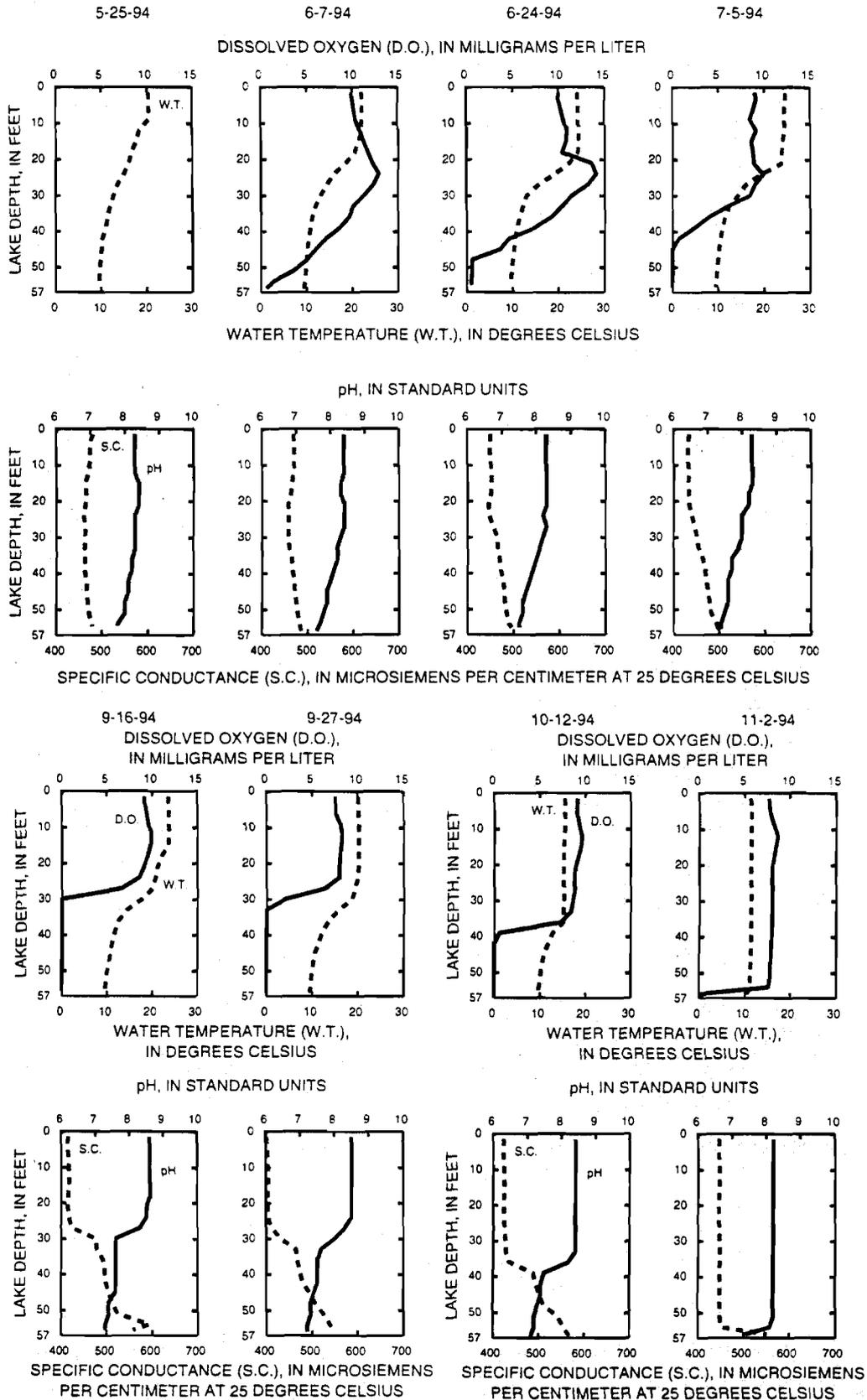


Figure 1 (continued)



Source: U.S. Geological Survey.

Figure 2

DISSOLVED OXYGEN, TEMPERATURE, pH, AND SPECIFIC CONDUCTANCE PROFILES FOR MIDDLE LAKE: 1993-1999

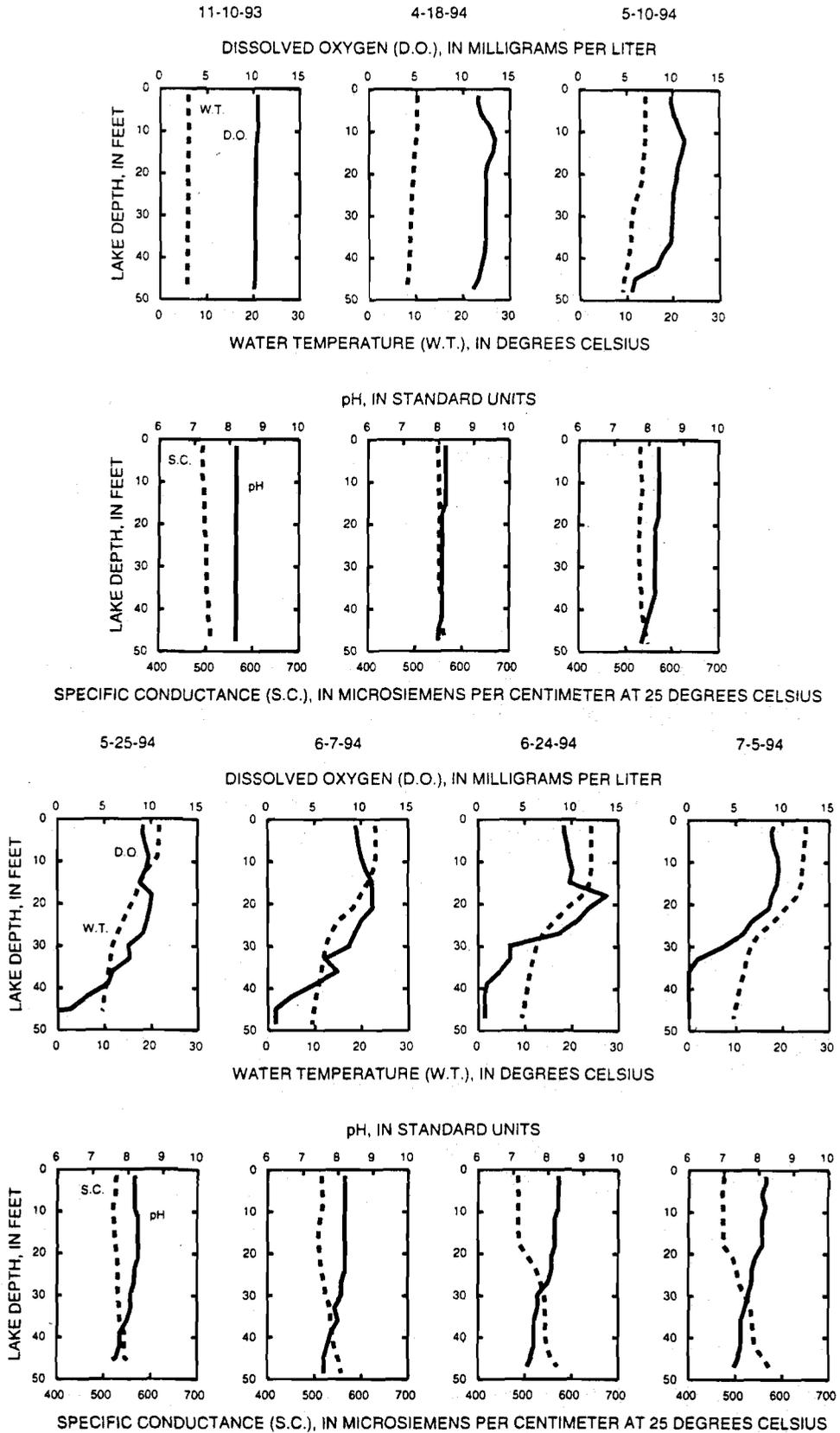


Figure 2 (continued)

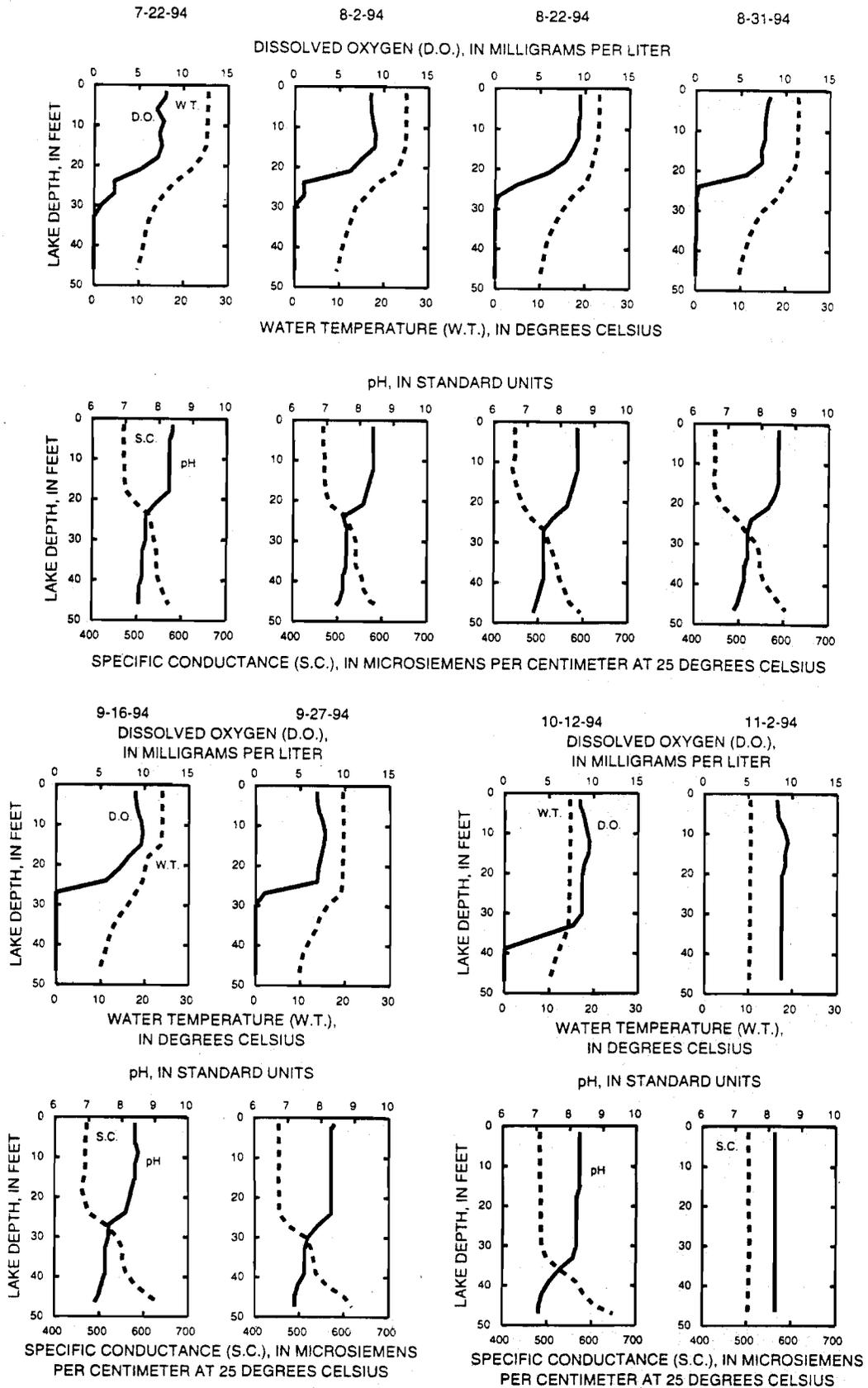


Figure 2 (continued)

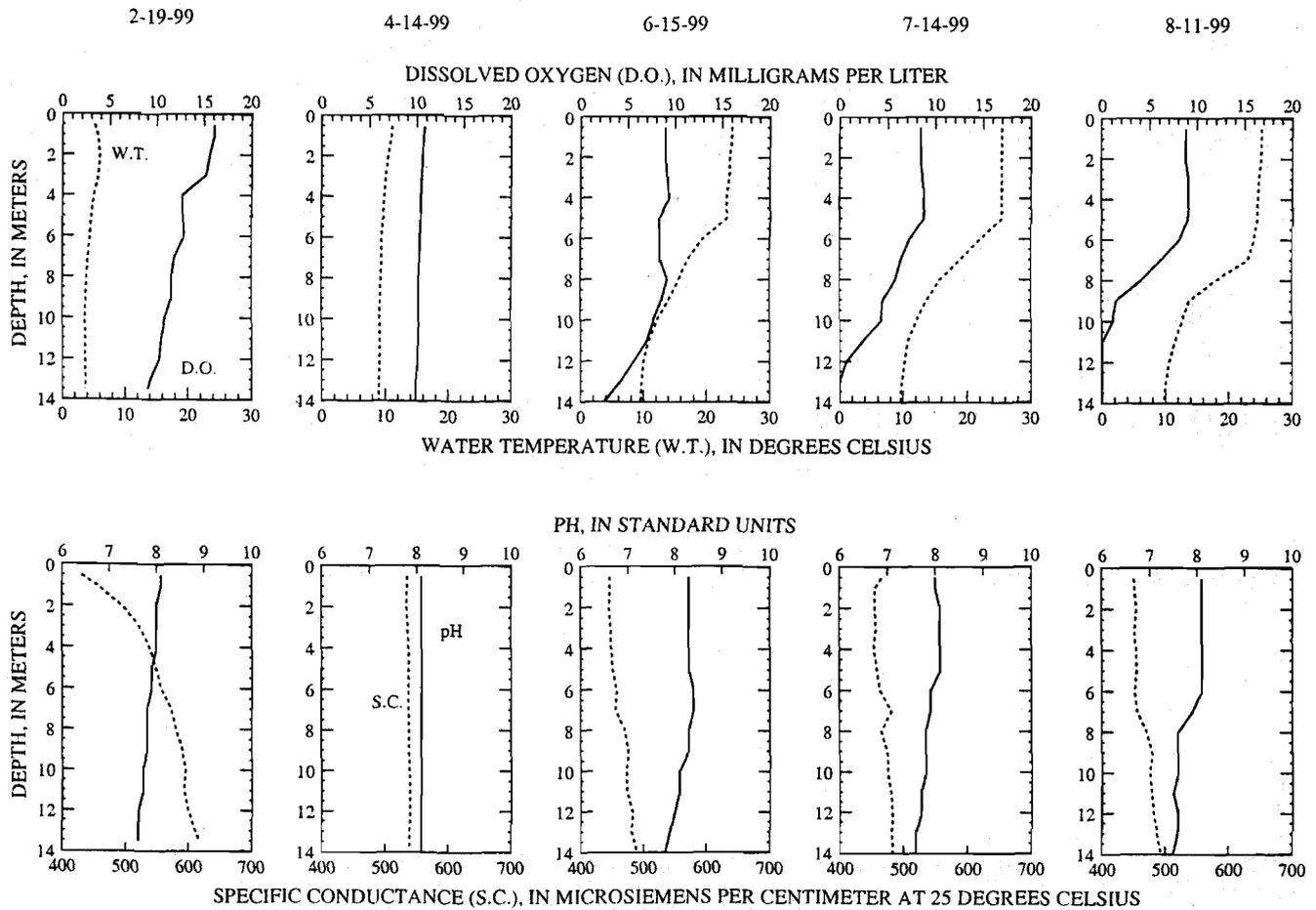


Figure 3

DISSOLVED OXYGEN, TEMPERATURE, pH, AND SPECIFIC CONDUCTANCE PROFILES FOR MILL LAKE: 1993-1999

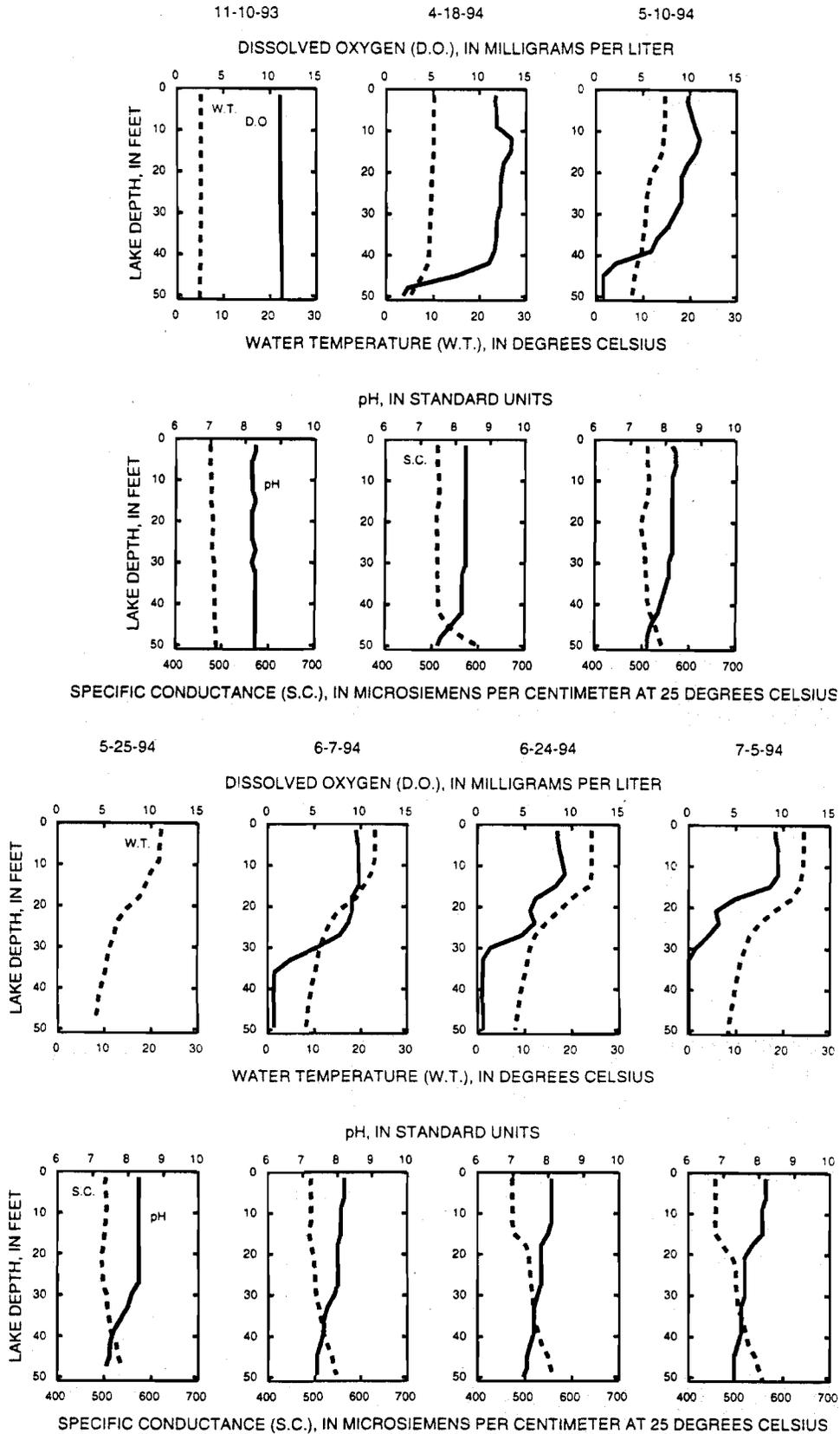


Figure 3 (continued)

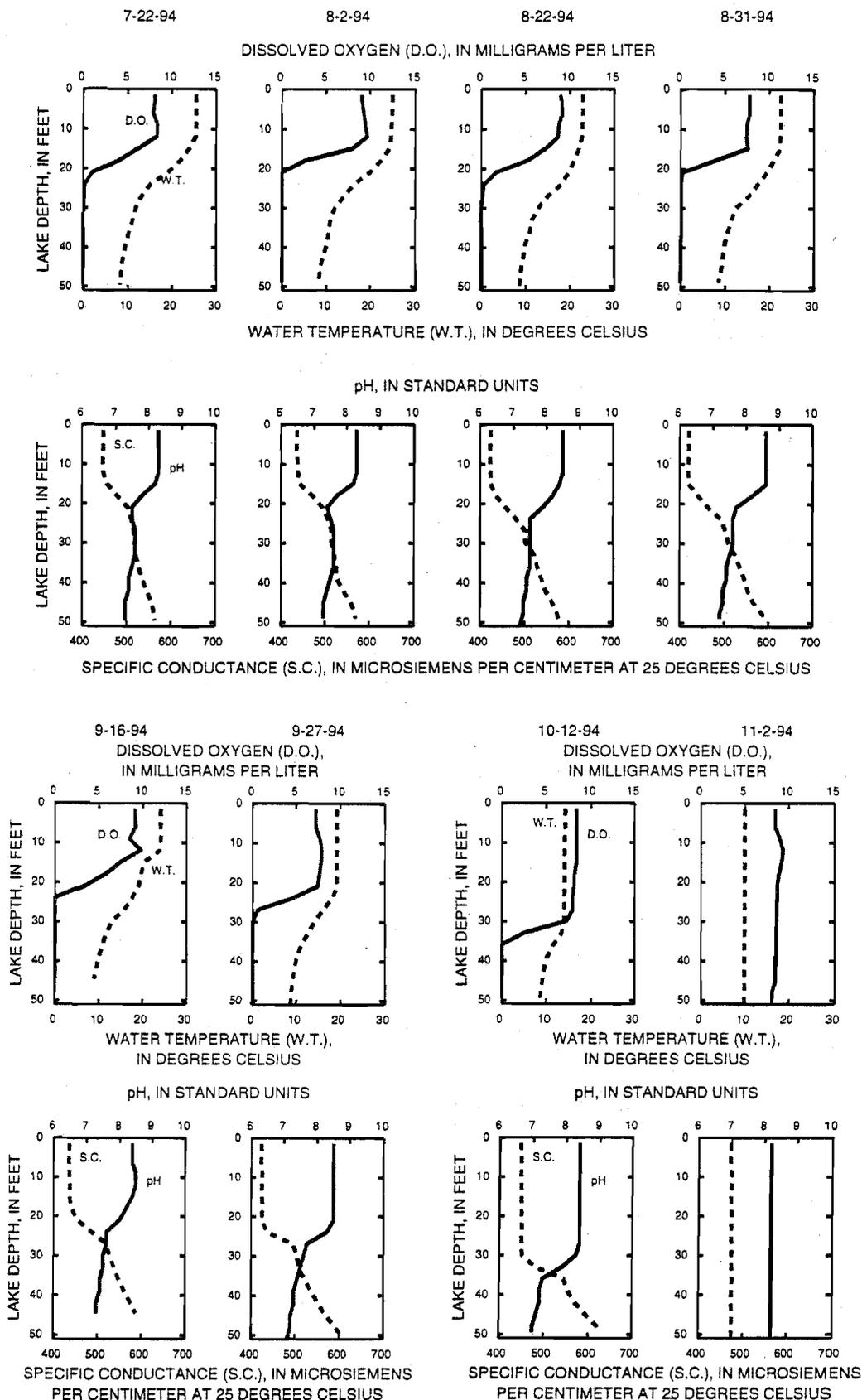
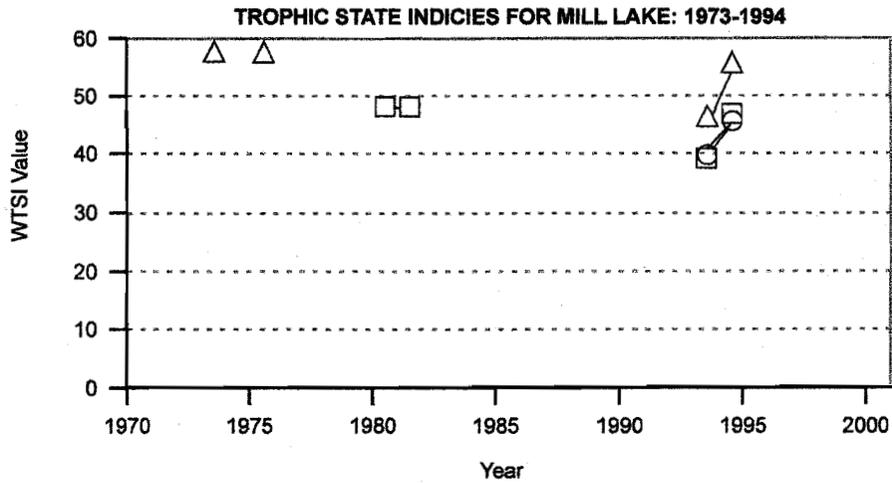
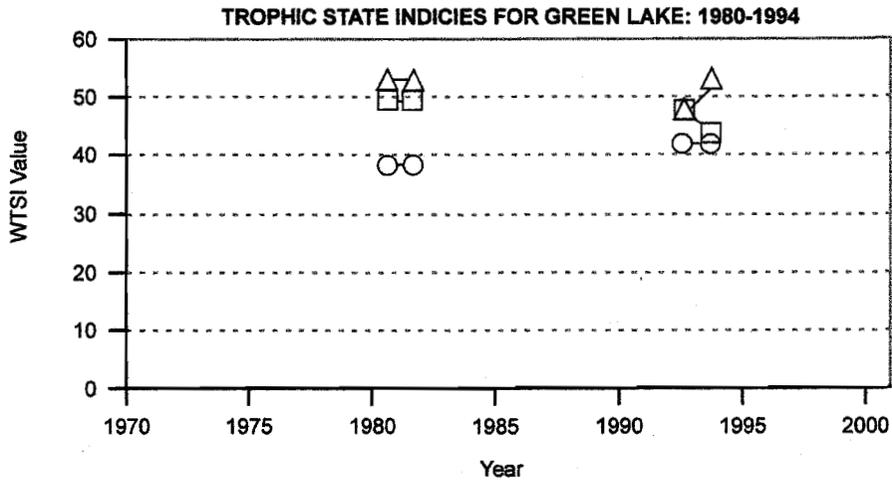
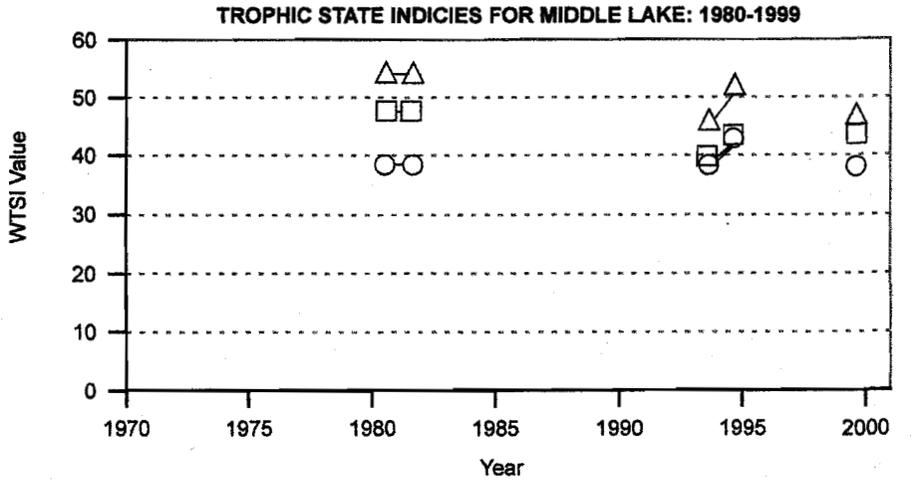


Figure 4

TROPHIC STATE INDICES FOR LAUDERDALE LAKES



○ SECCHI DISK □ TOTAL CHLOROPHYL-a △ TOTAL PHOSPHORUS

Source: U.S. Geological Survey and SEWRPC.

The average surface water total phosphorus values in Green Lake for the period of record ranged from approximately four micrograms per liter ($\mu\text{g/l}$) to approximately 55 $\mu\text{g/l}$, with an annual average chlorophyll-*a* concentration of 3.18 $\mu\text{g/l}$, as shown in Table 3. The average surface water total phosphorus values in Middle Lake for the period of record ranged from approximately six $\mu\text{g/l}$ to approximately 48 $\mu\text{g/l}$, with an annual average chlorophyll-*a* concentration of 2.95 $\mu\text{g/l}$, as shown in Table 4. In Mill Lake, the average surface water total phosphorus values for the period of record ranged from approximately six $\mu\text{g/l}$ to approximately 100 $\mu\text{g/l}$, with an annual average chlorophyll-*a* concentration of 4.94 $\mu\text{g/l}$, as shown in Table 5. In all three Lakes, the spring surface water total phosphorus concentrations during the period from 1993 through 1999 averaged about 21 $\mu\text{g/l}$, about 26 $\mu\text{g/l}$, and about 30 $\mu\text{g/l}$, for Green Lake, Middle Lake, and Mill Lake, respectively. These values are within the standard of 20 $\mu\text{g/l}$ recommended by the Regional Planning Commission as the value below which few water quality problems are likely to occur. Neither the observed total phosphorus nor chlorophyll-*a* concentrations were indicative of water quality problems in any of the three Lakes.

POLLUTANT LOADINGS

Pollutant loads to a lake are generated by various natural processes and human activities that take place in the drainage area tributary to a lake. These loads are transported to the lake through the atmosphere, across the land surface enter the lake as direct runoff and, indirectly, as groundwater inflows, including drainage from onsite wastewater treatment systems. Pollutants transported by streams enter a lake as surface water inflows. In drained lakes, like the Lauderdale Lakes, pollutants loadings transported by inflowing streams and across the land surface directly tributary to a lake, in the absence of identifiable or point source discharges from industries or wastewater treatment facilities, comprise the principal routes by which contaminants enter a waterbody.⁶ For this reason, the discussion that follows is based upon nonpoint source pollutant loadings or pollutant loadings transported to the Lauderdale Lakes in surface runoff.

The nonpoint source pollutant loads to the Lauderdale Lakes were estimated on the basis of land use inventory data for the drainage area tributary to the Lauderdale Lakes, and unit load coefficients determined for specific contaminants in the Southeastern Wisconsin Region. Of particular concern to wetland and aquatic plant growth in the Lakes is the mass of phosphorus, a plant nutrient, entering the waterbody. Based upon existing 1995 land use conditions, the annual phosphorus load entering the Lauderdale Lakes was calculated to be approximately 590 pounds of phosphorus,⁷ as shown in Table 6.

To validate the estimated phosphorus load to the Lauderdale Lakes, Commission staff applied the estimated phosphorus load of 590 pounds in the Vollenweider-type OECD phosphorus budget model to estimate an in-lake total phosphorus concentration. This calculation resulted in an estimated annual average phosphorus concentration of 19 $\mu\text{g/l}$. This concentration corresponds well to the observed range in in-lake total phosphorus concentrations reported from the Lakes of between 12 $\mu\text{g/l}$ and 22 $\mu\text{g/l}$ during the period from 1993 through 1999. This agreement would suggest that the estimated phosphorus load is a reasonable representation of the loads entering the Lauderdale Lakes, and that other pollution sources, including internal, atmospheric, groundwater, and onsite sewage disposal system sources, are relatively small compared to the loading from external sources.

Table 6 also shows the relative contributions of the various land uses within the drainage area tributary to the Lauderdale Lakes to other pollutant loadings, including sediment and selected heavy metals indicative of urban areas. These data indicate that, based on 1995 land use conditions in the drainage area tributary to the Lauderdale

⁶S.-O. Ryding and W. Rast, *The Control of Eutrophication in Lakes and Reservoirs, Unesco Man and the Biosphere Series Vol. 1, 1989.*

⁷Wisconsin Department of Natural Resources Report No. PUBL-WR-363 96 REV, Wisconsin Lake Model Spreadsheet, Version 2.00, User's Manual, June 1994.

Table 6

ESTIMATED ANNUAL POLLUTANT LOADINGS TO THE LAUDERDALE LAKES BY LAND USE CATEGORY: 1995

Land Use Category	Pollutant Loads			
	Sediment (tons)	Phosphorus (pounds)	Copper (pounds)	Zinc (pounds)
Urban				
Residential ^a	6.0	43.0	0.0	6.1
Commercial.....	3.1	1.9	1.8	11.9
Governmental.....	1.8	1.9	0.5	5.6
Transportation.....	1.2	90.8	0.0	0.0
Recreational.....	1.5	10.2	0.0	0.0
Subtotal	13.6	132.0	2.3	23.6
Rural				
Agricultural.....	779.6	307.9	--	--
Wetlands.....	0.2	8.9	--	--
Woodlands.....	1.2	29.1	--	--
Water.....	79.0	75.0	--	--
Other Open Lands.....	1.0	16.9	--	--
Subtotal	861.0	453.6	--	--
Total	874.6	585.6	2.3	23.6

^aIncludes the contribution from onsite sewage disposal systems. The contribution from onsite sewage disposal systems, based upon the per capita phosphorus contribution contained within wastewater estimated within the WILMS model, could range from approximately 16 pounds per year to as much as 130 pounds per year, depending upon soil type, system condition, and system locations. For purposes of this analysis, 16 pounds per year were used as that value provided the loading that was best correlated to the measured in-lake phosphorus concentration.

Source: SEWRPC.

Lakes, approximately 875 tons of sediment, two pounds of copper, and 24 pounds of zinc were contributed to the Lauderdale Lakes. Copper and zinc are used in this analysis as surrogates for metals and other pollutants that are contributed primarily from urban sources. Urban land uses also contribute about one-quarter of the total phosphorus load and about 2 percent of the sediment load to the Lakes. Agricultural land uses are estimated to contribute almost 90 percent of the sediment load and about one-half of the phosphorus load to the Lakes. The balance of the sediment and phosphorus load is contributed from other rural sources, such as woodlands and wetlands and direct deposition of materials onto the surface of the Lakes.

Under forecast year 2020 conditions, no significant change in the sediment, nutrient, and heavy metals loadings to the Lake are anticipated, although some additional urban development, largely in the form of residential development at overall low densities, is expected to occur within the total drainage area tributary to the Lauderdale Lakes.⁸ While this more intense development within the total drainage area tributary has the potential to increase the pollutant loadings to the Lakes, such loadings from the total tributary watershed could be minimized by the use of residential development clusters on smaller lots, preserving the majority of the open spaces, and by the use of sound residential housekeeping practices, effective stormwater management, and appropriate construction site erosion controls.

⁸SEWRPC Planning Report No. 45, op. cit.; SEWRPC Community Assistance Planning Report No. 168, op. cit.

SOIL TYPES AND CONDITIONS

Soil type, land slope, and land use and management practices are among the more important factors determining lake water quality conditions. Soil type, land slope, and vegetative cover are also important factors affecting the rate, amount, and quality of stormwater runoff. The soil texture and soil particle structures influence the permeability, infiltration rate, and erodibility of soils. Land slopes are also important determinants of stormwater runoff rates and of susceptibility to erosion.

The U.S. Natural Resources Conservation Service, under contract to the Southeastern Wisconsin Regional Planning Commission, completed a detailed soil survey of the Lauderdale Lakes area in 1966.⁹ Using the regional soil survey, an assessment was made of the hydrologic characteristics of the soils in the drainage area tributary to the Lauderdale Lakes. Soils within the tributary drainage area to the Lauderdale Lakes were categorized into four main hydrologic soil groups, as well as an “other” category, as indicated on Map 4. Approximately 84 percent of the of the tributary drainage area is covered by moderately drained soils, about 2 percent of the tributary drainage area by well drained soils, and 1 percent with undetermined soils, with the remaining 13 percent of the watershed being surface water.

The regional soil survey also contained interpretations of the suitability of soils for urban development with conventional onsite sewage disposal systems and with alternative onsite sewage disposal systems. At present, all residential lands in the drainage area tributary to the Lauderdale Lakes are served by private onsite sewage disposal systems. Those lands are covered by soils that are categorized as having varying suitability for onsite sewage disposal systems. The soil ratings for onsite sewage disposal systems, presented on Maps 5 and 6, reflect the requirements of Chapter Comm 83 of the *Wisconsin Administrative Code* governing onsite sewage disposal systems as it existed early in the year 2000. Much of the drainage area tributary to the Lauderdale Lakes is covered by moderately drained soils, as shown on Map 4. The suitability of these soils for conventional and alternative type onsite sewage disposal systems varies throughout the area. In some areas, the soils are suitable for residential development using onsite sewage treatment systems, as indicated on Maps 5 and 6. In other areas, such as the steeply sloping areas riparian to the Lakes indicated on Map 7, the suitability of soils within the shoreland zone for onsite sewage disposal using both conventional and alternative onsite sewage disposal systems is limited. As noted above, onsite sewage disposal systems have the potential to contribute a significant mass of phosphorus to the Lakes,¹⁰ effectively doubling the current urban phosphorus contribution. Thus, for these reasons, the Lauderdale Lakes Lake Management District has adopted an onsite sewage disposal system ordinance¹¹ that requires the regular inspection and maintenance of onsite sewage treatment systems within the District. This requirement is in addition to current Walworth County inspection requirements, and ensures that approximately one-quarter of all systems are inspected annually, as set forth in Appendix A. These actions have addressed a significant portion of the external phosphorus load to the Lakes.¹²

During 2000, the Wisconsin Legislature amended Chapter Comm 83 and adopted new rules governing onsite sewage disposal systems. These rules, which had an effective date of July 1, 2000, increased the number of types

⁹*SEWRPC Planning Report No. 8, Soils of Southeastern Wisconsin, June 1966.*

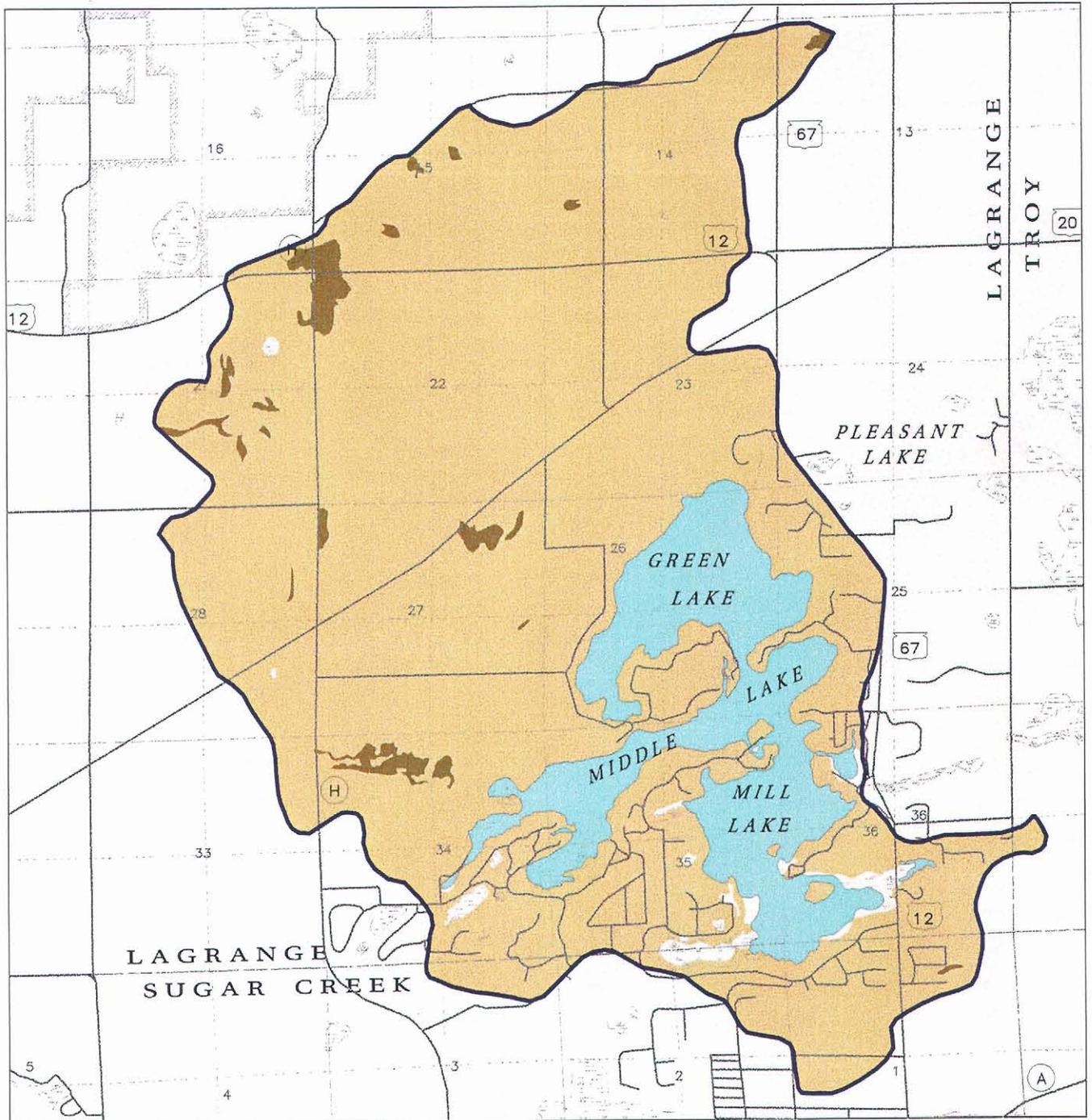
¹⁰*Swanson Environmental, Inc., Investigation of Septic Leachate Plumes Entering the Lauderdale Lakes, Walworth County, Wisconsin, August 1980.*

¹¹*R.A. Smith & Associates, Inc., and Applied Technologies, Inc., Final Report for the Lauderdale Lakes Area 1 Wastewater Feasibility Study for the Lauderdale Lakes Management District, March 1992.*

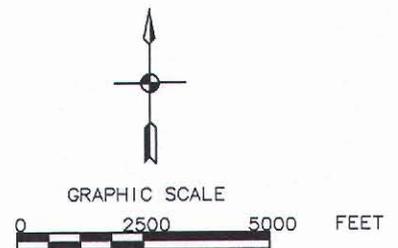
¹²*U.S. Geological Survey Water-Resources Investigations Report No. 96-4235, Hydrology and Water Quality of Lauderdale Lakes, Walworth County, Wisconsin, 1993-94, 1996.*

Map 4

HYDROLOGIC SOIL GROUPS WITHIN THE DRAINAGE AREA TRIBUTARY TO THE LAUDERDALE LAKES



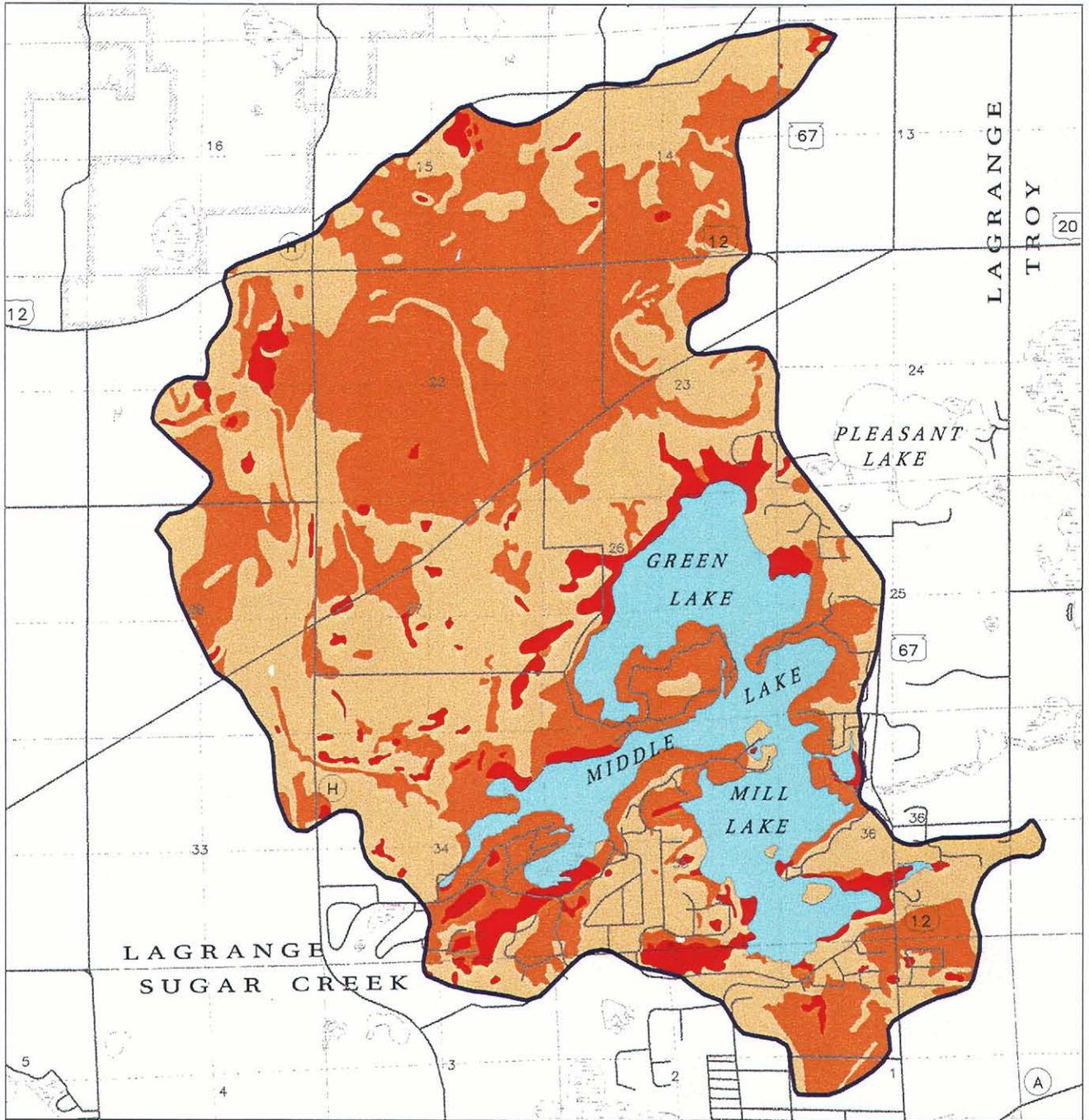
-  GROUP A: Well-drained soils
-  GROUP B: Moderately drained soils
-  GROUP C: Poorly drained soils
-  GROUP D: Very poorly drained soils
-  Surface Water
-  Hydrologic soil group not determined



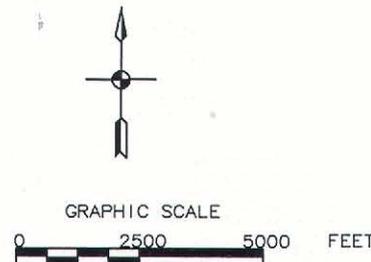
Source: SEWRPC.

Map 5

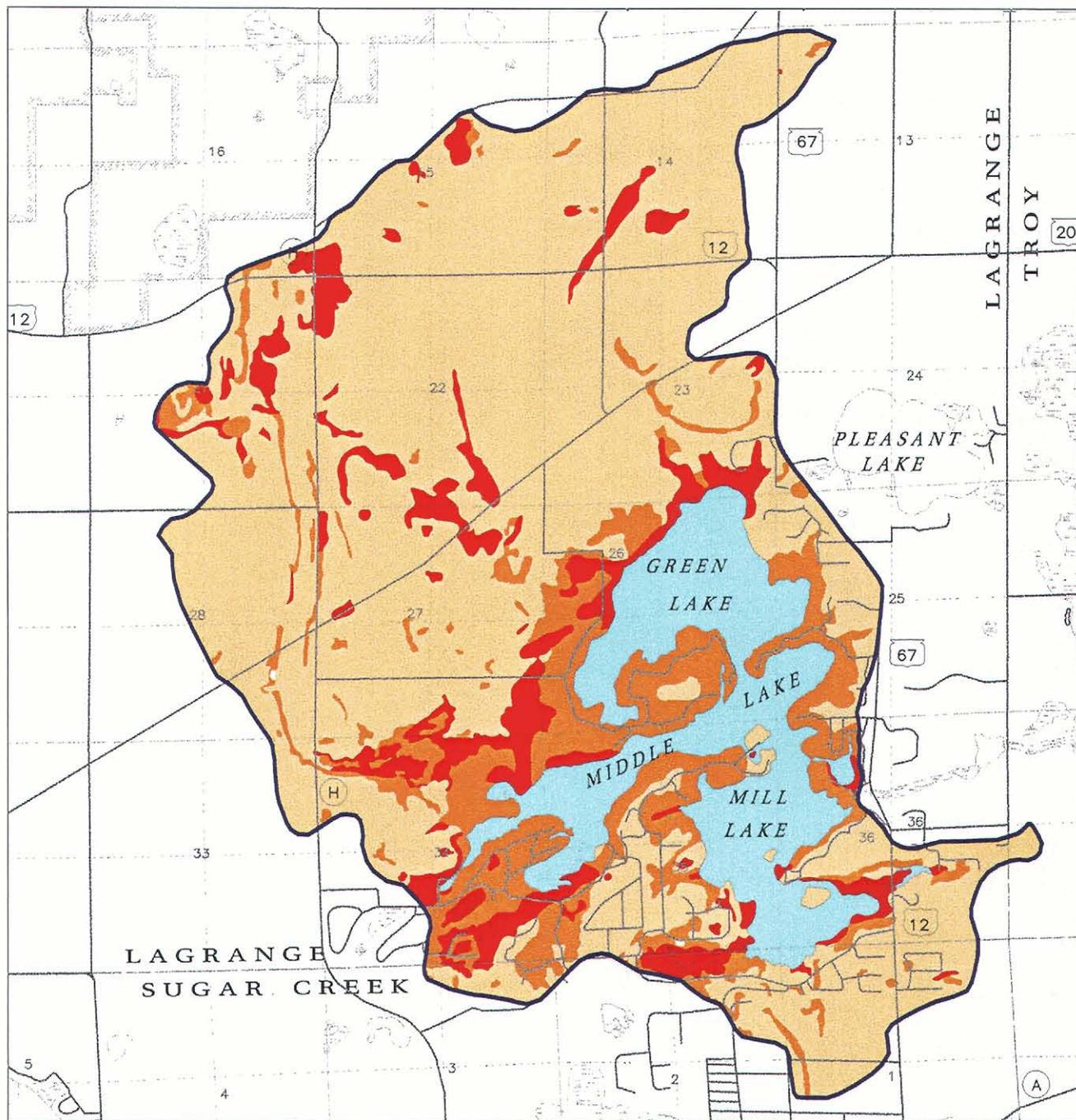
SUITABILITY OF SOILS WITHIN THE DRAINAGE AREA TRIBUTARY TO THE LAUDERDALE LAKES FOR CONVENTIONAL ONSITE SEWAGE DISPOSAL SYSTEMS



- UNSUITABLE:** Areas covered by soils which have a high probability of not meeting the June 2000 criteria of Chapter Comm. 83 of the *Wisconsin Administrative Code* governing conventional onsite sewage disposal systems
- UNDETERMINED:** Areas covered by soils having a range of characteristics and/or slopes which span the June 2000 criteria of Chapter Comm. 83 of the *Wisconsin Administrative Code* governing conventional onsite sewage disposal systems so that no classification can be assigned
- SUITABLE:** Areas covered by soils having a high probability of meeting the June 2000 criteria of Chapter Comm. 83 of the *Wisconsin Administrative Code* governing conventional onsite sewage disposal systems
- OTHER:** Areas consisting for the most part of disturbed land for which no interpretive data are available
- SURFACE WATER**



SUITABILITY OF SOILS WITHIN THE DRAINAGE AREA TRIBUTARY TO THE LAUDERDALE LAKES FOR MOUND-TYPE SEWAGE DISPOSAL SYSTEMS

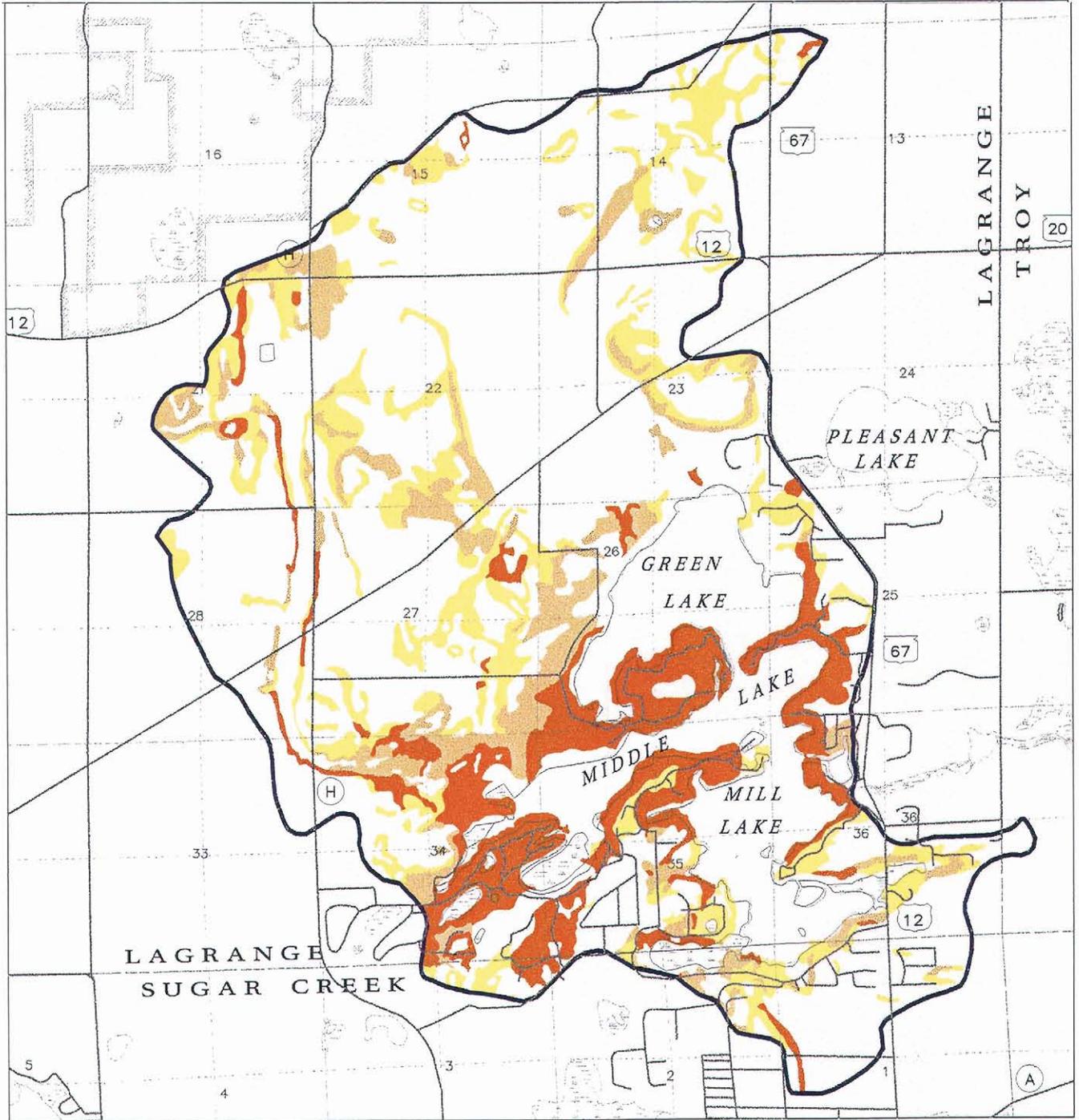


- UNSUITABLE: Areas covered by soils which have a high probability of not meeting the June 2000 criteria of Chapter Comm. 83 of the *Wisconsin Administrative Code* governing conventional mound sewage disposal systems
- UNDETERMINED: Areas covered by soils having a range of characteristics and/or slopes which span the June 2000 criteria of Chapter Comm. 83 of the *Wisconsin Administrative Code* governing conventional mound sewage disposal systems so that no classification can be assigned
- SUITABLE: Areas covered by soils having a high probability of meeting the June 2000 criteria of Chapter Comm. 83 of the *Wisconsin Administrative Code* governing conventional mound sewage disposal systems
- OTHER: Areas consisting for the most part of disturbed land for which no interpretive data are available
- SURFACE WATER



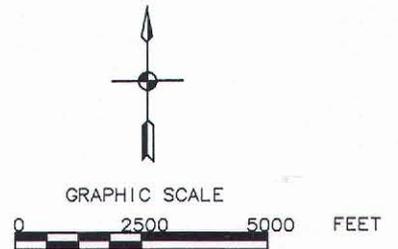
Map 7

SOIL SLOPE CLASSIFICATION SUMMARY FOR THE DRAINAGE AREA TRIBUTARY TO THE LAUDERDALE LAKES



-  6 to 11 Percent
-  12 to 19 Percent
-  Greater than 20 Percent

Source: SEWRPC.



of onsite sewage disposal systems that legally could be used from four to nine. The Wisconsin Department of Commerce envisions that other systems also will be approved in the future. These new rules significantly alter the existing regulatory framework and will increase the area in which onsite sewage disposal systems may be utilized. Although the new rules included a provision that allows counties the option of waiting three years before implementing the new onsite sewage disposal system rules and permitting the use of the new types of systems, in Walworth County, the use of the new technologies was not delayed and the new technologies are currently allowed where appropriate in accordance with the new code.

AQUATIC PLANTS, DISTRIBUTION, AND MANAGEMENT AREAS

Commission staff conducted a survey of aquatic plant species in the three Lake basins comprising the Lauderdale Lakes during August of 1999. The results of this survey are presented in Tables 7 through 9, and graphically depicted on Maps 8 through 10. Illustrations of the common aquatic plants found in the Lauderdale Lakes are included in Appendix B. A further reconnaissance was conducted during 2000, at the request of the Lauderdale Lakes Lake Management District Commissioners, to assess the efficacy of aquatic plant management measures being implemented by the District and to evaluate the "unusual" abundance of Eurasian water milfoil in the Lakes during this summer season.

The dominance of Eurasian water milfoil in Green and Mill Lakes as shown in Tables 7 and 9, as well as the abundance of the plant in Middle Lake as shown in Table 8, is cause for concern. Eurasian water milfoil is an exotic, or nonnative, species that can exhibit "explosive" growth under suitable conditions, such as in the presence of organic-rich sediments or where lake bottom has been disturbed. It reproduces by the rooting of plant fragments, and has been known to cause severe recreational use problems in lakes in Southeastern Wisconsin. It often outcompetes the native aquatic vegetation of lakes in Southeastern Wisconsin, reduces the biodiversity of the lakes, and degrades the quality of fish and wildlife habitats.¹³

Past and Present Aquatic Plant Management Actions

The Lauderdale Lakes Lake Management District has undertaken an active program of aquatic plant management within the Lakes' basins, consistent with an aquatic plant management plan prepared for the Lauderdale Lakes.¹⁴ It is a recommendation of that plan that the inventory be updated on a regular basis in order to adjust the aquatic plant management program to changes in plant community distributions. The current study is consistent with this recommendation.

The aquatic plant management program has been carried out on the Lauderdale Lakes in a documented manner since 1950, when records of aquatic plant management efforts were first maintained by the Wisconsin Department of Natural Resources. Prior to 1950, aquatic plant management interventions are likely, but were not recorded. Since 1950, and prior to the development of an aquatic plant management plan for the Lakes, the aquatic plant management control program could be characterized as a chemical control program designed to minimize nuisance growths of aquatic macrophytes and algae. Between 1950 and 1969, 19,306 pounds of sodium arsenite and 7,663 pounds of copper sulfate were applied to Lauderdale Lake to control perceived nuisance growths of these plants. These applications and subsequent applications through 2000 are summarized in Tables 10 through 12, for the individual Lakes forming the Lauderdale Lakes. A cumulative summary, including aquatic chemical applications indicated for the Lauderdale Lakes chain, but not otherwise assigned to individual component Lakes, is set forth in Table 13. In recent years, the aquatic plant management program conducted on the Lauderdale Lakes has been modified to include an emphasis on aquatic plant harvesting as a major element of

¹³*Wisconsin Department of Natural Resources, Eurasian Water Milfoil in Wisconsin: A Report to the Legislature, 1993.*

¹⁴*Integrated Lakes Management, Lauderdale Lakes Aquatic Plant Distribution, July 1989.*

Table 7

AQUATIC PLANT SPECIES PRESENT IN GREEN LAKE AND THEIR POSITIVE ECOLOGICAL SIGNIFICANCE

Aquatic Plant Species Present	Sites Found	Frequency of Occurrence (percent) ^a	Density at Sites Found ^b	Density in Whole Lake ^b	Ecological Significance ^c
<i>Ceratophyllum demersum</i> (coontail)	4	4.21	1.50	0.06	Provides good shelter for young fish and supports insects valuable as food for fish and ducklings
<i>Chara vulgaris</i> (muskgrass)	45	47.37	2.07	0.98	Excellent producer of fish food, especially for young trout, bluegills, small and largemouth bass, stabilizes bottom sediments, and has softening effect on the water by removing lime and carbon dioxide
<i>Elodea canadensis</i> (waterweed)	4	4.21	3.00	0.13	Provides shelter and support for insects which are valuable as fish food
<i>Myriophyllum</i> sp. (northern water milfoil)	1	1.05	1.00	0.01	Provides valuable food and shelter for fish; fruits eaten by many wildfowl
<i>Myriophyllum spicatum</i> (Eurasian water milfoil)	56	58.95	2.64	1.56	None known
<i>Najas flexilis</i> (bushy pondweed)	39	41.05	2.00	0.82	Stems, foliage, and seeds important wildfowl food and produces good food and shelter for fish
<i>Najas marina</i> (spiny naiad)	49	51.58	2.67	1.38	Provides good food and shelter for fish and food for ducks
<i>Nuphar</i> sp. (yellow water lily)	..d	..d	..d	..d	Leaves, stems, and flowers are eaten by deer; roots eaten by beaver and porcupine; seeds eaten by wildfowl; leaves provide harbor to insects, in addition to shade and shelter for fish
<i>Nymphaea odorata</i> (white water lily)	..d	..d	..d	..d	Provides shade and shelter for fish; seeds eaten by wildfowl; rootstocks and stalks eaten by muskrat; roots eaten by beaver, deer, moose, and porcupine
<i>Potamogeton crispus</i> (curly-leaf pondweed)	1	1.05	1.00	0.01	Provides food, shelter, and shade for some fish and food for wildfowl
<i>Potamogeton foliosus</i> (leafy pondweed)	3	3.16	3.67	0.12	Provides important food for wildfowl, and shelter and support for insects and young fish
<i>Potamogeton illinoensis</i> (Illinois pondweed) ^e	3	3.16	2.00	0.06	Provides shade and shelter for fish; harbor for insects; seeds are eaten by wildfowl
<i>Potamogeton pectinatus</i> (Sago pondweed) ^e	31	32.63	1.68	0.54	This plant is the most important pondweed for ducks, in addition to providing food and shelter for young fish
<i>Potamogeton</i> spp.	23	24.21	1.61	0.39	Provides food and shelter for fish, wildfowl, muskrats, beaver, and deer
<i>Potamogeton zosteriformis</i> (flat-stemmed pondweed)	8	8.42	1.50	0.13	Provides some food for ducks

Table 7 (continued)

Aquatic Plant Species Present	Sites Found	Frequency of Occurrence (percent) ^a	Density at Sites Found ^b	Density in Whole Lake ^b	Ecological Significance ^c
<i>Typha latifolia</i> (broad-leaved cattail)	-- ^d	-- ^d	-- ^d	-- ^d	Supports insects; stalks and roots important food for muskrats and beavers; attracts marsh birds, wildfowl, and songbirds, in addition to being used as spawning grounds by sunfish and shelter for young fish
<i>Vallisneria americana</i> (water celery) ^e	49	51.58	3.08	1.59	Provides good shade and shelter, supports insects, and is valuable fish food
<i>Zosterella dubia</i> (water stargrass)	7	7.37	1.14	0.08	Provides food and shelter for fish, locally important food for wildfowl

NOTE: There were 95 points sampled during the August 1999 survey.

^aMaximum equals 100 percent.

^bMaximum density equals 5.0.

^cInformation obtained from A Manual of Aquatic Plants by Norman C. Fassett, Guide to Wisconsin Aquatic Plants, Wisconsin Department of Natural Resources and Through the Looking Glass...A Field Guide to Aquatic Plants by Wisconsin Lakes Partnership.

^dEmergent and floating-leaved aquatic plants are not included in the analysis of density and frequency of occurrence of submerged macrophytes.

^eConsidered a high-value aquatic plant species known to offer important values in specific aquatic ecosystems under Section NR 107.08 (4) of the Wisconsin Administrative Code.

Source: SEWRPC.

the aquatic plant management strategy. Currently, aquatic plant harvesting is the preferred method of managing nuisance growths of aquatic plants within the Lauderdale Lakes.

Recognizing that the aquatic plant growth in the Lakes is, to an extent, driven by the external load of plant nutrients to the Lakes, as summarized above in Table 6, the Lauderdale Lakes Lake Management District has undertaken the development and implementation of a program of stormwater and onsite wastewater disposal system management.¹⁵ The stormwater management program includes the purchase of lands and installation of stormwater management detention basins in critical subwatersheds. These subwatersheds were identified in consultation with the U.S. Geological Survey and Wisconsin Department of Natural Resources. In addition to controlling surface runoff, the District has promulgated an onsite sewage disposal system ordinance requiring the regular inspection, maintenance, and replacement, as necessary, of onsite sewage disposal systems. Inspections are conducted annually within one quadrant of the lakeshore zone, with each system being inspected once every four years, as noted above. These actions have addressed a significant portion of the external phosphorus load to the Lakes,¹⁶ and form an essential element of the aquatic plant management strategy in the Lakes.

¹⁵R.A. Smith & Associates, Inc., and Applied Technologies, Inc., Final Report for the Lauderdale Lakes Area 1 Wastewater Feasibility Study for the Lauderdale Lakes Management District, March 1992.

¹⁶U.S. Geological Survey Water-Resources Investigations Report No. 96-4235, op. cit.

Table 8

AQUATIC PLANT SPECIES PRESENT IN MIDDLE LAKE AND THEIR POSITIVE ECOLOGICAL SIGNIFICANCE

Aquatic Plant Species Present	Sites Found	Frequency of Occurrence (percent) ^a	Density at Sites Found ^b	Density in Whole Lake ^b	Ecological Significance ^c
<i>Ceratophyllum demersum</i> (coontail)	1	1.85	1.00	0.02	Provides good shelter for young fish and supports insects valuable as food for fish and ducklings
<i>Chara vulgaris</i> (muskgrass)	33	61.11	2.76	1.69	Excellent producer of fish food, especially for young trout, bluegills, small and largemouth bass, stabilizes bottom sediments, and has softening effect on the water by removing lime and carbon dioxide
<i>Decodon verticillatus</i> (water-willow)	..d	..d	..d	..d	Seeds provide foods for ducks and food and cover for muskrats
<i>Elodea canadensis</i> (waterweed)	2	3.70	1.50	0.06	Provides shelter and support for insects which are valuable as fish food
<i>Lemna minor</i> (lesser duckweed)	..d	..d	..d	..d	A nutritious food source for ducks and geese, also provides food for muskrat, beaver and fish, while rafts of duckweed provide shade and cover for insects, in addition extensive mats of duckweed can inhibit mosquito breeding
<i>Myriophyllum</i> sp. (native milfoil)	5	9.26	2.40	0.22	Provides valuable food and shelter for fish; fruits eaten by many wildfowl
<i>Myriophyllum spicatum</i> (Eurasian water milfoil)	16	29.63	2.31	0.69	None known
<i>Najas flexilis</i> (bushy pondweed)	23	42.59	2.65	1.13	Stems, foliage, and seeds important wildfowl food and produces good food and shelter for fish
<i>Najas marina</i> (spiny naiad)	30	55.56	2.33	1.30	Provides good food and shelter for fish and food for ducks
<i>Nuphar</i> sp. (yellow water lily)	..d	..d	..d	..d	Leaves, stems, and flowers are eaten by deer; roots eaten by beaver and porcupine; seeds eaten by wildfowl; leaves provide harbor to insects, in addition to shade and shelter for fish
<i>Nymphaea odorata</i> (white water lily)	..d	..d	..d	..d	Provides shade and shelter for fish; seeds eaten by wildfowl; rootstocks and stalks eaten by muskrat; roots eaten by beaver, deer, moose, and porcupine
<i>Potamogeton crispus</i> (curly-leaf pondweed)	3	5.56	1.00	0.06	Provides food, shelter, and shade for some fish and food for wildfowl
<i>Potamogeton illinoensis</i> (Illinois pondweed) ^e	6	11.11	1.33	0.15	Provides shade and shelter for fish; harbor for insects; seeds are eaten by wildfowl
<i>Potamogeton natans</i> (floating-leaf pondweed)	2	3.70	1.00	0.04	Provides food and shelter for fish and food for wildfowl

Table 8 (continued)

Aquatic Plant Species Present	Sites Found	Frequency of Occurrence (percent) ^a	Density at Sites Found ^b	Density in Whole Lake ^b	Ecological Significance ^c
<i>Potamogeton pectinatus</i> (Sago pondweed) ^e	10	18.52	1.60	0.30	This plant is the most important pondweed for ducks, in addition to providing food and shelter for young fish
<i>Potamogeton</i> spp.	7	12.96	1.43	0.19	Provides food and shelter for fish, wildfowl, muskrats, beaver, and deer
<i>Potamogeton zosteriformis</i> (flat-stemmed pondweed)	6	11.11	2.00	0.22	Provides some food for ducks
<i>Sagittaria latifolia</i> (arrowhead)	.. ^d	.. ^d	.. ^d	.. ^d	Provides food for ducks, muskrats, porcupines, beavers and fish, and provides shelter for young fish
<i>Scirpus acutus</i> (hard-stem bulrush)	.. ^d	.. ^d	.. ^d	.. ^d	Provides shelter for young fish, seeds provide food for wildfowl, stems and rhizomes provide food for geese and muskrats, in addition the plant material provides nesting material and cover for wildfowl and muskrats
<i>Scirpus subterminalis</i> (water bulrush)	1	1.85	4.00	0.07	Provides shelter for fish and supports insects
<i>Typha latifolia</i> (broad-leaved cattail)	.. ^d	.. ^d	.. ^d	.. ^d	Supports insects; stalks and roots important food for muskrats and beavers; attracts marsh birds, wildfowl, and songbirds, in addition to being used as spawning grounds by sunfish and shelter for young fish
<i>Utricularia</i> sp. (bladderwort)	10	18.52	1.50	0.28	Provides good food and cover for fish
<i>Vallisneria americana</i> (water celery) ^e	22	40.74	2.50	1.02	Provides good shade and shelter, supports insects, and is valuable fish food
<i>Zizania aquatica</i> (wild rice) ^e	.. ^d	.. ^d	.. ^d	.. ^d	Provides food to waterfowl during fall migration, attractive food source for red-wing blackbirds and sora rails; used as a food source and building materials for muskrats
<i>Zosterella dubia</i> (water stargrass)	1	1.85	1.00	0.02	Provides food and shelter for fish, locally important food for waterfowl

NOTE: There were 54 points sampled during the August 1999 survey. Three-foot samples were not included due to incomplete data from inaccessible shallow areas.

^aMaximum equals 100 percent.

^bMaximum density equals 5.0.

^cInformation obtained from A Manual of Aquatic Plants by Norman C. Fassett, Guide to Wisconsin Aquatic Plants, Wisconsin Department of Natural Resources and Through the Looking Glass...A Field Guide to Aquatic Plants by Wisconsin Lakes Partnership.

^dEmergent and floating-leaved aquatic plants are not included in the analysis of density and frequency of occurrence of submerged macrophytes.

^eConsidered a high-value aquatic plant species known to offer important values in specific aquatic ecosystems under Section NR 107.08 (4) of the Wisconsin Administrative Code.

Source: SEWRPC.

Table 9

AQUATIC PLANT SPECIES PRESENT IN MILL LAKE AND THEIR POSITIVE ECOLOGICAL SIGNIFICANCE

Aquatic Plant Species Present	Sites Found	Frequency of Occurrence (percent) ^a	Density at Sites Found ^b	Density in Whole Lake ^b	Ecological Significance ^c
<i>Ceratophyllum demersum</i> (coontail)	25	35.71	2.12	0.74	Provides good shelter for young fish and supports insects valuable as food for fish and ducklings
<i>Chara vulgaris</i> (muskgrass)	49	70.00	2.55	1.79	Excellent producer of fish food, especially for young trout, bluegills, small and largemouth bass, stabilizes bottom sediments, and has softening effect on the water by removing lime and carbon dioxide
<i>Decodon verticillatus</i> (water-willow)	--d	--d	--d	--d	Seeds provide foods for ducks and food and cover for muskrats
<i>Elodea canadensis</i> (waterweed)	8	11.43	1.25	0.14	Provides shelter and support for insects which are valuable as fish food
<i>Myriophyllum</i> sp. (native water milfoil)	1	1.42	1.00	0.01	Provides valuable food and shelter for fish; fruits eaten by many wildfowl
<i>Myriophyllum spicatum</i> (Eurasian water milfoil)	61	87.14	3.36	2.93	None known
<i>Najas flexilis</i> (bushy pondweed)	33	47.14	2.42	1.14	Stems, foliage, and seeds important wildfowl food and produces good food and shelter for fish
<i>Najas marina</i> (spiny naiad)	23	32.86	1.91	0.63	Provides good food and shelter for fish and food for ducks
<i>Nuphar</i> sp. (yellow water lily)	--d	--d	--d	--d	Leaves, stems, and flowers are eaten by deer; roots eaten by beaver and porcupine; seeds eaten by wildfowl; leaves provide harbor to insects, in addition to shade and shelter for fish
<i>Nymphaea odorata</i> (white water lily)	--d	--d	--d	--d	Provides shade and shelter for fish; seeds eaten by wildfowl; rootstocks and stalks eaten by muskrat; roots eaten by beaver, deer, moose, and porcupine
<i>Potamogeton amplifolius</i> (large-leaf pondweed) ^e	1	1.42	1.00	0.01	Provides support for insects and produces good food supply for fish and ducks
<i>Potamogeton crispus</i> (curly-leaf pondweed)	8	11.43	1.13	0.13	Provides food, shelter, and shade for some fish and food for wildfowl
<i>Potamogeton foliosus</i> (leafy pondweed)	3	4.29	2.00	0.09	Provides important food for wildfowl, and shelter and support for insects and young fish
<i>Potamogeton illinoensis</i> (Illinois pondweed) ^e	3	4.29	1.00	0.04	Provides some food for ducks
<i>Potamogeton natans</i> (floating-leaf pondweed) ^e	4	5.71	1.50	0.09	Provides food and shelter for fish and food for wildfowl

Table 9 (continued)

Aquatic Plant Species Present	Sites Found	Frequency of Occurrence (percent) ^a	Density at Sites Found ^b	Density in Whole Lake ^b	Ecological Significance ^c
<i>Potamogeton pectinatus</i> (Sago pondweed) ^e	27	38.57	1.44	0.56	This plant is the most important pondweed for ducks, in addition to providing food and shelter for young fish
<i>Potamogeton</i> spp.	12	17.14	1.33	0.23	Provides food and shelter for fish, wildfowl, muskrats, beaver, and deer
<i>Potamogeton zosteriformis</i> (flat-stemmed pondweed)	10	14.29	1.20	0.17	Provides some food for ducks
<i>Typha latifolia</i> (broad-leaved cattail)	- ^d	- ^d	- ^d	- ^d	Supports insects; stalks and roots important food for muskrats and beavers; attracts marsh birds, wildfowl, and songbirds, in addition to being used as spawning grounds by sunfish and shelter for young fish
<i>Utricularia</i> sp. (bladderwort)	12	17.14	1.58	0.27	Provides good food and cover for fish
<i>Vallisneria americana</i> (water celery) ^e	39	55.71	2.38	1.33	Provides good shade and shelter, supports insects, and is valuable fish food
<i>Zosterella dubia</i> (water stargrass)	1	1.42	1.00	0.01	Provides food and shelter for fish, locally important food for waterfowl

NOTE: There were 70 points sampled during the August 1999 survey.

^aMaximum equals 100 percent.

^bMaximum density equals 5.0.

^cInformation obtained from A Manual of Aquatic Plants by Norman C. Fassett, Guide to Wisconsin Aquatic Plants, Wisconsin Department of Natural Resources and Through the Looking Glass...A Field Guide to Aquatic Plants by Wisconsin Lakes Partnership.

^dEmergent and floating-leaved aquatic plants are not included in the analysis of density and frequency of occurrence of submerged macrophytes.

^eConsidered a high-value aquatic plant species known to offer important values in specific aquatic ecosystems under Section NR 107.08 (4) of the Wisconsin Administrative Code.

Source: SEWRPC.

Green Lake

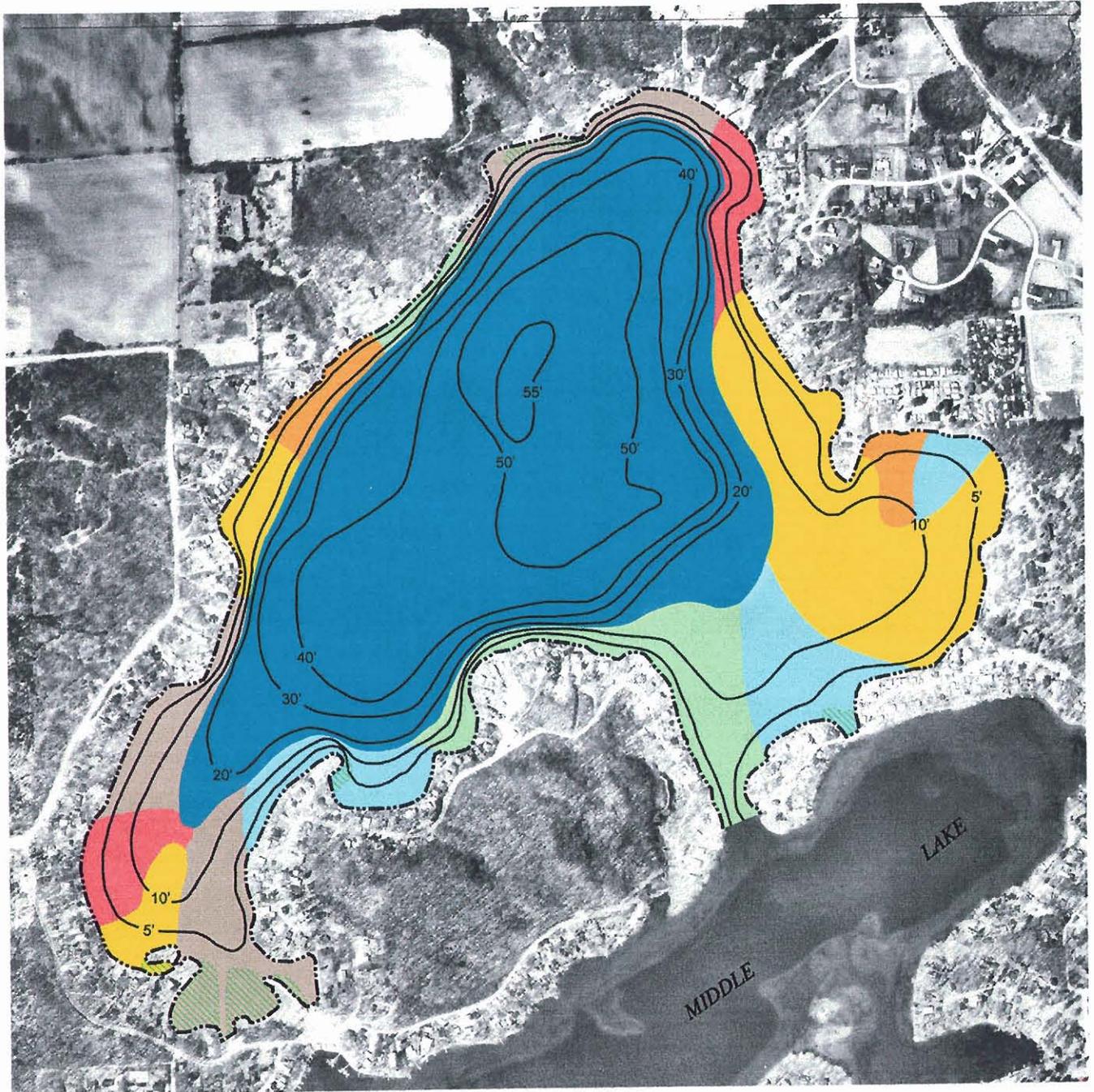
Eighteen aquatic plant species were found in Green Lake during 1999. While the Lake had high floral diversity, Eurasian water milfoil was found to be widespread throughout most of this Lake, as shown on Map 8. Aquatic plant species dominance is shown in Table 7. Other common aquatic plant species were bushy pondweed, *Najas flexilis*; muskgrass, *Chara vulgaris*; spiny naiad, *Najas marina*; and water celery, *Vallisneria americana*. Eurasian water milfoil was dominant at all depths where silty or sandy silt sediments were present in the Lake. However, it was found to be sparse or not present in areas of the Lake where the substrate was rocky or gravel-covered.

Middle Lake

Twenty-five aquatic plant species were found in Middle Lake during 1999. Middle Lake had the best floral diversity of the three lakes, as shown on Map 9. Aquatic plant species dominance is shown in Table 8. The aquatic plant species with the highest frequencies of occurrence were bushy pondweed, *Najas flexilis*; Eurasian water milfoil, *Myriophyllum spicatum*; muskgrass, *Chara vulgaris*; spiny naiad, *Najas marina*; and water celery,

Map 8

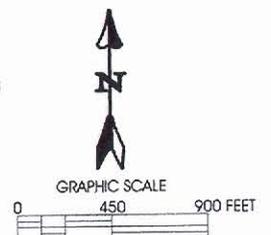
AQUATIC PLANT COMMUNITY DISTRIBUTION IN GREEN LAKE: 1999



- EURASIAN WATER MILFOIL, MUSKGRASS, WILD CELERY, AND SPINEY NAIAD
- EURASIAN WATER MILFOIL, MUSKGRASS, WILD CELERY, BUSHY PONDWEED, AND SPINEY NAIAD
- EURASIAN WATER MILFOIL, WILD CELERY, BUSHY PONDWEED, AND SPINEY NAIAD
- MUSKGRASS, WILD CELERY, BUSHY PONDWEED, SPINEY NAIAD, AND SAGO PONDWEED

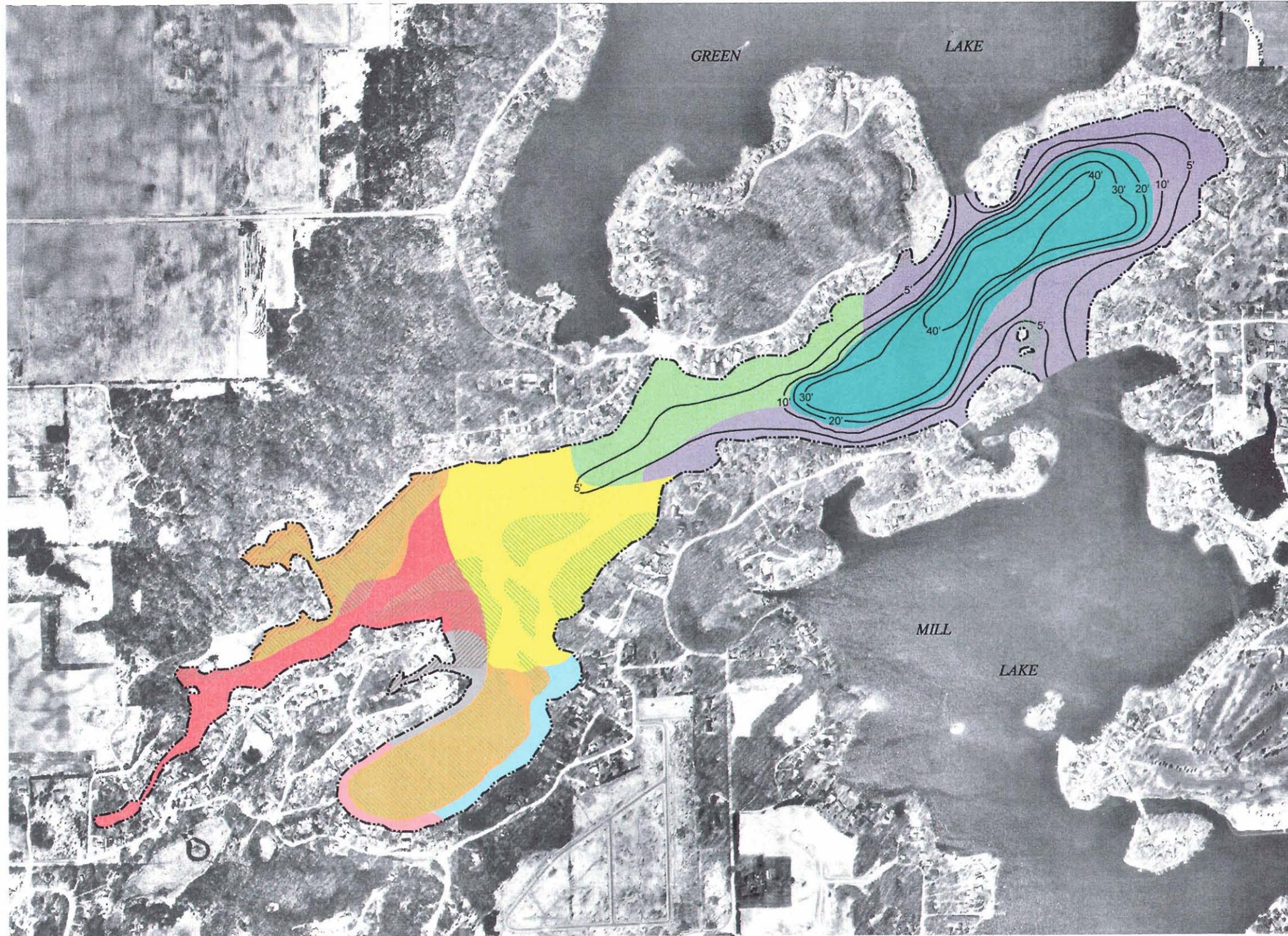
- EURASIAN WATER MILFOIL, MUSKGRASS, WILD CELERY
- EURASIAN WATER MILFOIL, MUSKGRASS, AND BUSHY PONDWEED
- WATER LILIES
- DEPTH GREATER THAN 15 FEET

Source: SEWRPC.

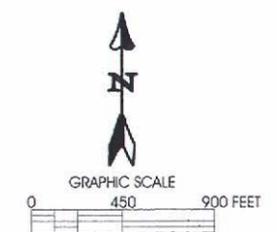


Map 9

**AQUATIC PLANT COMMUNITY
DISTRIBUTION IN MIDDLE LAKE: 1999**



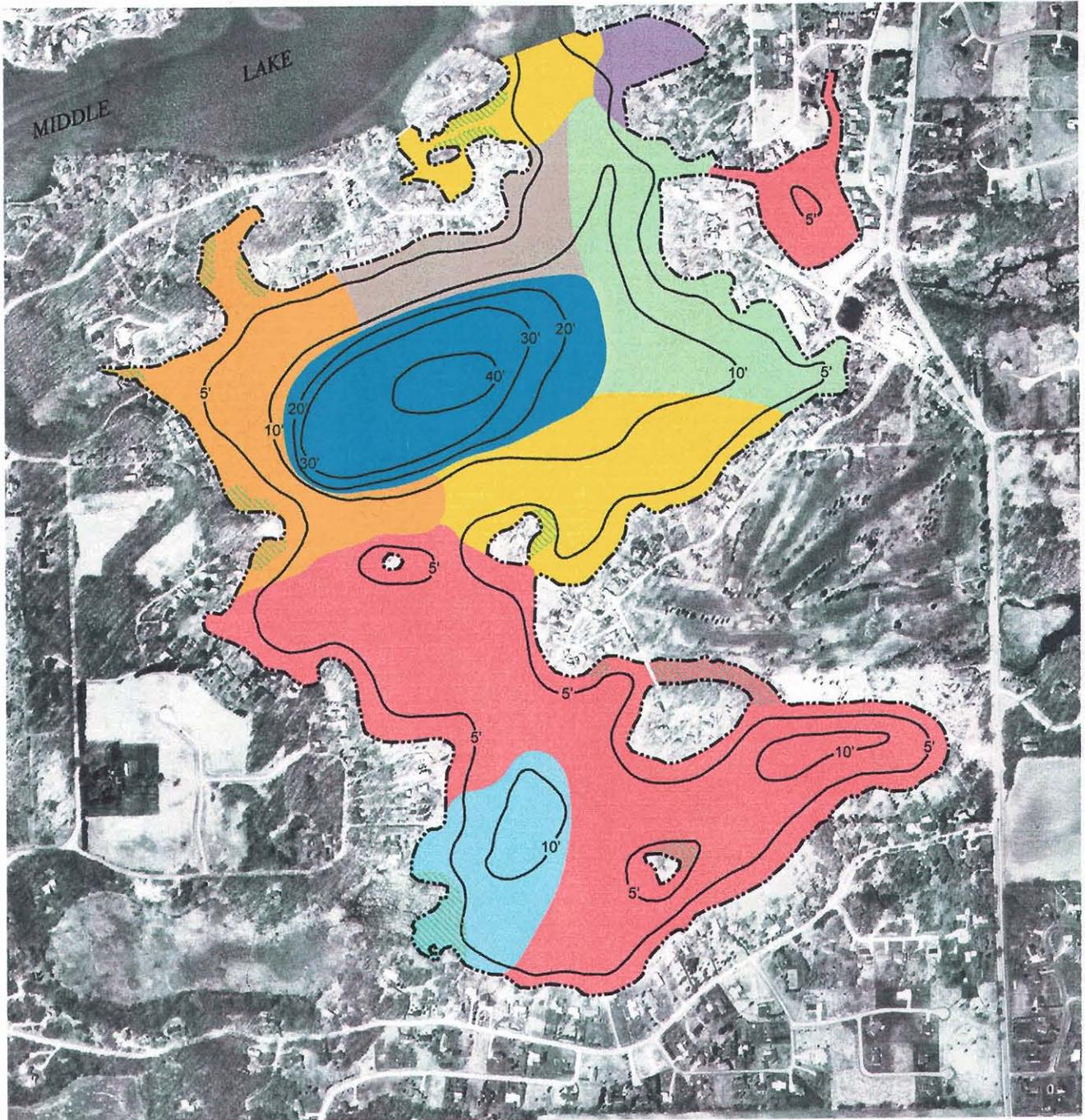
- MUSKGRASS, WILD CELERY, EURASIAN WATER MILFOIL, BUSHY PONDWEED, SPINEY NAIAD, AND BLADDERWORT
- MUSKGRASS, WILD CELERY, EURASIAN WATER MILFOIL, BUSHY PONDWEED, AND SPINEY NAIAD
- MUSKGRASS, EURASIAN WATER MILFOIL, BLADDERWORT, AND SAGO PONDWEED
- MUSKGRASS, WILD CELERY, EURASIAN WATER MILFOIL, SAGO PONDWEED, AND NATIVE WATER MILFOIL
- MUSKGRASS, WILD CELERY, BUSHY PONDWEED, SPINEY NAIAD, BLADDERWORT, AND WATER BULRUSH
- MUSKGRASS, WILD CELERY, BUSHY PONDWEED, AND NATIVE WATER MILFOIL
- WILD CELERY, WATERWEED, AND FLAT-STEM PONDWEEDS
- MUSKGRASS AND WATER BULRUSH
- CATTAIL AND WATER WILLOW
- WATER LILIES
- DEPTH GREATER THAN 15 FEET



Source: SEWRPC.

Map 10

AQUATIC PLANT COMMUNITY DISTRIBUTION IN MILL LAKE: 1999



- EURASIAN WATER MILFOIL, BUSHY PONDWEED, AND COONTAIL
- EURASIAN WATER MILFOIL, MUSKGRASS, AND SPINEY NAIAD
- EURASIAN WATER MILFOIL, MUSKGRASS, WILD CELERY, BUSHY PONDWEED, AND COONTAIL
- EURASIAN WATER MILFOIL, MUSKGRASS, WILD CELERY, BUSHY PONDWEED, SPINEY NAIAD, AND SAGO PONDWEED
- EURASIAN WATER MILFOIL, MUSKGRASS, WILD CELERY, BLADDERWORT

- EURASIAN WATER MILFOIL, MUSKGRASS, WILD CELERY, BUSHY PONDWEED, SPINEY NAIAD, AND NATIVE WATER MILFOIL
- EURASIAN WATER MILFOIL, MUSKGRASS, WILD CELERY, SPINEY NAIAD, SAGO PONDWEED, AND BLADDERWORT
- WATER LILIES
- DEPTH GREATER THAN 15 FEET

Source: SEWRPC.

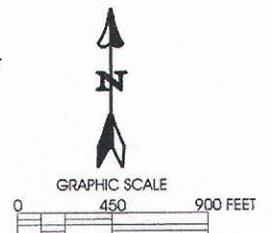


Table 10

CHEMICAL CONTROLS ON GREEN LAKE: 1950-1996

Year	Macrophyte Control						Algal Control	
	Sodium Arsenite (pounds)	Diquat (gallons)	Silvex (gallons)	Endothol		2,4-D (gallons)	Cutrine-Plus (gallons)	Copper Sulfate (pounds)
				Gallons	Pounds			
1950-1969	1,260	--	--	--	--	--	--	2,506
1970	--	--	--	5	--	--	--	--
1971	--	--	--	--	--	--	--	--
1972	--	3	--	6	--	--	--	--
1973	--	3	--	--	--	--	--	--
1974	--	--	--	--	--	--	--	--
1975	--	--	--	4	--	2	--	--
1976 ^a	--	--	--	--	--	--	--	--
1977	--	--	--	5	--	--	--	--
1978 ^a	--	--	--	--	--	--	--	--
1979	--	--	--	--	--	--	--	--
1980	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--
1983 ^a	--	--	--	--	--	--	--	--
1984	--	--	--	--	--	--	--	--
1985	--	--	--	--	--	--	--	--
1986	--	--	--	--	--	--	--	--
1987	--	--	--	--	--	--	--	--
1988	--	--	--	--	--	--	--	--
1989 ^a	--	--	--	--	--	--	--	--
1990	--	--	--	--	--	--	--	--
1991	--	--	--	--	--	--	--	--
1992	--	--	--	--	--	--	--	--
1993 ^a	--	--	--	--	--	--	--	--
1994 ^a	--	--	--	--	--	--	--	--
1995 ^a	--	--	--	--	--	--	--	--
1996 ^a	--	--	--	--	--	--	--	--
1997 ^a	--	--	--	--	--	--	--	--
1998 ^a	--	--	--	--	--	--	--	--
1999 ^a	--	--	--	--	--	--	--	--
2000 ^a	--	--	--	--	--	--	--	--
Total	1,260	6	--	20	--	2	--	2,506

^aNo chemical controls were reported during these years.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Vallisneria americana. With the exception of Eurasian water milfoil, these species provide good fish and aquatic wildlife habitat and little interference with the recreational uses of the Lake. The abundance and widespread distribution of Eurasian water milfoil in the western portions of Middle Lake, where the predominantly soft or organic sediments favor the spread of Eurasian water milfoil, is cause for concern. Such sediments are characteristic of a deep water marsh, and it is likely that this area was wetland prior to the construction of the dam impounding the Lauderdale Lakes. Indeed, the western portions of Middle Lake meet the State definition of a deep water marsh, and there is considerable overlap between this aquatic plant community and the riparian wetland areas as discussed below.

Table 11

CHEMICAL CONTROLS ON MIDDLE LAKE 1950-1996

Year	Macrophyte Control					Algal Control		
	Sodium Arsenite (pounds)	Diquat (gallons)	Silvex (gallons)	Endothol		2,4-D (gallons)	Cutrine-Plus (gallons)	Copper Sulfate (pounds)
				Gallons	Pounds			
1950-1969	--	--	--	--	--	--	--	2,506
1970	--	3.0	--	--	--	--	--	--
1971	--	--	--	30.0	--	--	--	--
1972	--	--	--	11.5	--	--	--	--
1973	--	3.5	--	2.0	--	--	--	--
1974	--	--	--	--	--	--	--	--
1975	--	--	--	--	--	--	--	--
1976 ^a	--	--	--	--	--	--	--	--
1977	--	--	--	--	--	--	--	--
1978 ^a	--	--	--	--	--	--	--	--
1979	--	1.0	--	5.0	--	--	5	--
1980	--	1.5	--	1.5	--	24.0	--	50
1981	--	0.5	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--
1983 ^a	--	--	--	--	--	--	--	--
1984	--	--	--	3.0	--	4.0	--	18
1985	--	--	--	2.0	--	2.5	--	--
1986	--	--	--	--	20	--	--	--
1987	--	--	--	--	--	--	--	--
1988	--	--	--	--	--	--	--	--
1989 ^a	--	--	--	--	--	--	--	--
1990	--	--	--	--	--	--	--	--
1991	--	--	--	--	--	--	--	--
1992	--	--	--	--	--	--	--	--
1993 ^a	--	--	--	--	--	--	--	--
1994 ^a	--	--	--	--	--	--	--	--
1995 ^a	--	--	--	--	--	--	--	--
1996 ^a	--	--	--	--	--	--	--	--
1997 ^a	--	--	--	--	--	--	--	--
1998 ^a	--	--	--	--	--	--	--	--
1999 ^a	--	--	--	--	--	--	--	--
2000 ^a	--	--	--	--	--	--	--	--
Total	--	9.5	--	55.0	20	30.5	5	2,574

^aNo chemical controls were reported during these years.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Mill Lake

Twenty-one aquatic plant species were found in Mill Lake during 1999. This Lake had the second highest floral diversity of the three Lakes, as shown on Map 10. Notwithstanding, Eurasian water milfoil was found at its highest densities in this Lake. Aquatic plant species dominance is shown in Table 9. In addition to Eurasian water milfoil, aquatic plant species occurring at high frequencies were bushy pondweed, *Najas flexilis*; coontail, *Ceratophyllum demersum*; muskgrass, *Chara vulgaris*; Sago pondweed, *Potamogeton pectinatus*; spiny naiad, *Najas marina*; and water celery, *Vallisneria americana*. The abundance of Eurasian water milfoil is also cause for much concern in this portion of the Lauderdale Lakes system, given heavy recreational usage and organic

Table 12

CHEMICAL CONTROLS ON MILL LAKE 1950-1996

Year	Macrophyte Control					Algal Control		
	Sodium Arsenite (pounds)	Diquat (gallons)	Silvex (gallons)	Endothol		2,4-D (gallons)	Cutrine-Plus (gallons)	Copper Sulfate (pounds)
				Gallons	Pounds			
1950-1969	--	--	--	--	--	--	--	2,506
1970	--	--	--	--	150	--	--	--
1971	--	--	--	--	--	--	--	--
1972	--	--	--	3	--	--	--	--
1973	--	2.5	--	2	--	--	--	--
1974	--	--	--	--	--	--	--	--
1975	--	--	--	--	--	--	--	--
1976 ^a	--	--	--	--	--	--	--	--
1977	--	--	--	6	--	--	--	--
1978 ^a	--	--	--	--	--	--	--	--
1979	--	--	--	--	50	--	--	--
1980	--	--	--	3	25	--	--	--
1981	--	1.0	--	6	80	--	--	4
1982	--	4.0	--	14	--	--	--	15
1983 ^a	--	--	--	--	--	--	--	--
1984	--	--	--	--	--	--	--	--
1985	--	0.5	--	5	--	4	--	--
1986	--	--	--	--	--	--	--	--
1987	--	--	--	--	--	--	--	--
1988	--	--	--	--	--	--	--	--
1989 ^a	--	--	--	--	--	--	--	--
1990	--	--	--	--	--	--	--	--
1991	--	--	--	--	--	--	--	--
1992	--	--	--	--	--	--	--	--
1993 ^a	--	--	--	--	--	--	--	--
1994 ^a	--	--	--	--	--	--	--	--
1995 ^a	--	--	--	--	--	--	--	--
1996 ^a	--	--	--	--	--	--	--	--
1997 ^a	--	--	--	--	--	--	--	--
1998 ^a	--	--	--	--	--	--	--	--
1999 ^a	--	--	--	--	--	--	--	--
2000 ^a	--	--	--	--	--	--	--	--
Total	--	8.0	--	39	305	4	--	2,525

^aNo chemical controls were reported during these years.

Source: Wisconsin Department of Natural Resources and SEWRPC.

substrates. The embayment, locally known as Don Jean Bay, especially, is at considerable high risk for the continued spread of Eurasian water milfoil.

WETLAND PLANTS, DISTRIBUTION, AND MANAGEMENT AREAS

Commission staff conducted a concurrent survey of wetland plant species riparian to the three Lake basins comprising the Lauderdale Lakes during August and October 1999. The results of this survey are presented in Table 14, graphically depicted on Maps 11 through 13, and described in detail in Appendix C. A further reconnaissance was conducted during 2000, to evaluate additional wetland areas not analyzed during the previous summer season.

Table 13

CHEMICAL CONTROLS ON THE LAUDERDALE CHAIN OF LAKES: 1950-1996^a

Year	Macrophyte Control					Algal Control		
	Sodium Arsenite (pounds)	Diquat (gallons)	Silvex (gallons)	Endothol		2,4-D (gallons)	Cutrine-Plus (gallons)	Copper Sulfate (pounds)
				Gallons	Pounds			
1950-1969	19,306	78.0	92.6	9.0	48.40	80.0	--	7,663.0
1970	--	12.0	--	5.0	150.00	--	--	--
1971	--	--	--	37.0	--	--	--	--
1972	--	3.0	--	20.5	--	--	--	--
1973	--	9.0	--	4.0	--	--	--	--
1974	--	--	--	--	--	--	--	--
1975	--	--	--	4.0	--	2.0	--	--
1976 ^b	--	--	--	--	--	--	--	--
1977	--	--	--	11.0	--	--	--	--
1978 ^b	--	--	--	--	--	--	--	--
1979	--	1.0	--	5.0	50.00	--	5	--
1980	--	1.5	--	4.5	25.00	24.0	--	50.0
1981	--	1.0	--	6.0	80.00	--	--	4.0
1982	--	4.0	--	14.0	--	--	--	15.0
1983 ^b	--	--	--	--	--	--	--	--
1984	--	1.0	--	7.0	--	9.5	--	18.0
1985	--	0.5	--	7.0	--	6.5	--	--
1986	--	1.5	--	--	41.75	41.0	--	3.0
1987	--	0.5	--	3.5	--	21.0	--	0.5
1988	--	--	--	1.5	--	22.0	--	--
1989 ^b	--	--	--	--	--	--	--	--
1990	--	--	--	--	--	14.0	--	--
1991	--	--	--	--	--	6.0	--	--
1992	--	--	--	--	--	2.5	--	--
1993 ^b	--	--	--	--	--	--	--	--
1994 ^b	--	--	--	--	--	--	--	--
1995 ^b	--	--	--	--	--	--	--	--
1996 ^b	--	--	--	--	--	--	--	--
1997 ^b	--	--	--	--	--	--	--	--
1998 ^b	--	--	--	--	--	--	--	--
1999 ^b	--	--	--	--	--	--	--	--
2000 ^b	--	--	--	--	--	--	--	--
Total	19,306	113.0	92.6	139.0	395.15	228.5	5	7,753.5

^aHerbicide quantities reported herein are for those treatment dates on which specific Lakes were not stated; for herbicide usage on specific Lakes within the Lauderdale Lakes chain or Lakes, see Tables 10 through 12.

^bNo chemical controls were reported during these years.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Wetlands

Wetlands are defined by the Regional Planning Commission as, "areas that have a predominance of hydric soils and that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions." This definition is also used by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency, and is essentially the same as the definition used by the U.S. Natural Resource

Table 14

**MAJOR EMERGENT WETLAND PLANT SPECIES PRESENT IN THE
LAUDERDALE LAKES AREA AND THEIR POSITIVE ECOLOGICAL IMPORTANCE**

Emergent Wetland Plant Species Present	Ecological Significance ^a
<i>Alisma plantago-aquatica</i> (water plantain)	Provides shade and shelter for young fish, nutlets and tubers are food for waterfowl, and leaves and roots are food for beavers and muskrats
<i>Asclepias incarnata</i> (marsh milkweed)	Seeds provide food for ducks, roots may be eaten by muskrats, and plant fiber are use by birds for nesting materials, used as a host plant for Monarch butterfly caterpillars
<i>Aster lucidulus</i> (swamp aster)	Flowers attract insects
<i>Bidens coronata</i> (tall swamp-marigold)	Fruit provides food for waterfowl and submerged portions of the plant provide shade shelter and forage for fish
<i>Carex comosa</i> (bristly sedge)	Nutlets are eaten by waterfowl while the dense growth form of the plant provides valuable shoreline stabilization, and in shallow water the plant provides spawning habitat
<i>Carex stricta</i> (tussock sedge)	Sedges are an essential food source for wildfowl and marsh birds; large sedge meadows provide nesting for Sandhill cranes
<i>Cornus stolonifera</i> (red-osier dogwood)	Berries are eaten by upland game birds, songbirds, waterfowl, deer and beaver; shrub provides habitat and nesting for songbirds
<i>Decodon verticillatus</i> (water-willow)	Seeds provide food for ducks and food and cover for muskrats
<i>Eupatorium maculatum</i> (Joe-pye weed) and <i>Eupatorium perfoliatum</i> (boneset)	Fruits and leaves provide food for Mallards and Ruffed grouse
<i>Impatiens biflora</i> (jewelweed)	Flowers attract hummingbirds and insects; plants may be eaten by grazers
<i>Iris virginica</i> (virginica blueflag)	Provides food for waterfowl and muskrats; and persists as good cover for wildlife and waterfowl
<i>Leersia oryzoides</i> (rice cut grass)	Seeds can be a locally important food for waterfowl, and occasionally eaten by muskrats
<i>Lycopus americanus</i> (cutleaf bugleweed)	Used by upland game birds, waterfowl and muskrats
<i>Lythrum salicaria</i> (purple loosestrife) ^b	Provides minimal value for wildlife; flowers attract insects; crowds out valuable native vegetation
<i>Phalaris arundinacea</i> (reed canary grass) ^b	Low food value for grazers; offers some summer shelter to waterfowl in disturbed areas; crowds out valuable native vegetation
<i>Polygonum pensylvanicum</i> (pinkweed)	Nutlets eaten by wildfowl, upland game birds, shorebirds, songbirds, deer and muskrats
<i>Ribes americanum</i> (wild black current)	Berries provides food for wildlife
<i>Rumex orbiculatus</i> (great water dock)	Nutlets eaten by waterfowl; grazed by deer and muskrats
<i>Salix</i> spp. (willows)	Attracts marsh birds, wildfowl, songbirds and upland game birds, leaves eaten by muskrats, browsed by deer, and important for beaver
<i>Sambucus canadensis</i> (elderberry)	Thickets provide shelter; berries are eaten by songbirds and ruffed grouse
<i>Scirpus atrovirens</i> (green bulrush) ^c and <i>Scirpus validus</i> (soft-stemmed bulrush) ^c	Nutlets and tubers are eaten by ducks, plants and roots eaten by geese and swans; attracts marsh birds, waterfowl and songbirds
<i>Sagittaria latifolia</i> (common arrowhead)	Provides food for ducks, muskrats, porcupines, beavers and fish, and provides shelter for young fish

Table 14 (continued)

Emergent Wetland Plant Species Present	Ecological Significance ^a
<i>Solidago gigantea</i> (giant goldenrod)	Flowers attract insects
<i>Typha latifolia</i> (broad-leaved cattail)	Supports insects; stalks and roots important food for muskrats and beavers; attracts marsh birds, wildfowl, and songbirds, in addition to being used as spawning grounds by sunfish and shelter for young fish
<i>Verbena hastata</i> (blue vervain)	Seeds eaten by ducks
<i>Vitis riparia</i> (river-bank grape)	Berries eaten by songbirds
<i>Zizania aquatica</i> (wild rice) ^c	Provides food to waterfowl during fall migration, attractive food source for red-wing blackbirds and sora rails; used as a food source and building materials for muskrats

^a Information obtained from *Wetland Plants and Plant Communities of Minnesota and Wisconsin*, Second Edition, by Steve D. Eggers and Donald M. Reed; *A Manual of Aquatic Plants* by Norman C. Fassett; and *Through the Looking Glass...A Field Guide to Aquatic Plants*, by Wisconsin Lakes Partnership.

^b Nonnative plant species.

^c Considered a high value aquatic plant species known to offer important values in specific aquatic ecosystems under Section NR 107.08 (4) of the Wisconsin Administrative Code.

Source: SEWRPC.

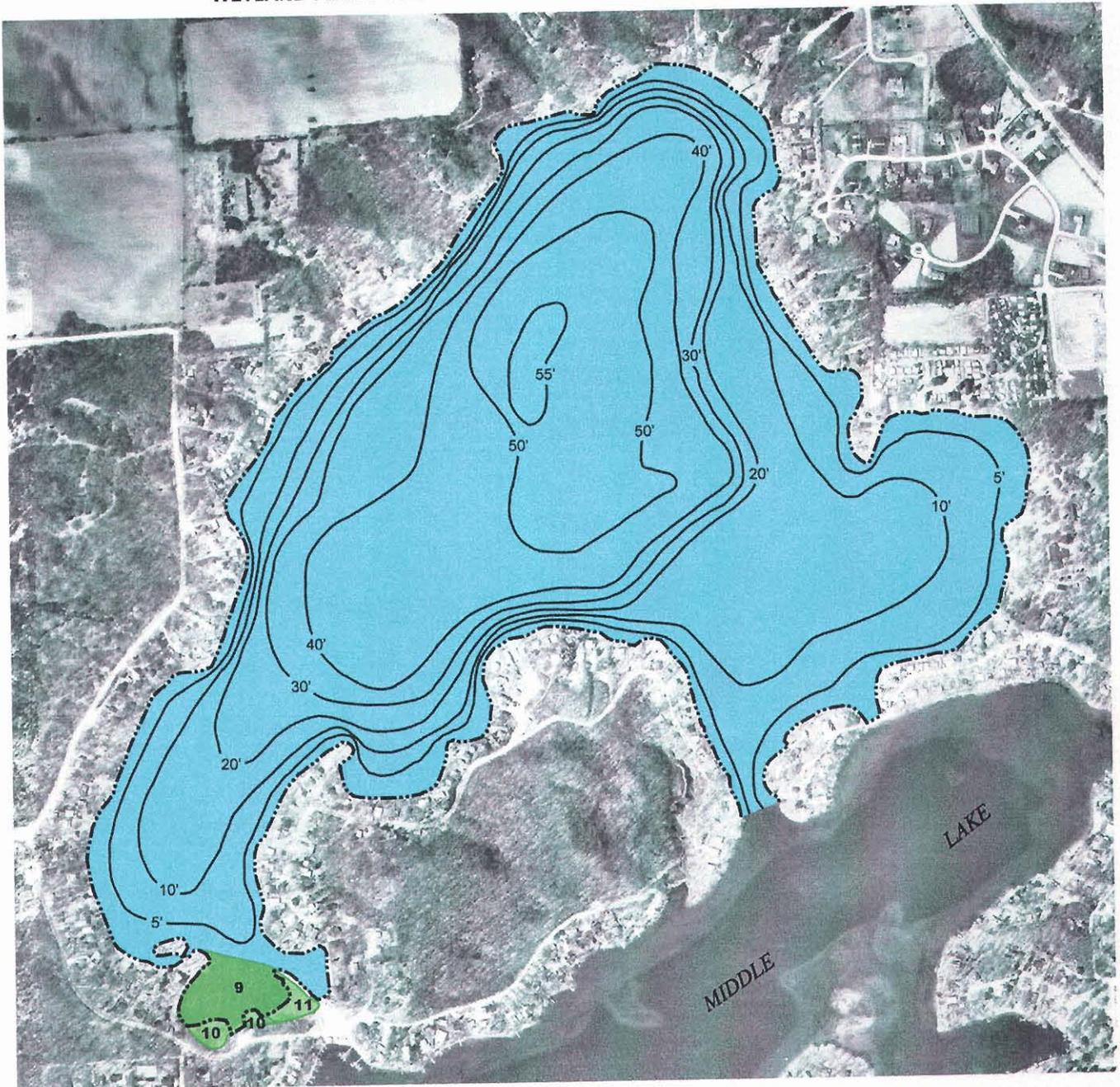
Conservation Service.¹⁷ The Wisconsin Department of Natural Resources, pursuant to Chapter 23 of the *Wisconsin Statutes*, defines a wetland as “an area where water is at or near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation, and which has soils indicative of wet conditions.” This latter definition may include some very poorly drained, poorly drained, or somewhat poorly drained soils¹⁸ as wetland soils that meet the Department’s “wet condition” criterion; the Regional Planning Commission would consider only very poorly drained and poorly drained soils as meeting the “hydric soil” criterion. Notwithstanding, as a practical matter, experience has shown that the application of all of these definitions produce reasonably consistent wetland identifications and delineations in a majority of situations within the Southeastern Wisconsin Region. This consistency is due in large part to the provision in the Federal wetland delineation manual which allows for the application of professional judgement in cases where the degree to which the three criteria for wetland identification is satisfied is unclear.

¹⁷ Lands designated as prior converted cropland, that is, lands that were cleared, drained, filled, or otherwise manipulated make them capable of supporting a commodity crop prior to December 23, 1985, may meet the criteria of the U.S. Natural Resource Conservation Service wetland definition, but they would not be regulated under Federal wetland programs. If such lands are not cropped, managed, or maintained for agricultural production, for five consecutive years, and in that time the land reverts back to wetland, the land would then be subject to Federal wetland regulations.

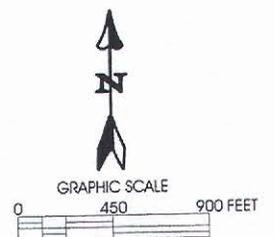
¹⁸ Although prior converted cropland is not subject to Federal wetland regulations unless cropping ceases for five consecutive years and the land reverts to a wetland condition, the State may consider prior converted cropland to be subject to State wetland regulations if the land meets the criteria set forth in the State wetland definition before it has been cropped for five consecutive years.

Map 11

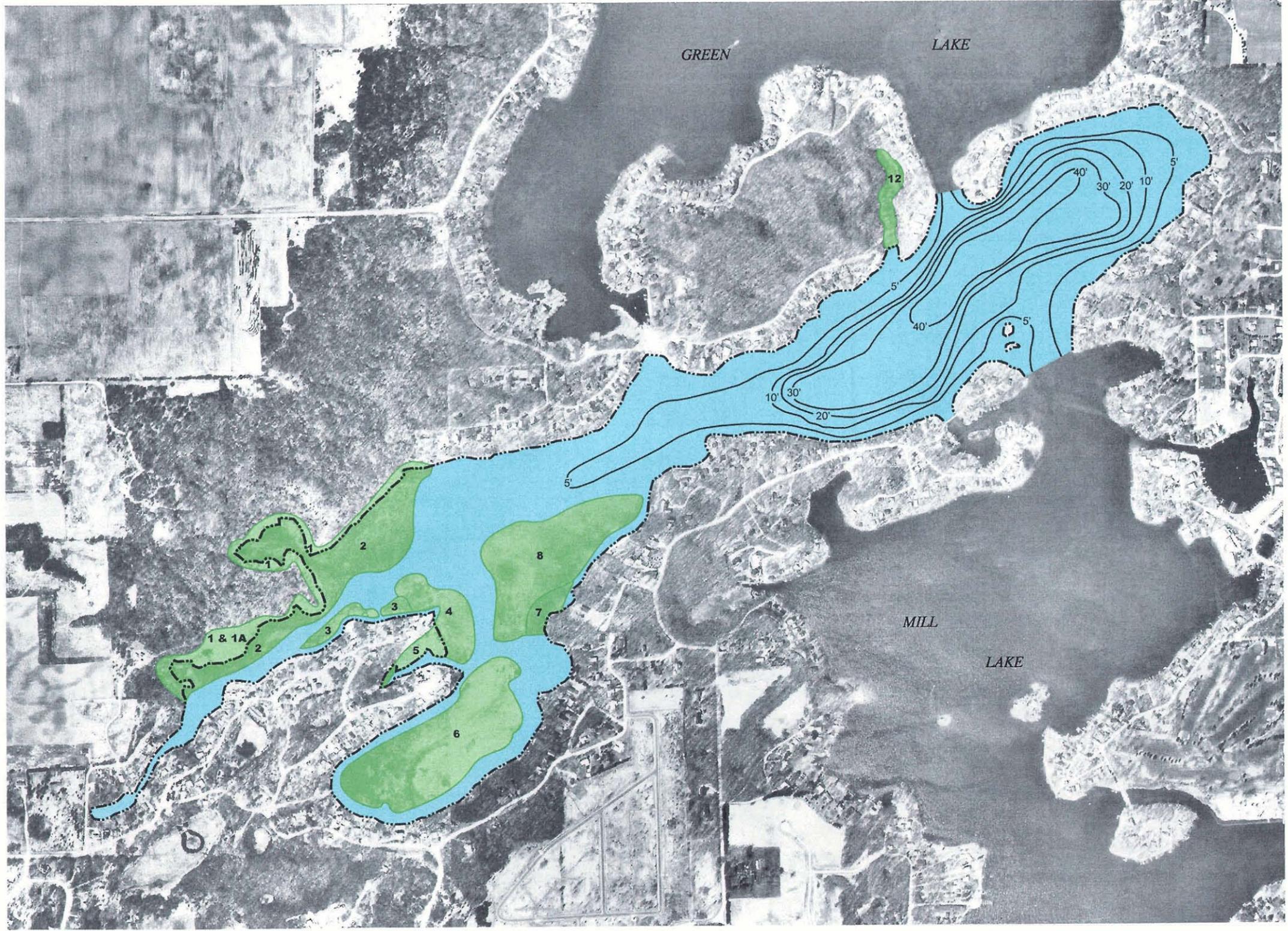
WETLAND PLANT COMMUNITY AREAS RIPARIAN TO GREEN LAKE: 2000



- 20'— WATER DEPTH CONTOUR IN FEET
- 10 WETLAND PLANT COMMUNITY AREA IDENTIFICATION NUMBER
- WETLAND PLANT COMMUNITY AREA

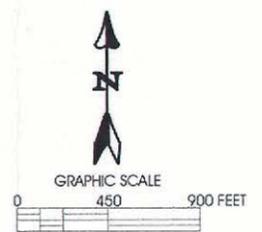


Source: SEWRPC.



Map 12
**WETLAND PLANT COMMUNITY
 AREAS RIPARIAN TO MIDDLE LAKE: 2000**

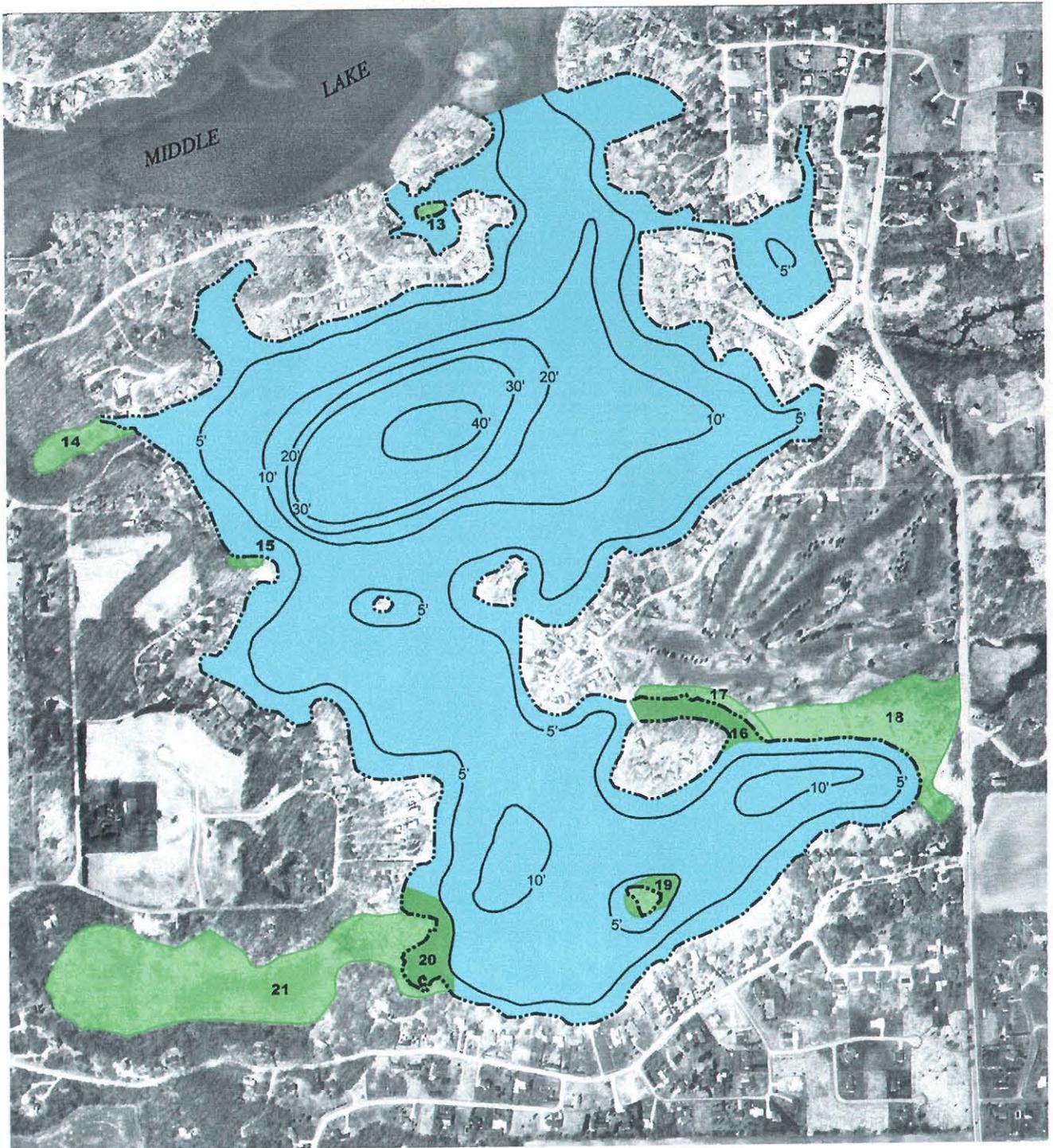
- 20'— WATER DEPTH CONTOUR IN FEET
- 3 WETLAND PLANT COMMUNITY AREA IDENTIFICATION NUMBER
- WETLAND PLANT COMMUNITY AREA



Source: SEWRPC.

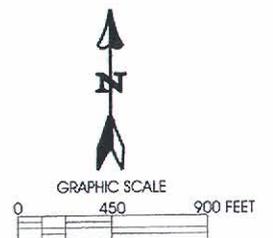
Map 13

WETLAND PLANT COMMUNITY AREAS RIPARIAN TO MILL LAKE: 2000



- 20'— WATER DEPTH CONTOUR IN FEET
- 4 WETLAND PLANT COMMUNITY AREA IDENTIFICATION NUMBER
- WETLAND PLANT COMMUNITY AREA

Source: SEWRPC.



Wetlands in Southeastern Wisconsin are classified predominantly as deep marsh, shallow marsh, southern sedge meadow, fresh (wet) meadow, shrub carr, alder thicket, low prairie, fen, bogs, southern wet- and wet-mesic hardwood forest, and conifer swamp. Wetlands affect the quality of water by acting as a filter or a buffer zone allowing silt and sediments to settle out. They also influence the quality of water by providing water during periods of drought and holding it back during periods of floods. When located along shorelines of lakes and streams, wetlands help protect those shorelines from erosion. Wetlands may also serve as groundwater discharge and recharge areas in addition to being important resources for overall ecological health and diversity by providing essential breeding and feeding grounds, shelter, and escape cover for many forms of fish and wildlife.

Wetlands are poorly suited to urban use. This is due to the high soil compressibility and instability, high water table, low load-bearing capacity, and high shrink-well potential of wetland soils, and, in some cases, to the potential for flooding. In addition, metal conduits placed in some types of wetland soils may be subject to rapid corrosion. These constraints, if ignored, may result in flooding, wet basements and excessive operation of sump pumps, unstable foundations, failing pavements, broken sewer lines, and excessive infiltration of clear water into sanitary sewerage systems. In addition, there are significant onsite preparations and maintenance costs associated with the development of wetlands, particularly as they relate to roads, foundations, and public utilities.

Wetland community types found in the Lauderdale Lakes area comprise a range of hydrologic conditions from open water; deep marsh; shallow marsh; southern sedge meadow; fresh (wet) meadow; and wet- and wet-mesic hardwood. Indeed, many of the more shallow areas of the Lauderdale Lakes system may be better defined as flooded wetlands or deep water marshland. The degree to which these deep water marshes overlap the aquatic plant communities within the Lauderdale Lakes may be seen through comparison of Maps 8 through 10 with Maps 11 through 13, which show the distributions of aquatic plant communities and wetland plant communities in the three Lakes comprising the Lauderdale Lakes system.

CHAPTER NR 107-DELINEATED SENSITIVE AREAS

Chapter NR 107 of the *Wisconsin Administrative Code* authorizes the Department of Natural Resources to restrict chemical treatment of aquatic plants in sensitive areas on lakes. Sensitive areas are defined by NR 107 as “areas of aquatic vegetation identified by the Department as offering critical or unique fish and wildlife habitat, including seasonal or life-stage requirements, or offering water quality or erosion control benefits of the body of water.” Sensitive areas can be located in and immediately adjacent to bodies of water. NR 107 also requires that alternatives to chemical treatment of aquatic plants be evaluated.

The Department surveyed the Lauderdale Lakes in 1990 to evaluate potential sensitive areas. Five sensitive areas were designated in June 1990, and are shown on Maps 14 through 16. Department management recommendations include prohibiting chemical treatment, filling, altering shoreland wetlands, and placing of aquatic plant screens and boardwalks within the delineated sensitive areas. Dredging and depositing sand blankets or pea gravel on the lakebed is prohibited in some sensitive areas and restricted in others. The Wisconsin Department of Natural Resources also recommends that mechanical harvesting be limited or avoided in the sensitive areas. The Wisconsin Department of Natural Resources management recommendations for the five Chapter NR 107-delineated sensitive areas in the Lauderdale Lakes basin are appended hereto as Appendix D.

FISHERIES

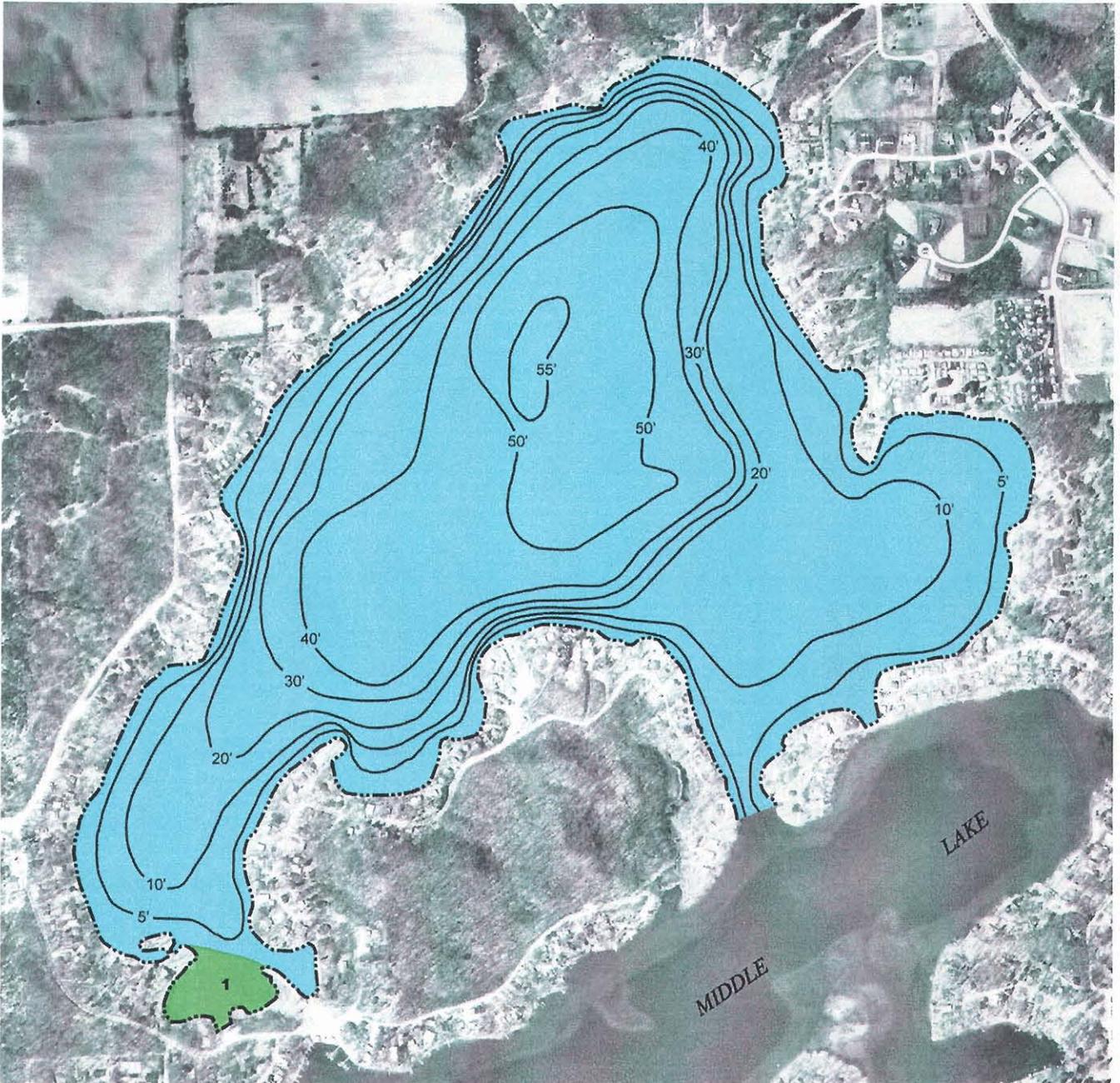
Wisconsin Department of Natural Resources conducted fish surveys between 1998 and 1999. These surveys identified 19 species of fish within the Lauderdale Lakes, as shown on Table 15. The results of these surveys indicated that bluegill were very abundant, largemouth bass were abundant, and rock bass, pumpkinseed and black crappie were common.¹⁹ Walleyed pike and northern pike were noted to be present within the system.²⁰

¹⁹*D.E. Welch and R. Dauffenbach, Fisheries Survey Report for the Lauderdale Lakes (WBIC 0755500), Walworth County, Wisconsin Department of Natural Resources, 2000.*

²⁰*Ibid.*

Map 14

WISCONSIN DEPARTMENT OF NATURAL
RESOURCES-DELINEATED SENSITIVE AREAS IN GREEN LAKE: 1990

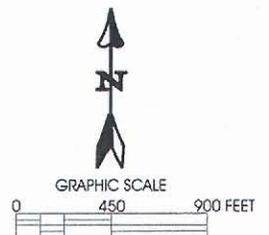


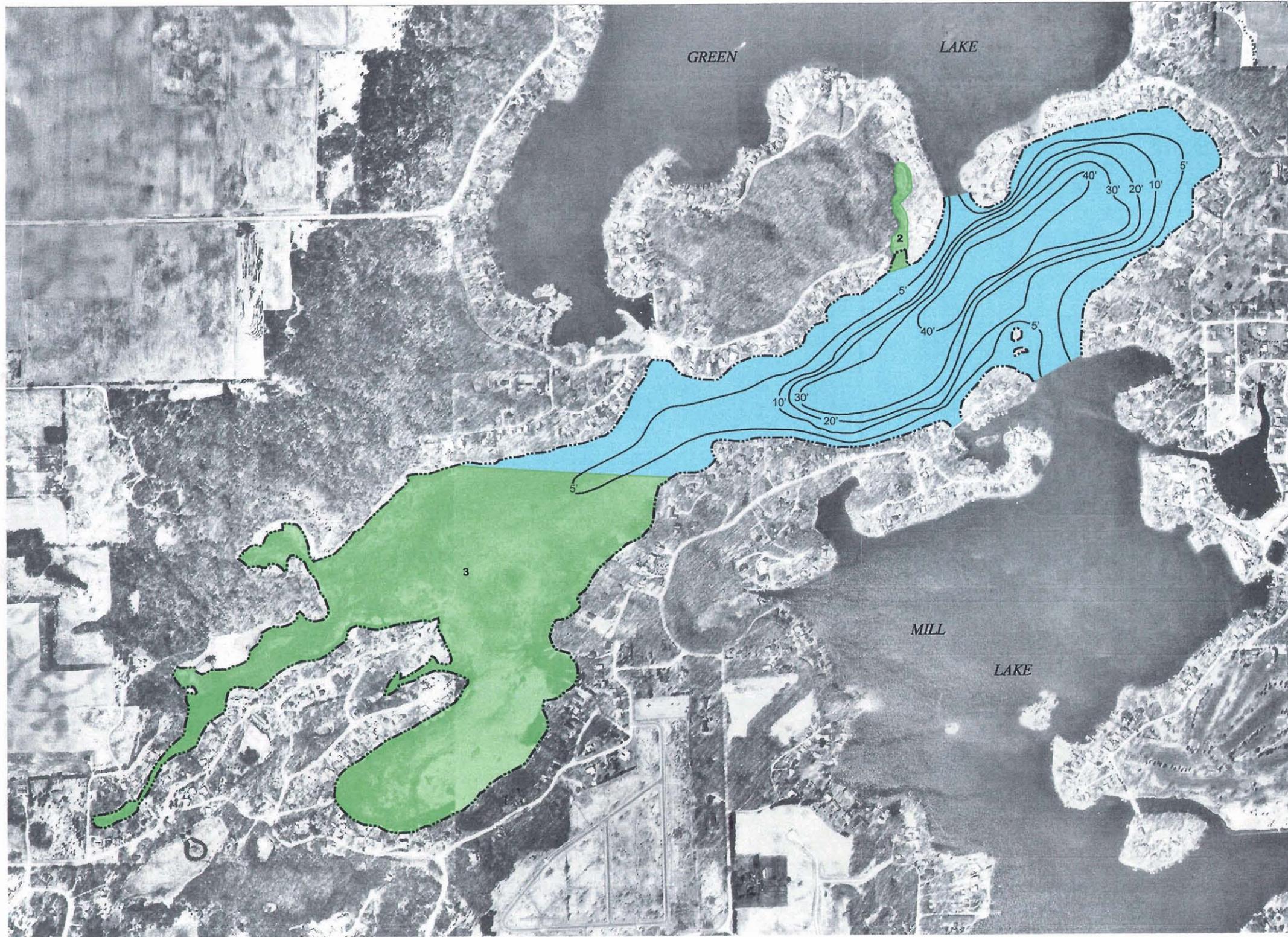
—20'— WATER DEPTH CONTOUR IN FEET

1 SENSITIVE AREA IDENTIFICATION NUMBER

 AREA OF AQUATIC VEGETATION OFFERING CRITICAL OR
UNIQUE FISH AND WILDLIFE HABITAT OR WATER QUALITY
OR EROSION CONTROL BENEFITS UNDER CHAPTER NR 107
OF THE WISCONSIN ADMINISTRATIVE CODE

Source: SEWRPC.

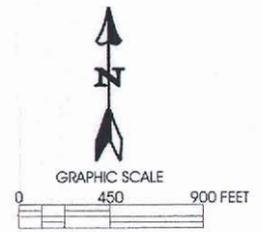




Map 15

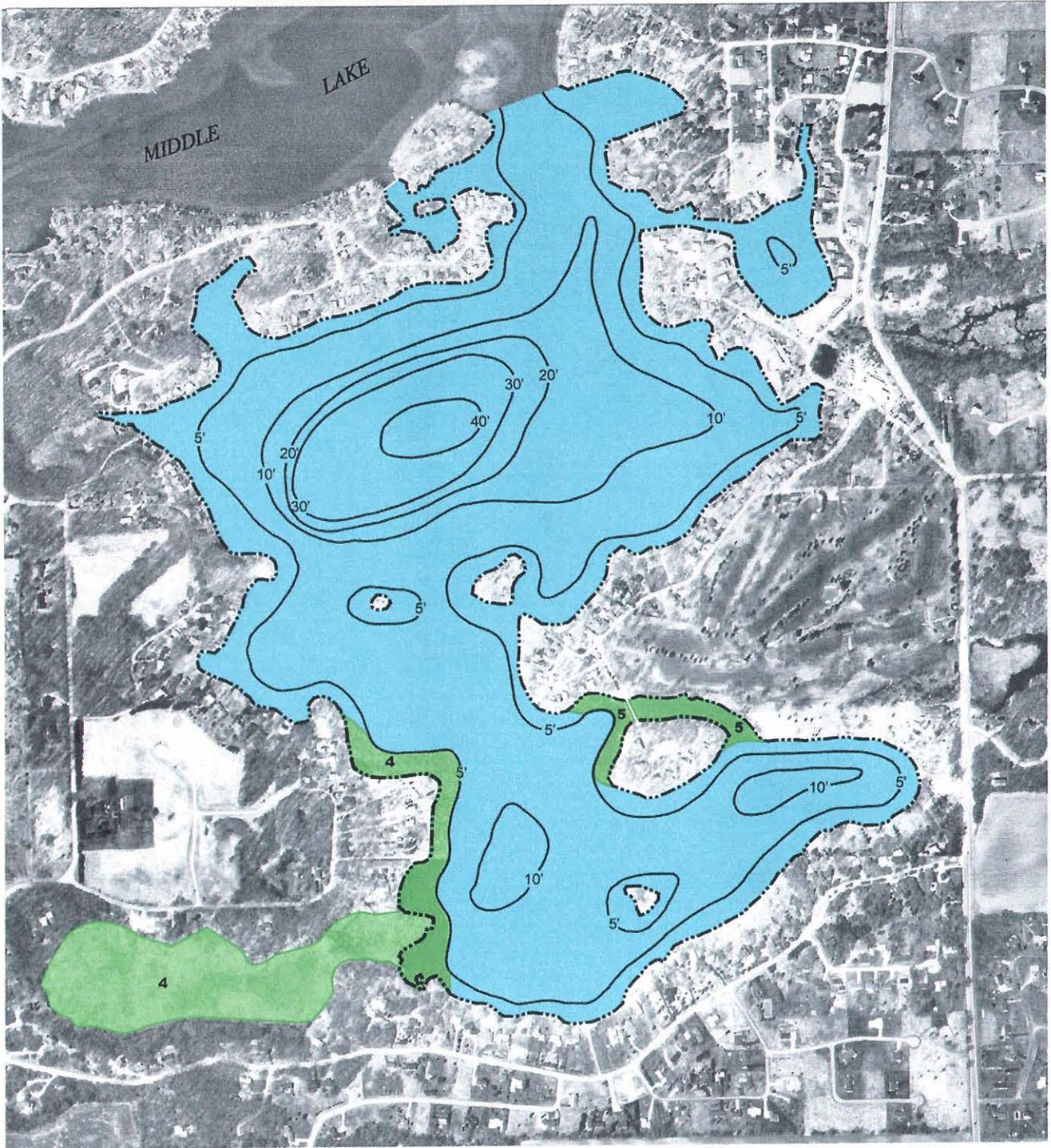
WISCONSIN DEPARTMENT OF
NATURAL RESOURCES-DELINEATED SENSITIVE
AREAS IN MIDDLE LAKE: 1990

- 20' — WATER DEPTH CONTOUR IN FEET
- 3 SENSITIVE AREA IDENTIFICATION NUMBER
- AREA OF AQUATIC VEGETATION OFFERING CRITICAL OR UNIQUE FISH AND WILDLIFE HABITAT OR WATER QUALITY OR EROSION CONTROL BENEFITS UNDER CHAPTER NR 107 OF THE WISCONSIN ADMINISTRATIVE CODE



Source: SEWRPC.

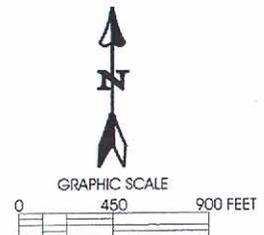
WISCONSIN DEPARTMENT OF NATURAL
RESOURCES-DELINEATED SENSITIVE AREAS IN MILL LAKE: 1990



— 20' — WATER DEPTH CONTOUR IN FEET

4 SENSITIVE AREA IDENTIFICATION NUMBER

 AREA OF AQUATIC VEGETATION OFFERING CRITICAL OR
UNIQUE FISH AND WILDLIFE HABITAT OR WATER QUALITY
OR EROSION CONTROL BENEFITS UNDER CHAPTER NR 107
OF THE WISCONSIN ADMINISTRATIVE CODE



Source: SEWRPC.

Table 15
FISH SPECIES IDENTIFIED IN
THE LAUDERDALE LAKES: 1999

Common Name	Scientific Name	Family Name
Brook Silverside	<i>Labidesthes sicculus</i>	Atherinidae
Bowfin	<i>Amia calva</i>	Amiidae
White Sucker	<i>Catostomus commersoni</i>	Catostomidae
Lake Chubsucker	<i>Erimyon sucetta</i>	Catostomidae
Warmouth	<i>Lepomis gulosus</i>	Centrarchidae
Bluegill	<i>Lepomis macrochirus</i>	Centrarchidae
Largemouth Bass	<i>Micropterus salmoides</i>	Centrarchidae
Pumpkinseed	<i>Lepomis gibbosus</i>	Centrarchidae
Green Sunfish	<i>Lepomis cyanellus</i>	Centrarchidae
Black Crappie	<i>Pomoxis nigromaculatus</i>	Centrarchidae
Rock Bass	<i>Ambloplites rupestris</i>	Centrarchidae
Golden Shiner	<i>Notemigonus crysoleucas</i>	Cyprinidae
Northern Pike	<i>Esox lucius</i>	Esocidae
Grass Pickerel	<i>Esox americanus</i>	Esocidae
Yellow Bullhead	<i>Ictalurus natalis</i>	Ictaluridae
Brown Bullhead	<i>Ictalurus nebulosus</i>	Ictaluridae
Longnose Gar	<i>Lepisosteus osseus</i>	Lepisosteidae
Yellow Perch	<i>Perca flavescens</i>	Percidae
Walleyed Pike	<i>Stizostedion vitreum vitreum</i>	Percidae

Source: Wisconsin Department of Natural Resources.

yellow perch; brown bullhead; johnny darter; lake chubsucker; bluntnose minnow; and unspecified sunfish. The adopted regional natural areas and critical species habitat protection and management plan reports the lake chubsucker as a State species of special concern.²³

Fish stocking of the Lauderdale Lakes was done privately in 1988 and 1989, and in 1998 the Wisconsin Department of Natural Resources stocked 602 adult walleyed pike.

WILDLIFE AND WATERFOWL

Given the low- and moderate-density,²⁴ single-family residential nature of much of the Lakes' shorelines, and the surrounding woodlands and wetlands in the vicinity, it is likely that the wildlife community is comprised of small upland game animals, such as rabbit and squirrel; predators, such as fox and raccoon; game birds, such as pheasant; marsh furbearers, such as muskrat; migratory and resident songbirds; marsh birds, such as redwinged blackbirds and great blue herons; and waterfowl. The character of wildlife species, along with the nature of the

²¹ Wisconsin Department of Natural Resources Publication No. PUBL-FH-800 99 Rev, Wisconsin Lakes, 1999.

²² D. Fago, Wisconsin Department of Natural Resources Research Report No. 148, Retrieval and Analysis used in Wisconsin's Statewide Fish Distribution Survey, Second Edition, December 1988.

²³ SEWRPC Planning Report No. 42, A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin, September 1997.

²⁴ SEWRPC Planning Report No. 40, A Regional Land Use Plan for Southeastern Wisconsin: 2010, January 1992, defines residential land use as follows: high-density—7.0 to 17.9 dwelling units per net residential acre, 0.15-acre lots or smaller; medium-density—2.3 to 6.9 dwelling units per net residential acre, 0.16- to 0.44-acre lots; low-density—0.7 to 2.2 dwelling units per net residential acre, 0.45- to 1.43-acre lots; and suburban-density—0.2 to 0.6 dwelling units per net residential acre, 1.44- to 5.0-acre lots.

These findings confirmed those reported in previous Wisconsin Department of Natural Resources publications which indicated that walleye are present, and northern pike, largemouth bass and panfish were common in Green, Middle, and Mill Lakes.²¹

Previous fisheries surveys conducted by the Wisconsin Department of Natural Resources within the Lauderdale Lakes provide a more detailed inventory of the fish species within the Lakes. The 1978 fisheries inventory²² indicated that the fish community in Green Lake was comprised of bluntnose minnow; fantail, rainbow and johnny darter; bluegill; banded killfish; blackchin, mimic and blacknose shiner; white sucker; largemouth bass; green sunfish; warmouth; bowfin; yellow perch; pumpkinseed; and brook silverside. The fish community in Middle Lake was reported to be comprised of mimic shiner, yellow perch, bluegill, banded killfish, blacknose and blackchin shiner, bluntnose minnow, and largemouth bass. Likewise, the fish community in Mill Lake was reported to be comprised of blacknose, blackchin, and golden shiner; grass pickerel; green sunfish; warmouth; largemouth bass; pumpkinseed; bluegill;

habitat present in the planning area has undergone significant change since the time of European settlement and the subsequent clearing of forests, plowing of the prairie, and filling or draining of wetlands for agricultural purposes. Modern practices that adversely affect wildlife and wildlife habitat include: the excessive use of fertilizers and pesticides, road salting, heavy traffic, the introduction of domestic animals, and the fragmentation and isolation of remaining habitat areas for urban and agricultural uses.

As shown on Map 17, wildlife habitat areas in the drainage area tributary to the Lauderdale Lakes generally occur in association with existing surface water, wetland, and woodland resources, shown on Map 18, located around the Lauderdale Lakes. Such areas covered about 1,220 acres, or about 20 percent of the drainage area. Of this total habitat acreage, about 348 acres, or about 6 percent, were rated as Class I habitat; about 330 acres, or about 5 percent, were rated as Class II habitat; and about 541 acres, or about 9 percent, were rated as Class III habitat.²⁵

The habitat areas shown on Map 17 are largely coincident with Commission-delineated environmental corridors in this watershed, as shown on Map 19. Primary environmental corridors extend over 751 acres, or about 12 percent of the drainage area tributary to the Lauderdale Lakes. Isolated natural resource features cover 148 acres, or about 2 percent of the drainage area. The Commission recommends that, to the extent practicable, primary environmental corridor lands should be maintained in essentially natural, open uses.²⁶

RECREATIONAL USES AND FACILITIES

The Lauderdale Lakes are multi-purpose use waterbodies serving all forms of recreation, including swimming, boating, and fishing in the summer months, and ice-skating, cross-country skiing, ice fishing, and snowmobiling in the winter months. The Lakes are used year-round as a visual amenity, walking and jogging, bird watching, and picnicking being popular passive recreational uses of the waterbodies.

Recreational use surveys were conducted by Commission staff on all three Lakes during the period between August 20 and 21, 1999. These surveys indicated that between 27 and 39 watercraft of all types were being operated on Green Lake. On Middle Lake, between 35 and 40 watercraft were being operated, while on Mill Lake between 26 and 51 watercraft were being operated. Watercraft being operated on these Lakes included fishing boats, pleasure boats of various types, such as pontoon boats, skiboats, sailing vessels, and personal watercraft. Tables 16 through 18 summarize the weekday and weekend boating usage on the Lakes.

In addition to the survey of recreational uses of the Lakes, a boat count was conducted during August of 1999 that indicated a total of 605 boats on Green Lake, 657 boats on Middle Lake, and 608 boats on Mill Lake, either moored in the water or stored on land adjacent to the Lakes. Of the total of 1,870 watercraft, the majority were powered boats of various types, as shown in Table 19. On Green Lake, there were 223 skiboats, 53 fishing boats, 111 pontoon boats, 55 canoes, 42 paddleboats, 28 sailboats, 92 personal watercraft, and one kayak. On Middle Lake, there were 168 skiboats, 106 fishing boats, 147 pontoon boats, 44 canoes, 70 paddleboats, 31 sailboats, 85 personal watercraft, 4 kayaks, and 1 barge. On Mill Lake, there were 204 skiboats, 71 fishing boats, 176 pontoon boats, 14 canoes, 23 paddleboats, 14 sailboats, 98 personal watercraft, three barges, and five vessels of undetermined types. Some of these watercraft were in operation at the time of the survey.

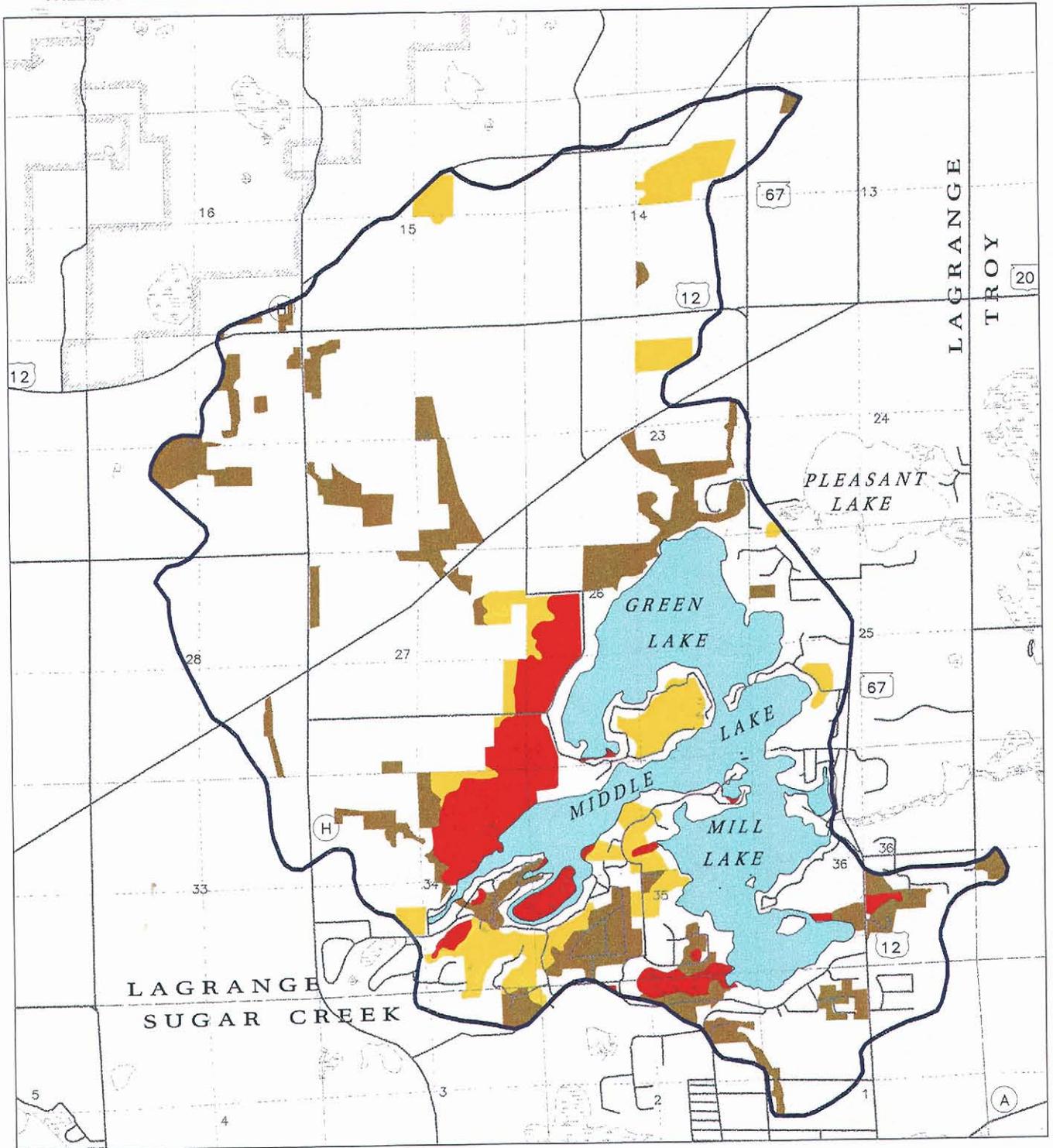
Public recreational boating access is provided at each Lake of the Lauderdale Lakes and is considered to be adequate public access pursuant to Chapter NR 1 of the *Wisconsin Administrative Code*. Recreational boating access sites on the Lauderdale Lakes are shown on Map 2.

²⁵For details on these classifications, see *SEWRPC Planning Report No. 40, A Regional Land Use Plan for Southeastern Wisconsin: 2010, January 1992*.

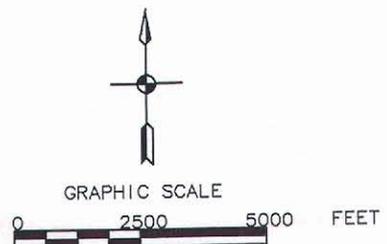
²⁶*SEWRPC Planning Report No. 40, A Regional Land Use Plan for Southeastern Wisconsin: 2010, January 1992, p. 438.*

Map 17

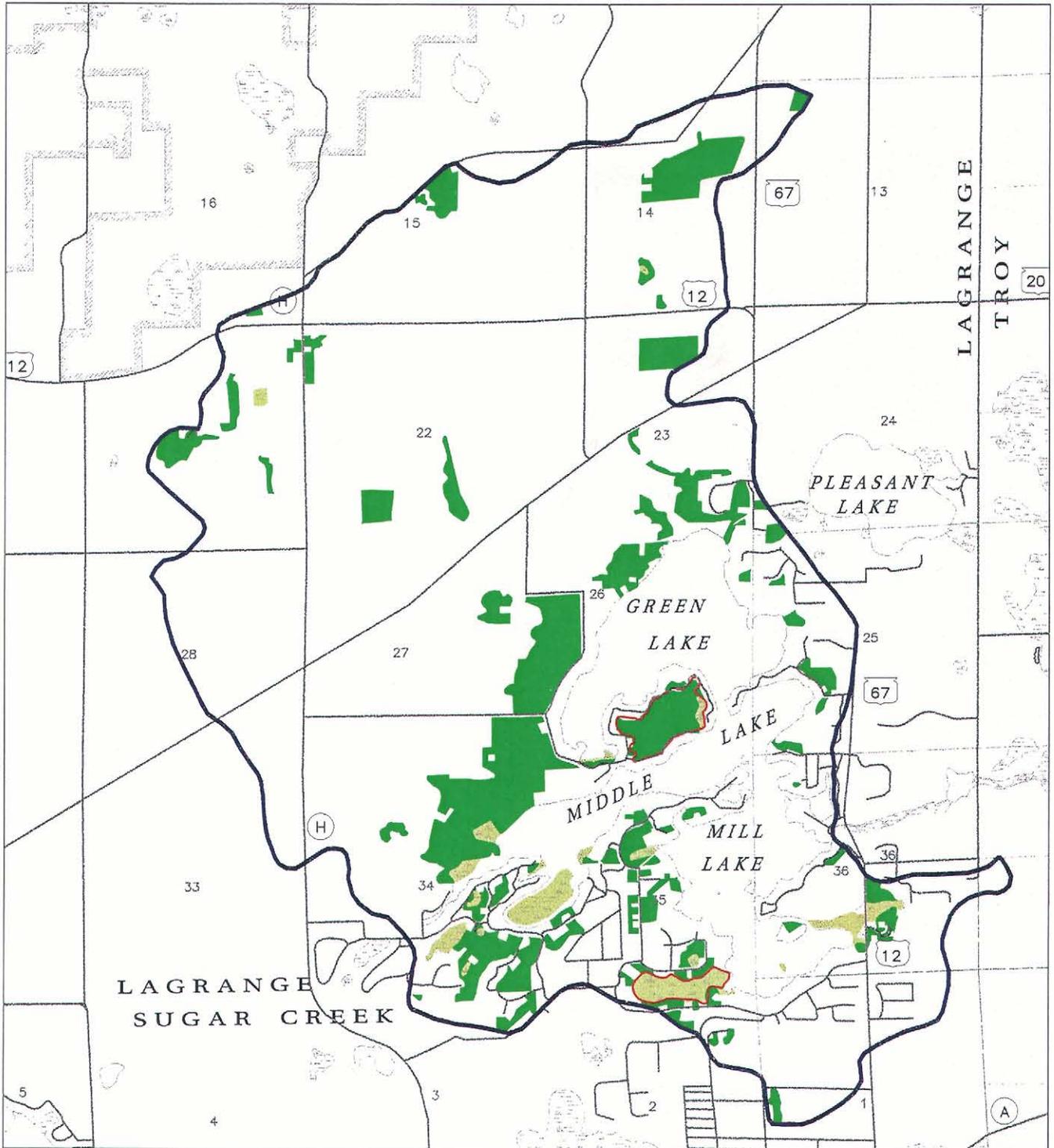
WILDLIFE HABITAT AREAS WITHIN THE DRAINAGE AREA TRIBUTARY TO THE LAUDERDALE LAKES: 1995



- Class I, high-value habitat
- Class II, medium-value habitat
- Class III, good-value habitat
- Surface Water

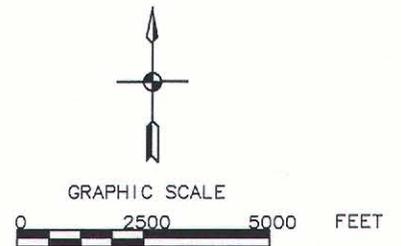


WOODLANDS AND WETLANDS WITHIN THE TOTAL TRIBUTARY DRAINAGE AREA TO THE LAUDERDALE LAKES: 1995



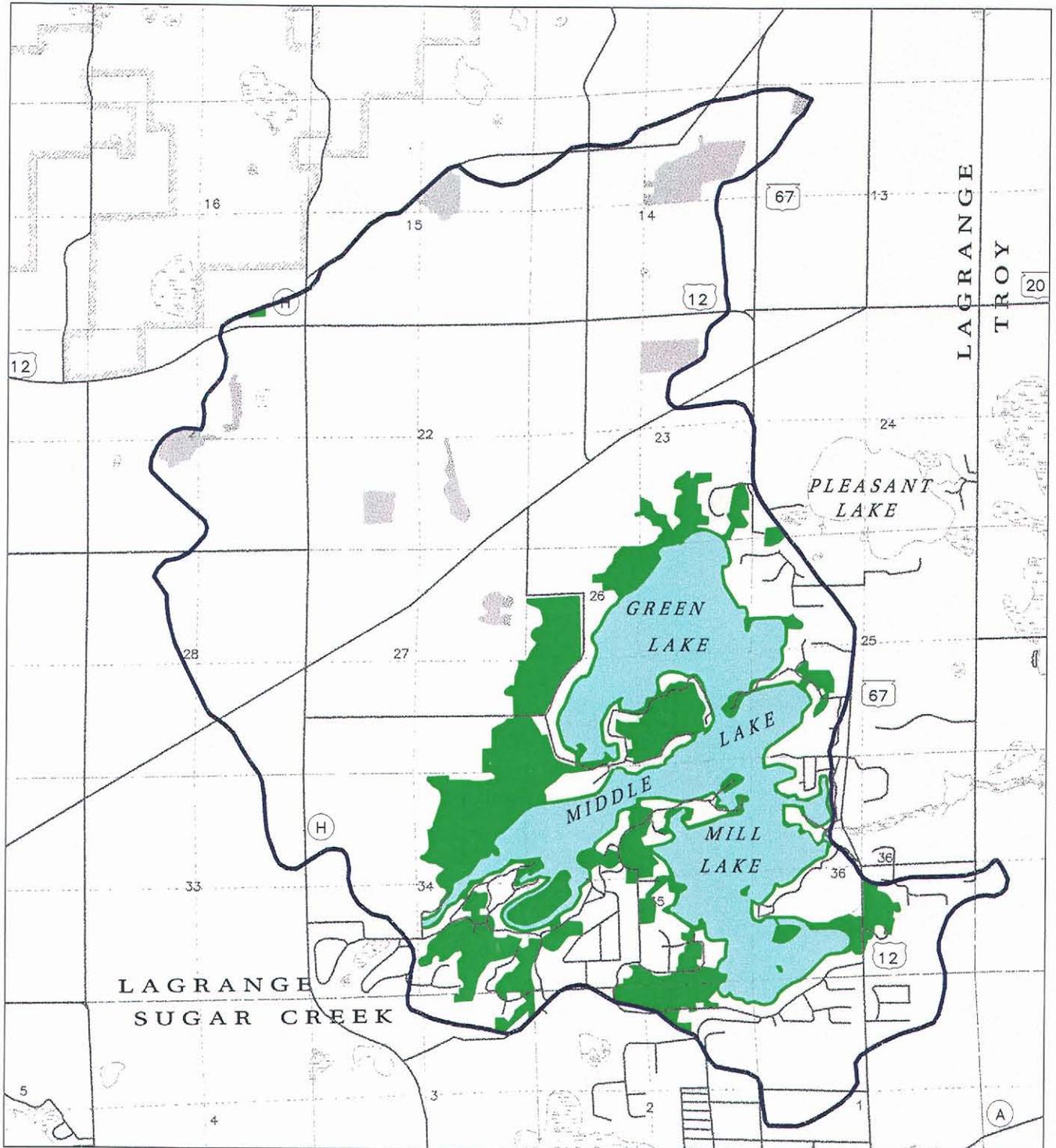
- Woodlands
- Wetlands
- Natural Area Boundary

Source: SEWRPC.



Map 19

ENVIRONMENTALLY VALUABLE AREAS WITHIN THE DRAINAGE
AREA TRIBUTARY TO THE LAUDERDALE LAKES: 1995



-  Primary Environmental Corridors
-  Secondary Environmental Corridors
-  Isolated Natural Resource Areas
-  Surface Water



GRAPHIC SCALE

0 2500 5000 FEET

Source: SEWRPC.

Table 16

BOATING USE SURVEY ON GREEN LAKE: 1999

Date and Time	Weekday Boating Activity (number of watercraft in use)						
	Fishing	Pleasure Boating	Skiing	Sailing	Jetskiing	Other	Total
August 20, 1999							
10:00 a.m. to 10:15 a.m.	2	3	0	1	1	0	5
1:00 p.m. to 1:15 p.m.	7	11	0	0	3	1	22
Total	9	14	0	1	4	1	27
Mean	4	7	0	0	2	0	13

Date and Time	Weekend Boating Activity (number of watercraft in use)						
	Fishing	Pleasure Boating	Skiing	Sailing	Jetskiing	Other	Total
August 21, 1999							
11:00 a.m. to 11:15 a.m.	3	7	2	0	0	1	13
2:30 p.m. to 2:45 p.m.	0	11	7	0	8	0	26
Total	3	18	9	0	8	1	39
Mean	1	9	4	0	4	0	19

Source: SEWRPC.

Table 17

BOATING USE SURVEY ON MIDDLE LAKE: 1999

Date and Time	Weekday Boating Activity (number of watercraft in use)						
	Fishing	Pleasure Boating	Skiing	Sailing	Jetskiing	Other	Total
August 20, 1999							
10:30 a.m. to 10:45 a.m.	2	6	2	0	3	1	14
1:15 p.m. to 1:45 p.m.	2	13	3	0	3	0	21
Total	4	19	5	0	6	1	35
Mean	2	9	2	0	3	0	17

Date and Time	Weekend Boating Activity (number of watercraft in use)						
	Fishing	Pleasure Boating	Skiing	Sailing	Jetskiing	Other	Total
August 21, 1999							
11:15 a.m. to 11:30 a.m.	5	8	0	0	1	1	15
2:30 p.m. to 2:45 p.m.	4	8	7	0	5	1	25
Total	9	16	7	0	6	2	40
Mean	4	8	3	0	3	1	20

Source: SEWRPC.

Table 18

BOATING USE SURVEY ON MILL LAKE: 1999

Date and Time	Weekday Boating Activity (number of watercraft in use)						Total
	Fishing	Pleasure Boating	Skiing	Sailing	Jetskiing	Other	
August 20, 1999							
10:45 a.m. to 11:00 a.m.	1	0	1	0	1	0	3
1:30 p.m. to 1:45 p.m.	3	14	1	0	5	0	23
Total	4	14	2	0	6	0	26
Mean	2	7	1	0	3	0	13

Date and Time	Weekend Boating Activity (number of watercraft in use)						Total
	Fishing	Pleasure Boating	Skiing	Sailing	Jetskiing	Other	
August 21, 1999							
11:30 a.m. to 11:45 a.m.	3	10	5	0	4	0	22
2:15 p.m. to 2:30 p.m.	2	7	8	0	12	0	29
Total	5	17	13	0	16	0	51
Mean	2	8	6	0	8	0	25

Source: SEWRPC.

Table 19

WATERCRAFT ON THE LAUDERDALE LAKES: 1999

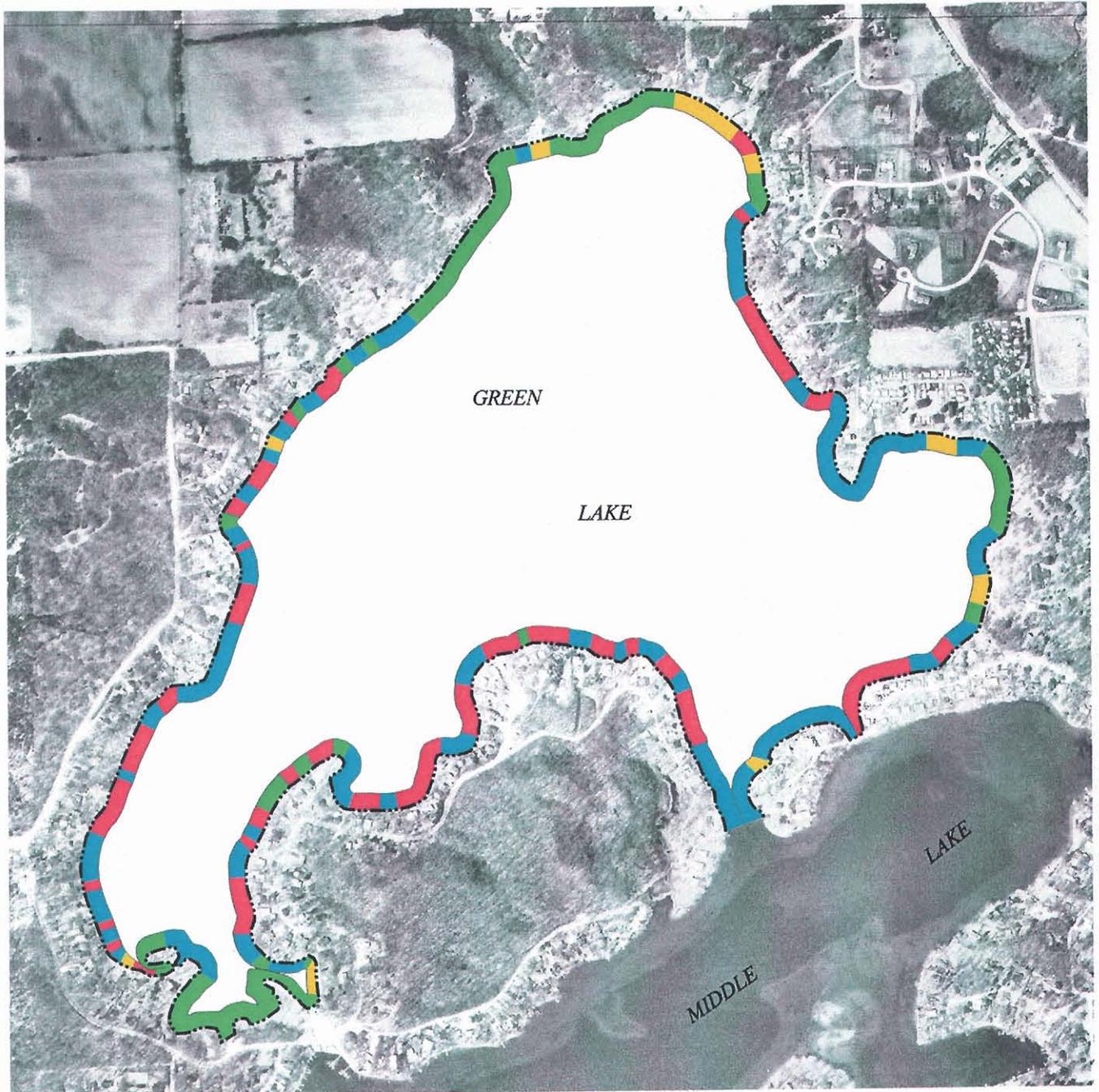
Lake	Type of Watercraft								Total
	Power Boat	Fishing Boat	Pontoon Boat	Canoe	Paddle Boat	Sailboat	Jetski	Other	
Green Lake.....	223	53	111	55	42	28	92	1	605
Middle Lake.....	168	106	147	44	70	31	85	6	657
Mill Lake.....	204	71	176	14	23	14	98	8	608
Total	595	230	434	113	135	73	275	15	1,870

Source: SEWRPC.

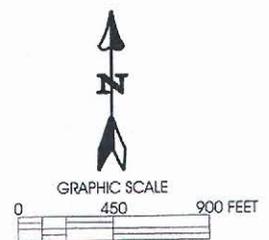
SHORELINE PROTECTION STRUCTURES

The need for maintenance of the shoreline in order to avoid erosion is important in order to protect the structure and functioning of the aquatic ecosystem of the Lakes, and, especially, to preserve the nearshore and wetland aquatic vegetation in and around the Lakes. Such protections also contribute to preserving and enhancing water quality and the essential structure and functioning of the waterbody and adjacent areas, and provide habitat for fishes and other aquatic life. Certain shoreland landscaping practices have also been shown to be effective deterrents to resident waterfowl populations, as well as attractive means of preserving and providing habitat for

SHORELINE PROTECTION STRUCTURES ON GREEN LAKE: 1999



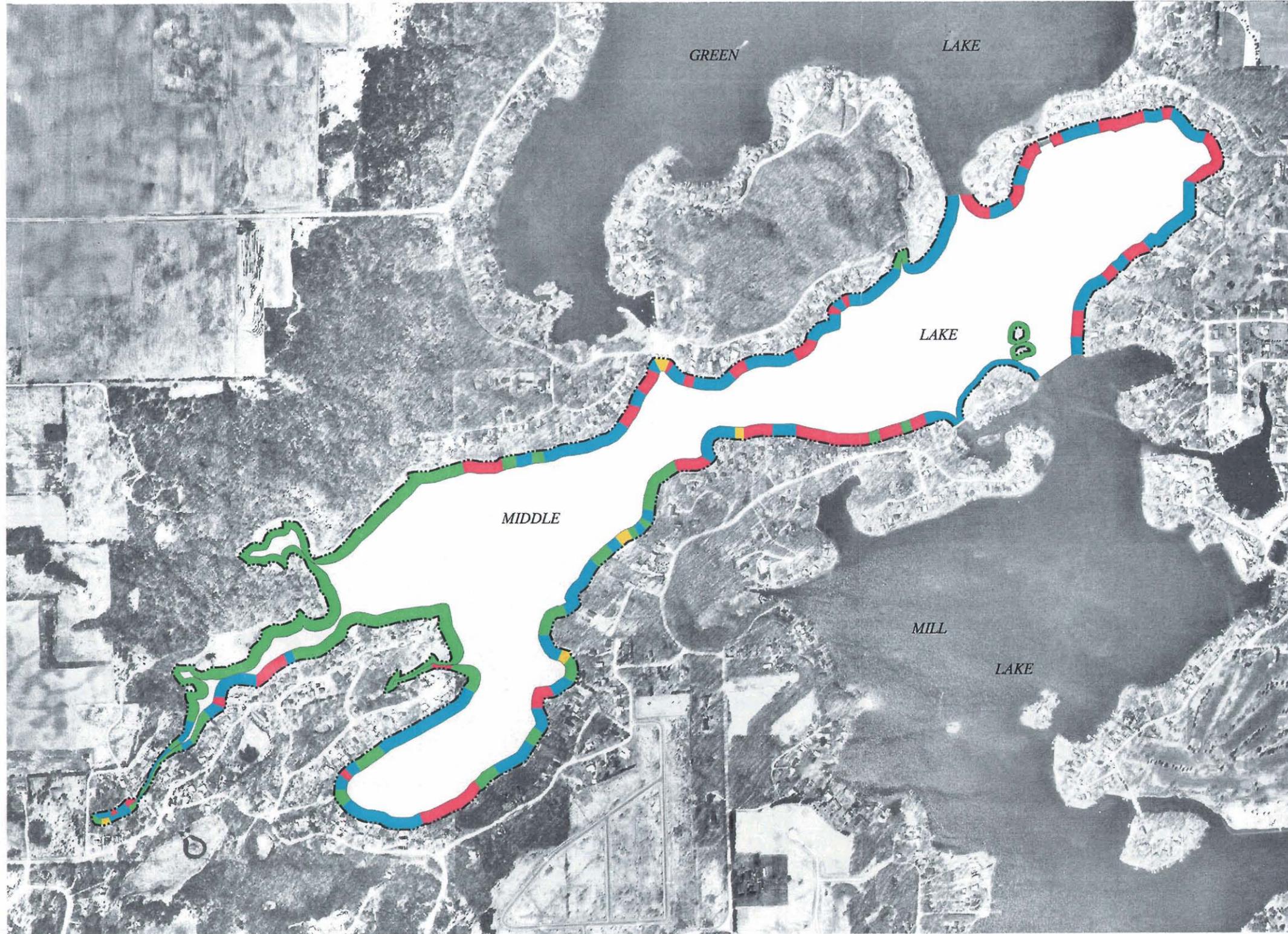
-  RIPRAP
-  BULKHEAD
-  BEACH
-  NATURAL



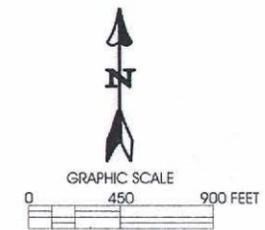
Source: SEWRPC.

Map 21

SHORELINE PROTECTION STRUCTURES ON GREEN LAKE: 1999

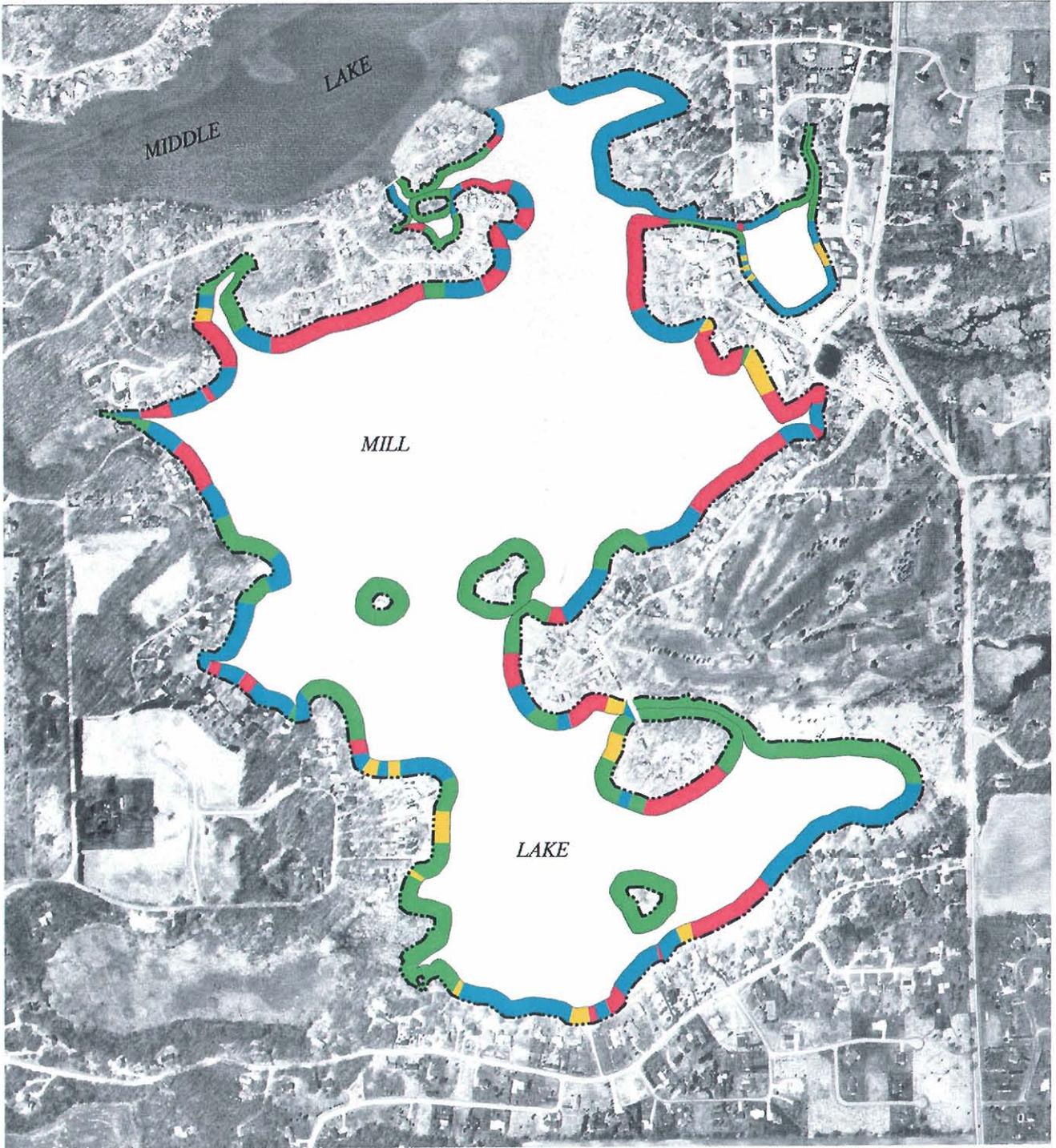


- RIPRAP
- BULKHEAD
- BEACH
- NATURAL

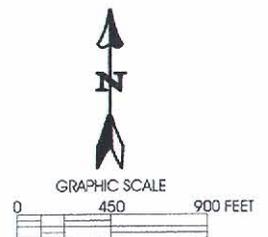


Source: SEWRPC.

SHORELINE PROTECTION STRUCTURES ON MILL LAKE: 1999



-  RIPRAP
-  BULKHEAD
-  BEACH
-  NATURAL



Source: SEWRPC.

desirable aquatic species. A survey of the Lauderdale Lakes shoreline, conducted by Commission staff in August of 1999, identified the shoreline as having a combination of riprap, bulkhead, and natural shoreline, with small scattered areas of beach, as shown on Maps 20 through 22. At present, no obvious erosion-related problems were encountered. Although some areas of natural shoreline, especially with steep slopes, may be experiencing minor to moderate erosion.

LOCAL ORDINANCES

The Lauderdale Lakes are subject to a boating ordinance promulgated by the Town of LaGrange. This ordinance provides generally applicable rules for all waters within the jurisdiction of the District, as set forth in Appendix E. These rules limit the times during which boats may operate on the Lauderdale Lakes and allow for the enactment and enforcement of boating restrictions and limitations. The ordinance conforms to State of Wisconsin boating and water safety laws pursuant to Chapter 30, *Wisconsin Statutes*.

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Chapter III

ALTERNATIVE AND RECOMMENDED AQUATIC PLANT MANAGEMENT PRACTICES

INTRODUCTION

The abundance of aquatic plants, including Eurasian water milfoil, continues to be perceived as a nuisance by users of the Lauderdale Lakes. In addition, there are other localized recreational use problems experienced in various areas of the Lakes. These problems depend on the uses in those portions of the Lakes, but generally involve the abundant growths of coontail and Eurasian water milfoil. These plants often grow to the surface of the Lakes, limiting certain recreational uses in those areas of the Lakes, in addition to impairing the aesthetic quality of the Lakes. These plants primarily interfere with recreational boating activities by clogging propellers and cooling water intakes, and likewise impair slow boating activity. Without control measures, these areas could become impassable.

In addition to the impacts on boating activities, fishing and swimming activities on the Lakes are also adversely affected by aquatic plant growth. This is especially of concern in those areas of the Lakes where Eurasian water milfoil occurs at swimming depths. Native aquatic plants, generally found at slightly deeper depths pose less severe potential problems for swimming. Fishing areas are similarly affected by growths of Eurasian water milfoil in the Lakes. In addition, however, the abundance and virtually exclusive, monospecific stands of Eurasian water milfoil limit fish habitat, providing few food resources and little shelter.

In general, the abundance of aquatic plants throughout the lake basin is perceived as adversely affecting the aesthetic enjoyment of lake residents and visitors to the Lakes. Thus, aquatic plant management is an important issue to be considered.

The Lauderdale Lakes and their tributary drainage areas also contain ecologically valuable areas, including significant areas of diverse, native aquatic vegetation suitable for fish spawning which are located within, and immediately adjacent to, the Lakes. Notwithstanding, the Lauderdale Lakes community has expressed concern over the perceived degradation of these resources. Two potential problems associated with ecologically valuable areas in and near the Lauderdale Lakes have been identified. These include: the potential loss of wetlands and other ecologically valuable areas due to urbanization or other encroachments; and the degradation of wetlands and aquatic habitat due to the presence of invasive species, primarily Eurasian water milfoil and purple loosestrife. Thus, management of ecologically valuable areas in and adjacent to the Lakes is an important issue to be considered.

The ecologically valuable areas within the drainage area tributary to Lauderdale Lakes, as documented in Chapter II, include wetlands, woodlands, and wildlife habitat. Most of these areas are included in the lands designated as environmental corridors by the Regional Planning Commission. Riparian wetland areas and aquatic macrophyte beds also are generally included within Chapter NR 107 sensitive areas delineated by the Wisconsin Department of Natural Resources. These critical sites include prime fish spawning habitat and macrophyte beds, especially those containing a diverse native flora, within the Lakes, and shoreline areas supporting productive aquatic and wetland habitat, as described in Chapter II. As noted above, these areas largely lie along the western shorelines of the Lakes. Protection of these areas is an important issue that should be considered.

Important areas of high-quality woodland and wetland have been designated within the adopted regional natural areas and critical species habitat protection and management plan.¹ The Baywood Road Sedge Meadow and the Island Woods, both located adjacent to the Lauderdale Lakes, have been designated as natural areas of local significance. The Baywood Road Sedge Meadow, located adjacent to the western shoreline of Mill Lake, is a 29-acre sedge meadow and shallow marsh complex that is currently under private ownership. This good-quality sedge meadow is associated with a shallow marsh complex and contains a variety of calciphilic plant species. The Island Woods, located on the northwestern shore of Middle Lake, adjacent to and south of Green Lake, is a 46-acre good-quality dry-mesic woods currently under private and protective ownership. The Lauderdale Lakes Woods, a 45-acre dry-mesic woods currently under private ownership, have been designated as a critical species habitat area in the plan as State-listed threatened plant species and plant species of special concern have been identified within this woodland. The protection of these resources from intrusion by incompatible land uses which degrade and destroy their environmental values, and the preservation of the corridors in an essentially open and natural state, is an important issue to be considered.

The existing lake management measures being carried out by the Lauderdale Lakes Lake Management District pursuant to their current aquatic plant management plan for the Lauderdale Lakes were set forth in Chapter II of this report.² In this chapter, alternatives and recommended refinements to that existing plan are described. Alternative plant management measures for wetland areas as well as in-lake areas of the Lauderdale Lakes system are presented. The alternatives and recommendations set forth herein are focussed on those measures which are applicable to the Lauderdale Lakes Lake Management District, and the Towns of LaGrange and Sugar Creek, with lesser emphasis given to measures which are applicable to others with jurisdiction within the drainage area tributary to the Lauderdale Lakes.

WETLAND MANAGEMENT ALTERNATIVES

Wetland plant management refers to a group of management and restoration measures aimed at both removal of nuisance vegetation and manipulation of species composition in order to enhance and provide for the protection and maintenance of the biodiversity of the Lauderdale Lakes and its tributary drainage area. Protection of ecologically valuable areas and wetlands is generally best accomplished through land use control measures, public acquisition, or acquisition of conservation easements. In addition, certain in-lake management measures could be used to moderate deleterious changes in the aquatic plant and animal communities that comprise the lakeward portions of the ecologically valuable areas within the Lake basins. Citizen informational and educational programming also forms an important element of the management of environmentally valuable areas within and riparian to the Lauderdale Lakes by encouraging actions on the part of riparian residents and residents within the drainage area tributary to Lauderdale Lakes that would benefit from the maintenance of ecologically valuable areas within the Lake.

Land Use Management Alternatives

The recommended future land use condition for the drainage area tributary to the Lauderdale Lakes is set forth in the adopted regional, Town of LaGrange, and Town of Sugar Creek land use plans.³ These plans recommend the

¹*SEWRPC Planning Report No. 42, A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin, September 1997.*

²*Integrated Lakes Management, Lauderdale Lakes Aquatic Plant Distribution, July 1989; R.A. Smith & Associates, Inc., and Applied Technologies, Inc., Final Report for the Lauderdale Lakes Area 1 Wastewater Feasibility Study for the Lauderdale Lakes Management District, March 1992.*

³*SEWRPC Planning Report No. 45, A Regional Land Use Plan for Southeastern Wisconsin: 2020, December 1997; SEWRPC Community Assistance Planning Report No. 168, A Land Use Plan for the Town of LaGrange: 2010, March 1991; SEWRPC Community Assistance Planning Report No. 220, A Land Use Plan for the Town of Sugar Creek: 2010, Walworth County, Wisconsin, August 1995.*

preservation of primary environmental corridor lands in essentially natural, open space use. The delineated environmental corridors contain most of the wetlands and other ecologically valuable lands adjacent to the Lauderdale Lakes and within the drainage area tributary to the Lauderdale Lakes. Recommended protection measures include the placement of these lands in appropriate zoning districts, depending upon the type and character of the natural resource features to be preserved and protected.

All lakes, rivers, streams, wetlands, and associated undeveloped floodlands and shorelands are recommended to be placed in conservancy or floodplain protection districts. The existing Walworth County zoning for the lands in the vicinity of Lauderdale Lakes and in the drainage area tributary to Lauderdale Lakes is generally consistent with the recommended future land use pattern set forth in the aforementioned land use plans.

The Walworth County zoning for the drainage area tributary to Lauderdale Lakes generally provides for conservancy zoning of wetland portions of the primary environmental corridors, within the C-1 and C-4, lowland resource conservation zoning districts, with the C-4 lowland resource conservation district applying to shoreland wetland areas. These districts prohibit residential and commercial developments. C-4 designated lands include the Lakes and the western shoreland portions of Middle and Mill Lakes that encompass the good-quality wetland plant communities identified in the regional natural areas and critical species habitat protection and management plan and Wisconsin Department of Natural Resources-delineated sensitive areas. Upland areas adjoining these sites are largely zoned as C-2, upland resource conservation district, as noted below. Portions of the drainage area between Green Lake and Middle Lake, and immediately south of Mill Lake, as well as portions of the eastern shorelands of Green and Mill Lakes, are zoned as P-1, recreational park lands, which permit more intensive recreational usage as principal and conditional uses under the Walworth County zoning code. The Lauderdale Lakes Country Club golf course is so designated.

The upland portions of the drainage area are predominately included in the R-1, single-family residential zoning district, which provides for low-density, single-family residential development; the C-2, upland resource conservation zoning district, which permits residential development at very low densities; and the A-1, prime agricultural, and A-2, agricultural, zoning districts. The R-1 single-family residential zoning district permits development of homestead properties on lots with a minimum area of 40,000 square feet, where soil conditions allow placement of onsite sewage disposal systems, similar requirements apply to lands identified as agricultural rural residential lands, designated as A-5 in the Walworth County code, within the drainage area tributary to the Lauderdale Lakes. Lands designated as C-2 provide for a minimum lot size of five acres, while those designated as A-1 and A-2 provide for a minimum area of 35 acres and 20 acres, respectively. Portions of these upland areas include lands identified in the regional natural areas and critical species habitat protection and management plan as upland areas of specific concern. Other lands have been placed within the B-2, general business; B-3, waterfront business; B-5, planned commercial recreation; and, B-6, bed and breakfast zoning districts. All land uses within the B-3 and B-5 zoning districts are subject to a conditional use permit under the Walworth County zoning ordinance. Limited multi-family housing, designated as being within the R-4 Multi-Family zoning district, exists in the vicinity of the eastern shore of Mill Lake, adjacent to Sterlingworth Bay.

Where environmentally valuable lands are threatened by encroachment or degradation, the purchase of specific critical properties or the acquisition of conservation easements could be considered. Land acquisition, as a means of protecting environmentally valuable lands from encroachment or further degradation, or as a means of facilitating their rehabilitation and restoration, is possible with funds provided through the Chapters NR 50/51 Stewardship Grant Program and Chapter NR 191 Lake Protection Grant Program. Outright purchase, or the purchase of conservation easements, are both possible options. Lands proposed for purchase must be appraised using standard governmental land acquisition procedures as established by the Wisconsin Department of Natural Resources, and must be subject to a land management plan setting forth the processes and procedures for their long-term maintenance and development. The Chapter NR 191 grant program provides State cost-share funding for the purchase up to a maximum State share of \$200,000 at up to a 75 percent State cost-share. The Chapter NR 50/51 grant program provides State cost-share funding up to a maximum State share of \$100,000 at up to a 50 percent cost-share.

Shoreland and In-Lake Management Alternatives

There is significant overlap between lands designated as wetland under current State definitions and areas with aquatic plant communities. These areas include shallow nearshore areas within the shoreland zone of the Lakes. While the management of aquatic plant communities is discussed below, various potential in-lake management actions may be considered for purposes of management of environmentally valuable wetland areas within this shoreland zone. These potential management measures include physical, chemical and biological controls. Measures, such as the use of chemical herbicides, require permits from the Wisconsin Department of Natural Resources. In addition, citizen informational and educational programming should be considered as an essential aspect of the management of environmentally valuable lands within the drainage area tributary to the Lauderdale Lakes.

Manual Harvesting

The physical removal of specific types of vegetation by selective harvesting of plants provides an highly selective means of controlling the growths of nuisance upland and wetland plant species, including purple loosestrife, reed canary grass, buckthorn and other invasive plants. Bagging and cutting loosestrife plants, for example, prior to the application of chemical herbicides to the cut stems, can be an effective control measure for small infestations of this plant. Loosestrife management programs, however, should be followed by an annual monitoring and control program for up to 10 years following the initial control program to manage the regrowth of the plant from seeds. For other nonnative invasive plant species, selective cutting of shrubs and small trees, in the case of buckthorn, can likewise remove nuisance species from the midst of native plants without causing significant disruption of the habitat area. This procedure may require the limited application of a herbicide to the remaining plant materials for effective long-term control. Such applications should not be carried out within or immediately adjacent to a water environment without a Wisconsin Department of Natural Resources permit; a County permit also may be required for removal of trees and other shoreland vegetation.

In the nearshore area, specially designed rakes are available to assist in the removal of nuisance aquatic plants from the shoreline area. The use of such rakes also provides a safe and convenient method of controlling aquatic plants in deeper nearshore waters around piers and docks. Should the Lauderdale Lakes Lake Management District acquire a number of these specially designed rakes, they could be made available for the riparian owners to use on a trial basis to test their operability before purchasing them. The advantage of the rake is that it is easy and quick to use, immediately removing the plants.

In larger areas, repeated mowing or occasional burning can be effective means of managing larger prairie areas, although prairie burns require trained personnel and would be likely to require local permits prior to this measure being used. Physical or manual controls of nuisance species in shoreland wetland areas of the Lauderdale Lakes are considered to be a viable management option.

Chemical Herbicides

Chemical treatment with herbicides is a short-term method of controlling heavy growths of nuisance plants. The use of herbicides can potentially damage or destroy nontarget plant species that provide habitat for other wildlife and shoreland organisms. Widespread chemical treatments can also provide an advantage to less desirable, invasive, introduced plant species to the extent that they may outcompete the more beneficial, native species. Hence, this is not a feasible management option to be used on a large scale. However, chemical control is often a viable technique for the control of the relatively small-scale infestations of purple loosestrife and certain other plants. Chemicals are generally applied to the growing plants in liquid form. Chemical treatment can be administered at a relatively low cost and is, therefore, considered to be a viable management option.

Biological Controls

An alternative approach to controlling nuisance weed conditions, particularly in the case of purple loosestrife, is biological control. Classical biological control has been successfully used to control both weeds and herbivorous

insects.⁴ Recent evidence shows that *Galerucella pucilla* and *Galerucella californiensis*, beetle species, and *Hylobius transversovittatus* and *Nanophyes brevis*, weevil species, have potential as biological control agents for purple loosestrife. Extensive field trials conducted by the Wisconsin Department of Natural Resources in the Southeastern Wisconsin Region during 1999 and 2000 have indicated that these insects can provide effective management of large infestations of purple loosestrife. Therefore, the use of these insects as a means of wetland plant management is considered to be viable.

Shoreline Structures and Maintenance

The shorelines of the Lauderdale Lakes presents a largely natural aspect to lake users and residents. As described in Chapter II, the shorelines of the Lauderdale Lakes did not appear to be subject to any significant erosion. However, residents did express concerns about the presence of waterfowl and aesthetic degradation arising from the activities of these waterfowl along the shorelands of the Lakes. These concerns indicated a need for alteration of current shoreland management practices employed on certain riparian lands. The need for maintenance of the shorelines in order to avoid erosion also is important in order to protect the structure and functioning of the aquatic ecosystem of the Lakes, and, especially, to preserve the nearshore and wetland aquatic vegetation in and around the Lakes. Such protections also contribute to preserving and enhancing water quality and the essential structure and functioning of the waterbody and adjacent areas, and provide habitat for fishes and other aquatic life. Certain shoreland landscaping practices have also been shown to be effective deterrents to resident waterfowl populations, as well as attractive means of preserving and providing habitat for desirable aquatic species.

Two options are generally recommended for shoreland protection; namely, the use of rip-rap to protect lands along active shorelines where erosion by wind waves, wakes of watercraft, and ice movement are anticipated; and the use of natural vegetation along less active shorelines. These options also should be considered in the repair or replacement of existing protection structures. These measures can be constructed or implemented, at least in part, by local residents using readily available construction materials. In addition, these measures would, in most cases, enable the continued use of the immediate shoreline, and create a visually "natural" or "semi-natural" aspect that would enhance the aesthetic qualities of the Lakes' shorelines. The use of taller, native grasses and plants would also discourage waterfowl and address, in part, the concerns expressed by lakeshore residents, while at the same time contributing to the preservation of the shoreland flora.

There are also a number of other control measures which can be considered to manage resident waterfowl populations. These measures include incorporating a component into the citizen information and education program directed toward both residents and nonresidents describing the problems related to feeding of waterfowl. The Wisconsin Department of Natural Resources and the U.S. Department of Agriculture have educational materials which are directed toward discouraging feeding and other management measures. Other management measures include:

- Modifying landscaping to allow grass to grow longer so it is unpalatable to birds, and planting vegetation which is less attractive to birds than grass;
- Installing barriers to limit access from water to adjacent grassy areas;
- Harassing the birds using decoys, noise generators or other devices, or, in selected cases, trained dogs;

⁴B. Moorman, "A Battle with Purple Loosestrife: A Beginner's Experience with Biological Control," *LakeLine*, volume 17, number 3, pages 20-21, 34-37, September 1997.

- Preventing nesting or disturbing nesting sites; and,
- In extreme cases, relocating birds, hunting or culling, controlled shooting for purposes of wildlife management.

If the problems associated with resident waterfowl persist, and become severe enough to warrant coordinated actions, the available management measures could be explored further by the Lauderdale Lakes Lake Management District. Assistance in evaluating alternatives may be available from the Wisconsin Department of Natural Resources and the U.S. Department of Agriculture Fish and Wildlife Service.

Citizen Information and Education

As part of the overall citizen informational and educational programming to be conducted in the Lauderdale Lakes community, residents and visitors in the vicinity of the Lauderdale Lakes should be made aware of the value of the ecologically significant areas in the overall structure and functioning of the ecosystems of the Lauderdale Lakes. Specifically, informational programming related to the protection of ecologically valuable areas in and around the Lauderdale Lakes should focus on need to minimize the spread of nuisance aquatic species, such as purple loosestrife in the wetlands and Eurasian water milfoil in the Lake. Other informational programming offered by the Lauderdale Lakes Lake Management District, the Wisconsin Department of Natural Resources, University of Wisconsin and University of Wisconsin-Extension (UWEX), and other agencies can contribute to an informed public, actively involved in the protection of ecologically valuable areas within the drainage area tributary to the Lauderdale Lakes. As noted above, the information and education program could include a component related to waterfowl management.

IN-LAKE AQUATIC PLANT MANAGEMENT ALTERNATIVES

Aquatic plant management⁵ refers to a group of management and restoration measures aimed at both removal of nuisance vegetation and manipulation of species composition in order to enhance and provide for recreational water use. Generally, aquatic plant management measures are classed into four groups; namely, physical measures which include water level management; manual and mechanical measures which include harvesting and removal; chemical measures which include using aquatic herbicides; and biological controls which include the use of various organisms, including insects. Of these, chemical control and biological controls are stringently regulated and require a State permit. Costs range from minimal for manual removal of plants using rakes and hand-pulling to upwards of \$100,000 for the purchase of a mechanical plant harvester and associated equipment, the operational costs for which can approach \$50,000 per year, depending on staffing and operating policies. Harvesting is probably the measure best applicable to large areas, while chemical controls may be best suited to confined areas and initial control of invasive plants. Planting of native plant species and control of Eurasian water milfoil by the weevil, *Eurhychiopsis lecontei*, are largely experimental in lakes, but can be considered in specialized shoreland areas. In addition, good housekeeping practices implemented in shoreland areas, on riparian properties, and within the drainage area tributary to the Lauderdale Lakes, encouraged through an active public informational and educational program, should be considered essential elements in any aquatic plant management plan. These options are discussed further below.

Aquatic Herbicides

Chemical treatment with aquatic herbicides is a short-term method of controlling heavy growths of aquatic macrophytes and algae. The use of herbicides can contribute to an ongoing aquatic plant problem by increasing the natural rates of accumulation of decaying organic matter, in turn contributing to an increased oxygen demand which may cause anoxia. The use of herbicides can also potentially damage or destroy nontarget plant species that

⁵U.S. Environmental Protection Agency Report No. EPA-440/4-90-006, The Lake and Reservoir Restoration Guidance Manual, August 1990.

provide needed habitat for fish and other aquatic organisms. As a result, less desirable, invasive, introduced plant species may outcompete the more beneficial, native species. Hence, this is not a feasible management option to be used on a large scale. However, chemical control is often a viable technique for the control of the relatively small-scale infestations of milfoil and certain other plants. Chemicals are applied to the growing plants in either liquid or granular form. Chemical treatment can be administered at a relatively low cost and is, therefore, considered a viable management option to continue. This measure is considered as viable for selected areas in the Lauderdale Lakes.

Aquatic Plant Harvesting

On the basis of the ongoing use of a mechanical harvester on the Lauderdale Lakes and the success of harvesting as an aquatic plant management technique in other major Lakes within the Southeastern Wisconsin Region, mechanical harvesting of aquatic plants appears to continue to be a practical and efficient means of controlling plant growth. Harvesting also has the added advantage of removing the plant biomass and its associated nutrients from the Lauderdale Lakes. Aquatic macrophytes are mechanically harvested with specialized equipment consisting of a cutting apparatus which cuts up to five feet below the water surface and a conveyor system that picks up the cut plants and hauls them to shore. Harvesting leaves enough plant material in the lake to provide shelter for fish and other aquatic organisms and to stabilize sediments. Mechanical harvesting does have some potentially negative impacts to fish and other aquatic life, may cause fragmentation and spread of some plants, and could disturb loosely consolidated bottom sediments. However, if done correctly and carefully, it has shown to be of benefit in ultimately reducing the regrowth of nuisance plants. Mechanical harvesting is a recommended method to continue as a control of aquatic plants in the Lauderdale Lakes.

Manual Harvesting

Due to an inadequate depth of water, it is not always possible for harvesters to reach the shoreline of every property. Another measure involves the purchase of a dozen specially designed rakes that are designed to manually remove aquatic plants from the shoreline area. The rakes may be made available for the riparian owners to use on a trial basis to test their operability before purchasing them. The advantage of the rake is that it is easy and quick to use, immediately removing the plants where as chemical treatment involves a waiting period. Using this method also removes the plants from the lake, avoiding the accumulation of organic matter on the lake bottom adding to the nutrients that favor more plant growth. This method also gives the harvester more time to cover larger areas of the lake as maneuvering between the piers takes time and skill.

Biological Controls

Biological controls provide another alternative approach to controlling nuisance aquatic plant growths, particularly in the case of Eurasian water milfoil. Classical biological control has been successfully used to control both nuisance plants and herbivorous insects.⁶ Recent documentation states that *Eurhychiopsis lecontei*, an aquatic weevil species, has potential as a biological control agent for Eurasian water milfoil.⁷ However, as very few studies have been completed using *Eurhychiopsis lecontei* as a means of aquatic plant management control, it is not recommended for use on the Lauderdale Lakes at this time. The Wisconsin Department of Natural Resources is conducting an evaluation of this measure on several Wisconsin lakes on an experimental basis. The findings of that program may be considered in the future to evaluate the viability of this measure to the Lauderdale Lakes. Grass carp, *Ctenopharyngodon idella*, an alternative biological control used elsewhere in the United States, are not permitted in Wisconsin.

⁶C.B. Huffacker, D.L. Dahlsen, D.H. Janzen, and G.G. Kennedy, *Insect Influences in the Regulation of Plant Population and Communities*, 1984, pp. 659-696; C.B. Huffacker and R.L. Rabb, editors, *Ecological Entomology*, John Wiley, New York, New York, USA.

⁷Sally P. Sheldon, "The Potential for Biological Control of Eurasian Water Milfoil (*Myriophyllum spicatum*) 1990-1995 Final Report," Department of Biology Middlebury College, February 1995.

Lake Bottom Covering

Lake bottom covers and light screens provide limited control of rooted plants by creating a physical barrier which reduces or eliminates the sunlight available to the plants. They have been used to create swimming beaches on muddy shores, to improve the appearance of lakefront property, and to open channels for motorboating. Sand and gravel are usually readily available and relatively inexpensive to use as cover materials, but plants readily recolonize areas so covered in about a year. Synthetic material, such as polyethylene, polypropylene, fiberglass, and nylon can provide relief from rooted plants for several years. Because of the limitations involved, lake bottom covering as a method to control aquatic plant growth are not recommended for the Lauderdale Lakes.

Boating Ordinances

The promulgation of more stringent controls on the use of powered watercraft within the Lauderdale Lakes is one means of regulating the conduct of boat traffic that could be harmful to the most important ecologically valuable areas in the Lake. These areas include the western portions of the Middle Lake and Mill Lake basins where the greatest diversity of native aquatic plant species occur. Controls on boat traffic could limit boating activity within these specific areas of the Lakes to defined traffic lanes to minimize the disturbance and propagation of nuisance plant species by the operation of watercraft. Boating ordinances enacted in conformity with State law must be clearly posted at public landings in accordance with the requirements of Section 30.77(4) of the *Wisconsin Statutes*. Placement of regulatory markers must conform to Section NR 5.09 of the *Wisconsin Administrative Code*, only regulatory markers are enforceable, informational buoys are not enforceable. Creation of boating access lanes is considered to be a viable alternative.

Public Informational and Educational Programming

Aquatic plant management usually centers on the eradication of nuisance aquatic plants for the improvement of recreational lake use. The majority of the public views all aquatic plants as “weeds” and residents often spend considerable time and money removing desirable plant species from a lake without considering their environmental impacts. Thus, public information is an important component of an aquatic plant management program. Posters and pamphlets are available from the University of Wisconsin-Extension and Wisconsin Department of Natural Resources that provide information and illustrations of aquatic plants, their importance in providing habitat and food resources aquatic environments, and the need to control the spread of undesirable and nuisance plant species.

RECOMMENDED WETLAND AND AQUATIC PLANT MANAGEMENT MEASURES

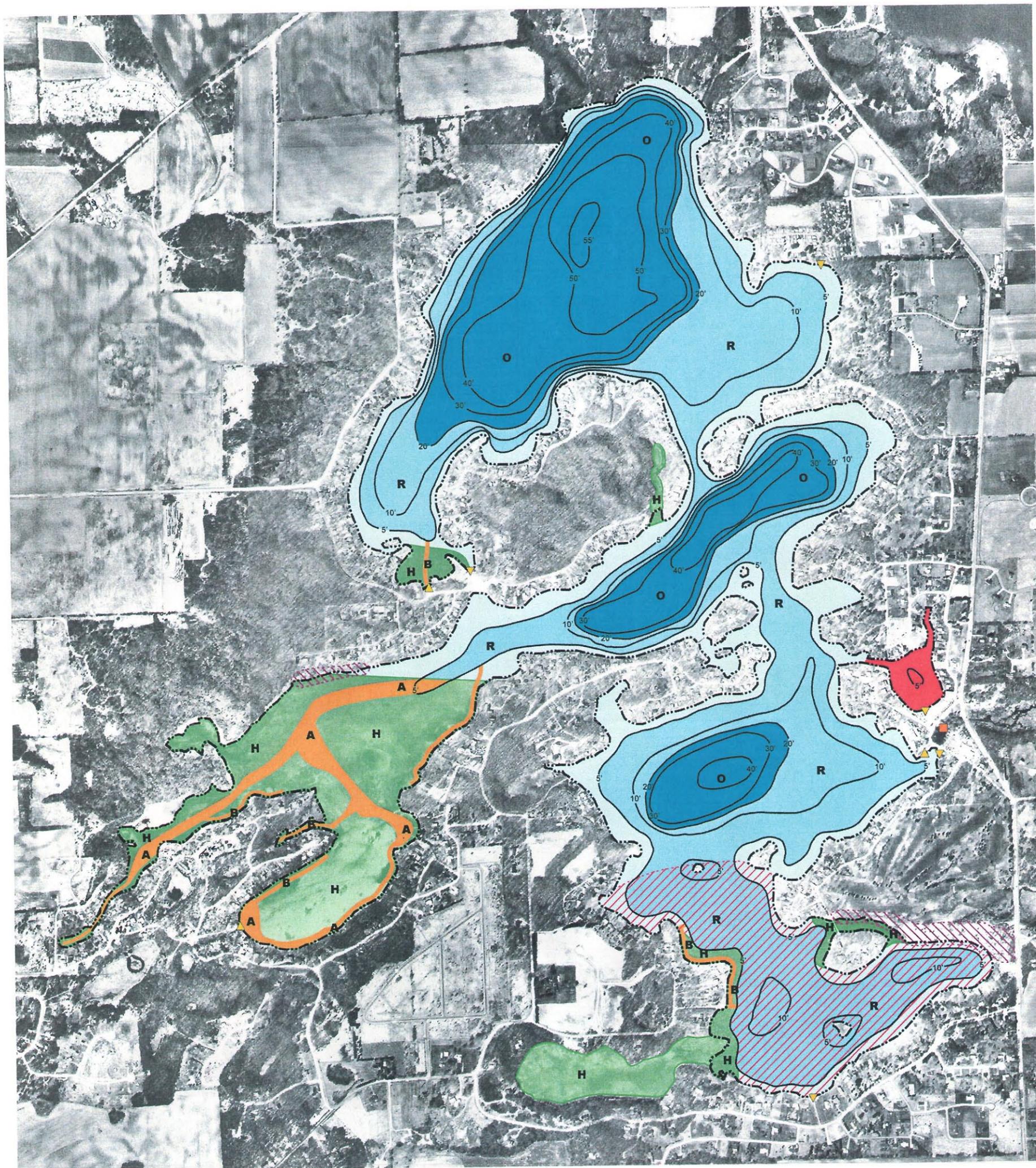
The goal of the wetland and aquatic plant management program on the Lauderdale Lakes is to accommodate recreational uses of the Lakes to the extent practicable, without inflicting irreparable damage to the ecosystem of the Lakes and its structure and functioning. To accomplish this goal, specific control measures are recommended to be applied in various areas of the Lakes. The recommended Lauderdale Lakes aquatic and wetland plant management measures are graphically summarized on Map 23, and the recommended measures are summarized in Tables 20 and 21. It is recommended that the Lauderdale Lakes Lake Management District continue to take the lead in implementing the refined aquatic plant management plan.

Wetland and Related Land Management Measures

The recommended future condition land use plan for the drainage area tributary to the Lauderdale Lakes is set forth in the adopted regional and local land use plans.⁸ Those plans recommend the preservation of primary

⁸*SEWRPC Planning Report No. 45, A Regional Land Use Plan for Southeastern Wisconsin: 2020, December 1997; SEWRPC Community Assistance Planning Report No. 168, A Land Use Plan for the Town of LaGrange: 2010, March 1991; SEWRPC Community Assistance Planning Report No. 220, A Land Use Plan for the Town of Sugar Creek: 2010, Walworth County, Wisconsin, August 1995.*

RECOMMENDED AQUATIC PLANT MANAGEMENT PLAN FOR THE LAUDERDALE LAKES



- 20'— WATER DEPTH CONTOUR IN FEET
- WATER LEVEL CONTROL STRUCTURE
- ▲ PUBLIC-ACCESS SITE AND HARVESTER OFF-LOAD AREA
- ▼ PRIVATE-ACCESS SITE
- A** NAVIGATIONAL ACCESS LANES, 50 FEET WIDE TO 5 FOOT DEPTH CONTOUR
HARVESTING: HIGH PRIORITY
CHEMICALS: NONE
- B** SHARED BOATING ACCESS, 15 FEET WIDE TO 5 FOOT DEPTH CONTOUR OR JUNCTION WITH NAVIGATIONAL ACCESS LANE
HARVESTING: MODERATE PRIORITY
CHEMICALS: NONE
- H** AREA OF AQUATIC VEGETATION OFFERING CRITICAL OR UNIQUE FISH AND WILDLIFE HABITAT OR WATER QUALITY OR EROSION CONTROL BENEFITS UNDER CHAPTER NR 107 OF THE WISCONSIN ADMINISTRATIVE CODE
HARVESTING: ACCESS CHANNELS ONLY
CHEMICALS: NONE

Source: SEWRPC.

- LITTORAL ZONE MAINTAIN SHORELINE PROTECTION STRUCTURES AS NECESSARY: INSTALL VEGETATION BUFFERS
HARVESTING: MANUAL AROUND PIERS AND DOCKS
CHEMICALS: LIMITED
- R** RECREATIONAL AREA
HARVESTING: LOW PRIORITY, SURFACE CUT FOR EURASIAN WATER MILFOIL CONTROL
CHEMICALS: NONE
- O** OPEN WATER AREA
HARVESTING: NONE
CHEMICALS: NONE
- EURASIAN WATER MILFOIL CONTROL AREA
HARVESTING: MODERATE PRIORITY
CHEMICALS: LIMITED
- ▨ EURASIAN WATER MILFOIL MANAGEMENT AREA
HARVESTING: MODERATE PRIORITY
CHEMICALS: NONE
- ▨ PURPLE LOOSESTRIFE MANAGEMENT AREA
HARVESTING: NONE
CHEMICALS: LIMITED

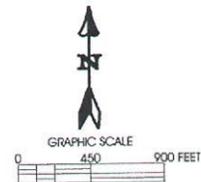


Table 20

RECOMMENDED AQUATIC PLANT MANAGEMENT PLAN ELEMENTS FOR THE LAUDERDALE LAKES

Plan Element	Subelement	Location	Management Measures	Initial Estimated Cost	Management Responsibility
Land Use Management	Land use zoning	Entire Watershed	Observe guidelines set forth in the regional and local land use plans, and Walworth County land and water resource management plan; maintain historic lakefront residential dwelling densities to the extent practicable; protect environmentally sensitive lands as recommended in the regional natural areas and critical species habitat protection and management plan	- ^a	Walworth County, Town of LaGrange, Town of Sugar Creek
	Ordinance enforcement	Entire Watershed	Enforce construction site erosion control, stormwater management, development control, and onsite sewage disposal system inspection and maintenance ordinances and programs	- ^a	Walworth County, The Lauderdale Lakes Lake Management District
Recreational Use Management	Recreational use zoning	Entire Lake—Zone R	Restrict recreational boating to prevent the spread of Eurasian water milfoil throughout the Lakes	\$ 500	The Lauderdale Lakes Lake Management District
	Nonnative aquatic plant management program	Eurasian water milfoil control zone, purple loosestrife control areas	Restrict recreational boating to prevent the spread of Eurasian water milfoil throughout the Lakes; limited use of herbicides in spring, manual removal during summer and fall recommended	-	The Lauderdale Lakes Lake Management District
	Public informational programming	Direct drainage area tributary to The Lauderdale Lakes	Continue public awareness and information programming	-	Walworth County and The Lauderdale Lakes Lake Management District
Aquatic Plant Management	Manual harvesting	Areas of nuisance growth—Zone B	Harvest nuisance plants, including Eurasian water milfoil and purple loosestrife, as required around docks and piers; collect plant fragments arising from boating and harvesting activities	- ^b	The Lauderdale Lakes Lake Management District
	Mechanical harvesting	Areas of nuisance growth—Zones A and B	Harvest nuisance plants, including Eurasian water milfoil to maintain public recreational boating access and promote public safety and convenience	\$100,000 capital, plus \$20,000 operating ^c	The Lauderdale Lakes Lake Management District
	Chemical control of nonnative plants	Eurasian water milfoil control zone	Restrict recreational boating to prevent the spread of Eurasian water milfoil throughout the Lakes; limited use of herbicides in spring, manual removal during summer and fall recommended	\$5,000	The Lauderdale Lakes Lake Management District
	Public informational programming	Direct drainage area tributary to The Lauderdale Lakes	Continue public awareness and information programming; continue monitoring of aquatic plant communities	\$1,500 ^{c,d}	Walworth County and The Lauderdale Lakes Lake Management District
Institutional Development	Refine boundaries of the Lake Management District	Riparian area including lands within the direct drainage area	Consider future expansion of the District to include limited additional areas within the drainage basin directly tributary to the Lakes	\$ 500	Walworth County and The Lauderdale Lakes Lake Management District

^aRecommendation set forth in the regional land use, water quality management, and natural areas and critical species habitat protection and management plans. No specific cost allocation for the Lauderdale Lakes Lake Management District.

^bMeasures recommended generally involve low or no cost and would be borne by private property owners. Cost is included under public informational and educational component.

^cPartial funding available through the Wisconsin Department of Natural Resources grant programs.

^dPeriodic additional surveys are recommended at five- to 10-year intervals.

Source: SEWRPC.

Table 21

RECOMMENDED AQUATIC PLANT MANAGEMENT TREATMENTS FOR THE LAUDERDALE LAKES

Zone and Priority	Recommended Aquatic Plant Management Treatment
<p>Zone A (Navigational Access) High-Priority Harvesting</p>	<p>Harvesting limited to maintaining 50-foot-wide navigational channels from the public recreational boating access sites, to allow boat access to the open water areas of the Lauderdale Lakes</p> <p>Limited late season harvesting, late August to early September, may be necessary to maintain adequate open water areas to the central portions of the Lakes</p>
<p>Zone B (Boating) Moderate-Priority Harvesting</p>	<p>Harvesting limited to maintaining 15-foot-wide access channels connecting private piers and docks, and private recreational boating access sites, to the 50-foot-wide recreational boating navigational access channels and/or open water areas of the Lakes</p> <p>Limited late season harvesting, late August to early September, may be necessary to maintain adequate open water areas to the central portions of the Lakes</p>
<p>Zone H (Habitat) Limited Harvesting</p>	<p>It is recommended that selected areas of the Lake, designated as WDNR sensitive areas, be preserved as high-quality habitat area, subject to review by the WDNR as recommended in the lake management plan</p> <p>This zone and adjacent lands should be managed for fish habitat</p> <p>Limited harvesting and no in-lake chemical application should be permitted, except in special instances where selective herbicide application may be allowed for the control of nuisance species</p> <p>Debris and litter cleanup would be needed in some adjacent areas; the immediate shoreline should be preserved in natural, open use to the extent possible</p>
<p>Zone O (Open Water) No Harvesting</p>	<p>The entire area does not require plant management as water depths exceed the maximum depth of colonization of aquatic plants</p>
<p>Zone R (Recreational Access) High-Priority Harvesting</p>	<p>The entire area may not require intensive plant management^a</p> <p>Nuisance aquatic macrophyte growth within 150 feet of shoreline should be harvested to provide maximum opportunities for boating, fishing, and swimming</p> <p>Areas between piers should not be harvested due to potential liability and maneuverability problems. Residents should be encouraged to manually harvest aquatic plants in these areas</p> <p>Chemical use, if required, should be restricted to pier and dock areas and should not extend more than 100 feet from shore, subject to permit requirements, to control of nuisance species</p>

^aExcludes areas greater than 15 feet which require no harvesting.

Source: SEWRPC.

environmental corridor lands including their component wetlands and other ecologically valuable lands. The plans also recommend that such protection be afforded through the placement of these lands in appropriate zoning districts, depending upon the type and character of the natural resource features to be preserved and protected.

To this end, it is recommended that the Lauderdale Lakes Lake Management District, in cooperation with Walworth County and the Towns of LaGrange and Sugar Creek, support the preservation of the environmental

corridor lands in the drainage area tributary to Lauderdale Lakes in essentially natural, open-space uses, primarily through public land use controls. Such preservation should be promoted through the enforcement of existing Walworth County zoning regulations intended to protect such natural resources.

As necessary, Walworth County, the Towns of LaGrange and Sugar Creek, and the Lauderdale Lakes Lake Management District should support the acquisition and preservation of those lands identified in the adopted regional natural areas and critical species habitat protection and management plan. That plan recommends acquisition of the Island Woods and the Lauderdale Lakes Woods by the Lauderdale Lakes Lake Management District. In addition, the plan recommends acquisition of the Baywood Road Sedge Meadow by a private conservation organization.

Within these areas, the Towns and Lake Management District should consider supporting future management actions that may be necessary to ensure the habitat quality. These actions could include actions such as the control of purple loosestrife or other invasive plants which might degrade the habitat quality. Management measures consistent with the protection of critical species habitat areas as set forth in SEWRPC Planning Report No. 42, *A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin*, September 1997, are recommended. Ongoing monitoring may be necessary to minimize the risk of reinfestation by nonnative invasive plant species following application of the recommended control measures.

At present, the current Walworth County zoning within the drainage area tributary to the Lauderdale Lakes is generally consistent with the regional land use plan. The Walworth County zoning code provides for protection of wetlands and the riparian portions of the environmental corridor lands within lowland resource conservation zoning districts, and portions of the upland areas within upland resource conservation zoning districts. Elsewhere, in areas where residential development is anticipated, such development is anticipated to be at residential densities consistent with the adopted regional land use plan.

Where new development or redevelopment is proposed, it is recommended that the provisions of the relevant Walworth County land disturbance ordinances be strictly enforced within the drainage area tributary to the Lauderdale Lakes. The Walworth County-adopted Land Disturbance, Erosion Control and Storm Water Management Ordinance governs the amount of sediment and other pollutants from construction sites and land disturbing activities in the County that occur on platted lots within a subdivision plat; lots developed under a certified survey map; areas of 4,000 square feet or greater; works where fill and/or excavation volumes exceed 400 cubic yards; public streets, roads or highways; watercourses; and utilities. In addition, the soil erosion control and stormwater management provisions of the Walworth County land division ordinance would apply to residential developments of five acres or more, and other developments of three acres or more. All control measures are administered and enforced by the Walworth County Land Conservation. It is also recommended that the relevant performance standards set forth in the adopted County land and water resource management plan be enforced as necessary.

It is recommended that the onsite sewage disposal systems continue to be subjected to an ongoing program of regular inspection and maintenance, as set forth in the adopted Lake Management District ordinance appended hereto as Appendix A. This requirement is recommended to continue to be in addition to any inspections currently required under the Walworth County Code. The purpose of these inspections is to minimize phosphorus loadings from this source, and, thereby, maintain good water quality in the Lakes while limiting the growth of aquatic plants.

Aquatic Plant Management Measures

This aquatic macrophyte management element of the recommended plan sets forth alternative management measures consistent with the provisions of Chapters NR 103 and NR 107 of the *Wisconsin Administrative Code*. Further, the recommendations set forth below are derived from a review of alternative aquatic plant management measures consistent with the requirements of Chapter NR 7 of the *Wisconsin Administrative Code*, and with the public recreational boating access requirements relating to the grant program, set forth under Chapter NR 1 of the *Wisconsin Administrative Code*. A plan summary consistent with the requirements of Chapter NR 7 of the

Wisconsin Administrative Code is set forth in Appendix F, insofar as this plan includes grant eligible expenses under the Recreational Boating Facilities Program.

It is recommended that mechanical harvesting be retained by the Lauderdale Lakes Lake Management District as the primary aquatic plant control measure. As indicated in Chapter II, this will, in the long-term, help to maintain good water quality conditions by removing plant materials which are currently contributing to an accumulation of decomposing vegetation and associated nutrient recycling. The harvesting should be carried out by the District using its existing harvester, off-loading, and transport equipment which should be replaced as necessary.

It is recommended that shared-access channels be harvested, especially along the western shorelines of Middle and Mill Lakes, to minimize the potential detrimental effects on the fish and invertebrate communities. Directing boat traffic through these common channels also would help to delay the regrowth of vegetation in these areas.

It is recommended that ecologically valuable areas be excluded from aquatic plant management activities, especially during fish spawning seasons in early summer and autumn.

For the control of Eurasian water milfoil throughout the Lakes, surface harvesting is recommended, as shown in Figure 5. Cutting to a depth of approximately two feet will remove the surface canopy of nonnative aquatic plants, such as the Eurasian water milfoil, thereby removing the plant's competitive advantage over the lower-growing native aquatic plants that occur within the Lakes. By not disturbing the low-growing species which generally grow within one to two feet of the lake bottom and in relatively low densities, leaving the root stocks and stems of all cut plants in place, the resuspension of sediments in the Lauderdale Lakes will be minimized, and some degree of cover will continue to be provided for panfish populations which support the bass population in the Lakes. Further, cutting should not be broad-based, but focused on boating channels and selected navigation areas.

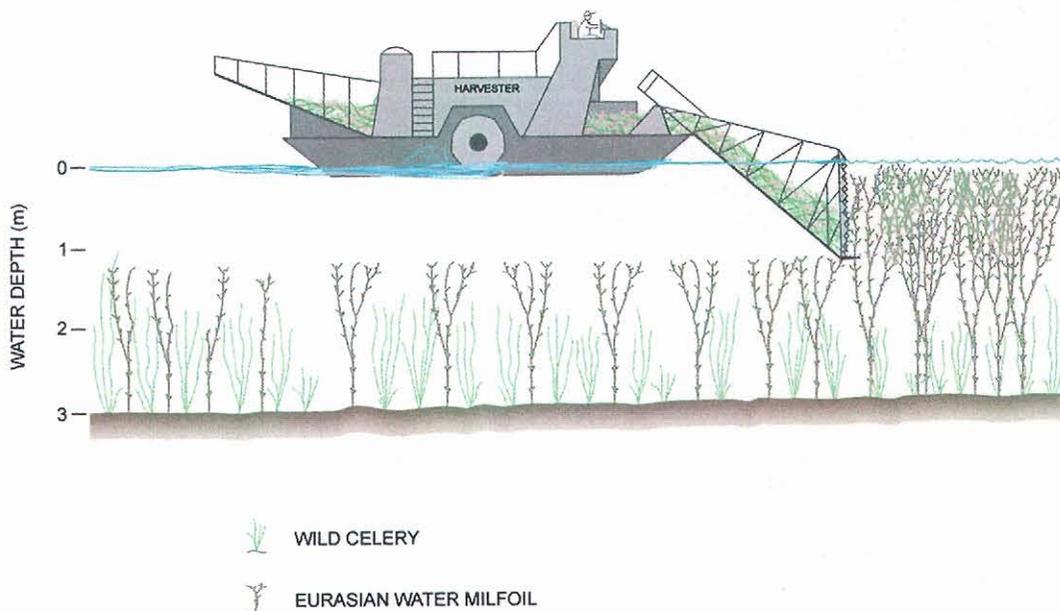
It is recommended that the use of chemical herbicides be limited to controlling nuisance growth of exotic species in shallow water, especially around docks and piers, where the harvester is unable to reach. Such use should be evaluated annually and the herbicide applied only on an as needed basis. Only herbicides that selectively control milfoil, such as 2,4-D, should be used. Algicides, such as Cutrine Plus, could be used for the control of filamentous algae or planktonic algal problems should the growth of these plants interfere with recreational use of the Lakes. However, it is recommended that the use of these algicides be limited to minimize the potential loss of valuable macroscopic algae, such as *Chara* and *Nitella*, which also are killed by this product.

It is recommended that chemical applications, if required, be made in early spring to maximize their effectiveness on nonnative plant species, while minimizing impacts on native plant species and acting as a preventative measure to reduce the development of nuisance conditions. Consideration should be given to the use of chemical herbicides as an alternative measure to control the extensive stands of Eurasian water milfoil in the eastern embayment of Mill Lake, locally known as Sterlingworth Bay, as the confined and shallow nature of this embayment would limit the impact of such herbicides on nontarget areas of the Lakes. Control of the extensive growth of Eurasian water milfoil within this embayment would reduce the likelihood of this embayment acting as a reservoir of Eurasian water milfoil fragments that could inoculate other areas of the Lauderdale Lakes basins. Notwithstanding, extensive use of chemical herbicides within the Lauderdale Lakes, however, is not recommended.

It is recommended that the Lauderdale Lakes Lake Management District and the Wisconsin Department of Natural Resources should work with private property owners to promote and encourage limited, manual control of aquatic plants within the Lakes basins. The control of rooted vegetation between adjacent piers is time consuming and costly for mechanical harvesters, which are awkward to maneuver between piers and boats, and may expose the District to liability for damage to boats and piers. Therefore, selected manual harvesting of these plant species is recommended in those areas where it is likely to be appropriate to the abundance of plants. Such control measures also may encourage the resurgence of native plant species and enhance the value of the habitat areas within the Lakes. The Lake Management District may wish to obtain informational brochures regarding shoreline maintenance, such as information on hand-held specialty rakes made for this specific purpose, to inform residents of the control options available.

Figure 5

PLANT CANOPY REMOVAL WITH AN AQUATIC PLANT HARVESTER



NOTE: Selective cutting or seasonal harvesting can be done by aquatic plant harvesters. Removing the canopy of Eurasian water milfoil may allow native species to reemerge.

Source: Wisconsin Department of Natural Resources and SEWRPC.

It is further recommended that the Lake Management District continue to conduct public informational programs on the types of aquatic plants in the Lauderdale Lakes. These programs should focus on the value of and the impacts of these plants on water quality, fish, and on wildlife; and on alternative methods for controlling existing nuisance plants including the positive and negative aspects of each method. These programs can be incorporated into the comprehensive informational and educational programs that also would include information on related topics, such as water quality, recreational use, fisheries, and onsite sewage disposal systems.

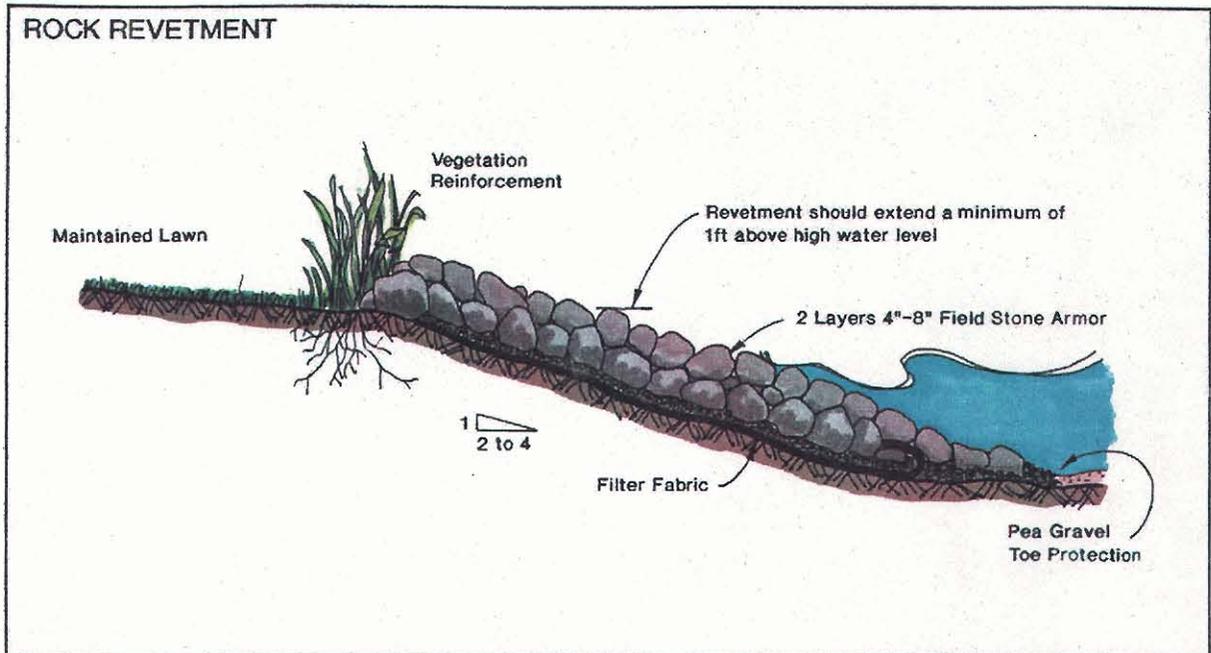
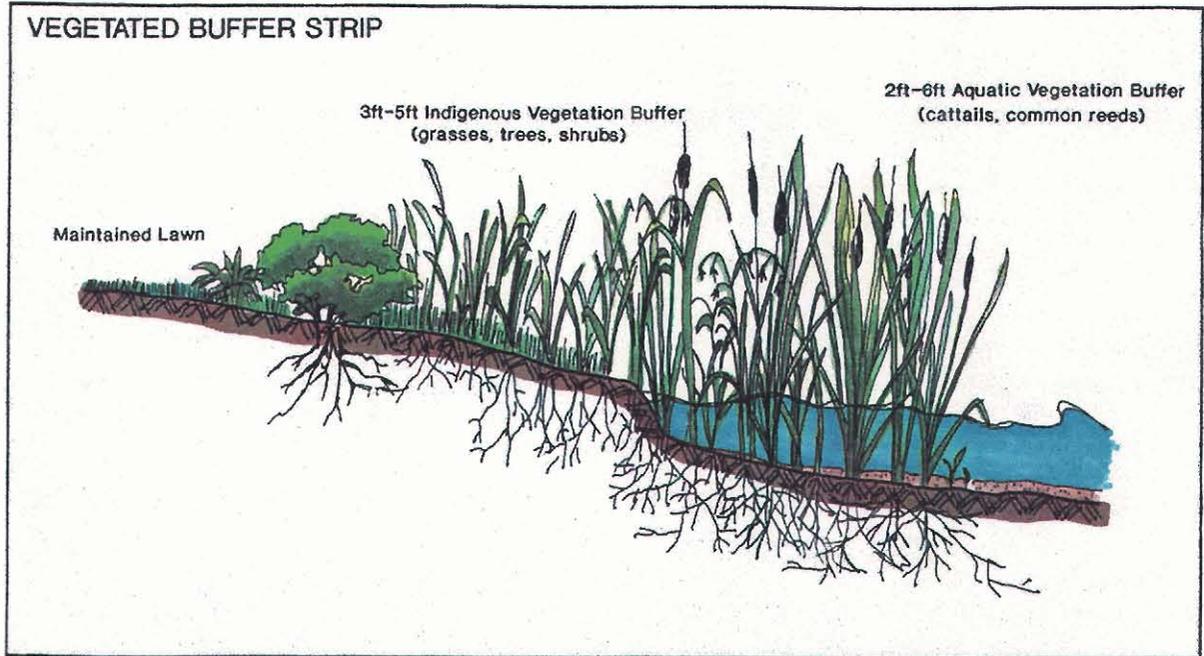
Lastly, it is recommended that continued aquatic macrophyte surveys be conducted at about five-yearly intervals, depending upon the observed degree of change in the aquatic plant communities. In addition, information on the aquatic plant control program should be recorded and should include descriptions of: major areas of nuisance plant growth; areas harvested and/or chemically treated, species harvested and amounts of plant material removed from lake, and species and approximate numbers of fish caught in the harvest. Specific recommendations regarding record-keeping by the Lake Management District is set forth below.

Shoreline Protection Measures

Most of the shoreline of the Lauderdale Lakes is protected and no major areas of erosion, which require additional protection against wind, wave, and wake erosion, were identified in the planning effort. Adoption of the vegetated buffer strip method is recommended to be used in lakeshore areas wherever practical in order to maintain habitat value and the natural ambience of the lakeshore. Continued maintenance of existing revetments and other protection structures is also recommended. Conversion of bulkheads to rip-rap or natural vegetated shoreline or combinations thereof, as shown in Figure 6, is recommended to be considered where potentially viable at such time as major repairs are found necessary. Natural vegetated buffer strips should also be considered for shorelines, where practical.

Figure 6

PLAN ALTERNATIVES FOR SHORELINE EROSION CONTROL



NOTE: Design specifications shown within are for typical structures. The detailed design of shore protection measures must be based on detailed analysis of local conditions.

Source: SEWRPC.

It is also recommended that the Lauderdale Lakes Lake Management District continue to monitor problems related to resident waterfowl. If such problems persist at levels which are unacceptable, it is recommended that management measures be explored further with the assistance of the Wisconsin Department of Natural Resources and the U.S. Department of Agriculture Fish and Wildlife Service.

Recreational Use Management Measures

Recommended actions for the management of ecologically valuable areas and aquatic plants should be effected by the Town of LaGrange through its existing boating ordinance and amendment thereof. It is recommended that the Town continue to limit boat speeds 100 feet from pierheads, and personal watercraft speeds 200 feet from shore, to slow-no-wake as defined in Chapter 30 of the *Wisconsin Statutes*; reduce motorized boat traffic within the Eurasian water milfoil control areas shown on Map 23 to essential traffic only; and define watercraft transit speeds and lanes consistent with the milfoil control areas and established patterns of recreational boating usage on the Lake. Such regulation may require buoyage depending on the sufficiency of the signage and notices provided to lake users and the level of compliance achieved. Copies of such an ordinance must be placed at the Lauderdale Lakes public access sites as set forth in Section 30.77(4) of the *Wisconsin Statutes*.

Public inland lake protection and rehabilitation districts, pursuant to Section 33.22 (2m), *Wisconsin Statutes*, may operate a water safety patrol. As of early 2001, the Lauderdale Lakes Lake Management District adopted a resolution to operate such a patrol on the Lauderdale Lakes.

Public Informational and Educational Programming Measures

The Towns of LaGrange and Sugar Creek, and the Lauderdale Lakes Lake Management District, through a joint educational and informational program, should discourage human disturbances in ecologically valuable areas, except as may be necessary to provide riparian residents with a reasonable level of access to the open water areas of the Lakes, and limit boating and other water sports in the ecologically valuable areas. Lake residents and visitors should be made aware of the invasive nature of species such as purple loosestrife and Eurasian water milfoil, and be encouraged to participate in citizen-based control programs coordinated by the Wisconsin Department of Natural Resources and University of Wisconsin-Extension. In addition, it is recommended that individuals within the Lauderdale Lakes Lake Management District continue to be enrolled in the Wisconsin Department of Natural Resources Self-Help Monitoring Program, and that regular water quality reports be presented to the electors of the District at the annual meetings of the District. Informational programming is recommended to be a regular feature of the annual meetings of the Lauderdale Lakes Lake Management District.

ANCILLARY PLAN RECOMMENDATIONS

As the Lauderdale Lakes community seeks a more active role in the management of the Lauderdale Lakes, it is essential that an adequate institutional base to support such activities to be developed. Currently, the community-based lake management activities are being carried out by the Lauderdale Lakes Lake Management District, a Chapter 33, *Wisconsin Statutes*, public inland lake protection and rehabilitation district. The District was created by the Walworth County during 1991 to encompass those lands riparian to the Lakes together with certain other residential properties. While the District boundary as currently defined excludes specific agricultural lands from the District, concerns over the long-term impacts on the aquatic plants and water quality of the Lakes of changing land uses within the relatively small drainage area tributary to the Lakes have resulted in a discussion of the need to refine the institutional structure for lake management. As a result, the Lauderdale Lakes Lake Management District Commissioners requested the Southeastern Wisconsin Regional Planning Commission to assist them in a review of the current District boundary.

The boundary review was predicated upon consideration of the following criteria:

1. Consistency with Chapter 33, *Wisconsin Statutes*, requirements that properties included within a public inland lake protection and rehabilitation district be benefited by inclusion in the district;

2. Consistency with University of Wisconsin-Extension guidance set forth in *A Guide to Wisconsin's Lake Management Law, Tenth Edition*, that recommends that the district, at a minimum, include the entire lakeshore, all riparian property, areas directly affecting the lake and/or which are included in planned service areas, and entire parcels; and
3. Consistency with applicable regional and local plans including the County land a water resource management plan and other applicable plans.

Based upon consideration of the current boundary of the District, as shown on Map 24, no immediate action would appear to be necessary to enable the District to fulfill its functions under Chapter 33 of the *Wisconsin Statutes*. However, given the relatively limited area draining to the Lauderdale Lakes, when the Lakes are compared to other waterbodies of similar areal extent within the Southeastern Wisconsin Region, future expansion of the District to encompass most or all of the tributary drainage area to the Lauderdale Lakes is not unreasonable. Should the expansion of the District be contemplated, the Commission staff have developed two alternative boundary options, consistent with the abovereferenced guidance, that could be considered. Of these, as noted below, Alternative 2 would appear to be the most practicable.

Under Alternative 1, the largest possible boundary for the District to be considered, the District boundary would encompass lands bounded approximately by Greening Road to the north, USH 12/STH 67 to the east, CTH A to the south, and CTH H to the west, as shown on Map 24. Wandawega Lake would be enclosed within this boundary, this Lake is not currently served by a known lake organization,⁹ as well as a number of properties that are within the drainage area tributary to the Lauderdale Lakes, but which may not commonly be perceived of as being "lake" properties. The significant political and social difficulties that arise under this alternative could limit the ability of the Lauderdale Lakes Lake Management District to carry out a program of lake protection and rehabilitation. For example, the provisions of Section 33.30, *Wisconsin Statutes*, require lake protection and rehabilitation districts to convene annual meetings for the purpose of electing commissioners and approving a budget. All registered voters, plus a nominated representative, officer or employee of any trust, foundation, corporation, association, or organization, that are property owners within the district may participate in this meeting. Because of their situation, riparian property owners and electors may find that their perceptions of actions necessary to protect and rehabilitate the lakes may differ from those of a wider constituency, a difference that could result in inaction or conflict within the community.

Under Alternative 2, also shown of Map 24, the District boundary would encompass lands bounded approximately by Territorial Road to the north, USH 12/STH 67 to the east, and CTH H to the west. The southern boundary of the District would remain unchanged under this Alternative. This alternative includes a number of agricultural properties that are located to the north of the Lakes, and within the drainage area tributary to the Lauderdale Lakes. Should the Lauderdale Lakes Lake Management District Board of Commissioners determine to proceed with an expansion of the District to encompass the majority of the lands draining to the Lakes, this alternative is recommended.

Process

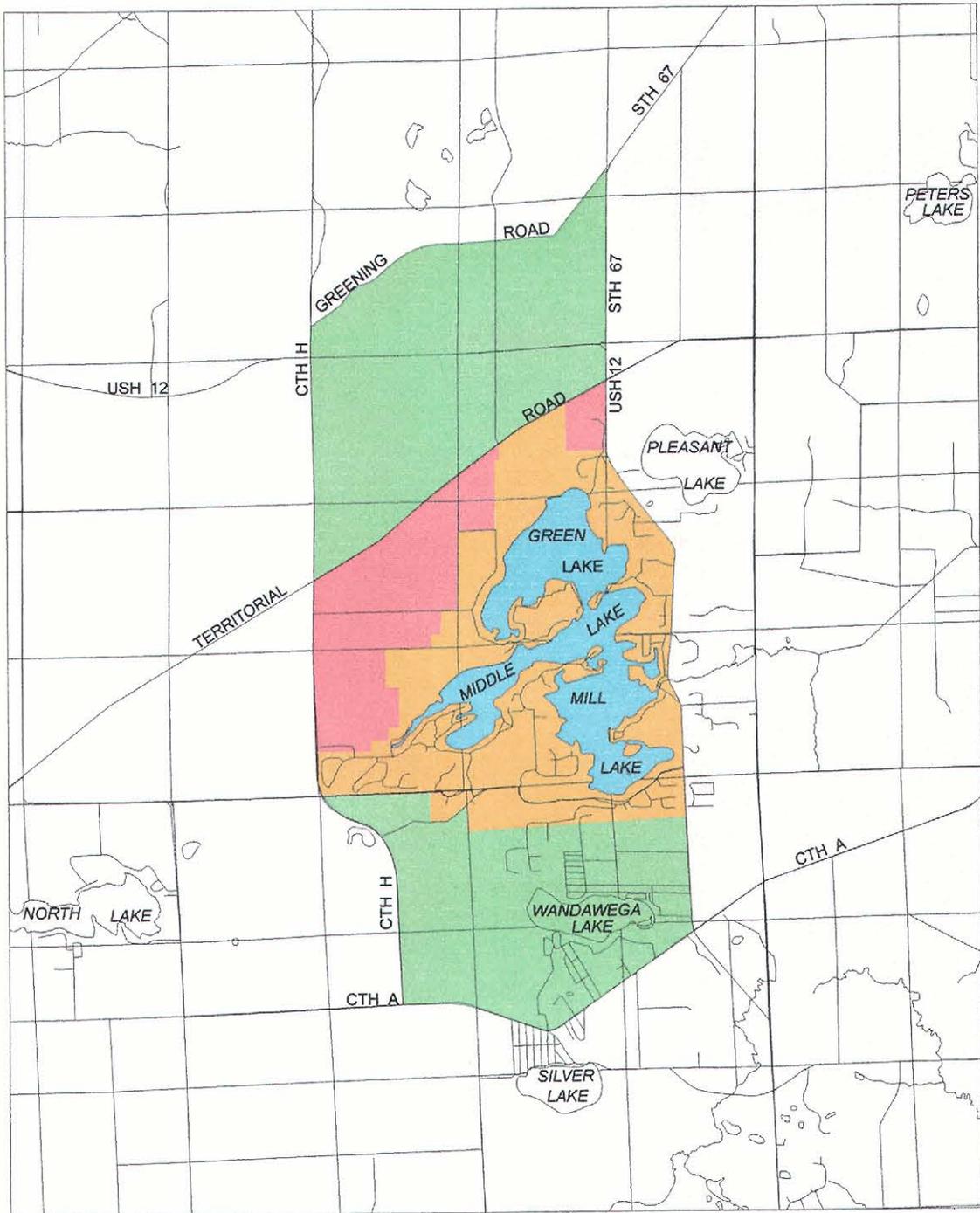
Lands may be attached to an existing lake management district pursuant to requirements set forth in Section 33.33(2), *Wisconsin Statutes*. Attachment may be initiated either by petition of the affected landowners within the district, or by motion of the district commissioners to attach lands to the district. In both cases, the district commissioners must make a finding that the lands to be attached are benefited by inclusion within the district, benefit being assessed based upon the relative benefit to the lake of the affected lands being included within the district.¹⁰ While bound by the specific process and requirements of Section 33.33(2)(a), and of Section

⁹*Wisconsin Lakes Partnership Publication No. PUBL-FH-407 2001 REV, The Lake List 2001-2003, March 2001.*

¹⁰*University of Wisconsin-Extension, A Guide to Wisconsin's Lake Management Law, Tenth Edition, 1998.*

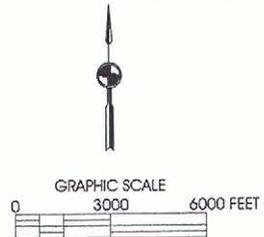
Map 24

ALTERNATIVE LAKE MANAGEMENT DISTRICT BOUNDARY
FOR THE LAUDERDALE LAKES LAKE MANAGEMENT DISTRICT



-  EXISTING LAKE MANAGEMENT DISTRICT
-  ALTERNATIVE 1 EXTENSION LAKE MANAGEMENT DISTRICT
-  ALTERNATIVE 2 EXTENSION LAKE MANAGEMENT DISTRICT

Source: SEWRPC.



33.26 insofar as they may be applicable, the district commissioners have full discretion regarding the granting of a petition for attachment.

Alternatively, should the district commissioners initiate the attachment of lands to a district, the commissioners must provide written notice to the affected landowners and to the governmental unit that created the district. In this case, the Lauderdale Lakes Lake Management District Board of Commissioners must provide written notice under Section 33.33(2)(b) to the affected landowners and to Walworth County. Following receipt of which notice, the County must convene a hearing pursuant to the process and requirements of Section 33.33(2), and Section 33.26 insofar as it may be applicable. Following the hearing, the County must make a determination on the attachment proposal. Attachment findings made pursuant to Sections 33.33(2) and 33.26 of the *Wisconsin Statutes* can be appealed to the circuit court for judicial review. Attachment of lands to a district should not create a hole with the district.

SUMMARY

This plan, which documents the findings and recommendations of a study requested by the Lauderdale Lakes Lake Management District, examines existing and anticipated conditions, and potential wetland and aquatic plant management problems, in the Lauderdale Lakes. The plan sets forth recommended actions and management measures for the resolution of these problems. The recommended plan is summarized in Table 20 and shown on Map 23.

The Lauderdale Lakes, which are comprised of Green, Middle and Mill Lakes, were found to be mesotrophic waterbodies of average to above average water quality. Surveys indicated that the Lakes and their tributary drainage area contain significant areas of ecological value, including numerous wetlands and significant wildlife habitat in and surrounding the Lakes. Preservation of environmental corridor lands, and especially within the shoreland and nearshore areas situated immediately adjacent to sensitive areas located within the Lakes, is recommended. Walworth County, the Towns of LaGrange and Sugar Creek, together with the Lauderdale Lakes Lake Management District should support appropriate land management practices within these areas, especially in areas of steep slopes adjacent to Wisconsin Department of Natural Resources-delineated sensitive areas. Further, the Lake Management District should promote appropriate shoreline management practices, including the use of vegetative buffer strips where applicable.

The Lauderdale Lakes wetland and aquatic plant management plan recommends actions be taken to reduce further human impacts on the ecologically valuable areas in and adjacent to the Lakes, and reduce human impacts on the in-lake macrophyte beds, especially those beds dominated by Eurasian water milfoil, to limit the spread of nonnative invasive plant species. In this regard, consideration should be given to refining the Town of LaGrange boating ordinance to limit boating traffic within those areas of the Lakes where Eurasian water milfoil is prevalent, or ecologically valuable area exist. The plan also recommends limited aquatic plant management measures, primarily associated with aquatic plant harvesting, including selected manual removal, in specific areas of the Lakes. Ongoing surveillance activities are also recommended at this time. Use of chemical herbicides is recommended to be limited, mainly to areas where purple loosestrife and Eurasian water milfoil are present.

The recommended plan includes continuation of an ongoing program of public information and education, focussing on providing riparian residents and lake users with an improved understanding of the lake ecosystem. For example, additional options regarding household chemical usage, lawn and garden care, shoreland protection and maintenance, and recreational usage of the Lakes should be made available to riparian householders, thereby providing riparian residents with alternatives to traditional alternatives and activities. Such programming should include information on waterfowl management with emphasis on the problems associated with feeding waterfowl.

To limit the delivery of nutrients, that contribute to the abundant growths of plants and algae in the Lakes, control of nonpoint sources of water pollution should be considered as an element of this plan. The Lauderdale Lakes Lake Management District should encourage strict enforcement of the existing Walworth County stormwater and construction site erosion control ordinances, and related development control ordinances, especially within those

areas of the drainage basin directly tributary to Lauderdale Lakes. In addition, the Lauderdale Lakes Lake Management District should continue to enforce its own onsite sewage disposal system inspection and maintenance program.

Finally, the recommended plan seeks to balance the demand for high-quality residential and recreational opportunities at the Lauderdale Lakes with the requirements for environmental protection. To this end, the plan emphasizes limited interventions.

APPENDICES

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Appendix A

**WASTEWATER MANAGEMENT AND SEPTIC
SYSTEM ORDINANCE FOR THE LAUDERDALE
LAKES LAKE MANAGEMENT DISTRICT**

ORDINANCE 96-01

WASTE WATER MANAGEMENT AND SEPTIC SYSTEM ORDINANCE

Whereas, the Board of Commissioners of the Lauderdale Lakes Lake Management District ("District") having considered enforcement of its septic and holding tank pumping and disposal program and contract; and

Whereas, the Board of Commissioners is authorized pursuant to Wisconsin Statutes 33.22(3) and 60.77(5)(c) to issue rules and orders to administer the foregoing program;

Now, Therefore, the Lauderdale Lakes Lake Management District Commissioners do hereby ordain, rule and order as follows:

1. That Ordinance 96-01 shall be created and shall constitute an Order of the Board of Commissioners pursuant to Wisconsin Statute 60.77(5)(c), as hereinafter provided.

SEPTIC AND HOLDING TANK PUMPING AND DISPOSAL ORDINANCE

Section 1: General Provisions

Section 1.01: Title

This ordinance shall be known as the "Septic and Holding Tank Pumping and Disposal Ordinance".

Section 1.02: Authority

This ordinance is passed and adopted pursuant to Wisconsin Statute 60.77(5)(c) and shall constitute a rule and order of the Commission. The same is authorized pursuant to the adoption of sanitary district powers by the Lauderdale Lakes Lake Management District as provided for in Section 33.22(3), Wis, Stats.

Section 1.03: Intent

It is the intent of this ordinance to provide for the administration and enforcement of the Lauderdale Lakes Lake Management District septic and holding tank pumping and disposal program and to carry out the terms of its pumping and disposal contract.

Section 1.04: Construction

This ordinance and order of the District shall be broadly and liberally construed to require property owners within the District to comply with the District's septic and holding tank pumping and disposal program and the terms of the District's pumping and disposal contract. This ordinance shall be interpreted and construed to be consistent with Chapters 33 and 66 of the Wisconsin Statutes, as well as Administrative Code regulations and ordinances administered and enforced by the Department of Industry, Labor and Human Relations and the Wisconsin Department of Natural Resources.

Section 2: Access and Identification.

Section 2.01: Right of Entry

The District or its duly authorized representatives, septage hauling contractor ("Contractor") or their representatives bearing proper credentials and identification shall be permitted to enter all properties for the purpose of inspection, observation or pumping of any holding tank or septic system in accordance with the provisions of this ordinance.

Section 3: Holding and Septic Tank Information

Section 3.01:

All property owners shall respond to any inquiry by the Contractor, the District or their representatives with respect to information relating to the owner's septic system or holding tank.

Such duty shall extend both to written and verbal inquiries from the Contractor or District representatives.

Section 3.02:

Owners shall respond to written questionnaires from the District's Contractor within twenty-one (21) days of mailing. Owners shall be required to conduct a reasonable investigation regarding the age, design, pumping history and history of all system failures or problems and to fully report such information.

Section 4: Inspection, Pumping, Collection and Disposal Obligations

Section 4.01: Notice

All properties in the District shall be divided into four (4) Quadrants, one (1) of which will be pumped each year. Septic tanks and holding tanks have different scheduling and notice procedures.

Septic tank home owners shall receive a first class mail notice at least 20 days in advance of the 20 day time window that their property will be pumped. This will permit the home owner to take whatever actions are needed to assure that pumper access to the septic tank will be provided.

Holding tank property owners, on the other hand, have the flexibility to schedule their pump, during the summer that their Quadrant is being pumped, within two (2) consecutive business days after making a phone request to the pumper.

Section 4.02: System Locks

In the event that locks for above grade septic and/or holding tanks are missing, the Contractor will install new master key locks shortly after the initial pumping, and provide the homeowner with keys to said locks. New master locks will not be required in the event that property owners provide a copy of the key to their lock with the returned questionnaires, or in the event that locks are changed at some later date, the new key copy shall be provided within ten (10) days of the new lock being installed.

Section 4.03: Pumping

Homeowners shall permit the Contractor to pump their system at least once every four (4) years. If owners require additional pumping of their system, they shall do so at their cost. Year-round property owners are encouraged to pump their own systems on 2-year intervals to match, on an alternating basis, the District's 4-year pumping program.

Section 4.04: Hold Status

In the event the Contractor determines that there is a problem or other condition of the system that unreasonably increases potential liability for the Contractor or the District, the Contractor shall place the subject property in a "hold status" and notify the owner of the same until the issue is resolved by the District with the owner. Owners shall respond to District inquiries regarding such matters within thirty (30) days of being notified of such a condition on their property. Owners shall meet with District representatives and address inquiries by the District within thirty (30) days of being notified in writing.

All property owners shall similarly maintain their systems in compliance with the State Plumbing Code. Any non-compliance with the same, if found by the Contractor, will be corrected by the homeowner within 90 days of the Contractor's notifying the homeowner of the same, in writing. All accesses shall be at grade with the lock or 6-inches below grade without a lock, with a minimum 2-foot diameter access. In the event the Contractor agrees to place the homeowner's system into compliance, that shall be at the homeowner's cost and shall be done by contract between the homeowner and the Contractor without District involvement. The homeowner shall advise the District Contractor of such activity in the event that this interrupts the normal pumping schedule for the system.

In the event the Contractor determines that a system has failed, as defined under the State Plumbing Code, the District shall schedule an inspection by a licensed soil tester or other qualified State licensed professional to inspect the same. If the failure is verified, the property owners shall be notified in writing and advised that the same must be corrected within 120 days. If more than 120 days pass without compliance being obtained, as verified by the District's inspector, the information shall be turned over to the County Sanitarian for formal action.

Section 4.05:

Property owners shall be required to keep their systems in a safe condition and shall fully cooperate with the District's Contractor in permitting the Contractor to carry out their pumping, collection and disposal obligations.

Section 4.06:

Property owners may petition the District for deferrals or expedited service for good cause. Any deferral of pumping during one year shall not cause a property to fall outside of its normally-scheduled year for the next pumping cycle.

Section 5: Septage

Section 5.01:

Owners shall prevent septage from being exposed to, mixed with or contaminated by any type of hazardous waste.

Section 5.02:

Title to all waste that is pumped and removed from the tanks shall be vested in the Contractor upon being placed into their vehicles.

Section 6: Questionnaire and Information Compliance

Section 6.01:

Once a property owner submits a signed Questionnaire, such party shall be deemed to have given the Contractor both the information and the authority to proceed.

Section 6.02:

In the event that a property owner fails to return a completed, fully signed Questionnaire on a timely basis, the District shall issue a second written request. In the event that the property owner fails to comply within 60 days after the second request, the District may prosecute such non-complying property owner. The penalty for non-compliance within 60 days after the second notice shall be not less than \$100 and not greater than \$500. After 120 days, a third written request may be issued to the property owner at the discretion of the District. In the event that non-compliance is not remedied within 60 days thereafter, a fine of not less than \$250 nor greater than \$500 shall be assessed. In the event the Questionnaire is not returned within 120 days after the second notice, a \$500 minimum penalty shall be assessed.

Section 7: Violation and Penalties

Section 7.01:

Any person who violates any provision of this ordinance shall be subject to a penalty as provided by the Wisconsin State Statutes, which are by this reference made a part hereof as if fully set forth herein. Where there is no statutory penalty provided, such fine shall be no less than \$1.00 and no greater than \$500.00, plus statutory costs. Each day that an owner is in violation of this Ordinance shall be considered a separate violation for purposes of imposition of penalties.

Section 7.02: Liability to District for Losses

Any person violating any provisions of this Ordinance shall, in addition to any penalty or fine which may be assessed against the owner, become liable to the District for any expense, loss, damage or attorneys fees occasioned by such violation which the District may suffer as a result thereof.

Section 7.03: Enforcement

In the event the District is required to retain legal counsel to bring an action in Circuit Court to enforce any provision of this Ordinance, the owner shall be responsible for all legal fees, Contractor fees, expert witness fees and other costs which may reasonably and necessarily be incurred in enforcing the terms of this Ordinance.

Section 8: Written Notice

Section 8:

Where the District alleges that there has been non-compliance with any time requirements or written notices or directives from the District or its Contractor, there shall be a rebuttable presumption that the owner received notice if the District or the Contractor submits proof of the date and first class mailing of such notices.

Section 9: Miscellaneous

Section 9.01: Severability

In the event that any section, provision, clause or any portion of this ordinance is found to be ineffective or invalid by a court of law, such finding shall not affect the validity of the remainder of this Ordinance.

Section 9.02: Effective Date

This Ordinance shall take effect and be enforced from and after its passage and publication as provided by law.

Dated this 13th day of April, 1996.

Lauderdale Lakes Lake Management District

By: sl
Gerald Peterson, Chairperson

Attest:

sl
Scott Mason, Secretary

CERTIFICATION

The undersigned Secretary for the Lauderdale Lakes Lake Management District certifies that this Ordinance was adopted at a duly convened meeting of the Board of Commissioners of the Lauderdale Lakes Lake Management District on the 13th day of April, 1996, and a vote of 6 in favor and 1 opposed. This ordinance was published in the *Elkhorn Independent*, which is the official newspaper of the District, as a Class 1 Notice on the _____ day of _____, 1996.

, Secretary

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Appendix B

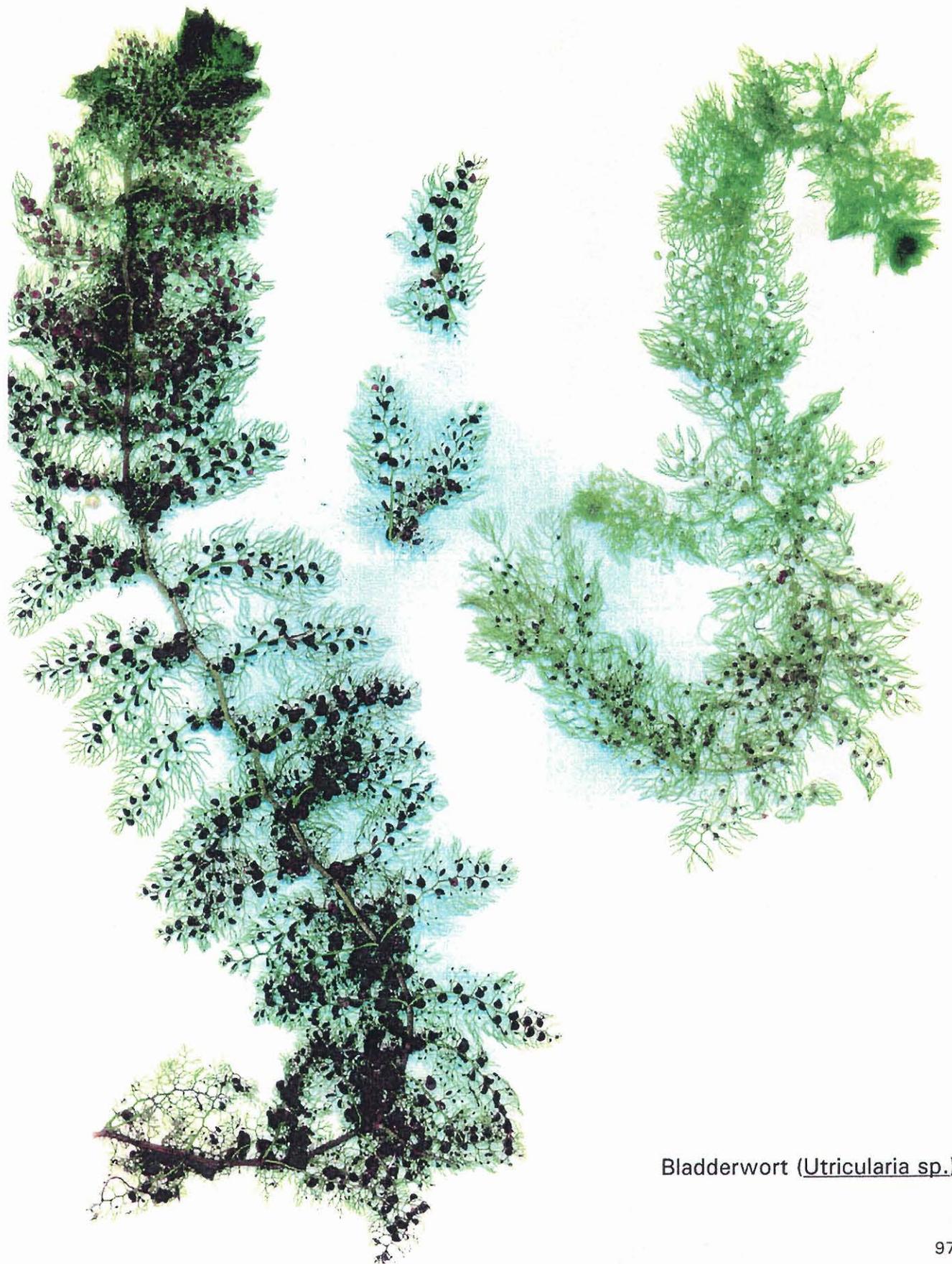
**REPRESENTATIVE ILLUSTRATIONS OF
AQUATIC PLANTS FOUND IN THE LAUDERDALE LAKES**



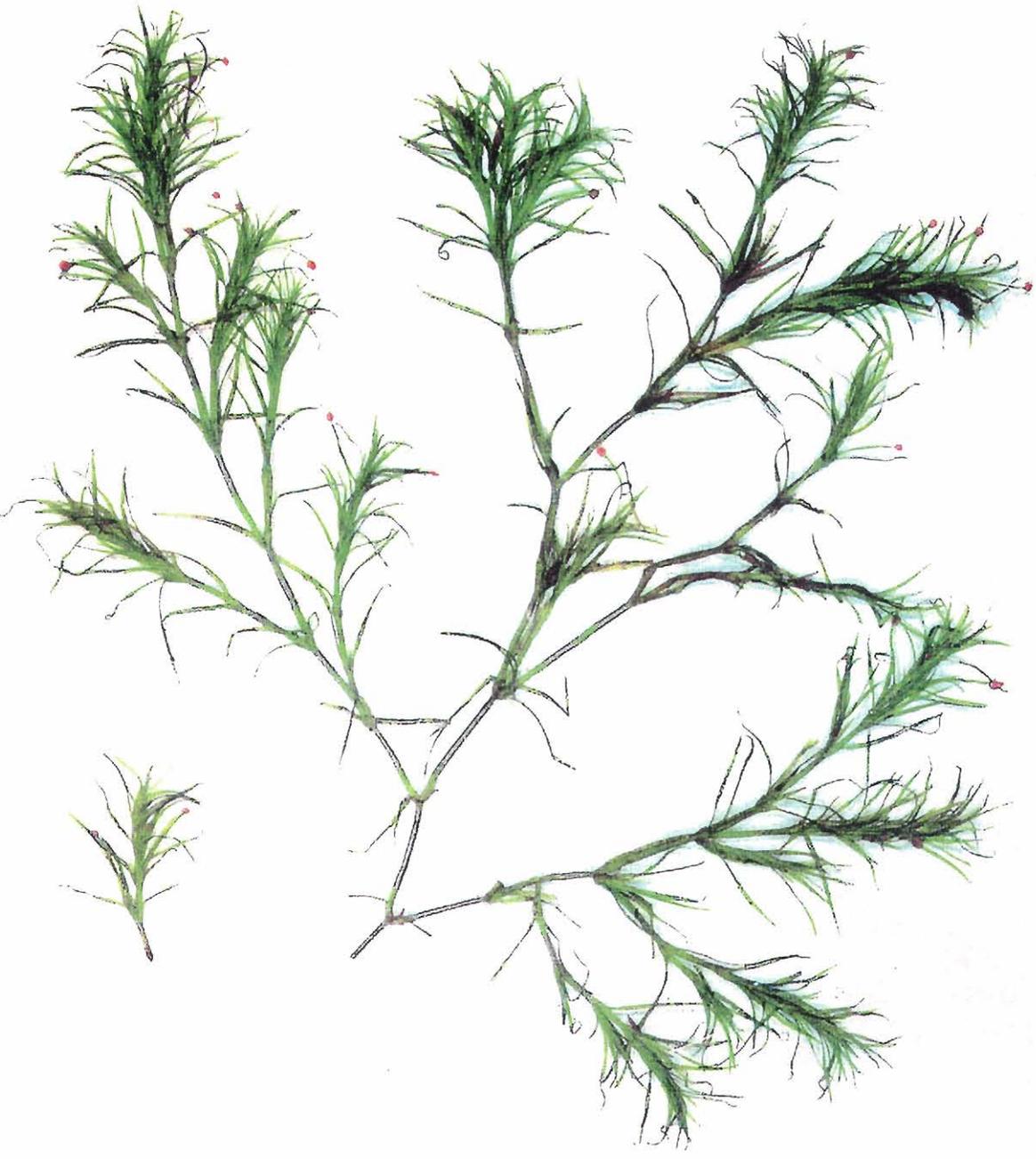
Arrowhead (Sagittaria sp.)

NOTE: Plant species in photograph are not to scale.

Source: Steve D. Eggers and Donald M. Reed, *Wetland Plants and Plant Communities of Minnesota & Wisconsin*, 2nd Edition, 1997.



Bladderwort (Utricularia sp.)



Bushy Pondweed (Najas flexilis)



Cattail (Typha augustifolia)



Coontail (Ceratophyllum demersum)



Curly Leaf Pondweed (Potamogeton crispus)



Eel Grass / Wild Celery (Vallisneria americana)



Eurasian Water Milfoil (Myriophyllum spicatum)



Flat-stem Pondweed (Potamogeton zosteriformis)



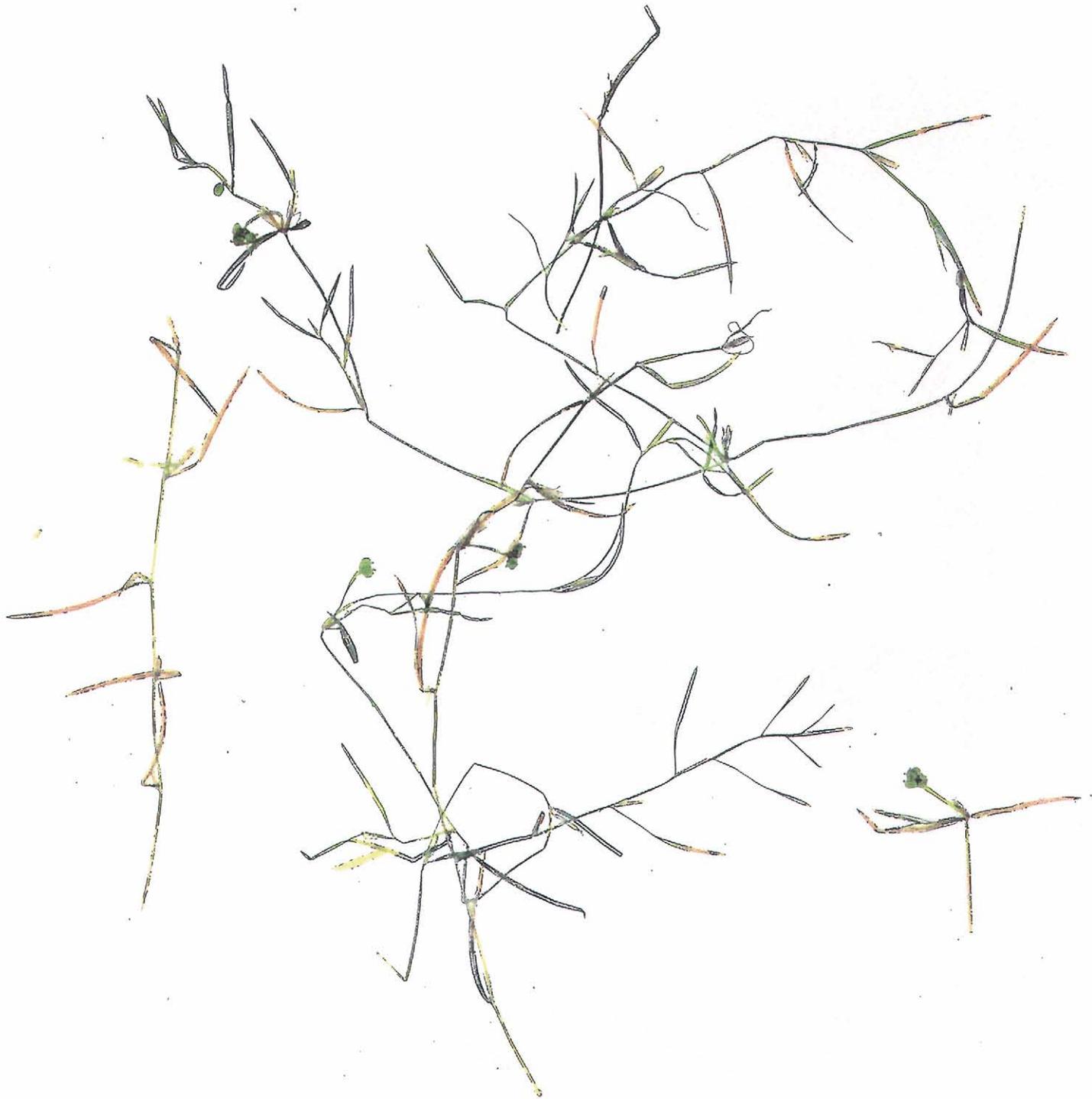
Floating-Leaf Pondweed (Potamogeton natans)



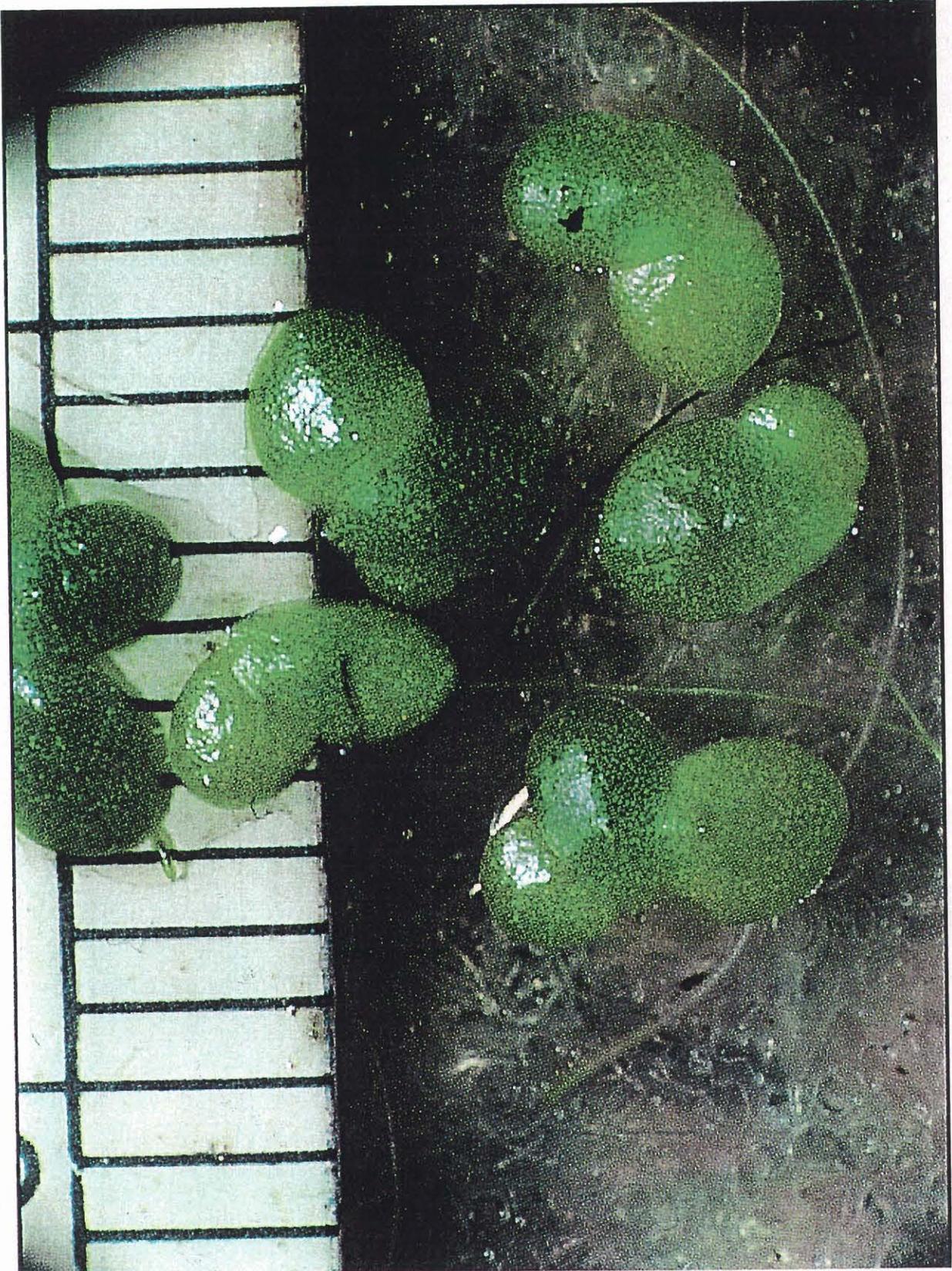
Illinois Pondweed (Potamogeton illinoensis)



Large Leaf Pondweed (Potamogeton amplifolius)



Leafy Pondweed (Potamogeton foliosus)



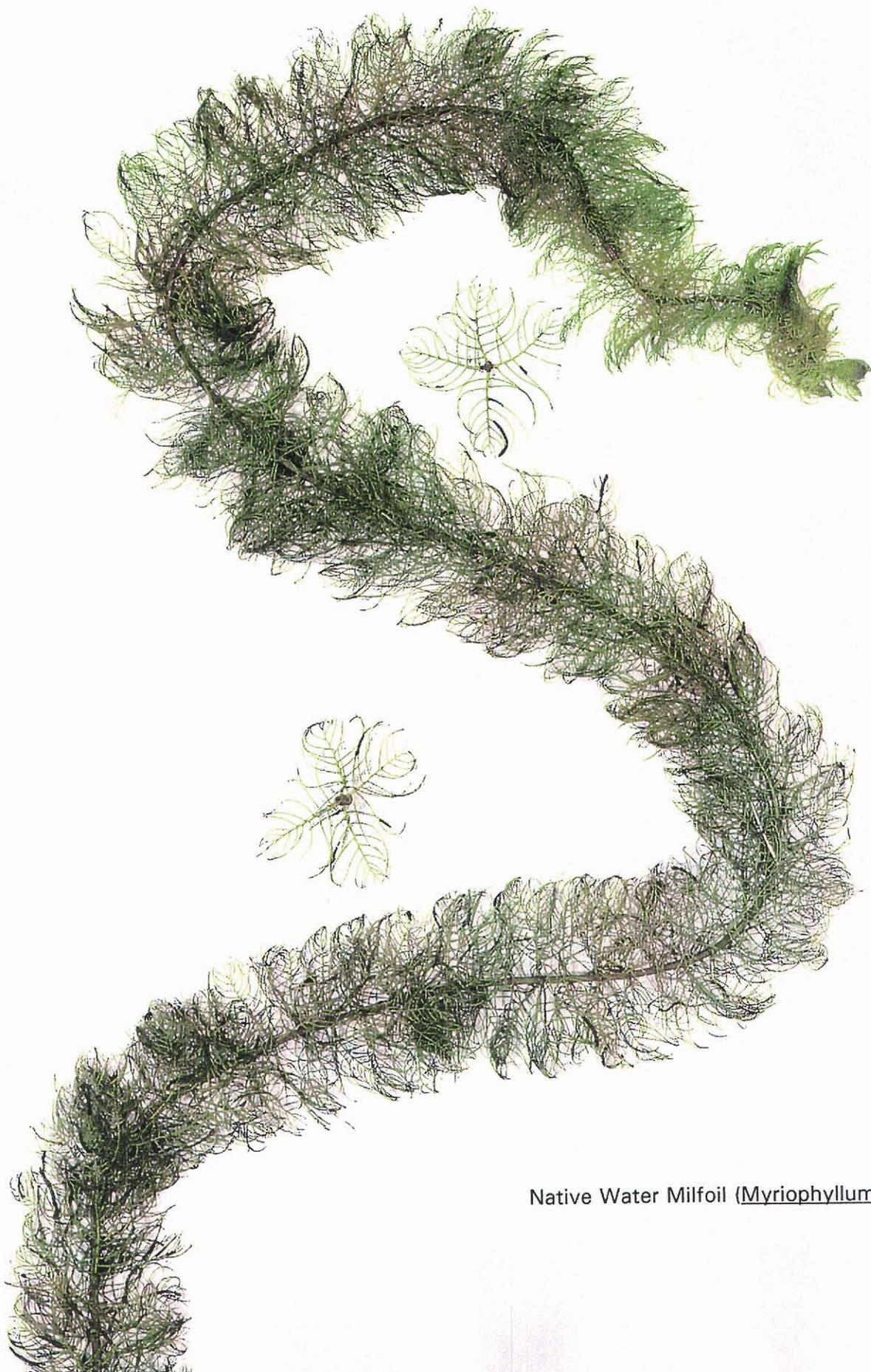
Lesser Duckweed (*Lemna minor*)

NOTE: Plant species in photograph are not to scale.

Source: Steve D. Eggers and Donald M. Reed, *Wetland Plants and Plant Communities of Minnesota & Wisconsin*, 2nd Edition, 1997.



Muskgrass (*Chara vulgaris*)



Native Water Milfoil (Myriophyllum sp.)



Pondweed (*Potamogeton* spp.)



Sago Pondweed (Potamogeton pectinatus)



Spiney Naiad (Najas marina)



Water Bulrush (Scirpus subterminalis)



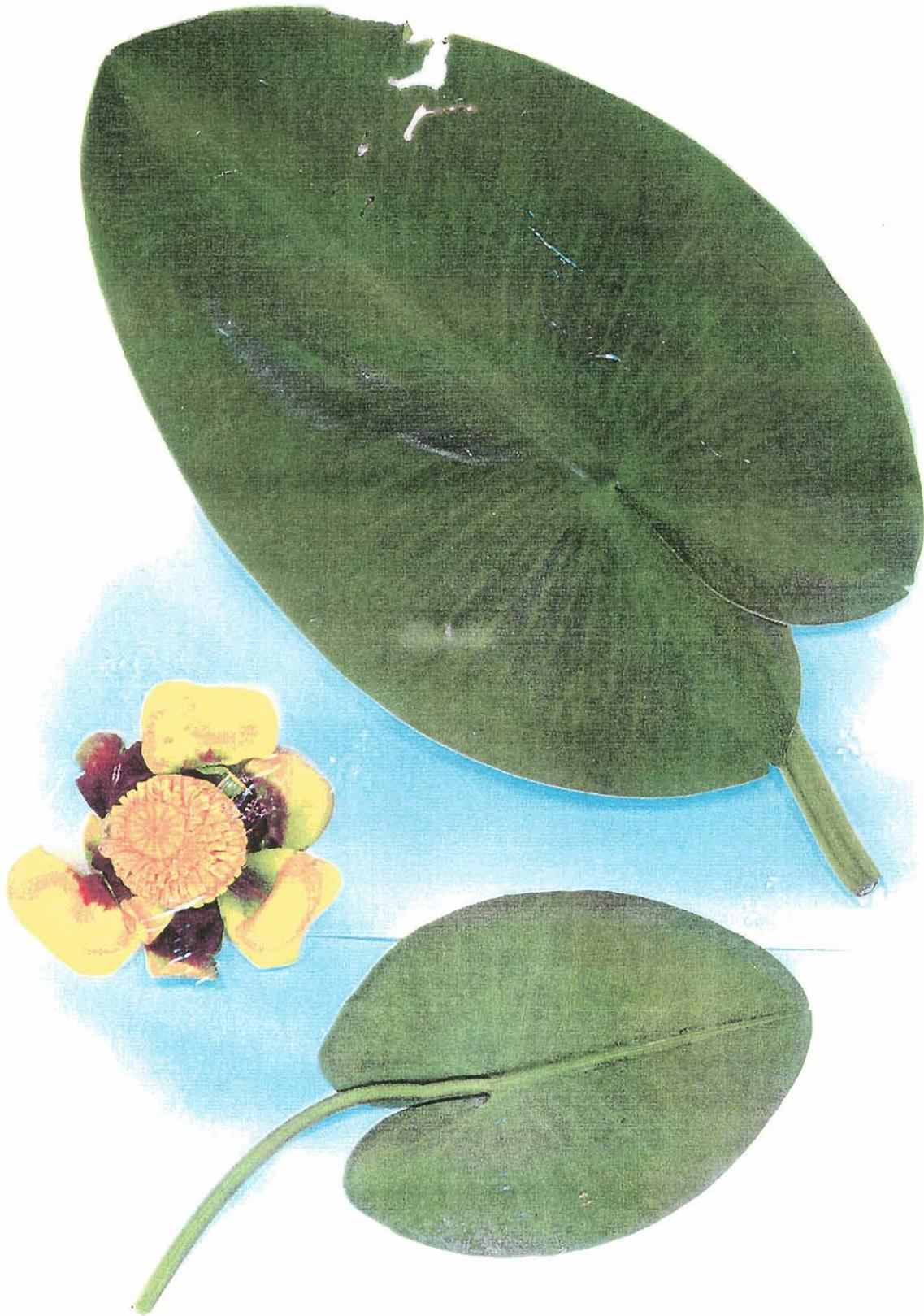
Water Star Grass (Zosterella dubia)



Waterweed (Elodea canadensis)



White Water Lilly (Nymphaea tuberosa)



Yellow Water Lilly (Nuphar variegatum)

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Appendix C

**SEWRPC LETTER REPORTS
PRELIMINARY VEGETATION SURVEYS
FOR THE LAUDERDALE LAKES**

#27768
SVY2251/SVY2264

EXHIBIT A

PRELIMINARY VEGETATION SURVEY
LAUDERDALE LAKES WETLANDS

Dates: August 6 and 20, 1999; October 1, 1999

Observer: Rachel E. Lang, Senior Specialist-Biologist
Southeastern Wisconsin Regional Planning Commission

Location: Town of La Grange in part of U.S. Public Land Survey
Sections 25, 26, 34, 35 and 36, Township 4 North,
Range 16 East, and the Town of Sugar Creek in part of
U.S. Public Land Survey Sections 1 and 2, Township 3 North,
Range 16 East, Walworth County, Wisconsin.

Species List: Plant Community Area No. 1

CHARACEAE

Chara sp.--Muskgrass

POLYPODIACEAE

Thelypteris palustris--Marsh fern

TYPHACEAE

Typha latifolia¹--Broad-leaved cat-tail

ALISMATACEAE

Alisma plantago-aquatica--Water plantain
Sagittaria latifolia--Common arrowhead

GRAMINEAE

Calamagrostis canadensis--Canada bluejoint
Phalaris arundinacea²--Reed canary grass
Zizania aquatica--Wild rice

CYPERACEAE

Scirpus validus--Soft-stemmed bulrush
Scirpus acutus³--Hard-stemmed bulrush
Carex stricta--Tussock sedge
Carex comosa--Bristly sedge
Carex lacustris--Lake sedge
Carex sp.--Sedge

IRIDACEAE

Iris virginica--Virginia blueflag

SALICACEAE

Populus tremuloides³--Quaking aspen
Populus deltoides--Cottonwood
Salix nigra--Black willow
Salix bebbiana--Beaked willow
Salix discolor--Pussy willow
Salix candida⁴--Sage willow

URTICACEAE

Pilea pumila--Clearweed

POLYGONACEAE

Rumex orbiculatus--Great water dock

Polygonum sp.--Smartweed

ANACARDIACEAE

Rhus vernix--Poison sumac

BALSAMINACEAE

Impatiens biflora--Jewelweed

RHAMNACEAE

Rhamnus cathartica²--Common buckthorn

Rhamnus frangula²--Glossy buckthorn

LYTHRACEAE

Decodon verticillatus--Water-willow

Lythrum salicaria^{2,3}--Purple loosestrife

ONAGRACEAE

Epilobium coloratum--Willow herb

CORNACEAE

Cornus amomum--Silky dogwood

Cornus stolonifera--Red-osier dogwood

ASCLEPIADACEAE

Asclepias incarnata--Marsh milkweed

VERBENACEAE

Verbena hastata--Blue vervain

LABIATAE

Lycopus americanus--Cutleaf bugleweed

RUBIACEAE

Galium trifidum--Small bedstraw

CAPRIFOLIACEAE

Viburnum lentago--Nannyberry

COMPOSITAE

Bidens coronata--Tall swamp-marigold

Solidago gigantea--Giant goldenrod

Aster lucidulus--Swamp aster

Eupatorium maculatum--Joe-pye weed

Eupatorium perfoliatum--Boneset

Total number of plant species: 43

Number of alien, or non-native, plant species: 4 (9 percent)

This approximately 10-acre plant community area is part of a larger wetland complex and consists of shallow marsh, good quality Southern sedge meadow and floating sedge mat, with second growth, Southern wet to wet-mesic lowland hardwoods along the wetland edge. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

An aggressive, non-native, plant species, Purple loosestrife, (*Lythrum salicaria*), was observed during the field inspection, but currently was only found in an isolated stand at the easternmost wetland edge.

¹ Scattered stands.

² Alien or non-native plant species.

³ Growing along the wetland edge.

⁴ Uncommon plant species.

Plant Community Area No. 1A

Dates: August 4, 1993 and June 24, 2000

Observers: Lawrence A. Leitner, Ph.D., Principal Biologist
Christopher J. Jors, Biologist
Southeastern Wisconsin Regional Planning Commission

SPHAGNACEAE

Sphagnum sp.--Sphagnum

POLYPODIACEAE

Thelypteris palustris¹--Marsh fern

TYPHACEAE

Typha latifolia¹--Broad-leaved cat-tail

Typha angustifolia--Narrow-leaved cat-tail

ALISMACEAE

Sagittaria latifolia--Common arrowhead

GRAMINEAE

Calamagrostis canadensis--Canada bluejoint

Leersia oryzoides--Rice cut grass

CYPERACEAE

Eleocharis sp.--Spike-rush

Scirpus validus--Soft-stemmed bulrush

Scirpus acutus--Hard-stemmed bulrush

Scirpus cyperinus--Wool-grass

Carex bebbii--Sedge

Carex stricta--Tussock sedge

Carex aquatilis¹--Aquatic sedge

Carex hystericina--Bottlebrush sedge

Carex comosa--Bristly sedge

LEMNACEAE

Lemna minor--Lesser duckweed

IRIDACEAE

Iris virginica--Virginia blueflag

SALICACEAE

Salix bebbiana--Beaked willow

Salix sp.--Willow

URTICACEAE

Pilea pumila--Clearweed

POLYGONACEAE

Rumex orbiculatus--Great water dock

CARYOPHYLLACEAE

Stellaria longifolia--Stitchwort

NYMPHAEACEAE

Nuphar advena--Yellow water lily
Nymphaea odorata--White water lily

DROSERACEAE

Drosera rotundifolia--Sundew

ANACARDIACEAE

Rhus vernix--Poison sumac

ACERACEAE

Acer saccharinum--Silver maple

BALSAMINACEAE

Impatiens biflora--Jewelweed

HYPERICACEAE

Triadenum virginicum--Marsh St. Johns wort

VIOLACEAE

Viola cucullata--Blue marsh violet
Viola pallens--Smooth white violet

ONAGRACEAE

Epilobium strictum²--Downy willow herb

UMBELLIFERAE

Cicuta bulbifera--Water-hemlock

CORNACEAE

Cornus stolonifera--Red-osier dogwood

PRIMULACEAE

Lysimachia thyrsiflora--Tufted loosestrife

ASCLEPIADACEAE

Asclepias incarnata--Marsh milkweed

VERBENACEAE

Verbena hastata--Blue vervain

LABIATAE

Scutellaria lateriflora--Sideflower skullcap
Lycopus uniflorus--Northern bugleweed
Lycopus americanus--Cutleaf bugleweed
Mentha arvensis--Wild mint

SOLANACEAE

Solanum dulcamara³--Deadly nightshade

CAMPANULACEAE

Campanula aparainoides--Marsh bellflower

COMPOSITAE

Bidens coronata--Tall swamp-marigold
Solidago gigantea--Giant goldenrod
Aster lucidulus--Swamp aster
Eupatorium maculatum--Joe-pye weed
Eupatorium perfoliatum--Boneset

Total number of plant species: 49

Number of alien, or non-native, plant species: 1 (0.5 percent)

This approximately 4.0-acre wetland plant community area consists of good quality floating sedge mat and deep and shallow marsh.

A State-designated Special Concern species, Downy willow herb, (*Epilobium strictum*), was observed during the field inspection.

¹ Co-dominant plant species.

² Special Concern plant species.

³ Alien or non-native plant species.

Dates: August 6 and 20, 1999; October 1, 1999

Observer: Rachel E. Lang, Senior Specialist-Biologist
Southeastern Wisconsin Regional Planning Commission

Plant Community Area No. 2

CHARACEAE

Chara sp.¹--Muskgrass

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

POTAMOGETONAGEAE

Potamogeton pectinatus¹--Sago pondweed

Potamogeton natans¹--Floating-leaf pondweed

HYDROCHARITACEAE

Vallisneria americana¹--Tape-grass

ALISMATACEAE

Alisma plantago-aquatica--Water plantain

Sagittaria latifolia--Common arrowhead

CYPERACEAE

Eleocharis sp.--Spike-rush

Scirpus acutus²--Hard-stemmed bulrush

Carex stricta--Tussock sedge

Carex comosa--Bristly sedge

Carex sp.--Sedge

LEMNACEAE

Lemna minor³--Lesser duckweed

JUNCACEAE

Juncus sp.--Rush

IRIDACEAE

Iris virginica--Virginia blueflag

POLYGONACEAE

Rumex orbiculatus--Great water dock

Polygonum sp.--Smartweed

NYMPHAEACEAE

Nuphar variegatum--Yellow water lily

Nymphaea odorata²--White water lily

LYTHRACEAE

Decodon verticillatus--Water-willow

HALORAGACEAE

Myriophyllum sp.¹--Native water milfoil

ASCLEPIADACEAE

Asclepias incarnata--Marsh milkweed

LABIATAE

Lycopus americanus--Cutleaf bugleweed

COMPOSITAE

Bidens coronata--Tall swamp-marigold

Total number of plant species: 24

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 17-acre plant community area is part of a larger wetland complex and consists of open water and deep marsh, with small scattered stands of shallow marsh and Southern sedge meadow. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection. In addition, this plant community area is part of a Wisconsin Department of Natural Resources designated Sensitive Area.

¹ Submersed aquatics.

² Co-dominant plant species.

³ Free-floating plant species.

Plant Community Area No. 3

POLYPODIACEAE

Thelypteris palustris--Marsh fern

TYPHACEAE

Typha latifolia¹--Broad-leaved cat-tail

CYPERACEAE

Eleocharis sp.--Spike-rush

Scirpus acutus--Hard-stemmed bulrush

Carex stricta¹--Tussock sedge

Carex comosa--Bristly sedge

Carex sp.--Sedge

SALICACEAE

Salix discolor--Pussy willow

POLYGONACEAE

Rumex orbiculatus--Great water dock

Polygonum sp.--Smartweed

ACERACEAE

Acer saccharinum²--Silver maple

LYTHRACEAE

Decodon verticillatus--Water-willow

ONAGRACEAE

Epilobium coloratum--Willow herb

CORNACEAE

Cornus stolonifera--Red-osier dogwood

ASCLEPIADACEAE

Asclepias incarnata--Marsh milkweed

LABIATAE

Lycopus americanus--Cutleaf bugleweed

COMPOSITAE

Eupatorium perfoliatum--Boneset

Total number of plant species: 17

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 2.3-acre plant community area consists of deep marsh, shallow marsh and Southern sedge meadow. Disturbances to the plant community area include harvesting of aquatic plants and past dredging for navigation channels. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection. In addition, this plant community area is part of a Wisconsin Department of Natural Resources designated Sensitive Area.

¹ Co-dominant plant species.

² Sapling.

Plant Community Area No. 4

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

CYPERACEAE

Scirpus acutus¹--Hard-stemmed bulrush

NYMPHAEACEAE

Nymphaea odorata¹--White water lily

LYTHRACEAE

Decodon verticillatus--Water-willow

Total number of plant species: 4

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 6.3-acre plant community area is part of a larger wetland complex and consists of deep marsh and shallow marsh. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection. In addition, this plant community area is part of a Wisconsin Department of Natural Resources designated Sensitive Area.

¹ Co-dominant plant species.

Plant Community Area No. 5

POLYPODIACEAE

Thelypteris palustris--Marsh fern

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

GRAMINEAE

Zizania aquatica--Wild rice

CYPERACEAE

Eleocharis sp.--Spike-rush

Scirpus acutus--Hard-stemmed bulrush

Carex stricta--Tussock sedge

Carex comosa--Bristly sedge

Carex sp.--Sedge

LEMNACEAE

Lemna minor¹--Lesser duckweed

SALICACEAE

Salix nigra²--Black willow

Salix bebbiana--Beaked willow

POLYGONACEAE

Rumex orbiculatus--Great water dock

Polygonum sp.--Smartwed

NYMPHAEACEAE

Nymphaea odorata--White water lily

LYTHRACEAE

Decodon verticillatus--Water-willow

CORNACEAE

Cornus amomum--Silky dogwood

LABIATAE

Lycopus americanus--Cutleaf bugleweed

COMPOSITAE

Bidens sp.--Beggars-ticks

Eupatorium maculatum--Joe-pye weed

Total number of plant species: 19
Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 2.0-acre plant community area is part of a larger wetland complex and consists of deep marsh, shallow marsh and Southern sedge meadow. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection. In addition, this plant community area is part of a Wisconsin Department of Natural Resources Sensitive Area.

-
- ¹ Free-floating plant species.
² Growing along the wetland edge.

Plant Community Area No. 6

CHARACEAE

Chara sp.^{1,2}--Muskgrass

TYPHACEAE

Typha latifolia²--Broad-leaved cat-tail

POTAMOGETONACEAE

Potamogeton zosteriformis²--Flat-stemmed pondweed

Potamogeton sp.^{2,3}--Pondweed

Najas flexilis²--Slender naiad

HYDROCHARITACEAE

Elodea canadensis²--Water-weed

Vallisneria americana²--Tape-grass

CYPERACEAE

Eleocharis sp.--Spike-rush

Scirpus acutus⁴--Hard-stemmed bulrush

NYMPHAEACEAE

Nymphaea odorata⁴--White water lily

LYTHRACEAE

Decodon verticillatus⁵--Water-willow

HALORAGACEAE

Myriophyllum sp.²--Native water milfoil

Total number of plant species: 12

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 19-acre plant community area consists of open water, deep marsh and shallow marsh. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection. In addition, this plant community area is part of a Wisconsin Department of Natural Resources designated Sensitive Area.

¹ Dominant plant species.

² Submersed aquatic plant species.

³ Uncommon plant species.

⁴ Co-dominant plant species.

⁵ Small stands.

Plant Community Area No. 7

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

CYPERACEAE

Eleocharis sp.--Spike-rush

POLYGONACEAE

Polygonum pennsylvanicum--Pinkweed

LABIATAE

Lycopus americanus--Cutleaf bugleweed

Total number of plant species: 4

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 4.0-acre plant community area is part of a larger wetland complex and consists of shallow marsh. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection. In addition, this plant community area is part of a Wisconsin Department of Natural Resources designated Sensitive Area.

Plant Community Area No. 8

CHARACEAE

Chara sp.¹--Muskgrass

LENTIBULARIACEAE

Utricularia sp.¹--Blatterwort

NAJADACEAE

Najas marina¹--Spiny naiad

Najas flexilis¹--Slender naiad

HYDROCHARITACEAE

Vallisneria americana¹--Tape-grass

CYPERACEAE

Scirpus acutus--Hard-stemmed bulrush

NYMPHAEACEAE

Nuphar variegatum--Yellow water lily

Nymphaea odorata²--White water lily

Total number of plant species: 8

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 17-acre plant community area is part of a larger wetland complex and consists of open water and deep marsh. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection. In addition, this plant community area is part of the Wisconsin Department of Natural Resources designated Sensitive Area.

¹ Submersed aquatic plant species.

² Dominant plant species.

Plant Community Area No. 9

LEMNACEAE

Lemna minor¹--Lesser duckweed

NYMPHAEACEAE

Nymphaea odorata²--White water lily

Total number of plant species: 2

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 3.0-acre plant community area is part of a larger wetland complex and consists of deep marsh. Disturbances to the plant community area include harvesting of aquatic vegetation for a navigation channel. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection. In addition, this plant community area is part of a Wisconsin Department of Natural Resources designated Sensitive Area.

¹ Free-floating plant species.

² Dominant plant species.

Plant Community Area No. 10

POLYPODIACEAE

Thelypteris palustris--Marsh fern

TYPHACEAE

Typha latifolia¹--Broad-leaved cat-tail

ALISMATACEAE

Sagittaria latifolia--Common arrowhead

GRAMINEAE

Agrostis gigantea²--Redtop grass

Leersia oryzoides--Rice cut grass

Echinochloa crusgalli³--Barnyard grass

CYPERACEAE

Scirpus validus--Soft-stemmed bulrush

Carex comosa--Bristly sedge

Carex lacustris--Lake sedge

Carex sp.--Sedge

LEMNACEAE

Lemna minor--Lesser duckweed

IRIDACEAE

Iris virginica--Virginia blueflag

DIOSCOREACEAE

Dioscorea villosa³--Wild yam

SALICACEAE

Populus tremuloides³--Quaking aspen

Salix babylonica^{2,3}--Weeping willow

Salix nigra³--Black willow

Salix discolor--Pussy willow

Salix sp.--Willow

FAGACEAE

Quercus rubra³--Northern red oak

ULMACEAE

Ulmus americana³--American elm

URTICACEAE

Boehmeria cylindrica--False nettle

Pilea pumila--Clearweed

POLYGONACEAE

Rumex orbiculatus--Great water dock

Polygonum pensylvanicum--Pinkweed

NYMPHAEACEAE

Nuphar variegatum--Yellow water lily

SAXIFRAGACEAE

Ribes americanum³--Wild black currant

ROSACEAE

Geum aleppicum--Yellow avens
Rubus strigosus³--Red raspberry
Agrimonia gryposepala³--Agrimony

ANACARDIACEAE

Rhus radicans³--Poison ivy
Rhus glabra³--Smooth sumac

BALSAMINACEAE

Impatiens biflora--Jewelweed

RHAMNACEAE

Rhamnus cathartica^{2,3}--Common buckthorn

VITACEAE

Vitis riparia³--River-bank grape

ONAGRACEAE

Epilobium coloratum--Willow herb
Circaea quadrisulcata³--Enchanters nightshade

UMBELLIFERAE

Cicuta bulbifera--Water-hemlock

CORNACEAE

Cornus stolonifera--Red-osier dogwood

ASCLEPIADACEAE

Asclepias incarnata--Marsh milkweed

LABIATAE

Mentha arvensis--Wild mint

CAPRIFOLIACEAE

Viburnum opulus²--High bush-cranberry
Sambucus canadensis--Elderberry
Lonicera x bella^{2,3}--Hybrid honeysuckle

COMPOSITAE

Bidens coronata--Tall swamp-marigold
Solidago gigantea--Giant goldenrod
Aster lateriflorus³--Calico aster
Eupatorium perfoliatum--Boneset

Total number of plant species: 47

Number of alien, or non-native, plant species: 5 (11 percent)

This approximately 1.0-acre plant community area is part of a larger wetland complex and consists of shallow marsh, fresh (wet) meadow and second growth, Southern wet to wet-mesic lowland hardwoods. Disturbances to the plant community area include past filling along the wetland edge. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

¹ Dominant plant species.

² Alien or non-native plant species.

³ Growing along the wetland edge.

Plant Community Area No. 11

POLYPODIACEAE

Thelypteris palustris--Marsh fern

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

ALISMATACEAE

Sagittaria latifolia--Common arrowhead

CYPERACEAE

Scirpus validus--Soft-stemmed bulrush

Carex stricta--Tussock sedge

Carex comosa--Bristly sedge

Carex spp.--Sedges

SALICACEAE

Salix discolor¹--Pussy willow

POLYGONACEAE

Rumex orbiculatus--Great water dock

Polygonum pensylvanicum--Pinkweed

ONAGRACEAE

Epilobium coloratum--Willow herb

CORNACEAE

Cornus amomum--Silky dogwood

COMPOSITAE

Bidens coronata--Tall swamp-marigold

Aster lucidulus--Swamp aster

Eupatorium maculatum--Joe-pye weed

Eupatorium perfoliatum--Boneset

Total number of plant species: 16+

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 0.8-acre plant community area is part of a larger wetland complex and consists of Southern sedge meadow. Disturbances to the plant community area include past filling. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

¹ Growing along the wetland edge.

Plant Community Area No. 12

GRAMINEAE

Leersia oryzoides--Rice cut grass

LEMNACEAE

Lemna minor¹--Lesser duckweed

POLYGONACEAE

Rumex orbiculatus--Great water dock

ANACARDIACEAE

Rhus vernix--Poison sumac

BALSAMINACEAE

Impatiens biflora--Jewelweed

LYTHRACEAE

Decodon verticillatus²--Water-willow

CORNACEAE

Cornus stolonifera³--Red-osier dogwood

COMPOSITAE

Bidens sp.--Beggars-ticks

Total number of plant species: 8

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 3.3-acre plant community area consists of shallow marsh with small areas of open water. Disturbances to the plant community area include siltation and sedimentation due to stormwater runoff from adjacent lands. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

¹ Free-floating plant species.

² Dominant plant species.

³ Growing along the wetland edge.

Plant Community Area No. 13

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

SALICACEAE

Salix sp.--Willow

FAGACEAE

Quercus macrocarpa--Bur oak

NYMPHAEACEAE

Nymphaea odorata--White water lily

FABACEAE

Robinia pseudoacacia¹--Black locust

LYTHRACEAE

Decodon verticillatus²--Water-willow

CORNACEAE

Cornus stolonifera--Red-osier dogwood

OLEACEAE

Fraxinus pennsylvanica--Green ash

ASCLEPIADACEAE

Asclepias incarnata--Marsh milkweed

CONVOLVULACEAE

Convolvulus sp.--Field bindweed

CAPRIFOLIACEAE

Sambucus canadensis--Elderberry

Total number of plant species: 11

Number of alien, or non-native, plant species: 1 (9 percent)

This approximately 0.5-acre plant community area consists of shallow marsh and fresh (wet) meadow with scattered second growth, Southern wet to wet-mesic lowland hardwoods. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

¹ Alien or non-native plant species.

² Dominant plant species.

Plant Community Area No. 14

POLYPODIACEAE

Thelypteris palustris--Marsh fern

TYPHACEAE

Typha latifolia¹--Broad-leaved cat-tail

ALISMATACEAE

Sagittaria latifolia--Common arrowhead

CYPERACEAE

Scirpus validus--Soft-stemmed bulrush

Carex stricta--Tussock sedge

Carex comosa--Bristly sedge

Carex lacustris--Lake sedge

Carex sp.--Sedge

ARACEAE

Symplocarpus foetidus--Skunk cabbage

LEMNACEAE

Lemna minor²--Lesser duckweed

SALICACEAE

Populus tremuloides--Quaking aspen

Salix bebbiana--Beaked willow

Salix spp.--Willows

URTICACEAE

Pilea pumila--Clearweed

POLYGONACEAE

Rumex orbiculatus--Great water dock

ROSACEAE

Rubus occidentalis³--Black raspberry

FABACEAE

Vicia sp.--Vetch

BALSAMINACEAE

Impatiens biflora--Jewelweed

TILIACEAE

Tilia americana³--Basswood

LYTHRACEAE

Decodon verticillatus--Water-willow

CORNACEAE

Cornus amomum--Silky dogwood

LABIATAE

Lycopus americanus--Cutleaf bugleweed

SCROPHULARIACEAE

Gerardia purpurea--Pink gerardia

CAPRIFOLIACEAE

Viburnum lentago³--Nannyberry

COMPOSITAE

Bidens coronata--Tall swamp-marigold

Eupatorium maculatum--Joe-pye weed

Eupatorium perfoliatum--Boneset

Total number of plant species: 27

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 2.3-acre plant community area consists of shallow marsh and Southern sedge meadow with second growth, Southern wet to wet-mesic lowland hardwoods along the wetland edge. Disturbances to the plant community area include siltation and sedimentation due to stormwater runoff from adjacent lands. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

¹ Dominant plant species.

² Free-floating plant species.

³ Growing along the wetland edge.

Plant Community Area No. 15

SALICACEAE

Salix nigra--Black willow

POLYGONACEAE

Rumex orbiculatus--Great water dock

ACERACEAE

Acer negundo--Boxelder

LYTHRACEAE

Decodon verticillatus--Water-willow

COMPOSITAE

Bidens coronata--Tall swamp-marigold

Total number of plant species: 5

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 0.3-acre plant community area consists of shallow marsh with second growth, Southern wet to wet-mesic lowland hardwoods growing along the wetland edge. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

Plant Community Area No. 16

NYMPHAEACEAE

Nymphaea odorata--White water lily

Total number of plant species: 1

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 1.8-acre plant community area is part of a larger wetland complex and consists of deep marsh. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection. In addition, this plant community area is part of a Wisconsin Department of Natural Resources designated Sensitive Area.

Plant Community Area No. 17

POLYPODIACEAE

Thelypteris palustris--Marsh fern

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

GRAMINEAE

Phragmites communis--Tall reed grass

Phalaris arundinacea¹--Reed canary grass

Leersia oryzoides--Rice cut grass

CYPERACEAE

Scirpus validus--Soft-stemmed bulrush

Carex stricta--Tussock sedge

Carex lacustris--Lake sedge

Carex spp.--Sedges

IRIDACEAE

Iris virginica--Virginia blueflag

SALICACEAE

Populus deltoides²--Cottonwood

Salix nigra--Black willow

FAGACEAE

Quercus macrocarpa²--Bur oak

MORACEAE

Morus alba^{1,2}--White mulberry

URTICACEAE

Urtica dioica--Stinging nettle

Pilea pumila--Clearweed

POLYGONACEAE

Rumex orbiculatus--Great water dock

Polygonum amphibium--Smartweed

CRUCIFERAE

Alliaria officinalis^{1,2}--Garlic-mustard

SAXIFRAGACEAE

Ribes americanum--Wild black currant

ANACARDIACEAE

Rhus radicans²--Poison ivy

ACERACEAE

Acer negundo²--Boxelder

BALSAMINACEAE

Impatiens biflora--Jewelweed

RHAMNACEAE

Rhamnus cathartica^{1,2}--Common buckthorn

Rhamnus franqula^{1,2}--Glossy buckthorn

VITACEAE

Vitis riparia--River-bank grape
Parthenocissus quinquefolia²--Virginia creeper

TILIACEAE

Tilia americana²--Basswood

LYTHRACEAE

Decodon verticillatus³--Water-willow
Lythrum salicaria¹--Purple loosestrife

CORNACEAE

Cornus amomum--Silky dogwood
Cornus stolonifera--Red-osier dogwood

OLEACEAE

Fraxinus pennsylvanica²--Green ash

ASCLEPIADACEAE

Asclepias incarnata--Marsh milkweed

CAPRIFOLIACEAE

Viburnum rafinesquianum²--Downy arrow-wood
Sambucus canadensis--Elderberry
Lonicera x bella^{1,2}--Hybrid honeysuckle

LOBELIACEAE

Lobelia siphilitica--Great blue lobelia

COMPOSITAE

Bidens coronata--Tall swamp-marigold
Eupatorium maculatum--Joe-pye weed

Total number of plant species: 40+

Number of alien, or non-native, plant species: 7 (18 percent)

This approximately 1.5-acre plant community area is part of a larger wetland complex and consists of shallow marsh and second growth, Southern wet to wet-mesic lowland hardwoods. Disturbances to the plant community area include dumping of yard wastes along the wetland edge. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

An aggressive, non-native, plant species, Purple loosestrife, (*Lythrum salicaria*), was observed during the field inspection.

¹ Alien or non-native plant species.

² Growing along the wetland edge.

³ Dominant plant species.

Plant Community Area No. 18

PINACEAE

Picea pungens^{1,2}--Colorado blue spruce

CUPRESSACEAE

Juniperus virginiana--Red-cedar

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

GRAMINEAE

Glyceria striata--Fowl manna grass

Poa pratensis--Kentucky bluegrass

Phragmites communis--Tall reed grass

Phalaris arundinacea^{1,3}--Reed canary grass

Leersia oryzoides--Rice cut grass

Echinochloa crusgalli--Barnyard grass

Setaria glauca¹--Yellow foxtail

CYPERACEAE

Scirpus validus--Soft-stemmed bulrush

Scirpus atrovirens--Green bulrush

Carex vulpinoidea--Fox sedge

Carex granularis--Sedge

Carex stricta--Tussock sedge

Carex sp.--Sedge

IRIDACEAE

Iris virginica--Virginia blueflag

SALICACEAE

Populus tremuloides--Quaking aspen

Populus deltoides--Cottonwood

Salix nigra--Black willow

Salix exigua--Sand-bar willow

Salix bebbiana--Beaked willow

Salix discolor--Pussy willow

FAGACEAE

Quercus macrocarpa--Bur oak

ULMACEAE

Ulmus americana--American elm

URTICACEAE

Urtica dioica--Stinging nettle

Boehmeria cylindrica--False nettle

POLYGONACEAE

Polygonum pensylvanicum--Pinkweed

Polygonum sp.--Smartweed

BALSAMINACEAE

Impatiens biflora--Jewelweed

RHAMNACEAE

Rhamnus cathartica¹--Common buckthorn

VITACEAE

Vitis riparia--River-bank grape
Parthenocissus quinquefolia--Virginia creeper

LYTHRACEAE

Decodon verticillatus--Water-willow
Lythrum salicaria¹--Purple loosestrife

ONAGRACEAE

Oenothera biennis--Evening-primrose

CORNACEAE

Cornus amomum--Silky dogwood
Cornus stolonifera--Red-osier dogwood

ASCLEPIADACEAE

Asclepias incarnata--Marsh milkweed

VERBENACEAE

Verbena hastata--Blue vervain

SOLANACEAE

Solanum dulcamara¹--Deadly nightshade

CAPRIFOLIACEAE

Sambucus canadensis--Elderberry

LOBELIACEAE

Lobelia siphilitica--Great blue lobelia

COMPOSITAE

Bidens coronata--Tall swamp-marigold
Ambrosia trifida--Giant ragweed
Ambrosia artemisiifolia--Common ragweed
Solidago gigantea--Giant goldenrod
Solidago altissima--Tall goldenrod
Solidago graminifolia--Grassleaf goldenrod
Aster simplex--Marsh aster
Eupatorium maculatum--Joe-pye weed
Eupatorium perfoliatum--Boneset
Sonchus arvensis¹--Sow thistle

Total number of plant species: 53

Number of alien, or non-native, plant species: 7 (13 percent)

This approximately 8.0-acre plant community area is part of a larger wetland complex and consists of shallow marsh and Southern sedge meadow, fresh (wet) meadow, and second growth, Southern wet to wet-mesic lowland hardwoods. Disturbances to the plant community area include mowing and past filling. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

An aggressive, non-native, plant species, Purple loosestrife, (*Lythrum salicaria*), was observed during the field inspection.

¹ Alien or non-native plant species.

² Planted tree species.

³ Dominant plant species.

Plant Community Area No. 19

POLYGONACEAE

Rumex orbiculatus--Great water dock

NYMPHAEACEAE

Nuphar variegatum--Yellow water lily

Nymphaea odorata--White water lily

LYTHRACEAE

Decodon verticillatus¹--Water-willow

Total number of plant species: 4

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 1.0-acre plant community area consists of deep marsh and shallow marsh. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

¹ Dominant plant species.

Plant Community Area No. 20

NYPHAEACEAE

Nuphar variegatum--Yellow water lily

Nymphaea odorata--White water lily

Total number of plant species: 2

Number of alien, or non-native, plant species: 0 (0 percent)

This approximately 2.0-acre plant community area is part of a larger wetland complex and consists of deep marsh. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection. In addition, this plant community area is part of a Wisconsin Department of Natural Resources designated Sensitive Area.

Dates: August 4, 1993 and June 24, 2000

Observers: Lawrence A. Leitner, Ph.D., Principal Biologist
Christopher J. Jors, Biologist
Southeastern Wisconsin Regional Planning Commission

Species List: Plant Community Area No. 21

SPHAGNACEAE

Sphagnum sp.--Sphagnum

EQUISETACEAE

Equisetum arvense--Common horsetail

POLYPODIACEAE

Thelypteris palustris--Marsh fern

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

ALISMATACEAE

Sagittaria latifolia--Common arrowhead

GRAMINEAE

Bromus ciliatus--Ciliated brome grass
Calamagrostis canadensis--Canada bluejoint
Agrostis gigantea¹--Redtop grass
Muhlenbergia glomerata--Fen muhly grass
Leersia oryzoides--Rice cut grass

CYPERACEAE

Eleocharis erythropoda--Spike-rush
Scirpus validus--Soft-stemmed bulrush
Scirpus cyperinus--Wool-grass
Scirpus atrovirens--Green bulrush
Eriophorum angustifolium--Narrow-leaved cotton-grass
Carex lasiocarpa--Woolly sedge
Carex stricta--Tussock sedge
Carex aquatilis--Aquatic sedge
Carex hystericina--Bottlebrush sedge
Carex comosa--Bristly sedge
Carex lacustris--Lake sedge
Carex rostrata--Beaked sedge

LEMNACEAE

Lemna minor--Lesser duckweed

SALICACEAE

Populus tremuloides--Quaking aspen
Salix serissima--Autumn willow
Salix pedicellaris--Bog willow
Salix bebbiana--Beaked willow
Salix discolor--Pussy willow
Salix candida--Sage willow

BETULACEAE

Betula pumila--Bog birch

URTICACEAE

Boehmeria cylindrica--False nettle
Pilea pumila--Clearweed

POLYGONACEAE

Rumex orbiculatus--Great water dock
Polygonum amphibium--Smartweed
Polygonum pennsylvanicum--Pinkweed

CARYOPHYLLACEAE

Stellaria longifolia--Stitchwort

RANUNCULACEAE

Caltha palustris--Marsh marigold

BALSAMINACEAE

Impatiens biflora--Jewelweed

VIOLACEAE

Viola pallens--Smooth white violet

ONAGRACEAE

Epilobium strictum²--Downy willow herb

UMBELLIFERAE

Cicuta bulbifera--Water-hemlock

CORNACEAE

Cornus stolonifera--Red-osier dogwood

PRIMULACEAE

Lysimachia quadriflora--Prairie loosestrife
Lysimachia thyrsoflora--Tufted loosestrife

ASCLEPIADACEAE

Asclepias incarnata--Marsh milkweed

VERBENACEAE

Verbena hastata--Blue vervain

LABIATAE

Scutellaria lateriflora--Sideflower skullcap
Scutellaria galericulata--Marsh skullcap
Prunella vulgaris--Selfheal
Pycnanthemum virginianum--Mountainmint
Lycopus uniflorus--Northern bugleweed
Lycopus americanus--Cutleaf bugleweed

SCROPHULARIACEAE

Mimulus ringens--Monkey flower
Chelone glabra--Turtlehead
Pedicularis lanceolata--Swamp lousewort

RUBIACEAE

Galium labradoricum--Bog bedstraw
Galium trifidum--Small bedstraw

CAPRIFOLIACEAE

Sambucus canadensis--Elderberry

CAMPANULACEAE

Campanula aparinoides--Marsh bellflower

COMPOSITAE

Bidens coronata--Tall swamp-marigold
Solidago uliginosa--Bog goldenrod
Solidago gigantea--Giant goldenrod
Solidago altissima--Tall goldenrod
Solidago graminifolia--Grassleaf goldenrod
Aster puniceus--Red-stemmed aster
Aster lucidulus--Swamp aster
Aster junciformis--Rush aster
Aster simplex--Marsh aster
Eupatorium maculatum--Joe-pye weed
Eupatorium perfoliatum--Boneset

Total number of plant species: 70

Number of alien, or non-native, plant species: 1 (1 percent)

This approximately 29-acre wetland plant community area consists of good quality calcareous sedge meadow and shallow marsh. The entire plant community area has been identified in SEWRPC Planning Report No. 42, "A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin," as the "Baywood Road Sedge Meadow," a natural area of local significance (NA-3).

A State-designated Special Concern species, Downy willow herb, (*Epilobium strictum*), was observed during the field inspection.

¹ Alien or non-native plant species.

² Special Concern plant species.

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Appendix D

**WISCONSIN DEPARTMENT OF NATURAL
RESOURCES-DELINEATED CHAPTER NR 107
SENSITIVE AREA DETERMINATIONS**

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State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

AQUATIC PLANT MANAGEMENT

Carroll D. Besadny
Secretary

SENSITIVE AREA ASSESSMENT SUMMARY

File Ref:

LAKE: LAUDERDALE LAKE

COUNTY: WALWORTH

DATE OF ASSESSMENT: JUNE 14, 1990

RESOURCE VALUE OF AREA 1

This shallow bay is located on the SE end of Green Lake and is unique to the Lauderdale Lakes. Water Lilies in the bay can help shade out Eurasian Water Milfoil. Eurasian Water Milfoil is present only on the outer edge of the bay. The substrate in the bay is muck. This area has not been the target of plant control activities. A list of the aquatic plants that were found in the sensitive areas of Lauderdale Lakes is attached.

The bay acts as a sediment and nutrient trap for the lake, helping to protect the lake's water quality. The aquatic vegetation helps control shoreline erosion. It also provides northern pike, largemouth bass, and bluegill with spawning and nursery areas, and well as feeding areas.

The extensive development of Lauderdale Lakes area limits the wildlife habitat. However, ducks, herons, bittern, and a variety of songbirds, muskrat and opossum inhabit this portion of the lake during various times of year.

MANAGEMENT RECOMMENDATIONS

1. No chemical treatment allowed.
2. Mechanical control allowed with following condition:
Harvesting restricted to a 25 foot wide navigational channel from the boat launch to the open water.
3. None of the following inlake activities allowed:
Filling
Aquatic plant screens
Wetland Alterations
Boardwalks
Pea gravel/sand blankets
4. The following inlake activities allowed with conditions:
Dredging only in navigational channel from boat launch.
5. Strictly enforce shoreland and wetland ordinances.
6. Efforts should be undertaken to prevent erosion from developments through education, as well as ordinance development and enforcement.



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

AQUATIC PLANT MANAGEMENT

Carroll D. Besadny
Secretary

SENSITIVE AREA ASSESSMENT SUMMARY

File Ref:

LAKE: LAUDERDALE LAKE

COUNTY: WALWORTH

DATE OF ASSESSMENT: JUNE 14, 1990

RESOURCE VALUE OF AREA 2

This area consists of a small bay on the north shore of Middle Lake that is dominated by Decodon (Water Willow). The Decodon acts as a buffer for runoff entering the bay. Its importance to the lake lies in its quiet water and its proximity to upland areas.

The substrate is primarily silt and muck in the open water areas. The bay acts as a sediment and nutrient trap for the lake, helping to protect the lake's water quality. The aquatic vegetation helps control shoreline erosion. It also provides northern pike, largemouth bass, and bluegill with spawning and nursery areas, and well as feeding areas. A list of the aquatic plants that were found in the sensitive areas of Lauderdale Lakes is attached.

This area is not critical to the fisheries in Lauderdale, however, it is extremely important to the wildlife. The extensive development of Lauderdale Lake limits the wildlife habitat. However, herons, bittern, a variety of songbirds, muskrat and opossum inhabit this area of Lauderdale Lakes during various times of year. Because the area is small, its value to migratory birds is diminished.

MANAGEMENT RECOMMENDATIONS

1. No chemical treatment allowed.
2. No mechanical treatment allowed.
3. None of the following inlake activities allowed:
 - Filling
 - Aquatic plant screens
 - Wetland Alterations
 - Boardwalks
 - Dredging
 - Pea gravel/sand blankets
4. Strictly enforce shoreland and wetland ordinances.
5. Efforts should be undertaken to prevent erosion from developments through education as well as ordinance development and enforcement.



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

AQUATIC PLANT MANAGEMENT

Carroll D. Besadny
Secretary

SENSITIVE AREA ASSESSMENT SUMMARY

File Ref:

LAKE: LAUDERDALE LAKE

COUNTY: WALWORTH

DATE OF ASSESSMENT: JUNE 14, 1990

RESOURCE VALUE OF AREA 3

This area is the largest of the sensitive areas on Lauderdale and consists of much of the western third of Middle Lake. The area contains the most diverse populations of emergent, submergent and floating plants on Lauderdale Lake, including wild rice. A list of the aquatic plants that were found in the sensitive areas of Lauderdale Lakes is attached. Water lilies, logs, stumps and vegetation are used by fish for cover. The area is an important spawning habitat for sunfish. The aquatic vegetation provides northern pike, largemouth bass, and bluegill with spawning, nursery and feeding areas.

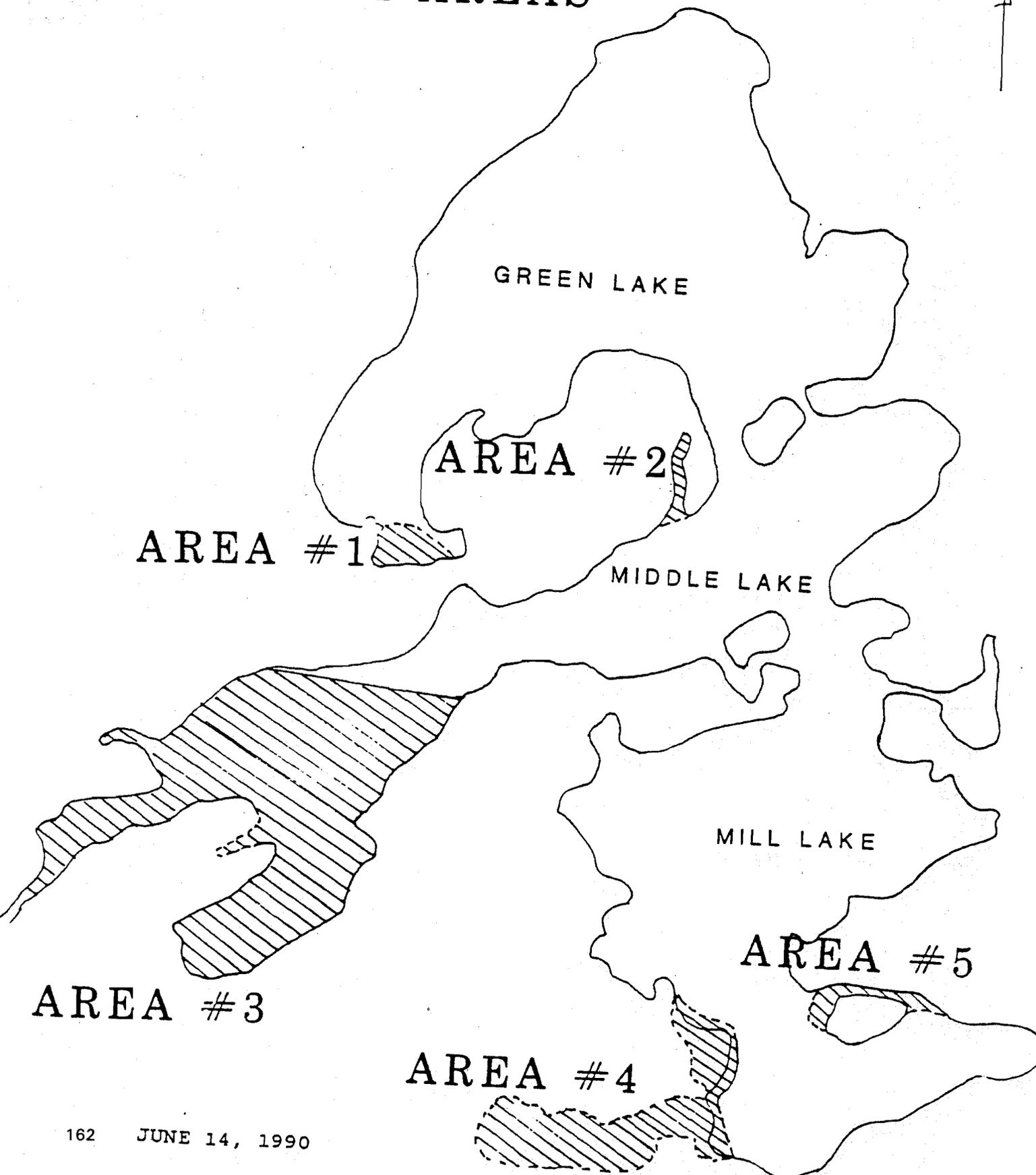
The substrate is sand, silt, and muck. The area acts as a sediment and nutrient trap for the lake, helping to protect the lake's water quality.

The extensive development of Lauderdale Lake limits the wildlife habitat. However, ducks, geese, herons, bittern, and a variety of songbirds, muskrat and opossum inhabit this area of Lauderdale Lakes during various times of year.

MANAGEMENT RECOMMENDATIONS

1. No chemical treatment allowed.
2. Mechanical treatment limited to a navigational channel along the developed shoreline, but only after spawning activities have finished.
3. None of the following inlake activities allowed:
 - Filling
 - Aquatic plant screens
 - Wetland Alterations
 - Boardwalks
4. The following inlake activities allowed with conditions:
 - Dredging a navigational channel along developed shoreline
 - Pea gravel/sand blankets
5. Strictly enforce shoreland and wetland ordinances.
6. Efforts should be undertaken to prevent erosion from developments through education, as well as ordinance development and enforcement.

LAUDERDALE LAKES SENSITIVE AREAS





State of Wisconsin

DEPARTMENT OF NATURAL RESOURCES

AQUATIC PLANT SPECIES LIST
LAUDERDALE LAKES SENSITIVE AREAS 1990

Carroll D. Besadny
Secretary

<u>PLANT SPECIES</u>	<u>AREA 1</u>	<u>AREA 2</u>	<u>AREA 3</u>	<u>AREA 4</u>	<u>File AREA 5</u>
EMERGENT					
Cattail	X		X	X	X
Bulrush	X		X	X	
Sedges	X		X	X	
Decodon		X	X	X	
SUBMERGENT					
Eurasian Milfoil	X	X	X	X	X
Northern Milfoil			X		
Chara		X	X	X	X
Large-leaf Pondweed				X	X
Curly-leaf Pondweed		X	X	X	X
Elodea		X	X	X	X
Bladderwort	X		X		
Coontail	X				
Sago Pondweed	X		X		
Wild Celery		X	X	X	X
Flat-stemmed Pondweed		X	X	X	X
Illinois Pondweed			X	X	
Common Naiad			X	X	X
White-stemmed Pondweed	X	X	X		
FLOATING					
Yellow Lily Pad	X	X	X	X	X
White Lily Pad	X		X	X	
Floating-leaf Pondweed			X		X
Filamentous Algae		X	X		X
Duckweed	X				



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

AQUATIC PLANT MANAGEMENT

Carroll D. Besac
Secret

SENSITIVE AREA ASSESSMENT SUMMARY

File Ref:

LAKE: LAUDERDALE LAKE

COUNTY: WALWORTH

DATE OF ASSESSMENT: JUNE 14, 1990

RESOURCE VALUE OF AREA 4

This area is shallow, less than five feet deep and is adjacent to a wetland on the southwest shore of Mill Lake. There is a large amount of Floating leaf Pondweed. The aquatic plant community is not unusually valuable, except for the Large-leaf Pondweed. However the aquatic plants proximity to the wetland improves the overall value of this area. A list of the aquatic plants that were found in the sensitive areas of Lauderdale Lakes is attached.

Northern pike use the area for spawning, while the large amount of cover provides shelter for waterfowl. The aquatic vegetation provides northern pike, largemouth bass, and bluegill with spawning, nursery and feeding areas.

The wetland provides a buffer for runoff entering the lake, acting as a sediment and nutrient trap, helping to protect the lake's water quality. The aquatic vegetation helps control shoreline erosion.

The extensive development of Lauderdale Lake limits the wildlife habitat. However, this area is locally important as fish and wildlife habitat. Herons, bittern, and a variety of songbirds, muskrat and opossum inhabit this portion of the Lauderdale Lakes during various times of year.

MANAGEMENT RECOMMENDATIONS

1. No chemical treatment allowed.
2. Mechanical treatment limited to a navigational channel extending from piers.
3. None of the following inlake activities allowed:
 - Filling
 - Aquatic plant screens
 - Wetland Alterations
 - Boardwalks
 - Dredging
 - Pea gravel/sand blankets
4. Strictly enforce shoreland and wetland ordinances.
5. Efforts should be undertaken to prevent erosion from developments through education, as well as ordinance development and enforcement.



State of Wisconsin

DEPARTMENT OF NATURAL RESOURCES

AQUATIC PLANT MANAGEMENT

Carroll D. Besadny
Secretary

SENSITIVE AREA ASSESSMENT SUMMARY

File Ref:

LAKE: LAUDERDALE LAKE

COUNTY: WALWORTH

DATE OF ASSESSMENT: JUNE 14, 1990

RESOURCE VALUE OF AREA 5

This area of Lauderdale Lakes is located between Spragues Island and the Lauderdale Country Club Golf Course. The area has large beds of Floating leaf Pondweed. The Pondweed bed on the extreme west of the island should be protected from any removal activities. There is good shoreline cover consisting of woody growth and the north side of the island is excellent for wildlife.

The substrate in this area is soft muck/silt. There is not much flow of water through the area. The area acts as a sediment and nutrient trap for the lake, helping to protect the lake's water quality. The aquatic vegetation helps control shoreline erosion.

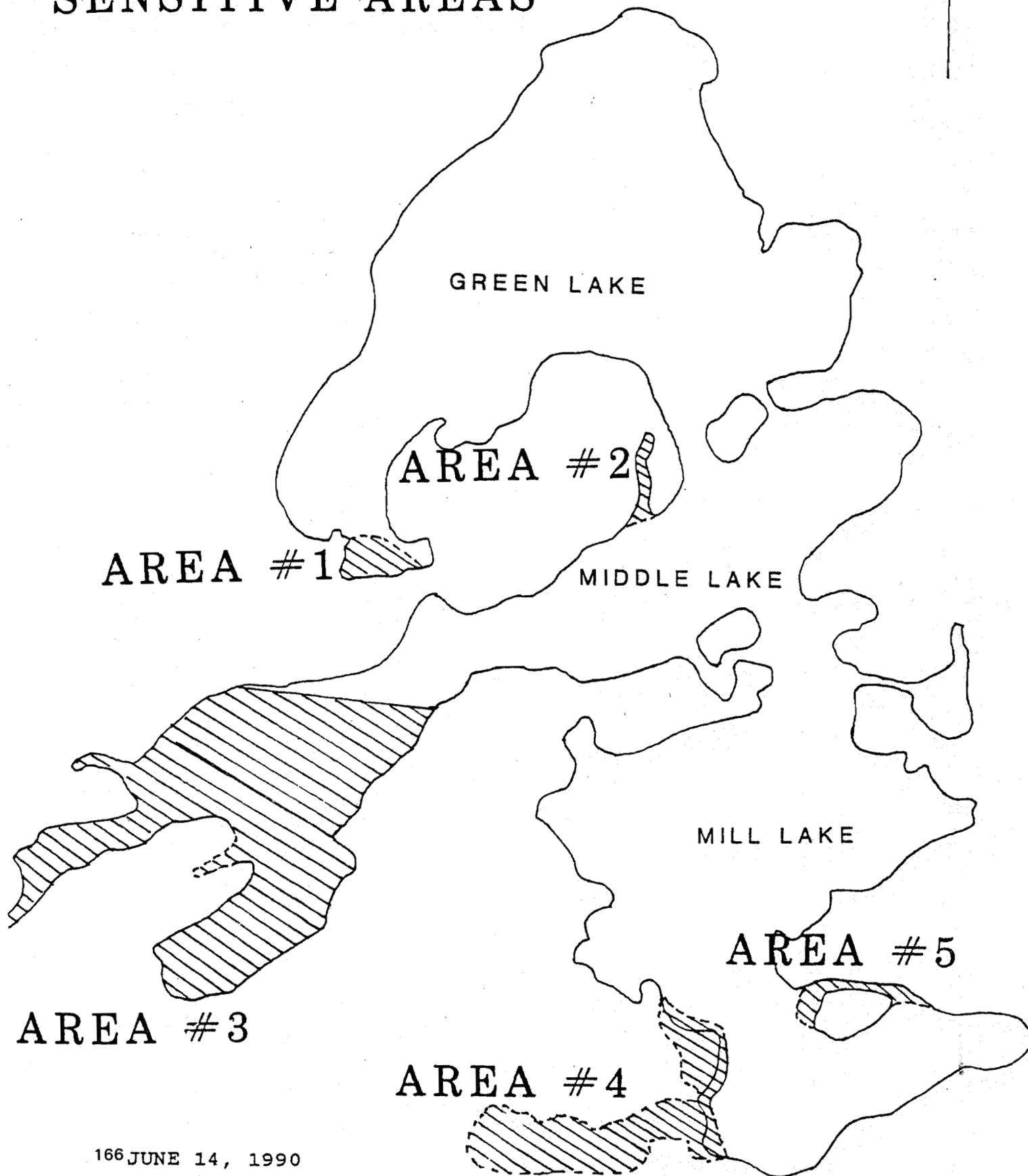
The aquatic vegetation provides provides northern pike, largemouth bass, and bluegill with spawning and nursery areas, and feeding habitat. A list of the aquatic plants that were found in the sensitive areas of Lauderdale Lakes is attached.

The extensive development of Lauderdale Lake limits the wildlife habitat. Ducks, geese, herons, bittern, and a variety of songbirds, muskrat and opossum inhabit the area during various times of year.

MANAGEMENT RECOMMENDATIONS

1. No chemical treatment allowed.
2. Mechanical treatment limited to a navigational channel extending from piers and only be done after spawning has ended. No Large-leaf or Floating-leaf Pondweed may be harvested.
3. None of the following inlake activities allowed:
 - Filling/dredging
 - Aquatic plant screens
 - Wetland Alterations
 - Boardwalks
 - Pea gravel/sand blankets
4. Strictly enforce shoreland and wetland ordinances.
5. Efforts should be undertaken to prevent erosion from developments through education, as well as ordinance development and enforcement.

LAUDERDALE LAKES SENSITIVE AREAS





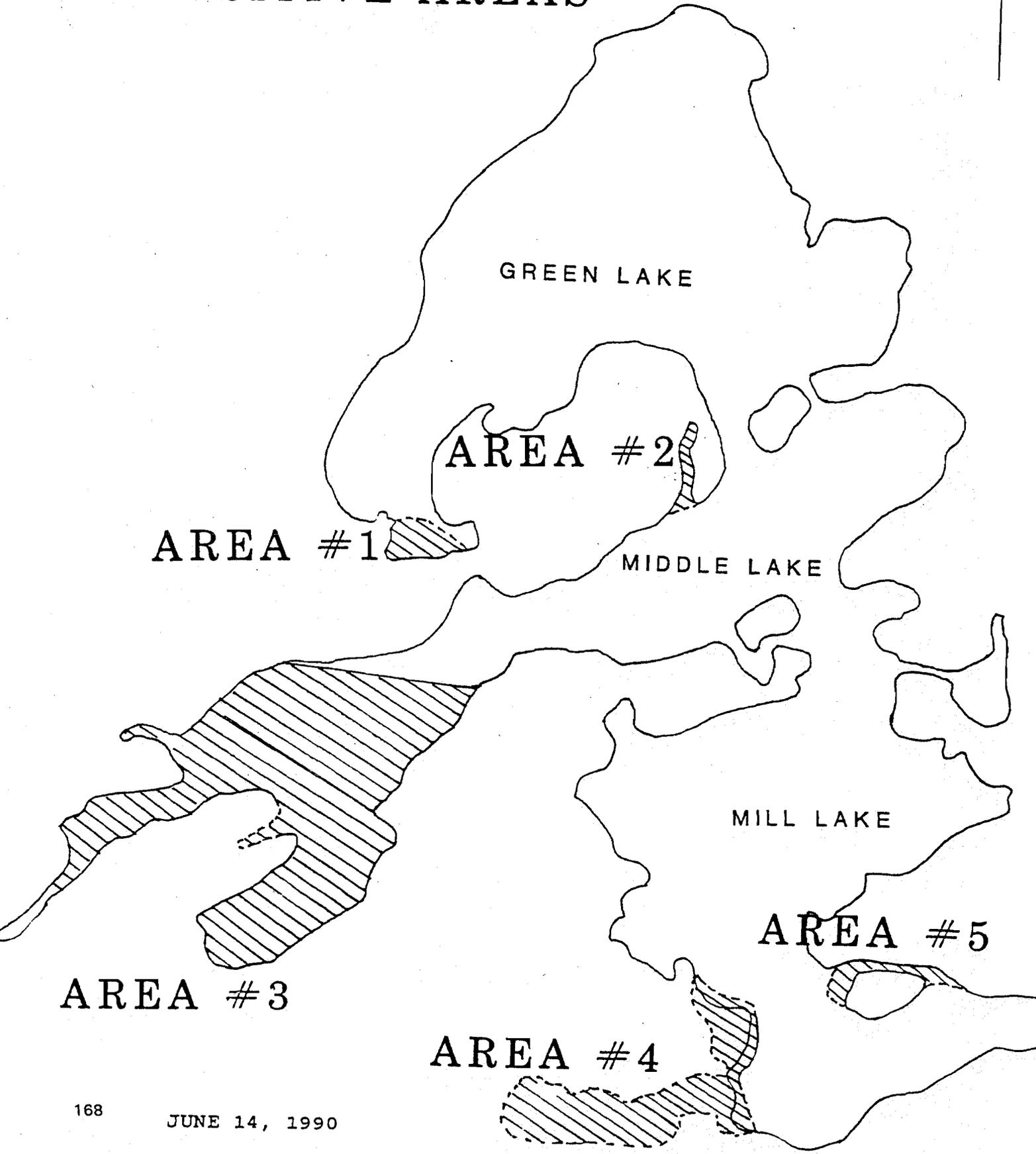
State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

AQUATIC PLANT SPECIES LIST
LAUDERDALE LAKES SENSITIVE AREAS 1990

Carroll D. Besadny
Secretary

<u>PLANT SPECIES</u>	<u>AREA 1</u>	<u>AREA 2</u>	<u>AREA 3</u>	<u>AREA 4</u>	<u>File Ref</u> <u>AREA 5</u>
EMERGENT					
Cattail	X		X	X	X
Bulrush	X		X	X	
Sedges	X		X	X	
Decodon		X	X	X	
SUBMERGENT					
Eurasian Milfoil	X	X	X	X	X
Northern Milfoil			X		
Chara		X	X	X	X
Large-leaf Pondweed				X	X
Curly-leaf Pondweed		X	X	X	X
Elodea		X	X	X	X
Bladderwort	X		X		
Coontail	X				
Sago Pondweed	X		X		
Wild Celery		X	X	X	X
Flat-stemmed Pondweed		X	X	X	X
Illinois Pondweed			X	X	
Common Naiad			X	X	X
White-stemmed Pondweed	X	X	X		
FLOATING					
Yellow Lily Pad	X	X	X	X	X
White Lily Pad	X		X	X	
Floating-leaf Pondweed			X		X
Filamentous Algae		X	X		X
Duckweed	X				

LAUDERDALE LAKES SENSITIVE AREAS



Appendix E

**BOATING AND PIER ORDINANCES
FOR THE LAUDERDALE LAKES**

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ORDINANCE NO. 012001

**AN ORDINANCE TO REGULATE WATER TRAFFIC, BOATING
AND WATER SPORTS UPON THE WATERS OF LAUDERDALE
LAKES, WALWORTH COUNTY, WISCONSIN**

The Town Boards of LaGrange and Sugar Creek ordain as follows:

SECTION I. REPEAL OF CONFLICTING ORDINANCES

All ordinances regulating water traffic, boats, boating or water sports upon the waters covered by this ordinance and all ordinances and parts of ordinances in conflict with this ordinance heretofore enacted by the Towns of LaGrange and Sugar Creek, Walworth County, Wisconsin, are hereby repealed.

SECTION II. APPLICABILITY

A. This ordinance shall apply to the waters of Lauderdale Lakes, the Town of LaGrange and the Town of Sugar Creek, unless otherwise specified. (March 1983)

B. Drivers or operators of all boats by means of which aquaplanes, water ski or similar objects are being towed, and the riders of such aquaplanes, water skis or similar objects, must conform to the same rules and clearances as provided for in this ordinance.

SECTION III. DEFINITIONS

A. The definitions set forth in Section 30.01 and 30.50, Wisconsin Statutes, as amended from time to time, are adopted by reference.

B. "Swimming zone" means an authorized area marked by regulatory markers to designate a swimming area.

C. "Slow-no-wake" is defined as the slowest possible speed so as to maintain steering.

SECTION IV. STATE LAWS ADOPTED

The statutory provisions describing and defining regulations with respect to water traffic, boats, boating and related water activities in the following enumerated sections of the Wisconsin Statutes, exclusive of any provisions therein relating to the penalties to be imposed or the punishment for violation of said statutes, are hereby adopted and by reference made a part of this ordinance as if fully set forth herein as amended, repealed or recreated by the State of Wisconsin from time to time. Any act required to be performed or prohibited by the provisions of any statute incorporated by reference herein is required or prohibited by this ordinance.

- 30.16 Removal of Obstructions to Navigation
- 30.501 Capacity Plate on Boat
- 30.51 Operation of Unnumbered Boats Prohibited
- 30.52 Certificate of Number
- 30.53 Identification Number to be Displayed on Boat; Certificate to be Carried
- 30.54 (2) Transfer of Ownership of Numbered Boat
- 30.55 Notice of Abandonment or Destruction of Boat or Change of Address
- 30.60 Classification of Motor Boats
- 30.61 Lighting Equipment
- 30.62 Other Equipment
- 30.63 (2) Use of Certain Outboard Motors Restricted and Draining Fuel into Lake Prohibited (March 1983)
- 30.64 Patrol Boats (March 1983)
- 30.65 Traffic Rules
- 30.66 Speed Restrictions
- 30.67 Accidents and Accident Reports
- 30.675 Distress Signal Flag
- 30.68 Prohibited Operations
- 30.69 Water Skiing
- 30.70 Skin Diving
- 30.71 Boats Equipped with Toilets

30.99 Parties to a Violation (March 1983)

287.81 Littering

SECTION V. AIRCRAFT LANDING ON LAKES

It is hereby prohibited for any aircraft to land upon the surface of Lauderdale Lakes within the corporate limits of the Towns of LaGrange or Sugar Creek, Walworth County, Wisconsin, except in case of emergency.

SECTION VI. ADDITIONAL TRAFFIC RULES

In addition to the provisions of the Wisconsin Statutes adopted in this ordinance, the following rules shall apply to boats or persons using the waters covered by this ordinance. (May 1989)

A. **Mooring Lights Required.** No person shall moor or anchor any boat, raft, buoy or other floating object, or permit the same to drift in the traffic lane described in this ordinance between sunset and sunrise unless there is prominently displayed thereon a bright white light of sufficient intensity and placed so as to be visible from any direction (360 degrees) for a distance of two (2) miles on a dark night with clear atmosphere. (March 1983)

B. **Lights Required for Row Boats and Sailboats Without Motors.** No person shall operate any boat propelled by muscular power or any sailboat not equipped with a motor in the traffic lane described in Section VII of this ordinance, between the hours of sunset and sunrise, unless there is prominently displayed thereon, a bright white light of sufficient intensity and placed so as to be visible from any direction (360 degrees) for a distance of two (2) miles on a dark night with clear atmosphere. (March 1983)

C. **Use of Spot Lamps Restricted.** No person aboard a boat, other than a law enforcement officer or a person in need of assistance to prevent bodily injury or destruction of

property, shall direct the beam of any spot lamp or any similar device so as to project any glaring light into the eyes of another boat operator. (March 1983)

D. No person shall operate any boat, when there are any persons or objects so situated as to obstruct the view of the operator to the front or to the side, or as to interfere with the operator's control of the operating mechanisms of the boat. Spot lamps and horns placed on the foredeck of any boat and signal lamps or speakers of authorized patrol boats shall not be considered a violation of this section. (March 1983)

E. No person shall take or operate any boat without the consent of the owner. (March 1983)

F. Organized Events and Displays. Any person organizing an event or display on Lauderdale Lakes shall provide the clerk of the respective Town written notice describing the event or display and its date and times two weeks in advance.

SECTION VII. SPEED RESTRICTIONS

A. Shore Zone.

1. Except under § 30.69(3) relating to water skiing, no person may operate a motorboat within 100 feet of the shoreline or any dock, raft, pier or buoyed restricted area at a speed in excess of slow-no-wake.
2. Except under § 30.69(3)(a), (c) or (d) relating to water skiing, no person may operate a personal watercraft within 200 feet of the shoreline at a speed in excess of slow-no-wake.

B. Except for law enforcement and/or rescue vessels, no person may operate a motorboat on the waters of Middle Lake west of a line from LL 741 (W6734 Park Lane) on the north and LL 560E (W5534 Lost Nation Road) on the south at a speed in excess of "slow-no-wake" speed. A designee of the Town Board of LaGrange is authorized and directed to place

and maintain appropriate regulatory markers to advise the public of the location of said zone.
(May 1989)

C. Except for law enforcement and/or rescue vessels, and except when or where such speed would otherwise be prohibited by law or is otherwise regulated by this ordinance, no person may operate a motorboat at a speed in excess of fifteen miles per hour (15 MPH) during the hours between sunset Friday and 9:00 a.m. Saturday, sunset Saturday and 9:00 a.m. Sunday, and sunset on the eve of any public holiday and 9:00 a.m. on such holiday. (May 14, 1990)

SECTION VIII. SWIMMING REGULATIONS

A. **Swimming from Boats Regulated.** No person shall swim from any boat unless such boat is anchored.

B. **Distance from Shore or Base.** No person shall swim more than ONE HUNDRED (100) FEET from shore or from the end of any pier or more than FIFTY (50) FEET from any anchored raft or boat unless he or she is accompanied by a boat manned by a competent person having immediately available a U.S. Coast Guard approved Type IV personal flotation device for each swimmer being escorted in addition to those required to be on board under applicable regulations. Such boat shall stay reasonably close to and guard such swimmer or swimmers. A person manning such an escort boat shall be considered competent if he can, in fact, observe the swimmer or swimmers, throw the flotation device to them should the need arise, and is otherwise qualified to operate the escort boat under applicable regulations. (March 1983)

C. **Hours Limited.** No person may swim more than 100 feet from shore, or the projecting extremities, of piers or wharfs from sunset to sunrise.

SECTION IX. WATER SKIING

In addition to the provisions of the Wisconsin statutes adopted in this ordinance, the following regulations apply to boats and persons using the waters covered by this ordinance:

A. Careful and Prudent Operation. A person operating a boat having in tow a person on water skis, aquaplane or similar device and the users of such water skis, aquaplane or similar devices shall operate such boat or use such device in a careful and prudent manner and at a reasonable distance from persons and property so as not to endanger the life or property of any person, and shall conform to all applicable rules and clearances as provided for in this ordinance.

B. Hours Limited. No person shall engage in water-skiing, aquaplaning or similar activity between the hours of sunset and sunrise. This shall not supercede the 15 MPH speed limit on weekends and holidays in Section VII. D.

C. Area Limited. No person shall engage in water-skiing, aquaplaning or similar activity outside the traffic lane described in Section VII of this ordinance.

D. Observer required. No person shall operate a boat having in tow a person on water skis, aquaplane or similar device unless there is in the boat a competent person, in addition to the operator, in a position to observe the progress of the person being towed. An observer shall be considered competent if the observer can, in fact, observe the person being towed and relay any signals to the operator. This observer requirement does not apply to Class A motorboats actually operated by the person being towed and so constructed as to be incapable of carrying the operator in or on the motorboat.

E. Number of Skiers Limited. No more than two (2) persons shall use towlines as a means of water skiing, aquaplaning or similar activity behind a boat.

F. Flotation Required.

1. All persons engaged in water skiing, aquaplaning or similar activity shall wear U.S. Coast Guard approved Type I, II or III Personal Flotation Devices. However, persons engaged in trick skiing may elect to wear a non-Coast Guard approved personal flotation device, other than a so-called "ski-belt." A trick skier

shall be identified by skiing positions which readily differentiate the skier from the ordinary "front-forward" skier, and also by the following:

(a) Skis: Short, wide or swivel skis, wakeboards and similar devices;
and

(b) Towrope: Less than 75 feet.

2. Persons engaged in barefoot skiing may elect to wear a non-Coast Guard approved barefoot wet suit designed specifically for the activity.

3. Whenever a water skier elects to wear a non-Coast Guard approved device pursuant to these regulations, there shall be a Coast Guard approved device carried in the boat for the use of such skier.

G. Restrictions. No person operating a boat having in tow a person on water skis, tube, aquaplane or similar device, nor the users of such water-skis, aquaplanes, tubes or similar devices, shall engage in such activity within one hundred (100) feet of any occupied anchored boat or marked swimming area or public boat landing.

H. Exceptions. Duly authorized water ski tournaments, competitions, exhibitions or trials therefore, for which notice has been given to the Town Clerk pursuant to this ordinance, shall be exempt from the following provisions of this Section:

Paragraph (b) (Hours limited) where adequate lighting is provided and at designated times and places for which notice was given.

Paragraph (c) (Area limited) at designated times and places for which notice was given.

Paragraph (e) (Numbers of skiers limited) at designated times and places for which notice was given.

Paragraph (f) (Flotation required) where pick-up boats are provided and at designated times and places for which notice was given.

I. Emergency Permit. Where it is impossible or impractical as a result of lack of advance knowledge to provide two (2) weeks notice for a special organized event or emergency practice, an emergency notice under this Section may be made to the head of the Water Safety Patrol and that same request is reasonable and fully describes the event, time of the event, and area of the lake to be used. (March 1983)

SECTION X. MARKERS, NAVIGATION AIDS AND POSTING

A. The designee of the LaGrange Town Board is authorized and directed to place and maintain authorized markers, navigation aids and signs as shall be appropriate to advise the public of the provisions of this ordinance and to post and maintain a copy of this ordinance at all public access points within the jurisdiction of the Towns of LaGrange and Sugar Creek, Walworth County, Wisconsin.

B. Standard Markers. No person shall place or maintain any marker upon waters of the lake except the designee of the Town Board of LaGrange.

C. Interference with Markers Prohibited. No person shall without authority remove, damage, destroy, moor or attach any watercraft to any buoy, beacon or marker placed in the waters by authority of the United States.

D. Race course markers, water ski course markers, water ski jumps, and similar devices may be temporarily placed in the traffic lane during the hours between sunrise and sunset when authorized by the Town Board of the Town of LaGrange upon application to the LaGrange Town Clerk.

SECTION XI. REGULATION OF ICEBOUND WATERS

A. Permit.

I. No person shall remove ice or cause its removal from Lauderdale Lakes without first obtaining a permit from the Town Board of LaGrange or

Sugar Creek, depending upon the location of the proposed ice removal.
(April 1983)

2. The application for permit shall be made in writing and filed in the office of the Clerk of the Town of LaGrange or Sugar Creek. The application shall describe the area from which the ice will be removed together with any additional details that the Town Board might require. It shall also state the name, residence and post office, and telephone number of the applicant.

B. Ice Holes.

1. Any person or persons who shall remove ice or cause its removal from Lauderdale Lakes shall place around the margin of the opening made by such removal, a fence, by setting posts of not less than two (2) by four (4) inches in size with a fence board thoroughly nailed thereto not less than 3½ feet above the surface of the ice on said lakes.
2. Any person or persons creating ice holes by aeration of water may, in lieu of the requirements of sub (1), erect and maintain a barricade around such holes consisting of uprights spaced every twenty-five (25) feet or less, connected by a continuous rope, cord or similar material placed 3½ feet off the surface of the ice. The connecting rope, cord or similar material shall have reflectorized ribbon or tape attached to it, so as to be highly visible, and shall be of sufficient strength to permit retrieval of the barricade following melting of ice. Any person or persons erecting such barricade shall remove the barricade and all parts thereof from the ice or water immediately after the ice has melted.

3. Removal of ice shall not interfere with the rights of the public to lawfully use the icebound waters of Lauderdale Lakes. Removal of ice for a distance of more than ten (10) feet beyond any existing pier is prohibited.
4. Each day during which an opening exists in violation of this ordinance is a separate offense.
5. Removal of ice shall not interfere with the rights of neighboring riparian proprietors. Removal of ice along the shoreline of neighboring riparian properties, except by permission of the owner or owners, is hereby declared to be a public nuisance and the maintenance of such ice holes may be abated by action at the suit of the Town. (April 1983)

C. This section shall not apply to ice fishermen as long as the hole or removal of ice does not leave a hole in the ice greater than twelve (12) inches at its greatest dimension.

SECTION XII. ENFORCEMENT, POWERS, PENALTIES AND DEPOSITS

A. This ordinance shall be enforced by the officers of the Water Safety Patrol, which shall be operated under the jurisdiction of the Town of LaGrange, Walworth County, Wisconsin. Every Water Safety Patrol officer appointed by the Town of LaGrange shall be a qualified law enforcement officer. To the extent that the Water Safety Patrol operates within the Township of Sugar Creek on Lauderdale Lakes, the authority of said officers shall be limited to the waters of Lauderdale Lakes, unless said officers, in the enforcement of their duties are, by other law, permitted to pursue such duties off the water, upon land or piers otherwise within the Township of Sugar Creek boundaries.

B. The members of the Water Safety Patrol shall have supervision over the waters of Lauderdale Lakes and may stop and board any boat for the purpose of enforcing any provisions of this ordinance and for conducting search and rescue operations, if the officers have reasonable

cause to believe there is a violation, is about to be a violation, or has been a violation of such ordinances, or the stopping and boarding of any boat is essential to conduct a search and rescue operation. Said officers may arrest any person found on the waters of Lauderdale Lakes, or within the Towns of LaGrange or Sugar Creek, violating such ordinance, whether at the time of arrest the person is on the waterways or upon land, except as above set forth with respect to the Township of Sugar Creek. Such persons will be delivered to the Circuit Court of Walworth County and the arresting officer shall make and execute a complaint charging such person with the offense committed unless otherwise provided by law. Provisions relating to citations, arrests, questioning, releases, searches, deposits and stipulations of no contests in the Wisconsin Statutes, as they are amended or repealed and recreated from time to time hereafter, shall apply to all civil forfeiture violations. Provisions relating to complaints, arrests, questioning and releases and searches under Sections 968.01 to 968.256 as they may be from time to time hereafter amended, shall apply to all criminal violations, unless otherwise provided by law.

C. All actions to recover forfeitures and penalty assessments under this ordinance are civil actions in the name of the Town of LaGrange, shall be heard in Circuit Court of Walworth County, and shall be recovered under the procedure set forth in the Wisconsin Statutes. (March 1983)

D. (1) Wisconsin state boating penalties as found in Section 30.80, Wis. Stats., as amended from time to time, and deposits as established in the Uniform Deposit and Bail Schedule established by the Wisconsin Judicial Conference, are adopted by reference for all violations for which there is a statutory counterpart.

(2) Any person who unlawfully obstructs navigation under this ordinance shall forfeit not more than Fifty Dollars (\$50.00) for each offense. Each day the obstruction exists is a separate offense.

(3) The forfeitures and bail schedule for offenses in this ordinance for which no statutory counterpart exists are all assessments imposed by statute, court costs and fees, and as follows:

Offense	Forfeiture		Bail
	Minimum	Maximum	
a. Aircraft Landing on Lakes, Sec. V.	\$ 50	\$200	\$ 75
b. Mooring Lights Required, Sec. VI.A.	\$ 20	\$100	\$ 30
c. Lights For Row Boats and Sailboats, Sec. VI.B.	\$ 20	\$100	\$ 30
d. Use of Spot Lamps Restricted, Sec. VI.C.	\$ 20	\$100	\$ 30
e. Operator View Restricted, Sec. VI.D.	\$ 20	\$100	\$ 30
f. Excess Number of Skiers, Sec. IX.E.	\$ 20	\$100	\$ 30
g. Unauthorized Marker Placement, Sec. X.B.	\$ 20	\$100	\$ 30
h. Ice Violation, Sec. XI.	\$ 20	\$100	\$ 30
i. Events and Displays Without Notice, Sec. VI.F.	\$ 10	\$ 80	\$ 20
j. Water-skier Flotation Violation, Sec. IX.F.	\$ 10	\$ 80	\$ 20
k. Interference With Markers, Sec. X.C.	\$ 30	\$100	\$ 40
l. Careful and Prudent Operation, Sec. IX.A.	\$ 30	\$100	\$ 40
m. Speed in Traffic Lane, Sec. VII.A.	\$ 40	\$130	\$ 50
n. Speed Excess of 15 MPH, Sec. VII.D.	\$ 40	\$130	\$ 50
o. Swimming From Unanchored Boat, Sec. VIII.A.	\$ 40	\$130	\$ 50
p. Swimming in Restricted Areas or at Restricted Times, Sec. VIII.B. and C.	\$ 40	\$130	\$ 50
q. Speed Excess Slow-No-Wake, Sec. VII.C.	\$ 50	\$140	\$ 60
r. Speed in Shore Zone, Sec. VII.B.	\$ 50	\$140	\$ 60
s. Operation Without Consent, Sec. VI.E.	\$ 50	\$500	\$200
t. The above forfeitures and bail amounts shall be double for a second or third subsequent offense within one (1) year.			

(4) Any person violating any provisions of this ordinance for which a penalty is not set forth above shall, upon conviction thereof, forfeit not more than \$500, nor less than \$10 for each violation, together with penalty assessments and the costs of prosecution and in default of payment of such forfeiture, assessments and

costs of prosecution shall be imprisoned in the County Jail until full payment is made, but not exceeding sixty (60) days. (April 1990)

SECTION XIII. SEVERABILITY

The provisions of this ordinance shall be deemed severable and it is expressly declared that the Town Boards would have passed the other provisions of this ordinance irrespective as to whether or not one or more provisions may be declared invalid and any provision of this ordinance or the application thereof to any person or circumstance is held invalid, the remainder of the ordinance and the application of such provisions other persons or circumstances shall not be affected thereby.

SECTION IV. EFFECTIVE DATE AND CLERK'S DUTY

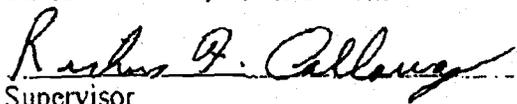
A. This ordinance shall take effect and be in force from and after its passage and publication as provided by law, and after review by the Department of Natural Resources.

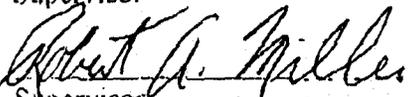
B. The LaGrange Clerk is directed to file a signed copy of this ordinance with the Department of Natural Resources in Madison, Wisconsin.

Enacted by the Town Board of LaGrange this 12th day of Feb, 2001.

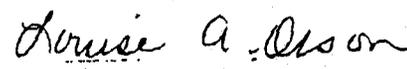
Approved:


David Heilmeyer, Town Chairman


Supervisor


Supervisor


Supervisor


Supervisor

ATTEST:

Elizabeth A. Sukala
Elizabeth A. Sukala, Town Clerk, LaGrange

Enacted by the Town Board of Sugar Creek this 19th day of February, 2001.

Approved:

John E. Winters
Charles Papske
Edward J. Meynarski

ATTEST:

Diane Boyd
Diane Boyd, Town Clerk, Sugar Creek

ORDINANCE NO. 022001

**AN ORDINANCE TO REGULATE WHARVES, PIERS AND MOORING FACILITIES
AND ESTABLISH A PIERHEAD LINE FOR LAUDERDALE LAKES**

WHEREAS, the placement of structures in and on Lauderdale Lakes may materially impact the health, safety and welfare of the public, environmental concerns relating to clean water, and aquatic habitat for fish and plant life, and recreational opportunities for all;

NOW, THEREFORE, the Town Boards of LaGrange and Sugar Creek enact this ordinance.

SECTION I. DEFINITIONS

A. The definitions set forth in Section 30.01, Wis. Stats., as amended from time to time, are adopted by reference.

B. "Mooring facility" means any allotted space, place or contrivance to which a single water craft is attached, secured or berthed, including, but not limited to, a mooring buoy, pier slip or shore station. By way of example, a pier of sufficient size to moor two (2) boats counts as two (2) mooring facilities.

C. "Pierhead line" means the distance into the water from the ordinary high water mark, as defined in NR 320.03(4), Wisconsin Administrative Code, in which area piers may be allowed.

SECTION II. PERMIT REQUIRED

No property owner, tenant, agent, business or person may do any of the following:

construct;

place,

extend,

enlarge,

replace, except seasonal replacement; or

repair an existing pier greater than 10% of its surface's square feet in one year or more than 50% of the posts of a permanent pier in one year, a wharf, pier, or mooring facility in Lauderdale Lakes without obtaining a permit from the Town of LaGrange for the portion of the lakes in the Town of LaGrange and from the Town of Sugar Creek for the portion of the lakes in the Town of Sugar Creek.

SECTION III. APPLICATION FOR PERMIT

Any person, firm, corporation or association desiring to erect, construct, place, extend or replace or repair to an extent defined in Section II any wharf, pier or mooring facility on or about the bed of Lauderdale Lakes along or beyond the shoreline as it exists or as it may have been determined and established by ordinance shall make and file a written application in the office of the Building Inspector of the Town of LaGrange or Town of Sugar Creek, as the case may be. The application shall contain the following information:

- A. Describe the real estate, existing mooring facilities, and wharf, pier, mooring facility or extension thereof in detail;
- B. The structure's location in regard to the shoreline and pierhead line;
- C. Distances to all property lines of the abutting riparian lands;
- D. Details of the dimensions and kinds of materials, together with drawings;
- E. Any additional details and specifications that the Town Board may request.

F. The name, addresses of legal residence of riparian property, and signature of the riparian proprietor of the shoreline on whose behalf the application is made, and the name and post office address of the applicant, if different;

G. A fee in the amount established from time to time by the respective Town Board, and

H. In the case of repair or replacement of a legally nonconforming pier, the year the pier, wharf or mooring facility was originally placed in the water and the number of mooring facilities in existence as of May 16, 1981.

SECTION IV. STANDARDS AND PROCEDURE FOR GRANTING PERMITS

There shall be two (2) procedures for obtaining a permit. All applicants shall submit an application to the Building Inspector. The Building Inspector is authorized to issue permits which meet the standards in Section IV.A. Any application which does not meet the standards in Section IV.A. shall be forwarded to the Town Board which may grant or deny the permit pursuant to Section IV.C.

A. The Building Inspector shall review the application and grant permits to riparian owners for piers, wharfs, mooring facilities and shore stations which meet the following standards:

1. No longer than the established pierhead line;
2. No wider than 5 feet measured at its point of greatest width, except the pier or wharf may exceed 5 feet width for a triangle at an angle of an L or T shaped pier or wharf, no greater than 3 feet on any side of the triangle attached to the pier or wharf;

3. Constructed so as to allow the free movement of water underneath all parts of the structure extending beyond the natural shore;
4. Constructed in such manner as will not cause the formation of land on the lake bed;
5. No more than one mooring facility for each twenty-two (22) feet, or fraction thereof, of shoreline owned by the riparian owner;
6. No more than five (5) mooring facilities per lot regardless of the size of the riparian owner's shoreline;
7. Placed in a location not inconsistent with drawing a chord between each pair of property lines at the point where each line meets the shoreline, extending perpendicular lines into the lake from each end of such chords to the line of navigation, and bisecting the resulting angles. These bisecting lines shall be considered the coterminous riparian rights line extension;
8. No mooring facility shall be located closer than eight (8) feet to a lot line; and
9. Not in an environmentally sensitive area delineated by the Department of Natural Resources.

B. The Building Inspector shall review the application and forward the application, together with an investigation and report, to the Town Board of LaGrange or Sugar Creek for all applications for mooring facilities which do not meet the standards established in Section IV A of this ordinance and for all applications for moorings, mooring buoys and mooring anchors

C. At a Town Board meeting, the Town Board may, after considering the application and all evidence presented, and hearing all parties desiring to be heard, grant a permit to riparian

owners for piers, wharfs, mooring facilities, moorings, mooring buoys and mooring anchors meeting the following standards and considering the following factors:

1. The location, design and construction will not detrimentally impact the health, safety and welfare of the public which consideration shall include water quality, aquatic habitat and other environmental concerns, including factors considered by the DNR, and of the owners of the abutting riparian property;
2. The location, design and construction will not interfere with public rights in the waters or with the rights of neighboring riparian proprietors or occupants;
3. Constructed so as to allow the free movement of water underneath all parts of the structure extending beyond the natural shore;
4. Constructed in such manner as will not cause the formation of land on the lake bed;
5. No more than one mooring facility for each twenty-two (22) feet, or fraction thereof, of shoreline owned by the riparian owner;
6. Placed in a location not inconsistent with drawing a chord between each pair of property lines at the point where each line meets the shoreline, extending perpendicular lines into the lake from each end of such chords to the line of navigation, and bisecting the resulting angles. These bisecting lines shall be considered the coterminal riparian rights line extension;
7. No mooring facility shall be located closer than eight (8) feet to the lot line, and
8. Additional Requirements for Mooring Buoys and Anchors

- a. No permit for placement of a mooring buoy or anchor shall be granted by the Town Board beyond 60 feet from the ordinary high water mark.
- b. Mooring buoys shall extend eighteen (18) inches above the waterline, be white in color with a blue band clearly visible above the waterline, and be spherical or ovate in shape;
- c. The painter or line between a mooring buoy and any watercraft attached to it shall not exceed ten (10) feet in length; and
- d. Section 30.722(d) 1 through 4, Stats., are adopted by reference as though fully set forth herein and as amended from time to time

9. For replacement or repair for which a permit is required for legally nonconforming piers, wharfs or mooring facilities, the Town Board shall grant permits authorizing structures for the number of mooring facilities in existence as of May, 1981 or grant permits to the extent reasonably possible, or grant permits consistent with the other standards in this ordinance.

D. All permits granted shall state the location and size of the allowed mooring facility, as well as the number of permitted watercraft.

SECTION V. MAINTENANCE

All wharfs, piers, and mooring facilities extending beyond the natural shore shall be so maintained as to prevent any part or parts thereof from floating into and obstructing the waters or impeding free navigation of Lauderdale Lakes.

SECTION VI. PREEXISTING PIERS, WHARFS AND MOORING FACILITIES

Any wharf, pier or mooring facility legally existing in place as of the date of adoption of this ordinance may be repaired during one year up to 10% of the square feet of the surface of the

structure and, if permanent, up to 50% of the posts, so long as the size of the structure is not expanded

SECTION VII. PIERHEAD LINE REGULATED

A. Policy The Towns of LaGrange and Sugar Creek, pursuant to Chapter 30 of the Wisconsin Statutes, are empowered to regulate wharfs and piers and to establish a pierhead line. It is in the interest of the Towns of LaGrange and Sugar Creek to preserve and protect the property within the Town of LaGrange and Sugar Creek at the same time as preserving and protecting public rights in navigable waters and non-uniformity with respect to wharfs and piers in Lauderdale Lakes can be detrimental to these interests. It is in the interest of the Towns of LaGrange and Sugar Creek and the public to establish uniform requirements for the establishment of piers and wharfs on Lauderdale Lakes, Walworth County, Wisconsin. To that end, a pierhead line should be established.

B. Establishment of Pierhead Line. There is established, in the Towns of LaGrange and Sugar Creek on Lauderdale Lakes, a pierhead line. Such pierhead line is established at a distance of thirty-five (35) feet channelward from the ordinary high water mark of the shore. No pier or wharf shall be so placed or so constructed such that it extends a distance greater than the established pierhead line channelward from the ordinary high water mark of the shore from which such pier or wharf is constructed, unless the permit from the Town Board as required by Section IV.C. has been obtained. No pier or wharf may exist more than thirty-five (35) feet from the ordinary high water mark of the shore, except as hereinafter set forth. "Ordinary high water mark" is defined by NR 120.03(4), Wisconsin Administrative Code. Where the bank or shore, at any particular place, is of such a character that it is impossible or difficult to ascertain where the

point of ordinary high water mark is, recourse may be had to other places on the shore of the lake to determine whether a given stage of water is above or below the ordinary high water mark.

C. Prohibition and Exceptions. Any wharf or pier extending into navigable water beyond the limit set forth herein, constitutes an unlawful obstruction of navigable water unless a permit for such wharf or pier has been obtained by the Town Board and pursuant to Section 30.12(2) of the Wisconsin Statutes, or is otherwise accepted.

SECTION VIII. REMEDIES AND PENALTIES

A. All actions to recover forfeitures and penalty assessments under this ordinance are civil actions in the name of the Town of LaGrange or Town of Sugar Creek and shall be heard in Circuit Court for Walworth County.

B. Any person violating any provisions of this ordinance relating to piers and wharfs shall forfeit not less than \$10 nor more than \$200 for each day that a violation takes place or continues, plus costs and assessments. The cash deposit amount shall be \$100 plus costs and assessments per day for each day that a violation takes place or continues.

C. Any person violating any provision of this ordinance relating to moorings, mooring buoys and mooring anchors shall forfeit an amount not to exceed \$50 for each violation. Each day that a violation takes place or continues is a separate violation. The cash deposit shall be the amount established by the State of Wisconsin.

D. Any permit issued which is contrary to any law or ordinance, or rule or regulation of the Department of Natural Resources, or with which the applicant has not complied, shall be void and of no effect.

E. In the event a mooring facility for which a permit has been granted shall not be erected, constructed, placed, extended or maintained in accordance with the plans, specifications

details and drawings submitted, or not maintained in a safe condition, or in the event such mooring facility shall not be constructed within one (1) year from date permit was granted, or that it be used in a manner detrimental to the general public, or interfere with the rights of the neighboring riparian owners, then, in such event, the board may cancel and revoke the permit provided it shall first hold a meeting after fixing a time and place of hearing and shall cause a written notice thereof to be issued and delivered or mailed to the holder of such permit, and also to the owners of the neighboring abutting riparian lands, not less than five (5) days before the time fixed for hearing.

F. Every pier, wharf or mooring facility constructed, placed or extended, enlarged or replaced in violation of this ordinance is declared to be a public nuisance, and the construction thereof may be enjoined and the maintenance thereof may be abated by action at the suit of the town.

G. The Building Inspector(s) of the Towns of LaGrange and Sugar Creek are authorized to issue citations for violations of this ordinance.

SECTION IX. SEVERABILITY

The provisions of this ordinance shall be deemed severable and it is expressly declared that the Town Boards would have passed the other provisions of this ordinance irrespective as to whether or not one or more provisions may be declared invalid and any provision of this ordinance or the application thereof to any person or circumstance is held invalid, the remainder of the ordinance and the application of such provisions, other persons or circumstances shall not be affected thereby.

SECTION X. REPEAL OF CONFLICTING ORDINANCE

All ordinances and parts of ordinances in conflict with this ordinance heretofore enacted by the Towns of LaGrange and Sugar Creek, Walworth County, Wisconsin, are hereby repealed

XI. EFFECTIVE DATE AND CLERK'S DUTY

A. This ordinance shall take effect and be in force from and after its passage and publication as provided by law, and after review by the Department of Natural Resources.

B. The LaGrange Clerk is directed to file a signed copy of this ordinance with the Department of Natural Resources in Madison, Wisconsin.

Enacted by the Town Board of LaGrange this 9th day of APRIL 2001

Approved:

David Heilmeier
David Heilmeier, Town Chairman

Richard F. Callaway
Supervisor

Donald D. Sukala
Supervisor

Janet Schuman
Supervisor

Louise A. Olson
Supervisor

ATTEST:

Elizabeth A. Sukala
Elizabeth A. Sukala, Town Clerk, LaGrange

Enacted by the Town Board of Sugar Creek this 16th day of April 2000

Approved:
John E. White

Charles Papoke

Edward Reynolds

ATTEST:

Diane Boyd
Diane Boyd, Town Clerk, Sugar Creek

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ORDINANCE NO. _____

**AN ORDINANCE TO AMEND MINOR MISTAKES IN THE ORDINANCE
REGULATING PIERS AND MOORING FACILITIES AND THE ORDINANCE
REGULATING WATER TRAFFIC, BOATING AND WATER SPORTS**

WHEREAS, a careful reading of the Ordinance to Regulate Water Traffic, Boating and Water Sports Upon the Waters of Lauderdale Lakes and the Ordinance to Regulate Wharfs, Piers and Mooring Facilities and Establish a Pier head Line for Lauderdale Lakes revealed the need to make minor changes to the Ordinances,

NOW THEREFORE, the Town Boards of LaGrange and Sugar Creek enact this Ordinance.

SECTION 1. WATER TRAFFIC, BOATING AND WATER SPORTS ORDINANCE

A. SECTION IX. WATERSKIING. B. is amended to change the reference from Section VII. D. to Section VII. C. and shall read as follows:

Hours Limited. No person shall engage in water-skiing, aquaplaning or similar activity between the hours of sunset and sunrise. This shall not supercede the 15 MPH speed limit on weekends and holidays in Section VII. C.

B. SECTION IX. WATERSKIING. C. is amended to change the phrase "outside the traffic lane" to be "within the shore zone" and shall read as follows:

Area Limited. No person shall engage in water-skiing, aquaplaning or similar activity within the shore zone described in Section VII of this ordinance.

C. SECTION XII. ENFORCEMENT, POWERS, PENALTIES AND DEPOSITS. D. (3) m. through t. are amended to delete subsection m. dealing with speed in the traffic lane; change the reference in subsection n. from D. to C.; change the language in subsection q. to Speed in Middle Lake Between Designated LL Numbers, Sec. VII. B.; change the reference in subsection r. from B. to A.; and reletter all subsections from m. through t. and shall read as follows:

m. Speed Excess of 15 MPH, Sec. VII.C.	\$40	\$130	\$50
n. Swimming from Unanchored Boat, Sec.VIII.A	\$40	\$130	\$50
o. Swimming in/at Restricted Areas or Times, Sec.VIIIB.and C	\$40	\$130	\$50
p. Speed in Middle Lake Between Designated LL #'s, Sec.VII. B.	\$50	\$140	\$60

- q. Speed in Shore Zone, Sec. VII.A. \$50 \$140 \$60
- r. Operation without Consent, Sec. VI. E. \$50 \$500 \$200
- s. The above forfeitures and bail amounts shall be double for a second or third subsequent offense within one (1) year.

SECTION 2. WHARFS, PIERS AND MOORING FACILITIES ORDINANCE.

A. SECTION VII. C. is amended to change the words "obtained by the Town Board" to "obtained from the Town Board" and "accepted" to "excepted," and shall read as follows:

Prohibitions and Exceptions. Any wharf or pier extending into navigable water beyond the limit set forth herein, constitutes an unlawful obstruction of navigable water unless a permit for such wharf or pier has been obtained from the Town Board and pursuant to Section 30.12(2) of the Wisconsin Statutes, or is otherwise excepted.

B. SECTION VII's heading is amended to change the word from "REQUIRED" to "REGULATED," and shall read as follows:

SECTION VIII. RAFTS REGULATED

SECTION 3. EFFECTIVE DATE AND CLERK'S DUTY

- A. This ordinance shall take effect and be in force from and after its passage and publication as provided by law, and after review by the Department of Natural Resources.
- B. The LaGrange Clerk is directed to file a signed copy of this ordinance with the Department of Natural Resources in Madison Wisconsin.

Enacted by the Town Board of LaGrange this ___ day of _____, 2001.

Approved:

Town Chairman

Supervisor

Supervisor

Supervisor

ATTEST:

Supervisor

Elizabeth Sukala, LaGrange Town Clerk

Enacted by the Town Board of Sugar Creek this ____ day of _____, 2001.

Approved:

Town Chairman

Supervisor

Supervisor

ATTEST:

Diane Boyd, Sugar Creek Town Clerk

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Appendix F

AN AQUATIC PLANT MANAGEMENT PLAN FOR THE LAUDERDALE LAKES, WALWORTH COUNTY, WISCONSIN

INTRODUCTION

This aquatic plant management plan for the Lauderdale Lakes is an integral part of the program of lake management being conducted by the Lauderdale Lakes Lake Management District. A summary of the recommended aquatic plant management measures is provided, followed by a detailed outline of the District's recommended equipment needs, management program, and an estimate of costs likely to be incurred in the purchase of replacement aquatic plant harvesting and transport equipment. The goal of the aquatic plant management program on the Lauderdale Lakes is to accommodate recreational uses of the Lakes to the extent practicable, without damage to the underlying structure and functioning of the Lake ecosystem.

Overview of the Aquatic Plant Management Program

The primary management measure to be utilized in the management of aquatic plant communities within the Lauderdale Lakes is recommended to be mechanical harvesting.¹ The Lake has been divided into high-, moderate-, and low-priority harvesting areas. High-priority harvesting areas are areas that are used for boating access. Moderate-priority harvesting areas are the areas used for general recreation. Low-priority harvesting areas are areas that are used primarily for passive recreation and/or where plant growth is observed to be sparse. In addition, some areas have been designated as "no control" areas. These areas include important areas for fish spawning which should not be subjected to aquatic plant control measures before mid-June of each year, and areas of high quality native aquatic and wetland plant communities that should be protected from disturbance to the extent possible. Many of the latter areas are coincident with Wisconsin Department of Natural Resources-delineated sensitive areas within the Lauderdale Lakes. A majority of the Green Lakes and Middle Lake basins are comprised of deep water habitat requiring no aquatic plant management intervention, being greater than five-feet in depth. Milfoil control areas have been identified where the growths of Eurasian water milfoil are especially thick.²

Harvesting operations should continue to be timed to minimize any impact on the fish spawning season. For this reason, harvesting should begin in mid- to late-June of each year. Also, harvesting should not take place in

¹The inventory data upon which this aquatic plant management plan is based are set forth in SEWRPC Memorandum Report No. 143, An Aquatic Plant Management Plan for the Lauderdale Lakes, Walworth County, Wisconsin, May 2001.

²In the case of the embayment forming the eastern extension of Mill Lake, locally known as Sterlingworth Bay, the extent of Eurasian water milfoil growth, and its potential to serve as a reservoir of plant material likely to infest other portions of the Lakes, would suggest that consideration be given to an early spring herbicide treatment to control Eurasian water milfoil in this specific location. Notwithstanding, cutting to a depth of approximately two feet to remove the surface canopy of the plants in this bay is recommended.

shallow waters, generally three feet or less in depth, to avoid disturbance to fish habitat and beds of native aquatic plants. In addition, existing controls applied within the Wisconsin Department of Natural Resources-delineated sensitive areas may limit harvesting and restrict chemical applications in these five areas. Special care should be taken to avoid disturbing major spawning and habitat areas of fishes in the Lauderdale Lakes during the spring spawning season, May 1 to June 30, annually.

The primary objective of the management program is to accommodate the multiple recreational uses of the Lauderdale Lakes, and to enhance the public perception of the Lakes without inflicting irreparable damage on the structure and functioning of the lake ecosystem. To accomplish this objective, only specified control measures should be applied in each of the various lake zones identified on Map F-1. The recommended sequence of the harvester operations on Nagawicka Lake is portrayed in Figure F-1. The recommended aquatic plant management treatments that should be applied in each of the three priority areas are shown in Tables F-1 and F-2.

The operators of the harvester should be provided with laminated copies of the approved harvesting plan showing the limits of harvesting operations, as shown on Map F-1. A copy of this map is to be kept on the harvester at all times.

Depth of Harvesting and Treatment of Fragments

The Aquarius Systems H-420 Aquatic Plant Harvester, or equivalent model, has a maximum cutting depth of about five feet. While this exceeds the water depth of about one-third of the Lauderdale Lakes, it is not the intention of the District to clear the Lakes of aquatic plants given the heavy angling use, its morphology (which is not conducive to extensive motorized boat traffic), and the program goals. Sufficient plant life will be retained in the Lake to minimize resuspension of lake bottom sediments, maintain desirable plant communities, and provide adequate fish habitat to support a productive and varied fishery within the Lakes. The harvester will collect all plant cuttings and fragments on site. The District and/or the riparian householders should collect fragments accumulating on the shore. Fragments can be used as garden mulch.

For the control of Eurasian water milfoil throughout the Lakes, surface harvesting is recommended, as illustrated in Figure F-2. Cutting to a depth of approximately two feet will remove the surface canopy of nonnative aquatic plants, such as the Eurasian water milfoil, thereby removing the plant's competitive advantage over the lower-growing native aquatic plants that occur within the Lakes. By not disturbing the low-growing species which generally grow within one to two feet of the lake bottom and in relatively low densities, leaving the root stocks and stems of all cut plants in place, the resuspension of sediments in the Lauderdale Lakes will be minimized, and some degree of cover will continue to be provided for panfish populations which support the bass population in the Lakes. Further, cutting should not be broad-based, but focused on boating channels and selected navigation areas.

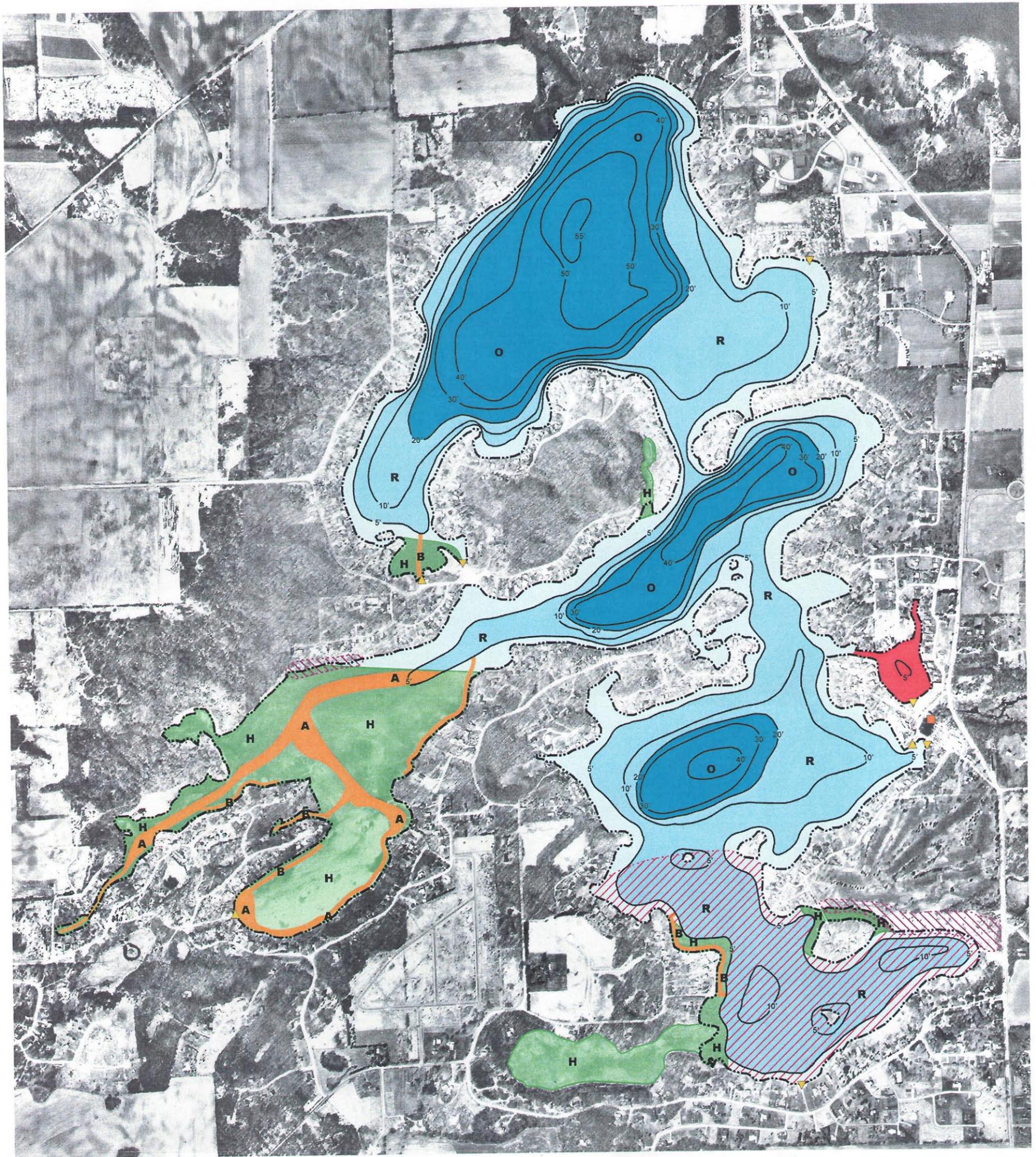
Buoyage

Temporary marker buoys may be used to direct harvesting operations on the Lakes by marking the areas to be cut. However, the shape of the Lauderdale Lakes system generally precludes the need for such buoys, except as they are required for the control of boating traffic. The harvester operators will be provided with a laminated copy of the updated harvesting plan and made familiar with the plan and local landmarks to the degree necessary to carry out the plan without the use of buoys. The Lauderdale Lakes Lake Management District Commissioners regularly supervise harvesting operations.

Harvested Plant Material Transfer and Disposal Sites

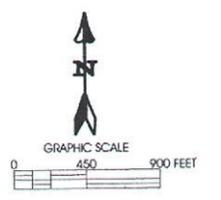
Off-loading of harvested plant material currently takes place at the public recreational boating access sites. Plant material is removed from the harvester, where it is transferred to a dump truck using a conveyor, and transported to disposal sites identified by the District. Plant material should be collected and disposed of daily to avoid leaching of nutrients back into the Lakes and to minimize the visual degradation of the area near the boat-launching sites. The operators will strictly police the off-loading site to ensure minimal disruption of boaters and of the people using the riparian areas of the Lakes. The harvested plant material will be landspread on area farms.

RECOMMENDED AQUATIC PLANT MANAGEMENT PLAN FOR THE LAUDERDALE LAKES



- 20'— WATER DEPTH CONTOUR IN FEET
- WATER LEVEL CONTROL STRUCTURE
- ▲ PUBLIC-ACCESS SITE AND HARVESTER OFF-LOAD AREA
- ▼ PRIVATE-ACCESS SITE
- A NAVIGATIONAL ACCESS LANES, 50 FEET WIDE TO 5 FOOT DEPTH CONTOUR
HARVESTING: HIGH PRIORITY
CHEMICALS: NONE
- B SHARED BOATING ACCESS, 15 FEET WIDE TO 5 FOOT DEPTH CONTOUR OR JUNCTION WITH NAVIGATIONAL ACCESS LANE
HARVESTING: MODERATE PRIORITY
CHEMICALS: NONE
- H AREA OF AQUATIC VEGETATION OFFERING CRITICAL OR UNIQUE FISH AND WILDLIFE HABITAT OR WATER QUALITY OR EROSION CONTROL BENEFITS UNDER CHAPTER NR 107 OF THE WISCONSIN ADMINISTRATIVE CODE
HARVESTING: ACCESS CHANNELS ONLY
CHEMICALS: NONE

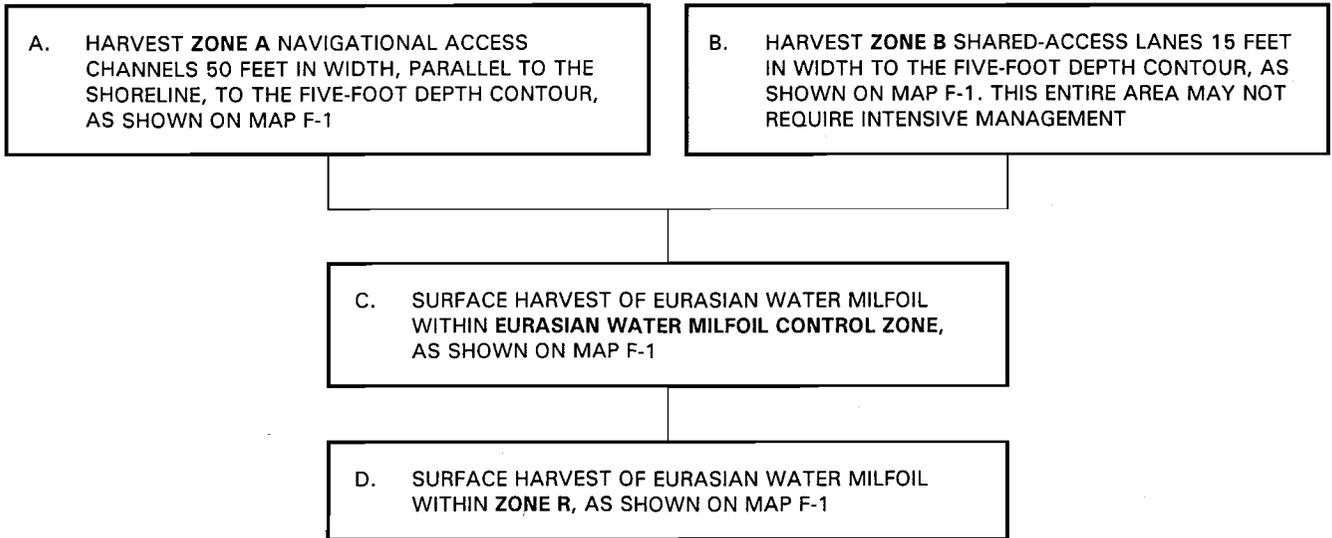
- LITTORAL ZONE MAINTAIN SHORELINE PROTECTION STRUCTURES AS NECESSARY: INSTALL VEGETATION BUFFERS
HARVESTING: MANUAL AROUND PIERS AND DOCKS
CHEMICALS: LIMITED
- R RECREATIONAL AREA
HARVESTING: LOW PRIORITY, SURFACE CUT FOR EURASIAN WATER MILFOIL CONTROL
CHEMICALS: NONE
- O OPEN WATER AREA
HARVESTING: NONE
CHEMICALS: NONE
- EURASIAN WATER MILFOIL CONTROL AREA
HARVESTING: MODERATE PRIORITY
CHEMICALS: LIMITED
- ▨ EURASIAN WATER MILFOIL MANAGEMENT AREA
HARVESTING: MODERATE PRIORITY
CHEMICALS: NONE
- ▨ PURPLE LOOSESTRIPE MANAGEMENT AREA
HARVESTING: NONE
CHEMICALS: LIMITED



Source: SEWRPC.

Figure F-1

HARVESTING SEQUENCE FOR THE LAUDERDALE LAKES^a



NOTE: Sequence A and B could be done concurrently in one area of the Lake as a time-saving measure.

^aNo harvesting would be conducted in Zone H or within 100 feet of the islands.

Source: SEWRPC.

Chemical Treatment

Chemical herbicides generally should be limited to controlling nuisance growths of exotic species in shallow water around docks and piers. As noted above, however, the Lauderdale Lakes Lake Management District may wish to consider the use of aquatic herbicides to control the extensive growths of Eurasian water milfoil in the embayment adjacent to Mill Lake, locally known as Sterlingworth Bay. This bay has had a history of aquatic chemical treatments, including extensive treatments with sodium arsenite prior to this herbicide being discontinued during the 1960s when it was determined that the use of this chemical led to accumulations of arsenic in lake sediments. As such accumulations have been measured in the sediments of Sterlingworth Bay, it is recommended that only registered herbicides that are selective in their control, such as 2,4-D, be used for the control of Eurasian water milfoil in this area. Limited use of algacides, such as Cutrine Plus, is recommended for the treatment of nuisance growths of filamentous or planktonic algae in the Lake. Widespread use of aquatic chemicals to control both aquatic plant growth and algal growth within the Lakes is not recommended.

If considered necessary, chemical applications should be made in accordance with current Wisconsin Department of Natural Resources rules, under the authority of a State permit, by a licensed applicator working under the supervision of State staff. Records accurately delineating treated areas and the type and amount of herbicide used in each area, should be carefully recorded and used as a reference in applying for permits in the following year. A recommended checklist is provided as Figure F-3.

Notwithstanding, the Lauderdale Lakes Management District and the Wisconsin Department of Natural Resources should work together to develop a reasonable herbicide usage policy to control the expansion of purple loosestrife in and around the Lake. It is recommended that chemical applications be made in the mid-summer to maximize

Table F-1

RECOMMENDED AQUATIC PLANT MANAGEMENT PLAN ELEMENTS FOR THE LAUDERDALE LAKES

Plan Element	Subelement	Location	Management Measures	Initial Estimated Cost	Management Responsibility
Land Use Management	Land use zoning	Entire Watershed	Observe guidelines set forth in the regional and local land use plans, and Walworth County land and water resource management plan; maintain historic lakefront residential dwelling densities to the extent practicable; protect environmentally sensitive lands as recommended in the regional natural areas and critical species habitat protection and management plan	-- ^a	Walworth County, Town of LaGrange, Town of Sugar Creek
	Ordinance enforcement	Entire Watershed	Enforce construction site erosion control, stormwater management, development control, and onsite sewage disposal system inspection and maintenance ordinances and programs	-- ^a	Walworth County, The Lauderdale Lakes Lake Management District
Recreational Use Management	Recreational use zoning	Entire Lake—Zone R	Restrict recreational boating to prevent the spread of Eurasian water milfoil throughout the Lakes	\$ 500	The Lauderdale Lakes Lake Management District
	Nonnative aquatic plant management program	Eurasian water milfoil control zone, purple loosestrife control areas	Restrict recreational boating to prevent the spread of Eurasian water milfoil throughout the Lakes; limited use of herbicides in spring, manual removal during summer and fall recommended	--	The Lauderdale Lakes Lake Management District
	Public informational programming	Direct drainage area tributary to The Lauderdale Lakes	Continue public awareness and information programming	--	Walworth County and The Lauderdale Lakes Lake Management District
Aquatic Plant Management	Manual harvesting	Areas of nuisance growth—Zone B	Harvest nuisance plants, including Eurasian water milfoil and purple loosestrife, as required around docks and piers; collect plant fragments arising from boating and harvesting activities	-- ^b	The Lauderdale Lakes Lake Management District
	Mechanical harvesting	Areas of nuisance growth—Zones A and B	Harvest nuisance plants, including Eurasian water milfoil to maintain public recreational boating access and promote public safety and convenience	\$100,000 capital, plus \$20,000 operating ^c	The Lauderdale Lakes Lake Management District
	Chemical control of nonnative plants	Eurasian water milfoil control zone	Restrict recreational boating to prevent the spread of Eurasian water milfoil throughout the Lakes; limited use of herbicides in spring, manual removal during summer and fall recommended	\$5,000	The Lauderdale Lakes Lake Management District
	Public informational programming	Direct drainage area tributary to The Lauderdale Lakes	Continue public awareness and information programming; continue monitoring of aquatic plant communities	\$1,500 ^{c,d}	Walworth County and The Lauderdale Lakes Lake Management District
Institutional Development	Refine boundaries of the Lake Management District	Riparian area including lands within the direct drainage area	Consider future expansion of the District to include limited additional areas within the drainage basin directly tributary to the Lakes	\$ 500	Walworth County and The Lauderdale Lakes Lake Management District

^aRecommendation set forth in the regional land use, water quality management, and natural areas and critical species habitat protection and management plans. No specific cost allocation for the Lauderdale Lakes Lake Management District.

^bMeasures recommended generally involve low or no cost and would be borne by private property owners. Cost is included under public informational and educational component.

^cPartial funding available through the Wisconsin Department of Natural Resources grant programs.

^dPeriodic additional surveys are recommended at five- to 10-year intervals.

Source: SEWRPC.

Table F-2

RECOMMENDED AQUATIC PLANT MANAGEMENT TREATMENTS FOR THE LAUDERDALE LAKES

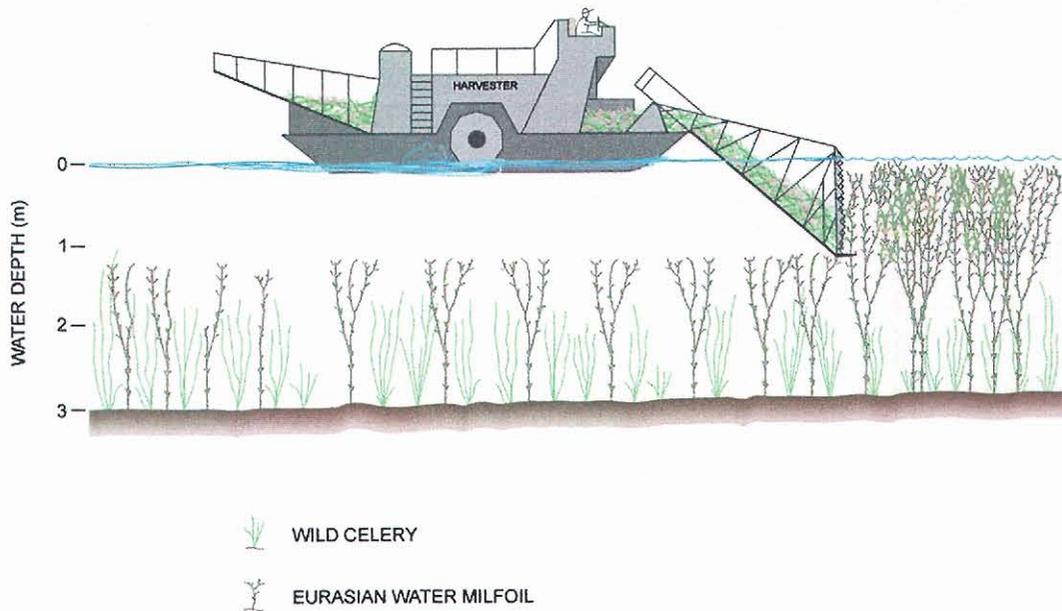
Zone and Priority	Recommended Aquatic Plant Management Treatment
<p>Zone A (Navigational Access) High-Priority Harvesting</p>	<p>Harvesting limited to maintaining 50-foot-wide navigational channels from the public recreational boating access sites, to allow boat access to the open water areas of the Lauderdale Lakes</p> <p>Limited late season harvesting, late August to early September, may be necessary to maintain adequate open water areas to the central portions of the Lakes</p>
<p>Zone B (Boating) Moderate-Priority Harvesting</p>	<p>Harvesting limited to maintaining 15-foot-wide access channels connecting private piers and docks, and private recreational boating access sites, to the 50-foot-wide recreational boating navigational access channels and/or open water areas of the Lakes</p> <p>Limited late season harvesting, late August to early September, may be necessary to maintain adequate open water areas to the central portions of the Lakes</p>
<p>Zone H (Habitat) Limited Harvesting</p>	<p>It is recommended that selected areas of the Lake, designated as WDNR sensitive areas, be preserved as high-quality habitat area, subject to review by the WDNR as recommended in the lake management plan</p> <p>This zone and adjacent lands should be managed for fish habitat</p> <p>Limited harvesting and no in-lake chemical application should be permitted, except in special instances where selective herbicide application may be allowed for the control of nuisance species</p> <p>Debris and litter cleanup would be needed in some adjacent areas; the immediate shoreline should be preserved in natural, open use to the extent possible</p>
<p>Zone O (Open Water) No Harvesting</p>	<p>The entire area does not require plant management as water depths exceed the maximum depth of colonization of aquatic plants</p>
<p>Zone R (Recreational Access) High-Priority Harvesting</p>	<p>The entire area may not require intensive plant management^a</p> <p>Nuisance aquatic macrophyte growth within 150 feet of shoreline should be harvested to provide maximum opportunities for boating, fishing, and swimming</p> <p>Areas between piers should not be harvested due to potential liability and maneuverability problems. Residents should be encouraged to manually harvest aquatic plants in these areas</p> <p>Chemical use, if required, should be restricted to pier and dock areas and should not extend more than 100 feet from shore, subject to permit requirements, to control of nuisance species</p>

^aExcludes areas greater than 15 feet which require no harvesting.

Source: SEWRPC.

Figure F-2

PLANT CANOPY REMOVAL WITH AN AQUATIC PLANT HARVESTER



NOTE: Selective cutting or seasonal harvesting can be done by aquatic plant harvesters. Removing the canopy of Eurasian water milfoil may allow native species to reemerge.

Source: Wisconsin Department of Natural Resources and SEWRPC.

their effectiveness and to act as a preventative measure to target purple loosestrife prior to the plant flowering in mid- to late-summer.³

Precautions to Protect Wildlife, Fish, and Ecologically Valuable Areas

Harvester operators and chemical applicators will be provided with a laminated copy of the approved harvesting plan, set forth on Map F-1. It is proposed that aquatic plant management activities be restricted in certain ecologically valuable areas of the Lakes. The western shorelands and nearshore areas of Middle and Mill Lakes, which have more of a wetland character, are ecologically valuable areas that should be excluded from aquatic plant management, except insofar as necessary to maintain the existing boating access channel along the southern bank and northwestern shore, respectively. Areas considered being important for fish spawning, areas of three feet or less in depth, should also be excluded from aquatic plant management operations.

Harvesting Schedule

The harvesting season is recommended to begin in mid- to late-June to accommodate the fish spawning activities and should end no later than mid-September of each year. Harvesting should average between 30 and 35 hours per week over a five-day week, depending on weather conditions and plant growth, to minimize recreational use conflicts. In addition, harvesting will be confined to daylight hours to minimize public disturbances resulting from these operations.

³Wisconsin Department of Natural Resources Publication No. PUBL-PM-005 90, Purple Loosestrife (*Lythrum salicaria*, *L. virgatum*, and their hybrids): An Attractive but Deadly Threat to Wisconsin's Wetlands and Waterways, 1990.

Figure F-3

DISTRICT CHECKLIST FOR HERBICIDE APPLICATION

<input type="checkbox"/>	Nuisance report completed defining areas of potential treatment
<input type="checkbox"/>	Permit filed with the Wisconsin Department of Natural Resources
<input type="checkbox"/>	Certified applicator hired ^a
<input type="checkbox"/>	Required public notice in the newspaper
<input type="checkbox"/>	Public informational meeting (required if five or more parties request a meeting)
<input type="checkbox"/>	Posting of areas to be treated in accordance with regulations (discussed previously in report)
<input type="checkbox"/>	Weather conditions cooperating <ul style="list-style-type: none">— Wind direction and velocity— Temperature

^aA licensed applicator will determine the amount of herbicide to be used, based upon discussions with appropriate staff from the Wisconsin Department of Natural Resources, and will keep records of the amount applied.

Source: SEWRPC.

Equipment Needs and Total Costs

Manufacturer: Aquarius Systems, D&D Products, Inc., North Prairie, Wisconsin, or other manufacturer with comparable equipment.

Existing Equipment Requiring Replacement

Harvester:	Aquarius Systems model HM-420 or equivalent.	
Costs:	HM-420 Aquatic Plant Harvester or equivalent	\$ 65,000
	TR 12 trailer and shore conveyor or equivalent	20,000
Shore Barge:		
Costs:	Shore barge with conveyor	<u>\$ 15,000</u>
Total Cost		<u>\$100,000</u>

Maintenance Schedule, Storage, and Related Costs

Routine maintenance will be performed by the Lauderdale Lakes Lake Management District staff in accordance with the manufacturer's recommended maintenance schedule. Maintenance costs will be borne by the District. Winter storage of the harvesting equipment will be the responsibility of the Lauderdale Lakes Lake Management District. The harvesting equipment will be stored by the District in storage facilities provided for this purpose.

Insurance Coverage

Insurance coverage on the harvesting equipment will be incorporated into the policy held by the Lauderdale Lakes Lake Management District on all capital equipment. Liability insurance for the operation of the harvesting equipment will also be borne by the District. The relevant certificates of insurance will be held by the Lauderdale Lakes Lake Management District.

Operators, Training, and Supervision

The harvesting equipment will be owned and operated by the Lauderdale Lakes Lake Management District, who will be responsible for day-to-day operations of the equipment. The District will provide operator training as required. District staff have extensive experience in the operation of this type of machinery. Initial training will be provided by the manufacturers on delivery of the machinery.

Day-to-day supervision will be by the District staff.

Evaluation and Monitoring

Daily Record-Keeping Relating to the Harvesting Operation

The operators of the harvesting equipment will record daily harvesting activities in a harvesting log. This includes daily maintenance and service records showing engine hours, fuel consumed, and oil used. An annual summary of the harvesting program will be submitted to the Lauderdale Lakes Lake Management District electors at the annual meeting of the District, and made available to the electors of the District at that time. Interim reports should be provided regularly to the Lauderdale Lakes Lake Management District Board of Commissioners, or designated committee thereof. The Board of Commissioners, or designated committee, should review such interim reports and modify the harvesting program as necessary in accordance with the harvesting priorities set forth in this management plan.

It is the intention of the Lauderdale Lakes Management District to undertake a periodic, formal review of the harvesting program as set forth in the adopted aquatic plant management plan for the Lauderdale Lakes, a copy of which has been lodged with the Wisconsin Department of Natural Resources Southeast Region office. Further, it is the intention of the District to publish periodic refinements of the aquatic plant management plan as recommended herein. It is recommended that a further inventory be prepared in three to five years to confirm that the changes in the plant community are for reasons other than annual variability.

Recreational Use Management

Recommended actions for the management of ecologically valuable areas and aquatic plants should be effected by the Town of LaGrange through its existing boating ordinance. It is recommended that the Town reduce motorized boat traffic within the Eurasian water milfoil control areas shown on Map F-1 to essential traffic only and define watercraft transit speeds and lanes consistent with the milfoil control areas and established patterns of recreational boating usage on the Lakes. Such regulation may require buoyage depending on the sufficiency of the signage and notices provided to lake users and the level of compliance achieved. Copies of such an ordinance must be placed at the public access site as set forth in Section 30.77(4) of the *Wisconsin Statutes*.

Public Information

It is the policy of the Lauderdale Lakes Lake Management District to maintain an active dialogue with the community. This is done through the medium of the public press and through various city committees, public meetings and other scheduled hearings. In addition, the Lauderdale Lakes Lake Management District holds regular public meetings. It is recommended that an educational and informational program continue to be conducted by the District. Such a program should discourage human disturbances in ecologically valuable areas, except as may be necessary to provide riparian residents with a reasonable level of access to the open water areas of the Lakes. Lake residents and visitors should be made aware of the invasive nature of species, such as purple loosestrife and Eurasian water milfoil, and be encouraged to participate in citizen-based control programs coordinated by the Wisconsin Department of Natural Resources and University of Wisconsin-Extension. Where necessary, personal contacts with homeowners should be made.